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# THE CISITALIA

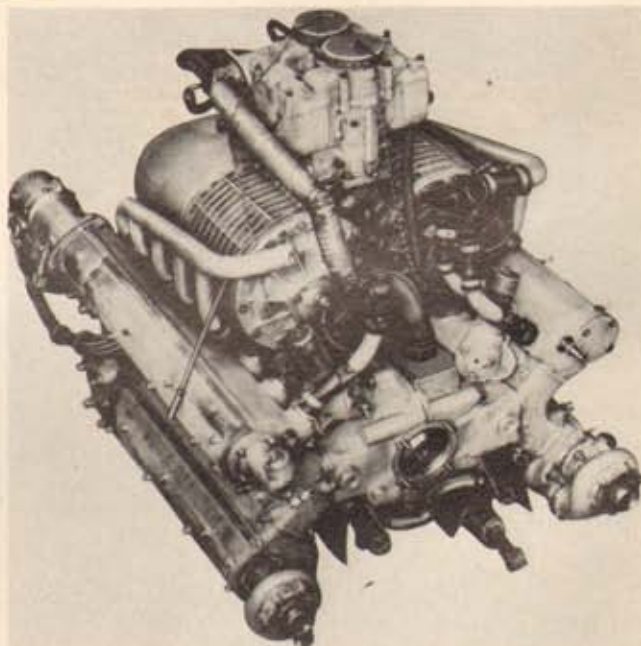
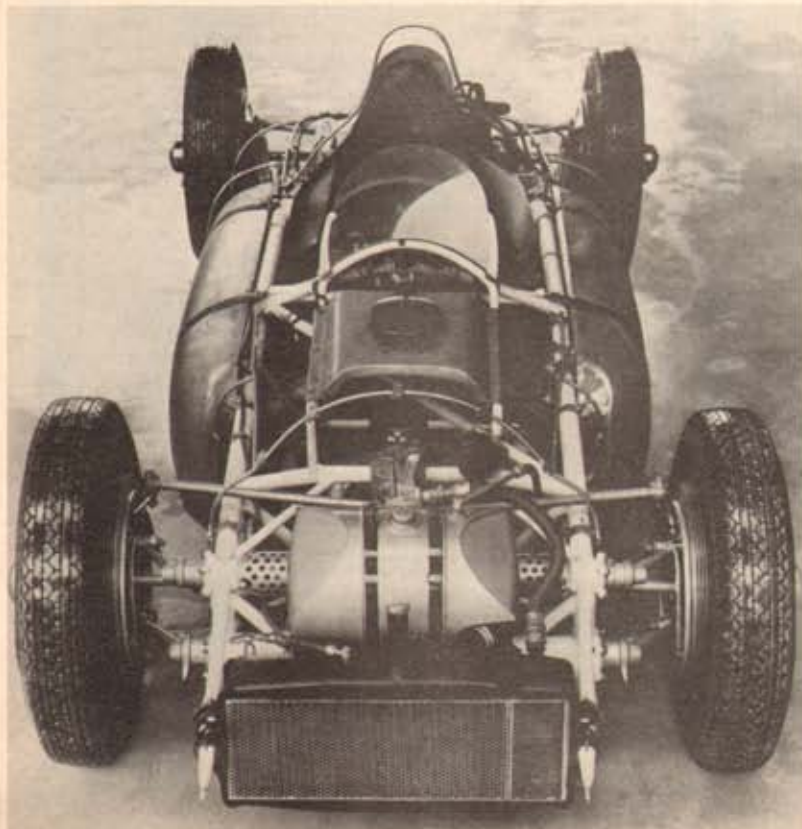
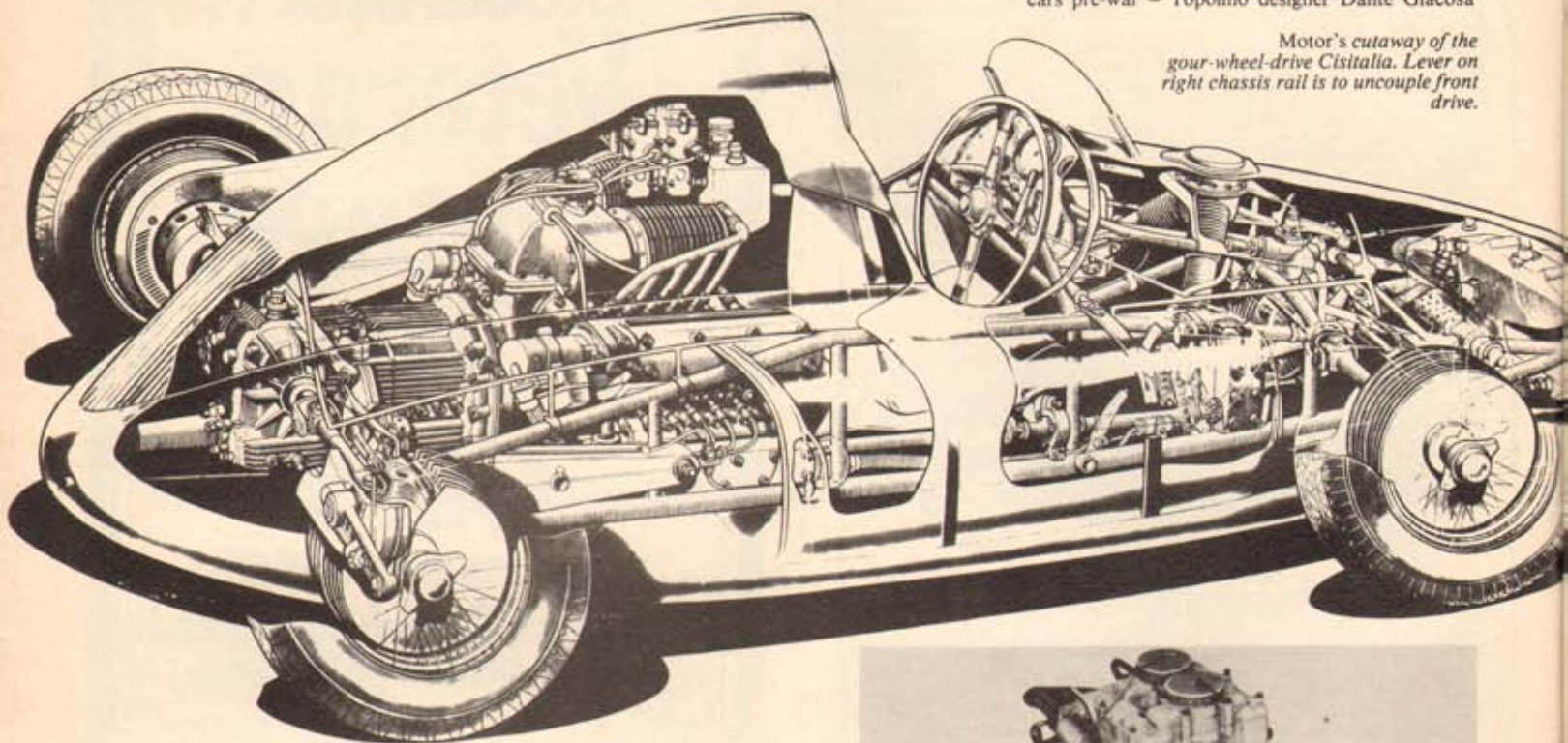
## PORSCHE

