F1 MAVERICKS

THE MEN AND MACHINES THAT REVOLUTIONIZED FORMULA 1 RACING

PETE BIRO AND GEORGE LEVY

Foreword by Mario Andretti | Afterword by Niki Lauda

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On the back cover: Arturo Merzario in the Williams FW05 at the 1976 United States Grand Prix, Watkins Glen.
On the frontis: Generations of Grand Prix greats. From left to right: Sir Stirling Moss, Juan Manuel Fangio, Innes Ireland, Richie Ginther, René Dreyfus, Dan Gurney, Phil Hill, and Maurice Trintignant at the first Long Beach Grand Prix of the United States, 1976.
On the title page: Englishman John Surtees scores a comeback victory at Spa in Mauro Forghieri's exquisite Ferrari 312.

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INTRODUCTION

How did we get here?

When you look back across the 120-year history of Grand Prix racing, that's the question you ask yourself. How did we get here? How did we go from the lumbering *tanks* that were the first Grand Prix cars to the rocket-sleds we have today? How did the species evolve from mastodons to cheetahs in just over a century?

It would be reasonable to presume that it happened in a neat, drip-drip-drip, leaky-faucet progression. And sure, most of the time it was like that. Gradual improvements happened year over year. But look closer and you'll see something else: a concentrated period when the spigot was turned on full. In the twenty-five-year span including the 1958 through 1982 seasons, the stream of innovations in Formula One quickly became a torrent. From front engines to rear engines. From carburetors to turbos. From flexible-flyer space frames to carbon-fiber monocoques. From cars that went around corners on tiptoes to ones that generated so much downforce they could literally drive on the ceiling. And then, just as suddenly, the gush reverted to a drip-drip-drip.

That twenty-five-year period—and the people responsible for it—are what *F1 Mavericks* is all about. Arguably the most glamorous era in the sport's history. Certainly the most dangerous. And the one that produced the greatest advances in speed and technology the sport has ever known.

Did it happen because the people who designed and built the cars simply were more clever and motivated than their predecessors and successors? It can't be rejected out of hand. This was, after all, the era of Chapman, Cooper, Forghieri, Murray, Barnard, and Sir Patrick Head. Mavericks all. Geniuses in many cases. But the times were different too. Different rules, different culture, different technologies. And very, very different levels of funding, as F1 mastermind Bernie Ecclestone will attest later in the book. Formula One, meet the Fortune 500.

All of these things together created a perfect hothouse for new ideas.

Illustrating our journey through those very good years will be the photography of the great motorsports photographer Pete Biro, on hand to shoot F1 from the 1960 United States Grand Prix at Riverside to the 1982 United States Grand Prix events at Las Vegas and Long Beach, nearly the entire period in question. Supplementing Pete's archive with images from the 1958 season and other key moments during the Maverick Era are some treasures from father-and-son Formula One photographic legends Bernard and Paul-Henri Cahier. We are very grateful for their help. For sure there are other books that serve as better references for every car at every race, if that's your goal, but if you're looking for great shots from several masters during a golden time, you've come to the right place.

You'll find in each chapter, too, a portrait of a different maverick who was particularly relevant to that stage in our chronology. Be forewarned that the dozen or so we highlight aren't the *only* F1 mavericks or even necessarily the most significant. It was a time of mavericks; this is merely a sampling.

Finally, heed the wisdom of the legendary motorsports author and pioneer Denise McCluggage, who, when asked to try and explain the Formula One she was part of in the 1950s and early 1960s—palling around with friends Phil, Stirling, Peter, Louise, and Taffy—would begin with the opening line of the 1953 L. P. Hartley novel *The Go-Between*: "The past is a foreign country; they do things differently there."

The Formula One of the period that is the subject of this book *is* a foreign country. They did almost *everything* differently there from the way it'd been done previously and the way it's been done since.

So grab your passport and let *F1 Mavericks* serve as your guidebook to a distant and exotic place that, like Atlantis, shone brightly once upon a time and lives on today in the memories of those who were fortunate enough to witness racing's most glamorous, glorious, and star-studded stage.

Welcome to the Maverick Era of Formula One.


