

Encyclopedia of
Supercars



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WORLD TECHNOLOGIES

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Chapter- 1

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".



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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.



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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".



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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.

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Chapter- 2

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.







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.



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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.





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

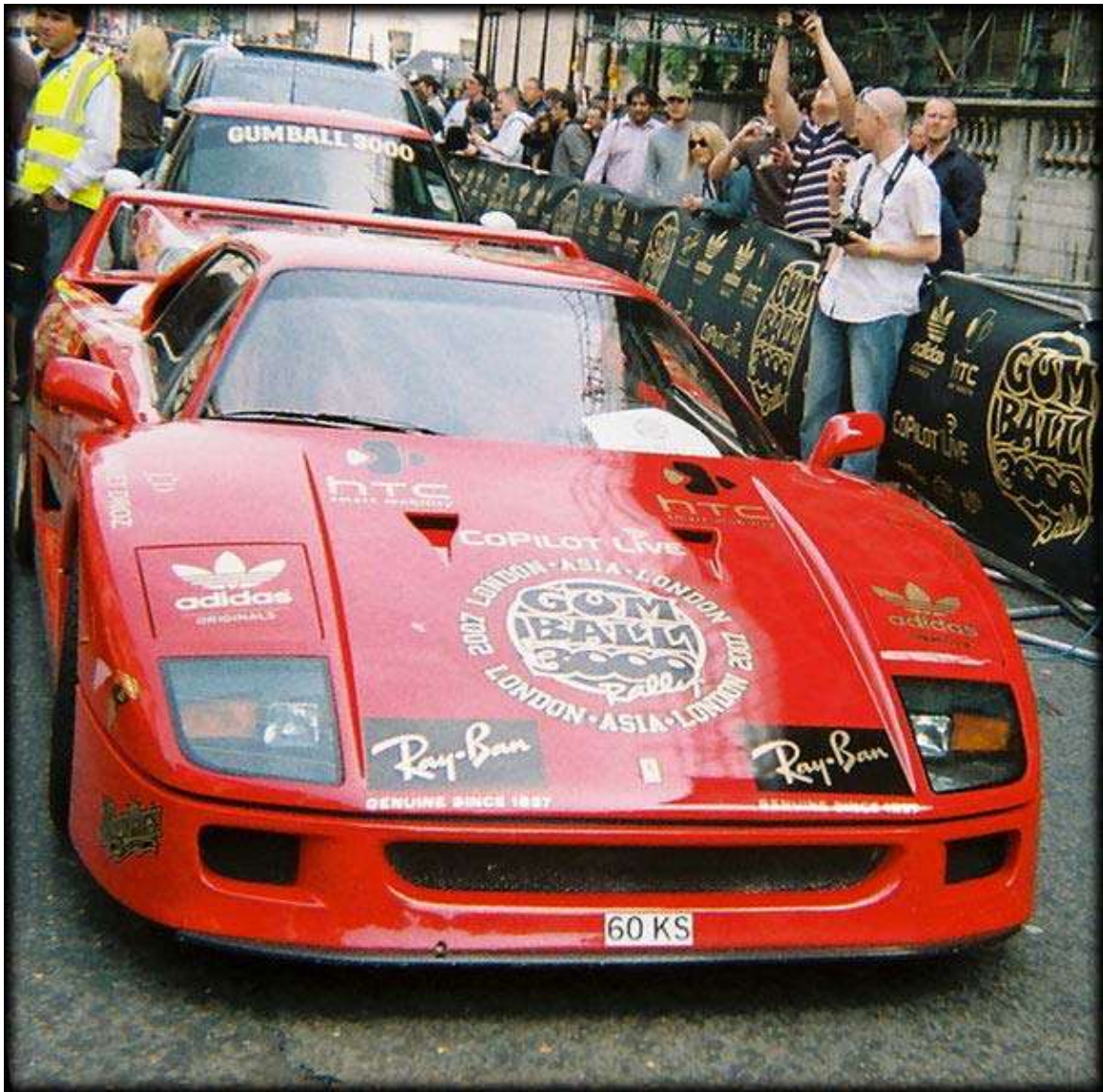
windows and no carpets, sound system, or door handles were installed although the cars did have air conditioning. The first 50 cars produced had sliding Lexan windows, although newer windows that could be rolled down were installed into later cars.

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.







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.





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- 3

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.



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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		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	5,709 cc (348 cu in) V12			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)				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)	Rear mid-engine, rear-wheel drive	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 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)	47/53% front/rear
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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, floor mats, and the special car cover included with this rare model.



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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.



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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.





