FERRARI F1-2000

MICHAEL SCHUMACHER

The Formula I world champion in 2000

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Michael Schumacher

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FERRARI F310 B
RELIABILITY AT THE CORE



FOR THE 1997 SEASON, JEAN TODT WANTED A BASIC AND RELIABLE CAR, A SECURE STARTING POINT FOR A DEVELOPMENT PATH IN WHICH SCHUMACHER WOULD PLAY A LEADING ROLE.

The 1996 Formula 1 World Championship ended satisfactorily for Ferrari, with Schumacher finishing third in the Drivers' Championship and the team taking second place in the Constructors' Championship. It was an up-and-down season, in which the German champion often made the difference, mainly thanks to his ability to maintain his performance at the highest level. After the adoption of a high nose and other minor modifications, the F310 single-seater designed by John Barnard finished the season on a high note.

Looking ahead to 1997, Jean Todt's imperative was to improve the car where possible, but without revolutionizing it. It was a task that primarily concerned Ross Brawn, the Scuderia's new technical



director, and Rory Byrne, the South African designer who had just arrived at Maranello. Together, Brawn, Byrne, and Michael Schumacher had previously won world titles at Benetton.

Less sophisticated, more reliable

Byrne designed a single-seater without excessive flights of fancy – in line with Todt's wishes – similar to its competitors, without the sidepods separated from the bodywork and therefore without a double flat bottom. Compared to the F310, the sides were more squared and vertical, the protections on the sides of the driver's head were significantly less bulky, and the engine air intake was larger and more efficient, thanks in part to the reverse mounting of the roll bar (an idea that came from Brawn). The miniaturized gearbox with titanium casing and carbon spacer acting as an oil reservoir were inherited from the F310; the weight distribution

THE SIGNIFICANT IMPROVEMENT ACHIEVED WITH THE F310 B ALLOWED SCHUMI TO FIGHT FOR THE TITLE, AND IRVINE ALSO FINISHED ON THE PODIUM SEVERAL TIMES. SO, AT THE END OF THE SEASON, FERRARI WAS STILL SECOND IN THE CONSTRUCTORS' CHAMPIONSHIP, BUT ITS GAP TO WILLIAMS WAS MUCH SMALLER THAN IN 1996.



Schumacher and Irvine pose for an "official portrait" with the new F310 B. The car, marked with the number 5, was the one driven by Schumi.

was also very similar to the car fielded in 1996. Overall, the aerodynamics of the F310 B were perhaps a little less sophisticated, but promised greater consistency of performance: the aim was to transfer everything that had been successfully tested in the wind tunnel to the track. In this way, the F310 B would be a clear benchmark for any further developments during the season.

Facilitating the work of the mechanics

The F310 B was presented in early January 1997, allowing a couple of months to tackle a busy testing program and then be ready for the season's inaugural Grand Prix, scheduled for March 9 in Australia. Technically, the new single-seater appeared to be a solid, well-built car, capable of fighting for the top positions in all race conditions. The main change from the F310 was the different suspension design, particularly the torsion bar springs, which were inserted into the chassis to make it easier for the mechanics to replace them. Accessibility to the various parts of the car and ease of intervention were other guidelines used to develop the car: it had to be possible to modify the car promptly based on the instructions of Michael Schumacher, who was able to provide his input in real time.

A COMPUTER AT THE WHEEL

One element in which the Maranello-based manufacturer proved to be technically ahead of its time was the multifunction steering wheel. Introduced by John Barnard and subject to continuous development, it undoubtedly made life easier for drivers and would be imitated by all the rival teams. The steering wheel incorporated digital displays that made it easier to read information. The upper part featured LEDs that indicated to the driver when to change gear, while the central part was packed with warning lights, buttons, and multifunction knobs that enabled the driver to instantly change numerous parameters of the F310 B. Schumacher, being the ace that he was, made the most of this possibility, adjusting the differential, traction control, and braking: in practice, the German champion could calibrate his car to perfection on every track, lap after lap, corner after corner.



FERRARI F310 B: TECHNICAL SPECIFICATIONS



ENGINE
rear, longitudinal, 10V 75º

Displacement
2,998.31 cc

Bore x stroke
3.622 in × 1.665 in
(92 × 42.3 mm)

Valve train
double overhead camshafts

Number of valves
4 per cylinder

Compression ratio
12:1

Fuel
indirect electronic injection

Marelli magnets
electronic ignition

Marelli static magnets
water cooling

Maximum power
730 hp at 16,050 rpm.

