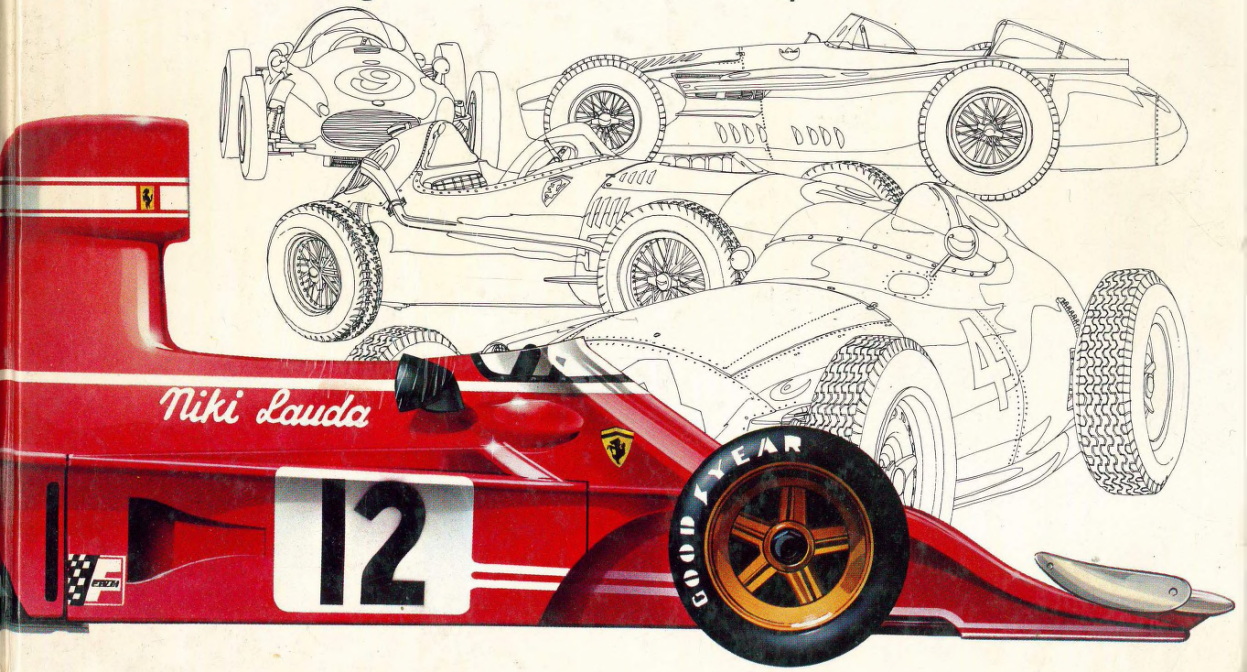
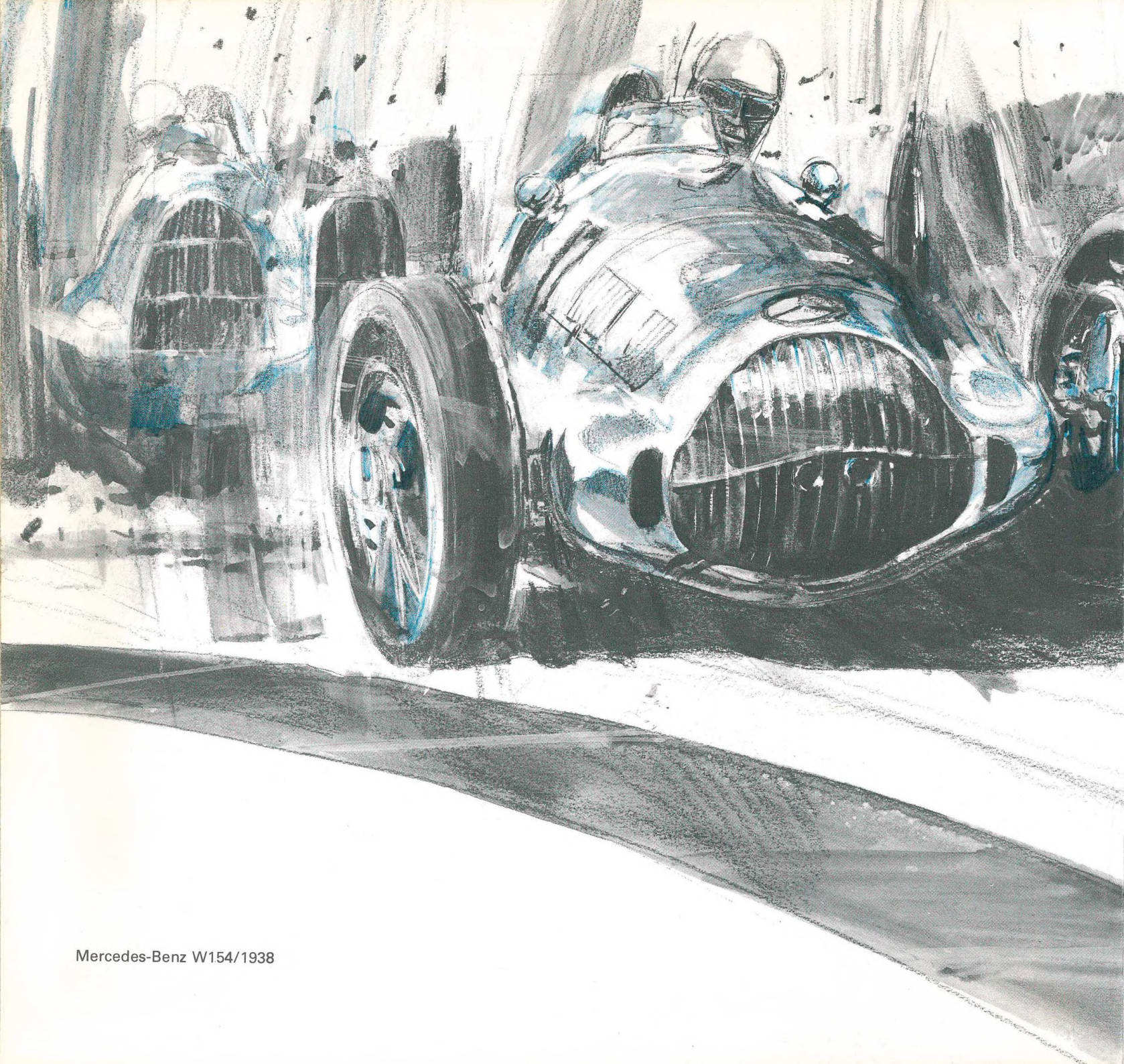
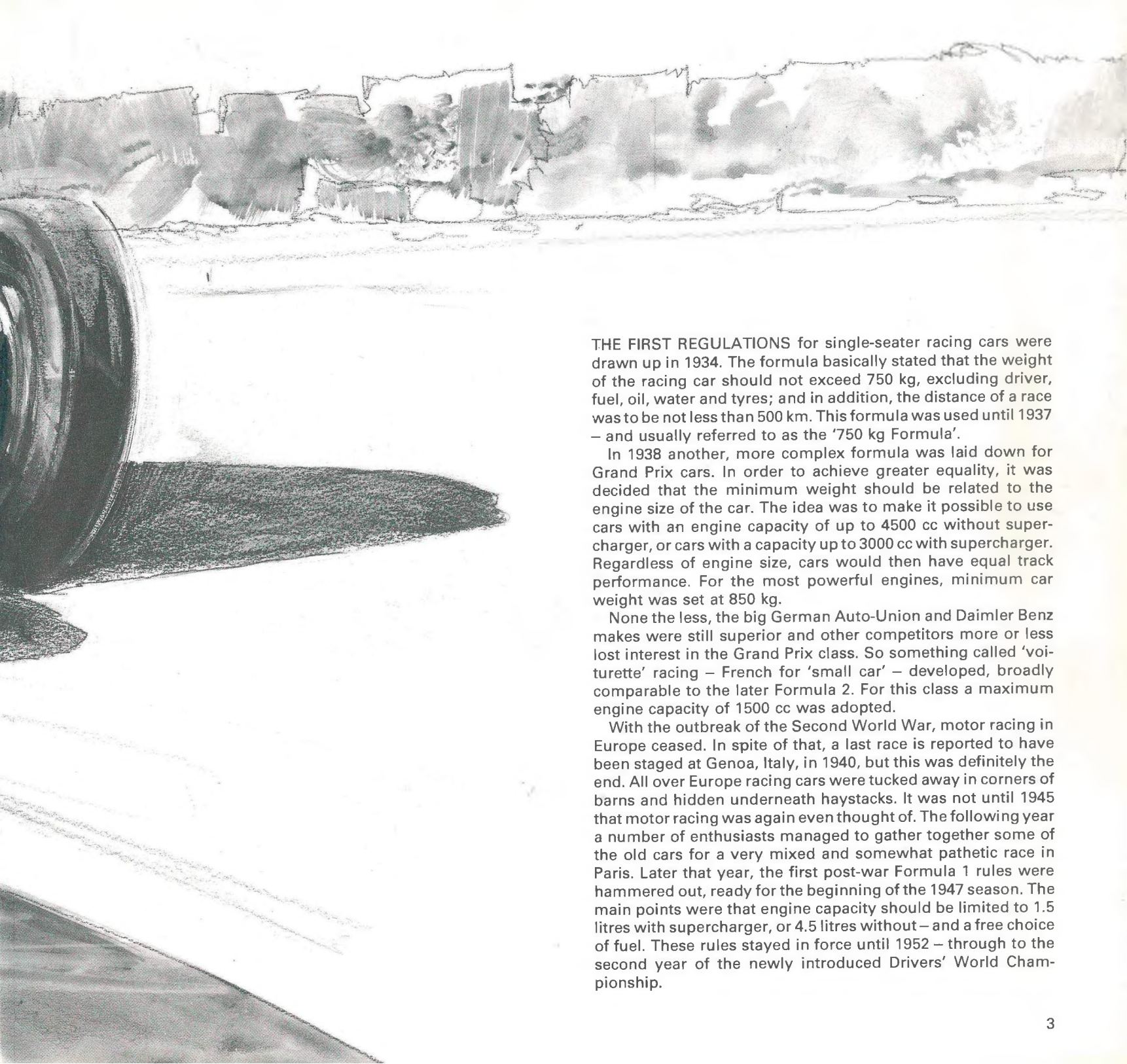
# FORMULA 1

By Sven Zettergren/Illustrations by Herbert Müdsam





Mercedes-Benz W154/1938



THE FIRST REGULATIONS for single-seater racing cars were drawn up in 1934. The formula basically stated that the weight of the racing car should not exceed 750 kg, excluding driver, fuel, oil, water and tyres; and in addition, the distance of a race was to be not less than 500 km. This formula was used until 1937 – and usually referred to as the '750 kg Formula'.

In 1938 another, more complex formula was laid down for Grand Prix cars. In order to achieve greater equality, it was decided that the minimum weight should be related to the engine size of the car. The idea was to make it possible to use cars with an engine capacity of up to 4500 cc without supercharger, or cars with a capacity up to 3000 cc with supercharger. Regardless of engine size, cars would then have equal track performance. For the most powerful engines, minimum car weight was set at 850 kg.

None the less, the big German Auto-Union and Daimler Benz makes were still superior and other competitors more or less lost interest in the Grand Prix class. So something called 'voiturette' racing – French for 'small car' – developed, broadly comparable to the later Formula 2. For this class a maximum engine capacity of 1500 cc was adopted.

With the outbreak of the Second World War, motor racing in Europe ceased. In spite of that, a last race is reported to have been staged at Genoa, Italy, in 1940, but this was definitely the end. All over Europe racing cars were tucked away in corners of barns and hidden underneath haystacks. It was not until 1945 that motor racing was again even thought of. The following year a number of enthusiasts managed to gather together some of the old cars for a very mixed and somewhat pathetic race in Paris. Later that year, the first post-war Formula 1 rules were hammered out, ready for the beginning of the 1947 season. The main points were that engine capacity should be limited to 1.5 litres with supercharger, or 4.5 litres without – and a free choice of fuel. These rules stayed in force until 1952 – through to the second year of the newly introduced Drivers' World Championship.

**Pictured cars/Page reference**





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# FORMULA 1

By Sven Zettergren/Illustrations by Herbert Müdsam

World's Work Ltd/The Windmill Press/Tadworth/Surrey

ALFA ROMEO TYPES 158 and 159, popularly known as 'Alfettas', figure in the classic story of motor racing. The first was designed in 1937 for a début in the so-called 'voiturette' class, mainly comparable with post-war Formula 2 in capacities and regulations. Behind its construction was Scuderia Ferrari in Modena, which in those days was running Alfa Romeo's competition department. The engine for this new Alfa was designed and developed by Gioachino Colombo. The class rules allowed for engines up to 1500 cc supercharged. When first tested on the engine-rig, the unit developed 180 bhp, but by the time the car reached the track Colombo had produced 195 bhp at 7000 rpm. The engine had 8 cylinders and was fitted with a single-stage Roots supercharger. The Alfetta's type number 158 stands for capacity (1500) and number of cylinders (8). But when the 1951 model number 159 was introduced, the 9 reflected a wish to distinguish the two models apart rather than anything more revolutionary! In 1938, when the Alfa Romeo 158 first appeared, Scuderia Ferrari's boss Enzo Ferrari was bought out by Alfa Romeo – Alfa immediately opened their own racing workshop at Milan, naming it Alfa Corse. The first racing car was christened Alfa Corse 158 for that reason.

That first car made its racing début at Livorno, Italy, on 1 July 1938. With Emilio Villoresi behind the wheel, the car won its first race convincingly. From that day, until the company retired from Grand Prix racing in 1951, the Alfa Romeo 158 and 159s managed to take thirty-six victories in Grand Prix racing – compare that with the legendary Bugatti, which managed only twenty-one victories!

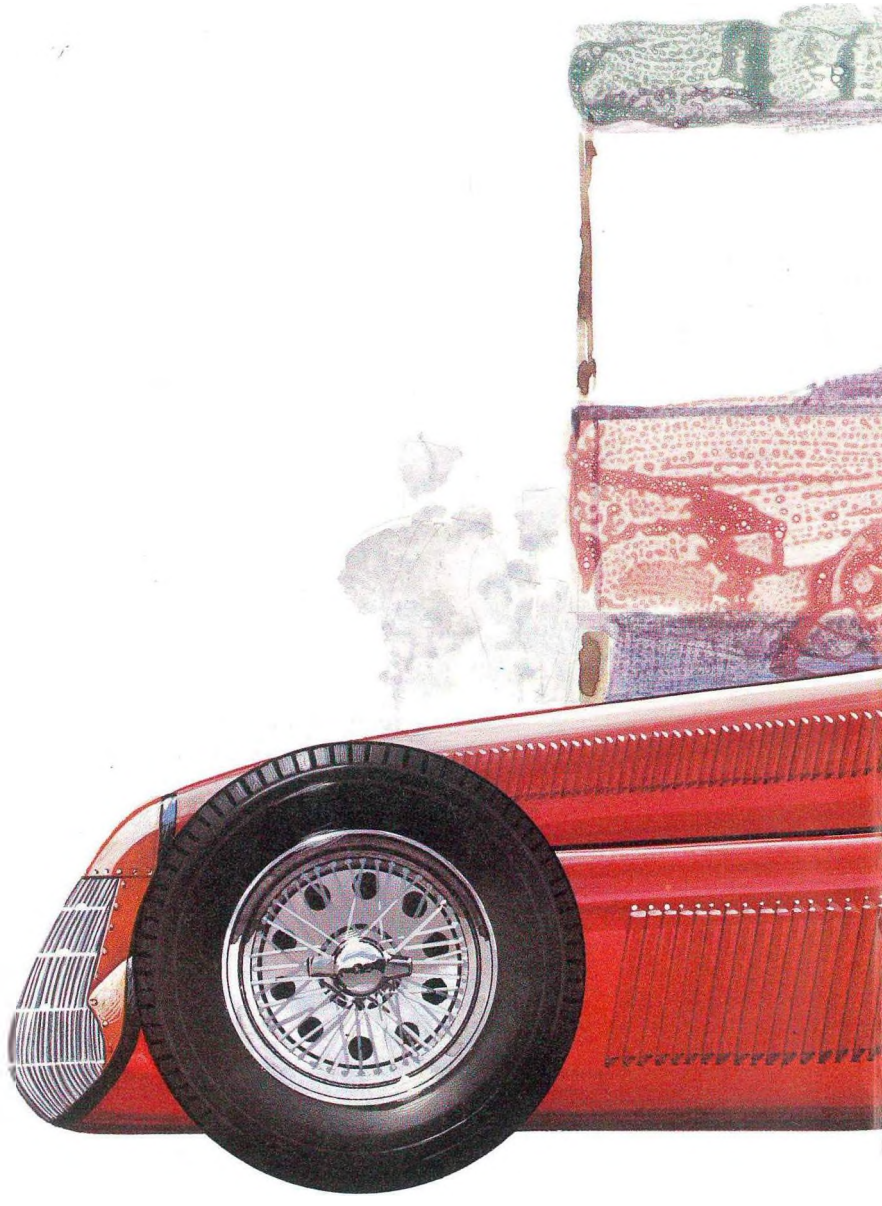
Although 'Alfetta' was the nickname given to the 158 and 159, the real Alfetta was a famous sports car in the late 1920s. And surprisingly, while the public dubbed the racing cars 'Alfettas' the company itself never used that name for the cars.

By 1939 engine output had been increased to 240 bhp, and stayed at that for the only race of 1940 in Italy. After the war, the engine was modified to take a two-stage Roots supercharger for the 1946 Paris race and power went up to 254 bhp at 7500 rpm. In 1947 the supercharger was further improved and the figure climbed to 310 bhp. Further improvements eventually took the power output to 420 bhp by 1961, shown at 9600 rpm and making the Alfa Romeo 159 one of the most powerful racing cars in history in respect of power per litre. Most of the power improvements reflected supercharger development. It is worth noting that in early days the supercharger consumed 110 bhp, yet in 1951 with more than double the power, the supercharger took only 135 bhp.

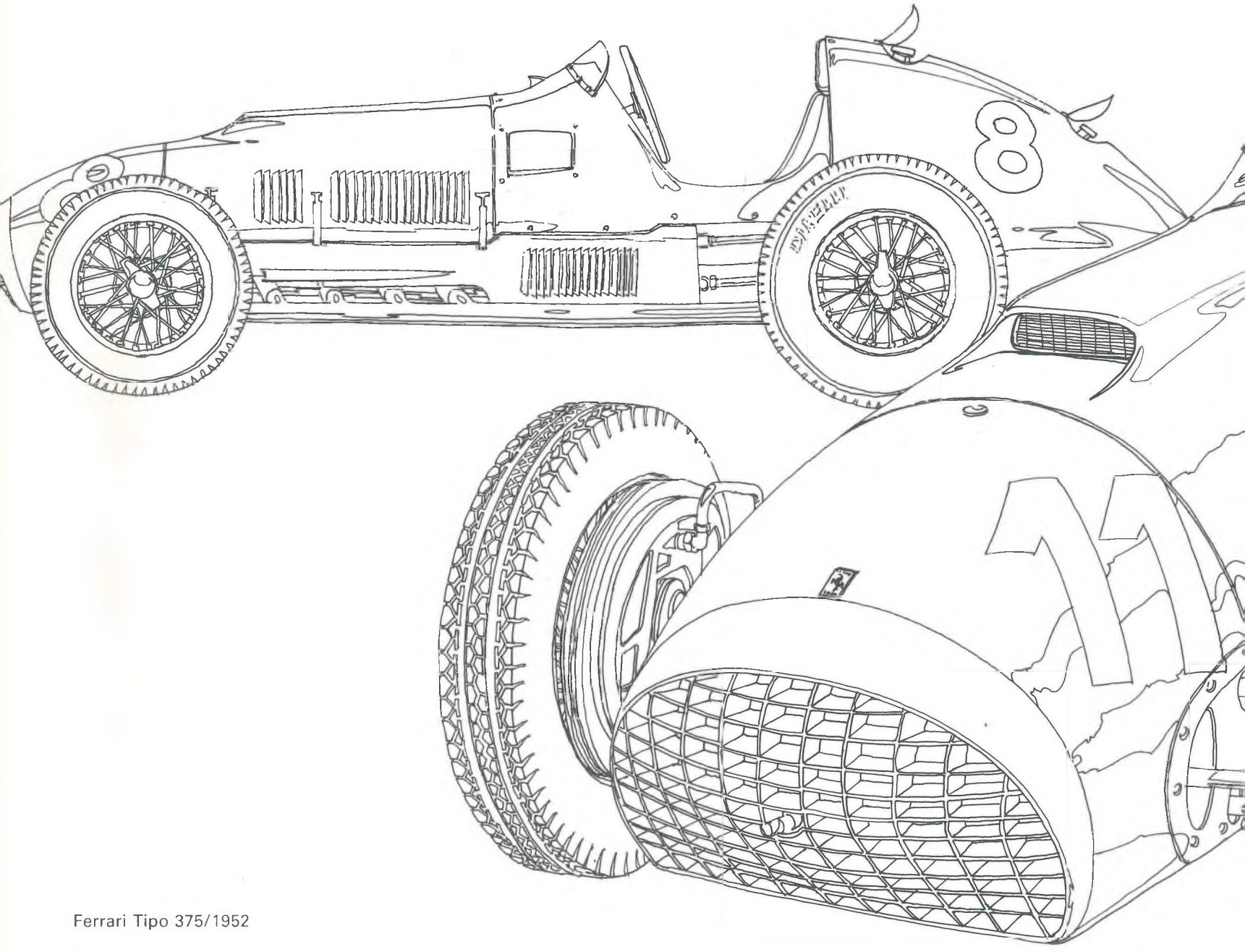
In 1950 the first World Championship for Drivers was won by the Italian Nino Farina, who drove to victory in an Alfa Romeo 158. Juan Manuel Fangio had made his European début in an identical car – well disciplined, he stayed behind Farina in all races during 1950. But the following year, Farina preferred to stay in the background while Fangio took the World Championship using the new Alfa Romeo 159.

At the start of the 1952 season, Alfa Romeo asked the Italian government for 500 million lire – approximately £500,000 – in order that the company could continue racing. The request was turned down and Alfa Romeo were forced to retire from the Formula 1 scene. Under private ownership a number of 158 and 159s continued racing for a few years.

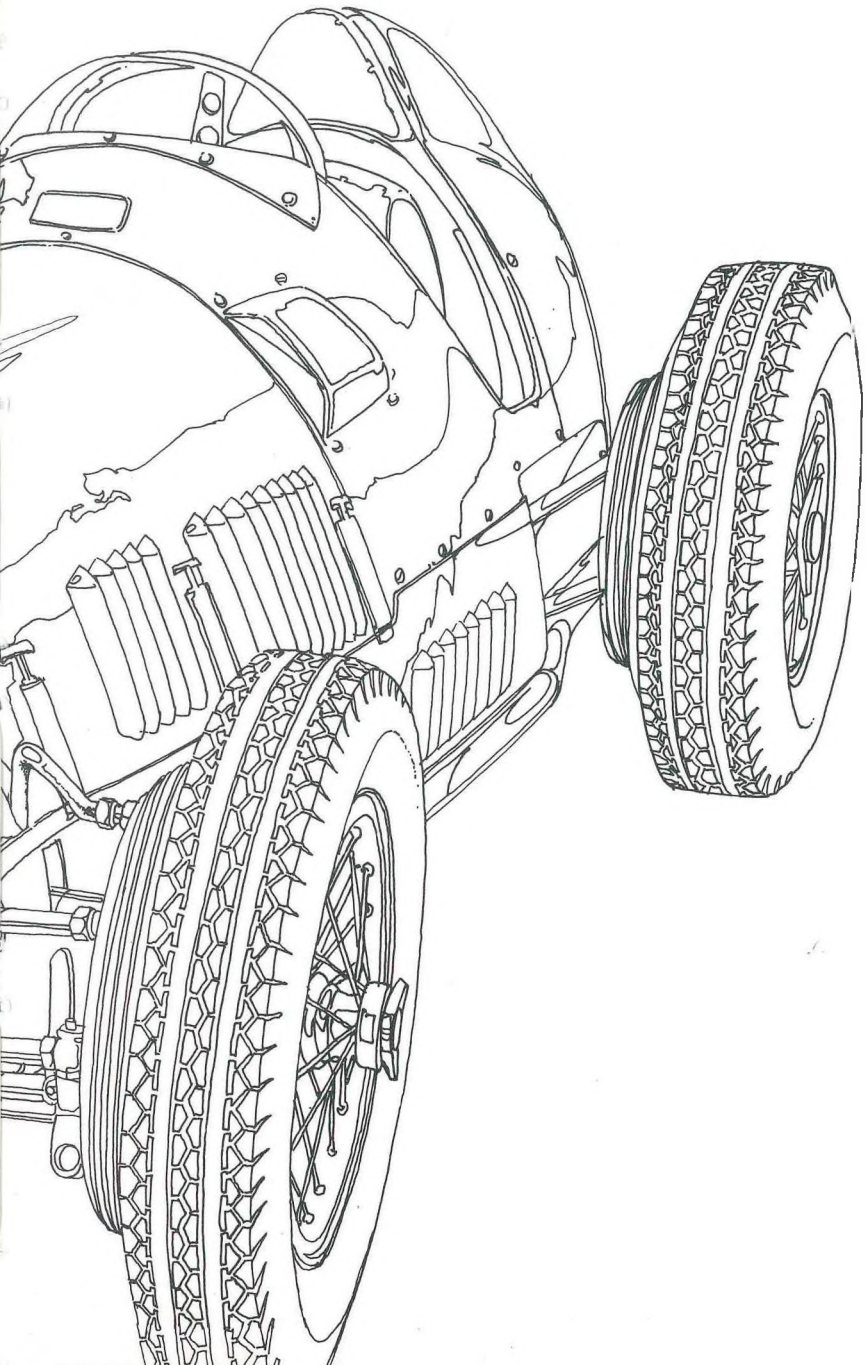
Only nine engines were made for the 158/159 series, and four of those were in continuous use from 1938 to 1951. Both cars and engines were little short of unique in terms of durability.




Alfa Romeo 158/1950




Ferrari Tipo 375/1952



ENZO FERRARI MANAGED Alfa Romeo's racing department until 1938 – and then Scuderia Ferrari was paid off by Alfa Romeo, who had decided to run the competition side themselves. Not until 1948 were Ferrari back on the tracks – the first Ferrari car had a 1.5 litre supercharged V12 engine producing 280 bhp at 7500 rpm. This model was named the Tipo 125 – the figures standing for the cubic capacity of each of the 12 cylinders. In 1950 power was increased to 300 bhp, but a new engine was already underway. Designed by Gioachino Colombo (previously Alfa's engine-builder but now with Enzo Ferrari) and constructed by him and young Aurelio Lampredi, it was a 4.5 litre unsupercharged V12. Better reliability and less fuel consumption than the supercharged engines was the target – the Alfa Romeo 1.5 litre engine, for instance, consumed no less than 12.5 litres per 10 kms which meant the car had to be refuelled twice during a race. Ferrari reckoned that his car would need only one refuelling stop.

The 1950 car which used this new engine was named the Tipo 375, figures again representing cubic capacity per cylinder. By the end of 1950 the power output was up to 350 bhp at 7000 rpm – and a year later the output had again been increased, to 384 bhp at 7500 rpm. From 1950 to 1952 there were five versions of the Ferrari Tipo 375: among them the prototype with a 3.3 litre unit, superseded by one with 4.1 litre capacity, and by the final 4.5 litre version which made its début at Monza in 1950.

The following year yet another version was designed, this time with twin ignition circuits. In 1952 a car was built exclusively for the American long-distance Indianapolis 500 classic. Despite the fact that the Indy Ferrari had 100 bhp over its American Offenhauser rivals and Alberto Ascari behind the wheel, the car couldn't keep pace. In the middle of the field at half-distance, Ascari was forced to retire after losing a wheel at 120 mph. The main reason for the Ferrari's failure to keep up was the new two-speed gearbox, which was too high-geared for quick acceleration out of the bends. The engine used for the Indy race had been tuned to 430 bhp at 7500 rpm.

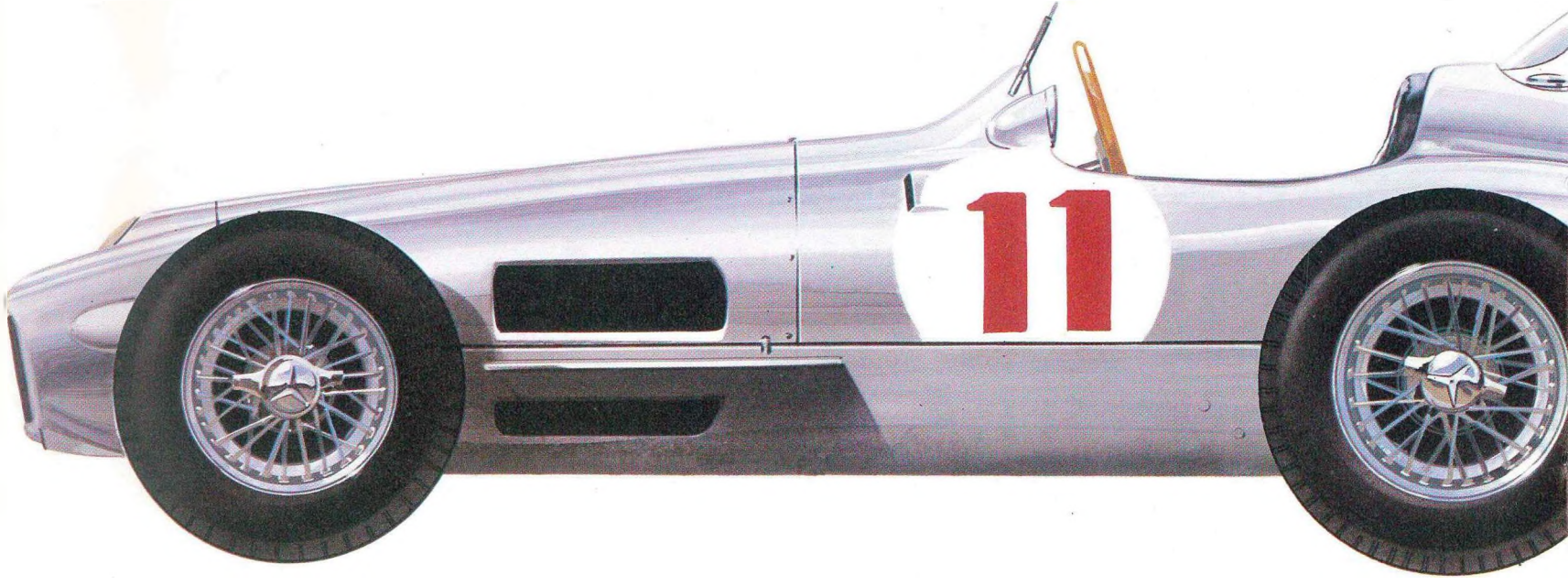
The Indianapolis performance marked the official end of the Ferrari Tipo 375 era, although many cars were bought up privately. Probably the best-known was the 375 owned by English millionaire Tony Vandervell, partly modified and renamed the 'Thin Wall Special' – forerunner of the Vanwalls. As late as 1957 Harry Schell drove a destroked (4.2 litre) Ferrari 375 at Indianapolis. Unfortunately, he too retired after half the distance.

WHEN MERCEDES-BENZ decided to return to Formula 1 racing after fifteen years, they were fully aware of what the world expected of them. During the late 1930s their racing cars had been enormously successful. In 1954 the new Formula 1 regulations were introduced – engines with a maximum 2.5 litre capacity unsupercharged, or just 750 cc with a supercharger.