V V I



V V I



V V I



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

Specification level	Production	Engine	Maximum power	Maximum torque	Drive Layout	Brakes	Curb weight	Weight distribution
SV	1998–1999, ~100 built				Rear mid-engine, rear-wheel drive	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	1,530 kg (3,400 lb)	41/59% front/rear
VT	1998–2000	5,709 cc (348 cu in) V12	537 PS (395 kW; 530 hp)	605 N·m (446 lb·ft)	Rear mid-engine, four-wheel drive, 45% LSD rear & 25% LSD front (SV rear with 2.53:1 ratio used on Millennium Roadster)	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	1,625 kg (3,580 lb)	43/57% front/rear
VT Roadster	1998–2000, 100 built + 30 Millennium Roadster					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		
GT	1999, 80 sold, 83 built	5,992 cc (366 cu in) V12	583 PS (429 kW; 575 hp)	630 N·m (465 lb·ft)	Rear mid-engine, rear-wheel drive	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	1,460 kg (3,200 lb)	40/60% front/rear
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.



WORLD





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.



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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 exchangers 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- 4

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- 5

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.





W V I



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."



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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.



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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 detuned 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.

Chapter- 6

Koenigsegg CCR

Koenigsegg CCR



Manufacturer	Koenigsegg
Production	2004–2006
Predecessor	Koenigsegg CC8S
Successor	Koenigsegg CCX
Class	Super car
Body style(s)	2-door roadster
Layout	Rear mid-engine, rear-wheel drive
Engine(s)	4.7 L Ford V8
Transmission(s)	6-speed manual
Wheelbase	2,659 mm (104.7 in)
Length	4,191 mm (165.0 in)
Width	1,989 mm (78.3 in)
Height	1,069 mm (42.1 in)
Curb weight	1,180 kg (2,601 lb)

Designer Sven-Harry Åkesson
David Craaford

The **Koenigsegg CCR** is an automobile made by Koenigsegg. Designed and manufactured in Ängelholm, Sweden, it debuted at the 2004 Geneva Auto Show. It briefly held the world speed record for a production car. The CCR is currently the fourth fastest production car in the world, behind the Bugatti Veyron, Koenigsegg CCX and the SSC Ultimate Aero TT.

Overview

The CCR is based on the Koenigsegg CC8S but is more powerful and has better performance. The more powerful engine of the prototype was made possible by the use of a Lysholm twin-screw supercharger and a titanium exhaust system. This takes the power output to a maximum of 896 hp (668 kW; 908 PS) at 6,900 rpm. Torque is also distributed evenly and peaks at 920 N·m (680 ft·lbf) at 5,700 rpm. This car was the first production vehicle to sport a horsepower gauge - it has since been joined by the Bugatti Veyron.

However, the Lysholm twin-screw supercharger is not used in production cars. According to the official Koenigsegg book (ISBN 91-975178-3-6), it was lumbering and difficult to install in the mid-engined package. The production CCR is equipped with dual centrifugal compressors which are manufactured by Rotrex instead. It provides the same power, but lowers the peak torque point from 5,700 to 5,400 rpm.

Externally the CCR looks similar to the CC8S, but features a new side air-intake design, a tweaked headlight arrangement, a revised rear-end, larger brakes, more power and new front splitters for optimized downforce. Like the CC8S, the CCR is a two-seat coupé with a mid-engine, featuring large, high-tech dihedral synchro-helix actuation doors that open by rotating up and forward.

To honour the Swedish Fighter Jet Squadron No. 1, (Johan röd) which had occupied the current facility of Koenigsegg, the CCR is adorned with a symbol of a ghost, the symbol of the squadron.

On a History Channel special on the CCR (Aug, 2006), Koenigsegg states that the base price for the CCR is approximately US\$590,000.

Speed testing

The manufacturers claimed in 2005 when the car was released that the CCR is the fastest road car in the world, with a theoretical top speed of more than 394.2 km/h (244.9 mph) however, this has since been beaten by the Bugatti Veyron Super Sport in June 2010 with a top speed of 431 km/h (268 mph).

On February 28, 2005, at 12.08 local time, the Koenigsegg CCR broke the production road car speed record, achieving a new official top speed of 387.37 km/h (240.70 mph) at Italy's Nardo Prototipo proving ground. A team of five Koenigsegg engineers and mechanics together with founder Christian von Koenigsegg ran a technically standard CCR, driven by famous supercar test driver and veteran record breaker Loris Bionchi.

The CCR took the record from the McLaren F1, which held the record for over 12 years of 386.7 km/h (240 mph), set on the 9 km straight track at the VW Ehra facility in Wolfsburg, Germany. The CCR ran on the Nardo/Prototipo track, a circular track with a circumference of 12.5 km. This means that the car is driven in a constant turning motion, which makes the exercise and speed even more impressive. The steering wheel at this speed is kept at around 30 degrees of constant angle, a fairly sharp angle for the speed. On the same track, the F1 managed an unofficial record of 372 km/h (231 mph).

In May, 2005 not long after the CCR claimed the record, a prototype of the long awaited Bugatti Veyron took the crown with a top speed over 400.6 km/h (248.9 mph). The final production model of the Veyron reached a speed of 407.5 km/h (253.2 mph) in the hands of Car and Driver in their November 2005 issue. However, the Bugatti set the record on the aforementioned official VW-test track in Ehra-Lessien with a 9 km unbroken straight, as opposed to the Nardo-track which is circular.