*The far-sighted failure that could have been so dramatic; Michael Bowler looks at the development of Dr. Porsche's Auto-Unions*

IF the Porsche design type 360 had ever been called a Porsche, Grand Prix history may well have required a rewrite; if the men from Porsche had been responsible for the development of the design and had the backing then, the type 360 would very likely have been a success in the post-war years when the pre-war Alfettes were showing everyone the way home. After all the Porsche was a new design, a development of the knowledge accrued from the days of the Auto-Unions. But the Porsche type 360 was a design project for a currently wealthy Italian to embark upon an ambitious Grand Prix programme.

Piero Dusio had been a pre-war racing driver with the 1934 Italian amateur championship to his credit in a 2.6 Alfa. With a bit of money after the war he formed CISITALIA to produce cheap single-seaters and sports cars based on the Fiat 1100, which had been very popular as the basis for sports cars pre-war - Topolino designer Dante Giacosa

*Motor's cutaway of the four-wheel-drive Cisitalia. Lever on right chassis rail is to uncouple front drive.*



*Originally published pictures of the completed chassis, a fairly fully ancilliaried engine and a front brake assembly seen with the backplate removed.*





also designed these with spaceframes. In this Dusio was very successful and the little cars – in single seater and sports form – were driven by the likes of Ascari, Nuvolari, Taruffi, etc. to some excellent results, but Dusio wanted to aim higher, not only in the Grand Prix world, but to become a big industrialist and at the end of 1946 started talking to those brains of Porsche who were not detained in France at the time, including chief engineer Rabe, plus two Porsche contacts in Italy, Abarth of Fiat conversion fame and Hruschka, who was to direct tractor production for Porsche at the OM factory. Tractors were part of the Dusio deal as were water turbines – an important power producer in mountainous Italy – a 1500cc sports car and the flag-waving GP car. Dusio has always been cast in the role of charlatan, since the one project he did get started never finished and consumed a lot of money in two continents; I disagree and have always equated him with the likes of Lamborghini. If Dusio

had tackled his schemes in reverse order – tractors, turbines, sports cars and perhaps a GP project – he could well have been a wealthy man by now. But he didn't; he wanted to wave the flag first as a carrot for the other projects.