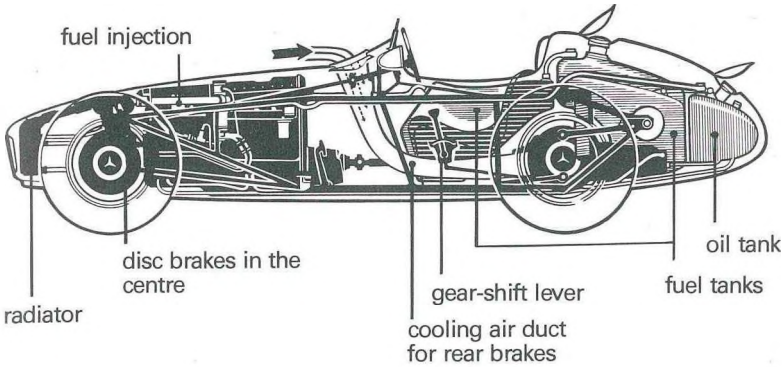
When this new formula was announced, Mercedes began building a completely new 2.5 litre engine. On the basis of previous experience, they knew that supercharged engines had a very high fuel consumption – and that unsupercharged engines developed better torque. The Mercedes engine was fitted with both desmodromic valve gear and fuel injection – both sophisticated refinements even nowadays. The 6-cylinder in-line engine was mounted inclined in order to give a lower frontal profile, and the chassis was built as a tubular frame with an extremely low centre of gravity. The gearbox was five-speed and the drum brakes were positioned inboard. But perhaps the most interesting development was the completely enveloping bodywork, covering all four wheels. The man behind the design was Rudolf Uhlenhaut, who was not only a skilled engineer but an experienced racing driver himself.

So, after fifteen years out of the sport, the time came for the start of the French Grand Prix in July 1954. Juan Manuel Fangio, Hans Herrmann and Karl Kling were the contracted drivers. Herrmann over-revved his engine on the start line and was forced to retire, but Fangio and Kling went on to a superb 1–2 victory. The very next race was to show up a major drawback with the bodywork – the enclosed version of the car just wouldn't handle on tracks with a lot of corners. In spite of a fantastic performance by Fangio, he was unable to finish better than fourth in the British Grand Prix at Silverstone. The Mercedes team were dissatisfied with this shortcoming, and went ahead with an open version of this car, at the same time shortening the wheelbase from 2350 mm to 2210 mm. The enclosed version would now be used only for tracks with an average speed higher than 120 mph, where it could show its top speed of 195 mph – as against the open car's 175 mph. The weight-saving with the open car was 50 kg, weighing in at 650 kg total. With these two cars, Mercedes-Benz went on to win both 1954 and 1955 World Championships.

It later became the subject of much argument as to which gave Mercedes-Benz their successes – the ingenuity of the cars or the driving skill of Fangio! In spite of the fact that Mercedes dominated racing during this period, victory was often far from certain. Many opinions hold that Mercedes would never have competed with such success without Fangio.



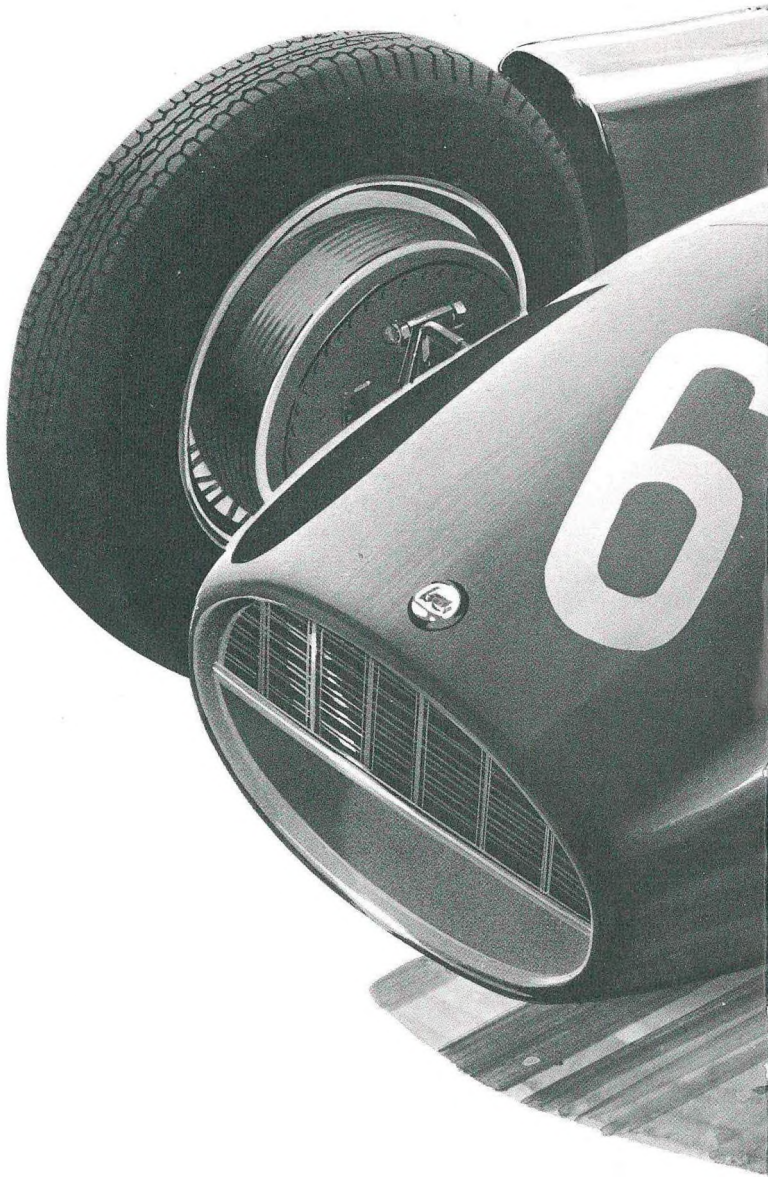

Mercedes-Benz W196 Monoposto/1955

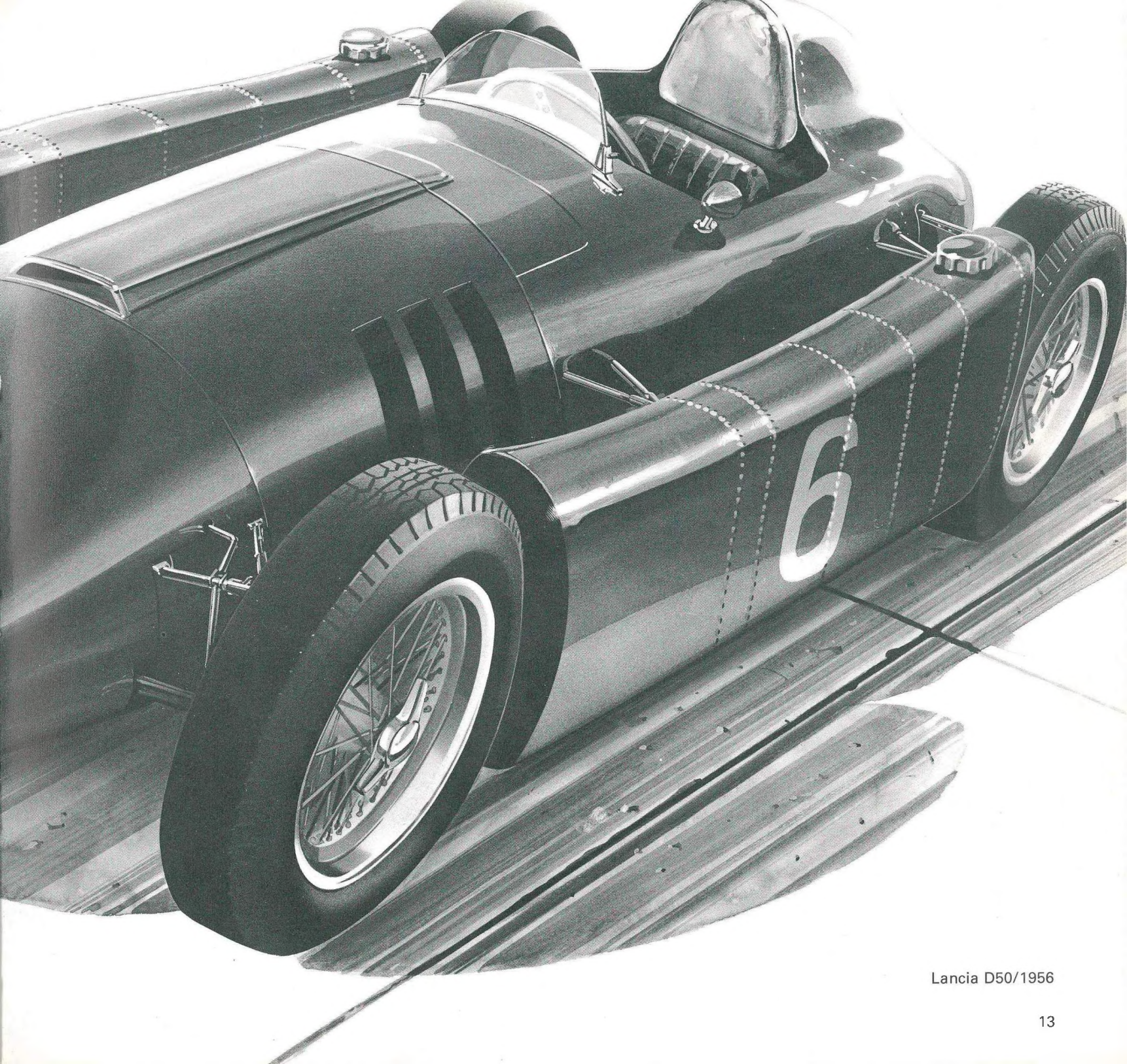



Another well-known character from the Mercedes-Benz post-war era was the racing boss, Alfred Neubauer. A fine organizer (but none too familiar with the actual cars) he introduced the system of signalling to drivers from the pits and speeded up pit stops – for tyre changes, refuelling, etc. – by making cine films of the mechanics in action. One thing is for certain – the post-war racing effort introduced organization into Formula 1 teams, and on a pattern still being used today.

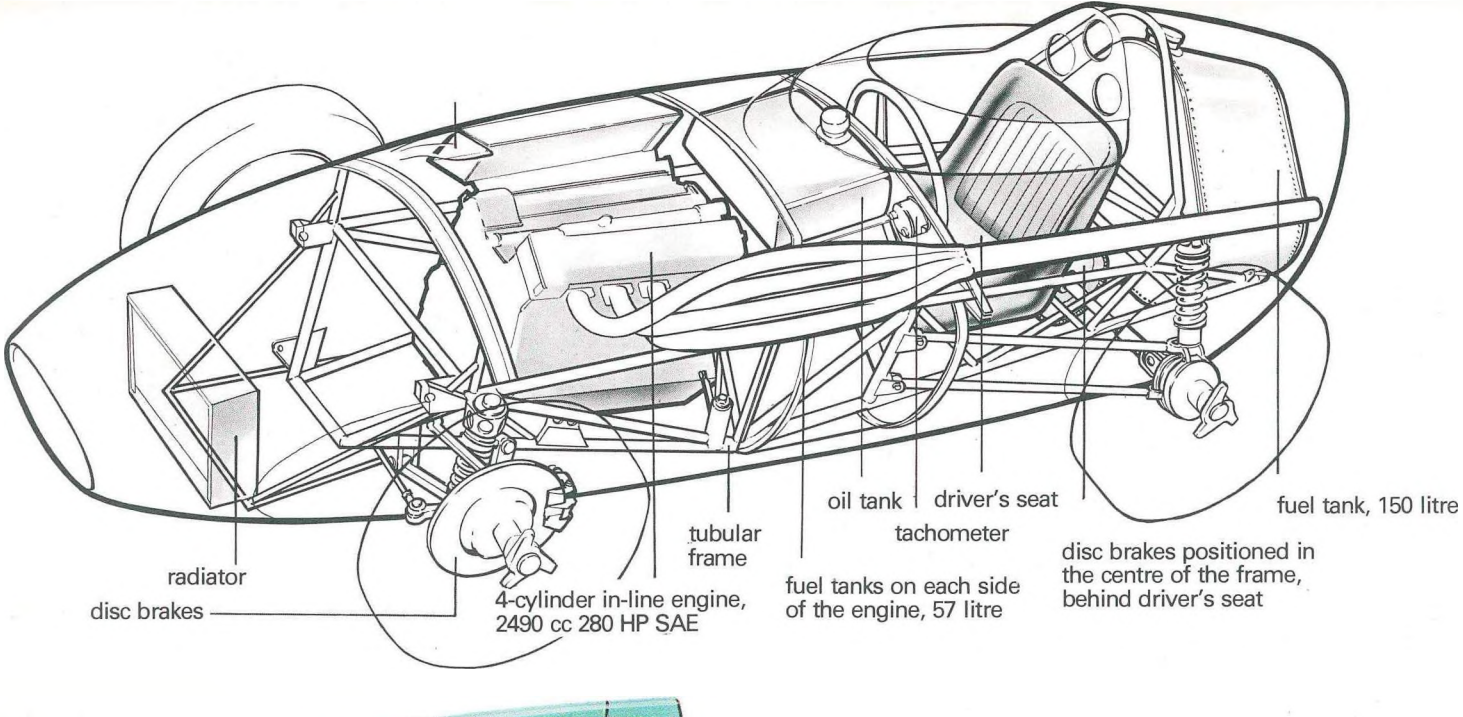
THE LANCIA D50 – together with the Mercedes-Benz W196 – was one of the most distinctive racing cars of the 1950s. The D50 was designed for the Lancia factory by the almost-legendary 63-year-old Italian Vittorio Jano, renowned for his cars and engines during the late 1920s and all through the 1930s. The Lancia was regarded as one of the most unconventional racing cars of the 2.5 litre formula. Most unusual feature was the positioning of the fuel tanks, separate pontoons between the front and rear wheels. The engine was a twin-overhead camshaft V8 and the rear axle was of the De Dion type.

The Lancia D50 proved itself as a fast car, especially with Alberto Ascari behind the wheel. It made its début at the Spanish Grand Prix in October 1954; during practice Ascari set a new lap record but was forced to retire during the actual race. In its third race, at Turin early in 1955, the car with Ascari still at the wheel won its first event. In the Monaco Grand Prix on 22 May, Ascari was way ahead of the rest of the field after ninety laps when he drove straight into the harbour – and escaped completely unhurt. Sadly, five days later, behind the wheel of a brand new Ferrari practising at Monza, Italy, he ran off the track and was killed instantly. All Italy mourned the death of one of their most famous drivers. Mainly because of Alberto's tragic accident, but also because the company had had a hard economic struggle, Lancia decided to give up racing two months later. The factory gave its engines, tools and cars to the Ferrari racing department – and Ferrari continued with the D50's development, naming it the Lancia/Ferrari D50S. Several different versions were built, and in 1956 a Lancia/Ferrari won the World Championship driven by Juan Manuel Fangio.






Lancia D50/1956


radiator
disc brakes
4-cylinder in-line engine,
2490 cc 280 HP SAE
tubular
frame
fuel tanks on each side
of the engine, 57 litre
oil tank
driver's seat
tachometer
disc brakes positioned in
the centre of the frame,
behind driver's seat
fuel tank, 150 litre

THE 2.5 LITRE FORMULA, introduced in 1954, gave a new lease of life to Formula 1 racing. One of the more notable cars of this period was the British-built Vanwall. The Vanwall story really began in 1948 when the re-formed Ferrari stable became a customer of the British Vandervell factory, buying engine parts from them. Primarily the deal involved bearings and piston rings, parts with which the British company had gained much wartime experience. This resulted in a close co-operation with Ferrari, and eventually the Managing Director of Vandervell Products – Tony Vandervell – became the proud owner of one of the Ferrari 4.5 litre Grand Prix cars. With this car, Tony started racing, developing and modifying it a great deal. First the exhaust system was altered, then the body and fuel tanks modified, and last but not least, a new type of braking system incorporated – disc brakes. The brake systems of today are entirely Tony Vandervell's brainchild. This modified Ferrari was raced as the 'Thin Wall Special'.

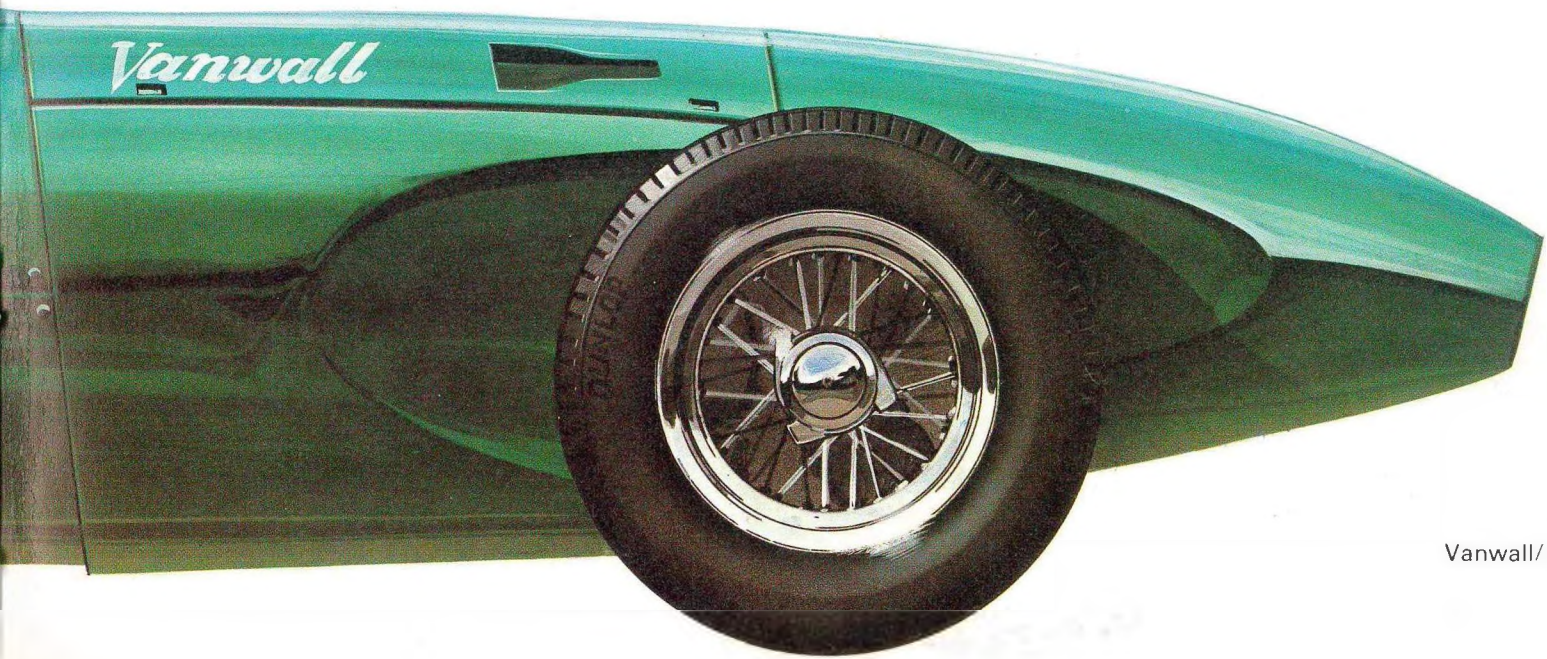
For the 1953 season, Vandervell began designing his own racing car in the 2.5 litre class. Much of its construction originated around Ferrari ideas, but the engine was completely new. A great deal of the basic design derived from the Norton TT engine – Norton were then the most successful 500 cc single-cylinder road racing bikes. The Vandervell 2-litre engine was based on four Norton engines in a line – a 4-cylinder in-line engine but water-cooled rather than air-cooled.

The car and engine were ready for the 1954 season, but could not stand up to the all-conquering Mercedes and Maseratis. For the 1955 season, the engine was modified to 2.5 litres and developed stage by stage into one of the fastest power units on the tracks. After Fangio's World Championships in 1954 and 1955, he chose to drive for Lancia/Ferrari during 1956, but confessed that without exception the racer he most respected was the British Vanwall. And particularly so as Vanwall had now signed Stirling Moss as number one driver.

From the technical point of view, the car was equipped with a four-speed gearbox during the 1955 season, and for 1956 a fifth gear was added to allow a lower bottom gear for better starting. The disc brakes were further developed and moved inboard at the rear, cooled by air ducts. The discs were perforated for better heat dissipation and less weight.

The disc brake story warrants further mention. When Tony Vandervell first installed disc brakes in his 'Thin Wall Special' they were of the Goodyear aircraft type, very similar to another design used previously on some Indianapolis racing cars. At first, however, the discs had been merely a weight-saving exercise with little thought for more efficient braking. Tony Vandervell eventually realized that the disc brake, properly developed, would have a far greater effect than the drum brake.

The Vanwall was improved over the years with the help of a long line of experts. For instance, the engine benefited from tuning expert Harry Weslake's attentions; and the steering and suspension was developed by Colin Chapman, later to become the Lotus boss. In 1958 Vanwall won the Constructors' Championship, but by 1959 the outdated design was no longer competitive enough for Formula 1.




Vanwall/1957

FOR THE 1958 SEASON great things were expected of one make in particular – BRM, British Racing Motors. Behind the brand name were two British engineers, Peter Berthon and Raymond Mays, both men with a vast experience of racing. As well as other projects, they had designed, financed and raced the ERA. Supporting the BRM effort was the whole of the British motor industry – a collective attempt to achieve the same sort of fame and prestige that the German auto industry had gained through the pre-war Mercedes and Auto-Union racing activities. The BRM was backed financially by no less than 160 companies connected with the British car industry, but the main two shareholders were Rubery Owen and Joseph Lucas.

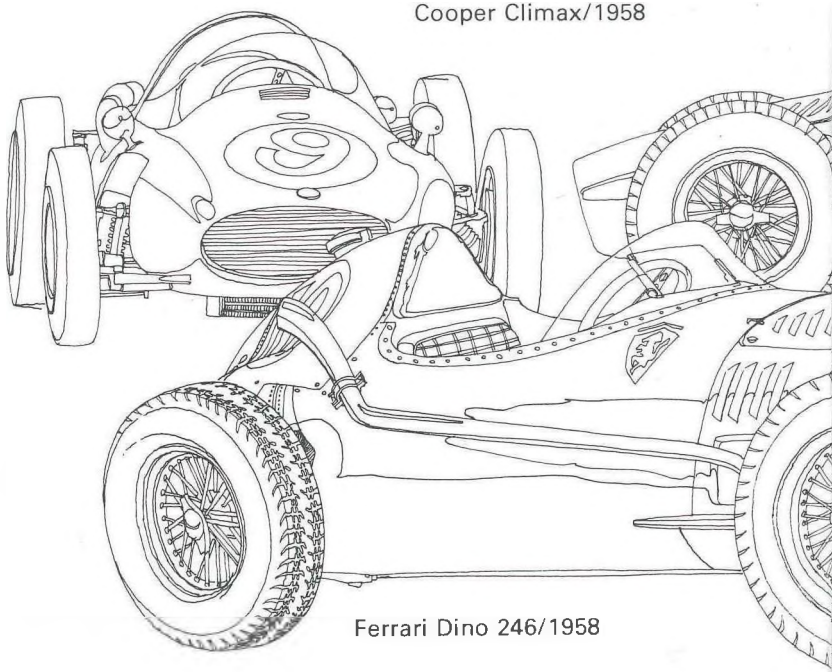
The first really competitive BRM racer had its début in 1953. Berthon and Mays' idea in engine construction was to use as many cylinders as possible – consequently the first engine was a 1.5 litre V16, fed by a two-stage Roots supercharger. However, the development of the engine had taken so long that the car would be eligible for only one season – in 1954 Formula 1 rules were to be changed to 2.5 litres unsupercharged, but only 750 cc with superchargers. Nevertheless, the BRM V16 earned itself a place in history during only one season of racing. The sound alone was quite fabulous and top speed and acceleration fantastic. There was just one snag – the car didn't keep in one piece long enough to reach the finishing line. Although usually first off the line, poor road-holding very often put it off the road at the first bend or left it way back in the field on the way out.

The introduction of the new formula in 1954 started a hunt for another engine with a somewhat more proven construction. BRM's choice was a 4-cylinder 2.5 litre with excellent torque characteristics from 4000 rpm through to 8000 rpm. But the car still retained its bad handling and victory eluded the marque. When BRM drivers complained to Berthon and Mays at the beginning of the 1957 season, it was obvious that something had to be done to improve the car. Colin Chapman was commissioned to design a completely new suspension – which he did, and added anti-roll bars front and rear. By the end of the 1957 season the modifications were completed and the 'new' car so impressed Jean Behra and Harry Schell that they immediately signed contracts for the 1958 season. Engine output for 1958 was 258 bhp at 8500 rpm running on aviation fuel.

Incidentally, the engine had originally been designed for the Connaught Grand Prix car, but this small company had found the development too costly. Connaught was then in the process of selling the engine project to Alta 4, when Alfred Owen – one of BRM's owners – managed to get in a higher bid.

Other remarkable cars from the 1958 season included the Ferrari Dino 246 with its V6 engine capable of 290 bhp at 8300 rpm. It had four chain-driven overhead camshafts, two spark plugs per cylinder and twin-choke downdraught Weber carburettors. The car was very fast and the engine reliable, but drivers found it a handful, particularly in tight bends where it drastically oversteered. The 1958 Maserati 250F was basically the same car which Fangio used to win the 1956 Drivers' World Championship. It had the same 6-cylinder engine, now with an output of 270 bhp at 7000 rpm running on methanol. Weight-saving modifications and a shortened wheelbase were the only other alterations for the 1958 season. The Vanwall story has already been told, but it should be pointed out that the car

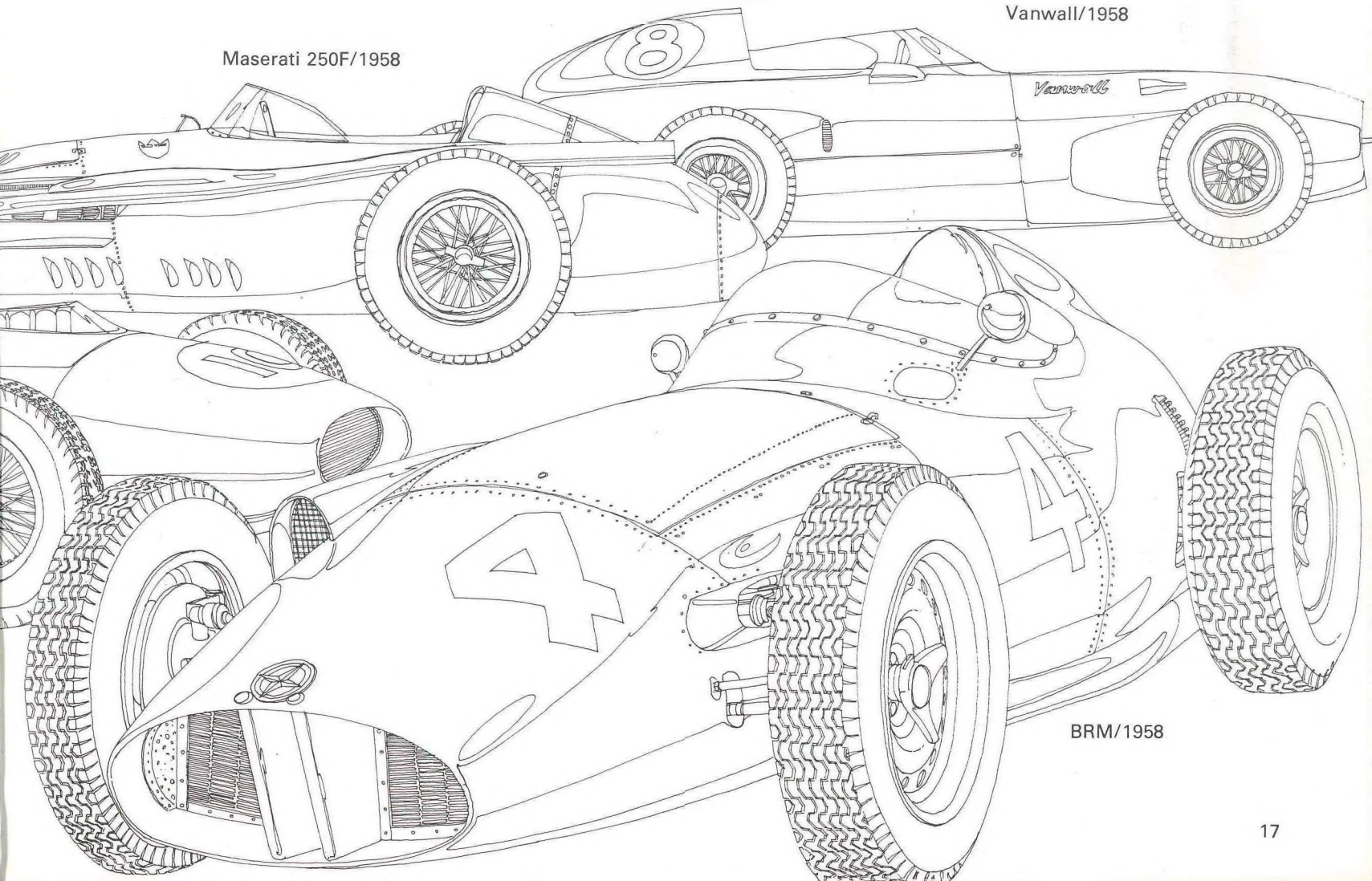
Cooper Climax/1958

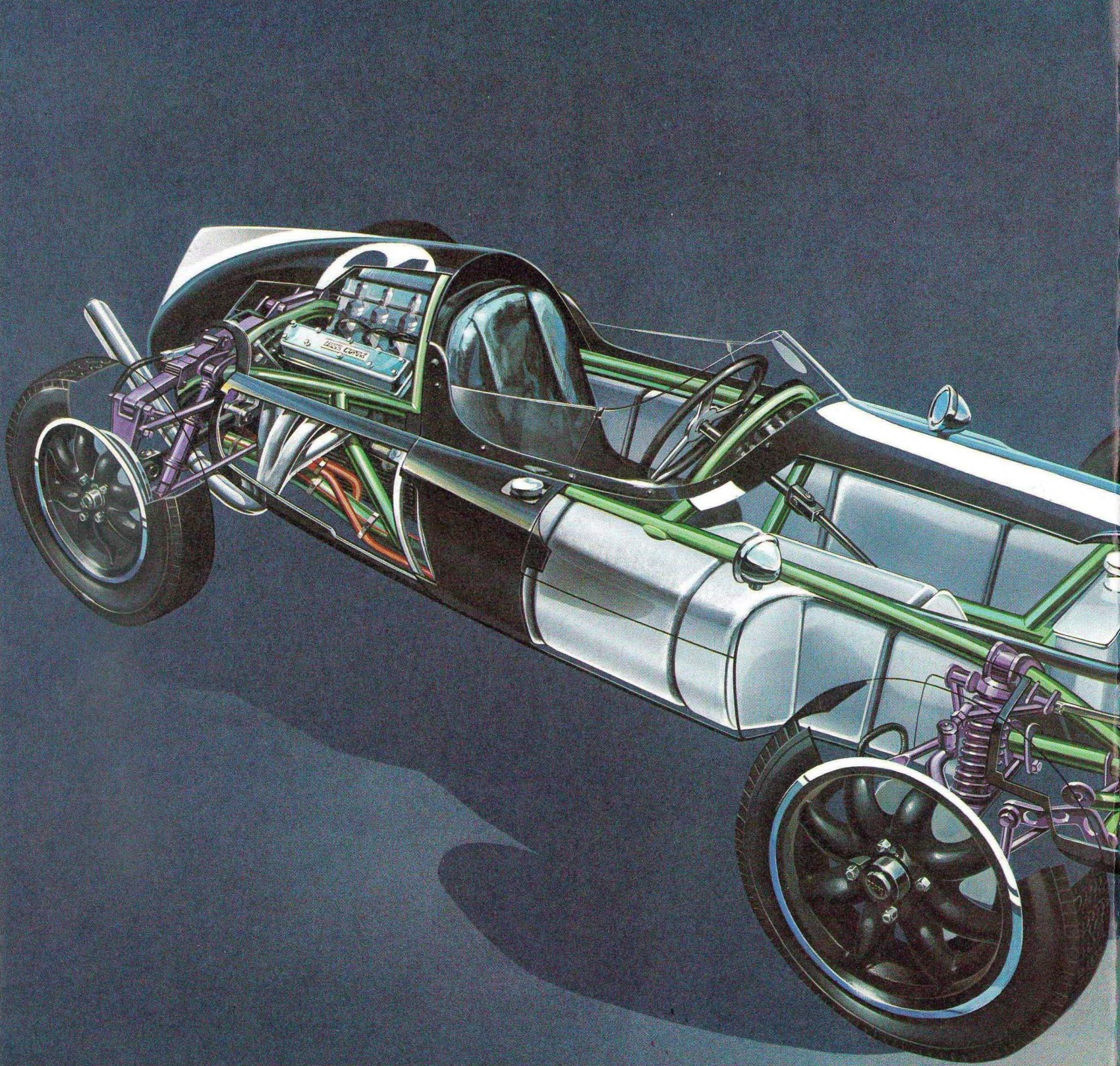


Ferrari Dino 246/1958

shown is a version specially run for the Monaco Grand Prix – the front has been chopped for better radiator cooling on this tight circuit with its many bends.