Specifications

Performance

- Acceleration: 0–100 km/h (0–62 mph) 3.2 seconds
- Top speed: 245 mph (394 km/h) (theoretical)
- Standing quarter mile: 9.9 seconds, end speed 235 km/h (146 mph)
- Braking distance: 31 m (100–0 km/h)

Body

Two-door, two-seater with removable hardtop stowable under the bonnet. The body is made of carbon fibre/kevlar as well as lightweight hard-foam sandwich reinforcements for gas.

Dimensions

- Ground clearance: 100 mm (3.9 in)
- Luggage compartment: 120 litres (4.24 cubic feet)

Aerodynamics

- C_d 0.297
- Frontal area 1.825 m²

- Underbody venturis and diffusers

Suspension

- Double wishbone, front and rear.
- Adjustable shock absorbers.
- Electronically adjustable ride height.

Brakes

- Front and rear ventilated disc brakes, 362 mm x 32 mm (14.25" x 1.2").
- 6 piston calipers.

Wheels

- Koenigsegg magnesium alloy wheels with center locking.
- Front: 19" x 9.5"
- Rear: 20" x 12.5"

Tires

- Michelin Pilot Sport 2 tires. Unidirectional with asymmetric tread pattern.
- Front: 255/35-19"
- Rear: 335/30-20"

Steering

- Rack and pinion power steering.
- 2.7 turns lock to lock.
- Turning circle: 11 metres.

Engine specifications

- Type: Koenigsegg aluminum V8, 4 valves per cylinder, double overhead camshafts. Carbon Fibre cam covers. Based on the Ford Modular V8.
- Engine displacement: 4.7 litres.
- Compression ratio: 8.6:1
- Weight: 215 kg (474 lb)
- Lubrication system: Dry sump with under-piston oil squirters; oil cooler.
- Motor oil: SAE 10W60 synthetic.
- Oil tank capacity: 12 litres (10.6 imperial quarts)
- Induction system: Sequential multipoint fuel injection. Dual Rotrex centrifugal intercooled superchargers with maximum 1.4 bar (140 kPa) boost pressure.
- Fuel: 98 RON unleaded.
- Ignition system: Electronic Coil on plug (Direct Ignition - DI).
- Engine redline: 7,600 rpm.

Transmission

- Purpose-built Cima 6-speed transmission.
 - Incorporates internal oil pump with cooler.
 - Torsen limited slip differential.
- Electronically-operated, sintered organic dual-plate clutch of 215 mm (8½ inch) diameter

WWT

Chapter- 7

Bugatti Veyron

Bugatti Veyron



Manufacturer	Bugatti Automobiles and Volkswagen Group (parent company)
Production	2005–present
Assembly	Molsheim, Alsace, France
Predecessor	Bugatti EB110
Body style(s)	Standard: 2-door coupé Variant: targa top
Layout	Longitudinal mid-engine, permanent all-wheel drive
Engine(s)	Standard: 8.0 L W16 quad-turbocharged 1,001 metric horsepower (736 kW; 987 bhp) Super Sport: 1,200 metric horsepower (883 kW; 1,184 bhp)
Transmission(s)	7-speed DSG sequential
Wheelbase	2,710 mm (106.7 in)

Length	4,462 mm (175.7 in)
Width	1,998 mm (78.7 in)
Height	1,159 mm (45.6 in)
Kerb weight	1,888 kg (4,162 lb)
Designer	Jozef Kaban

The **Bugatti Veyron EB 16.4** is a rear mid-engined Supercar. The Super Sport version is the fastest road-legal car in the world, with a top speed of 431.07 km/h (267.85 mph). The original version has a top speed of 408.00 km/h (253.52 mph).

Designed and developed by the German Volkswagen Group and produced by Bugatti Automobiles SAS at their headquarters in Château St. Jean in Molsheim (Alsace, France), the Veyron's chief designer was Hartmut Warkuss, and the exterior was designed by Jozef Kabaň of Volkswagen, with much of the engineering work being conducted under the guidance of former Peterbilt engineer and now Bugatti Engineering chief Wolfgang Schreiber.

The car is named after French racing driver Pierre Veyron, who won the 24 hours of Le Mans in 1939 while racing for the original Bugatti company. It was named *Car of the Decade* (2000–2009) by the BBC television programme *Top Gear*.

A number of special variants have been produced, including two targa tops. In December 2010, Bugatti began offering prospective buyers the ability to customize exterior and interiors colors by using the *Veyron 16.4 Configurator* application on the marque's official website.

Specifications and performance



The Veyron's quad-turbocharged W16 engine

The Veyron features an 8.0 litre W16 engine with sixteen cylinders in four banks of four, equivalent to two narrow-angle V8 engines mated in a *W* configuration. Each cylinder has four valves for a total of sixty four, but the narrow staggered eight configuration allows two overhead camshafts to drive two banks of cylinders so only four camshafts are needed. The engine is fed by four turbochargers and displaces 7,993 cubic centimetres (487.8 cu in), with a square 86 by 86 mm (3.4 by 3.4 in) bore and stroke.

