Chapter 34:

24 Hours and 500 Miles

1977–1981

Porsche's Group 6 contender, the 936, was powered by a 2.1-liter turbocharged engine that evolved from 12 to 24 valves and from single to twin turbos. Outright winner at Le Mans in 1977, it was runner-up in 1978. This same period saw the company explore new territory when it built a six-cylinder Indy engine which never raced.

If Porsche lacked competition in Group 5 racing at the end of the 1970s, the same was decidedly not the case in Group 6. There France's state-owned car company, Renault, had staked its claim. Renault had acquired the Alpine sports car company in Dieppe, where it developed tube-framed sports-racers powered by turbocharged V-6 engines. Against Alpine-Renault and Alfa Romeo, Porsche had taken the world sports car championship in 1976 with its 936—a car it had "improvised," said Ernst Fuhrmann, "just to stop others from having it too easy." In 1977 it decided not to compete in the full series but instead to concentrate on defending its title at Le Mans.

A clear focus on Le Mans at the expense of the other Group 6 races meant that the 936's design could be further optimized for the special conditions of the Sarthe circuit. A major step was the narrowing of the car's track by 40 mm (1.6 inches) at both ends by fitting shorter suspension wishbones. This enabled the flanks to be drawn in, making a major contribution to a reduction in the car's frontal area from 18.8 to 17.8 square feet.

Above left:
Removing the air-cooled 1977 engine from the 936.
(see page 802)

Above right:
Danny Ongais, one of the top drivers of his day.
(see page 812)

Left:
In one of the most dramatic Le Mans races in history, Jacky Ickx, Jürgen Barth and Hurley Haywood battled back from a hopeless position to win the 1977 edition of the 24-hour race with Porsche's 936.

Final refinements were made to the aerodynamics in Volkswagen's wind tunnel in February 1977. These included confirmation of the drag-reduction value of higher cockpit sides, a tweak that had been evaluated but not used for 1976. In an echo of experiments with the 1962 Grand Prix Porsche, the engineers tested flat discs covering the wheels, but these made no difference to the drag. A lengthening of the tail helped bring the drag coefficient down from 0.398 to 0.370 while maintaining downforce, which at speed was 234 pounds at the front and 670 pounds at the rear. In all, the revised car's drag was nine percent less than

Top: Porsche optimized its 936 for the 1977 running of Le Mans with reduced frontal area, a lower drag factor and twin turbos instead of the single unit used in 1976.

Bottom: Work was beginning here on removing the air-cooled 1977 engine from the 936 in preparing for the installation of its new 24-valve unit of 2,120 cc, at upper right.

the 1976 version, which contributed to an improvement of 16 mph in its top speed as measured in tests at Paul Ricard.

While the 1976 936 had fed its 2.1-liter 12-valve engine with a single turbocharger, the 1977 version was pressurized by two smaller KKK units, which gave better throttle response thanks to their lower inertia. The turbos were mounted far back in the car's long tail with a single large Porsche wastegate between them. The exhaust system proper was simpler with this arrangement, while long tracts forward were needed to deliver pressure air to a single large transverse intercooler placed just aft of the cooling fan. Boost was set at 19 p.s.i. for the race. On the 22 p.s.i. boost used during practice, the engine developed 540 bhp at 8,000 rpm and peak torque of 362 lb-ft at 6,000 rpm. With this power the 936 was timed at a top speed of 217 mph at Le Mans.

Incredible 1977 Le Mans

After extensive tests of one car at the Paul Ricard circuit in March that included a successful 28-hour durability run, two 936s were prepared for the Le Mans 24 Hours; one weighed 1,615 pounds and the other 1,628. On average this was 26 pounds heavier than the two 1976 cars had been, not including the radio and the tools that the cars always carried to help the driver make repairs out on the circuit. The white cars now carried their red and blue Martini Racing striping atop the fenders instead of down the center of the body as the year before. Among their rivals they faced three works Alpine-Renaults and two American-entered Mirages powered by Renault engines.

"The race developed very dramatically," said Hans Mezger. "Three hours after the start it seemed that the result was already decided. At that time no one believed that Porsche would still be able to win this race." About an hour into the race, half-way through his first driving stint, Jürgen Barth brought his 936 into the pit and declared that his engine had lost power. After the fault was traced to the injection pump this was replaced, causing a stop of 28 minutes and 50 seconds. A later autopsy of the pump disclosed the failure of a circlip only 4 mm in diameter that affected the lever that controlled the unit's delivery pressure. It was the first time this failure had occurred.

While poor Barth resumed his race in 41st place, the sister Porsche shared by Ickx and Pescarolo was well forward until, just three hours into the race, it broke a connecting rod and retired. Subsequent analysis disclosed that the surface of the titanium rod had not been polished enough to remove all the stress-raisers—a process even more critical with titanium than with steel. At this point it was obvious that the race was

decided in favor of the Alpine-Renaults, three of which were cruising in the lead.

However, for Porsche chief Ernst Fuhrmann, the outcome was not foreordained. When at the 4½-hour point Hurley Haywood brought in the remaining 936 for a routine driver change and refueling it was up to 15th place, nine laps behind the leader. Fuhrmann installed Jacky Ickx behind its steering wheel and gave him the explicit command, "Win or bust!" The latter seemed the most likely result, but Ickx accepted a challenge that Hans Mezger called "almost hopeless." In an epic drive that included two four-hour stints, the Belgian lapped at record speeds, seven to ten seconds faster than his co-drivers. In the process, he lost 18 pounds of body mass.

By the sixth hour the 936 was back up to sixth place and by the ninth it was up to fourth place. At 5 o'clock in the morning, after 13 hours, it was second but still 7½ laps behind the leading Alpine-Renault. A runner-up finish was the likely outcome, worthy in the circumstances. But just as dawn was breaking, the leader retired with an engine failure and the Porsche was in front. It had a margin of only a lap over the next Alpine-Renault but at noon, with four hours' racing remaining, this too broke—leaving the 936 unchallenged.

The drama of 1977 was not yet ended. With 40 minutes of the 24 hours remaining the dismayed Porsche pit staff saw a gout of smoke from the 936 at the Ford Chicane just before the pits. Hurley Haywood drove it straight into the pit lane. While mechanics worked on the car he and his team-mates were reassured that no competitor had a chance to cover as much distance as theirs had. But one more Le Mans ritual had to be satisfied. This required that a car cross the line under its own power and that its last lap be completed in no more than 15 minutes.

The piston in cylinder number three had seized. That cylinder's spark plug was removed and its fuel injection deactivated. But many questions remained, as Norbert Singer related: "How serious was the piston seizure? Would the engine start again, and if it would, how long would it run? We were preoccupied by all these questions when Jürgen Barth took the wheel for the last two laps. And it worked!"

With Barth at the wheel, Porsche chassis 936.001 successfully did the necessary and was flagged home the winner at Le Mans. During its 20 stops the car had been at rest in the pits for one hour and 31 minutes. Barth had driven for eight hours and 40 minutes, Haywood for three hours and 12 minutes and Ickx for 10 hours and 37 minutes. If ever perseverance and skill were rewarded, this was such an occasion. Justly, Jacky Ickx was the star when the Porsche was celebrated in the Stuttgart town square on its triumphant return to Germany.