Many racing car designers looked down their noses at the Cooper Climax. Stirling Moss had won the Argentine Grand Prix with it on 19 January 1958, and Maurice Trintignant grabbed the Monaco Grand Prix on May 18 with the same car – but some said that these victories were mere flukes. Not even in 1958 had the Cooper become a fully grown Formula 1 racer with its largest engine still at only 2.2 litres. But of all the racing cars of 1958, it was to be the little Cooper which paved the way for Formula 1 development in the years to come.





**COOPER CLIMAX was undoubtedly the major milestone of post-war Formula 1 history. The little rear-engined Formula 2 racer played the role of David against Goliath in its 1958 Argentine Grand Prix début, winning against all odds. When the 1.5 litre Formula 1 was introduced three years later, all the other racing teams had had second thoughts and moved their engines to the back of their cars likewise!**

The men behind Cooper were Charles Cooper and his son John. In close co-operation with Eric Brandon, they designed the first true rear-engined 500 cc racer in the summer of 1946. The front suspension and chassis came from a Fiat Topolino 500 and the engine was a single-cylinder JAP motorcycle unit driving the rear wheels through a Triumph motorcycle gearbox and chains. This little car was first used for 500 Club racing. By 1950 this British National class had gained International status as Formula 3, but before that Cooper had started producing cars on a small scale. During 1948, for example, output had totalled just twelve cars.

Cooper was to become one of the most successful names in Formula 3 racing. Then when the British engine manufacturers Coventry Climax introduced a new 1.5 litre unit, Cooper designed both a sports racing car and then in 1952 a Formula 2 car around the engine. In 1957 another Climax 1.5 litre engine – this one with twin-overhead camshafts – was announced. The Cooper Formula 2 was redesigned during 1957 and the engine inclined 18 degs in order to get the SU carburettors inside the engine cover. Transmission was by a Citroen gearbox with gears specially cut by Cooper.

By 1958 Climax were producing racing engines in three sizes – 1475 cc, 1960 cc and 2200 cc, the smallest priced at £2350.

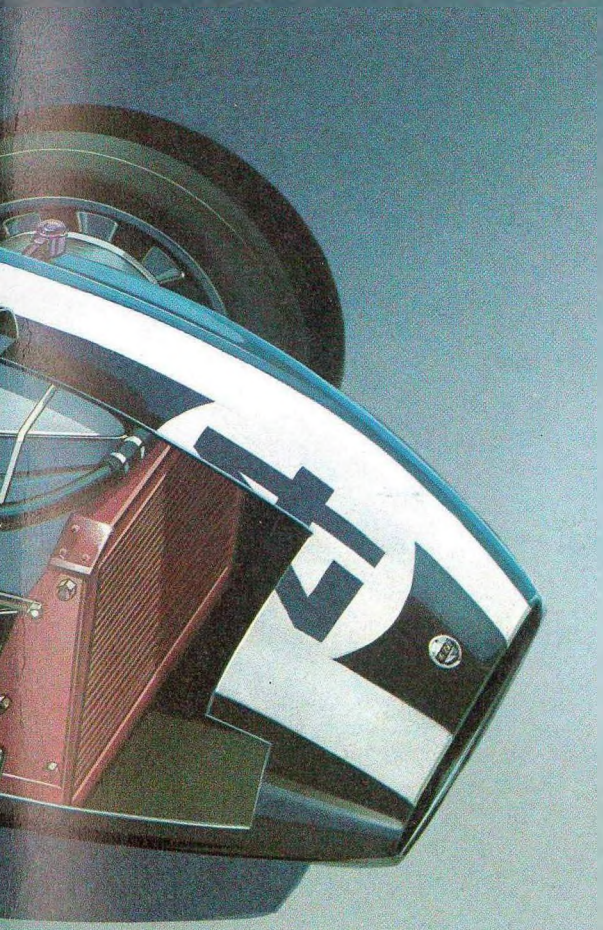
In the same year Cooper made its breakthrough into Formula 1. For the first *grande epreuve* of the season, the Argentine Grand Prix, Stirling Moss had been promised cars from both Vanwall and BRM. Due to uncertain fuel regulations both failed to materialize. Moss was then loaned a Cooper with the 1.9 Climax engine – just to get a race. When the car arrived, his fellow competitors started making fun of the car, but the jokes all fell flat after the first practice session when Moss produced the second fastest lap time.

The race saw a fierce battle between 'old style' Fangio in his Maserati and 'new style' Moss in the Cooper Climax. An unscheduled tyre change forced Fangio into the pits and Moss won quite unexpectedly. A new racing era had been heralded. (After the French Grand Prix in July 1958 Fangio retired from racing, possibly aware that a new racing epoch, quite unfamiliar to him, was imminent.)

Another Cooper, this time with a 2.2 litre Climax, was driven by Maurice Trintignant with equal success in the second World Championship race, the Monaco Grand Prix on 18 May. The rear-engined racing car had made its point.

During 1958, Cooper built a few cars fitted with Maserati engines, purely to gain more capacity than the Climax. Stirling Moss also competed in some Formula 2 races with a Cooper Borgward, and Jack Brabham won the World Championship in both 1959 and 1960 driving Cooper Climax cars.

In 1961 Jack Brabham raced in the Indianapolis 500 with a Climax-engined Type 54 bored out to 2750 cc. Quite sensationally the little car finished ninth amongst the larger, more powerful Indy racers. This first European racing car success at Indy in post-war years became the starting point for the American adoption of rear-engined racing cars.



Cooper Climax/1960

THE FERRARI DINO 156 was the first rear-engined model of its marque – and its first outing was in the 1961 Monaco Grand Prix. This was the first year of the 1.5 litre Formula 1 and the car was to remain virtually unchanged through 1962 to 1963. In 1964 Ferrari were to introduce the 158 with a V8 engine.

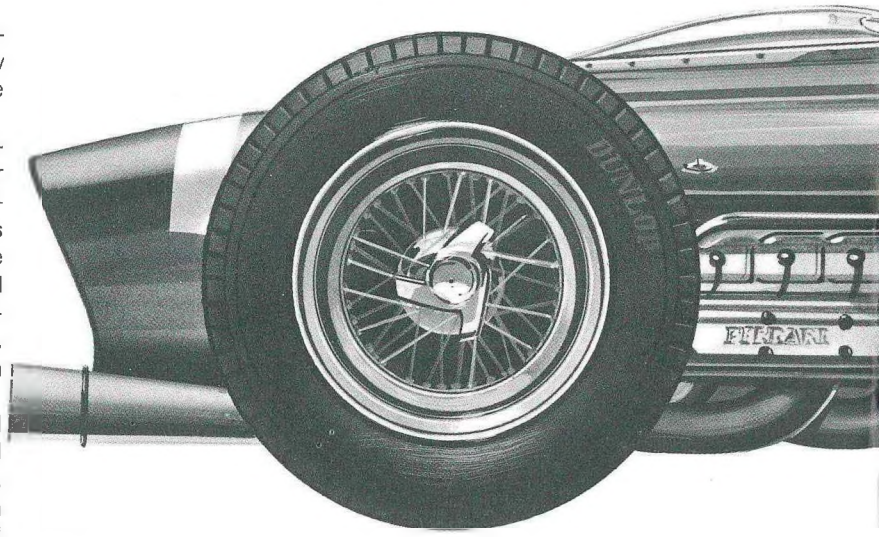
In previous years Ferrari had used a 2.5 litre V6 Dino engine – named in memory of Enzo's son who died young – and the new 1.5 litre engine followed the same configuration apart from one alternative power unit.

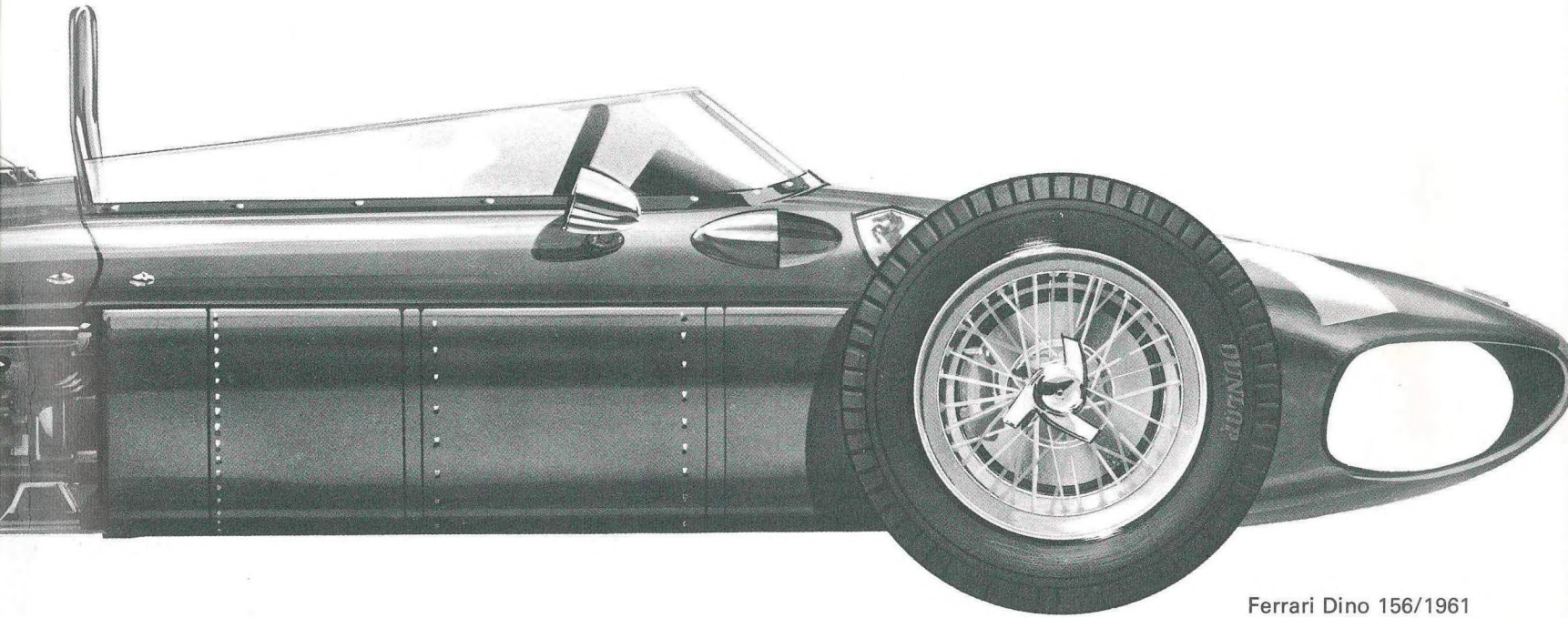
For the Monaco début the alternative proved to be a completely new 120 deg V6 driven by Richie Ginther, while two other cars using the 'ordinary' V6 were piloted by Phil Hill and Wolfgang von Tripps. All three cars sported five-speed gearboxes and power output was 190 bhp for the 120V and 180 bhp for the other two. The Ginther car weighed 455 kg including fuel, oil and water, while the other cars were 465 kg – remarkable engineering for a formula dictating a 450 kg minimum weight limit. Ginther finished second, Hill and von Tripps third and fourth in the race.

In its first season the 156 went on to win the World Championship for Constructors and Phil Hill the Drivers' World Championship. This followed victories at Zandvoort in Holland, Spa in Belgium, Reims in France, Aintree in Britain and Monza in Italy – the last a hollow victory when 'Taffy' von Tripps and fourteen spectators lost their lives in a dreadful accident.

By 1962 the engines had been tuned to 190 bhp in the 60 deg engine, and 200 bhp in the 120 deg. On top of that, the cars now had six-speed gearboxes and the bodies were redesigned with a slightly lower profile, although the now-distinctive shark-nosed front remained unaltered. As the 60 deg motor had better torque it was principally intended for tighter tracks – like Monte Carlo – while the 120 deg motor was ideal for fast tracks such as Monza and Spa.

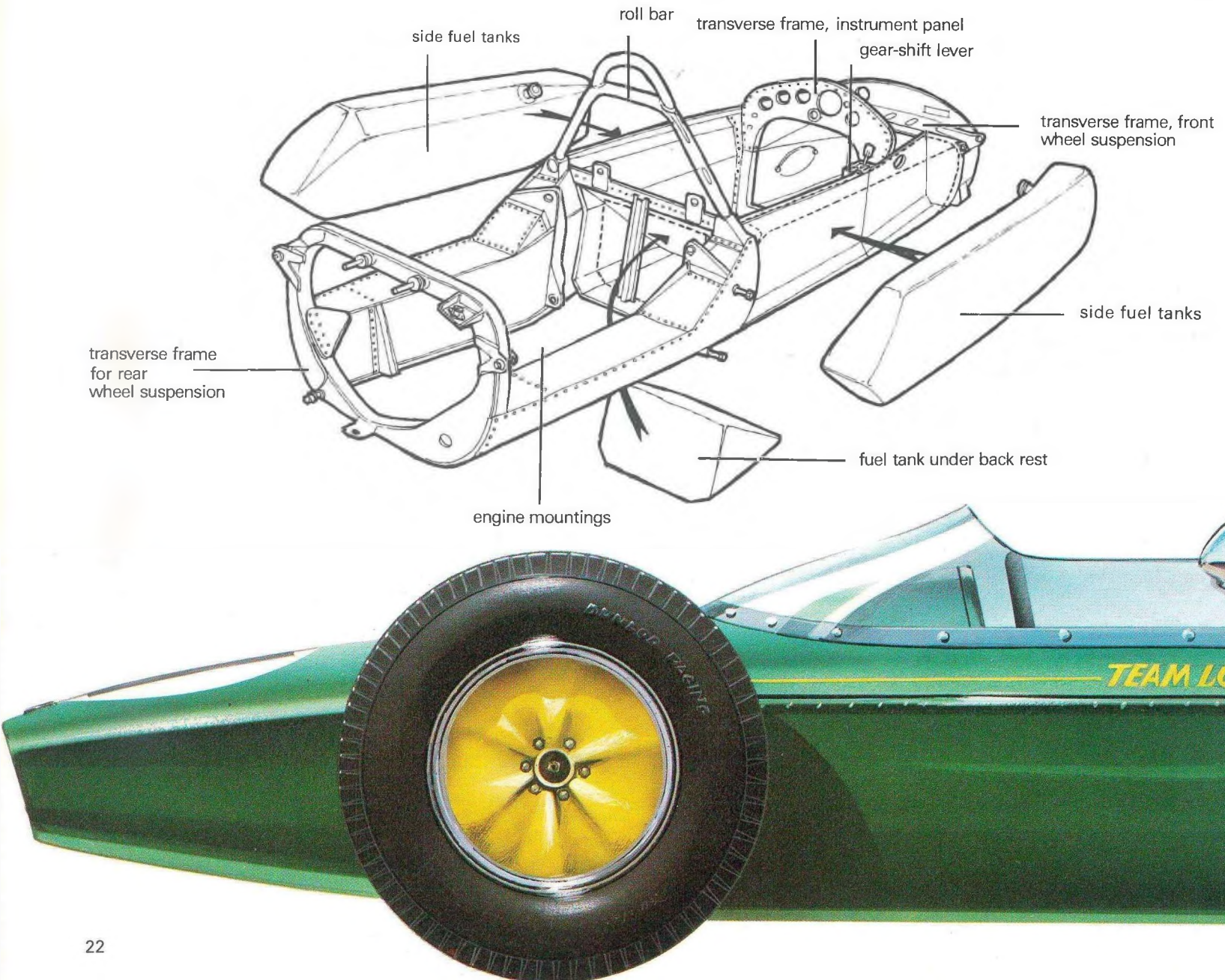
Ferrari fielded six complete Formula 1 racers during the 1962 season – and six drivers with three reserves were contracted for each Grand Prix. Yet despite this enormous effort Ferrari failed to win a single World Championship round during the season. During 1963 a further-improved version of the car was used, but only one World Championship race victory – on the Nurburgring – was achieved. The Ferrari 156 was finished.






Ferrari Dino 156/1961

THE LOTUS STORY is very much a tale about Colin Chapman, its creator. Born in 1928 and christened Anthony Colin Bruce Chapman (the initials ACBC are still incorporated in the Lotus badge) he started studying to become a civil engineer in London. After a motorcycle accident in 1947, his parents bought him a Morris 8. But Chapman discovered he could make money by renovating the car and selling it, and soon he was running a



small second-hand car business as a sideline to his studies. One car he failed to sell – a 1930 Austin Seven. When it didn't go, he rebuilt the car naming it Lotus Mk 1. Why Lotus he can't explain even today. He took a fancy to rebuilding cars and started on another Austin – to become Lotus Mk 2. This was modified for trialling and was lent to the current trials champion who promptly won the very first event he entered it in! This performance was repeated no less than seventeen times during that year, and the name of Lotus was beginning to become noticed. Success inspired Chapman to build more Lotus cars and his creations were always the cars to beat in competition.

By January 1952 the car modifying business had gone so well that Chapman decided to form Lotus Cars Ltd. Then aged 23 he continued to produce trials cars and later on added sports and sports-racing cars, among them the Lotus Seven kit car which was to become the best known, and is still being produced.

Chapman entered his first Lotus in a Formula 1 race in 1958, then in the guise of a Formula 2 car with a 1.5 litre Climax engine in competition with 2.5 litre cars. Chapman's creations were renowned for their ingenious construction and lightness. By the end of 1958 he had met Jim Clark, the quiet Scotsman who was to become one of Chapman's best friends and one of the world's best racing drivers. It was Chapman who gave Clark his chance to begin racing in Formula 1, and until his death in 1968 Clark drove no other make than Lotus.

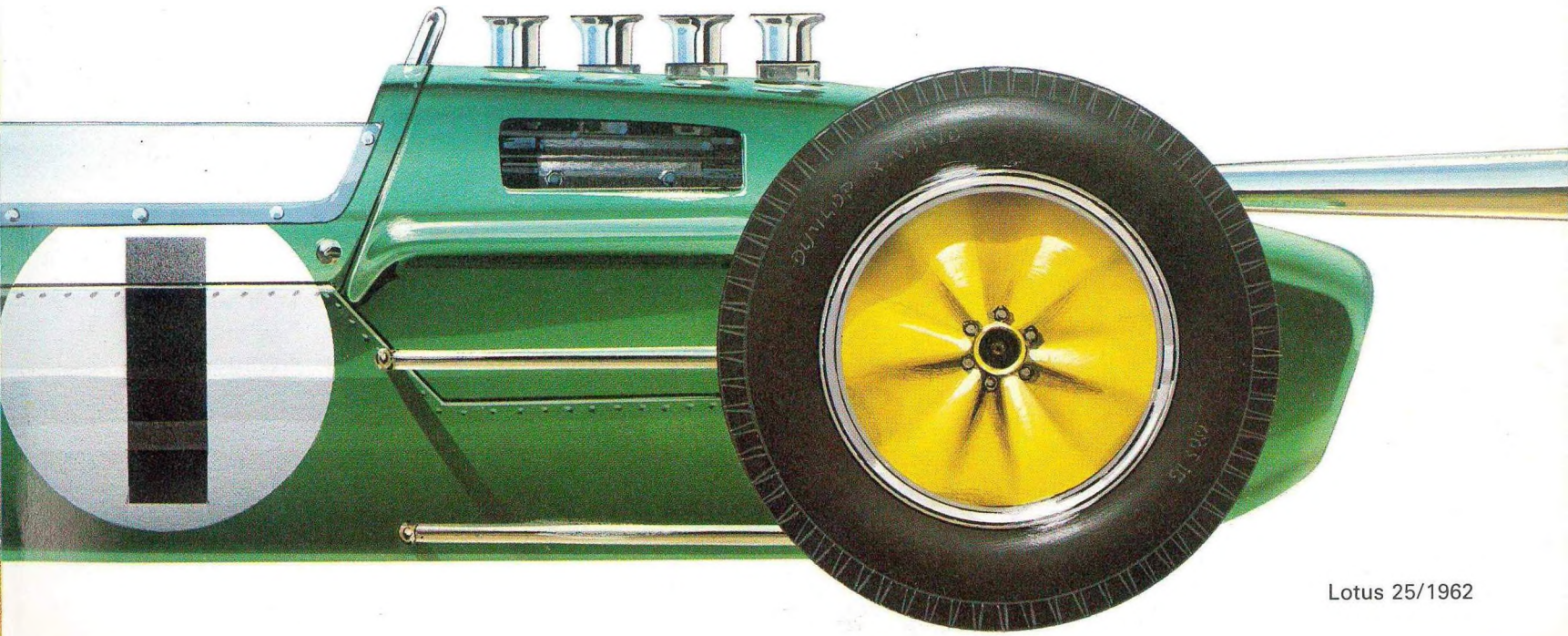
In 1959 Chapman built three Lotus cars for Grand Prix racing using the 2 litre Climax engine. These cars resembled Vanwalls so much that they were nicknamed 'Mini-Vanwalls'! All Chapman's cars had so far been front-engined but the success of Cooper was causing considerable rethinking. And so in 1959 Colin Chapman presented his first rear-engined Lotus – the Lotus 18. This car won two World Championship races that year.

For the 1961 season Formula 1 rules had again been changed, now making an engine size of 1.5 litres the limit. The Lotus Climax 21 won three World Championship races in that season.

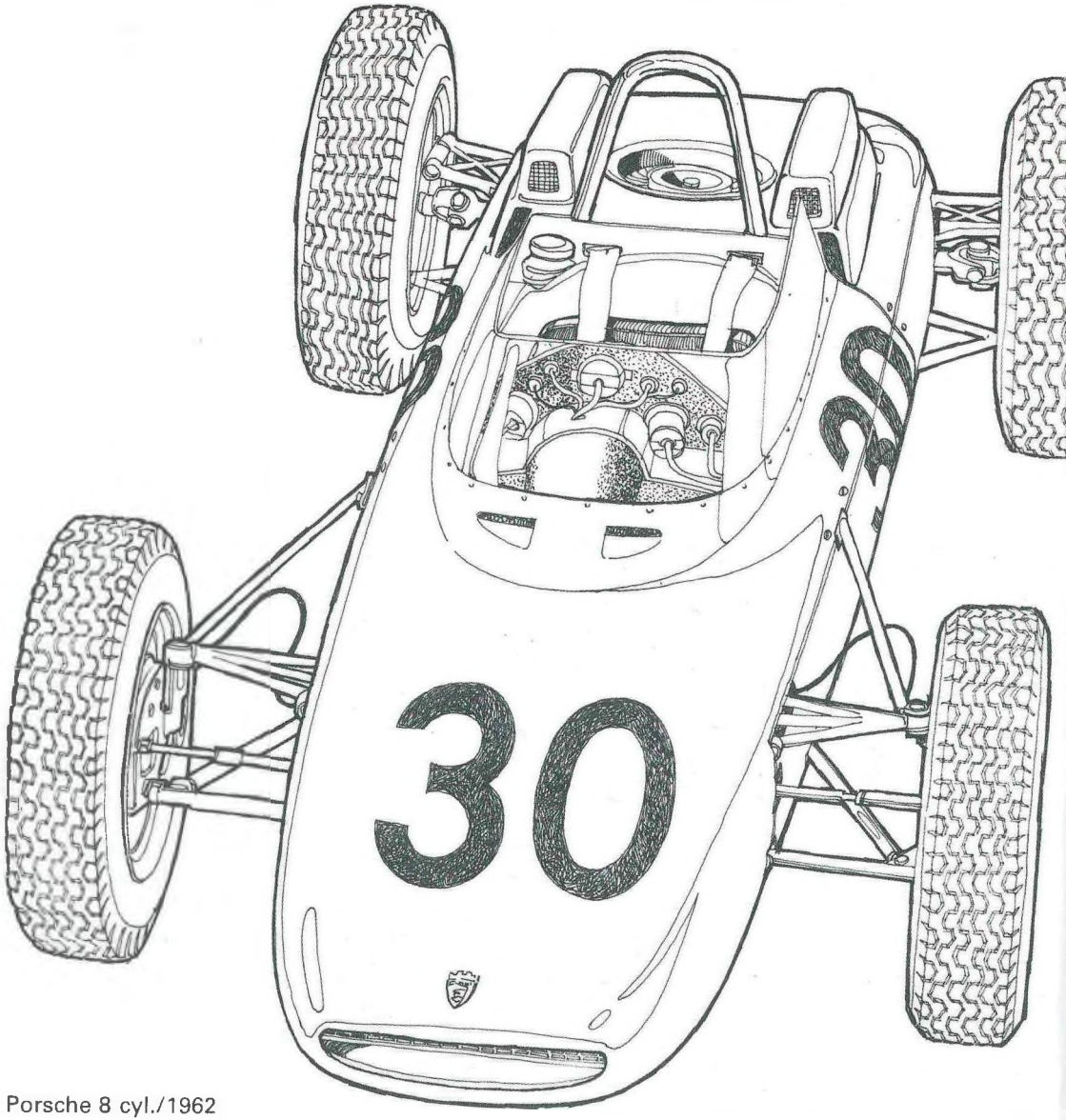
The car shown in our illustration on page 23 is the car of 1962 – the sensation of that year which finally proved Chapman's genius as a constructor. The car was the Lotus 25 and Chapman's revolutionary idea had been to throw away the usual tubular chassis in favour of a monocoque tub made from aluminium. Instead of sitting in the car, the driver was lying in the semi-prone position, making for a very low body profile. Steering wheel diameter was the smallest to date at just over 12 ins and the 25 was the lightest and most aerodynamic of all 1962 racing cars.

In its first race Jim Clark pulled out an enormous lead and proved the outstanding superiority of the car – but was unfortunately forced to retire. However, the 25 and Clark went on to take three World Championship race victories later in the year.

The following season Clark became World Champion for the first time after an incredible year – no less than seven victories. The Lotus 25 continued unchanged apart from slight modifications until 1965, when Chapman introduced the Lotus 33. In this car Jim Clark was again to become World Champion.



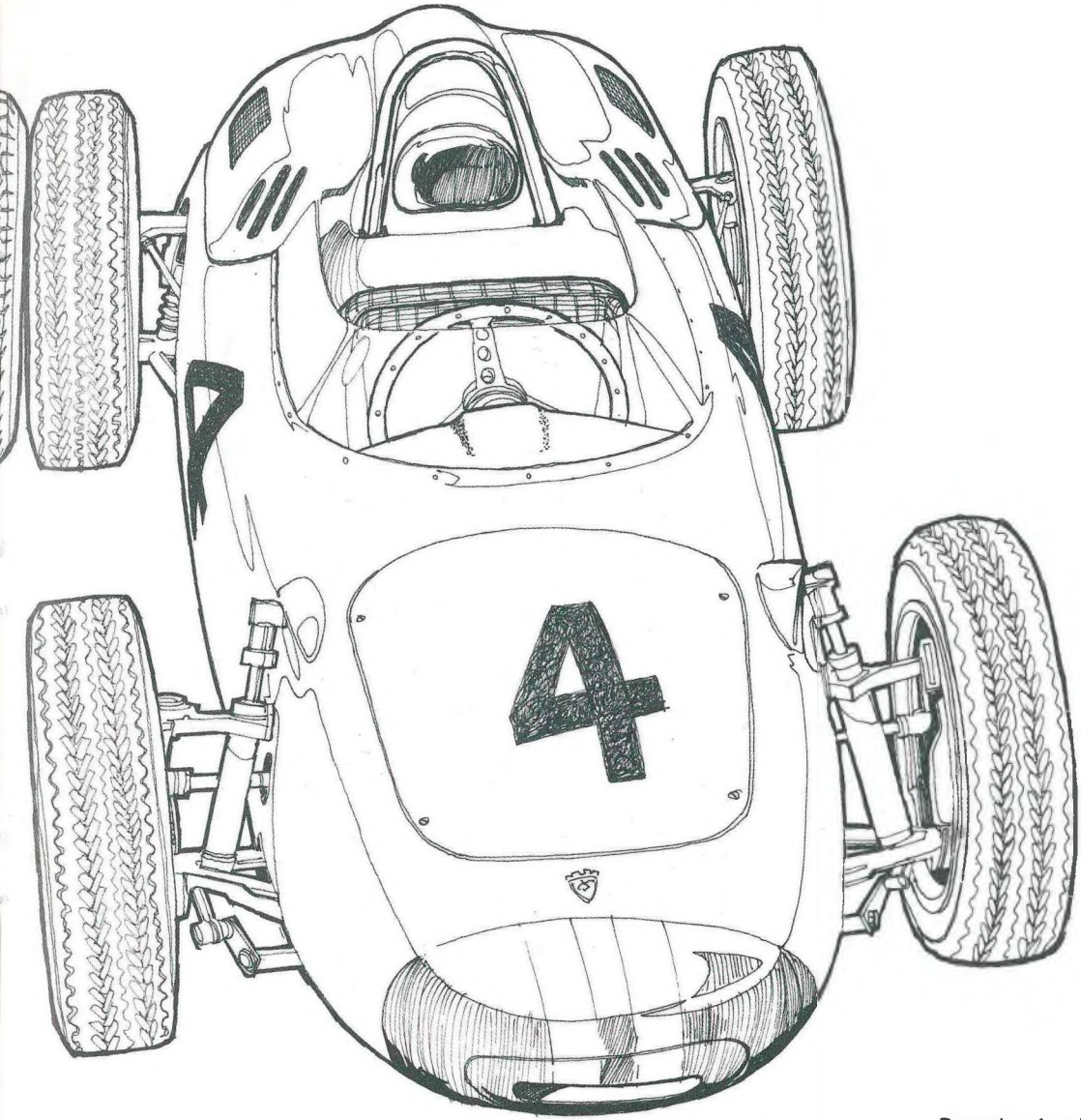
Lotus 25/1962




Porsche 8 cyl./1962

WHEN THE 1.5 LITRE Formula 1 had been introduced in 1961, everyone expected to see Porsche make its Grand Prix début, particularly as the German company had been doing well in Formula 2 the previous year. And that's just what did happen – early in the year Porsche announced that they were building an 8-cylinder flat engine to go into a completely new car. A 200 bhp output was promised by the factory's technical department – but installed in the test-rig the new flat 8 wouldn't show more than 120 bhp, and Porsche were forced to use the old 4-cylinder engine in the new car for the 1961 season. This combination proved to be none too successful, and it was finally decided to use the 1959/60 Formula 2 cars while the new car and its flat 8 were redeveloped. In the winter of 1961/2 the engine had been improved to show 180 bhp – although this figure was still well below outputs from its 1962 competitors. The car had been completely redesigned, incorporating a suspension not unlike that on the Lotus, and a six-speed gearbox was added.

