



Enzo Ferrari | Symphony No.1

IN A TWELVE-CYLINDER ENGINE, AT ANY given moment, three pistons are generating great waves of sound. In Ferrari's very first engine – a miniature machine compared to the 7.0-litre Packard 'Twin Six' V12 that inspired it, a 1.5-litre V12 jewel, the ultimate expression of mechanised art – the inlet and outlet tracts were designed to create an ideal resonance. Hostile to supercharging, Ferrari had instead ram-tuned the engine for maximum extraction of power through Edoardo Weber's twin-draught jets.

Franco Cortese, one of the first to race the little jewel, warned: 'You had to pay very close attention to the revs. It was a somewhat different engine, one that went up to speed very quickly. If you were used to normal fours and sixes, this twelve was more like an electric motor.'

Imagine, then, the engine as a mechanical musical instrument with ducts like pipes in a church's organ that amplify its sound, and also its power output. And this Ferrari was perfectly tuned: the higher it revved, the faster it pulled, the better it sounded. Ferrari's sound is not a noise, it's the orgiastic voice of speed, 'a burst of harmony no conductor could ever recreate,' in the words of Herbert von Karajan, late of the Berlin Philharmonic and a collector of fine automobiles, uniquely blessed in his ability to deconstruct the works of the finest composers from Bach to Sibelius, Beethoven to... Gioachino Colombo.

THE MAGIC OF THAT FIRST FERRARI V12 LAY IN ITS forward-thinking ingenuity: it perfectly embodied the Italian genius of creating much out of little, if any, matter at all. Its very grandeur lies in its singular modesty.

To contemplate any new engine was, in the Italy of 1945, an heroic act. The last bombs had fallen on Milan in April. By May, the country was free, neither kingdom nor republic. Alfa Romeo made economic wood-burning stoves. Ferrari reproduced German tools (the factory had been bombed in February). Yet by July, Enzo Ferrari had started work on the car that would bear his name.

Enter Colombo. An engineering autodidact, Gioachino Colombo had arrived at Alfa Romeo in 1924. All Italy's finest engineers graduated from the university of Alfa Romeo at that time: Colombo; his Hungarian boss, Vittorio Jano; Alberto Massimino, who was at Alfa with Wifredo Ricart, and in 1939 engineered Enzo's Ferrari 'prequel' car, the Auto Avio 815. Post-war, Jano was engaged by Lancia and Massimino by Maserati.

When Colombo's post at Alfa's Reparto Corse was suddenly suspended on no pay, he was the man Ferrari – itching to start work on the car with his own name on it – knew he had to call: 'Colombo! I am tired of making tools. I want to get back to building racecars. How would you do a *millecinque*?' The engineer had the right answer: 'Maserati has a great four-cylinder, the Brits have the ERA sixes, and Alfa has its eight. In my view, you should do a twelve.'

A smile, a quick lunch, and Colombo returned to Milan. A few days later, after, according to legend, a heavy *Ferragosto* lunch, Colombo sat under a tree and sketched the concept for the V12. Installing a cousin's drawing table in his bedroom, he went on to create the designs for the little jewel, with Lino Nasi, notionally head of Motori Diesel at Alfa, serving alongside as his adjutant.

Luigi Bazzi, Enzo's right-hand man and the 'soul of Ferrari', would visit each week to take the sketches back to Modena, where a young draftsman, Luciano Fochi, would translate Colombo's sketches onto tracing paper adorned with Ferrari's Auto-Avio-Costruzioni stamp. By November 1945 the design of the Sport 125 S was finished. Done by three men, in three months.

Ferrari's judgement on Colombo's work was characteristically dry: 'The first V12 1500cc was born an orthodox machine,' he'd say. 'We just thought to make a conventional engine, albeit exceptional.' And yet Ferrari would also admit that 100 per cent of the engineering focus of the car was on the engine.

The Tipo 125 delivered 100bhp at 7000rpm, a lot for 1947. Yet its build was simple: single camshaft, one rocker gear per each of the inclined valves, one spark plug mounted within the vee. Wherein then the *deus ex machina*?