TRANSMISSION
rear-wheel drive

Gearbox
7 speeds + RM,
electro-hydraulic

CHASSIS
composite monocoque:
carbon-fiber honeycomb

Front and rear suspension
independent, double wishbones, push-rods, torsion bar springs, telescopic shock absorbers

Brakes
carbon disc brakes

Front and rear tires
Goodyear, 13-inch wheels

DIMENSIONS
Length
171.6 in (4,358 mm)

Width
78.6 in (1,995 mm)

Height
38.2 in (971 mm)

Wheelbase
115.6 in (2,935 mm)

Front track
66.6 in (1,690 mm)

Rear track
63.2 in (1,605 mm)

WEIGHT
1,323 lb (600 kg)

TOP SPEED
199 mph (320 km/h)

More stable and balanced

The F310 B was built around a carbon-fiber monocoque chassis and aluminum honeycomb, featuring new wing profiles and a rear diffuser that proved to be more efficient in wind tunnel testing. Particular attention was paid to the suspension geometry, which, in addition to torsion bar springs, featured a push-rod design (with reaction struts) in order to reduce the pitch and dive effect – pitching during braking and acceleration. The car was thus more stable and balanced, thanks also to the slightly increased wheelbase (115.6 in/2,935 mm on a length of 171.6 in/4,358 mm); the weight, according to regulations, was 1,323 lb (600 kg) with water, oil, and driver on board.

The Ferrari 046/2 engine, a 75º naturally aspirated V10 with a displacement of 2,998.31 cc, had been modified in many internal details: it was more powerful than its predecessor and therefore slightly more "thirsty," while maintaining the same weight and dimensions. Maximum power was around 730 hp at just over 16,000 rpm, in line with the best rivals; the semiautomatic gearbox had seven speeds.



Identified by the code 046/2, the V10 engine mounted on the F310 B (above) had a displacement of 2,998.31 cc.

An excellent basis for continuous development

From the very first tests, it was clear that the F310 B was a reliable single-seater, which was exactly what Todt and the whole team had expected. There was a clear understanding that a winning single-seater could not be created out of thin air – to reach the highest levels of competitiveness, a long development process would be necessary, comprising many small changes at each race and each test. The new single-seater seemed the ideal basis for this type of work. During 1997, the evolution of the F310 B would be characterized by two fundamental stages: first, electronic management for brake distribution would be introduced; then, toward the end of the season, a new construction technique (which would affect the last three of the nine chassis produced during the year) would make it possible to lighten the car and, consequently, to use ballast to improve weight distribution and achieve the ideal setup, all to the benefit of tire performance. For its part, electronic brake management represented an important advantage for Ferrari over Williams, which was caught off guard by this solution. The Williams single-seater remained superior in terms of aerodynamic efficiency and overall balance, thanks to development work that began at the start of the decade, but the F310 B clearly excelled when it came to braking. ■

THE FERRARI F310 B'S RECORD

17 RACES

5 WINS

4 SECOND PLACES

4 THIRD PLACES

3 POLE POSITIONS

3 FASTEST LAPS



1962–63 F1 WORLD CHAMPIONSHIPS
THE MOSS AFFAIR AND SURTEES'S FIRST GP



In the days leading up to the 1961 Italian Grand Prix, the Ferrari team was in Monza to test the new Gran Turismo racing car that was set to replace the 250 GT Berlinetta with a short wheelbase. It was a routine test conducted by the Prancing Horse's engineers, led by Giotto Bizzarrini and supported by the Modena-based manufacturer's drivers, including Lorenzo Bandini. But what attracted the attention of the most observant spectators was the presence of Stirling Moss, who at one point got behind the wheel of the car with its still unfinished bodywork, which would later take the form of the 250 GTO. The appearance of the London ace during testing at the Brianza circuit was somewhat downplayed by Maranello: "Moss is a regular customer who has been racing and winning with the 250 GTs for several years now." Indeed, Stirling Moss had performed several times at the wheel of the Modena berlinettas made available to him by Rob Walker's team, to which Moss was very attached: with these cars, he won the two most recent editions of the Tourist Trophy (1960 and 1961) and competed as a protagonist, paired with Graham Hill, in the 1961 24 Hours of Le Mans. Moss was not only the most famous driver of the moment (and probably the strongest), but also a modern sportsman, ahead of his time: he took care of his physical preparation and was also very attentive to the exploitation of his image,



THE TWO SEASONS FOLLOWING PHIL HILL'S WORLD CHAMPIONSHIP VICTORY MARKED A DECLINE FOR FERRARI, BUT THERE WAS NO SHORTAGE OF INTEREST BEHIND THE SCENES IN THE TOP CATEGORY.