STP
Mario Andretti

FOREWORD

MARIO ANDRETTI

Mario Andretti saw his first Grand Prix at Monza in 1954. He made his first attempt to qualify for an F1 race at the same track fourteen years later, won the Italian Grand Prix in 1977, and clinched his World Championship at the famed Autodromo the following year. Few are as qualified to speak of the development of F1 from the 1950s to the 1980s as the only man in history to win an Indy 500, Daytona 500, and Formula One World Driving Championship. Andretti raced almost forty years. When people ask how he stayed motivated for that long, he always says that his passion came from the challenge. And it was the many changes and continuous startling developments that kept him stimulated. Although F1 Mavericks focuses on the innovations, technological and otherwise, that so shaped the sport during the Maverick Era, we asked Formula One World Champions Mario Andretti and Niki Lauda to bookend the narrative with two drivers' perspectives on what it was like to compete during that period.

When did your love of Formula One begin?

My love of Formula One began when I was a child growing up in Italy. In those days, motor racing was more popular than any other sport in Italy. That was especially true in the 1950s, when Ferrari, Maserati, and Alfa Romeo were the top players. And the World Champion at that time was Alberto Ascari—my idol. In 1954, I went to the Italian Grand Prix at Monza. I was fourteen years old, and it was my first time seeing Grand Prix cars. I rode every lap with Ascari that day as he battled it out with Fangio. It was a day I would never forget. And the die was truly cast. I decided that day that I wanted to be a racer.

When I was fifteen, my family moved to America. I thought for sure my dream of racing in Formula One was over. But even when I was driving stock cars, Formula One was always my ultimate goal.

How did you keep your F1 dream alive?

While my objective was always F1, it didn't happen overnight. Especially living in America. I had to establish myself and get personally exposed enough to earn a ride in stock cars. After that, midgets. Then sprint cars. Then Indy cars.

In my rookie season at Indianapolis in 1965, Lotus founder Colin Chapman was there with Jim Clark, and I made every effort

Overjoyed STP boss Andy Granatelli planting one on Mario in victory lane at the 1969 Indianapolis 500.

to get to know them and rub elbows with them. As my luck would have it, they took notice because I did quite well. *[Clark won the race and Andretti was named Rookie of the Year—Ed.]* After the postrace banquet, I saw Colin and said to him, "Colin, someday I'd like to do Formula One." He replied, "Mario, when you think you're ready, call me."

In 1968, I felt I was ready. I called Colin and, true to his word, without hesitating for a second, he agreed to give me a ride that same year. In my first official race, which was Watkins Glen, I was on pole. That was pure satisfaction for me.

Comment on the safety movement that began in the 1960s.

Fatalities are truly the dark side of the sport. I was among the many drivers who welcomed the safety movement, and it was something that had to be spearheaded by drivers. There was no way an engineer was going to volunteer any safety features, because every safety feature in a race car is a performance penalty, whether it's in weight or aerodynamics or anything else.

To get safety elements mandated was a daunting job. But every year in the 1960s and 1970s we were making so much progress in performance, there was no reason why some of that knowledge couldn't be used to make the cars safer. We all wanted to live to race another day. And we realized it was the drivers who could make a difference, guys that the press would listen to. That's how the movement gained traction. Jackie Stewart was behind it . . . and Niki Lauda and James Hunt and myself. The entire contingent. And little by little the sanctioning bodies started paying attention to us and began to legislate some of the safety features in the cars.

What do you feel is the biggest change during the Maverick Era?

The aerodynamic aspect took on a whole new life in that period. It was the beginning of exploiting aerodynamics to its fullest efficiency. Mainly ground effect. I recall at the end of the 1976 season, we were having a Lotus team meeting in England. The engineers and aerodynamicists asked what more I wanted out of the race car. Well, I could think of one thing, but it really seemed irrational. At that point in time, when you adjusted more downforce into the race car, you would pay dearly in drag penalty. Off the cuff, I said, "I want downforce without any drag." And I laughed because I knew I was asking for something unattainable. But the engineers on the team were not laughing. By the next season, they had discovered ground effect. This team was motivated by pure curiosity.

Do technology changes affect the relative performance of drivers?

Definitely, yes. Any development is something new. And whoever adapts quicker does better. Some drivers stay with their certain style, and others change accordingly. It's all about adapting to change. If you resist it, you fall behind.