The 936's piston failure had been one of the breakdowns that encouraged the creation of the new 24-valve engine with its liquid-cooled heads. In its 2,120 cc version (87 x 60 mm) it was installed in the 936 for yet another Le Mans sally in 1978. The two cars looked and were much the same as before, with the exception of large NACA-duct inlets in their flanks to feed air to the radiators cooling the respective cylinder heads. To make room for the radiators and also for slightly larger rear tires, the rear wheels were moved back by a bit more than an inch to make the wheelbase 2,430 mm or 95.7 inches. This required longer trailing suspension radius rods.

A peculiar-looking new rear wing, developed in cooperation with aerospace firm Dornier, had drooping side plates that made its downforce less sensitive to side winds. This was balanced by a new nose that was four inches longer. Paul Frère estimated the Cd of the 1978 version of the 936 as 0.40, similar to the 1976 version but not so good as the 1977 body. With the extra valves and liquid cooling the cars were also heavier, Frère said, at 1,769 and 1,778 pounds. Neither weight nor drag was calculated to show to best advantage the output of the new engine, which developed 545 bhp on a boost of 20 p.s.i. at 8,500 rpm—a subtle improvement over its predecessor.

A major change in the 936 for 1978 was the addition of long NACA inlets at the sides, delivering air to the radiators for the water-cooled cylinder heads.

Rivalry with Renault

A hasty effort to prepare two 936/78s for Le Mans in 1979 resulted in one retirement and one disqualification. High-flying Essex Petroleum was the sponsor.

Three 936s were readied for Le Mans 1978, one of which was a brand-new chassis. One of the old cars was equipped with the 12-valve engine as raced in 1977. Although delayed by a 13-minute stop to fit a new left-hand turbocharger the 12-valve car finished third, driven by Peter Gregg, Hurley Haywood and Reinhold Joest. During practice, the boost of the new engines was turned up to 24½ p.s.i., lifting their output to 640 bhp at 8,400 rpm and producing torque just on 400 lb-ft at 6,450 rpm. This allowed the best Porsche to qualify just ahead of the best Alpine-Renault. In spite of their 1977 debacle the French were back at Le Mans again.

In the race, however, the Alpines were able to race much closer to their qualifying paces than the Porsches. Ickx was an embarrassing 11 seconds behind the leading Alpine after his first lap, and on his second he called at the pits for a check of a throttle-pedal return that was too slow—not a good feature of a turbocharged racing car. This sorted by the removal of an auxiliary fuel-pressure pump, his car continued until at dusk it broke a fifth-gear pinion which had had lightening holes drilled larger than specified.

Playing musical chairs with their drivers, Fuhrmann, Bott and Jantke moved Ickx to the other car. From its crew Jochen Mass took over Ickx's seat, with Pescarolo, after the gearbox was repaired. Given the green light to raise the boost to qualifying level, this crew returned to the fray. Over the next 12 hours they improved their position until the car was terminally retired when Mass left the road.

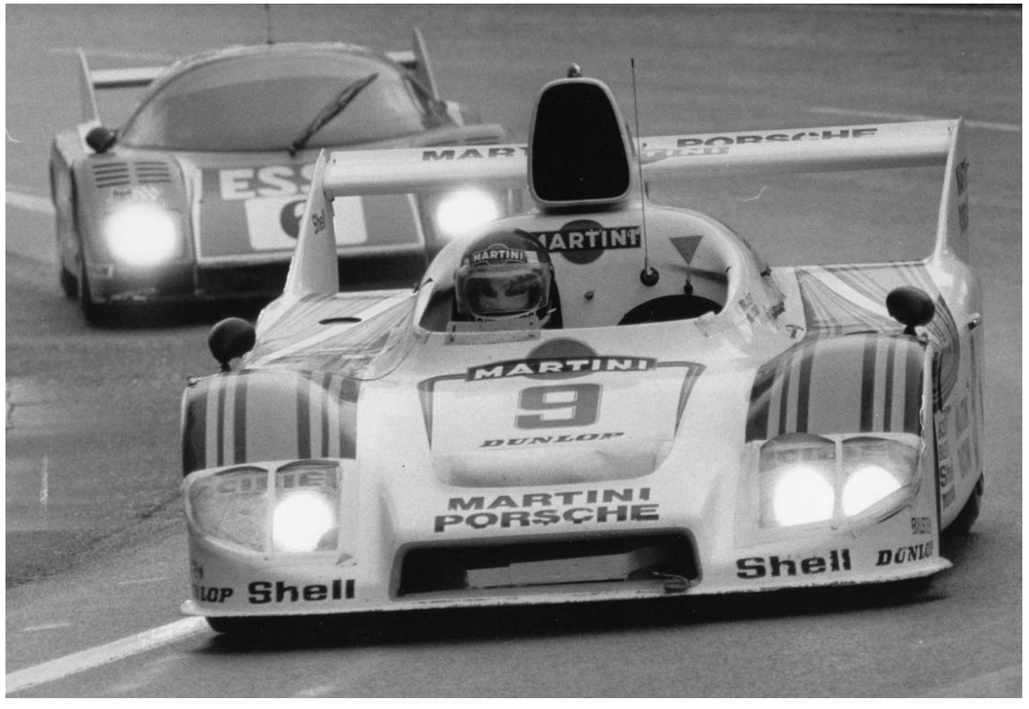
In the meantime Ickx was making good time as he had in 1977. He was well paired with Frenchman Bob Wollek, who matched his speed. One Alpine-Renault held the lead, but this obligingly retired six hours from the finish, which left the 936/78 out in front. But it, too, was stricken by a broken fifth gear that required a 37-minute pit stop to repair. Delayed to fourth, the drivers were allowed to use the qualifying boost that the other car's 24-valve engine had tolerated for half a day. They finally finished second behind the only Alpine-Renault that had enjoyed an untroubled race.

"Had Renault not won," wrote Paul Frère afterward, "it would have been a humiliation for France and certainly a catastrophe for all those responsible for the cars and the Le Mans operation. For Porsche, whose cars were winning races and rallies on every weekend all over the world, who already had the world championship of makes in their pocket and who make it all look so easy that their merits barely get proper recognition, this was just a lost battle. The defeat the Porsches suffered at Le Mans was more than honorable and, considering all the implications, it was probably as well that they lost."

Noble and valid though this assessment was, Porsche was not in a position to be as philosophical about the result of its 1979 Le Mans entry with two 936s. The only saving grace of this event was that it was won by the Kremer-entered 935 K3. In fact, Porsche had not planned on entering at all but had been persuaded at the eleventh hour to prepare a brace of 936/78s under the sponsorship of David Thieme's Essex Petroleum. Flying high at the time on the boom in oil prices, the flamboyant Thieme was the backer of Colin Chapman's Formula 1 Lotuses.

One car was entered for the Silverstone race as a precursor to Le Mans in 1979. This revealed a problem with the tires turning on the rims that contributed to another 936 crash for Jochen Mass. The same problem cropped up in the fast Dunlop Curve at Le Mans for Brian Redman in the car he was sharing with Ickx. Massive damage to the car's left rear quarter caused by the resulting tire failure took more than an hour to repair. Jacky's attempt to stage another of his patented comebacks was frustrated by a broken injection-pump drive belt and disqualification following outside assistance. Wollek and Haywood in the sister car reached third place but engine problems ended their race.