Willy Mairesse with the no.40 156 F1 at the 1962 Monaco Grand Prix.





The Ferrari GTO in action during the 1962 Tourist Trophy: at the wheel is Innes Ireland, who went on to win the race.

WITH THE POSSIBILITY OF FIELDING MOSS GONE, THE BRP TEAM HONORED ITS COMMITMENT TO FERRARI BY ENTRUSTING THE CAR TO INNES IRELAND.

which is why he was assisted by an agent (following the example of his "master" Juan Manuel Fangio, one of the first drivers to employ the services of an external manager).

The agreement between the parties

Enzo Ferrari had long wanted to sign Stirling Moss to his official team, but the Englishman, who was very demanding when it came to the financial aspects of his profession, made demands that the Commendatore did not feel he could meet. Then, however, the tables turned. For the 1961 Formula 1 World Championship season, Ferrari put a formidable car on the track – the 156 F1, which defeated the fierce British competition, winning the Drivers' and Constructors' Championships. Moss wanted to drive it at all costs – and possibly win the World Championship that had always eluded him by a whisker – but he remained firm on his contractual demands.

In the end, the situation was resolved with a fairly simple solution. Moss would remain in Great Britain, with contracts signed with Rob Walker's team for GT racing and with the British Racing Partnership (BRP) for Formula 1. Ferrari would present BRP with a complete single-seater, but unlike other private teams in similar situations (Francorchamps, for example), there was a clause that made all the difference: the car driven by Moss would be maintained, updated, developed, and serviced in every way as an official Ferrari single-seater. The agreement – still a secret – was signed and would come into effect in 1962. BRP was not a team chosen at random: it was a professional organization founded by the British ace's father, Alfred Moss, together with his partner Ken Gregory.

An impossible dream

Moss's debut with the Ferrari 156 F1 (an event that also explained Stirling's presence



A close-up of the characteristic "shark nose" of the Ferrari 156 F1, the dominant car of the 1961 season.

at Monza for the testing of the 250 GTO prototype) was set for May 12, 1962 – one week before the start of the World Championship – at Silverstone, during the BRDC International Trophy, a prestigious non-championship Formula 1 race. Three weeks earlier, on April 23 (Easter Monday), Moss was busy at the Goodwood circuit where the Glover Trophy was being contested. The battle was between him and Graham Hill, the darlings of the crowd who had flocked to see the exploits of their two compatriots. Moss, who started from pole position in his Lotus Climax (Hill was second on the grid in his BRM), suffered mechanical problems that forced him to make a long pit stop. When he restarted, he drove like a madman to make up ground, until he was the victim of a terrible crash in which he was seriously injured, putting an end to his career. Meanwhile, the 156 F1 for BRP was already ready, and the parties did not want to renege on their commitment. Ferrari sent the car to Silverstone on the official transport truck, accompanied by technicians and mechanics from Maranello. The British team provided its best driver after Moss: Innes Ireland. Born in 1930, Ireland made his Formula 1 debut rather late, in the 1959 Dutch Grand Prix, and had three podium finishes (in 1960) and one victory (in 1961) to his credit, all achieved with Lotus. The BRDC International Trophy would be his only appearance at the wheel of a Ferrari in the top category: after setting the sixth-fastest time in qualifying, Ireland crossed the finish line in fourth place at the end of a race contested in heavy rain. Despite this positive result, however, Stirling Moss's definitive withdrawal would scupper Ferrari's "English" project.