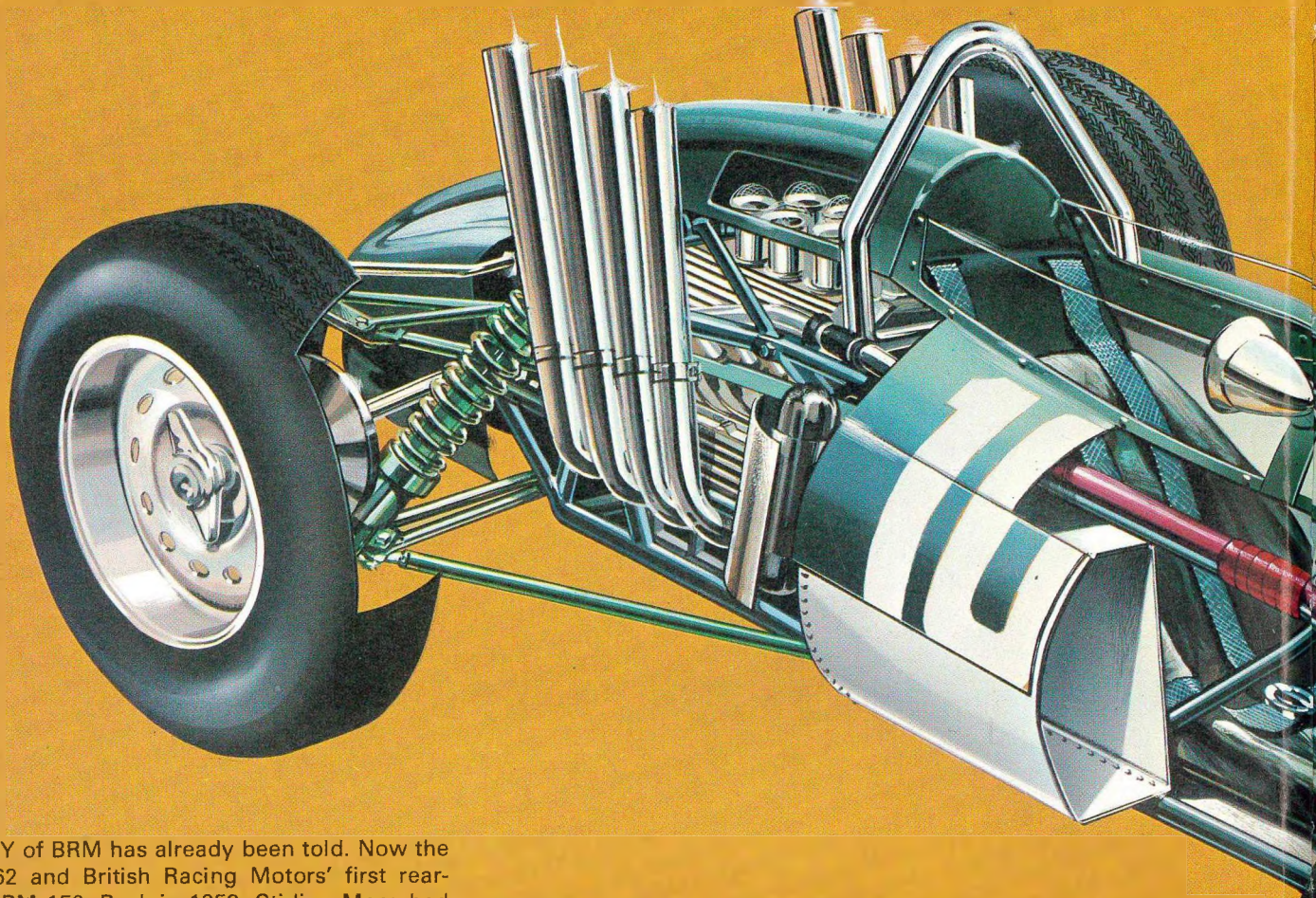
The first car was completed in February 1962, but testing was




Porsche 4 cyl./1961

delayed for various reasons and the start of the season went as badly as the previous year. As time went by, the factory managed to improve the car to reasonable competitiveness, and Dan Gurney won two races for Porsche that year – both minor non-championship races – although he was only a gnat's whisker – 4.4 seconds behind the leader – from victory in the German Grand Prix.

The Porsche Formula 1 was generally reckoned to be slower on the straights than the British cars with their powerful Climax engines. The Porsche, however, had the better brakes and by braking late could often keep pace with the leaders. The flat 8 was air-cooled with twin spark plugs in each cylinder and four twin-choke 38 mm Weber carburettors. The 180 bhp was seen at 9300 rpm and compression ratio was 10:1, remarkably low compared with the Climax and Ferrari engines. The most successful Porsche pilot was Dan Gurney, and he managed to win just one World Championship race for them – at Rouen in 1962.



THE EARLY HISTORY of BRM has already been told. Now the story moves to 1962 and British Racing Motors' first rear-engined car – the BRM 150. Back in 1958, Stirling Moss had suggested that BRM should experiment with a BRM engine in a Cooper. One car was built privately and raced, but without success. In 1959 this car was sold to the BRM factory, and Peter Berthon – one of the BRM designers – became interested in the idea of the BRM/Cooper combination and started on his own version. This he finished in September 1959. The car had its début in 1960, just one year before the 1.5 litre Formula 1 was introduced.

When this came about, BRM changed to a 1.5 litre Climax engine in the 1960 chassis, but this combination was unsuccessful. Apparently the car was too heavy and no real conclusions had been drawn from the project. So during the winter of 1961/2 a new car was built, and alongside it a new BRM V8 power unit. This is the car shown in our illustration – this particular version tailor-made for the Monaco Grand Prix with the front chopped to obtain maximum airflow for the radiator on the tight, twisting Monaco circuit.

Together with Ferrari, BRM was now the only manufacturer to use centre-locking 'knock-on' wheels, the magnesium alloy rims made by Dunlop. To start with, BRM's biggest headache was gearboxes – their five-speed gearbox was by no means reliable and in 1962 had to be replaced by an Italian Colotti gearbox.

Low wind-resistance had always been one of BRM's hobby-horses – and previous BRM bodies had been thoroughly wind-tunnel tested. However, the new 150 did without such tests since it was considered so light and low-profiled that even a better shape could hardly increase performance. One interesting feature was the rubber fuel tanks, used on all Formula 1 racers nowadays. The engine was a 90 deg V8 using a choice of Weber carburettors or Lucas fuel injection. Power was rated at 187 bhp at 10,000 rpm and the compression ratio was 12.2:1.

In 1962 BRM finally became World Champions after many problem-fraught years. Graham Hill took the Drivers' Championship, and BRM the Constructors' Championship. Graham won after a season of consistent performances which included victory in four races. And 1962 went down as the year of British Racing Motors.

BRM 150/1962

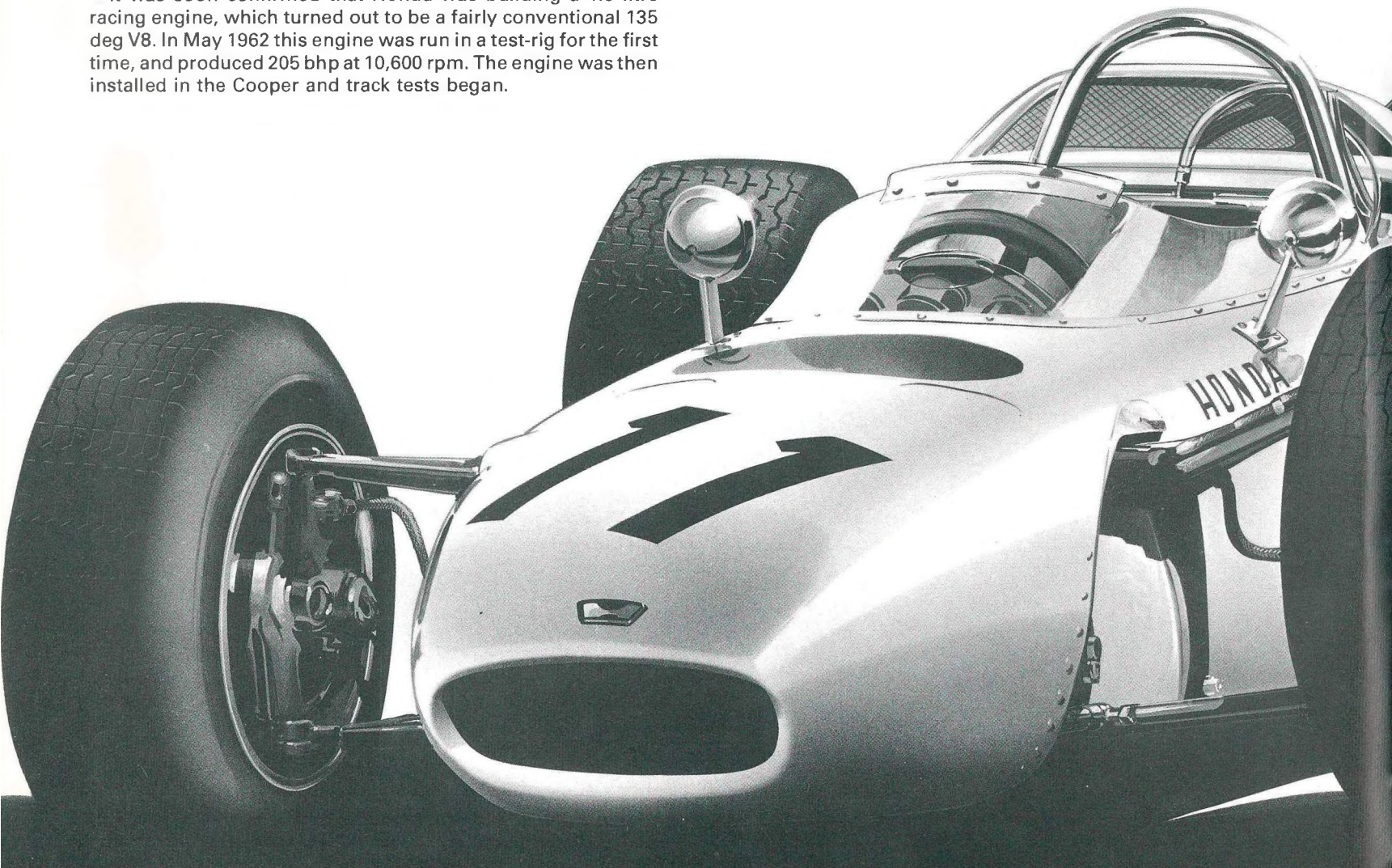
IN 1948 THE JAPANESE businessman Soichiro Honda began to manufacture motorcycles. By 1961 his products had become so popular that the Honda factory's annual production now exceeded one million bikes. Honda's racing début had been on the Isle of Man with racing bikes back in 1953, then using a 125 cc engine. In 1960 the first pure TT 250 machine was made – this bike revved to 14,000 rpm and churned out 35 bhp, which was absolutely fantastic for that time. The following year, Honda won the World Championship in both 125 and 250 road-racing classes. Honda had become a name to be reckoned with.

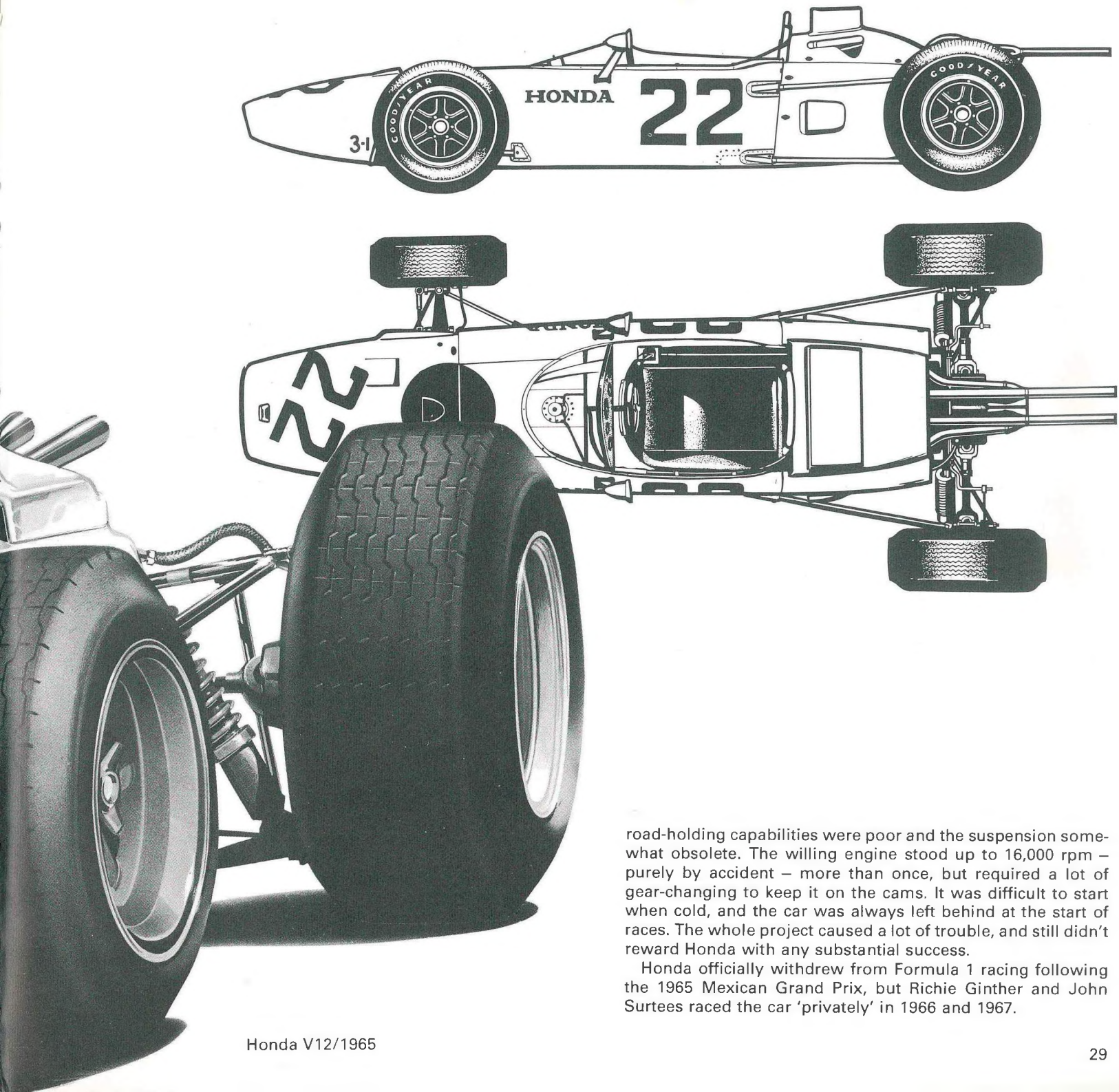
But Soichiro Honda wanted to extend his racing activities. In the same year that Honda bikes carried home those titles, Mr Honda bought a second-hand 1960 Cooper Climax and freighted it out to Japan. At the same time a sports car and light truck factory was being built; the pundits began to forecast that Honda was going into Formula 1 racing.

It was soon confirmed that Honda was building a 1.5 litre racing engine, which turned out to be a fairly conventional 135 deg V8. In May 1962 this engine was run in a test-rig for the first time, and produced 205 bhp at 10,600 rpm. The engine was then installed in the Cooper and track tests began.

Just one month later, Honda announced that he was building a 60 deg V12 engine, and this was completed over the winter of 1961/2. In the test rig it produced 220 bhp at 13,500 rpm, an incredibly high rpm figure then – and now. Further development of the engine and a six-speed gearbox went on throughout the 1963 season. At the beginning of June 1964 work started on Honda's own car and by July the first car was ready to go to Zandvoort, Holland, for private track-testing. Here it knocked three seconds off the new lap record.

In August the Honda V12 made its first appearance in the German Grand Prix – but it couldn't keep pace with its rivals. Its






road-holding capabilities were poor and the suspension somewhat obsolete. The willing engine stood up to 16,000 rpm – purely by accident – more than once, but required a lot of gear-changing to keep it on the cams. It was difficult to start when cold, and the car was always left behind at the start of races. The whole project caused a lot of trouble, and still didn't reward Honda with any substantial success.

Honda officially withdrew from Formula 1 racing following the 1965 Mexican Grand Prix, but Richie Ginther and John Surtees raced the car 'privately' in 1966 and 1967.

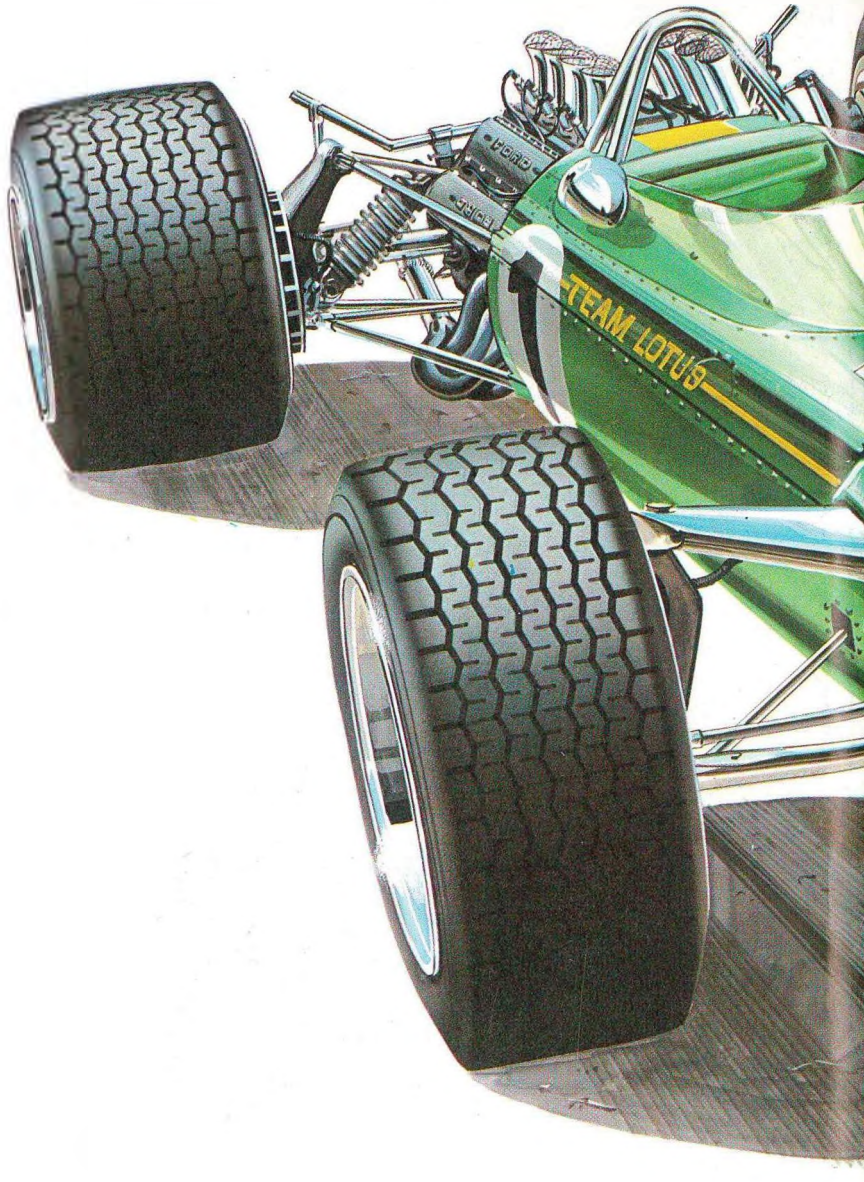
Honda V12/1965

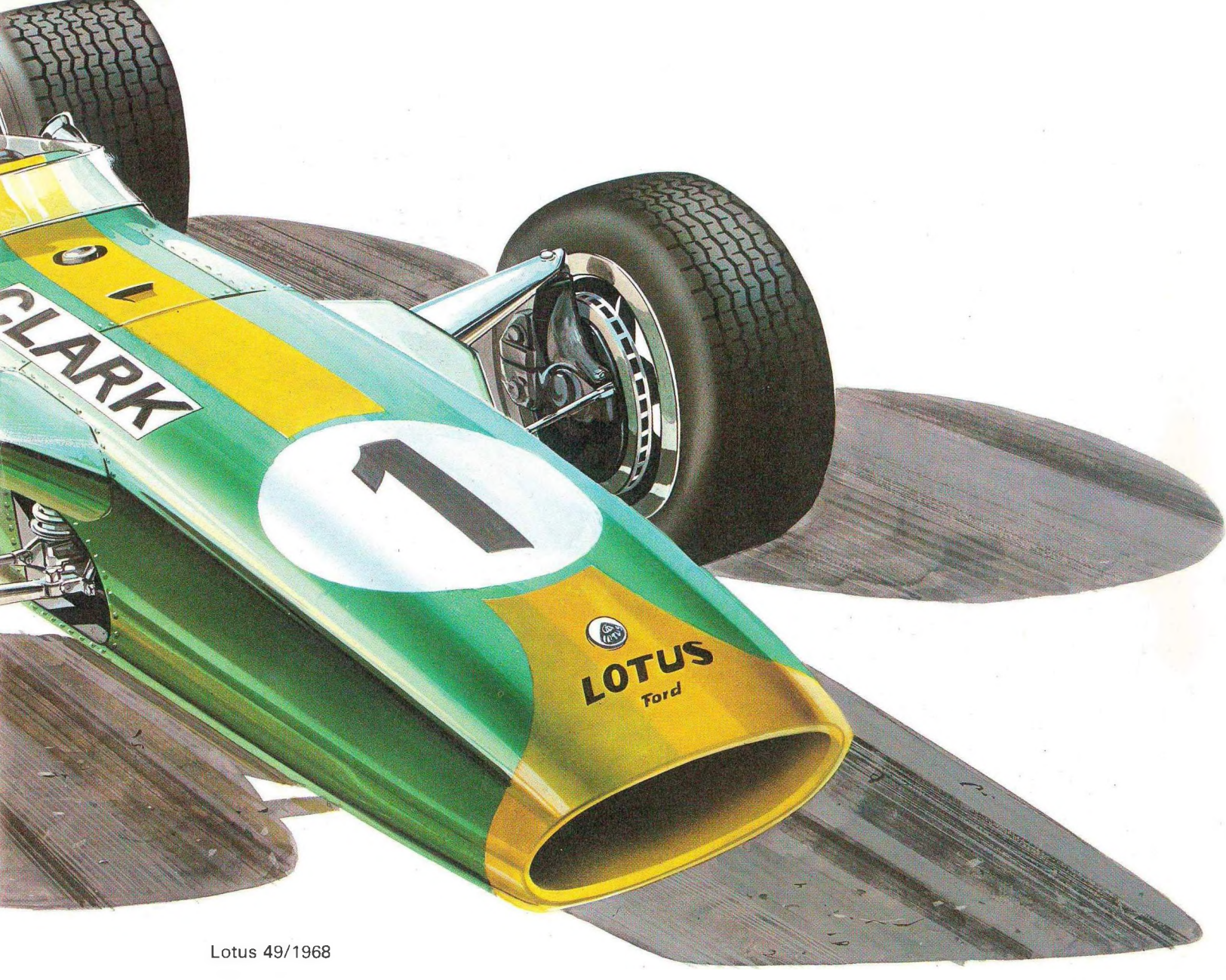
WHEN THE ENGINE CAPACITY FOR FORMULA 1 cars was increased from 1.5 litres to 3 litres at the start of the 1966 season, few manufacturers were prepared enginewise. During the first year with the new rules in force, Jim Clark raced a Lotus 39, i.e. the same car used previously for the 1.5 litre rule. Under the new formula, the car was equipped with either the BRM 2 litre engine or a Climax engine bored to 2.7 litre. Neither version of the Lotus 39 could keep up with the competitors and the 1966 season was a total failure for Lotus.

At the beginning of 1967 BRM had a 3 litre engine named the H16 ready, a 16-cylinder engine looked upon with great excitement. Colin Chapman installed one in a car for Jim Clark, but the engine proved too sensitive and Clark was totally unsuccessful. Many people thought that Clark as well as Lotus lagged behind in developments; but what no competitor knew was that Colin Chapman had produced a completely new Formula 1 racer with a totally new engine. It was the Lotus with model number 49, introduced at the third World Championship race in Holland 1967. That's the racer shown in the illustration. The Lotus 49 was the first car to utilize the engine as a part of the chassis, saving a considerable weight. The fuel tank was positioned in the centre of the car between driver and engine. And to top it all, the engine was the Cosworth-tuned Ford V8, still found in the majority of today's Formula 1 racers. Basically it consisted of two Ford Cortina engines. At Jim Clark's début in the Dutch Grand Prix the Lotus proved so superior that it left every competitor flabbergasted. But in spite of his four World Championship victories during 1967, Jim Clark was beaten to the World Championship by Denny Hulme with two victories and many second places. The main feature of the 1967 season was nevertheless Jim Clark's superiority in his Lotus 49.

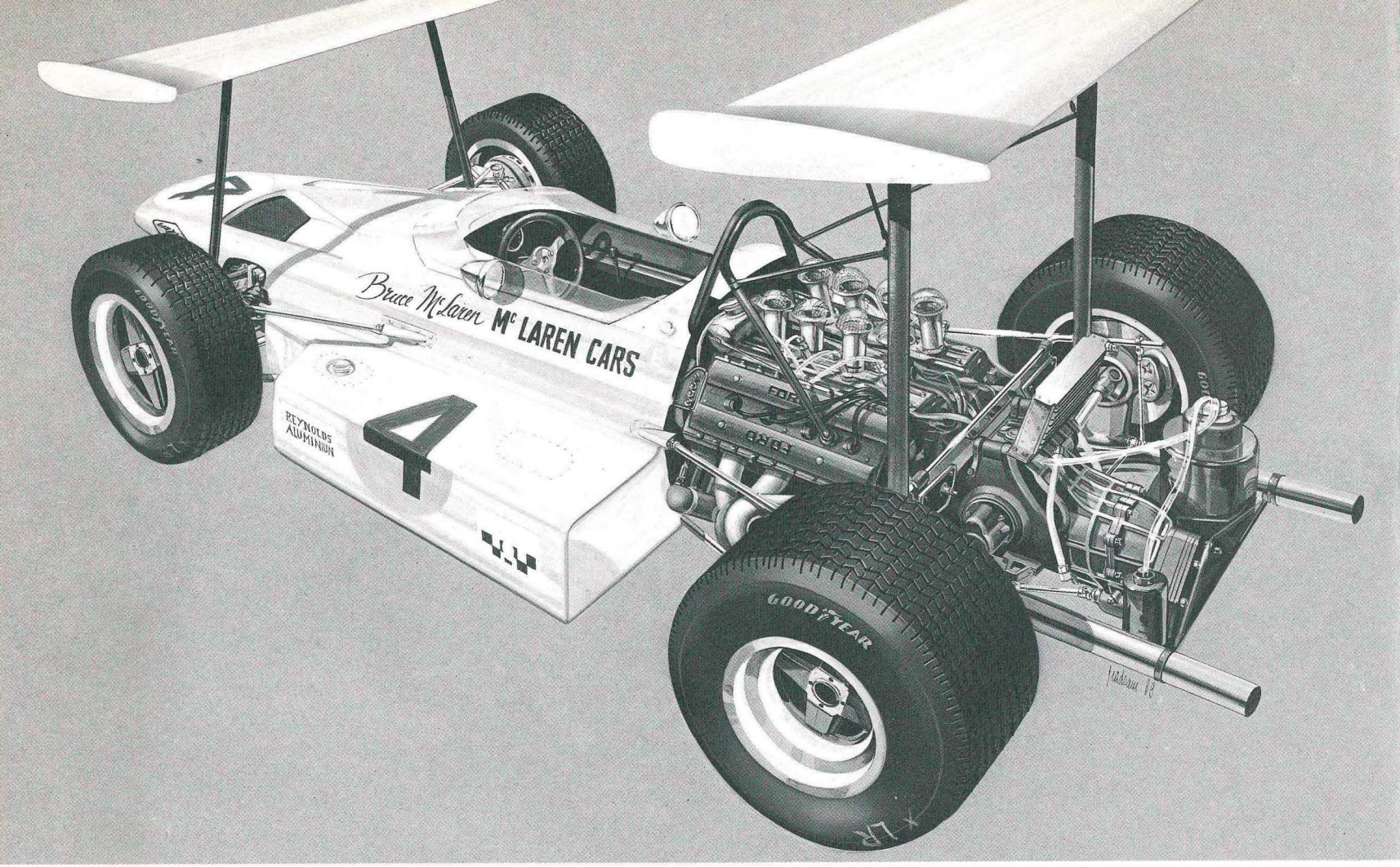
In 1968 Jim Clark won the season-opening World Championship race in South Africa in January. The '49' was still superior. But a couple of months later, Jim Clark was killed in a Formula 2 race at Hockenheim in West Germany, where his car left the track at 125 mph. To Colin Chapman, who had lost one of his best friends and one of the most skilled racing drivers of all times, Graham Hill's World Championship in a Lotus 49 later that year was cold comfort.

As the first Formula 1 car manufacturer, Colin Chapman managed to utilize his racers for advertising. A tobacco company became part sponsor for Lotus Formula 1 racing activities, the team was named Gold Leaf Team Lotus and the cars carried the colours of the cigarette manufacturer. The same idea has since spread, as we all know. The Lotus 49 was used after certain improvements, including aerofoils, had been made until 1970, when the newcomer Lotus D72 was introduced.






Lotus 49/1968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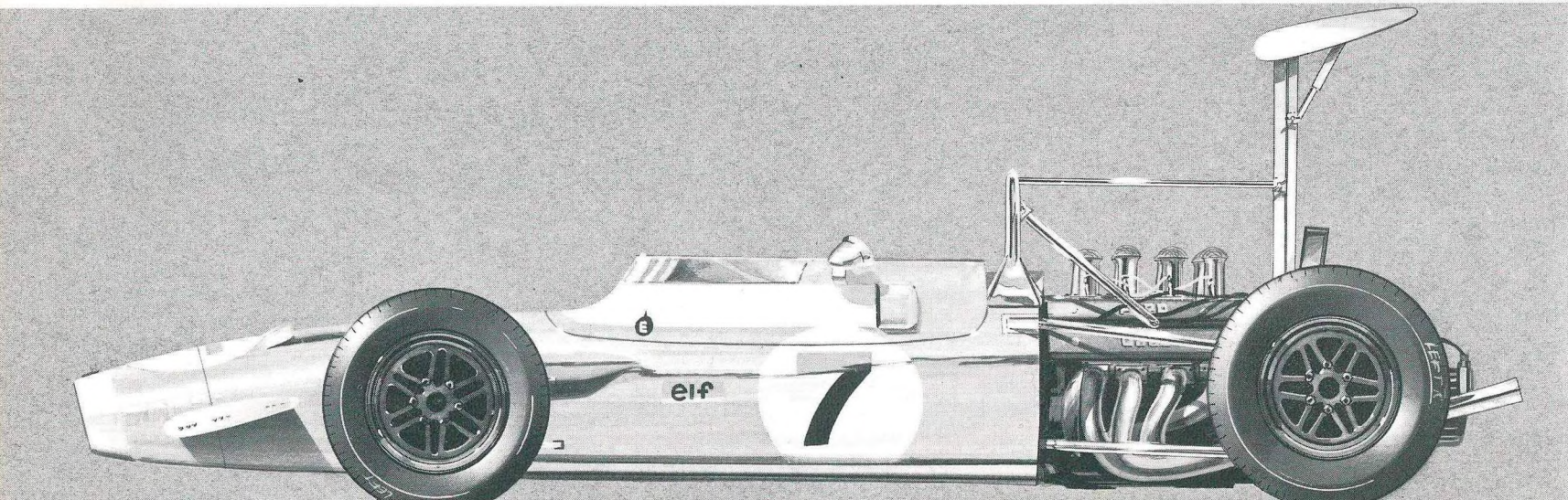
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BRUCE McLAREN was already an established Grand Prix driver when he made up his mind to build his own cars during the winter of 1963/4. The first was completed within a year – the M1A sportsracer, designed for Group 7. It was to become the forerunner of a long line of CanAm winning cars. McLaren finished his first Grand Prix racer in 1966. To begin with the single-seater was not an outstanding success, but the going was terrific in the American CanAm division where the big orange McLarens were mopping up everything year after year.

The racer in our drawing is the 1969 model, the McLaren M7A/3. The previous year's car had won no less than three championship races – and the Race of Champions at Brands Hatch – putting Bruce McLaren third in the final points. The M7A differed mainly in its big front and rear wings, the fuel tanks positioned outside the main bodywork. These wings were later banned from all cars as it was found that in certain conditions they could create lift instead of the intended contrary, and also sometimes collapsed with disastrous loss of control.