Fritz Indra re-engineered powertrains at Alpina before a 16-year career as head of engine design at Audi. The basic architecture of Ferrari's new engine was indeed conventional, he says: 'That was an era of classic vee angles. V8s had 90 degrees, V12s had 60 degrees.'

Colombo's Tipo 125 therefore maintained all the advantages of that Packard Twin Six. 'Each cylinder block is in perfect balance at all times,' says Indra. 'The blows of each individual explosion are so light that there is no possibility of crankshaft torque distortion nor critical speed. The power strokes overlap each other in a smooth, continuous purring of power...'

'But Colombo had put a lot of thought into this engine.'

The little jewel featured an unusually over-square geometry. 'The stroke is very short at 52.5mm, so the high speeds were not a problem: the piston speed of 12.25m/sec at 7000rpm is very moderate,' says Indra. The 58mm bore meanwhile allowed for larger valves and quick timing: ideal for a racing engine. Another unconventional feature was the angle-split piston rods. The pistons, first by Mondial, then by Borgo, themselves had three segments. The in-house-developed gearbox had five speeds, with an overdrive fifth – an astonishing breakthrough; no one else had it.

Two rows of six cast-iron liners were fitted to the monolithic aluminium engine block whose 90mm cylinder bore spacing was compact yet generous enough to accommodate a doubling of the capacity: 275x12 by the time of this V12's last evolution. Finally Fritz Indra notes a detail many might not see. 'The very special thing about this engine is the hairpin valve springs. The springs lie not in the centre of the valve stem, but two on each side. That way you can reduce the overall height and lower the centre of gravity.'

NEWS OF COLOMBO'S CLEVER LITTLE ENGINE spread quickly among northern Italy's engineering community. An upset Alfa Romeo immediately reinstalled Colombo at its Vulture Sportive office, so Colombo suggested that Giuseppe Busso – 'stubborn yet competent' – should finish the car. In June 1946, Busso became Ferrari's technical director, aided by the omnipresent Cavalier Bazzi and a young Aurelio Lampredi.

The Ferrari 125 S – shod of any Auto Avio labels – finally appeared on the Piacenza circuit, just over 70 miles from Modena, ready to race on 11 May 1947. Franco Cortese was leading with two laps to go when the fuel pump collapsed. It was, said Ferrari, 'a promising flop.' One month later in Rome, however, Cortese brought the 125 S and Ferrari its first victory. In all, the little car took part in 10 races, winning six of them.

When rumours surfaced of a new two-litre Maserati, Colombo's jewel was bored and stroked out to 58x59mm for 1.9-litres, good for 125bhp in the 159 S, which Busso would take credit for. At its debut in Pescara, in August 1947, Cortese (again) raced it to second place. By October, however, the car was winning with Raymond Sommer at the wheel in Turin, but only after both of Maserati's new A6GCS-2000s had been withdrawn. Unimpressed, Ferrari replaced Busso, who went back to Alfa Romeo, with... Gioachino Colombo, by now freelance again. [CONTINUED ON PAGE 73]









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This *carosello* of coming and goings is peculiar to the impulsive Italian way of handling business.

For the 1948 season, Colombo set about evolving Busso's 159, taking his own V12 out to the oversquare 60x58.8mm he believed to be 'the perfect two-litre', and the results followed. In April, Clemente Biondetti in the new 166 Barchetta Allemano won the Giro di Sicilia, and in May, in a 166 Berlinetta Allemano, the Mille Miglia. A Ferrari 166 was all of a sudden the must-have car.

For 1949, and with a more divergent clientele to appeal to, Colombo created three distinct versions of his V12 car: the 115bhp Inter kept the specification of the 1948 car; the 90bhp Sport was for new touring customers; for racers, the 166 MM with a longer wheelbase and no less than three Weber 32 DC carburettors was good for 140bhp.

The new range was exhibited at the Salone in Turin in September 1948 and marked the start of Ferrari's relationship with Milan coach builder Touring Superleggera. Touring showcased a four-seater Berlinetta Inter in cerulean metallic, while Ferrari brought the 166 MM in red.