The formula of a Porsche turbo engine in a light and open sports-racing chassis was by this time obviously attractive to the private teams racing Porsche hardware. One such team, that of Reinhold Joest, succeeded in persuading Porsche to make one of its 936/78 racers available to it for the 1980 Le Mans race. Porsche tried to downplay its involvement in the entry, but the presence of Jacky Ickx as co-driver tended to belie its denials. With the return of Martini backing, their effort was a good one, holding the lead in the fourth and fifth hours, but was frustrated again by the failure of fifth gear.



Above: In 1980 a 936 built by Reinhold Joest from Porsche parts was driven by himself and Jacky Ickx to second at Le Mans, finishing two laps behind a Rondeau-Ford like the one following Ickx.

Right: With 908 parts and factory data the Kremer brothers built this convincing 936 look-alike, here racing a Ford C100 in a German sprint event.

After repairs they finished second behind a Rondeau-Ford.

Those who could not aspire to a works 936 built their own. Privateers bought up old Porsche 908 chassis, which easily accommodated a suitable flat-six turbo. With the help of the works service department these could be converted into highly convincing facsimiles of the factory cars. Such cars, known as 908/80s, carried on through the end of the Group 6 era in 1981 and, further modified, into 1982's Group C racing.

Exploring the Brickyard

If Porsche's own efforts in Groups 5 and 6 had tapered off noticeably after Le Mans in 1978, there were valid reasons for this. Porsche had been seduced by the undeniable appeal of the Indianapolis 500-mile race. With its strong North American sales, Porsche could hardly ignore the attraction of an historic event that monopolized the attention of America's racing enthusiasts for the entire month of May. Jo Hoppen, Porsche's racing representative in the States, had lobbied strongly for participation at Indy—not necessarily with a car, but certainly with an engine.

A small but influential delegation from Weissach and Zuffenhausen arrived in Indiana in mid-May 1977 to have a first-hand look at this phenomenon. Accompanied by Jo Hoppen, Manfred Jantke and Helmut Flegl flew to Indianapolis. Jantke was the Porsche public relations and sports director, while Flegl was an engineer whose curriculum vitae included the Can-Am 917, the 936 and the 928 road car. Their putative link with the Speedway doings was the sponsorship of USAC's Mini-Indy series for Super Vee cars by VW of America, which was then importing Porsche cars. USAC arranged convenient accommodation for the Porsche men and placed a motorcycle at their disposal for the commute to the track.

In Gasoline Alley the trio were taken under the wing of Leo Mehl, the gregarious and popular Goodyear racing chief. Any effort to keep their presence low-key was doomed to failure. Word quickly spread that Porsche people were at the Speedway. Anthony Joseph Foyt, already a legendary three-time winner of the 500, did not beat around the bush. "What are you doing here?" he asked the delegates. To their response that they were just having a look around he asked, "Are you going to come?" When they protested that they didn't know if they would, Foyt looked Flegl in the eye and said, "You come, we race you!"

This made a strong impression. So too, in a way, did the race. Tom Sneva qualified for pole at 198.880 mph in a Penske McLaren-Cosworth, one of four Cosworth-powered cars to make the 33-car field. Sneva finished second behind none other than A. J. Foyt, who collected his unprecedented fourth win at the Speedway. Another Cosworth-powered car placed third ahead of a shoal of Offy-powered racers.

"It's an endurance race," said Jantke afterward. "Actually, it's kind of boring." "Foyt has won here four times," added Flegl. "Now it's time that we came here." He was willing to accept Foyt's challenge. But what would be the view of his superiors in Germany?

Indy regulars were very leery of the potential of a Porsche entry. Their views were reflected by a McLaren mechanic who, well recalling the impact of Porsche on the Can-Am series, said, "If Porsche comes, all the others can pack up." Nor did the surfacing of Porsche personnel in an otherwise quiet Indiana city go unnoticed by the American press, which immediately began speculating about a Porsche Indy entry in 1978. Jo Hoppen did little to discourage this by saying, "For us, it would be harder than anyone else to build an Indy car. For anyone else, they would take the best engine, the best transmission and the best brakes and then build a chassis around them. We've got to do it the Porsche way." Jo's words would have a certain echo in a Porsche venture a decade later. But for now Porsche was actually considering only the supply of a suitable engine, not building a complete car.

This was not the first time that Porsche had been offered an Indy opportunity. Its Can-Am partner in 1972 and '73, Roger Penske, had been competing at Indianapolis since 1969, when Mark Donohue was rookie of the year. Donohue took time out from his first Porsche 917 Turbo season to win the Indy 500 for Penske in 1972.

Searching for his team's treasured "unfair advantage," in this case an alternative to the ubiquitous four-cylinder Drake-built Offenhauser engine, in 1974 Penske bought five Cosworth V-8s specially reduced to the Indy displacement of 2.65 liters. Changing his mind, however, he sold them on to the Vel's Parnelli team, which used one in a race for the first time at the end of 1975. Penske may well have had a better idea: during that year he was in direct contract with Porsche about a possible engine supply for the 500-mile race. With turbocharged engines in the ascendancy in this race, who had more expertise in the field than the wizards of Weissach?

With his own dynamometer test facilities in Reading, Pennsylvania, Penske could brief Porsche on the performance that was needed to compete at Indy. On his behalf, Mark Donohue did so in a telex to turbo specialist Valentin Schäffer on February 26, 1975. He provided data on an Offy running at a boost pressure of 30½ p.s.i. that delivered in excess of 830 horsepower over the speed range from 7,600 to 8,800 rpm—a clue to the venerable Offy's ability to launch drivers out of the Indy Speedway's turns.

Six months later Roger Penske himself sent a telex of September 2, 1975, to Ernst Fuhrmann that set out the performance of the current Offy on a boost of 20½ p.s.i. and also its output with the new lower boost-pressure limit of 18¼ p.s.i. that would be enforced for 1976 with the new-fangled pop-off valve. The latter showed peak torque of 466 lb-ft at 7,200 rpm and maximum power of 721 bhp at 8,800 rpm that was largely maintained to 9,200 rpm. Details of fuel consumption and engine specification were provided as well.

Talks with Porsche followed; Roger Penske was in Europe the week following his telex and made arrangements to meet with Fuhrmann. In an important respect their meeting was somber. Only days had passed since Mark Donohue had died on August 19 from injuries suffered in a crash during the warm-up for the Austrian Grand Prix. Driver-engineer Donohue had provided the vital link between Penske and Porsche that led to great success in the Can-Am series. Was Penske likely to be the same force in the future that it had been under Donohue? Mark's many friends and colleagues at Porsche were entitled to have their doubts.

Another factor was at work which Mark himself had referred to. This was that Penske had received much of the credit for the success of the Can-Am campaign. We recall that Mark said he was "disappointed that I get all the credit for what Porsche did." That disappointment was shared by many in Stuttgart and its surroundings. Without Donohue's demanding perfectionism the 917 might never have succeeded in the Can-Am series, but clearly without Porsche the Penske team would never have trounced the dominant McLarens.