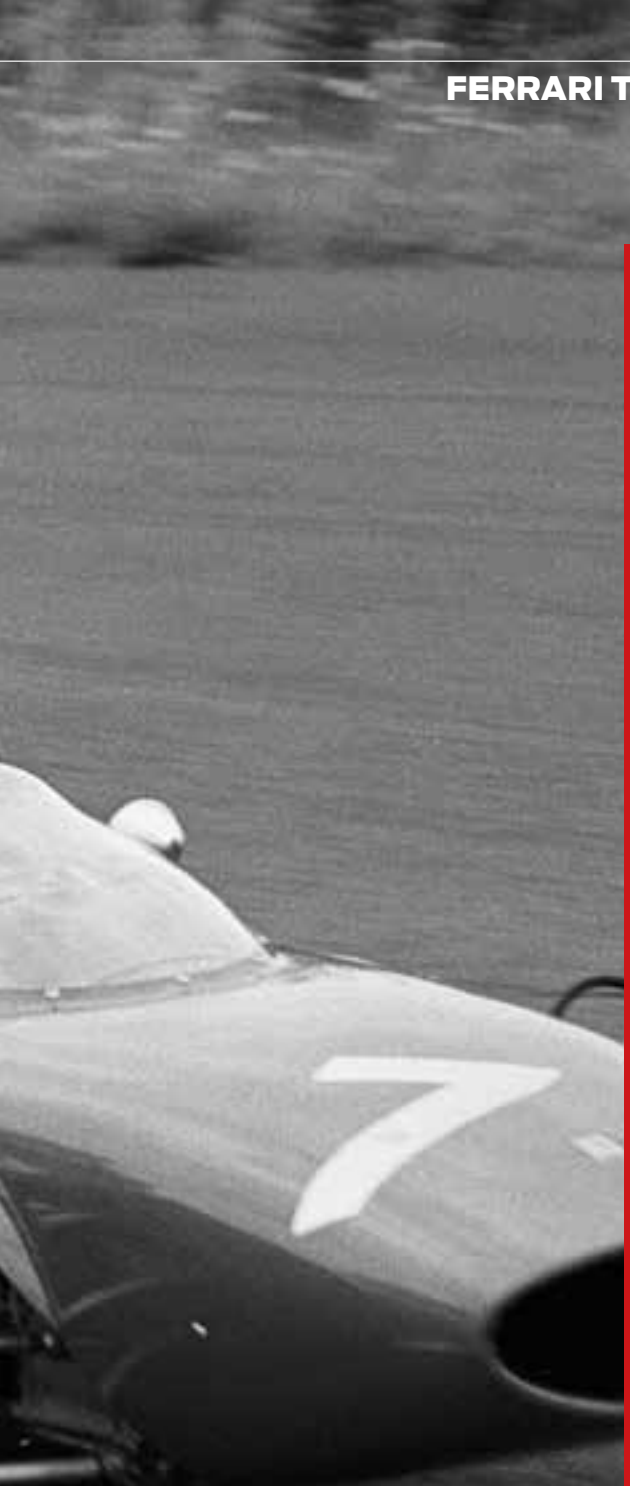


Innes Ireland with the BRP team's 156 F1 at the 1962 International Trophy in Silverstone, where he crossed the finish line in fourth place.

BETWEEN HISTORY AND MYTH

1963 GERMAN GP SURTEES'S DEBUT ON FOUR WHEELS





In the early 1960s, the name John Surtees was already extremely familiar in the world of motorsports, but in this case it was on two wheels. The rider from Tatsfield, a village in the English county of Surrey, had won seven titles in the 350 and 500 cc categories riding MV Agusta bikes, and in 1960 he also made his debut in the Formula 1 World Championship. That season he achieved a brilliant second place in his home race, driving a Lotus Climax. In 1962, he made a name for himself with the Lola Climax, and at the end of the year he was hired by Enzo Ferrari for the following season. The Prancing Horse team had had a disappointing year and was looking for improvement. Surtees answered the call and after the first five races of 1963, he had already been on the podium twice, in Holland (third) and Great Britain (second).

The time seemed ripe for a big result, which Surtees accomplished on one of the most difficult tracks in the World Championship. On August 4, at the Nürburgring circuit, which as usual hosted the German Grand Prix, Surtees and his 156 F1-63 started from the front row alongside the star of the season, Jim Clark, who had taken pole position. This time, however, the "Flying Scotsman" would remain in the lead for only one lap of the 15 scheduled: all the others (apart from the first, where Ginther led the way) would see the *Rossa* driven by the Surrey champion in the lead, crossing the finish line more than a minute ahead of his rival's Lotus.