The transmission is a dual-clutch direct-shift gearbox computer-controlled automatic with seven gear ratios, with magnesium paddles behind the steering wheel and a shift time of less than 150 milliseconds, built by Ricardo of England rather than Borg-Warner, who designed the six speed DSG used in the mainstream Volkswagen Group marques. The Veyron can be driven in either semi- or fully-automatic mode. A replacement transmission for the Veyron costs just over \$120,000. It also has permanent four wheel drive using the Haldex Traction system. It uses special Michelin PAX run flat tires, designed specifically to accommodate the Veyron's top speed, which reportedly cost \$25,000 US per set. The tires can be removed from the rims only in France, a service which reportedly costs \$70,000. Curb weight is 2,034.8 kilograms (4,486 lb). This gives

the car a power to weight ratio, according to Volkswagen Group's 1,001 metric horsepower (736 kW; 987 bhp) figures, of 446.3 metric horsepower (328 kW; 440 bhp) per ton.

The car's wheelbase is 2,710 mm (106.7 in). Overall length is 4,462 mm (175.7 in), width 1,998 mm (78.7 in) and height 1,204 mm (47.4 in).



The Veyron's hydraulic rear spoiler in the extended position

The Bugatti Veyron has a total of ten radiators.

- 3 heat exchangers for the air-to-liquid intercoolers.
- 3 engine radiators.
- 1 for the air conditioning system.
- 1 transmission oil radiator.
- 1 differential oil radiator.
- 1 engine oil radiator.

It has a drag coefficient of 0.41 (normal condition) and 0.36 (after lowering to the ground), and a frontal area of 2.07 square metres (22.3 sq ft). This gives it a C_dA value of 0.74 m² (8.0 sq ft).

Engine output

According to Volkswagen Group and certified by TÜV Süddeutschland, the final production Veyron engine produces 1,001 metric horsepower (736 kW; 987 bhp) of motive power, and generates 1,250 newton metres (922 ft·lbf) of torque. The nominal figure has been stated by Bugatti officials to be conservative, with the real total being 1,020 metric horsepower (750 kW; 1,006 bhp) or more.

Super Sport edition

The Veyron Super Sport features an engine power increase from the standard 1,001 metric horsepower (736 kW; 987 bhp) to 1,200 metric horsepower (883 kW; 1,184 bhp) and torque of 1,500 N·m (1,100 ft·lbf) and a revised aerodynamic package. It was shown publicly for the first time at the Pebble Beach Concours d'Elegance in August 2010.

Bugatti's official test driver Pierre Henri Raphanel drove the Super Sport version of the Veyron on Volkswagen's Ehra-Lessien high-speed oval to establish the car's top speed. With representatives of the Guinness Book of Records and German Technical Inspection Agency (TÜV) on hand, Raphanel made passes around the big oval in both directions achieving an average maximum speed of 431.072 km/h (267.856 mph). Once produced for sale, the first five Super Sports will sport the same black and orange finish as the first production car, which was used to set the speed record, and all production models will be electronically limited to 415 km/h (258 mph) to protect the tires.

Top speed

The top speed of the original version was verified by James May on *Top Gear* in November 2006, again at Volkswagen Group's private Ehra-Lessien test track. Jeremy Clarkson, driving a Veyron from Italy to London, noted that at top speed the engine consumes 45,000 litres (9,900 imp gal) of air per minute (as much as a human breathes in four days). The Veyron has the fastest top speed of any street legal production car. Once back in the *Top Gear* studio, James was asked by co-presenter Jeremy Clarkson what the Veyron felt like to drive at 407 km/h (253 mph), May replied that it was "totally undramatic", and very stable at speed. It only wobbled slightly as the air brake moved in the vertical position to slow the car down at lower speeds.



A chrome Veyron in the UK

German inspection officials recorded an average top speed of 408.47 km/h (253.81 mph) during test sessions on the Ehra-Lessien test track on 19 April 2005. On 4 July 2010, Bugatti's official test driver Pierre Henri Raphanel piloted the Super Sport edition and was clocked at an average of 431.072 km/h (267.856 mph) on the same track, taking back the title from the SSC Ultimate Aero TT as the fastest production vehicle of all time. The 431.072 km/h mark was reached by averaging the Super Sport's two test runs, the first topping out at 427.93 km/h (265.90 mph) and the second at 434.20 km/h (269.80 mph). The record run was certified by the German government and the Guinness Book of World Records.

The car's everyday top speed is listed at 350 km/h (220 mph). When the car reaches 220 km/h (140 mph), hydraulics lower the car until it has a ground clearance of about 9 cm (3.5 in). At the same time, the wing and spoiler deploy. This is the *handling mode*, in which the wing helps provide 3,425 newtons (770 lbf) of downforce, holding the car to the road. The driver must, using a special key (the *top speed key*), toggle the lock to the left of his seat in order to attain the maximum (average) speed of 407 km/h (253 mph). The key functions only when the vehicle is at a stop, when a checklist then establishes whether the car and its driver are ready to enable *top speed mode*. If all systems are go, the rear spoiler retracts, the front air diffusers shut and the ground clearance, normally 12.5 cm (4.9 in), drops to 6.5 cm (2.6 in).