The open two-seater didn't appeal to everyone. Motoring writer Giovanni Canestrini found the car's tapering form 'disconcerting'. Coining a new phrase, he called it 'Barchetta' – a little boat. The name would soon be heard around the world. Driving a 166 Barchetta, Clemente Biondetti won his fourth Mille Miglia in 1949. The same year, the 166 would win the Grand Prix of Luxembourg, the 24 Hours of Spa, and the 24 Hours of Le Mans – Ferrari's first win there.

In 1950, the engine now taken out to 2.3-litres, a Ferrari 195 S Berlinetta Le Mans by Touring would win yet another Mille Miglia, driven by Giannino Marzotto in a double-breasted suit and a tie, further burnishing Ferrari's image as the choice of the gentleman driver. By the time Colombo had executed the final evolution of his little jewel, at 2.5-litres, Turin's coach builders were queuing to dress the new long-wheelbase 212. Ferrari would choose Pininfarina for the new Inter convertible, and one of the most significant collaborative relationships in automotive history began.

IN THE ERA OF COLOMBO'S V12, MARANELLO WAS set amongst apple fields. Yet Colombo himself recalled 'a modern factory, fully refitted after the bombings, with highly skilled staff and machines of very good quality.' Around 120 workers had

access to some 500 machine tools. Apprenticeships were to be found 'in all departments to learn to be a turner, welder, miller etc,' according to Colombo. The construction of one of his engines, including the bench test, would take two weeks.

Visiting in 1957, however, Scottish journalist Graham Gauld found the actual process harder to understand. 'The various parts and components were assembled without respecting a given sequence,' he wrote in *Autosport*. 'Occasionally, a mechanic would arrive with a wheelbarrow full of parts and pass them to colleagues who were building that car.' When he 'moved on to the area where they created and assembled engines' he found 'chaos organized'. And yet, 'no one, in truth, was agitated and everyone seemed to know exactly what they were doing'.

Gauld was particularly interested in earth casting of engine blocks and cylinder heads. There were holes in the floor for the invisible ovens out of which the cast parts emerged hot, before being machined to perfection. The choice of a V12 required workshop acrobatics. Many casting moulds had to be made, a task performed by external suppliers. The block had five surfaces to be machined and a huge amount of holes needed to be drilled and threaded.

It's been estimated that Colombo's jewel required up to 70 per cent longer machining time and 50 per cent more parts compared to an in-line six. Early Ferraris were costly, but their engineering genius and Enzo's business talent kept the price just over that of a four-cylinder Maserati.

The artisanal charm of Colombo's first engines is still evident today. Their surfaces bear traces of the manual process: scratches and marks everywhere. They are, after all, the crude result of human work, the eye, hand and mind. Considering the total engines produced, they could not be anything else. Of the first Tipo 125, only two were ever made. Of the 166, just 39, and of the 195, only 32.

After Colombo, the V12 evolved rapidly. For its successful 1952 Mille Miglia campaign, Aurelio Lampredi bored out the Colombo's block to 73mm for a capacity of three litres and 230bhp – and the 250 was born. It remains Ferrari's most glamorous type number. By 1954, the 250 GT Maranello had embraced series production. By 1955 though, the star of Lampredi had dimmed.

Vittorio Jano, back from Lancia alongside Andrea Frascetti, Alberto Massimino and Vittorio

Bellentani, took the 250 engine and further evolved it, calling it the Tipo 128. Then after Jano's departure in 1957, in came ex-Alfa maestros Carlo Chiti and Giotto Bizzarrini. Their 250 Testa Rossa had machined piston rods and fully revised heads with cam covers finished in wrinkled red. The update included smaller helical double-coil springs and plugs mounted outside of the vee to make room for six two-barrel Weber 38 carburettors: enough to beat the 100hp/litre barrier for the first time. Its impact on Ferrari is almost unmatched.

The Testa Rossa made Ferrari the winning constructor in the World Sportscar Championship in 1958, 1960 and 1961. The 250 GT California – the beauty queen – had appeared in 1957. In 1959, the Colombo V12/Tipo 168 was at the heart of the 250 GT SWB, from which Bizzarrini created the 1960 GTO. Finally came the 250 P and LM – Ferrari's first mid-engined cars, and with them the original Colombo V12 emitted its last cry, sixteen years after Franco Cortese witnessed its first.