It was Surtees's first victory in a Formula 1 World Championship Grand Prix, a prelude to a year – 1964 – crowned by the World Championship title. ■



STIRLING MOSS THE UNCROWNED KING

Stirling Moss was born into a wealthy family in London on September 17, 1929. His father, Alfred Moss, was a dentist by profession and an amateur racing driver. Stirling began competing in Formula 1 in 1951, racing in the Swiss Grand Prix (where he finished eighth), while his first podium came in 1954 in Belgium at the wheel of a Maserati. The following year, Moss was hired by Mercedes as Juan Manuel Fangio's "wingman" and claimed his first World Championship victory at the British Grand Prix (after the first pole position of his career), finishing second in the final standings behind the Argentinian ace. After Mercedes withdrew, the Londoner joined Maserati, where he was once again second behind the Fangio-Ferrari duo. The same scenario repeated itself the following year, with Moss moving to Vanwall, while Fangio triumphed with Maserati. It seemed that 1958 might be year to win the long-awaited world title, but once again Moss just missed out: this time it was Mike Hawthorn who finished just one point ahead of him in the final standings, earning Stirling the reputation of eternal runner-up. His last three seasons in Formula 1 (1959–61) saw him finish third in the standings. Overall, his haul in the top flight amounted to 16 victories and 24 podium finishes out of a total of 66 Grand Prix races. Then there were his triumphs in the Sports category, starting with the 1955 Mille Miglia, which he won alongside Denis Jenkinson. He secured victories in great classics such as the Targa Florio (also in 1955, alongside Collins), the 1,000 Km of the Nürburgring (four wins between 1956 and 1960), and the Tourist Trophy (five wins between 1955 and 1961, two in a Ferrari 250 GT short wheelbase).

Two seasons lacking in satisfaction

With the dream of seeing the British ace driving a Prancing Horse car now over, Ferrari faced the 1962 season in a climate of relative uncertainty, despite Phil Hill's recent title win in a car that proved to be the one to beat. The Maranello-based manufacturer fielded the 156 F1 again, but with much less success than the previous year. The four podium finishes achieved in the first three races by Phil Hill and Lorenzo Bandini remained the only noteworthy results for the car, which throughout the entire championship suffered in comparison with its more competitive British rivals. This was also due to the almost total absence of development work, caused at least in part by the departure, at the end of 1961, of the head of the technical department, Carlo Chiti. The nine Grand Prix races scheduled in the 1962 Formula 1 World Championship were almost all won by BRM (with Graham Hill, four victories and the Drivers' and Constructors' World Championship titles) and Lotus (with Jim Clark, three wins and second place in the Drivers' Championship). In the second half of the season, Ferrari did not exceed sixth place in Germany (with

Rodríguez) and fourth and fifth places in Italy (with Mairesse and Baghetti); in the Constructors' Championship, it finished only sixth.
Things went a little better in 1963, when the British dominance – with Hill and Clark swapping positions in the final standings – was countered by Ferrari's new signing, a British "champion of the breed:" John Surtees. He recorded the Scuderia's only victory of the season and two other podium finishes, finishing fourth in the final standings. Ferrari finished in the same position in the Constructors' Championship in 1963, when it debuted a thoroughly revised version of the 156 F1. The new car, called the 156 F1-63, lost its "shark nose" in favor of a single oval-shaped "mouth" and, above all, was built around a mixed chassis, obtained by covering the old tubular steel structure with sheet metal panels. This construction technique was very popular in aeronautics (hence the use of the acronym 156 F1 Aero, by which the single-seater was also known), and the young Ferrari technical director, Mauro Forghieri, decided to adopt it on the basis of the excellent performance of the Lotus 25 with its monocoque chassis. The 156 F1-63 was the basis for the subsequent 158 F1, designed by Forghieri for the 1964 F1 World Championship. ■



In the 1962 German Grand Prix, Lorenzo Bandini debuted a new version of the 156 F1, a precursor to the Aero models that would be adopted from 1963. The front of the bodywork no longer featured the "shark nose" openings.



The Dino 120° V6 engine, one of the main architects of the 1961 triumphs, continued to power the Ferraris in both 1962 and 1963.