Braking

The Veyron's brakes use cross drilled, radially vented carbon fibre reinforced silicon carbide (C/SiC) composite discs, manufactured by SGL Carbon, which have a much greater resistance to brake fade when compared with conventional cast iron discs. The lightweight aluminium alloy monobloc brake calipers are made by AP Racing; the fronts have eight titanium pistons and the rear calipers have six pistons. Bugatti claims maximum deceleration of 1.3 g on road tires. As an added safety feature, in the event of brake failure, an anti-lock braking system (ABS) has also been installed on the handbrake.

Prototypes have been subjected to repeated 1.0 g braking from 312 km/h (194 mph) to 80 km/h (50 mph) without fade. With the car's acceleration from 80 km/h (50 mph) to 312 km/h (194 mph), that test can be performed every 22 seconds. At speeds above 200 km/h (120 mph), the rear wing also acts as an airbrake, snapping to a 55° angle in 0.4 seconds once brakes are applied, providing an additional 0.68 g (6.66 m/s²) of deceleration (equivalent to the stopping power of an ordinary hatchback). Bugatti claims the Veyron will brake from 400 km/h (250 mph) to a standstill in less than 10 seconds, though distance covered in this time will be half of a kilometer (third of a mile).

Specifications and statistics

		Basic stats	
Layout and body style	Mid-engine, four-wheel drive, two-door coupé/targa top	Base price	€1,225,000 (£1,065,000/\$1,700,000) <i>Super Sport:</i> €1,912,500 (£1,665,000/\$2,700,000)
Internal combustion engine	8.0 litre W16, 64v DOHC quad-turbocharged petrol engine	Engine displacement and max. power	7,993 cc (487.8 cu in) 1,001 metric horsepower (736 kW; 987 bhp) <i>Super Sport:</i> 1,200 metric horsepower (883 kW; 1,184 bhp)
Performance			
Top speed	408.47 km/h (253.81 mph) (average) <i>Super Sport:</i> 431.072 km/h (267.856 mph) (average)	0–100 km/h (0–62.1 mph)	2.5 seconds
		0–240 km/h (0–149.1 mph)	9.8 seconds
		0–300 km/h (0–186.4 mph)	15 seconds
		0–400 km/h (0–248.5 mph)	50 seconds

mph)

Standing quarter-mile (402 m) 10.2 seconds at 230 km/h (142.9 mph)

Fuel economy

EPA city driving 8 miles per US gallon (29 L/100 km; 9.6 mpg-imp)

EPA highway driving 13 miles per US gallon (18 L/100 km; 16 mpg-imp)

Top speed fuel economy 3 miles per US gallon (78 L/100 km; 3.6 mpg-imp), or 1.4 US gal (5.3 l; 1.2 imp gal) per minute

Sales figures



First US Bugatti Veyron on display in April 2006

- 2005: 5
- 2006: 44
- 2007: 83
- 2008: 172
- total: 304

Special versions

Pur Sang

Launched on 11 September 2007 at the Finnish Motor Show the "Pur Sang" (*thoroughbred*) is a limited run of five cars. They have high-gloss bronze roadwheels with a diamond-cut glass-like finish and a clear body finish revealing the Veyron's Silver-oxide finish carbon fibre body, but are otherwise standard finish.







A Bugatti Veyron Fbg par Hermès

Fbg Par Hermès

A Hermès-themed model: Hermès monogram on the front grille, roadwheels with a single H in the centre, and fuel filler door engraved with *Bugatti Veyron Fbg Par Hermès*. The interior is done in Hermès leather with internal door handles reminiscent of handles used on Hermès trunks - and a Hermès wallet and Hermès suitcase is included.

Sang Noir

A limited run of 15 cars with an all-black exterior colour palette and a bright orange interior.



Bleu Centenaire

A celebratory model unveiled at the 2009 Geneva Motor Show. for the 100th anniversary of the Bugatti brand. The entire body is painted in a combination of matte and gloss "Bugatti Blue", the mid-section between the two wings on the hood is expanded, and a chrome strip up the middle added.

Grand Sport

A targa top version unveiled at Pebble Beach Concours d'Elegance on 15 August 2008, with production beginning in spring 2009. The model has extensive reinforcements to compensate for the lack of standard roof, and small changes to the windshield and running lights. There are two removable tops, the second a temporary roof fashioned after an umbrella. The top speed with the hardtop in place is the same as the standard coupé version, but with the roof down is limited to 369 km/h (229 mph)—and to 130 km/h (81 mph) with the temporary soft roof. The first (chassis 001) was sold at auction, raising approximately \$900,000 for charity.

Grand Sport Sang Bleu

Blue carbon fibre with polished aluminium, rims inspired by the Grand Sport Roadster highlighted in a Midnight Blue and Diamond Cut two-tone finish.



Side view



Interior



Rear end



Front



Engine

Grand Sport Grey Carbon

Exposed carbon fibre with metallic grey and lower portion in polished aluminium.