Thus the Porsche 360 came into being designed effectively by Rabe and Ferry Porsche and with the subsequent approval, on his release, by the old man himself. The giant cars of the pre-war era had far too much horsepower for the capability of the tyres; no one could have foreseen a tyre growth that didn't in fact take place until some 15 years later, so four-wheel drive was an obvious benefit; the power loss which helped to kill the later four-wheel drive reincarnation of the late 'sixties was no problem as long as there was still enough surplus to keep the rear wheels short of spinning under full power – easier to drive, too. In any case the power loss could be reduced drastically at higher speeds and the handling balance of two-wheel drive res-

tored, by means of a lever operating a clutch along the rear to front drive shaft. In 1966 a learned article by Charles Bulmer in *Motor* showed that a four-wheel drive car would be able to accelerate faster until 105mph than a two-wheel drive car given 400bhp and tyres capable of giving a friction coefficient of 1.2; so, apart from the start and after the few very slow corners, four-wheel drive was not going to be a great help for racing unless, of course, it was wet.

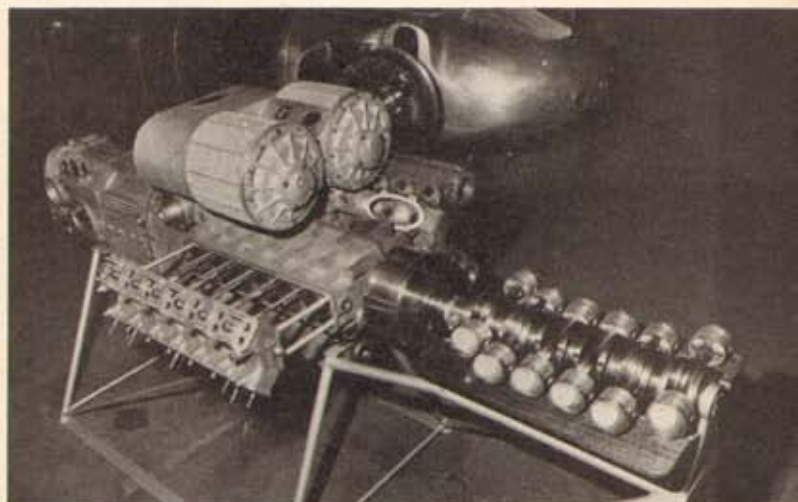
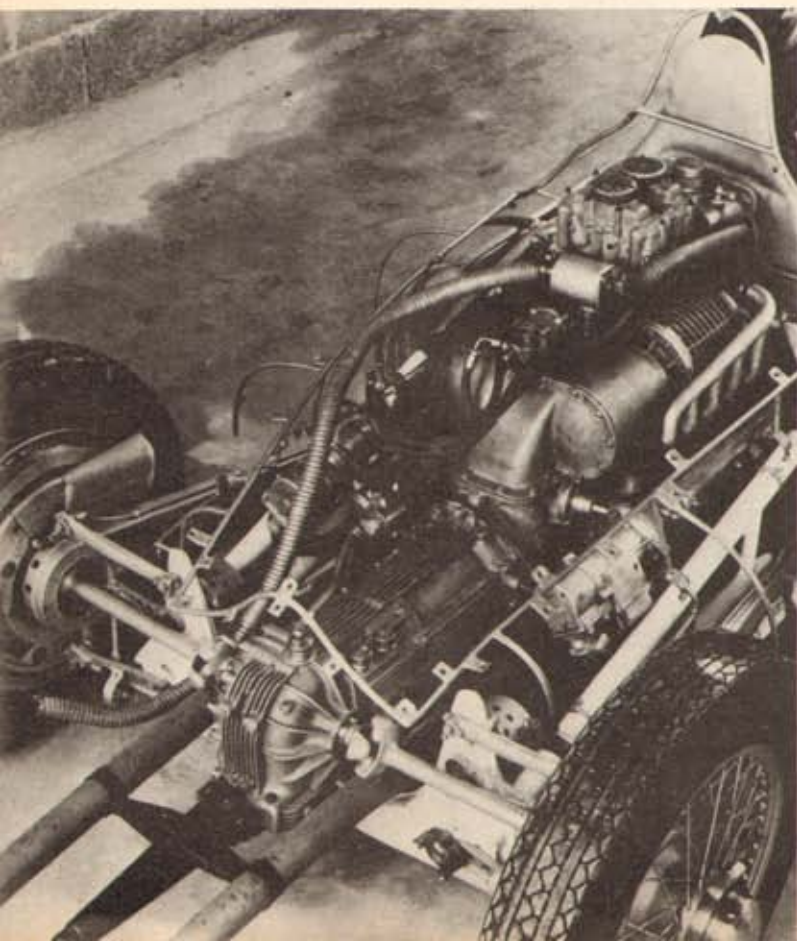
In 1946, though, the tyres were still of pre-war sections and of very inferior materials so the cross-over speed was much higher. The desire to cut the interconnection between front and rear wheels may seem strange to those who have driven front-wheel and rear-wheel drive road cars – it sounds like the best of two effective worlds; having driven Jensen FF, Ferguson FF and even a twin-Mini, I can quite understand why it isn't, although my knowledge is based on hindsight, but that of Porsche was based