FERRARI 156 F1-63T IN BRIEF



Engine rear, longitudinal, 6 cylinders in a 120º V configuration	**Displacement** 1,476.60 cc	**Bore × stroke** 2.87 x 2.31 in (73 × 58.8 mm)	**Timing** double overhead camshaft	**Number of valves** 2 per cylinder
Compression ratio 9.8:1	**Fuel system** Bosch direct injection	**Ignition** dual, two distributors	**Cooling** water	**Maximum power** 205 hp at 10,500 rpm
Transmission rear-wheel drive	**Gearbox** 6 speeds + RM	**Chassis** tubular steel	**Front suspension** independent, double wishbones, coaxial coil springs with telescopic shock absorbers	**Rear suspension** independent, upper arm, inverted lower triangle, double struts, coaxial coil springs with telescopic shock absorbers, stabilizer bar
Brakes disc	**Tires** Dunlop front 5-15, rear 6-15	**Wheelbase** 93.7 in (2,380 mm)	**Front track** 52.4 in (1,330 mm)	**Rear track** 54.3 in (1,380 mm)
Length 158.7 in (4,030 mm)	**Width** 55.1 in (1,400 mm)	**Height** 39.4 in (1,000 mm)	**Weight** 1,014 lb (460 kg) dry weight	**Maximum speed** 162 mph (260 km/h)

022 | THE ENGINE (12)



PARTS LIST

22A Part 1 of manifold R3

22B Part 2 of manifold R3

22C Part 1 of manifold R2

22D Part 2 of manifold R2

SCREWS*

2 **AP** screws 1.7 × 4 mm (+ 1 spare)

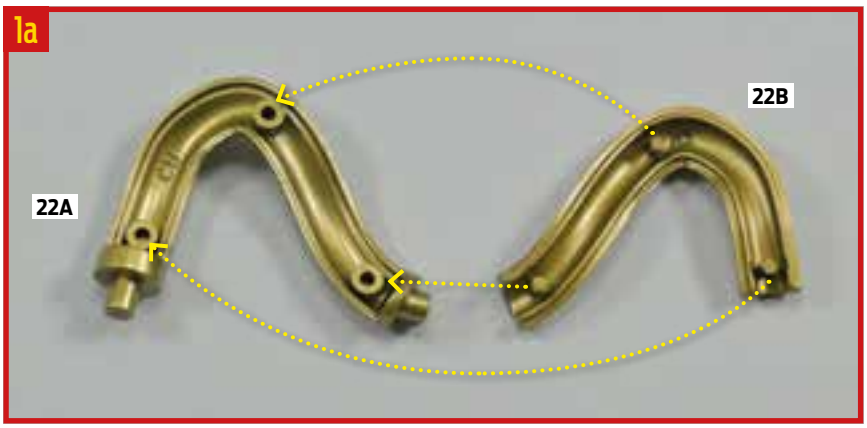
2 screws **AP**



** The screw codes end with the letter **M** or **P**: the former are for metal and the latter are for plastic. It is advisable to use lubricant for type M screws that are difficult to insert and to screw them in progressively, unscrewing and screwing them back in one or two turns at a time.*



1 Take parts **22A** and **22B**, which form manifold R3, and place them on the work surface (photo **1a**). Using the three pins and the corresponding holes, connect the two parts, applying sufficient pressure to obtain the result shown in photo **1b**. The detail in photo **1c** shows the notch that is used to fit manifold R3 into the right side of the engine block.

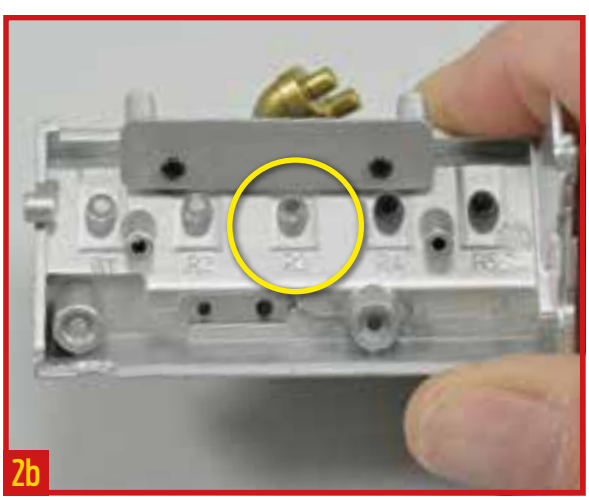






2 Retrieve the right engine block **15A**, on which you have already mounted two manifolds (photo **2a**). Underneath the block, the screw hole for the R3 manifold is marked (photo **2b**), while on top of the block the manifold hole includes a slot designed to accommodate the notch in the R3 manifold (photo **2c**).