The issue of a suitable Indy partner was moot after a meeting held on Wednesday, June 22, 1977, at Weissach to review the findings of the scouting trip to Indianapolis. Chaired by Ernst Fuhrmann and including all the responsible parties, the gathering concluded with a decision to abjure an official involvement with Indy. A week and a half earlier Porsche had won Le Mans for the second time running after a dramatic tussle with the Alpine-Renaults. The new 928 had just been launched and there was plenty of work to do to get it reliably on the road. For the time being, Indy could wait.

Indy Experiments

In the style of Porsche engineering under Helmuth Bott, this did not prohibit discreet experiments. Using a 2,857 cc 935 engine, tests were run in December to ascertain the effects of burning the Indy-mandated methanol fuel instead of gasoline. "Methanol and gasoline are very different," cautioned Helmut Flegl. "Methanol is a one-phase fuel; unlike gasoline, at one temperature it's liquid and at the next it's vapor." It was also highly corrosive, requiring the use of special materials and coatings wherever it flowed. But with methanol the flat-six, 8 percent larger than the size Indy allowed, delivered a reported—and very promising—890 horsepower.

In March 1978, tests with methanol fuel were also run on the new 24-valve engine, which was just becoming available. The results were promising enough to warrant another expedition to Indiana in May 1978. Jantke and Flegl were joined this time by turbo expert Valentin Schäffer for a visit during qualifying, not for the "boring" race. Their visit again sparked rumors and indeed a leak to the press that corresponded to one plan being considered by Porsche—providing engines in the first year, building a chassis for the second year and entering a full-fledged works team in the third year.

The 1978 race saw the coming of age at the Speedway of the new Interscope team. This was a team with Porsche connections. In IMSA racing an impressive swathe had been cut by Hawaii-born Danny Ongais driving a 935 entered by the Interscope team owned by wealthy businessman-driver Ted Field. Always well-prepared, the black Interscope entries wearing their enigmatic "0" or "00" numbers were invariably fast in the hands of 35-year-old Ongais, who was aptly nicknamed "On-the-gas" for his take-no-prisoners driving style. Interscope's crew chief was Jim Chapman, a Brit who had found a home in America after his visits as nursemaid to Can-Am Lolas.

Ongais and Interscope were much in the news during the first Porsche reconnaissance at the Speedway in 1977. Although Ongais had been at Indy a decade earlier without taking a driver's test, this time he was accepted by Speedway officials and installed in a Parnelli-Cosworth. The car was provided to Interscope under contract and maintained by Vel's Parnelli Jones, the racing business set up by former racer Jones and auto dealer Vel Miletich, a particular fan of Ongais and a backer of his earlier drag-racing career. Considered an Indy rookie, Danny qualified the fastest of that year's new intake (which included first-time female qualifier Janet Guthrie) for seventh on the grid.

The race performance was less impressive. Ongais had to pit on the 14th lap for replacement of the left-hand exhaust header that took 41 minutes; before covering half-distance he suffered an engine failure. With similar equipment, the Interscope entry went much better in 1978. Ongais qualified in the middle of the front row with a searing four-lap average of 200.122 mph, one of only four drivers to qualify at better than 200. Tipped as a likely winner, Danny jumped into the lead at the start of a race much interrupted by early caution flags. He and eventual winner Al Unser dueled for the lead until on lap 145 of 200 the crowd groaned with disappointment when a gout of smoke signaled the end of the Interscope Parnelli's engine.

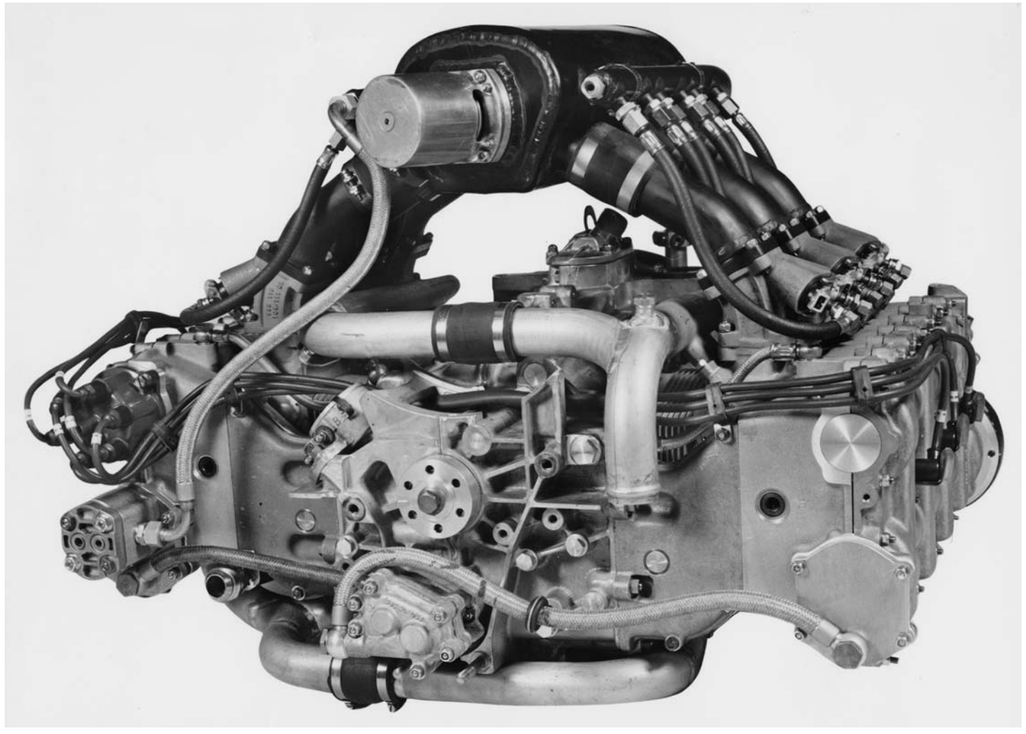
Field's Interscope clearly seemed to be an outfit on the rise. It credentials were praised in Zuffenhausen by a man whose credibility there was still high—California Porsche dealer Vasek Polak. Polak was not only an advisor to Ted Field but also a close friend of Jo Hoppen. Together, Polak and Hoppen helped forge the links with Interscope. Informal contacts were made with the aim of supplying an engine to the team as the first phase of a Porsche Indy involvement.

When the Indy cars raced at Silverstone at the end of September 1978 engineers Flegl and Schäffer were on hand as well to look over their technology. This was increasingly dominated by the Cosworth DFX V-8, a derivative of the successful DFV Formula 1 engine. Although the four-cylinder Offy was allowed a higher turbo boost pressure by USAC, the club in charge of the Indy rules, it was hard pressed to match the performance of the Cosworth.

Focus on the Speedway

Helmuth Bott reached a key decision on October 18 in a meeting with Flegl and racing director Jantke. He approved an allocation of half a million Deutchmarks, about $250,000, for Indy engine development. He also agreed to the preparation of estimates of the cost of a full-fledged Porsche Indy program. By December, an agreement was in place that provided for the shipping of an engine mockup to Interscope to assess its installation in the Parnelli chassis.

Over the 1978–79 winter Valentin Schäffer made three trips to the Interscope workshops in Costa Mesa, California, to discuss the engine and its adaptation to the Parnelli.



As configured for Indy-car racing, the 935/72 had a pressurized central plenum chamber to which the mandatory USAC boost-control valve was attached.