The engine was a Ford Cosworth V8 with a power output around 410 bhp. Behind the gearbox you can see the oil cooler and oil tank. But the M7A won no championship races during 1969. Bruce McLaren was killed early in 1970 whilst testing the new CanAm car at Goodwood. By that time he had built up a racing car factory at Colnbrook which many still consider to be the best in the world. For a short time it was uncertain whether McLaren Cars would continue without Bruce, but his wife Pat and colleagues Phil Kerr and Teddy Mayer decided to keep going – and have gone on succeeding. The McLaren team is still regarded as one of the best-run, best-organized in the world.

FRENCH MATRA built their first car in 1964 and their first Formula 1 racer took part in the 1968 Monaco Grand Prix. The first few cars were equipped with Matra's own V12 engine, but their successes were few and far between. The Matra co-operation with the British Tyrrell team and its chief driver Jackie Stewart gave the best results. Team Tyrrell equipped the Matra with a Ford Cosworth V8 engine. With the Matra Ford MS80, shown in the drawing, Jackie Stewart won the 1969 World Championship.



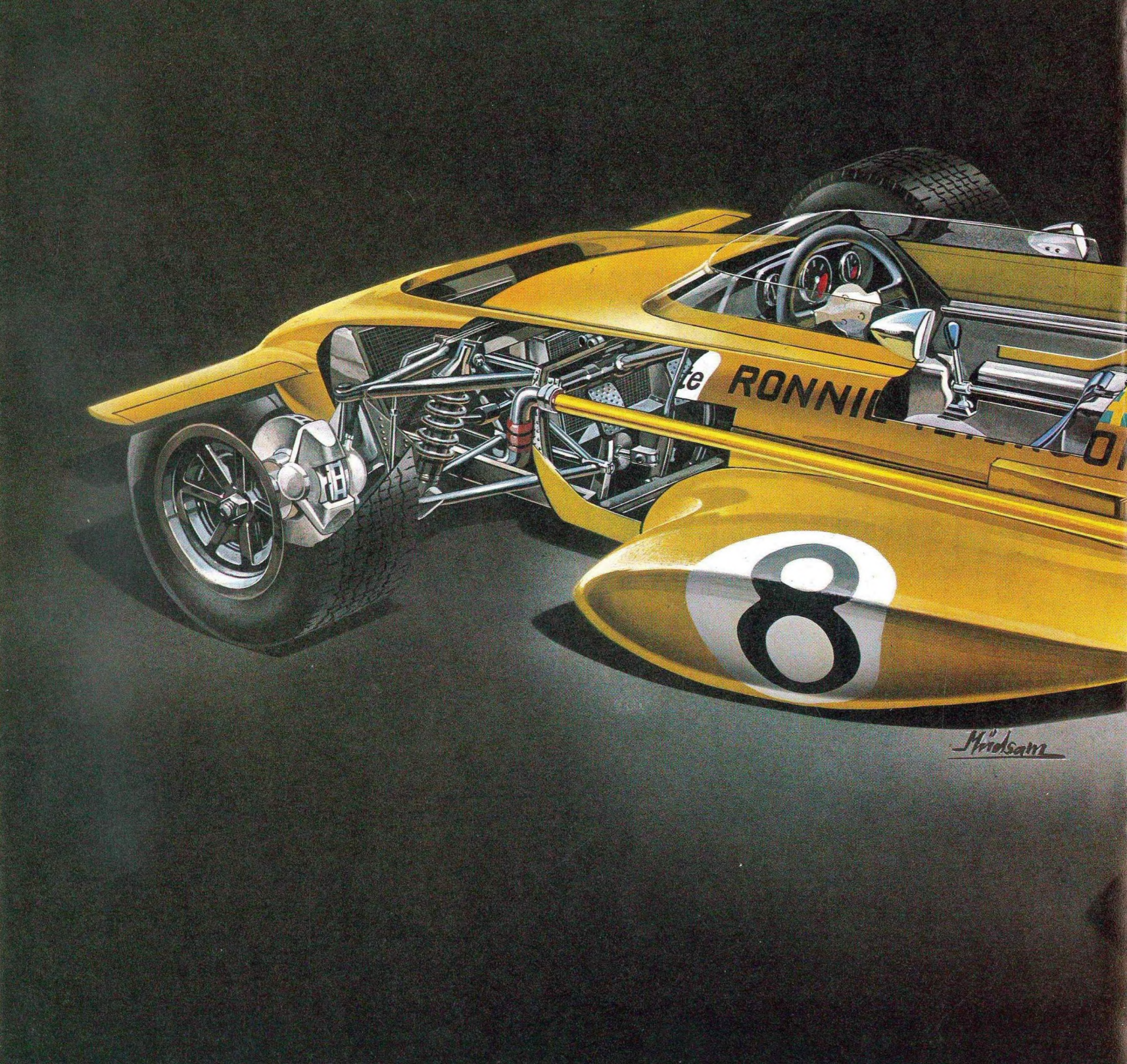
*Overleaf:* March 701/1970

THE NAME MARCH stands for the initials of its founders – Max **M**oseley, **A**lan **R**ees, Graham **C**oker and Robin **H**erd. It is still one of today's youngest Formula 1 teams, established at the end of 1969. The car on the following spread is the first Formula 1 car built by the Bicester company. The original intention of March was to build cars for Formula 1, 2, 3, Ford and CanAm racing. For the last-mentioned, just one car was built the first year and raced in 1970 without any real success. In the Formula 2 class the cars have been very successful and the Formula 3 cars are still much sought-after.

The March Formula 1 project got considerable financial backing from the American oil additive STP concern. When the all-new March was first announced at Silverstone, it made a big impact on motor sport – and the first car built was bought by Ken Tyrrell for Jackie Stewart to drive during the 1970 season. However, both Stewart and Tyrrell were so disappointed with the car's performance that Tyrrell decided there and then to go into the racing car construction business himself. The March 701 was not regarded as a completely proven race car. Appointed as works drivers for March in that first season were Chris Amon and Jo Siffert. A fourth car, privately owned by antique dealer Colin Crabbe, was the March in which Ronnie Peterson made his Grand Prix début.

What made the March 701 stand out among its rivals was primarily the shape – with its outboard fuel tanks either side of the body forming an inverted wing shape, intended to improve road-holding. March used the same Ford Cosworth V8 as many of its Grand Prix competitors.

The March 701 was not successful – apart from a convincing win for Stewart in the 1970 Spanish Grand Prix – and the real breakthrough was not to come until 1971 when a completely new car was constructed for Ronnie Peterson as works driver. The 711 took Peterson to second place in the Drivers' World Championship.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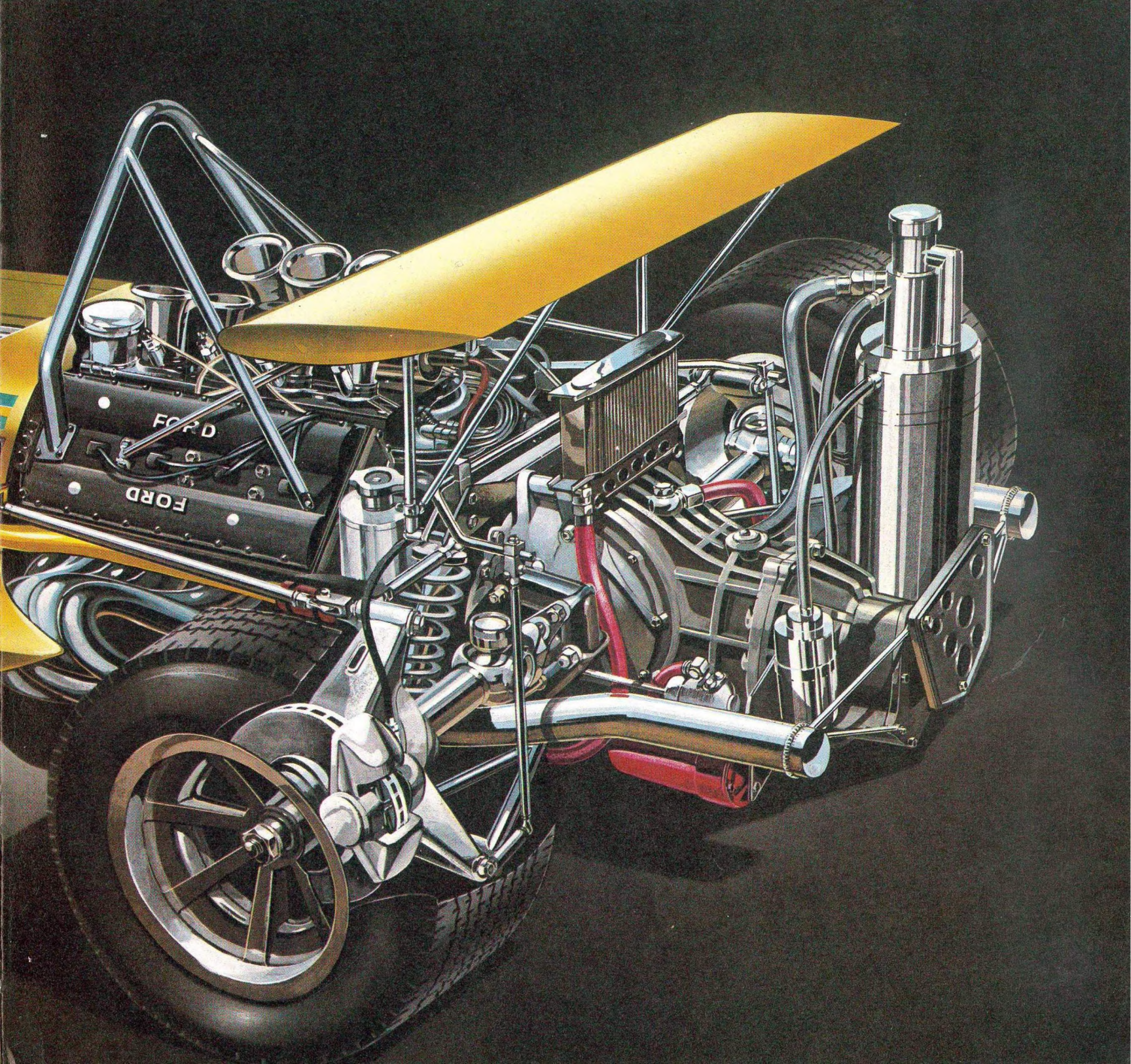
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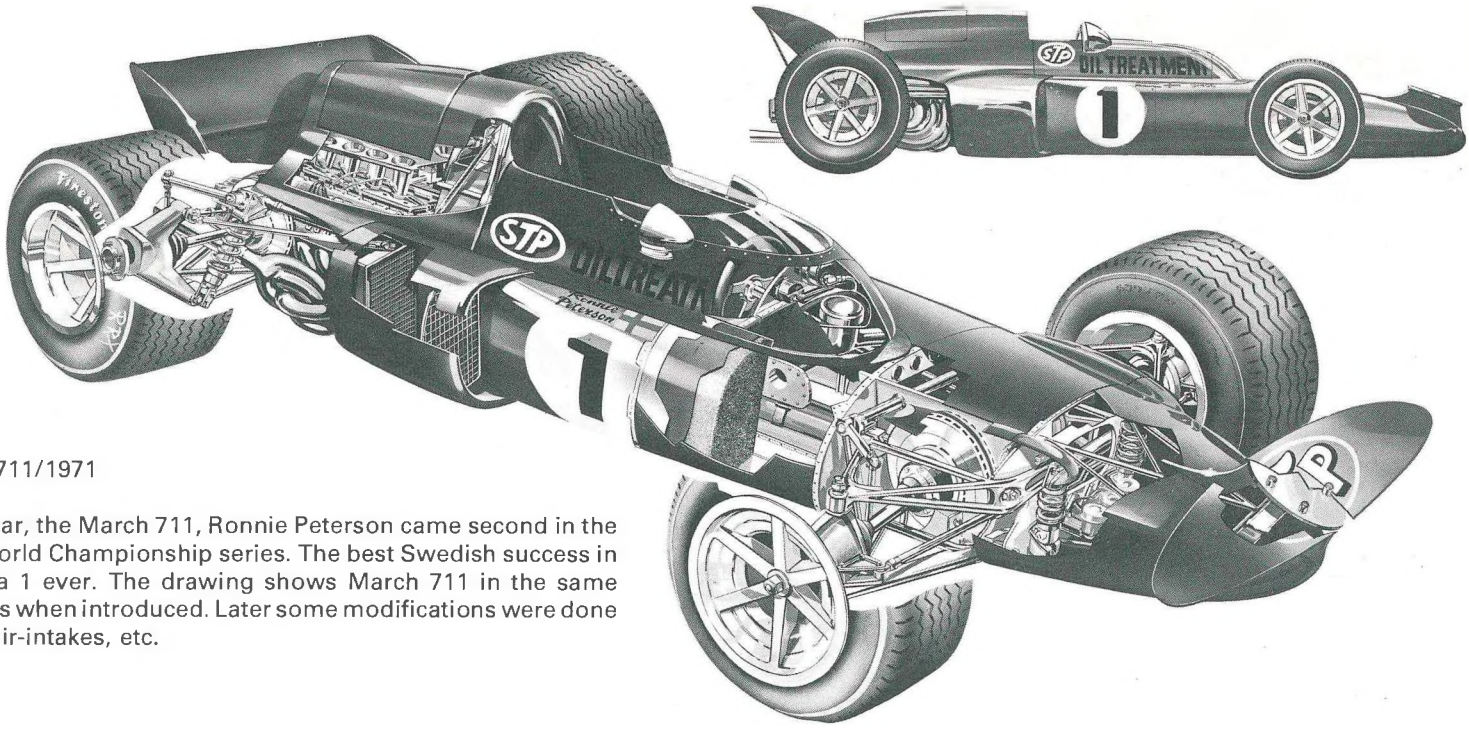



March 711/1971

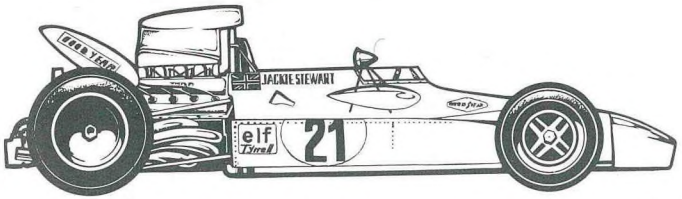
In this car, the March 711, Ronnie Peterson came second in the 1971 World Championship series. The best Swedish success in Formula 1 ever. The drawing shows March 711 in the same shape as when introduced. Later some modifications were done to the air-intakes, etc.

BACKED BY BRITISH timber millionaire Ken Tyrrell, Jackie Stewart became World Champion in 1969 driving a French-built Matra with a British Ford engine. For the 1970 season, Matra developed their own new car and a new engine, and refused to install a Ford engine. That was the end of the co-operation between Tyrrell and Matra, as Tyrrell insisted on having Ford power for his cars.

So Tyrrell had to start looking around for a new car suitable for his World Champion to drive. This was at the end of 1969, and Tyrrell was just too late to choose. The only car available with a Ford engine was the newly announced March, promising but an unknown quantity. Ken Tyrrell none the less took a chance and ordered one for Stewart to drive during the 1970 season. The result, a string of unsuccessful races – apart from the Spanish Grand Prix – as the car showed itself to be far from fully proved. As early as February Ken Tyrrell had realized that this was not going to be the car that Jackie Stewart needed. He arranged a meeting in a small Thames-side pub with Derek Gardner, then a 40-year-old research engineer with Harry Ferguson. As a designer Gardner had been involved in the Ferguson four-wheel-drive racing car and also with Colin Chapman's four-wheel-drive Lotus project. But otherwise he was uninitiated as far as racing car construction went. Now he was being asked by Ken Tyrrell to build a race-winning Formula 1 car – and to have it ready by 22 August 1970! Gardner accepted, gave up his job with Ferguson and started work on the Formula 1 Tyrrell – in deepest secrecy as ordered by his new boss. He used existing components for the car, and it was ready on 22 August, an incredibly quick job. The same day Jackie Stewart tested Tyrrell 001 at Oulton Park. In spite of a few teething problems, Stewart did a couple of laps just below the outright record. The car had already proved itself to be the winner Ken Tyrrell had asked for. The Tyrrell was fully tested in good time for the 1971 season, and Jackie Stewart recaptured his World Championship title that year. Tyrrell's second driver, Frenchman Francois Cevert, finished third overall in the 1971 Championship.

The car in our illustration is the first built by Derek Gardner – 001. The front wings and air-intake were later modified and gave the car a more chubby appearance – but the aerodynamics had been improved and so had the top speed.

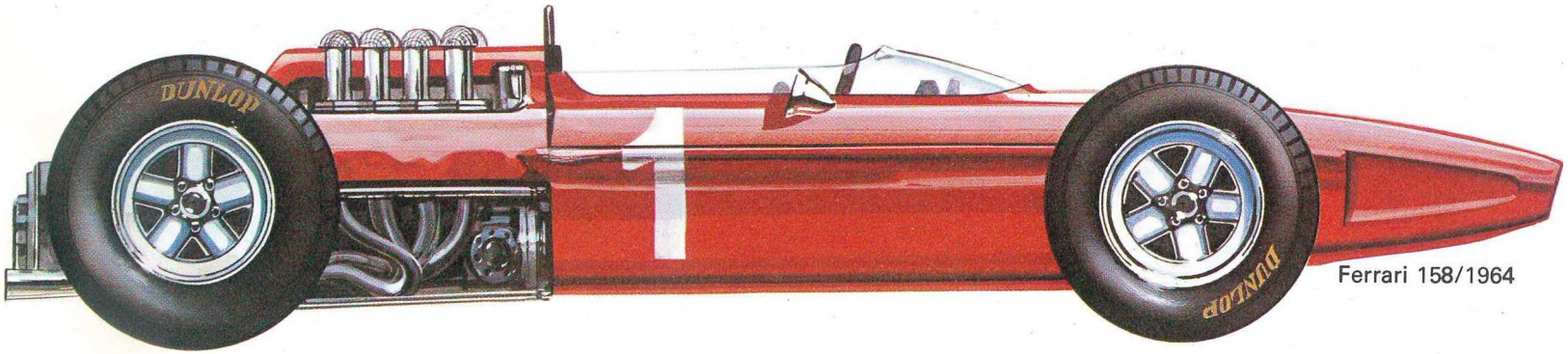
The Tyrrell was regarded as a fast and reliable car – a rather unusual combination which complemented Jackie Stewart's driving skill. Since Stewart was in the habit of upsetting his fellow competitors with his lightning starts, and then immediately setting an incredibly fast pace, not many managed to get more than a quick look at the car – and that was when they were being lapped!



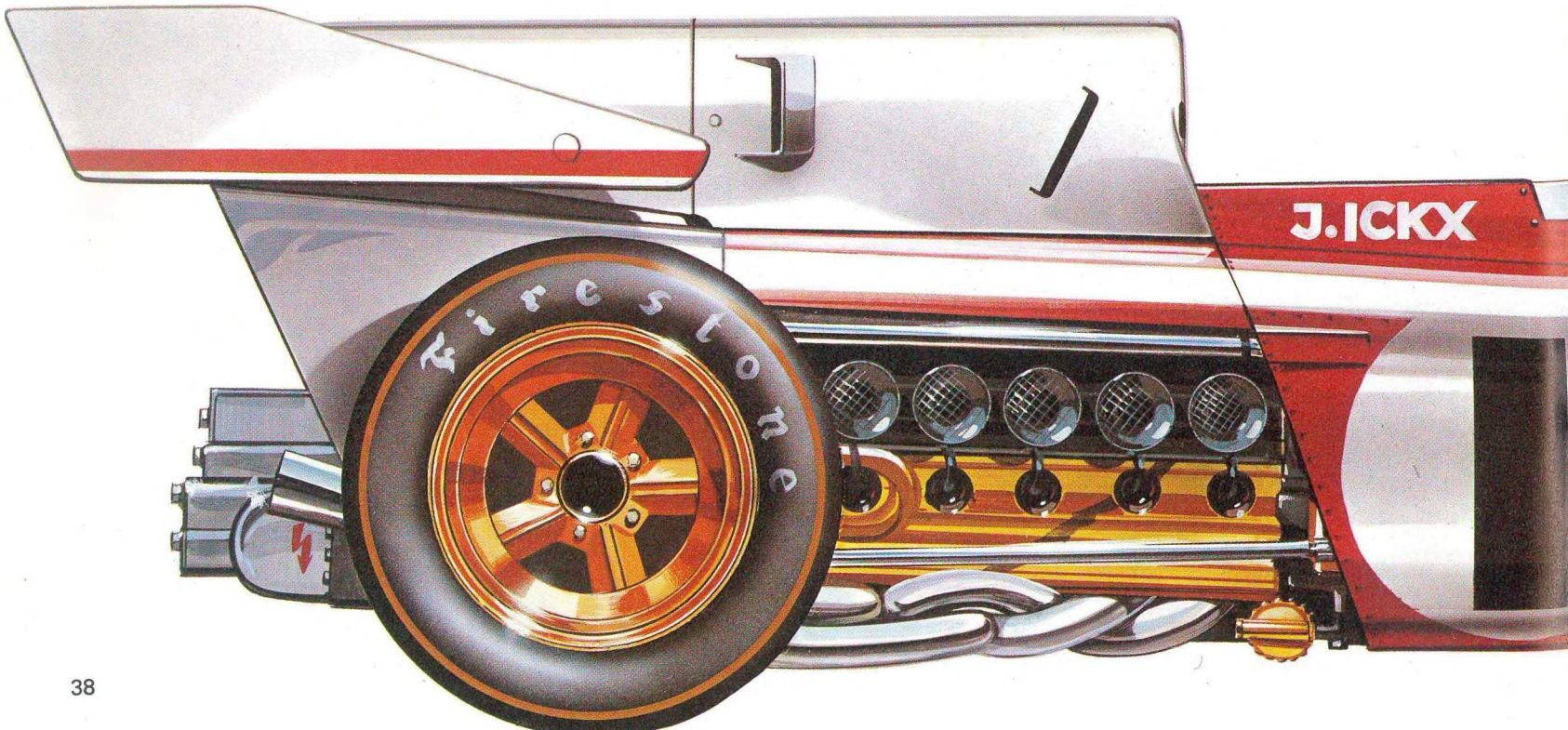

Tyrrell Ford 003/1972

Tyrrell Ford 001/1970

THE SMALL SKETCH to the left shows the World Championship-winning Ferrari of 1964. The previous year a 1476 cc V6 engine had been used, but for the 1964 season this was replaced with a 1489 cc V8. To start with the output was 200 bhp at 10,700 rpm on Weber carburettors. Later in the season fuel injection was added, improving the power to 215 bhp at 11,000 rpm. This gave Ferrari superior power to those competitors using the Climax V8 engines – which showed 195 bhp at 9500 rpm. Thanks to the extra power, John Surtees won the World Championship that year for Ferrari. The larger drawing shows the Ferrari 312B2 of 1972. The engine was then a flat 12-cylinder with a capacity of 2991 cc, giving 490 bhp at 12,800 rpm. This Ferrari was raced by Jacky Ickx and Clay Regazzoni during the 1972 season – but the marque's only victory that year was their 1–2 at Nurburgring in the German Grand Prix on 30 July.




Ferrari 158/1964



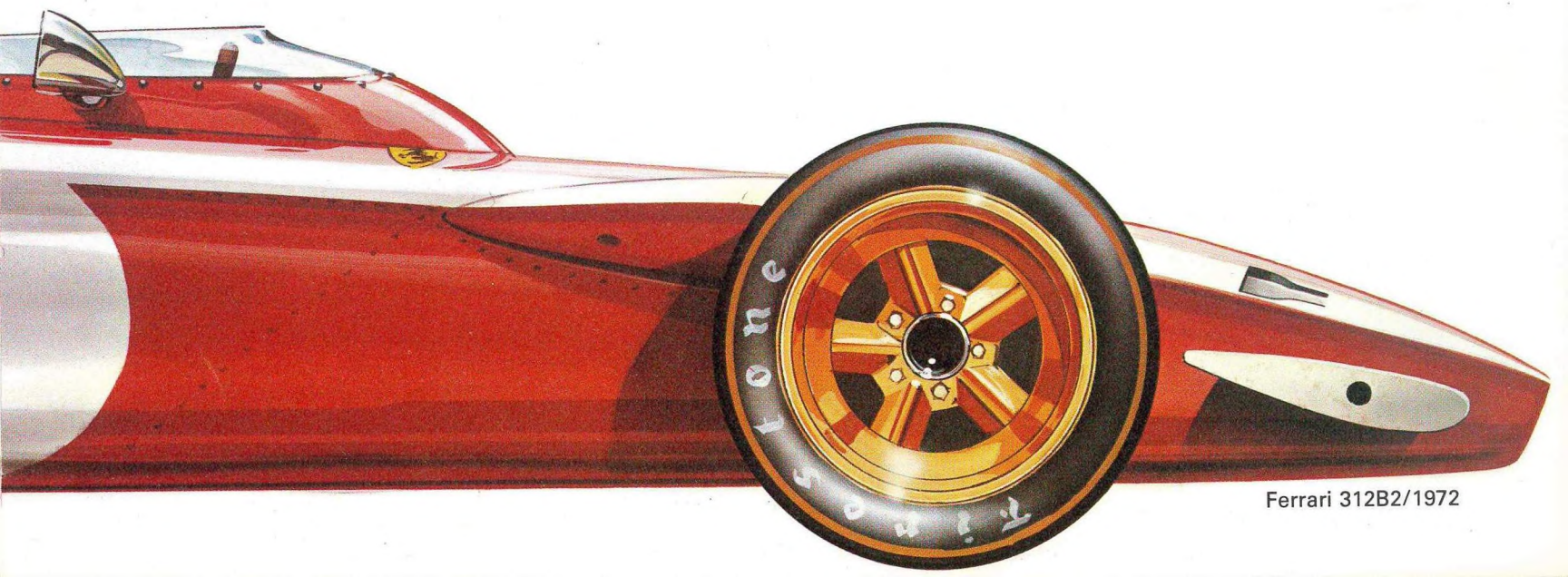
ITALIAN FERRARI has been in the Formula 1 game longer than any other racing car manufacturer. Ferrari's début as an own make came in 1948. Despite the various economic crises which have haunted the factory from the start, there are still no signs of Ferrari's retirement from racing. During the last few years, all efforts have been concentrated on Formula 1 racing, giving this manufacturer a position widely regarded as superior to all competitors in this, the heavyweight class of motor racing.

The company's founder, Enzo Ferrari, was born in Modena in 1898. His father was a technician and Enzo early developed a keen interest in technical matters. From childhood Enzo was hampered by bad health and spent long periods in hospital during the First World War.

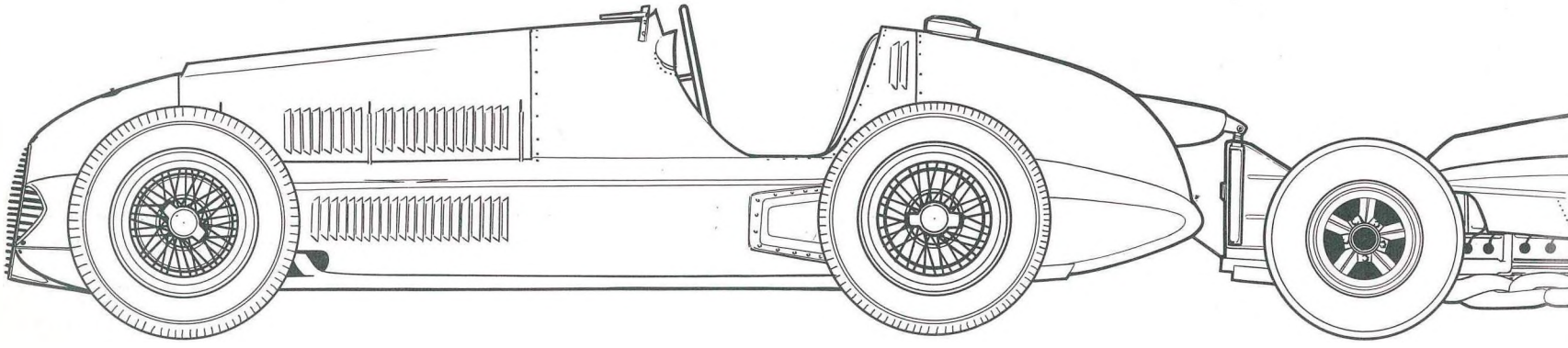
After the First World War Enzo Ferrari, then 21, started a small workshop in Turin with cars as his speciality. In the same year, 1919, he managed to start competing in a CMN standard car. In his very first competition in Targa Florio, Sicily, Enzo Ferrari came ninth. His future was beginning to take shape. In the following year, he began racing for Alfa Romeo which was the beginning of a long co-operation between Alfa Romeo and Enzo Ferrari.

With these cars he had many successes as driver during the first few years of the 1920s. For one of his victories in 1923, he was rewarded with a trophy given by the parents of an Italian soldier, killed in the Great War. It was a coat of arms with a rearing horse. This has been the symbol of the Ferrari cars since the 1930s.

In 1924 Enzo Ferrari had to give up racing due to bad health. Instead he concentrated his ambitions on organizing the Alfa Romeo racing activities. He kept on working for Alfa Romeo as leader and manager until 1938. The great enthusiasm and ambition of Enzo Ferrari became the driving force behind Alfa Romeo's big successes during that period.




Ferrari 312B2/1972



Up to December 1929, Enzo Ferrari was employed by Alfa Romeo as racing department manager. Then Ferrari decided to set up a racing team of his own, with Alfa Romeo cars. He founded Scuderia Ferrari (Team Ferrari); and as a symbol for his team, he introduced the coat of arms with the rearing horse.

In 1938 Alfa Romeo bought back all the racing cars from Scuderia Ferrari and cancelled the deal with Ferrari himself. The reason was that Alfa Romeo preferred to race in their own name when the competition from the Germans, Mercedes-Benz and Auto-Union, began to increase. Alfa Romeo was promised government support if they fought harder to conquer the German makes. When Alfa Romeo bought back their cars from Enzo Ferrari, he had to promise not to take part in any racing activities for four years.

Shortly after, the Second World War broke out, which kept Ferrari away from car racing for more than ten years. He did in fact build two racing cars in 1940, both based on Fiat parts, but neither of them completed their first and only races.

The first post-war Ferrari to make its début in 1947 was a sports car. Not until 1948 did Ferrari build his first single-seater racing car.

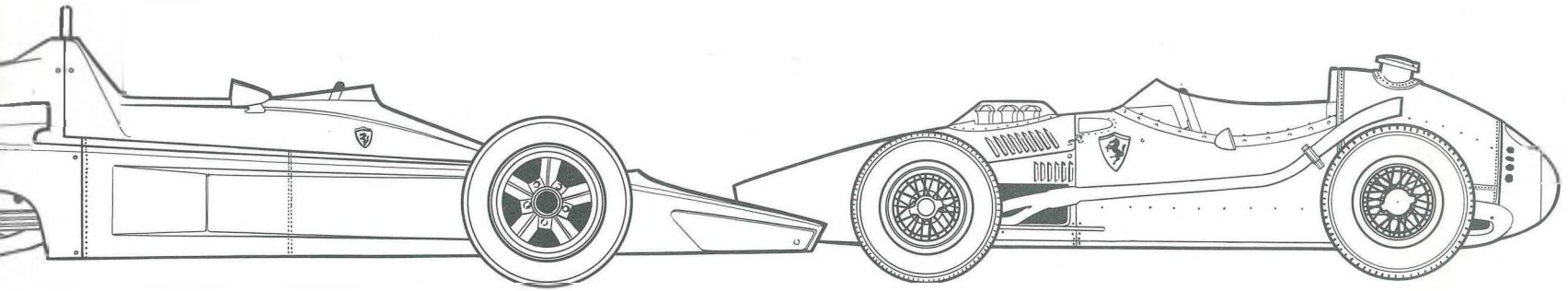
During his time at Alfa Romeo, Enzo Ferrari had met many individuals who were later to be of great help when he began building his own cars. One of the very best tutors in the art of construction was Vittorio Jano, according to Ferrari the outstanding engine builder of his time. (It was Jano who was later to design the Lancia D50 Formula 1 car, which subsequently was taken over by Ferrari.)