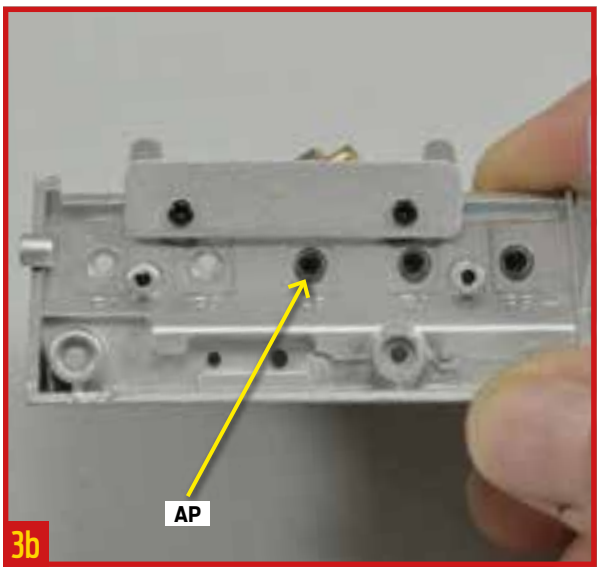




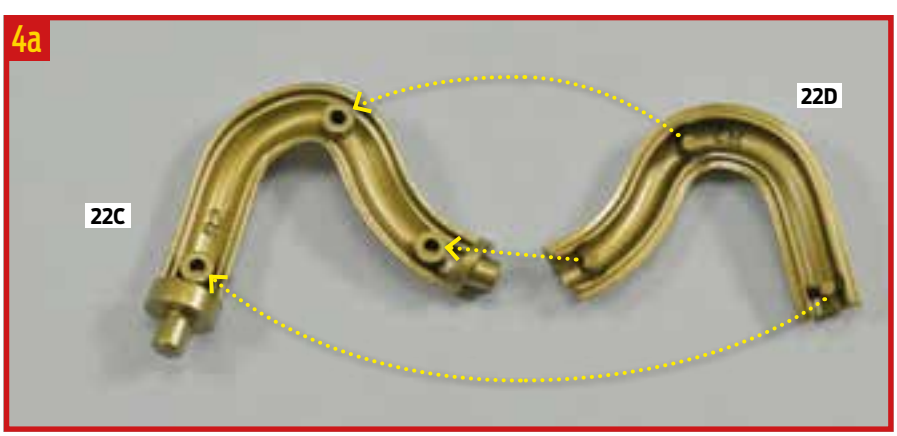


3 Insert the R3 manifold into the corresponding hole in the right engine block, as shown in photo **3a**. Then secure the R3 manifold from underneath with an **AP** screw (photo **3b**).





4 Take parts **22C** and **22D**, which form manifold R2 (photo **4a**), and press them together to obtain the result shown in photo **4b**. The detail in photo **4c** shows the notch that is used to fit manifold R2 into the right side of the engine block.

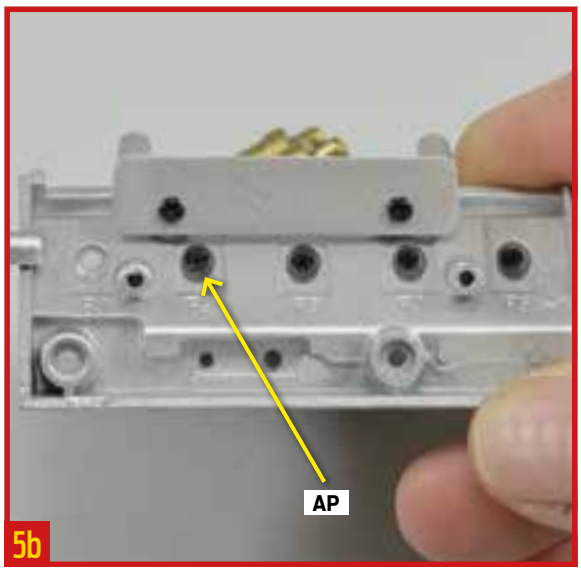






5 Insert the R2 manifold into the corresponding hole in the right engine block (identified on the back with the code R2), as shown in photo **5a**. Then secure the R2 manifold from underneath with an **AP** screw (photo **5b**).


5a



5b

FINAL RESULT