Your thoughts on sharing knowledge with teammates?

Back when we didn't have sophisticated data, when we couldn't sit and compare computer screen data with our teammates and engineers . . . we tried to talk openly and hoped that our teammate would be forthcoming. Well, hope is not reliable. If I was asked about something, I wasn't always open and informative. Why should I? *[Andretti says this with a wink—Ed.]* I'm trying to help myself win, not help someone else win. But today, you can't hide information, because it's on the computer screen, and everyone can see it.

The dream comes true: 1978 Formula One World Champion.

Does today's data narrow the gap between talent on the grid?

Data definitely narrows the gap between the greater and lesser talents on the grid. And not just drivers, but teams. Some of the lesser-budget teams are able to come within striking distance of top teams because of knowledge. The lesser teams are accustomed to doing more with less. A team with one-third the budget, but with a top engineer who knows how to interpret information, can produce victories for a team not regarded to be amongst the top-level teams.

The F1 car you would like to drive again?

I would love to have more time with the Ferrari I drove in 1982 at Monza. The Lotus 78 and 79 in which I won most of my races were memorable cars. But the reason I like the Ferrari from 1982 is because of the power. All of a sudden, we were teetering around in 900 to 950 horsepower. In qualifying, they were telling me probably around 1,000 horsepower. And there's nothing that a driver relishes more than horsepower.

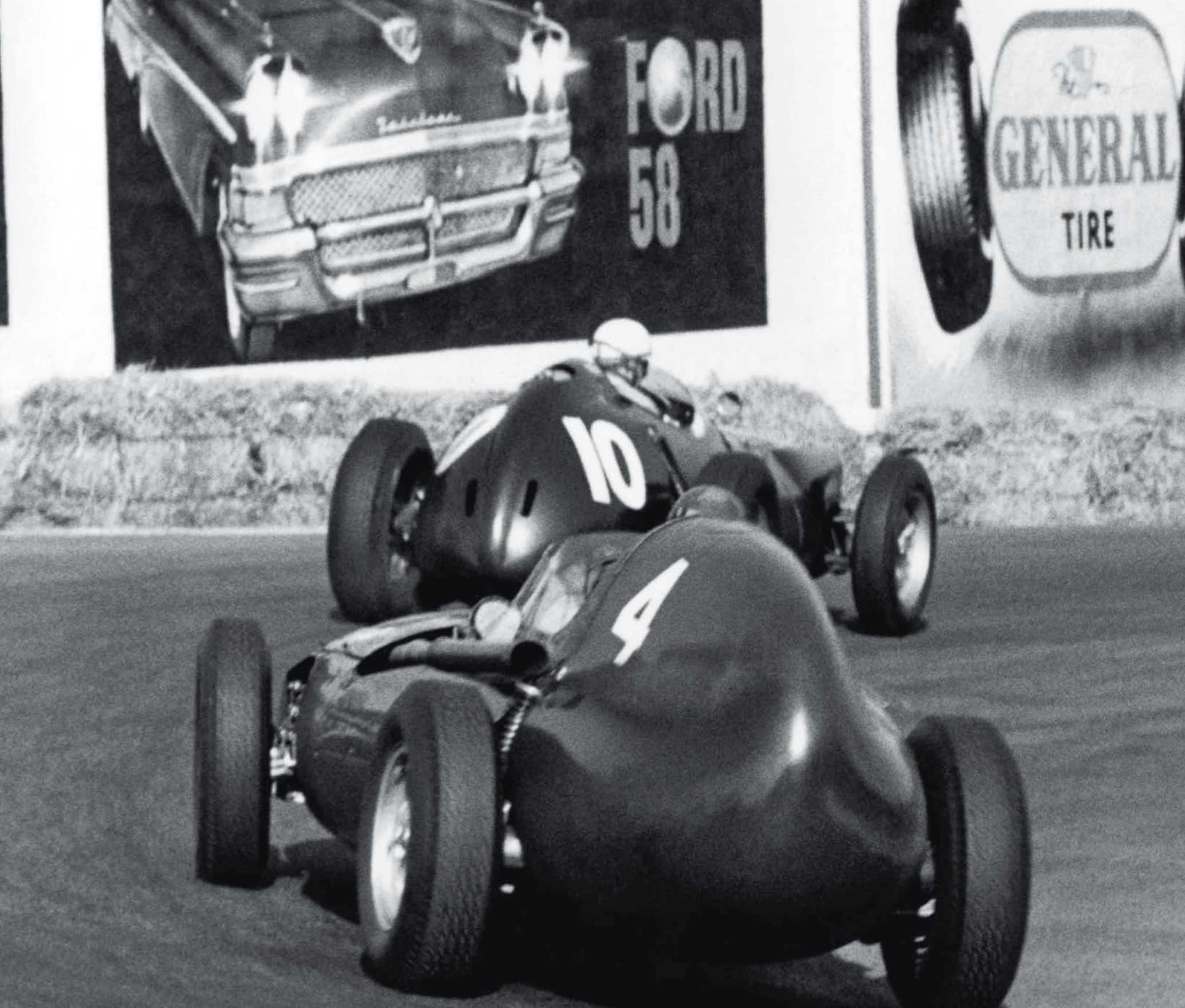
Has the sport improved as it has evolved?