Everyone knows of Enzo Ferrari, but few have come close to him. He is regarded as a demanding and moody team manager, and many drivers have left after rows with 'Il Commendatore' – a nickname which tells the whole story! He is the undisputed driving force behind the Ferrari racing effort. He, and no one else, decides everything regarding new cars and modifications.

Ferrari confesses that he is no technician: he is technically minded but lacks the deep insight so necessary to overcome engineering problems. Recently he said that the thing that makes him tick is still 'the love of driving a fast car'. He still does, and very skilfully according to people who have ridden with him. Ferrari's products have always been regarded as somewhat conventional. He was the last one to abandon the drum brake, one of the last to abandon the spaceframe chassis, and the very last to let fuel injection replace the carburettors. Enzo Ferrari's philosophy has always been to leave things alone until he is quite convinced that the modification is actually an improvement and not just a dictate of fashion.

Ferrari 312B3/1973

Ferrari Dino 246/1958



In 1931 Enzo Ferrari's only child was born and christened Dino. Dino died after an illness at the age of 25 – and to honour his memory, Ferrari used the name Dino on a number of racing cars and engines, and also on a production sports car which is still being made today.

In the late 1960s Ferrari S.p.a. SEFAC ran into yet another of the many financial crises. This time, Gianni Agnelli, the boss of Fiat, came to Ferrari's assistance and bought 50 per cent of the shares (not 51 per cent as many believe). With Fiat providing the financial backing. Ferrari continued racing – and only once did Fiat have to interfere. Enzo Ferrari is still 'Il Commendatore'.

The drawings above show three of Ferrari's Formula 1 racers. On the far left is the first Ferrari, introduced in 1948 as the 125 Grand Prix. The 1948 Formula allowed engines up to 4.5 litres unsupercharged, and 1.5 litres supercharged. Since Ferrari had been working with Alfa Romeo supercharged engines, it was natural that his first car should have supercharging. Capacity was 1496 cc and cylinders were in a V12 formation. There was no lack of boldness in engine construction in those days – even compared with today's 3 litre Formula 1 engines, the Ferrari 125 was something of a mechanical wonder.

The modern car in the centre is the Ferrari 312B3 of 1973. It had a 12-cylinder flat engine and a capacity of 2991 cc. Maximum power was 490 bhp at 12,800 rpm and the five-speed gearbox was of Ferrari's own design and manufacture.

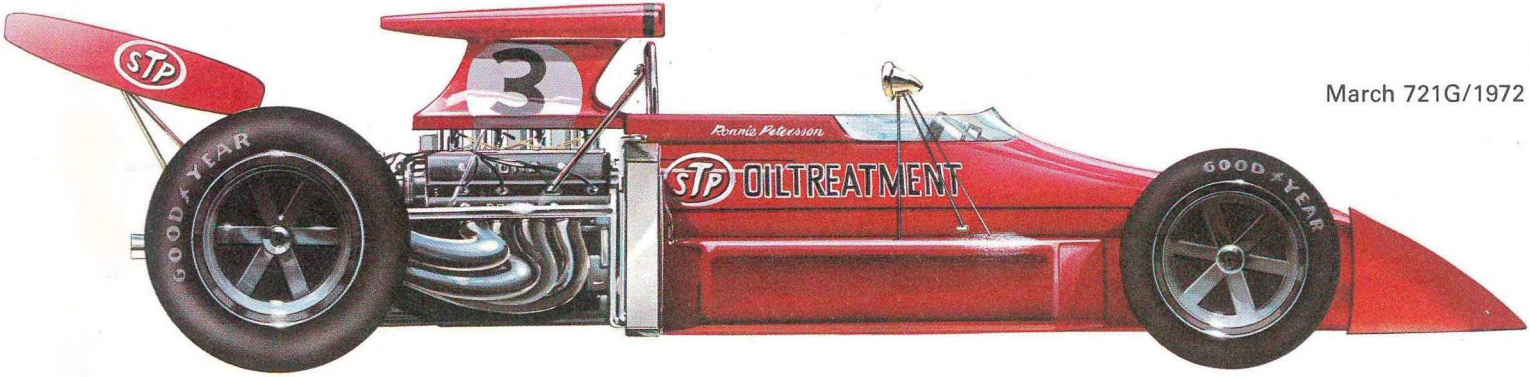
On the right is the Ferrari Dino 246, a fast and reliable car – but according to some drivers spoiled by vices with regard to its road-holding capabilities. The steering was so neutral that it could snap to either understeer or oversteer depending on how sharp the bend was when pressed hard. The engine in this car was a 2417 cc unsupercharged V6.

A quality common to all Ferrari racing cars, regardless of their success, has always been their elegance and beautiful design. Even when failing to finish at the top, a Ferrari always caught the eye and usually revealed some interesting technical innovation.

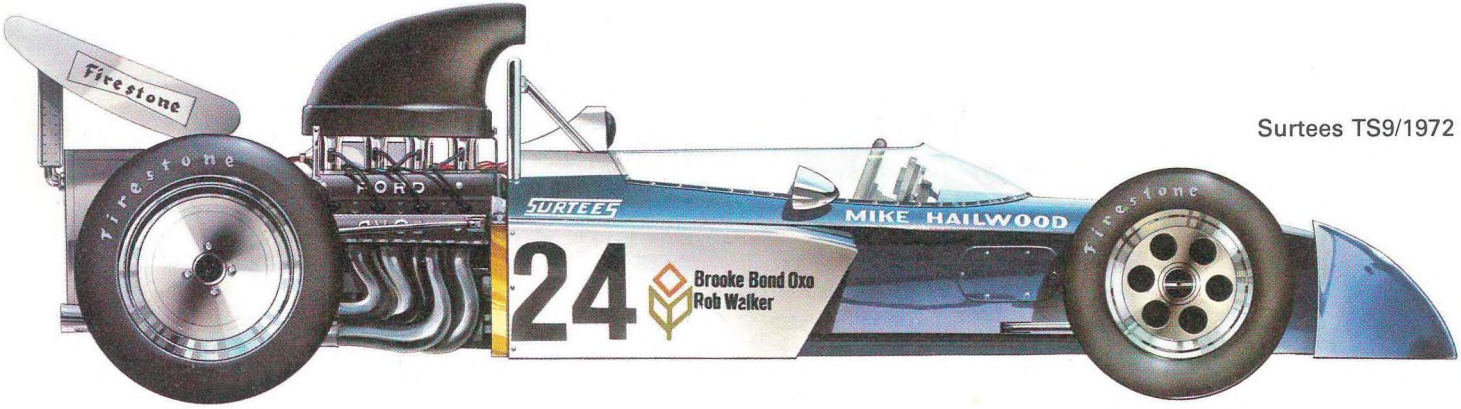
In the years between 1948 and 1976, Ferrari cars won the World Championship seven times. In 1952 Alberto Ascari was the winner, as in 1953. In 1956 Juan Manuel Fangio was the World Champion, in 1958 Mike Hawthorn, in 1961 Phil Hill and in 1964 John Surtees. Then followed a long down period for Ferrari, not broken until 1975 when the Austrian Niki Lauda became the World Champion in a Ferrari. Today's Ferrari is regarded as one of the most reliable Formula 1 cars and probably the fastest. This is a result of determined efforts and hard tests at the factory's own track at Maranello.

Lotus 72D/1972

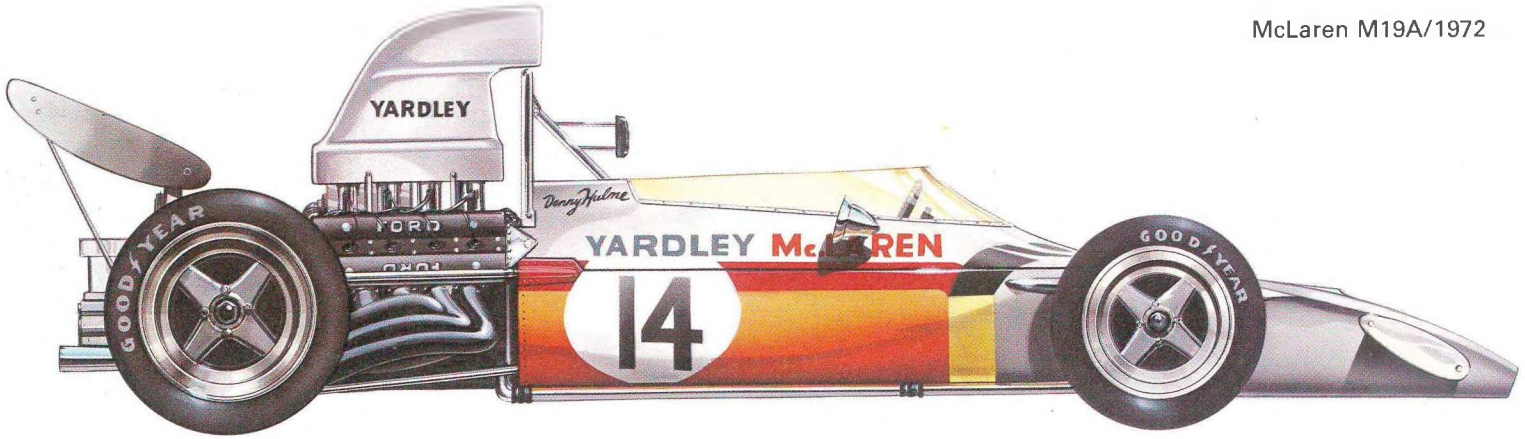

March 721G/1972




Surtees TS9/1972

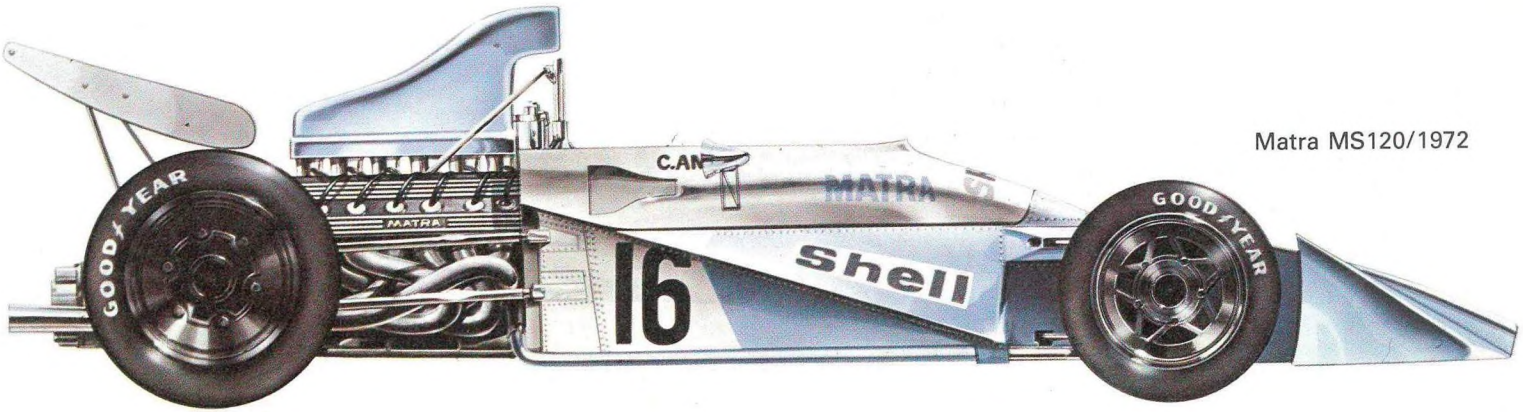


McLaren M19A/1972




BRM P180/1972


Matra MS120/1972



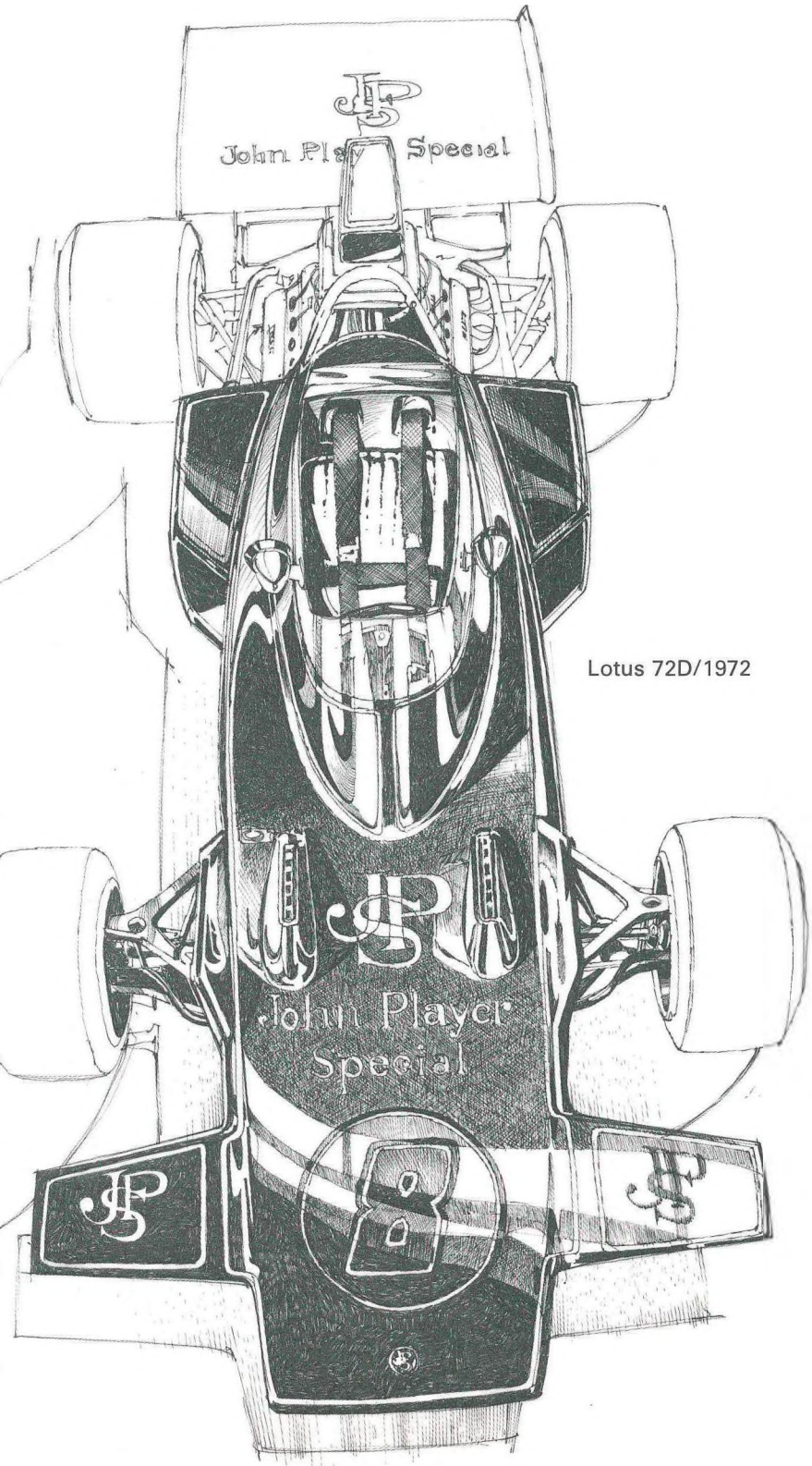
THE 1972 RACING SEASON was more or less just a matter of two drivers and two cars. On one side was Emerson Fittipaldi from Brazil in a Lotus 72D. And on the other, reigning World Champion Jackie Stewart from Scotland in a Tyrrell. During the thirteen races of the Championship season, Fittipaldi took pole position in practice five times, and Stewart once. Fittipaldi became Champion with five *grandes epreuves* to his credit – the Spanish, Belgian, British, Austrian, and Italian Grands Prix. Stewart won four events – the Argentine, French, Canadian and United States Grands Prix – to finish second in the Championship. In nine out of the thirteen races the winner was either Fittipaldi or Stewart.

Denny Hulme in a McLaren M19 came third overall; the New Zealander had a consistent run throughout the series which included victory in the South African Grand Prix.

On the other hand, Hulme was forced to retire only twice with mechanical troubles – contrast that with Fittipaldi's four race retirements and Stewart's failure to start four races. Hulme, who was born in 1936, has always been regarded as one of the most reliable and sympathetic Formula 1 drivers.

The 1972 season was Emerson Fittipaldi's second year in Formula 1. The first year had been successful neither for Mr Fittipaldi nor for Lotus. But at the start of the 1972 season, Lotus got a new three-year contract with the John Player tobacco company, a contract which made it financially possible to make a real effort. For the 1972 season the Lotus 72s were painted black-and-gold and renamed John Player Specials. Several weeks before each World Championship round, John Player Team Lotus would book the track for several days to test tyres, suspension and wings. These extensive – and expensive – preparations paid dividends for everyone. Emerson Fittipaldi became the second South American (Fangio was the first) to become World Champion. Jackie Stewart started the 1972 season splendidly by driving to a superb victory in the first Championship round in Argentina on 23 January. This was in Tyrrell 003, the car he had used the previous year. However, as the season progressed it became obvious that the car could not keep pace with its rivals, and a new model, the 005, was completed. This had inboard front disc brakes – but they didn't perform well and the car had to be modified. With Tyrrell 005, Stewart won the remaining two races in the series.

Among other competitors running in 1972, the Ferrari 312B2 proved to be one of the fastest – usually during practice sessions. But the B2 had only one victory to its credit during 1972 – in the German Grand Prix at the Nurburgring when Belgian Jacky Ickx won. Switzerland's Clay Regazzoni managed third place in the other B2 despite (or thanks to, as was also said!) a last-lap collision with Jackie Stewart.

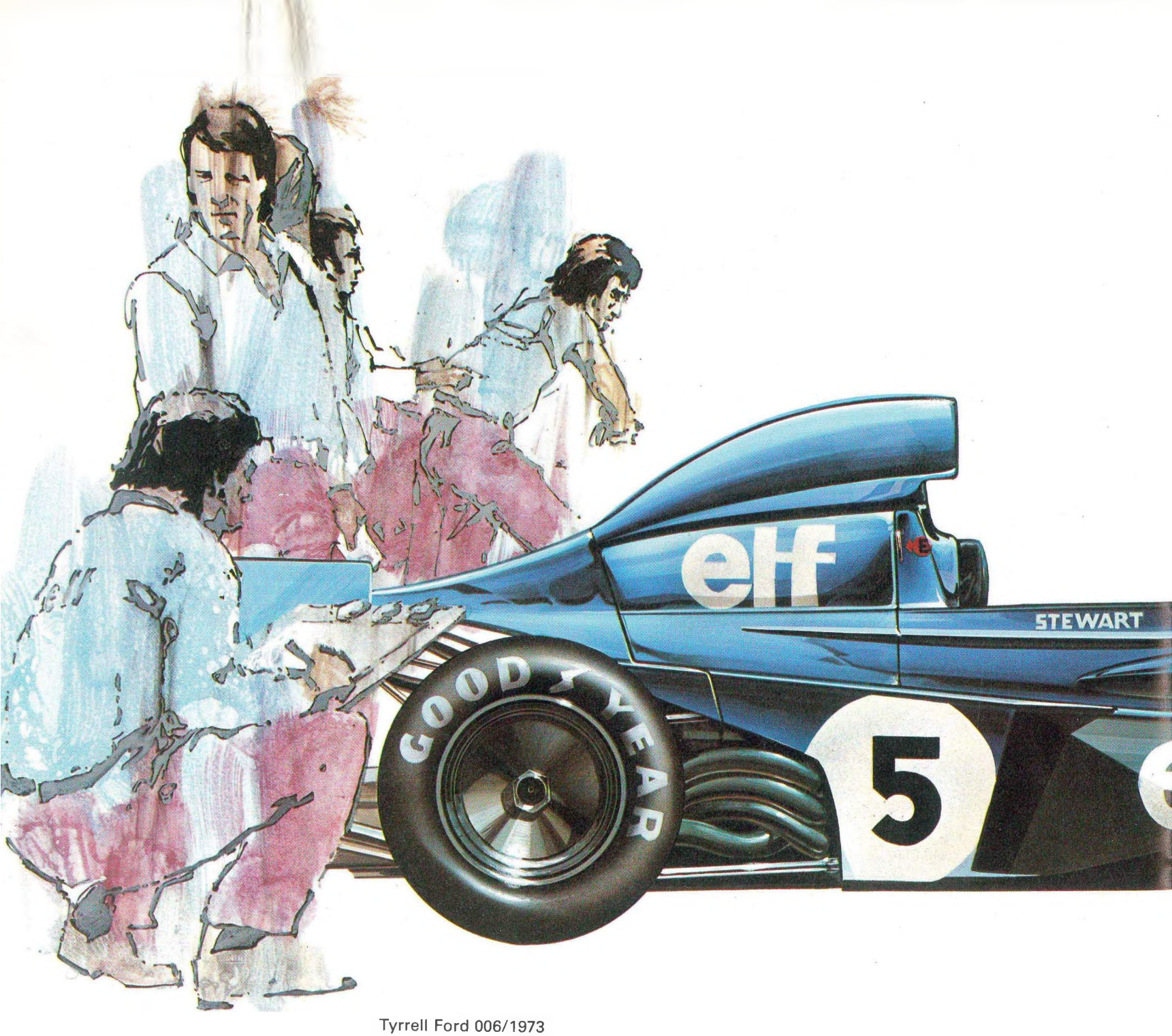



Lotus 72D/1972

BY THE END of the 1960s most competitors had closed the gap which Lotus made with the advanced technology of their successful 49. In November 1969 Colin Chapman prepared for the next leap ahead – he briefed his designer Maurice Philippe to build a new racing car to given specifications. Since this new car was to have the same Ford Cosworth engine as most of its competitors, then the car would have to be that much better. The radiator, previously positioned as far up front as possible, was now divided and located either side of the driver. This move saved the weight of long cooling pipes and at the same time eliminated the risk of driver overheating – in the Lotus the driver could keep cool. The wedge-shape was introduced improving penetration and road-holding capabilities. Magnesium was used where possible and this helped save weight. Rubber bag fuel tanks with a total capacity of 48 gallons were installed around the driver's seat. The result was that Lotus once again took the lead in Formula 1.

The Lotus 72D, as it was termed, won the first ever posthumous World Championship for its driver, Austrian Jochen Rindt. Rindt was killed during practice for the 1970 Italian Grand Prix at Monza. The excitable Italian authorities blamed Chapman for Rindt's death, and consequently his cars never again appeared in Italy under the Lotus name.

The Lotus 72D was used throughout 1970, 1971, 1972, 1973 and 1974. In 1972 Fittipaldi had won the Championship. During those five seasons, only minor modifications were made to the car – which must hold some sort of record for long-running in the ever-changing world of Formula 1 racing.



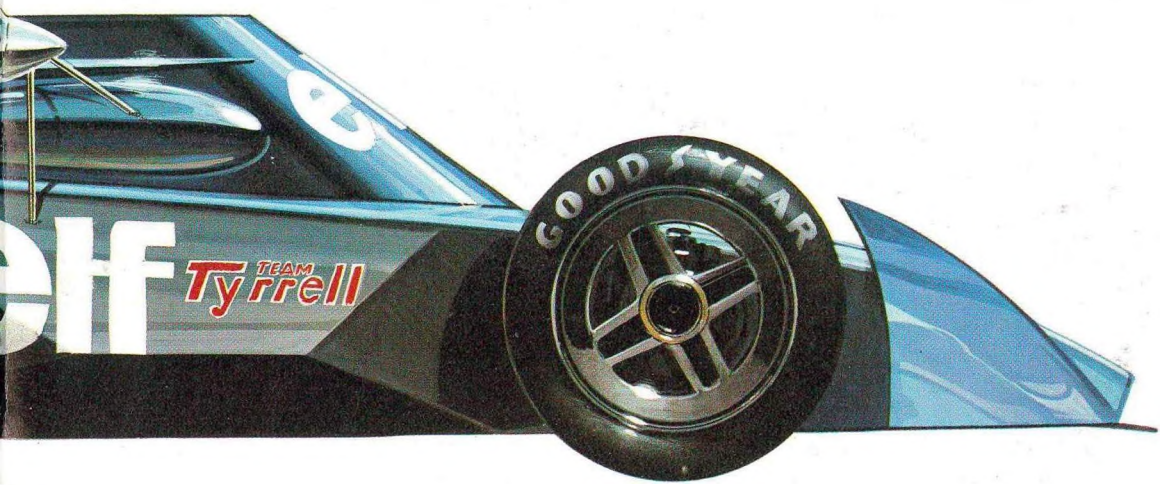

Tyrrell Ford 006/1973

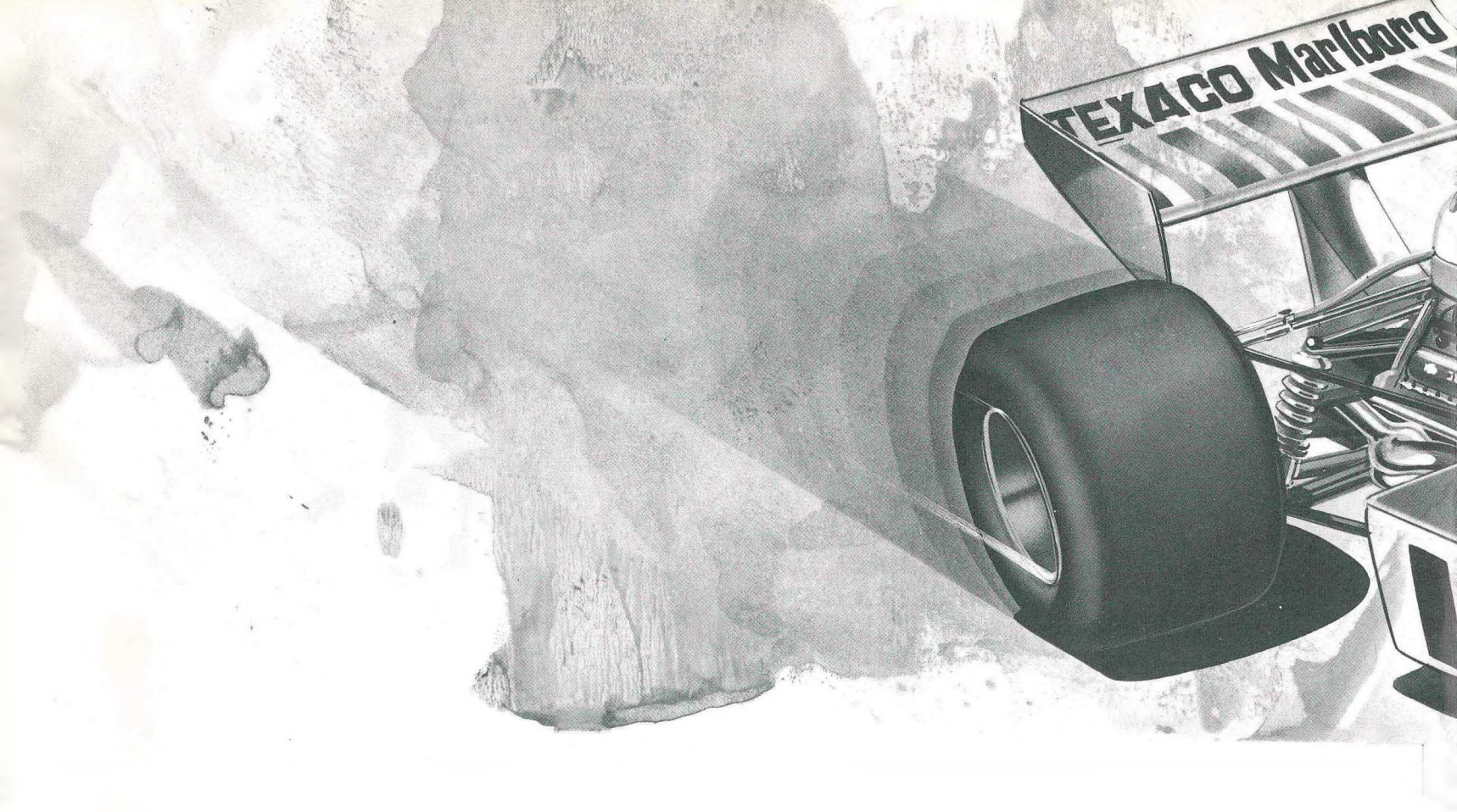
IN 1971 JACKIE STEWART became World Champion for the second time under Ken Tyrrell. But the time had come for Tyrrell to ask his designer Derek Gardner to build a new improved version of the Tyrrell 003. Stewart started the 1972 season with a runaway win in the South African Grand Prix in 003, but that was the only success. Tyrrell 005 was not ready until half-way through the season and first appeared in practice for the French Grand Prix in July. Here the car was driven by Francois Cevert and without really trying he demolished the existing lap record. Still jubilant he went out again in a later session and demolished 005 against the guardrail. Stewart used the rebuilt car to win the final two Championship races in Canada and the USA, while Cevert handled the new 006, very similar to 005. It was a very promising finale to the 1972 season and augured well for the year to come.

Technical advances incorporated in Tyrrell 006 over the 005 were mainly on the aerodynamic side, although the front disc brakes were once again mounted inboard – this time more successfully than on the 005 which suffered a number of brakeshaft failures and consequent accidents – and cooled via large frontal intakes. The inboard brakes made it necessary to alter shock absorber mountings. The chassis was monocoque with a small spaceframe reinforcement at the front, an arrangement designed to offer better impact resistance. There was also a fire system activated by either a thermo-control or dash-operated manual switch.

The Tyrrell 006 was not regarded as revolutionary in any way, but was nevertheless a logical progression along the line of Tyrrells. Stewart was to use a second 006 – 006/2 – for the important 1973 season.

At the beginning of the 1973 season the Ford Cosworth V8 delivered 460 bhp at 10,000 rpm. In the Tyrrell, Jackie Stewart regained his 1971 title of World Champion. Half-way through the season, Stewart had decided with Ken Tyrrell – but they kept it secret – that this was to be his last year of racing. With the Championship already theirs, the Tyrrell team went to Watkins Glen for the final Grand Prix of the year. During practice for the American race, Jackie Stewart's friend and team-mate Francois Cevert was killed when his 006 hit the guardrail. The team withdrew from the race, the race should have been Stewart's 100th Grand Prix. It was a tragic end to Ken Tyrrell's successful 1973 season, and a tragic start to Jackie Stewart's long-planned retirement, which he announced publicly just a few weeks later.