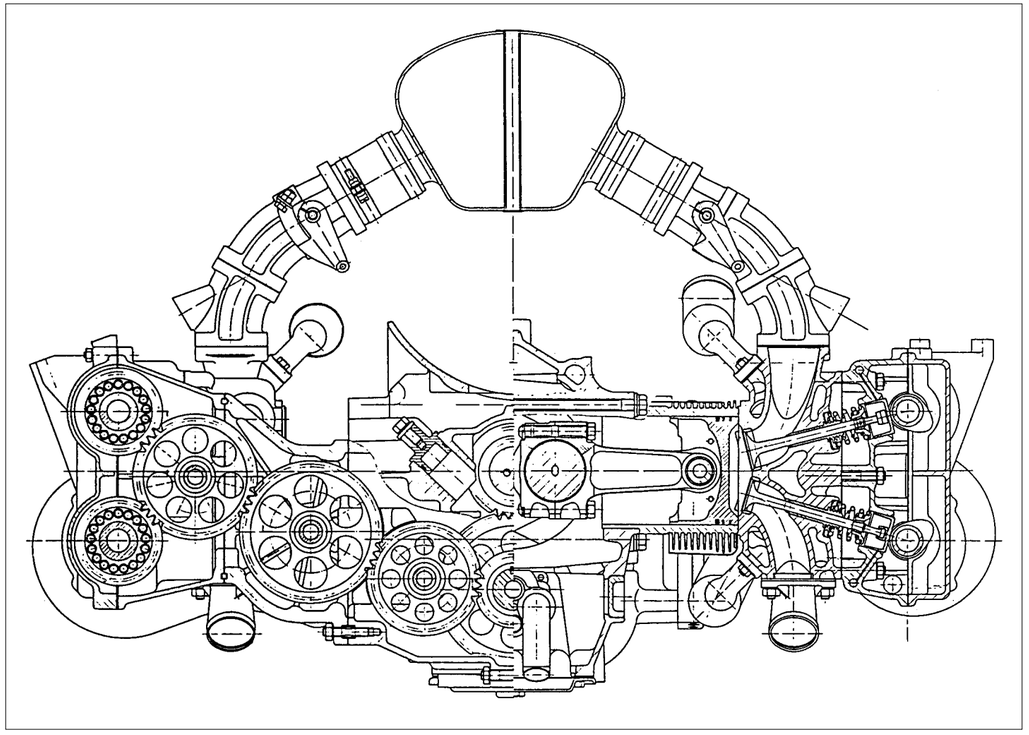
Among the many questions were issues over the supply of oil, fuel and coolant—at 9,000 rpm the engine's two pumps circulated 27,000 liters of water per hour—and the source and type of the clutch and bell housing. No Porsche gearbox was suitable so a special box was made using Hewland internals. It had the needed attachment points for a tubular structure alongside the engine, which couldn't act as the rear portion of the frame as the Cosworth did.

Interscope started the 1979 season well with a win for Ongais, Field and Haywood in the 24 Hours of Daytona. In their Porsche 935 they set a record for distance and were 192 miles ahead of their nearest rival. In March, the team tested its Cosworth-powered car at Indianapolis and Schäffer was there to observe. By April he could also check the marriage of the mockup engine to the Parnelli chassis in California. Assisting in the adaptation was Ukraine-born designer Roman Slobodynskyj, who had led the design of the successful All-American Racing Eagles of the early 1970s.

In the meantime, at Weissach the sports-car-racing 935 engine was being transformed into an Indy contender, the 935/72. Its bore and stroke dimensions were both unique for that engine series at 92.3 x 66 mm for 2,650 cc. A crucial question was whether its cylinder fins would require blower cooling. "We checked the temperature of the cylinder at the critical point, just below the weld to the head," said Hans Mezger. "It shouldn't exceed 90° C. With methanol we had six times the internal cooling effect of gasoline, so we found we could leave off the blower."

A disadvantage of methanol, added Mezger, was that "it has only 46 percent of the heat value of gasoline, so we had to use more fuel." A first thought was to use a 12-cylinder injection pump like that of the 917, but space was insufficient. Bosch came to the rescue with a fully electronic injection system that was capable of metering the fuel in response to engine speed and boost pressure as well as throttle position. Bosch's racing liaison, Fritz Jüttner, could proudly call it "a drive-free system that also brings us fuel savings."

The added fuel volume needed with methanol was accommodated by doubling up the electronically controlled injectors



With its gear-driven twin camshafts, water-cooled heads and four valves per cylinder, the Type 935 engine took Porsche into a new era. As the 935/72 it also offered a bid for glory at Indianapolis.

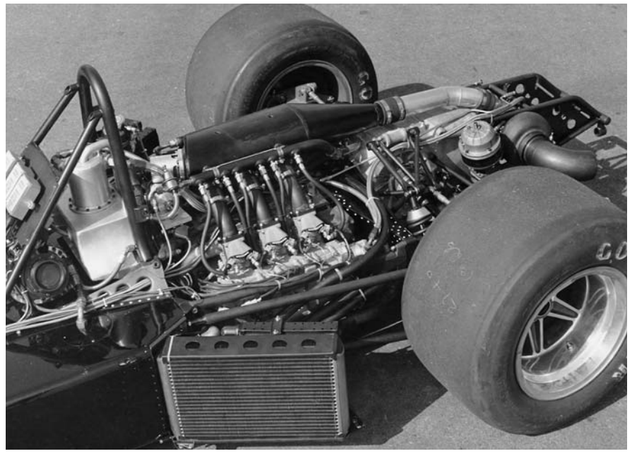
feeding each cylinder. These squirted the methanol upstream within the individual inlet ram pipes, which curved inward to a single central plenum chamber. The USAC pressure-relief or "pop-off" valve was mounted at the front of the chamber. For quick throttle response Porsche would certainly have preferred two turbochargers, but the Indy rules required a single Garrett turbo of predetermined size. This was mounted at the car's rear, aft of the gearbox.

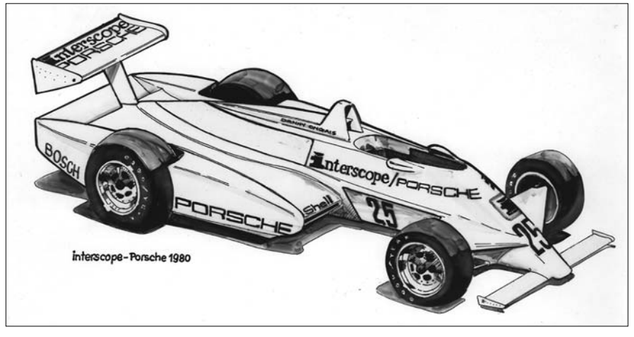
Methanol's good anti-knock qualities allowed Mezger and Schäffer to increase the 935/72's compression ratio more than two points above the level used in the gasoline-fueled versions. By reducing the depression in the piston crown, the ratio was raised to various levels between 9.3:1 and 9.8:1, depending on the installation. Most of the nine units made were in the range of 9.5-9.7:1.[1]

1. Porsche publicly quoted 8.5:1 for this engine but the development records show the compression ratios described.

While early test engines used individual throttles for each ram pipe, these were replaced by a single throttle at the inlet to the turbocharger to meet the needs of the new Bosch injection system. The Bosch system also controlled the engine's electronic ignition. In tests using a Kugelfischer mechanical injection, not the electronic Bosch system, the engine delivered a maximum of 904 bhp at 8,800 rpm and peak torque of 560 lb-ft at 6,800 rpm—but at a boost pressure of 22 p.s.i. This was more boost than the Indy rules would permit, but the engine's performance showed a clear advantage over the Offy figures that had been provided by Penske.