Super Sport

Improved aerodynamics kit, 1,200 metric horsepower (883 kW; 1,184 bhp) 1,500 newton metres (1,100 ft·lbf) torque engine upgrade. It has a 431.072 km/h (267.856 mph) top speed, making it the fastest road car in production, although it is electronically limited to 415.07 km/h (257.91 mph) to protect the tires from disintegrating. The first five of an unannounced production run made its debut in a matte black and orange color combination, all of which have been spoken for. The public debut was at the Pebble Beach Concours d'Elegance in August 2010. It is valued at £1.7 million and Bugatti have stated that only 30 will be produced. The Super Sport was featured on Series 15, Episode 5 of *Top Gear*, where presenter, James May attempted to set the speed record. It managed 417 km/h (259 mph), briefly setting a new production car speed record. Later in the day though, one of Bugatti's test drivers (Pierre Henri Raphanel) broke May's previous record, claiming it through runs in both directions (May only did one run in one direction) and registering an average top speed of 431.072 km/h (267.856 mph). The car then went round the Top Gear Test Track and topped the lap leader board with a 1:16.8 time, beating the 1:17.1 record set previously by the Gumpert Apollo Sport.

Criticisms and comments

Gordon Murray, designer of the McLaren F1 (which for many years was the fastest production car ever built) said the following about the Bugatti Veyron in UK auto magazine *evo* during its development period:





V V I



WV I



V V I



The most pointless exercise on the planet has got to be this four-wheel-drive thousand-horsepower Bugatti. I think it's incredibly childish this thing people have about just one element—top speed or standing kilometre or 0–60. It's about as narrow minded as you can get as a car designer to pick on one element. It's like saying we're going to beat the original Mini because we're going to make a car 10mph faster on its top speed—but it's two foot longer and 200 kilos heavier. That's not car designing—that just reeks of a company who are paranoid...

Murray later brought up and criticized Volkswagen for "scamming" car buyers in the 90s for buying the cheapest parts possible for the production of Jettas and Golfs, allowing Volkswagen to make a larger profit off their car sales, funding the construction of the Bugatti Veyron. However, Murray was impressed with the Veyron's engine and transmission after he test drove one for *Road and Track* magazine.

Reviews

Top Gear

On *Top Gear* the car has received considerable praise from all three presenters. While initially skeptical in 2004 that the Veyron would even be produced, Jeremy Clarkson later declared the Veyron "the greatest piece of engineering ever. No, I'm sorry, this *is* the greatest car ever made and the greatest car we will ever see in our lifetime." James May

proclaimed that the Veyron is "our Concorde moment". To review the car, Clarkson drove from Alba, northern Italy to London whilst racing James May and Richard Hammond who were travelling in a Cessna 182 aeroplane.





V V I



V V I



V V I



A few episodes later, James May drove the Veyron at the VW test track and took it to its top speed of 407.16 km/h (253.00 mph). During the second episode of the 13th series, Richard Hammond raced the Veyron against the McLaren F1 driven by The Stig in a one mile drag race in Abu Dhabi, commenting on Bugatti's "amazing technical achievement" versus the "non gizmo" racing purity of the F1. While the F1 was quicker off the line and remained ahead until both cars were travelling at approximately 200 km/h, the Bugatti overtook its competitor from 200 to 300 km/h, and emerged the victor. Hammond has stated that he did not use the Veyron's launch control in order to make the race more interesting.



W A T



The Veyron also won the award for *Car of the Decade* in Top Gear's end of 2009 award show. Clarkson commented "It was a car that just rewrote the rule book really, an amazing piece of engineering, a genuine Concorde moment". When the standard version was tested, it did not reach the top of the lap time leader board, which was speculated as being due to the car's considerable weight disadvantage against the other cars towards the top. The SuperSport version, however, achieved the fastest ever time of 1:16.8, as well as being taken to a (verified) average top speed of 431.072 km/h (267.856 mph) by Raphanel on the programme, henceforth retaking its position as the fastest production car in the world.

Chapter- 8

SSC Aero

SSC Aero



2010 Ultimate Aero at Dubai International Motor Show 2009

Manufacturer	Shelby SuperCars
Production	2006–present
Assembly	U.S.A
Body style(s)	2-seat Berlinetta
Layout	Rear mid-engine, rear-wheel drive
Engine(s)	6.35L Pushrod V8
Length	4,470 millimetres (176 in)
Width	2,080 millimetres (82 in)
Height	1,090 millimetres (43 in)
Curb weight	1,292 kilograms (2,850 lb)

The **SSC Ultimate Aero** is an American-built mid-engine supercar by Shelby SuperCars. The higher-performance limited production version, the SSC Ultimate Aero TT produces more emissions-legal horsepower than any other production automobile in the world & previously held the Guinness book of world records record for being the fastest production car in the world (succeeded by the 2010 Bugatti Veyron Super Sport), with a

recorded speed of 412.28 km/h (256.18 mph). This speed was achieved during tests on September 13, 2007 West Richland, Washington, United States and verified by Guinness World Records on October 9, 2007. This speed however does not reflect the Ultimate Aero TT's full potential. SSC estimates that the newer, more powerful and lighter weight 2009 Ultimate Aero TT is capable of a top speed of over 270 mph (430 km/h). The SSC Ultimate Aero does not have electronic aids such as ABS brakes or traction control because (to quote Jerod Shelby) "Early design philosophy on the car was to make it a drivers car. I wanted a car that you not only throttled with your right foot but at times you could steer with your right foot."