In most cases yes, but not always. One example: listen to the 18,000 rpm normally aspirated engines of the past versus the sound of the hybrid engines of today. For the technical mind, a hybrid engine with Energy Recovery System (ERS) is a marvel. For me, it isn't. For me, motor racing is still ultimately a spectacle, so you can't overlook the value of the sound. Listen to the audio of a race from three or four years ago and compare it to a race today; only one will make the hairs on the back of your neck stand up. So, you've got to look at both sides, the spectacle value and the technical value, and try to satisfy both.

What makes F1 F1, both then and now?

First, Formula One is the only discipline in motorsport that is truly international. It's like an Olympic event—every year. Two, F1 maintains the criteria of being at the top of technology by having each team be its own manufacturer. It sets the technology bar impressively high. And third, while the cars look different from one another, on the racetrack their performance is within a tenth of a second. All these things are part of the integrity that's been maintained in Formula One and what sets it apart from the rest of motorsport.

My love for Formula One isn't just for my era. It's not just about my personal experience. I have had a lifelong passion for F1, and my mind is full of grand memories, good and bad, happiness and grief. It's part of living that life. It has now been almost sixty-five years since I watched Ascari, Fangio, and Moss at the 1954 Italian Grand Prix. And I still watch every race. My passion is the same.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CHAPTER 1: 1958–1961

PUTTING THE CART BEFORE THE HORSE

The tsunami of F1 innovation was triggered by a little-noticed seismic event the better part of ten years earlier. The men responsible were two of motor racing's greatest mavericks, father and son Charles and John Cooper.

It's not that putting the engine behind the driver hadn't occurred to anyone before. In the run-up to World War II, Auto Union had demonstrated it to be a perfectly viable alternative to the traditional front-engine configuration, if not yet a clear advantage. And in fairness, it took some time before even the Coopers seemed to grasp the full magnitude of the opportunity. The great British motorsports historian Doug Nye:

At Monaco in 1950 a rear-engined Cooper ran in the Grand Prix, driven by a Franco-American, Harry Schell. Didn't do any good, but never mind. It was a 1000cc car with the engine in the back, and chain drive to the back axle.

Then we jump forward to 1957, when Roy Salvadori suggested to (Johnnie Walker heir and F1 entrant) Rob Walker that the little Formula Two Cooper with a slightly enlarged engine—1.9 liters instead of only 1.5—for Formula One would be a jolly good runner around the houses in Monte Carlo. Rob immediately jumped at the idea and said, "Well, I'd fund that." He paid for an engine to be built and fitted into a car, which was driven for him by Jack Brabham, and Jack was running third until very close to the finish, when the car broke under him in the tunnel, and he pushed it all the way to the finish, and placed sixth.