In July 1979 the first 935/72 engine was airlifted to Costa Mesa for installation in the modified Parnelli chassis, closely followed by Valentin Schäffer. On July 9 the key Porsche team of Bott, Flegl, Jantke and Schäffer met with Ted Field, Danny Ongais and Vasek Polak to begin concentrated planning for the launch of a 1980 effort at Indy. The final decision to race had not been made; that would only follow successful track tests. Interscope made clear its intention to build a completely new Slobodynskyj-designed car to take the engine.





Top: The flat-six Porsche unit nestled neatly in Interscope's Parnelli chassis. It required additional tubular bracing at its sides because it did not serve as a stressed element of the frame.

Bottom: Interscope planned a radical new car to exploit the Porsche engine, but after USAC denied Porsche a suitable boost level the project was halted and car and engine were never married.

Indiana Politics

No single issue was more critical than the boost pressure at which the Porsche engine would be allowed to compete. Permitted pressures had been coming down at Indy to curtail speeds, and Porsche stepped right into this scenario. Boost pressures were also an issue in a controversy between USAC and a group of team owners who banded together in the summer of 1978 to form Championship Auto Racing Teams, Inc., best known by its acronym of CART. They were concerned about USAC's inclination to penalize their new Cosworths with lower boost pressure to help the poorer teams who couldn't afford these costly new engines.

When the CART teams started their own racing series in 1979, the stage was set for the eventual isolation of the Indy 500 as the only major race sanctioned by USAC. The FIA-linked SCCA accredited the CART racers, allowing them to compete in international events such as the Indianapolis race. In the autumn of 1979—when Interscope and Porsche were beginning to test—the outlook for 1980 was still uncertain at best. CART teams were those most likely to be friendly to Porsche's entry, but USAC was bidding fair to continue to rule at the famous Speedway.

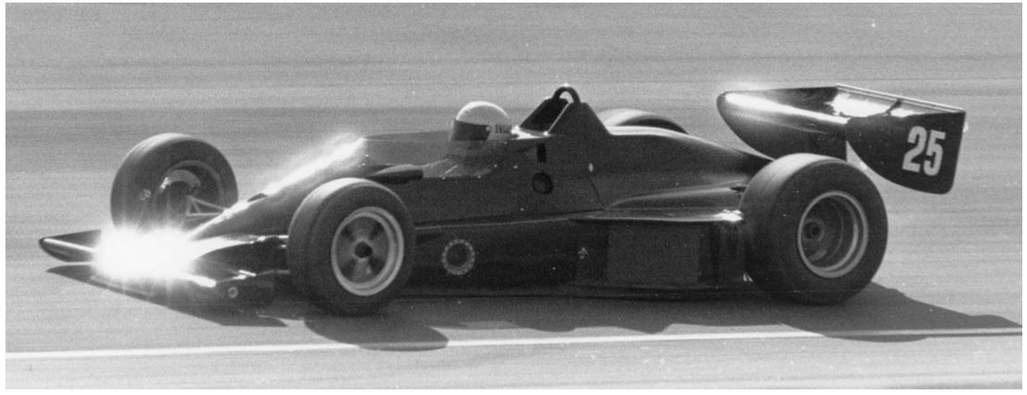
This program was vitally important for Jo Hoppen, Porsche's racer in America. Hoppen took up the role as interlocutor with USAC and its president and chairman Richard "Dick" King. For 1980 four-cylinder racing engines—the Offys—were allowed a boost of 60 inches of mercury, 15 p.s.i. above atmospheric pressure. Eights, the Cosworths, were to be allowed only 48 inches or 9¼ p.s.i. USAC was entirely at liberty to set pressures as it wished. What would it specify for a six-cylinder engine? None had sought to compete since the Bardahl-Ferrari in 1956, and sixes had only won twice—the first race in 1911 (Marmon) and again in 1946 (Sparks-Thorne).

In response to Hoppen's entreaties for a decision, King replied that USAC needed more information on the engine before it could render a view. Thus advised by Hoppen, Manfred Jantke asked project leader Flegl to speak to Dick King, which he did at the beginning of September. King recalled what happened next:

> I received a letter from Mr. Flegl after this telephone call with basic side and front sketches of the six cylinder, 2.65 liter, 935 Porsche engine. Mr. Flegl pointed out that there were no detailed drawings of the engine available and that the basic sketches he sent would show only overall dimensions. However, his letter indicated that further technical information would be forthcoming in the near future. (I must note that I never received anything further.)

Subsequently Flegl did send engine power-output data to Jo Hoppen for forwarding to King, but Hoppen did not pass this along. He told Flegl and his other Porsche colleagues that they should rely on him to sort the matter out.

With this issue unresolved the first tests of the Parnelli-Porsche took place on October 10 and 11 at California's Ontario Motor Speedway, which had been built as a West-Coast replica of the 2½-mile Indy track. Running a boost of 72 inches, 20.7 p.s.i., Ongais turned 99 laps and clocked a



Top: During trials at Ontario on October 10 and 11, 1979, Danny Ongais turned laps at up to 197 mph in the Interscope-Porsche test car.

Bottom: In December 1979 Porsche announced its plan to race at Indianapolis in 1980 with Interscope, releasing pictures of its test car now painted white with Porsche graphics that could only be regarded as dubious.

fastest lap of 197.1 mph—not bad for a test car using a four-year-old chassis. This was especially promising because the Interscope people assured their Porsche counterparts that the California track was two miles per hour slower than the one in Indiana. Boost for boost this showed comparability with the Cosworth, with a clear potential for better fuel economy. The basic engine was also lighter at 348 pounds against the DFX's 410 pounds.

Reports on the successful test were submitted to the Porsche management board, which met on October 22. On the following day Ernst Fuhrmann convened his top Indy-project managers. "The board has approved our going to Indy with Interscope," he told them. A budget equivalent to two million dollars was assigned to the project. This was followed up on November 13 by a working meeting which Danny Ongais and Vasek Polak also attended.

Although renowned for his taciturnity, in the meantime Ongais had been chatting up Dick King on behalf of Porsche. King referred to "numerous" conversations with both Ongais and Hoppen over the boost-pressure question. "In many of these conversations," said the USAC chief, "we requested further technical data regarding the engine." In its absence USAC agreed that as "an equitable starting point for test purposes" a boost pressure of 54 inches of mercury, 12¼ p.s.i., would be appropriate. This figure, which exactly split the difference between the four- and eight-cylinder pressures, was not definitive, however.

This was some comfort for Porsche—enough to switch on the green light for a public revelation of its plans. The Interscope car was shipped to Weissach, where it was thoroughly weighed and measured on December 4 and 5. On the following day at Stuttgart's Intercontinental Hotel it was revealed to the German press, painted a pristine German-racing white instead of the traditional Interscope black. "We are not coming to Indianapolis with expectations of instant victory," Manfred Jantke cautioned his countrymen. "The project is intended to run for more than a single year. We are sure to need a good deal of time to catch up with our rivals—but with luck, perhaps we can even manage to beat them."