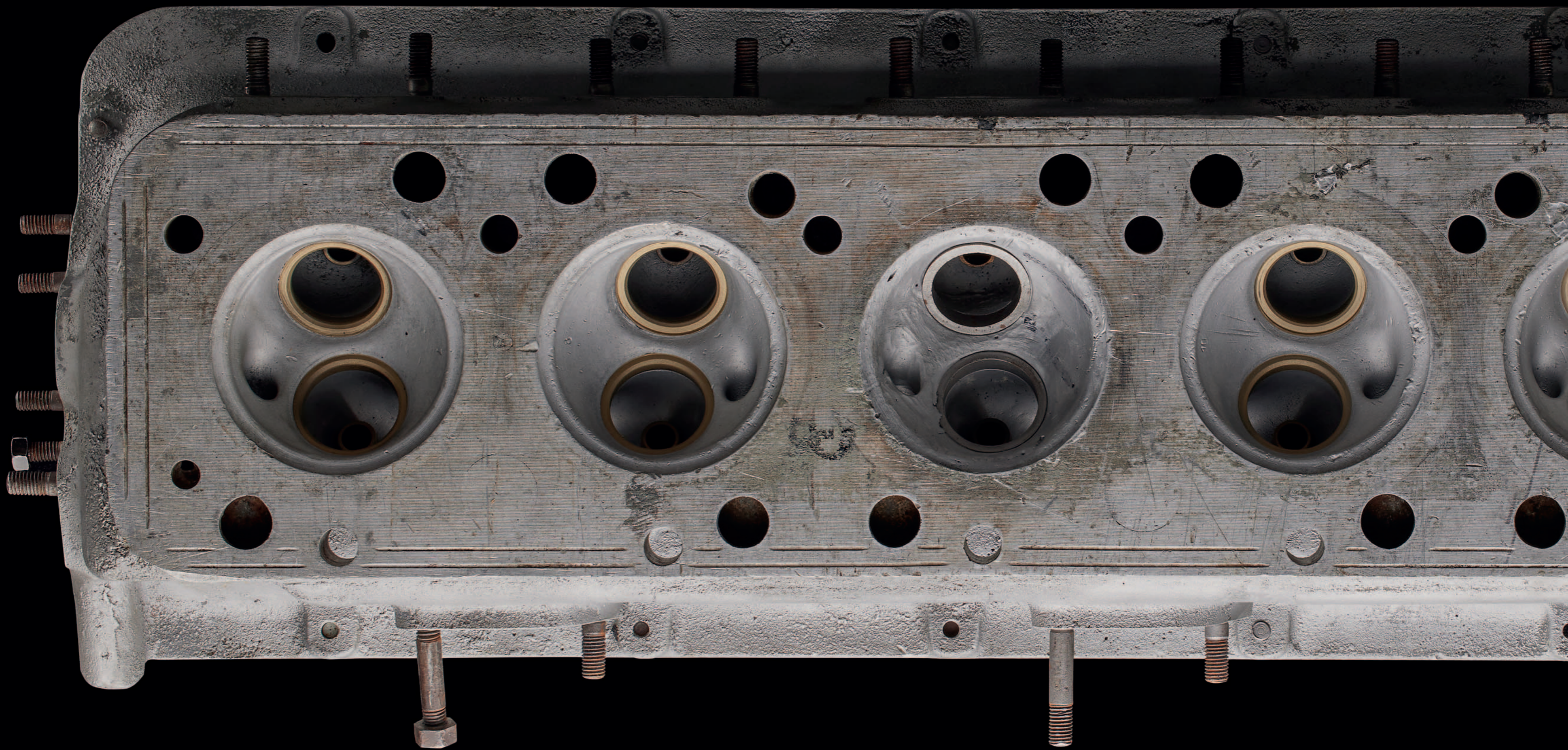
IF EVERY ENGINEER WHO CAME TO MARANELLO wanted to make a difference, one thing was never going to change: 'While I live, Ferrari cars will have a V12' affirmed Enzo in 1963.