The Aero and the Shelby SuperCars company are the brainchildren of Jerod Shelby (no relation to retired racing driver and sportscar builder Carroll Shelby), who started out building exotic "replicars" including a Fiero-based Ferrari F355 replica and a Lamborghini Diablo replica based on a spaceframe which later was used in the Ultimate Aero prototype. Jerod later moved from building replicas to designing his first Supercar and after seven years it finally began to take shape. Although the basic Aero model is no longer produced, the Ultimate Aero is still in production with an MSRP of around \$650,000.

Prototype (2004)

SSC Ultimate Aero SC/8T prototype #001 was built using a Lamborghini Diablo Replicar chassis with twin turbocharged engine sourced from the Corvette C5R mated to a G-64 6-speed manual transmission (also seen in the Dodge Viper). It weighs 1,270 kilograms (2,800 lb). Prototype #001 was sold in 2008 Barrett-Jackson Palm Beach auction with winning bid price of \$189,200. Actual Barrett Jackson Auction Listing

Specifications (2006)

Styling of the Aero includes the use of butterfly doors similar to those found on the Ferrari Enzo. Carbon fiber and titanium are used throughout the car, helping to limit the weight to 1,293 kilograms (2,850 lb) for the standard Aero. Rumors persist that the Ultimate Aero TT is nothing more than a stripped down racing version of the base Aero (rumors that the car has no air conditioning for example); however, such claims have been proven false.

The engine in the base Aero model was a Supercharged V8 Chevrolet Small Block series engine rated at 1,077 PS (792 kW; 1,062 hp) at 6600 rpm and 1,357 N·m (1,001 ft·lbf) at 5800 rpm, with the supercharger at 8 psi (0.55 bar) and running on 91 octane gasoline. The Ultimate Aero has increased engine displacement of 6.34 L (387 cu in) and increased boost of 14 psi (0.97 bar), resulting in 1,203 PS (885 kW; 1,187 hp) at 6950 rpm and 1,113 N·m (821 ft·lbf) at 6200 rpm, running on 91 octane gasoline.

Wind tunnel testing indicates that the Ultimate Aero could theoretically reach a top speed of 439 km/h (273 mph) given appropriate transmission gear ratios, although the supplied

transmission would result in 418 km/h (260 mph) at the car's redline. The base Aero, however, should "only" reach about 380 km/h (236 mph). The Ultimate Aero accelerates from 0–96 km/h in 2.78 seconds, slower than the Bugatti Veyron which achieves 0–96 km/h in 2.46 seconds partially due to its AWD drivetrain.

Specifications (2007)

The engine in the base Aero model is same as the previous year, but the Ultimate Aero has a 6.35 litres (388 cu in) engine, rated at 1,199 PS (882 kW; 1,183 hp) at 6950 rpm and 1,483 newton metres (1,094 ft·lbf) torque at 6150 rpm, and the supercharger is replaced by a twin turbocharger with cabin adjustable boost pressure. The car is designed to use 91-octane gasoline. The 6-speed transmission is readjusted to increase the theoretical top speed to 437 kilometres per hour (272 mph) at 7200 rpm.

Wheels on the base model are sized 460-millimetre (18 in) at the front and 480-millimetre (19 in) at the rear, while the Ultimate Aero TT has wheels an inch larger at each end.

The 2007 models are heavier, with the base model weighing 1,293 kilograms (2,850 lb), and Ultimate version 1,250 kilograms (2,800 lb). Unlike the previous year, base models have a navigation system, 10-speaker audio/CD/DVD system, video/DVD screen, back-up camera, air-conditioning, and trunk space as standard equipment. These come optional on the Ultimate.

The first production 2007 Ultimate Aero TT car was sold on eBay for US\$431,100. Later cars are expected to cost US\$485,000. Only 24 Ultimate Aero TTs were produced from 2006-2007. The Ultimate Aero TT made its international debut on the International Show Circuit in November 2006.

Specifications (2008)

In 2008 models of Ultimate Aero, 4 changes were made:

- New Twin-Turbo V8
- All new aluminum engine block
- Standard HRE Monoblok wheels
- Azentek Atlas computer infotainment system

Specifications (2009)

The new Ultimate Aero has 15% more horsepower, resulting in 1,287 hp (960 kW; 1,305 PS) at 6075 rpm SSC predicts a top speed of over 270 mph (430 km/h) is possible. In order to prevent the engine from overheating, airflow to the engine has increased 20% with new carbon fiber louvers. The nose has been redesigned to make the car more aerodynamic, and the interior has been redesigned. The new Aero also has a new

AeroBrake system, which is a spoiler that rises up to 8 in (203.2 mm) when the brake is pressed to slow the vehicle.