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As displayed in the Donington Museum, this Cisitalia has been assembled as far as possible from parts. Rear brake with drum removed is shown above.

Far left, another original picture with the engine installed in the chassis. Clever display of power/transmission unit shows massive crankshaft and basic layout.





# The CISITALIA

Porsche

on predictions. It's all a function of slip angles and the way the force vector at the contact patch changes direction very suddenly when power is also applied; that affects the transient response of initial cornering and directional changes. Steady state cornering under power brings on a form of understeer that feels very uncomfortable and almost untamable - I describe it as crab-steer; in fact it can be adjusted out by suspension tailoring for that one condition, at the expense of other characteristics, which is why it was still successful at steady state circuits like Indianapolis after the F1 designers had dropped it. The Grand Prix designers had in fact rapidly removed from a torque split equal to the weight distribution to something like 20/80 which largely negated the theoretical power transmission advantages.

However, the Porsche designers didn't have the advantage of such sophisticated centre differentials

and I doubt if they had considered the possible advantages of limited slip braking, so four-wheel drive was a logical step just to transmit the expected 300bhp plus through skinny tyres. Being a Porsche design it followed the Auto-Union layout with a mid-engine but, like Alfa-Romeo and Ferrari of the current generation, put the gearbox ahead of the rear wheels. Although this served the purpose of keeping the interconnecting shaft short and out of the way of the rear suspension, it seems improbable that the longer wheel-base low polar moment advantages were appreciated; I say this, because the suspension design would have been better if the overall suspension concept had been that well understood. A lot of useful American and British suspension knowledge became public just before and during the war and it seems possible that it hadn't penetrated really to Germany, because of the political climate; ground level roll centres at both ends, achieved by twin parallel trailing arms at the front and equal length wishbones at the rear, are not an ideal.

However, the mid-mounted box used a batch of constant mesh gears for five forward speeds using a pair of Porsche synchro-rings only - one for up-changes the other for down-changes. These were on the lower shaft, geared down to less than half crankshaft speed to avoid excessive revs for the

constant-mesh bottom gear, and necessitated progressive gear selection. There was a time when all racing drivers went all through the box for down-changes, but Mr Hewland makes them stronger now and it isn't uncommon for drivers to jump a ratio or two on the downward transmission journey. As a feature on the ZF boxes, used in the Ford GT40 and GT70, it is quite acceptable.

Low centres of gravity were well appreciated and the Porsche 360 engine used a flat configuration, although it could have been even lower, if there hadn't been quite so much of the dry sump oil ancillaries below and the gearbox had been rejigged. A compact and massive crankshaft ran in roller bearings with very short rods for the 50.5mm stroke. Wet liner cylinders of 56mm bore each had glycol all round. Twin overhead camshafts per bank were driven by shaft and bevels; each head had two valves per cylinder seating direct on the aluminium at an included 90°. With the formula for 4-litre un-supercharged or 1½-litre blown, this was obviously to be blown and was going to use three-stage Roots blowers although these were replaced by twin Centrics sitting on top of the engine; these were driven by gears at 59 per cent of engine speed to deliver around 40psi. The original conservative proposed output was some 300bhp at 8500rpm, but Pomeroy reckoned it could have been capable of 550 at 12,000rpm with development. Since that was based on figures for the V-16 BRM, it is questionable.