People thought, "Oh, these little Coopers, they're interesting things." More rear-engined Coopers ran in Formula One through

Tony Brooks's four-cylinder Vanwall VW5 (4) about to lap American Harry Schell's BRM (10). Schell had driven a rear-engine 1000cc Cooper in the 1950 Monaco Grand Prix, an augury. The Vanwall was designed by Colin Chapman, with aerodynamic help from Mike Costin, two who would soon make noise as heads of their own firms. *Bernard Cahier/The Cahier Archive*

1957 into 1958. In 1958 they were using 2.2-liter engines, with the exception of the Rob Walker car right at the start of the year, which still had only a 1.96-liter. Stirling Moss drove it in the late-announced Argentine Grand Prix, which opened that year's World Championship series, at short notice.

Stirling went there with just himself and his first wife and two mechanics. Rob didn't go. But Stirling won the race, beat Ferrari, and absolutely staggered everybody with his little car, despite its tires being worn through to the canvas, because Stirling didn't stop to change the wheels. Ferrari had just sat there, fat and happy, thinking, well, he's got to stop, he's got to stop, and he never did. Then the very next race in the World Championship was at Monaco, and Rob Walker's other driver, Maurice Trintignant, won that one with a 2.1-liter Climax engine in another of Rob's Cooper chassis.

So the first two races in 1958 had actually been won by rear-engined cars.

The Coopers' rear-engine insurgency might have been even more preemptive had they had more powerful engines. Note the size of their Climax units at a time when the upper capacity limit was 2.5 liters. This was the way Formula One was in 1958. If you didn't make your own engines, like Ferrari and British Racing Motors (BRM), you had to scrounge the most adaptable off-the-shelf units you could beg, borrow, or steal.

The year 1958 was a turning point for other reasons as well. It was the end of the line for the man who had come to define Formula One's first decade,[1] five-time Formula One Champion Juan Manuel Fangio. And it was the year that Formula One suffered its inevitable loss of innocence. Amazingly, no *piloti* had yet perished at a Formula One event. Then, just like that, three were gone. Luigi Musso at Reims, Peter Collins at the Nürburgring, and Stuart Lewis-Evans at the last race of the year in Morocco, where Mike Hawthorn clinched his World Championship.

Hawthorn announced his retirement immediately thereafter, citing in part the death of Collins, his *mon ami* mate. Six months later, the first English World Champion himself perished in a road accident.

The F1 community carried on. That's what one did then. You couldn't afford to brood.

Three years earlier Hawthorn had triggered the 1955 Le Mans disaster when he made an abrupt but legal dive into his pit box. The accident unfolded in front of teammate and longtime Jaguar test driver Norman Dewis, who saw Pierre Levegh's Mercedes ramp the back of Lance Macklin's Austin-Healey 100S and lawnmower through the crowd. Levegh and eighty-three spectators were killed. Someone asked Dewis later if he was horrified by what he'd witnessed. No.

"I'd seen bad things in the war," he explained, "and there was a job to do."

As the 1959 season began, fortune was about to smile even more brightly on the racing Coopers. Nye again:

In 1959 Coventry Climax built a full 2.5-liter Formula One engine for the first time, because it was a 2.5-liter class. That was the year when Jack Brabham won the Monaco Grand Prix, and the British Grand Prix, and (nearly) the United States Grand Prix, and took the Drivers' Championship title for himself and the Constructors' Championship for Cooper-Climax.

It was that year, 1959, that convinced all the people who were running front-engined designs that their cars were no longer competitive with these agile little rear-engined cars, which could be lighter, and were smaller and quicker.

1 "Don't believe any of this bullshit about Formula One coincides with the World Championship, starting in 1950, because it doesn't," says Nye. He's right. The Federation Internationale de l'Automobile (FIA) sanctioning body decided the rules in 1946, with the first F1 event later that year in Turin.

Well, almost everyone. Enzo Ferrari was at the forefront of the resistance, famously proclaiming, "The horses should pull the carriages, not push them." Which probably explains why the Coopers were even *more* dominant in 1960. They won every race but the Indianapolis 500 (which was quaintly included in the Formula One schedule from 1950 to 1960 despite the fact almost none of the F1 teams took part), Monaco and the United States Grand Prix at Riverside (won by Moss), and Italy, where Phil Hill defended Ferrari's honor with the first Grand Prix victory by an American since Jimmy Murphy in 1921—and the last-ever Formula One triumph by a front-engined car.