Airlifted to New York over the weekend, the white Parnelli-Porsche was shown to America's racing press on December 11. There as in Germany the engine's power was given as 630 bhp at 9,000 rpm on a boost pressure of 60 inches—the same as allowed to the four-cylinder Offy. Torque at that boost was quoted as 412 lb-ft at 6,400 rpm. Neither this, nor some of Porsche's more bullish statements, was calculated to calm the concerns of the old guard at the Speedway over this new threat to their status quo—which itself was in turmoil with the CART-USAC split.

In January tests commenced at Ontario with the USAC-rooted boost pressure of 54 inches. Three tests there collected a total of 172 laps and a best lap of 187.3 mph. On January 21 they also tested at Phoenix, for a best lap of the one-mile oval at 138.7 mph. These were reasonable speeds for a provisional car, although some rod and bearing failures were experienced—always a worry in a program in which different teams are building the engines and chassis. Either can be responsible for oiling-system problems. In general, however, "the engine was fine," Helmut Flegl recalled. "We felt it would be competitive."

Early in February Jo Hoppen called Dick King to request a confirmation of the six-cylinder boost of 54 inches. King protested that he was still in the dark about the Porsche's specifications and power. The upshot of their conversation was that USAC offered to send two technical representatives to Stuttgart to see the engine. "We agreed," said Flegl. "Why shouldn't we? But when they arrived at Stuttgart Airport we found out that their engine expert was Foyt's engine man!" Foyt, a USAC stalwart, was one of those most wary of the Porsche effort.

Here was a quandary for Porsche. Foyt's Howard Gilbert was the man least likely to take a balanced view of their engine. He was accompanied by veteran Indy crew chief Jack Beckley. "We couldn't very well have them landing here and not see them," said Flegl, who arranged for the Americans to visit Weissach on February 20 and 21. "The engine guy knew what he was looking at" when the engine was tested on the dynamometer, Flegl recalled. "He made some calculations of the fuel consumption." The power they saw with the boost of 54 inches was 574 bhp.

At this time, tensions with Interscope developed. Looking over the design of its all-new car for 1980, Porsche was not impressed. It featured almost complete enclosure of the rear tires yet did not fully exploit the ground-effects technology that was just beginning to be accepted at Indy following its pioneering by Lotus in Formula 1. They were not convinced that the new car should carry their engine at the Speedway. The relationship with Interscope "was difficult," Helmut Flegl admitted. "We couldn't build up a real relationship in that short period of time. We were more used to European racing."

On Monday and Tuesday March 3 and 4, Danny Ongais was testing again. This time the team was at the fast two-mile Texas World Speedway. Two hundred and eleven laps were turned with a best clocking of 189.9 mph. On the following day, Wednesday, in Indianapolis the USAC board's executive committee met to discuss the findings of their emissaries to Stuttgart. The data they were shown included information on other engines using what was termed "a comparative method of extrapolation."

Two days later Dick King wrote to his interlocutor in the matter, Jo Hoppen, to report USAC's conclusions. His comments on the technical findings were as follows:

> It was determined that while the engine performance in its present configuration is not extremely competitive, several basic engine modifications can be made to considerably improve the engine's performance. Modifications in the lubricating system alone can, in theory, increase the rpm range considerably, thereby improving horsepower and torque performance. Other modifications in the areas of air intake and exhaust would likely make further significant performance improvements.

After this negative assessment of the competence of the Porsche engineers King delivered the bad news: "After studying all available information and lengthy discussions, it was

At the Ontario track Danny Ongais posed with the Porsche-powered Interscope. A former drag racer, the Hawaiian was considered one of the top drivers of his day.

decided to set the manifold pressure for this engine at 48 inches of mercury."

King sought to sugar-coat the news by saying that USAC would observe the engine's performance "with the possibility of re-evaluation if it is not competitive." He concluded by "strongly encouraging" both Porsche and Interscope to continue development of the engine. The news was devastating to the plans of Porsche and especially to Jo Hoppen, who had undertaken to smooth his company's path to the big race. Manfred Jantke flew to the states to press Porsche's arguments and engaged in correspondence with King, but to no avail. The frustrated Jantke would call the USAC decision "an effrontery, the biggest scandal I've experienced in motor sports."

In March and again in mid-April, Porsche and Interscope were back at Ontario. There they saw best laps of 188.8 mph with 54 inches and 180.2 mph with the imposed 48-inch boost. At the latter level, reported Helmut Flegl to his management, "the engine had too little power [540 bhp at the most]. To develop higher power it would be necessary to change the engine fundamentally to reach higher crankshaft speeds. In principle, this would be possible, but would demand a delay of some five months for the ordering of new crankshafts and connecting rods."

Would it be worth the effort and cost to develop such a new engine? The uncertainty was too great, said many at Porsche. They recalled the treachery of the Americans at the end of the 1973 Can-Am season, when the SCCA reneged on an agreed plan that would have made Porsche hardware readily available to all competitors. Instead they imposed a fuel-consumption limit that hampered the Porsche effort, leading to its withdrawal.

Another Chance for Indy?

A glimmer of hope for the existing engine was seen in April, when the announcement came that USAC and CART had reached a reconciliation. This promised stable engine rules and a chance for the 54-inch boost level. But on April 21, the ruling that Porsche had to run at 48 inches was confirmed by the new partners. This was the final straw. On April 23 Porsche announced that it would not make engines available for Indy racing after all, calling this "a grave and disappointing decision for the company." Instead, it turned its attentions to preparations for Le Mans.

As far as the public was concerned, this was the end of the Porsche Indy project. But on the very next day a proposal was put to development chief Helmuth Bott. It recommended a three-month continuation of the activity to see how the engine worked in the new car that Interscope had built to carry it. Bott approved the plan. At Le Mans in June 1980 the Porsche men met with Interscope to assure them of their continued cooperation. The California team suggested that they consider an entry on July 13 at Mid-Ohio, a twisty track that would show the engine at its least disadvantage. Porsche agreed.

In the meantime the rapprochement between CART and USAC led to the formation of the Championship Racing League with new engine rules from mid-year. Greater rules stability seemed to be in the offing. A compromise was again sought that might allow the 935/72 a better chance. Manfred Jantke hoped for a figure less than 52 inches but not so low as 48.

With good news on the boost-pressure front not immediately forthcoming, however, Interscope recommended that the Mid-Ohio entry be called off. Work went ahead instead on the changes in the engine that were needed to fit it to the new Interscope chassis. This was completed in July, when the first tests took place on July 28 at Ontario Motor Speedway. By mid-August the Porsche-powered Interscope IP-1 was up to 187.4 mph on 54 inches of boost and 179 with 48 inches—about the same as the old Parnelli had recorded. Ongais described this as "something approaching competitive speeds." The final test there on September 25 produced a clocking of 189.5 mph on 54 inches.

Meanwhile the Porsche engineers met to review the technical potential of their engine. A short-stroke version of the 935/72 was laid out. It would have a bore of 96.8 mm with the 60 mm stroke of the "Baby" six. New 124 mm connecting rods—shorter by 6 mm—would be made, running on big-end journals reduced from 53 to 50 mm. The engine would be narrower, with the shorter stroke requiring adjustments to the gear drive to the cams. The valve gear would be upgraded to cope with the new unit's planned speed of 10,800 rpm. Revised injection would deliver methanol into the eye of the turbo compressor as well as directly to the cylinders.