- Length reduced to 176.2 in (4,475.5 mm)

Ultimate Aero EV

SSC announced the production of the Ultimate Aero EV, an electrical version of the sports car. The released specifications include using 500 horsepower (373 kW) electric motor, with SSC also exploring the potential of using 2 engines in 2 or 4 wheel drive configuration. The SSC, once in production, will be the fastest electric car on the market. "I think we can do it faster, leaner and cleaner than any other manufacturer," claims the SSC founder, Jerod Shelby. SSC planned to produce its first prototype in February 2009, with production to begin as early as Q4 of 2009.

As part of the production plan, SSC also announced it had contracted with Sheffield International Finance Corporation to initiate the company's first acceptance of outside capital since its inception.

SSC announced electric powertrain and Ultimate Aero EV specifications. "SSC will display its AESP in the Ultimate Aero EV in order to prove that electric-powered vehicles will not only match but also provide more linear power ... and overall performance than internal combustion cars. The Ultimate Aero EV uses a twin motor AESP producing an astounding 1,000 hp (746 kW) and 800 lb·ft (1,100 N·m) of torque enabling it to rocket to 60 mph (97 km/h) in a mere 2.5 seconds and reach a top speed of 208 mph (335 km/h). Not only does the Ultimate Aero EV have a range of 150–200 miles on a single charge, but SSC's "Charge on the Run" onboard charging system allows for full battery recharges in as little as 10 minutes. Mind you, this is not the solution for perpetual motion."

- Length and width reduced from Ultimate Aero engine car version

Speed attempt

SSC tested the top speed capability of the Ultimate Aero TT on March 22, 2007. The original test was scheduled for March 21, 2007 but was called off due to bad weather conditions. SSC closed down a 12-mile (19 km) stretch of U.S. Route 93 in Nevada for the event. Their goal was to replace the Bugatti Veyron as the fastest production car ever produced, which at the time could achieve 253.7 mph (408.3 km/h). Simulation and testing at NASA's Virginia facility had shown that the Ultimate Aero TT is theoretically capable of approximately 273 mph (439 km/h). The March 22nd attempt failed to break the record, due to sub-optimal conditions. Test driver Rick Doria reported "wheel-spin" at speeds above 190 mph (310 km/h). Despite the failure of the attempt, the car still reached 389 km/h (242 mph).

SSC announced they had broken the speed record for the world's fastest production car with 412.28 km/h (256.18 mph) in West Richland, WA on September 13, 2007. The reported record speed came from an average of two runs in opposite directions, in accordance with FIA Speed Records rules. The first run clocked 414.31 km/h (257.44 mph) and the return trip 410.24 km/h (254.91 mph). The results of this test, verified by Guinness World Records on October 9, 2007, gave the SSC Ultimate Aero the title of world's fastest production car, with a top speed of 412.28 km/h (256.18 mph). This beat the previous record holder, the Bugatti Veyron, that had a top speed of 253.81 mph (408.47 km/h). However, the Super Sport version of the Veyron has since reclaimed the title.

In addition to the fastest production car record, SSC also applied for the world record for the highest horsepower for an emissions-legal production automobile.

The record-breaking 2007 Shelby SuperCars Ultimate Aero Chassis #TT-02 was later put into auction by Shelby SuperCars, which also included SSC World Record commemorative watch, key fob, original record-breaking wheels and tires, framed official Guinness World Records certificate with commemorative photo signed by Shelby SuperCars team.

The car's record was broken on July 4, 2010 by the Bugatti Veyron Super Sport, which reached a certified top speed of 431.072 km/h (267.86 mph).

Successor (2011)

Prior to Bugatti's Veyron Super Sport achieving the top speed record for a production car with a speed of 268 mph (431 km/h), SSC worked on creating the Aero II. The Aero II is powered by a four-cam 6.8 liter twin-turbo engine, which will rev to 9000 rpm and make 1,350 bhp (1,007 kW; 1,369 PS). Unlike the current car, which has some steel in the structure, the new one will be all-carbon except for aluminum crash rails. Its transmission is the same all-SSC unit that has been proved in the current car, with the same triple-disc carbon clutch, but it will have the option of sequential paddle shifting. Many parts from the existing Ultimate Aero are re-used; the bottom end of the engine, the suspension, the Brembo carbon brakes, the steering wheel and the apertures for the dihedral doors are the same as in the Ultimate Aero. An Australian company called Carbon Revolution has developed for SSC the world's first one-piece carbon-fiber wheel – the 19-inch (480 mm) wheel at the front weighs only 5.8 kg (13 lb). The new car's entire structure will be made of F1-derived carbon. The dry weight will be under 1,200 kg (2,646 lb), putting the power-to-weight ratio, even with fluids and the driver, exceed 1,000 bhp (746 kW; 1,014 PS) per tonne. SSC claims that the car can accelerate from 0-60 mph in 2.8 secs. It will cost \$ 970,000, or £ 626,000 plus tax, when it goes on sale late next year. The first will be delivered in a year's time.