At this juncture, even Enzo had seen enough. When the FIA introduced a new 1.5-liter formula in 1961 to help combat rising speeds, only Ferrari came to the table with a new engine and put it into a completely new rear-engine chassis. The 120-degree Ferrari DOHC V-6 featured just two valves per cylinder, but connected to a Type 543/C 5-speed transaxle and placed in Carlo Chiti's elegant 156, it was comprehensively the fastest car of the season. Ferrari drivers Count Wolfgang von Trips and American Phil Hill slugged it out for the championship, with Hill clinching the title in the penultimate race at Monza when von Trips crashed to his death on lap two.

The prevailing opinion even today is that von Trips "deserved" the championship. After all, he'd held a four-point lead heading into Monza, with a maximum eighteen points still to be earned. (Back then, F1 used a 9-6-4-3-2-1 points system, with only the best five finishes counting toward your total.)

But the opinion is both spectacularly unfair to Hill and greatly at odds with the facts. First, as good as both were, Hill had been faster at every prior race that year. The American came into the event having won five straight poles. Yes, at Monza von Trips was fastest qualifier by almost a second over Phil, but the issue was a faulty engine in Hill's car. He insisted the team install a new V-6 the night before the race, and this act alone probably decided the championship. When the green flag flew the following morning, so did the American.

At the time of the accident, not only was Hill in the lead but von Trips had already lost the crucial slipstream of the leading pack. Hill left Monza with his second straight Italian Grand Prix victory and maximum championship points.

A bigger ramification of von Trips's accident was its influence on the perception of the sport. Fifteen spectators perished with him. Coming so soon after the tragedy at Le Mans, there were once again calls from around the world to ban racing entirely. Shortly before the season finale at Watkins Glen, the American *Hartford Courant* ran an editorial that read in part:

> **Grand Prix racing has its vehement aficionados, to whom, like bullfighting, it is almost a mystique. They have claimed auto racing to be the purest form of the arts, the noblest of sports, the heroic way of life. But even among sports devotees there are vehement critics of the Grand Prix. Because of the many deaths that have occurred in connection with these competitions, they have been called senseless purges by the opposition, and the courses themselves termed abattoirs.**

Imagine if football stadiums or tennis courts were considered abattoirs. If Diego Maradona or Rafael Nadal lay mortally wounded on their respective fields of battle. The public wouldn't stand for it.

Engine location aside, as 1961 came to a close, it was a fair question whether Formula One could ever ascend to the level of other major sports so long as it continued to tolerate the slaughter of fans and protagonists alike.