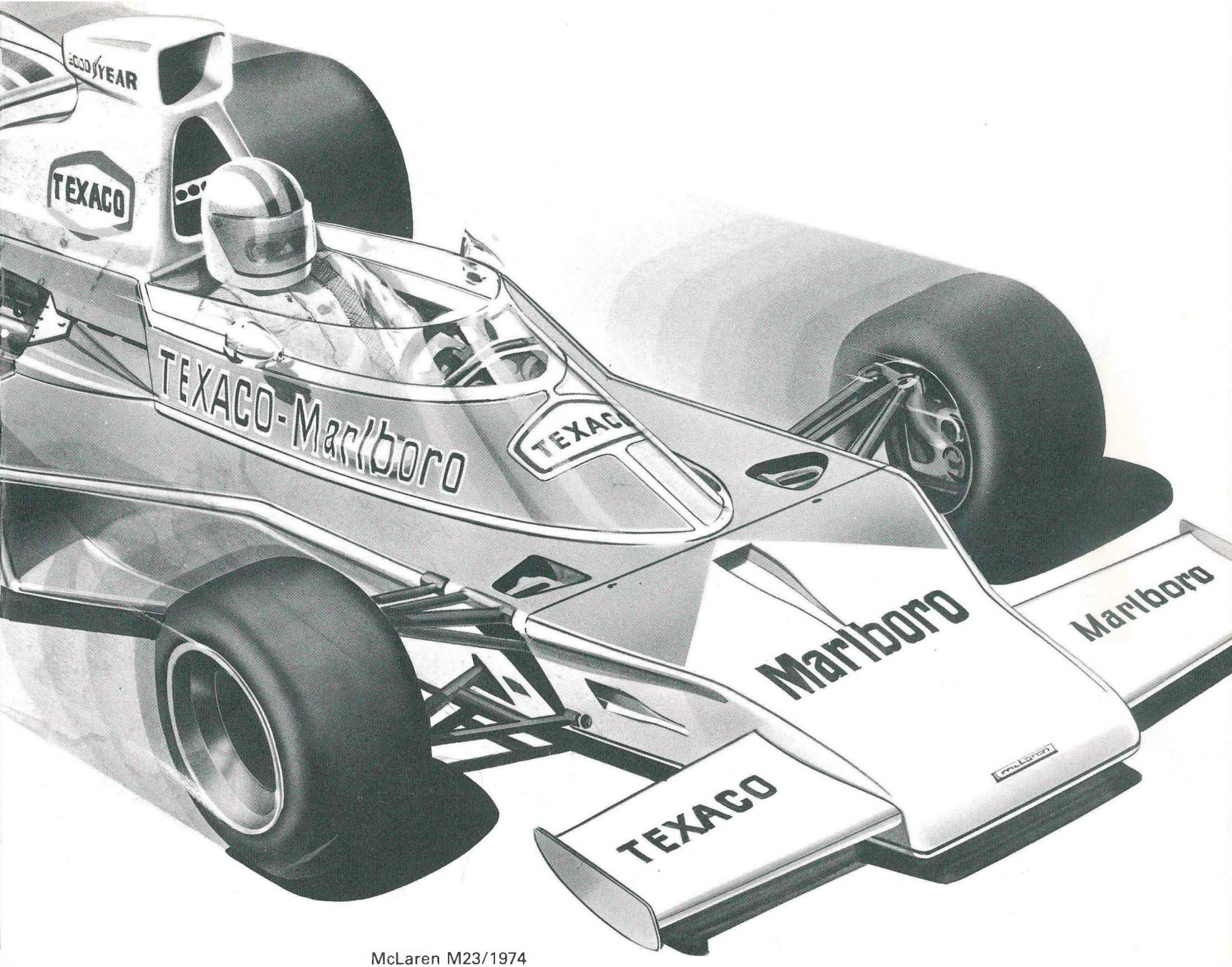




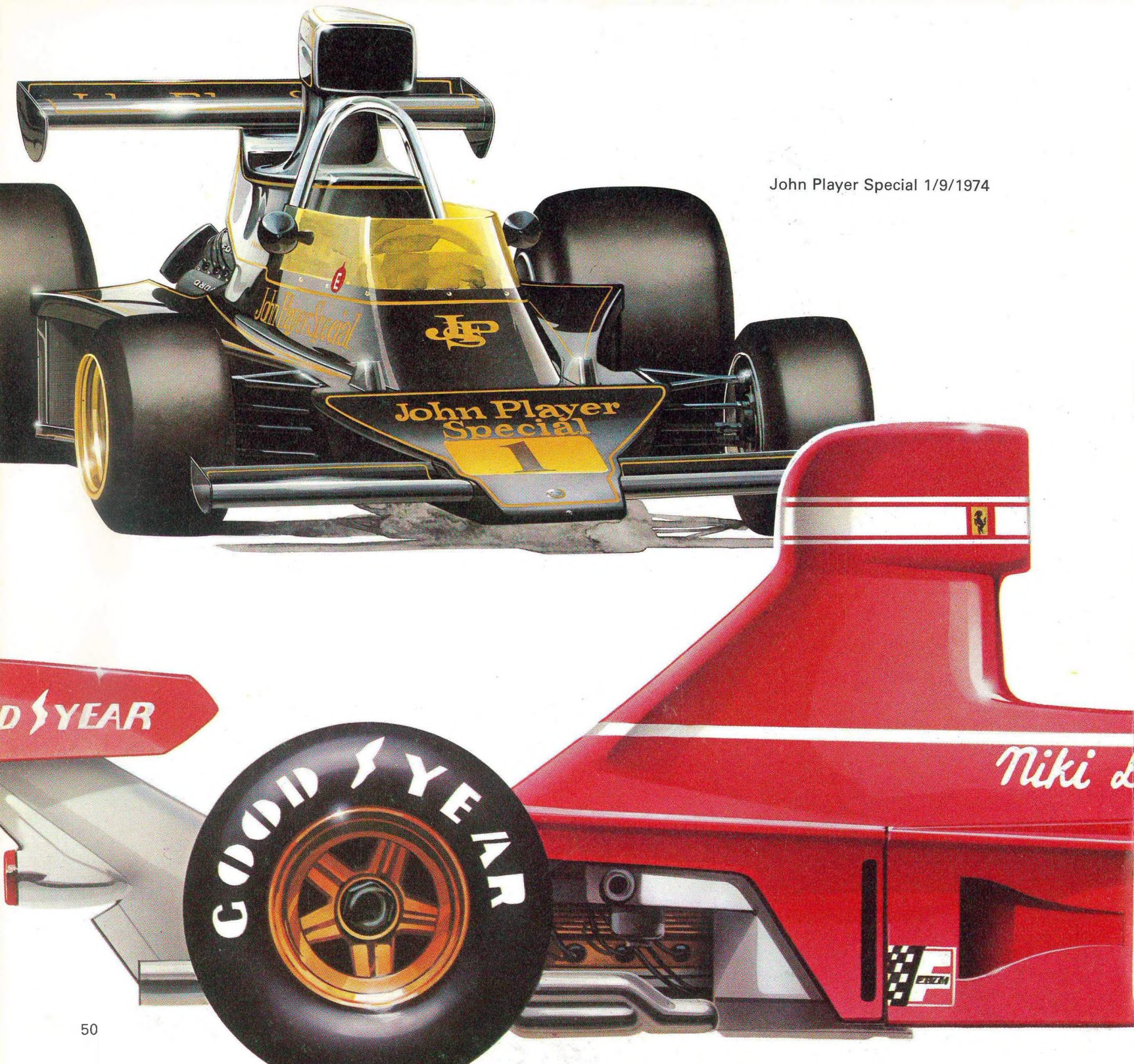

THE FIRST Formula 1 racer from McLaren Cars was built in 1966. There was no immediate success – but in sports-car racing it was a different story altogether. In the American CanAm series McLarens were winning virtually everything for many years. This rather put the factory's Formula 1 efforts into the background for a while. Nevertheless, Denny Hulme – number one driver for the McLaren CanAm team – did quite well with his McLaren M19 during the 1971 Grand Prix season. Inspired by his success, the factory built the McLaren M23 for 1973. The car featured a new body design with low front and side-mounted radiators. The car was fitted with both automatic and manual fire extinguisher systems, and the chassis was designed for maximum protection in a crash. The car in our drawing is the 1974 version of the M23, no longer called a McLaren but christened the Texaco Marlboro F1. The car has a Ford Cosworth V8 developing 480 bhp at 10,500 rpm and a Hewland five-speed gearbox. Hewland boxes are used by most Formula 1 teams.

One of the problems facing designer Gordon Coppuck with the front suspension was the use of wider tyres. They were so wide that they were causing camber changes in corners, the car became difficult to steer, and the tyre faces were not running fully flat on the road. Coppuck solved this by designing a completely new front suspension for the new car, which allows the use of front tyres even as wide as 14 ins for better road-holding.

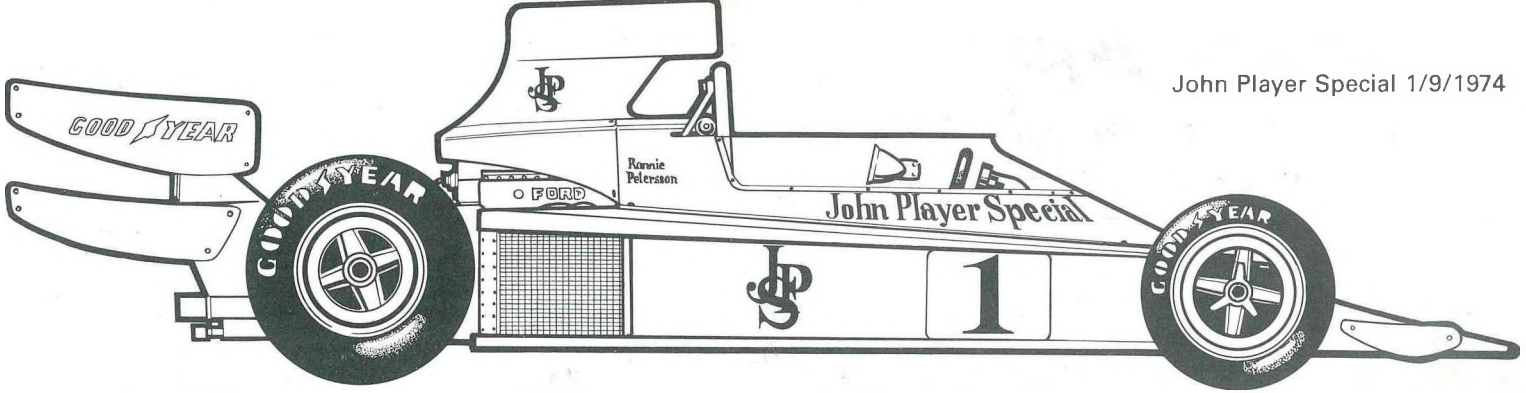
McLaren cars are renowned for their reliability and the organization behind factory and team is said to be one of the very best in the world. You'll always find a McLaren near the front in a Formula 1 race.




McLaren M23/1974




John Player Special 1/9/1974




John Player Special 1/9/1974

ON 11 FEBRUARY 1974 the latest Lotus Formula 1 racer was introduced at a press show in London. The previous model had two World Championships to its credit – one posthumously for Austrian Jochen Rindt in 1970 and one for Brazilian Emerson Fittipaldi in 1972. The new Lotus of year 1974 was the first one not officially named Lotus but John Player Special Formula 1/9. When first shown the car had two brake pedals, one clutch pedal and electrically-operated gearchange. The clutch pedal was to be used just for starting and then the electrical–hydraulic clutch should take over. The idea was for the driver to use his left foot for braking instead of declutching for gearchanges prior to corners, thus achieving later braking. But the whole system was removed after a few races, apparently too advanced and not fully enough tested. During early races the car showed some teething troubles and had little success. After some time the JPS 1/9 was withdrawn completely.

IN THE LATE 1960s Ferrari ran into a difficult financial crisis and could no longer afford to race on a scale that gave results. In Formula 1 Ferrari became a second rating. After the John Surtees World Championship in 1964, there was little more than a long line of disappointments. During the summer of 1969 Fiat formally tied up with Ferrari by buying half the stock of shares at a price of seven and a half milliard lire. This cash injection put Ferrari back on its feet and before long a new Formula 1 racer was announced. This was named the Ferrari 312B and had a new flat 12-cylinder engine. Making its début in 1970 the engine was giving 455 bhp at 11,500 rpm, which made the car one of the most powerful of its type. But in spite of its outstanding performance, there was really no success. In the summer of 1973, Ferrari's only driver, Jackie Ickx, was fired after a quarrel with Enzo Ferrari. A thorough reorganization of the Ferrari racing activities was necessary. For the first time since the purchase, Fiat came into the picture and detailed the then just 26-year-old lawyer Luca Montezemolo to take care of the Ferrari racing department. For the 1974 season, Niki Lauda and Clay Regazzoni were employed as drivers. All other racing activities but Formula 1 were abandoned and the two drivers were backed by a very thorough organization.

In 1974 Clay Regazzoni was only a gnat's whisker from winning the World Championship and the following year, in 1975, the other team driver Niki Lauda gained the honour.


Ferrari 312B3/1974

Top car: Ferrari 312T/1975
Lower car: Martini Brabham BT44B/1975

1977 WAS THE YEAR when USA supposedly should have seen her first Formula 1 World Champion.

Rarely was a Formula 1 driver so superior as the American Mario Andretti in his new Lotus 28 – and at the same time so haunted by bad luck. With four straight victories, lots of fastest practice times and many lap records, all odds were for Andretti/Lotus.

But fate pointed the other way. In more than one competition, Andretti was forced to retire from a leading position in the very last stages – for ridiculous reasons like 'empty fuel tank' or similar unforgivable excuses.

In spite of his many victories, Andretti nevertheless ended in third place at the end of the 1977 World Championship season.

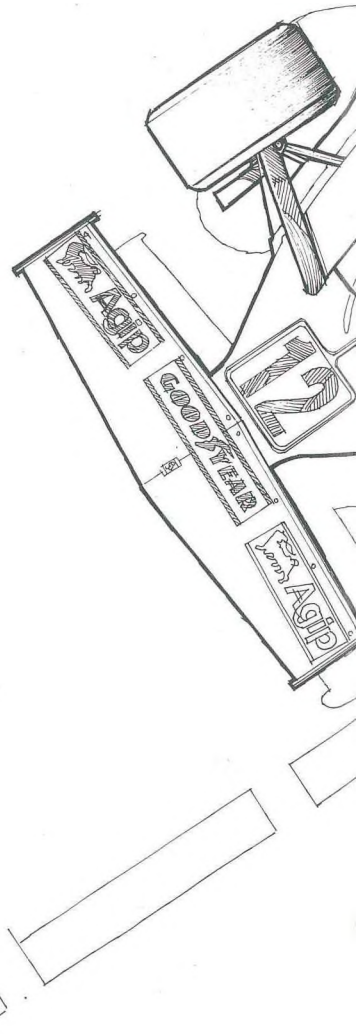
Champion for the second time was Niki Lauda in a Ferrari, who with only three victories to his credit, but a long series of completed competitions, did prove that this was the most reliable combination of the year.

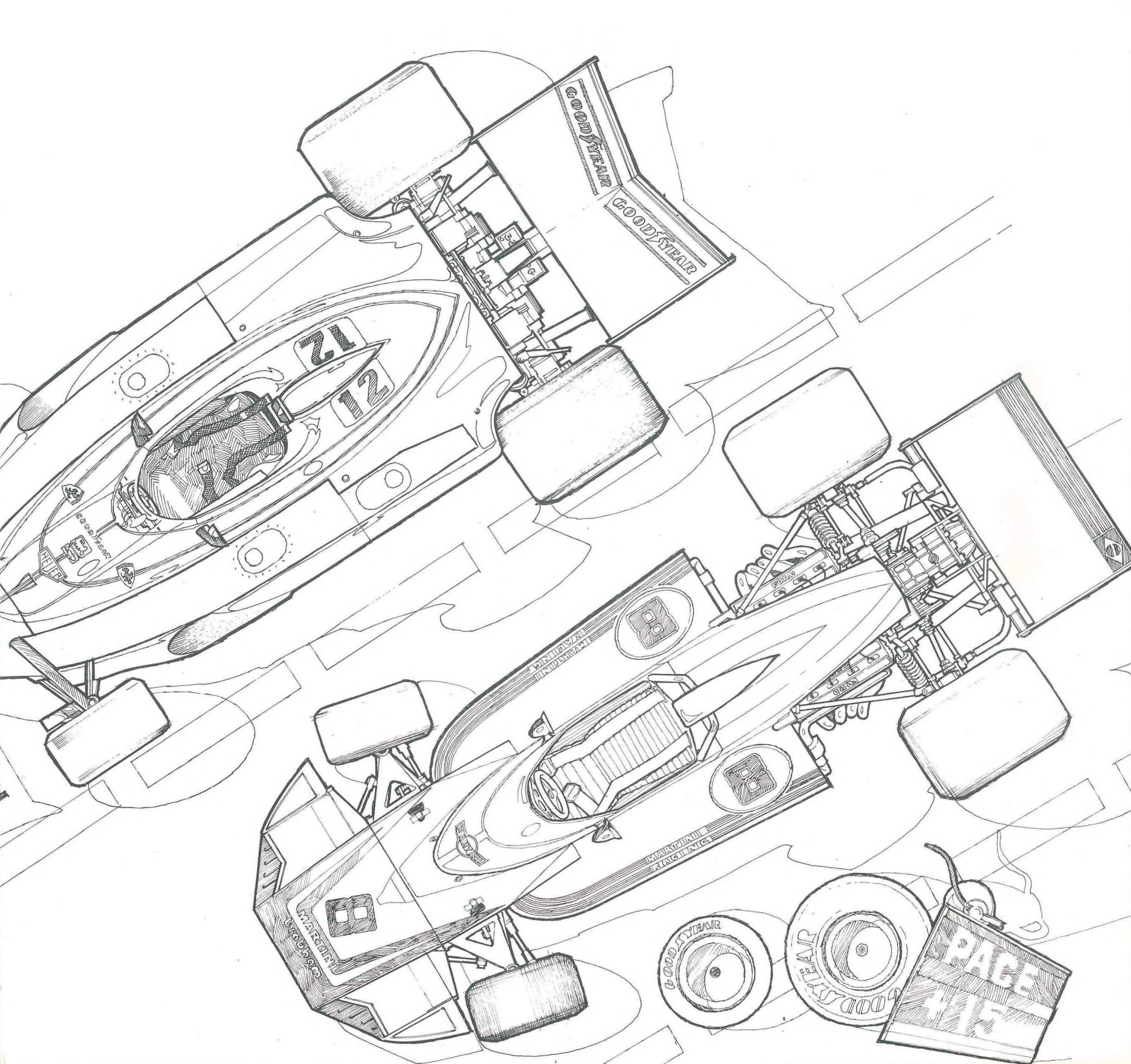
Although Ferrari became the World Championship winning car, the new Lotus was the one everybody was talking about. A new design, by Colin Chapman, differing from its competitors in construction as well as looks.

A distinct arrowhead-shaped front, the driver positioned far forward, suspensions with extremely long wishbone linkage and wing-shaped fuel tanks on either side. The front design in particular is thought to be the main reason for the great speed and remarkable road-holding abilities of the Lotus 28.

Rumours will have it, voiced more or less openly, that Andretti's Lotus was equipped with specially made tyres from Goodyear – the then sole manufacturer of Formula 1 tyres. It was pointed out that Goodyear, an all-American company, naturally would prefer an American driver as Formula 1 World Champion. Be that as it may, nothing has ever been proved.

The British Grand Prix, in the middle of the 1977 season, saw the introduction of a very interesting newcomer on the racing track. It was the French government-owned car manufacturer Renault making its début, with the Renault-Elf RS01, a Formula 1 racer based on an 1.5 litre turbocharged V6 engine. Apart from the very interesting engine construction it was noted that the Renault racer was equipped with Formula 1 tyres made by Michelin. Goodyear was no longer the one and only manufacturer of Formula 1 tyres.

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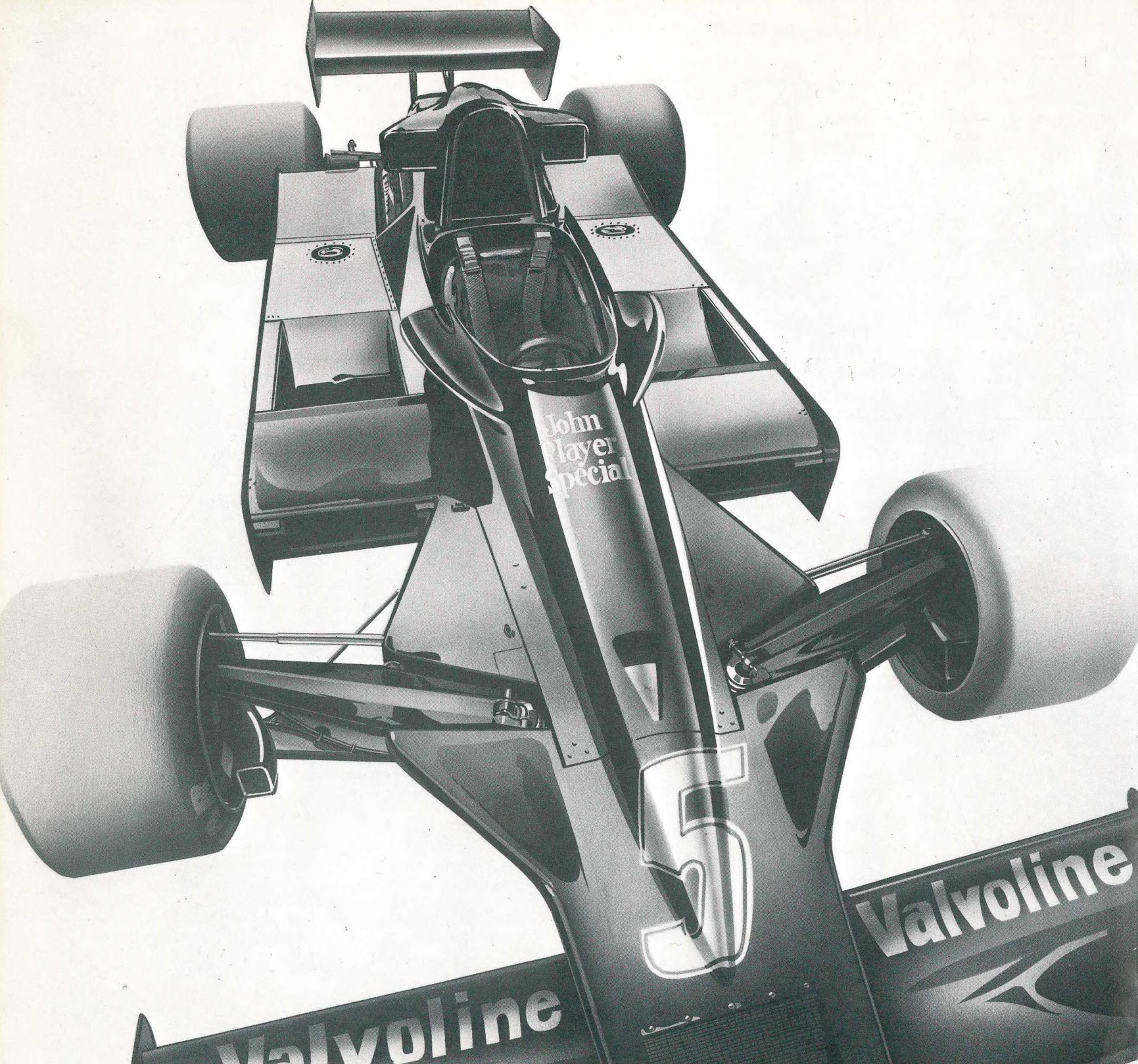
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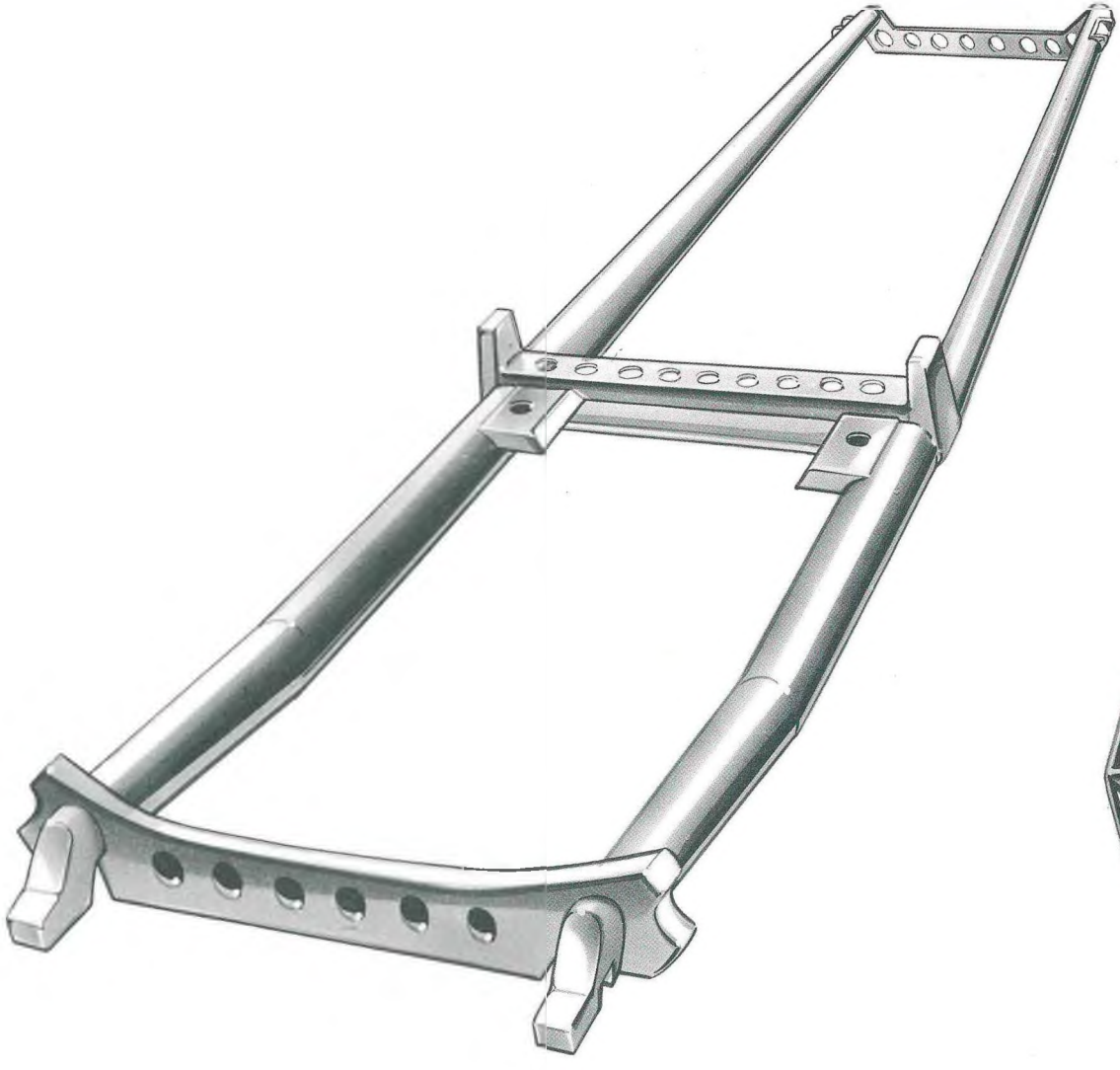
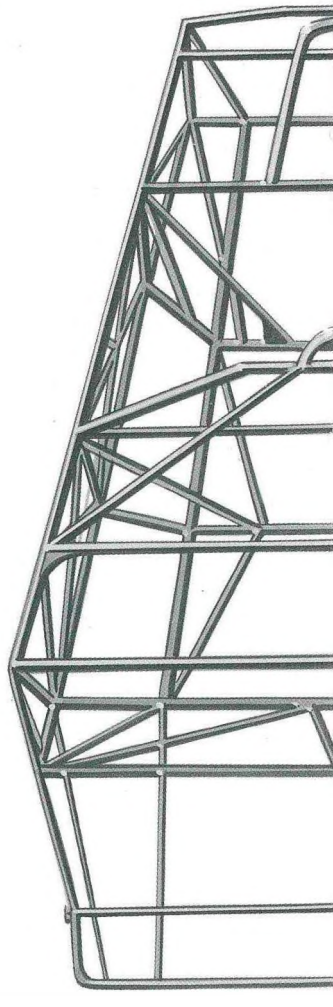
AT THE START OF THE 1978 RACING SEASON all teams were convinced that choosing the right type of tyre mattered more than previously believed. Ferrari did reveal that they had assisted the Michelin people with their tyre developments at their own track in Maranello for the previous two years. At the latest tests, the Michelin tyres proved to be two seconds faster on each lap, compared with the most efficient tyre from Goodyear. Ferrari then naturally decided to use Michelin tyres, and ready for the Argentine Grand Prix were more than 200 front and rear tyres available for any Formula 1 team that wanted them. Goodyear countered by producing 3000 Formula 1 tyres for the same event. And then the Great Tyre War was in full swing. Nowadays the competition rages not only between drivers and cars but also between the Michelin Steel Radial and the more conventionally constructed Goodyear Racing Tyre. The monopoly was broken, probably much to the relief of the Goodyear people, and the teams now enjoy full freedom of choice. The Italian Pirelli company has also promised to produce Formula 1 tyres providing that Alfa Romeo will build a Formula 1 racer. Both projects may well be in progress.

The developments within the rules of the 'car racing heavyweight formula' has now arrived at a stage where very little more can be done to improve the cars. It's on the spots where the racer touches the ground – on the tyres – that future research will concentrate. And from this even the everyday motorist may hope to benefit.

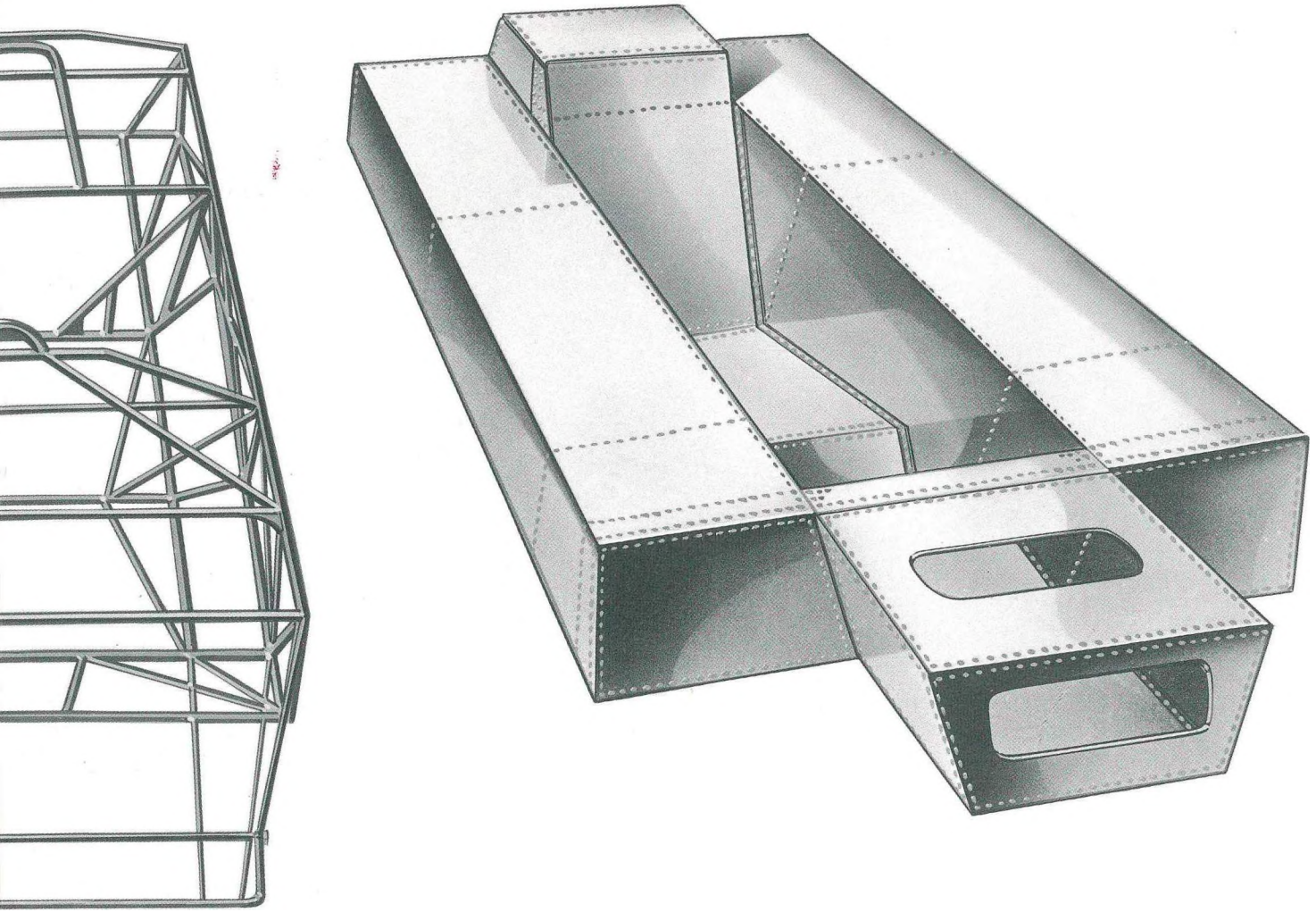
JPS Lotus Mark 3/1978





ONE OF THE racing car constructor's biggest headaches is the problem of making the car as stiff as possible – there should ideally be no chassis-flexing under high-speed cornering. This feature was noticeable on racing cars of older days. Forced through a bend, the rear wheels both remained firmly on the track while the inner front wheel lifted off as the chassis twisted outwards. This happened throughout the 1930s, 1940s and 1950s and was responsible for the style of driving mastered by Fangio. Instead of following a single line through a bend, the driver forced the car into a four-wheel drift, and went through the corner sideways, steering with the power.