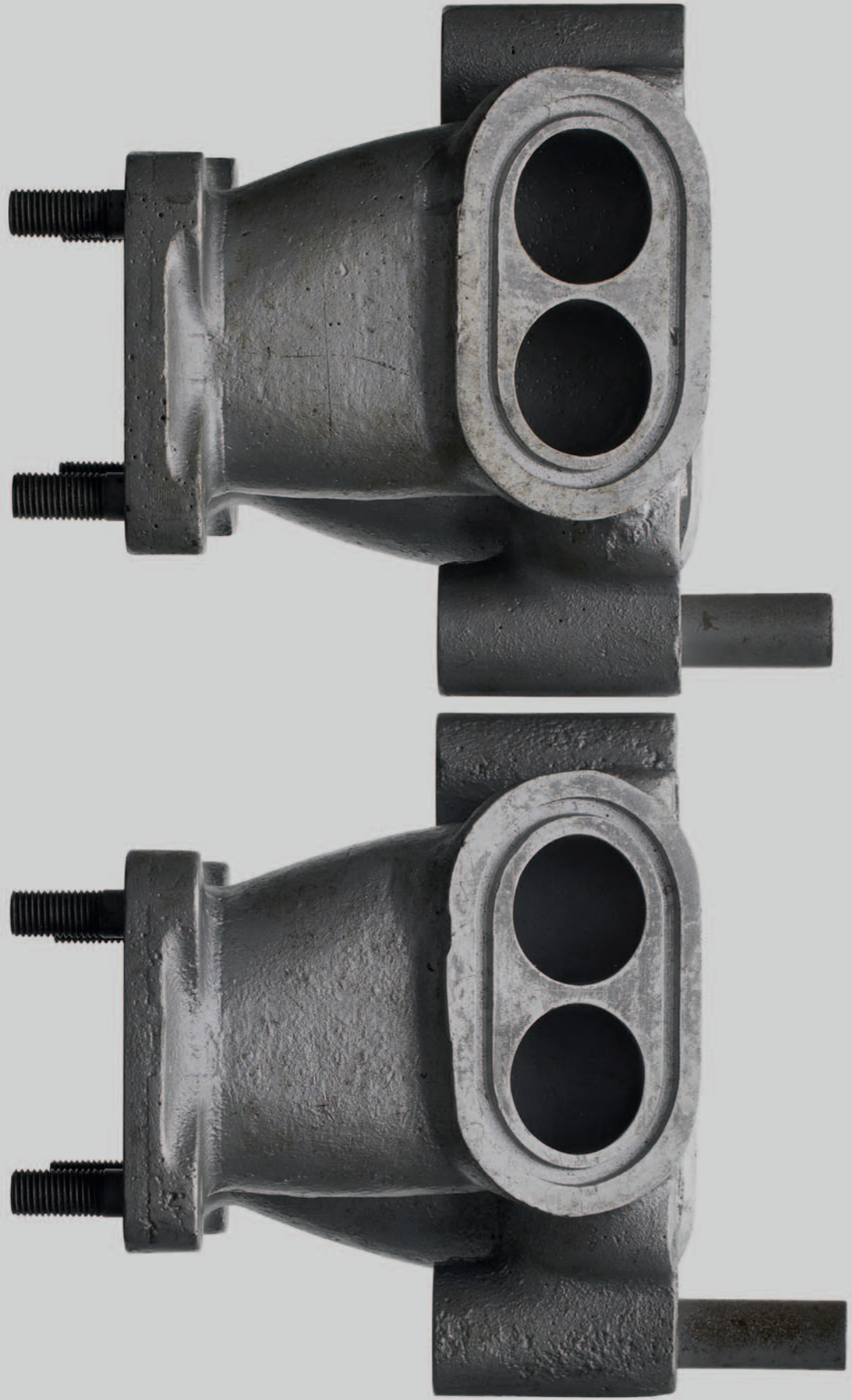
If only the types 125 and 166 had the original Colombo engine, its legacy can be traced in a plethora of later V12-engined Ferraris, including Lampredi's 1950 'long block V12' and Jano's Colombo-Lampredi hybrid racing engines, designed between 1956-1958.

Then in 1959, Colombo's short-block engine started a second life that lasted three decades. The 400 Superamerica and 500 Superfast, as well as the 275 GTB and GTB/4, all had variations of the original 90mm Colombo block. From 1966, a further step came with the 4.4-litre 365: California, GT 2+2, GTB/4 Daytona, GTC and GT/4 2+2.