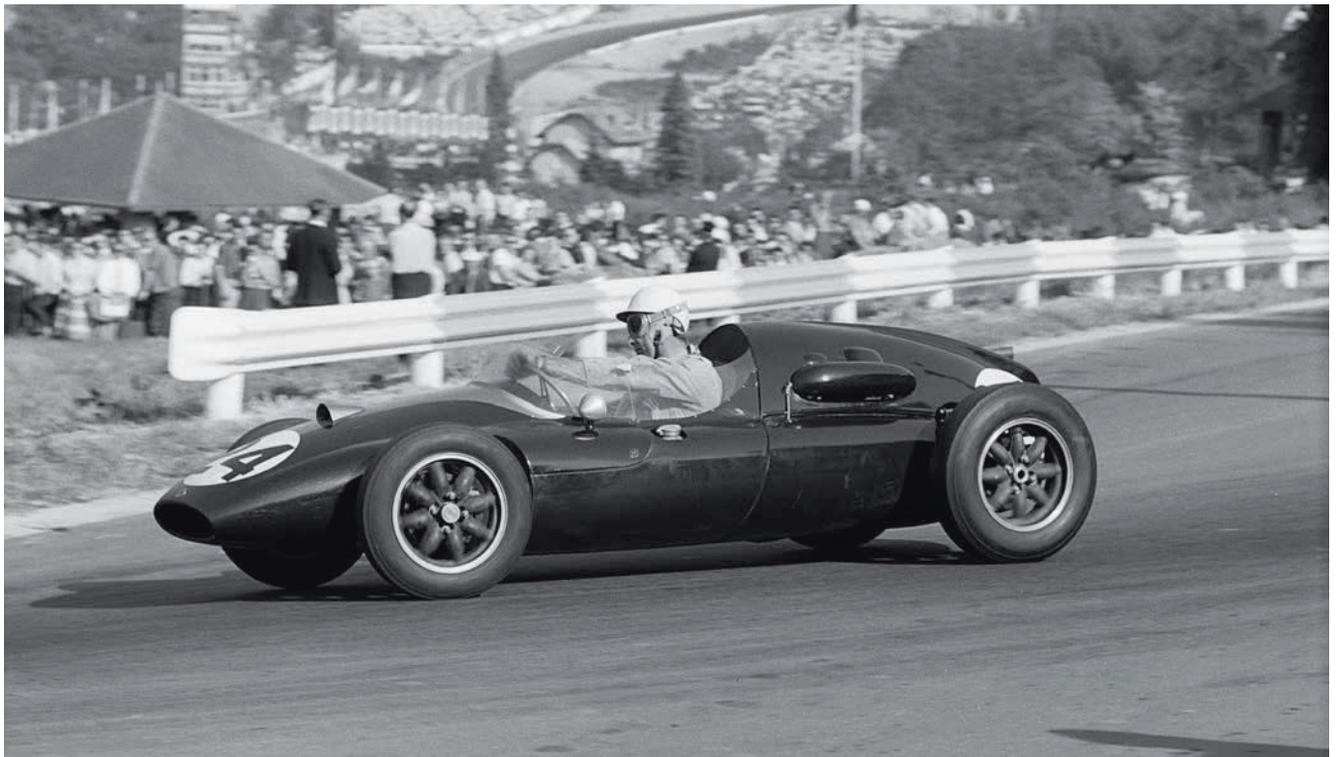
BELGIAN GRAND PRIX

June 15, 1958

Spa-Francorchamps
14.12 km (8.774 mi)
Pole Position: Mike Hawthorn (3:57.1)
Fastest Lap: Mike Hawthorn (3:58.3)
Winner: Tony Brooks (+20.7)

The start of the Maverick Era. Front-engine cars with drivers sitting upright, sawing at giant ship's wheels, rule the roost, as they had since the sport's earliest days. *Bernard Cahier/The Cahier Archive*

The state of the Grand Prix car is defined by Hawthorn's championship-winning Ferrari Dino 246 (16), designed by Vittorio Jano and Carlo Chiti, but the future belongs to Charlie Cooper's rear-engined Cooper T45-Climax. After 1958, a front-engine car will never win another championship.
Bernard Cahier/The Cahier Archive

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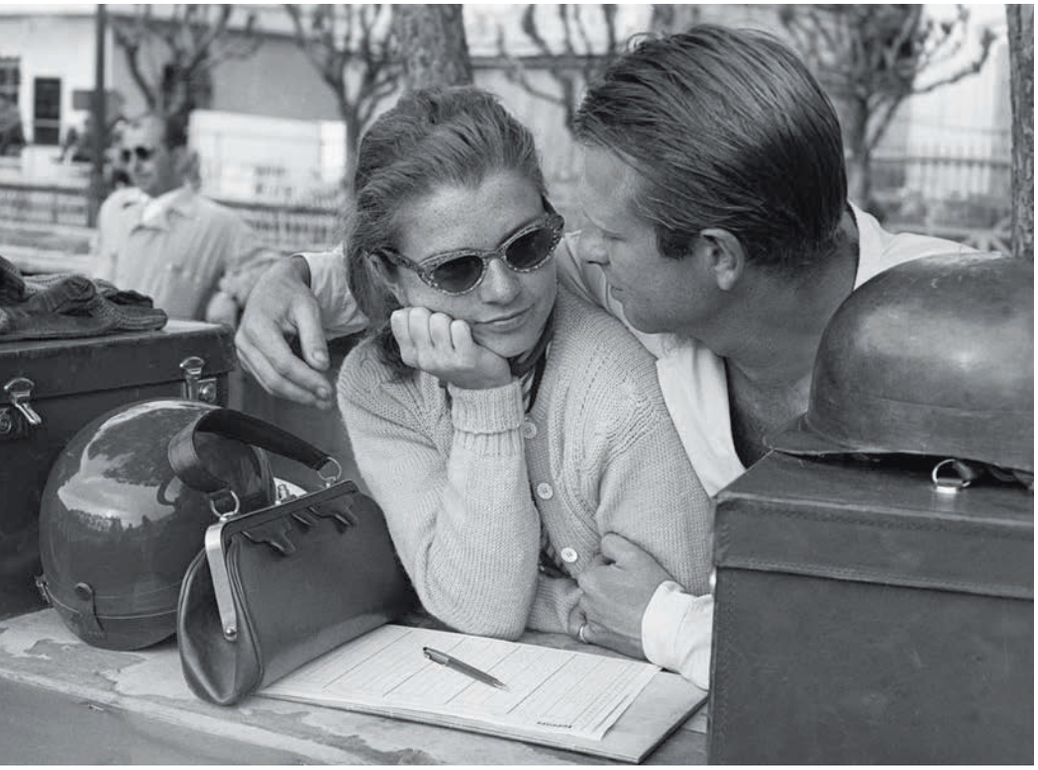