This was all mounted in a four-rail space frame, unlike the Auto-Union's twin-tube, and petrol tanks were strapped to the side like the D-type Auto-Union.

It was obviously an exciting specification to a man with Dusio's enthusiasm and Eberan von Eberhorst was to join him at the Turin factory to oversee production of the six cars that were considered necessary. Presumably Dusio's ideals were based on the mighty team that Mercedes and Auto-Union fielded before the war when money was no object, but were obviously over-ambitious in the difficult post-war years. Work started in 1947 in both Turin and Gmund, the Porsche factory, but by the end of 1948 there was still no car complete, although the engine had been tested but not developed due to a lack of dynamometer adequate for the projected power.

Sadly, money was running short, too, and by the end of 1948, Dusio entered negotiations with the Argentine government, persuading General Peron that the Cisitalia would form a good flagship for the Auto-Motores Argentinos (Autoar) company. The project eventually went to the Argentine with the one complete car; another was partially completed but stayed in Italy along with the sundry spares. It took some time to get things going in the Argentine but by this time the formula was dead so little was heard apart from occasional extravagant rumours. Dusio had returned to Italy in 1952 and the car was still sitting at the Autocar works. It was decided to let it run in the formula libre 1953 Argentine GP, but it was discovered at that stage that the front and rear final drive ratios were different which different sized tyres did little to alleviate - there was no central differential which helped the later experimenters. Felice Bonetto did a couple of practice laps as did Clemar Bucci, but the car didn't start. The chassis apparently worked well but the engine and transmission unit hadn't been developed. However interest was partly reawakened and it was decided to have a go at the 140mph Argentine land speed record in July 1953 after dynamometer figures showed some 385bhp available.

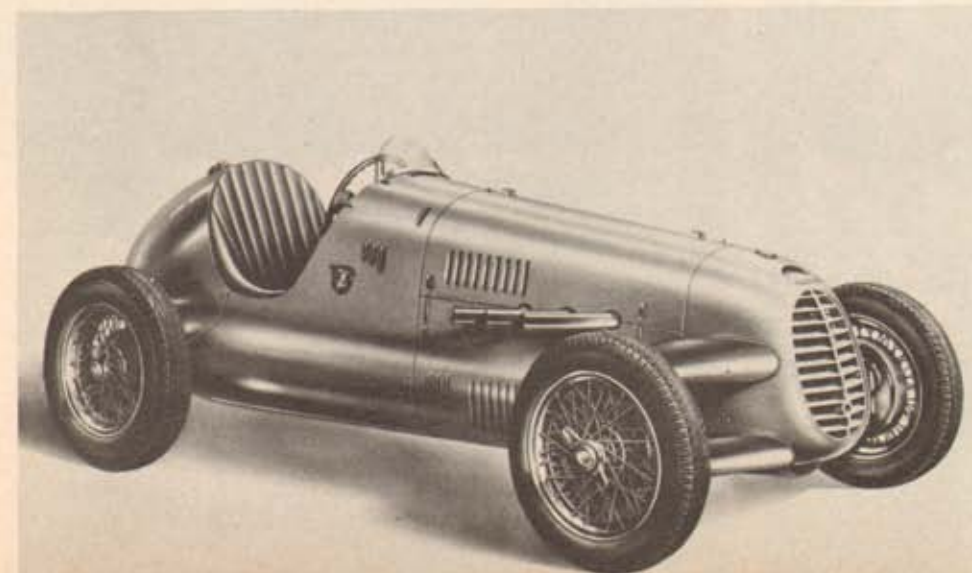
It was a swansong; 146mph one way and a blown piston the other to average 144mph. That was the end of a once-great design; the car gathered rust in a shed until von Hanstein found it and it returned to Porsche for their museum. The car was photographed is now at Donington and was part of the remains of the Cisitalia project that stayed in Turin.

It is not complete and will never be able to run but it is a fitting memorial to a great design, possibly the ultimate development of the pre-war Auto Unions. After Dusio's return to Italy, he tried to restart Cisitalia; the 1100cc sports cars were nominally resumed and in 1952 a 2.8-litre coupé was introduced; a restyled Fiat 1900 followed and in 1954 a modified 1100, but the firm finished up by making derivatives of the Fiat 600 with bigger engines and new bodies in 1961 after a three year gap.

Dusio the would-be industrialist had failed through too much ambition too soon. ●



Opposite, the complete car now owned by Porsche. Above and below, Cisitalia 1100s in sports and single-seater forms; Bonetto at Pescara 1948, above. Right, Clemar Bucci seen during practice for the 1953 Argentine GP.







*Civitalia*