In those days, the ladder-frame chassis dominated racing. The chassis consisted of two longitudinal members connected by a number of cross-members – resembling a ladder laid flat. This sort of chassis was not really ideal for fast cars, so step-by-step the designers improved it by welding tube reinforcements on top. This continued until eventually the chassis consisted of a framework of steel tube – and the spaceframe had



arrived, much more rigid than the previous type.

The tubular frame dominated Formula 1 racing in the late 1950s and into the 1960s. Then in 1962 Colin Chapman dropped his bombshell on the racing world – the Lotus 25 monocoque chassis. Explained briefly, this chassis is like a tin can with wheels at the front, a hole for the driver and engine in the middle, and wheels at the back. In principle the monocoque chassis is absolutely rigid and it was now possible to control and improve suspension movement.

In the Lotus 25 the engine was installed inside the monocoque, but later the engine was to become an integral part of the chassis on most cars. Engine and transmission carried the rear wheels and were mounted directly on to the rear of the can, no longer inside it. This construction is called semi-monocoque. The first Lotus monocoque was made of aluminium. Nowadays the lighter duralloy aluminium is favoured and many of the ancillary parts are made of glassfibre plastics.

NO SINGLE FEATURE of the modern racing car has required more development than the tyres – all the leading Formula 1 teams spend weeks testing different sizes of tyre, rubber compounds and mixes to suit their cars on different tracks. To claim that tyres today separate the winner from the second man home may be no exaggeration. Principally there are now only Goodyear and Michelin on the Grand Prix circuits. Most tyre manufacturers were at one time or another interested in racing, partly to gain experience for their own research and road tyre development, but also, of course, to benefit from the prestige and goodwill gained from the sport.

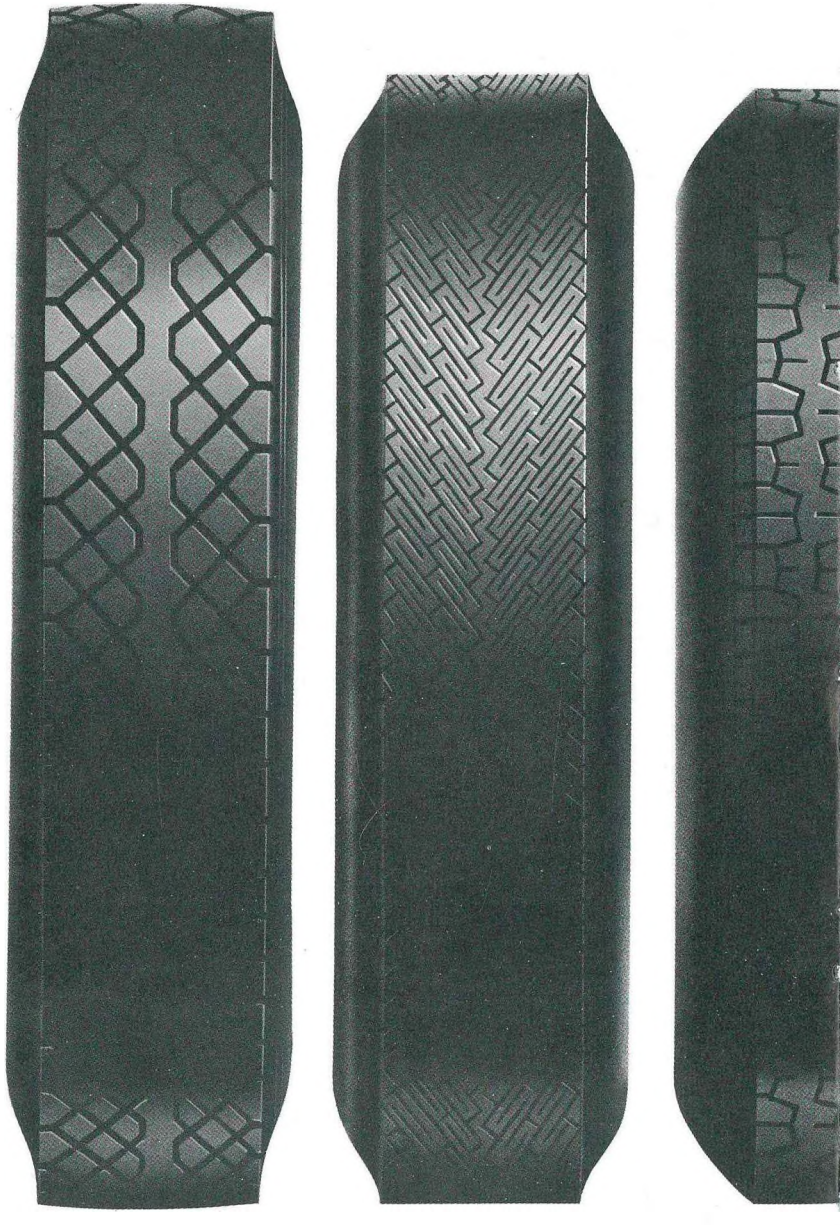
But progress marches fast, and in recent years one tyre manufacturer after another has been forced to give up the very costly development of racing tyres. During the 1930s racing car wheels were usually around 4 ins wide. The Mercedes-Benz of 1939 had the widest wheels of that period – a whole 4.5 ins front and 5.5 ins at the rear.

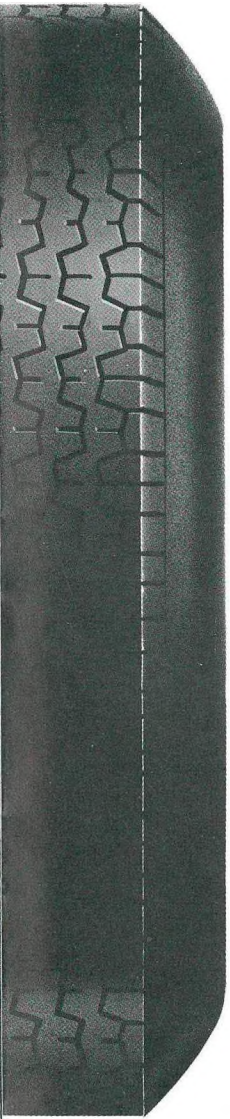
As late as 1961 most cars were still using wheels only 5 or 6 ins wide, but soon after the tyre war started in earnest. Research work was intensified and the tyres widened at least one inch each year. Today Formula 1 cars are using widths of up to 14 ins front and 17 ins rear.

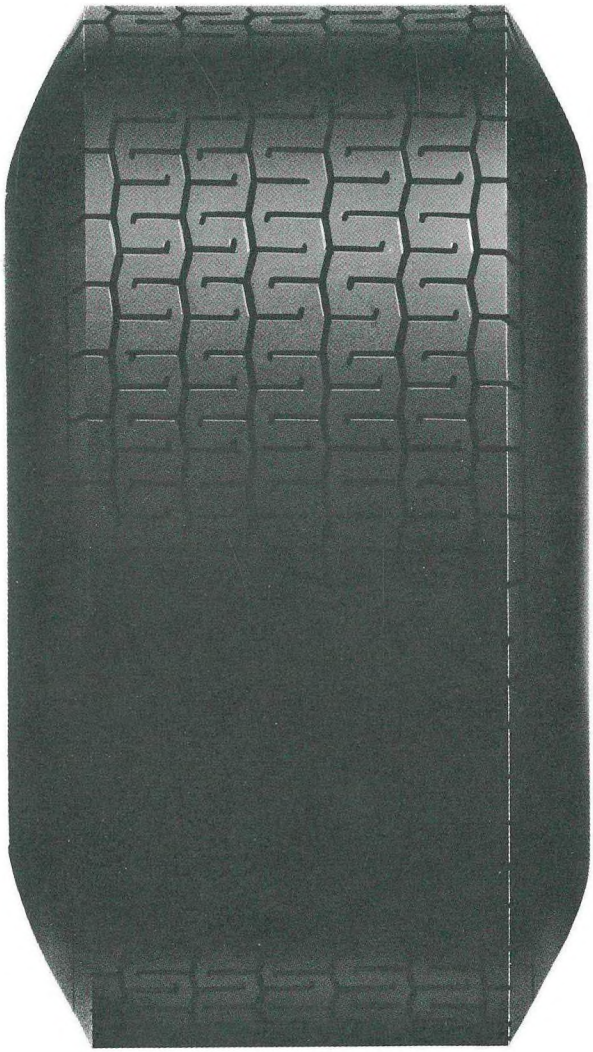
There are different tyres for different tracks. On dry surfaces smooth, treadless tyres – called slicks, evolved from drag racing – are used. Intermediates for damp and wets for rain are available. Modern racing tyre experts are now just a handful of people employed by two or three firms, so good contacts and favourable contracts are a must for every team.

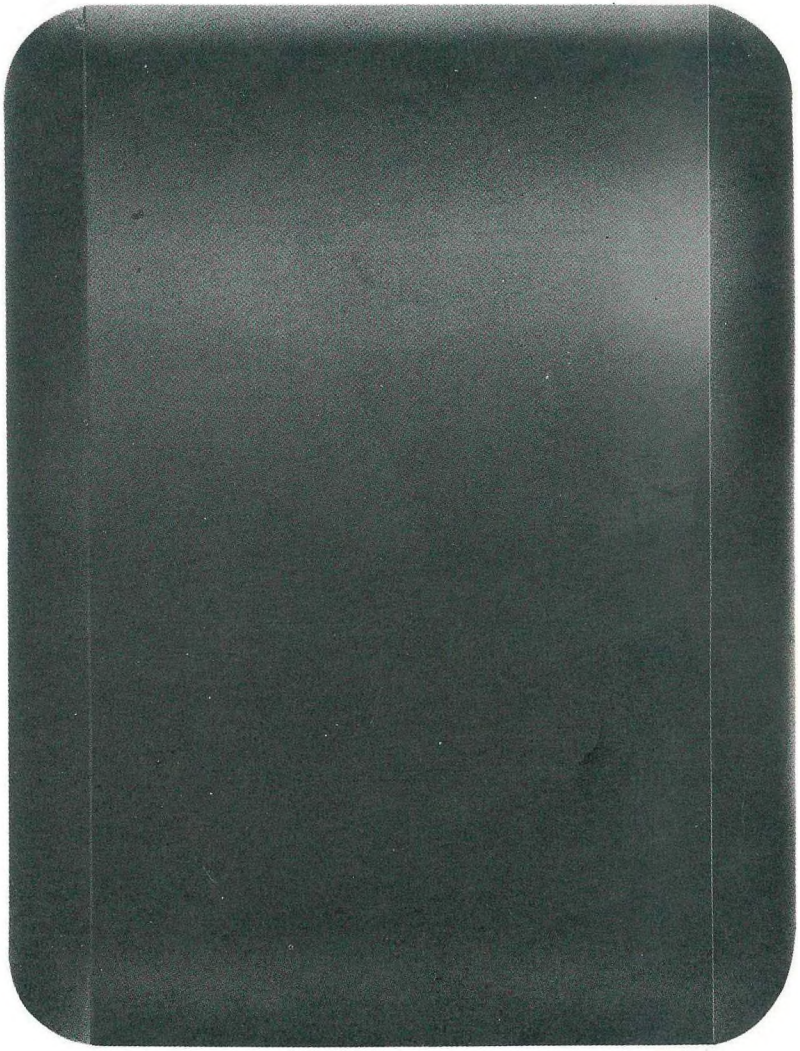
During the tyre testing sessions, the driver will be asked to do a specific number of laps and is then brought back to the pits and tyre temperatures measured. Based on these figures the right tyres are chosen for that race. For example, on a track with predominantly right-hand bends, the left tyres may get hotter than those on the right – and also wear more quickly. The answer is to use different compounds on either side.

There are more than 10,000 different mixtures in existence today and tyres can be made up in many sizes, types and thicknesses. Building racing tyres is pure craftsmanship and it takes a large organization with a lot of specialist knowledge to find the winning tyre.









AERODYNAMICS have quite naturally played a big part in the design of Formula 1 cars. Even back in the 1930s, Mercedes-Benz and Auto-Union had discovered the advantages of streamlining. After the war these discoveries were more or less forgotten until Mercedes again hit the Grand Prix circuits with their W196 model.

1. The first post-war Mercedes-Benz racing car appeared in this form in 1954. It was a completely enveloping body enclosing even the wheels, but was not fast enough on the short twisting tracks. Another, open version was built for that type of circuit, and the streamlined car with its 195 mph top speed was used for faster tracks. Despite being lighter, the open version could manage only 175 mph. The importance of streamlining for high speed had been proved.

2. The first wings on a Formula 1 racer appeared on the Lotus in 1968. The main idea of a wing is to keep the car down at high speed. This type of front wing was quickly adopted by all constructors.

3. This is the rear end of the 1968 Lotus. By raising the tail section like this, a downthrust was achieved at speed.

4. The Brabham of 1969 – one year after the first Lotus wing. Two huge aerofoils mounted on struts high above the body were supposed to improve the road-holding by pushing the car down. Unfortunately the mountings proved insecure and in some conditions had the adverse effect of actually lifting the car. They were banned after several wings collapsed with resultant accidents.

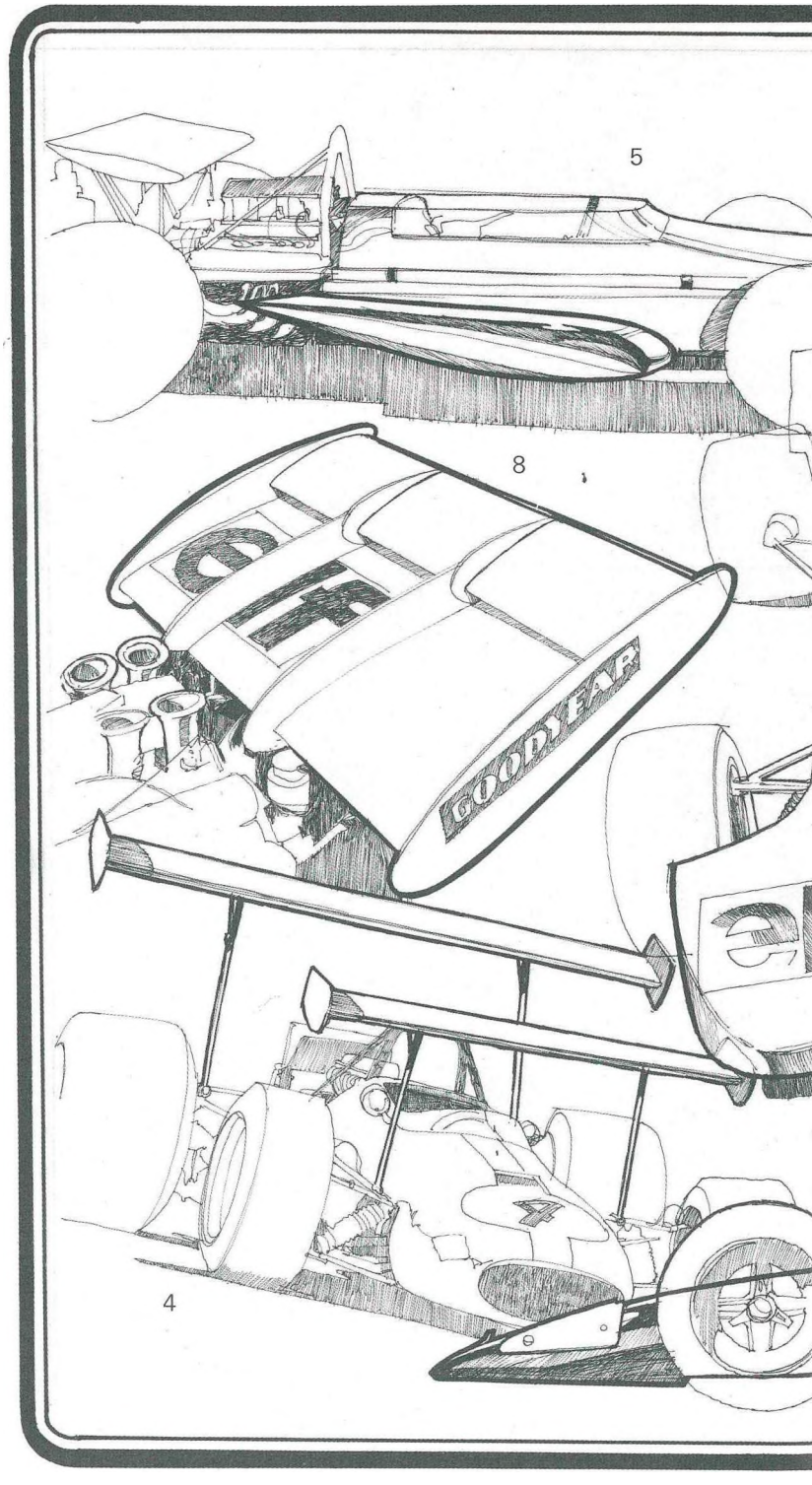
5. The fuel tanks on either side of the 1970 March took the shape of inverted wings. This was another method of giving the car better road-holding.

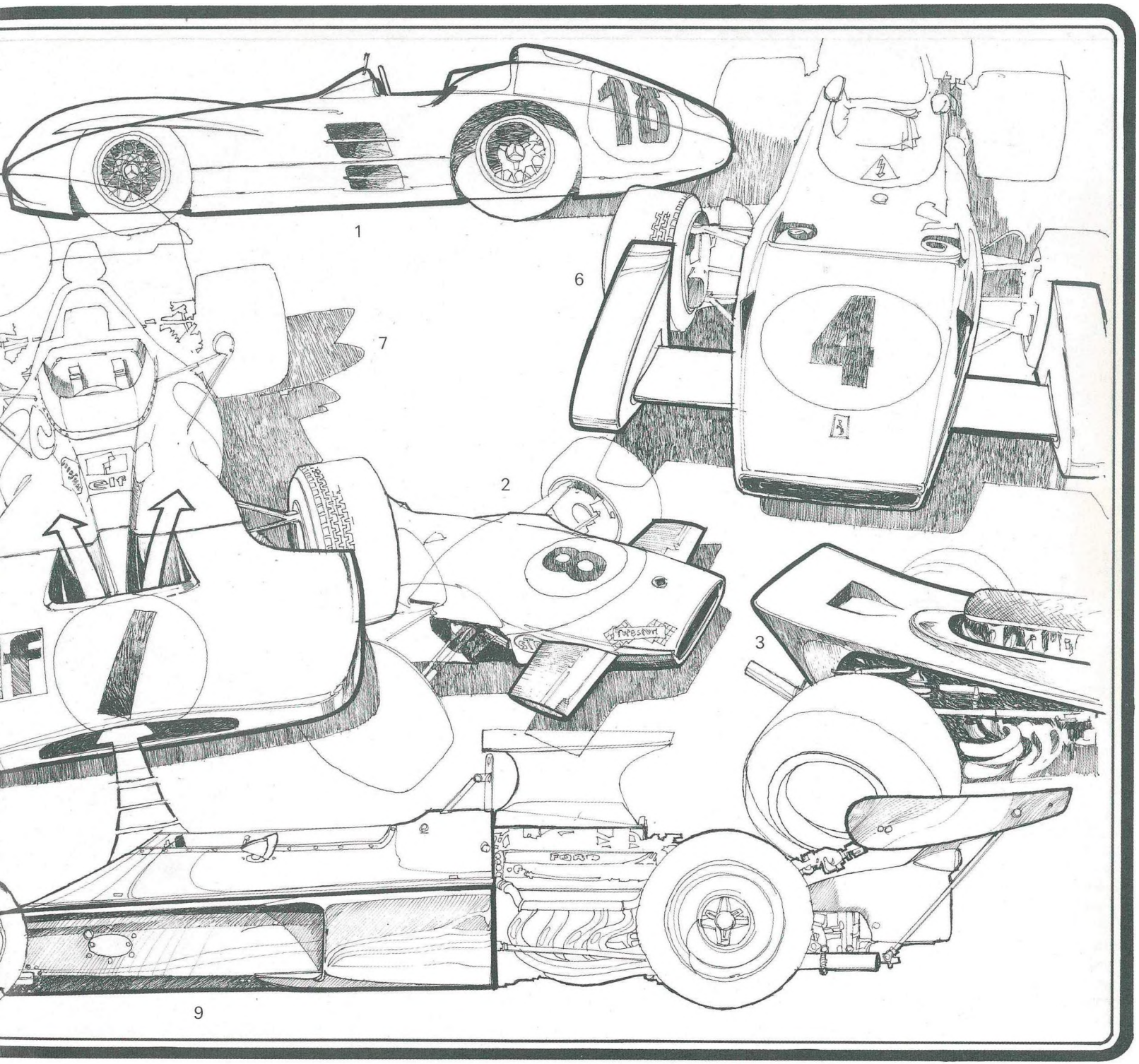
6. The Ferrari of 1971 had frontal wing extensions – canard fins – which were designed to improve the airflow over the front wheels.

7. The Tyrrell Ford, also from 1971, presented another solution with a different front design. The nose 'wing' was joined to the body and to lower wind resistance, air was let in through a central intake and directed over the car. The idea was to compress air flowing through the intake and cause it to force the body down as it passed over, pressure increasing with speed.

8. Even an aircraft designer would have been proud of the rear wing on the 1970 Tyrrell Ford. Twin wings allowed for maximum adjustability. The endpieces and pair of rails in the centre acted as cavitation plates, maintaining the airflow even when the car was turning. These plates are often used on jet aircraft to maintain balance when turning.

9. The 1973 Lotus – the lowest and most streamlined car of its day.

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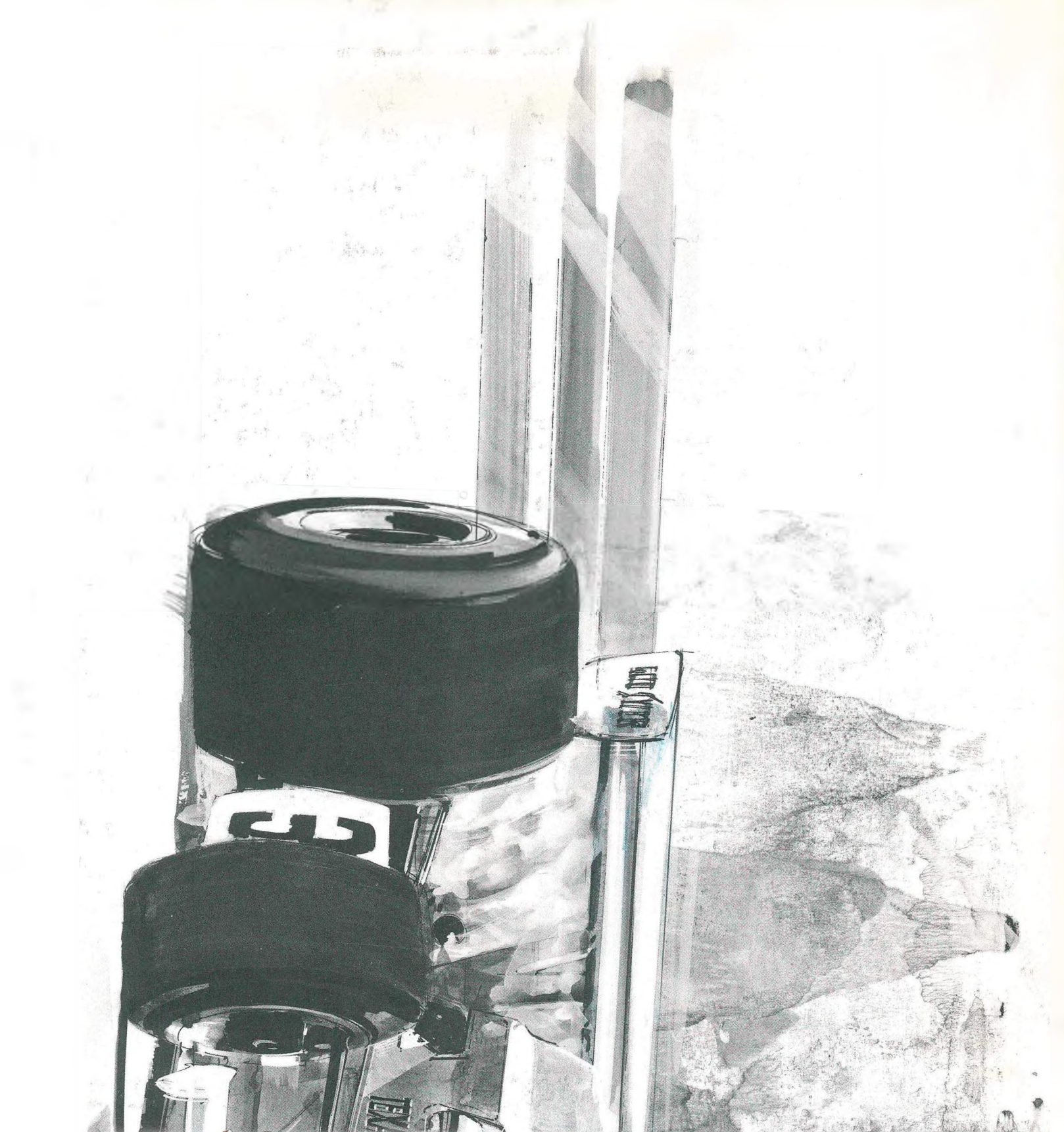

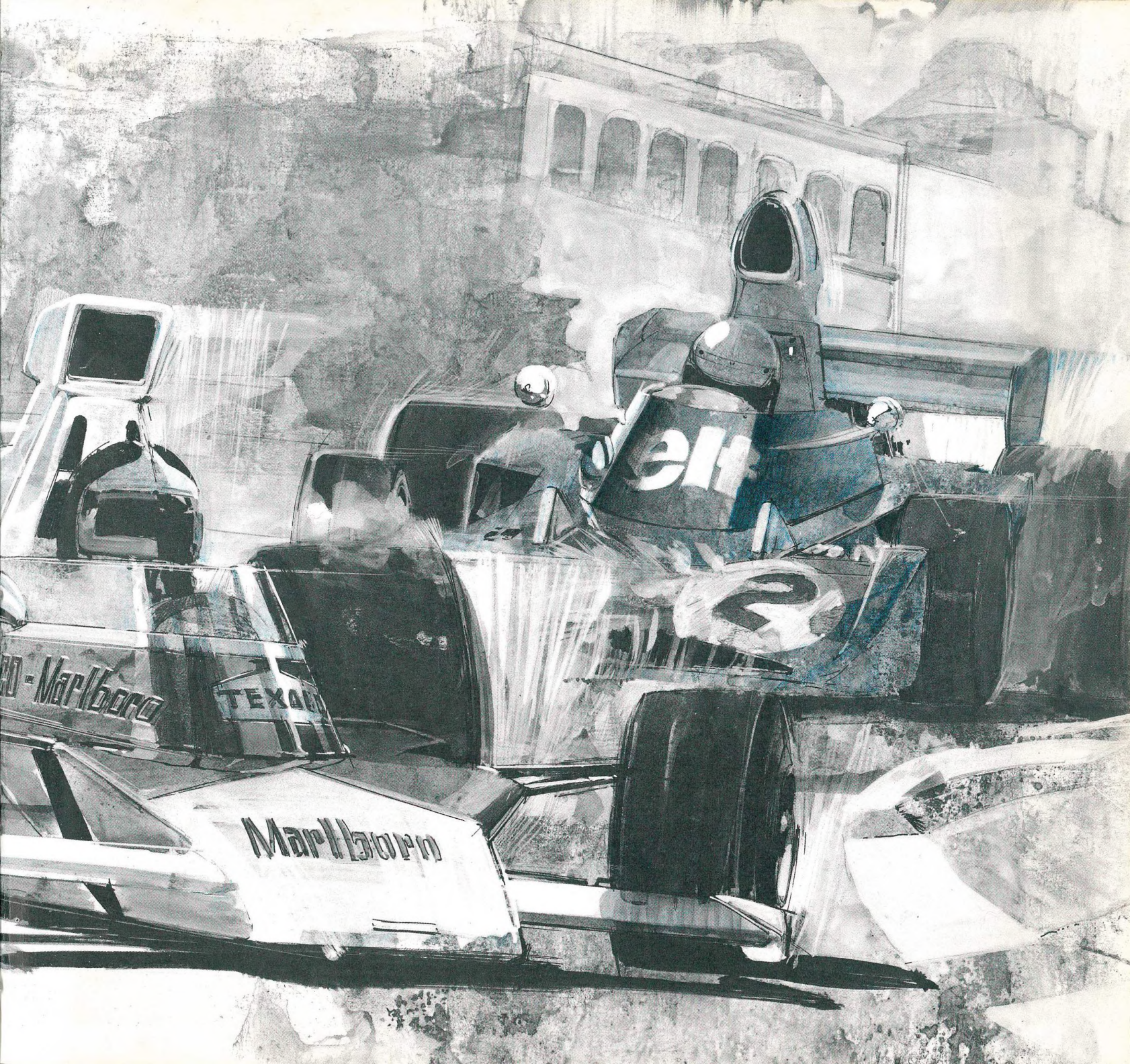
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# FORMULA 1

Formula 1 is the heavyweight class of the motor-racing world – bringing together not only the world's top racing drivers but also the most successful car designers and engine builders. This book describes the élite of Grand Prix cars over the years, their construction and their history.

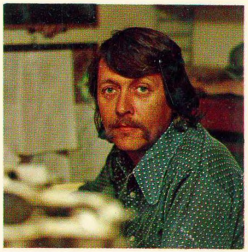
Here you'll get to know the car in which Juan Manuel Fangio made his début in Formula 1 – the legendary Alfa Romeo 'Alfetta'. And here is the story of the breakthrough in rear-engined design in 1958, when Stirling Moss drove so sensationally at the Argentine Grand Prix in a tiny Cooper. His rivals laughed at the car before the race – but Moss had the last laugh when the Cooper won, one of the milestones in post-war Formula 1. A new era was about to start. Tyrrell, Lotus and McLaren followed and were to become the big names – together with Ferrari. All this, and more, is told in FORMULA 1.

The many exciting illustrations are by Herbert Müdsam, combining the character of the racing cars with technical accuracy.

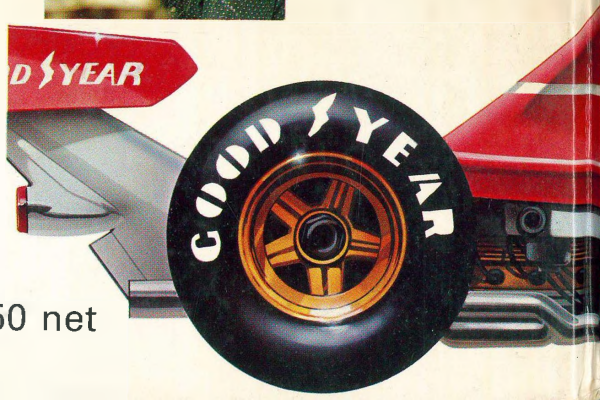
The text is comprehensive and loaded with facts. FORMULA 1 tells all about the top competition class of the racing world.


**Herbert Müdsam** was born in Nürnberg, Germany, in 1942. After studying art for three years in his home town, he left for Sweden at the age of 19. The science and technique behind racing and sports car design were his main interests and he was a regular visitor to the pits at race circuits. His skilfully drawn exploded views caught the attention of the big car manufacturers; the result was a heavy demand for his faultless cutaway drawings of new cars for both advertising and educational use.

The technical perfection, the bold perspective and the strong feeling for shape make Herbert Müdsam's sketches in ink-and-wash outstanding. This wealth of detail, clarity and boldness makes him a master among fast car artists, as this book proves beyond doubt.



**Sven Zettergren**, born in Stockholm in 1937, took an early interest in motor sport. As a photographer as well as a writer, he has closely followed motor sport for many years. He has kept pace with technical progress, which fascinates him as much as track performance. Nor is active competition unfamiliar to him – his personal achievements have included two Swedish championships in boat racing.

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