By now, a run of a thousand or more engines appeared normal (remember there were only ever two Colombo 125s). In 1976, the 365 GT/4 2+2 became the 4.8-litre 400, Ferrari's first car with an automatic gearbox. Finally, in 1985, one last millimetre of bore gave birth to the five-litre 412.

1947-1988: the spirit of Colombo's V12 accompanied Enzo Ferrari throughout his life. Just after Enzo passed away in 1988, the 412 was phased out and with it the original V12. Two inseparable great actors, who started the show together, left the scene smiling and roaring hand in hand. 🍷





FERRARI COLOMBO V12  
PARTS LIST

All parts shown are Ferrari factory originals for versions of the 166, or period upgrades for them. Supplied by DK Engineering.

PICTURE 1  
Air filter housings and connector

**MATERIAL** Aluminium  
**PROCESS** Sand cast, machined and polished (connector); punch stamped, rolled and welded sheet metal (housings)  
**DESCRIPTION** Stamped with the magic type number '166', the typical 'horn' of the original V12 connects twin air filters to a twin-choke Weber carb. Note the thinly finned surface of the filters' caps.

PICTURE 2  
Rocker arms

**MATERIAL** Forged steel  
**PROCESS** Machined  
**DESCRIPTION** In each vee of the 12, twelve individual arms are arranged, here seen from below. Note the original inclined design of the arms for both inlet and exhaust valves.

PICTURE 3  
Cylinder liners

**MATERIAL** Grey cast iron  
**PROCESS** Machined  
**DESCRIPTION** A viable compromise between light weight, robustness and practicality, the aluminium engine block is dry fitted with sleeves of grey cast iron, the narrower portion sitting at the bottom.

PICTURE 4  
Valves

**MATERIAL** Forged steel  
**PROCESS** Machined and polished  
**DESCRIPTION** Both comparatively short, inlet valves (left) are of larger diameter than the exhaust valves (right).

PICTURE 5  
Oil suction pipe

**MATERIAL** Brass  
**PROCESS** Welded assembly of stamped and tubular metal  
**DESCRIPTION** Part of the wet sump lubrication system, the suction pipe feeds oil to the engine. Note that the *succhiarella* (the strainer) is missing. The unit is fitted to the oil sump, the strainer located inside the round bottom end.

PICTURE 6  
Valve springs

**MATERIAL** Steel  
**PROCESS** Bent coils  
**DESCRIPTION** With a design passing from Sir Harry Ricardo through Alfa Romeo to Ferrari, the ingenious hairpin valve springs, two for each valve, contribute to a lightweight, high-revving distribution system.

PICTURE 7  
Cylinder head

**MATERIAL** Aluminium, with bronze valve seats  
**PROCESS** Sand cast, machined and polished  
**DESCRIPTION** The cylinder head – here seen from below – required hours of work. There are a total of 24 holes, the larger for fastening, the smaller for lubricating. Note the thin lines carved on the plane surface to ensure a better grip for sealing paste.

PICTURE 8  
Inlet Manifolds

**MATERIAL** Aluminium  
**PROCESS** Sand cast, machined and polished  
**DESCRIPTION** In a racier configuration, a set of three separate inlet manifolds were installed within the vees, each connecting four combustion chambers with one of three twin-choke Webers. Note the contrast between the porous unfinished surface and the precisely machined coupling of the inlet ducts.

PICTURE 9  
Air filter

**MATERIAL** Brass, copper and foam  
**PROCESS** Punched and pressed sheet metal, wire mesh with copper plating, and foam inlay  
**DESCRIPTION** A standard off-the-shelf component, this washable air filter by Fispas of Turin was the basic choice for touring cars of Ferrari's early period.

PICTURE 10  
Pistons and connecting rod assemblies

**MATERIAL** Aluminium and forged steel  
**PROCESS** Cast aluminium pistons, forged steel rods, machined and polished  
**DESCRIPTION** Two pistons, with connecting rods meeting at a 60 degree angle, are arranged in six pairs along the crankshaft. Note the seats for four rings: one compression and two wipers at the top, plus a lower scraper ring. The rod's big end is split at an angle for ease of assembly.