In July, Porsche decided to put work in hand to make ten such engines. This was not disclosed to Interscope; Porsche wanted to keep its options open for the future. After further consultations with the American authorities showed little hope of special dispensation for the six, however, the relevant parts orders were rescinded. On October 16 Helmuth Bott reported to his colleagues with sporting involvement that the board had decided to terminate the Indy project definitively. An epic adventure that had begun so hopefully was ended.

Indy Engine to Le Mans

Not long after that ending, new man Peter Schutz stood at the helm of Porsche. In March he asked for a briefing on the company's Le Mans entries for 1981. "We'll be racing with the 944 Turbo," he was told.

"Can we win with it?" asked Schutz.

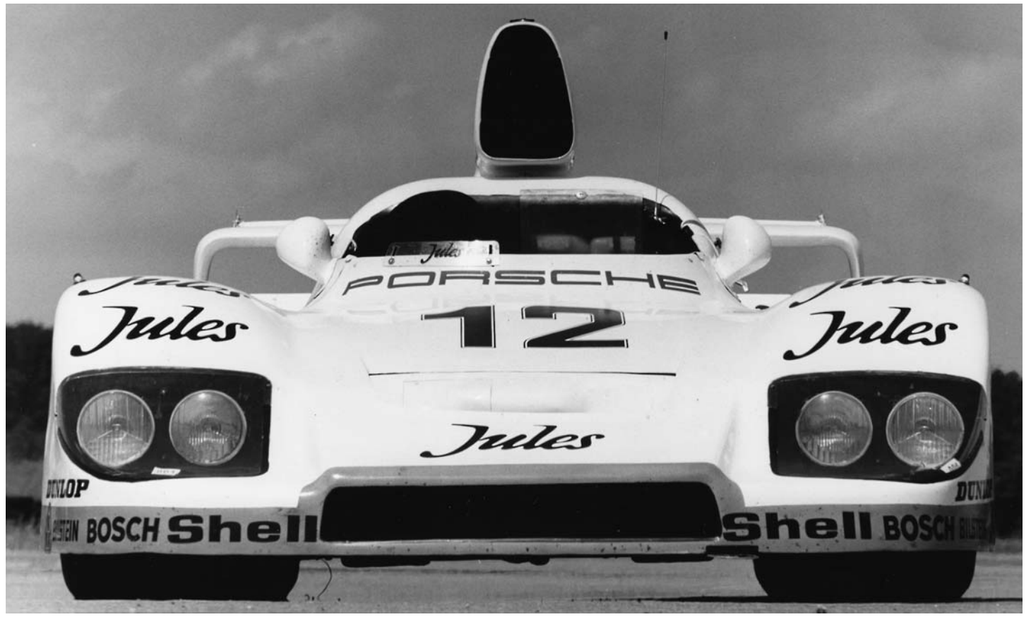
"No," came the reply. Winning had not, in fact, been out of the question, but tests in March at Paul Ricard had discouraged ambitions in that direction for the Type 949 (see Chapter 37).

"So why are we going?" asked the new Porsche chief.

"Professor Fuhrmann wanted to raise the profile of the 944's launch with a Le Mans entry. We can get a class win."

"Do we have a car that can win Le Mans?"

Peter Falk recalled the occasion: "We thought for five minutes or so and then said, 'We can get the 936 out of the



museum and install the Indy engine. We'd have to change it over to gasoline but we can do that.'"

Actual work began with Helmuth Bott's approval of the project on March 30 after Valentin Schäffer said that the engine transformation was possible. Revised to run on gasoline, with a 7.2:1 compression ratio, the Indy six was given the new type number of 935/76. Its cylinder-cooling blower was restored and a conventional 936-type twin-turbo induction and injection system fitted. Many of the parts were taken directly from the successful 2.14-liter sixes. As a turbocharged engine its equivalent displacement was 3,709 cc, which was much bigger than before, but the 3-liter capacity limit no longer applied. In fact, the car was accepted at Le Mans under rules that already admitted cars to run under the new Group C regulations that only came into full effect in 1982.

When first tested this 935/76 produced a rousing 740 bhp. By lowering the revs, reducing the boost pressure and other intake-system measures, its output was cut back to 630 bhp at 8,200 rpm. This was done both to avoid overstressing the Type 917 transaxle and to improve the fuel economy to the level needed to race under Group C rules. Unchanged externally save for their livery for sponsor Jules, the two 936/81s were prepared for the 24-hour race as what Paul Hensler described as "fire-fighting entries."

Some fire fighters! Derek Bell said that his most memorable moment at the wheel of a Porsche was his 1981 Le Mans victory with Jacky Ickx. "I hadn't sat in the car until practice," Briton Bell remembered, "and then set the fastest lap on my first time round. We didn't have to lift a body panel throughout the race." The entry was a bit of a surprise as well for Ickx, who had come back from his planned retirement to drive the Porsche. He was rewarded with his fifth Le Mans victory. The sister 936/81 (Mass, Haywood and Vern Schuppan) was as high as second place in the seventh hour but finally finished twelfth after stops totaling some three hours for clutch and injection repairs.

The summer of 1981 had gone less well for Porsche's erstwhile partner Danny Ongais. With the help of Phil Casey, the Interscope team had fitted a DFX to the IP-1 chassis and brought it to Indy. Danny qualified it on the second day at a speed for four laps of 197.690 mph—the third fastest qualifying time. In the race he held second place in much of the early going, but after a pit stop on lap 64 he hit the wall entering Turn Three. Something in the suspension failed. Exploding in a fireball that gave the lie to the notion that methanol burns invisibly, the car disintegrated and deposited Ongais—like a rag doll—on the track. Making a remarkable recovery, Ongais would compete at Indy six more times but would never improve on his fourth-place finish in 1979.

Neither was the Indy virus so easily eradicated at Porsche. In August 1981, Peter Schutz had it in mind to contact Ted Field to discuss a revival of the Indy 500 cooperation with Interscope. Valentin Schäffer carried out an inventory of the parts needed to complete the short-stroke engines and reported that with an immediate decision they could be ready in the November-December time period. On August 28, Helmuth Bott approved an allocation of DM120,000 to make a start on sourcing the needed connecting rods, cylinders, pistons and heads.

By the end of 1981 this initiative had been terminated. The contagious illness that is the Indy 500 had run its course at Porsche—for the time being. And the engineers at Weissach were already putting their experience with the 935/72 engine to work in a new Group C sports-racing car that would win more laurels for Porsche than the firm could ever have conceived.

Opposite top: Re-tuned to run on gasoline and redesignated as 935/76, Porsche's 24-valve six powered two 936-based Le Mans entries in 1981.

Opposite bottom: Jacky Ickx was the center of attention during refueling of his 936/81 at Le Mans in 1981. He and a Porsche newcomer, Derek Bell, drove the roadster to a convincing victory.

Below left: Ferry Porsche, who had not lost his interest in the Le Mans 24-hour race, was briefed by Helmuth Bott (right) during qualifying for the 1981 contest.

Below right: At Le Mans in 1981 Peter Falk (left) and Helmuth Bott checked lap times of their cars. One 936/81 finished twelfth after being sidelined for repairs.