Left: "It was a Monday evening when I first met the English racing driver Peter Collins," American actress Louise King told the *Guardian*, "and a week later we were married. I knew he wasn't indestructible, but he knew how to manage the risks. He was a great driver: when he won the British Grand Prix in July 1958, they even said he might become the best. He was twenty-six. He died three weeks later." *Bernard Cahier/The Cahier Archive*

Opposite: Brooks's win over Hawthorn and Stuart Lewis-Evans's third helped propel Vanwall to the first-ever World Constructors' Championship, but the latter driver's death in the season finale at Morocco affected team owner and Thinwall bearing magnate Tony Vandervell so deeply that he withdrew from the sport. *Bernard Cahier/ The Cahier Archive*

Right: Hawthorn (left) and Collins were "*mon ami* mates." Hawthorn was directly behind Collins when Collins crashed to his death at the Nürburgring. For the rest of her life, journalist Denise McCluggage would remember the look on Hawthorn's face as he entered the room at the Sporthotel where the F1 "family" was gathered, Collins's shattered helmet in his hand. That's when they knew F1's age of innocence was over. *Bernard Cahier/The Cahier Archive*

UNITED STATES GRAND PRIX

November 20, 1960

Riverside International Raceway

5.271 km (3.275 mi)

Pole Position: Stirling Moss (1:54.4)

Fastest Lap: Jack Brabham (1:56.3)

Winner: Stirling Moss (+38.0)

Sir Stirling Moss (5) was considered the heir apparent to retired five-time champion Juan Manuel Fangio, but his reign was cut short by a still-unexplained accident at Goodwood in 1962. Almost always driving for privateers and underdogs, the brilliant Moss never won a title. Here he captured pole and race in Rob Walker's Lotus.

1959 Le Mans winner Roy Salvadori (14) was eighth in an older Cooper. Bruce McLaren (3) was a surprise third for John Cooper after team leader Jack Brabham had to pit twice for engine fires while battling Moss, who quipped afterward, “What happened to Brabham when I flipped that match at him?” The Cooper and Lotus attracted a new generation of fans to F1. Future Formula One race reporter Pete Lyons remembers, “I was a teenager when those two cars came along. It was a revelation seeing how small and tiny they were. You put the same horsepower in the back of a Cooper or Lotus as you had in the front of a BRM or a Ferrari, and it was physically smaller, lighter, better balanced, nimbler. It had much better acceleration. It was like, ‘Wow. This is a whole new generation of car.’”

Moss (5) had won Monaco earlier in the year, in so doing giving Lotus its first two F1 victories. Maurice Trintignant (18) had also won Monaco for Rob Walker, in a Cooper, but could manage only fifteenth. Innes Ireland (10, not pictured) came second, giving Lotus the first two places. Trintignant's Scuderia Centro Sud teammate Ian Burgess (19) retired when his Cooper-Maserati suffered ignition failure. Note the pencil-thin tires and complete absence of roll bars and safety belts.

Traditionally in those days, the international field was supplemented by local entries. Chuck Daigh (23) was a major talent in Lance Reventlow's brilliantly engineered Scarab, but development of America's first F1 car took too long, and the front-engine machine was obsolete on arrival. He finished tenth. Texan Jim Hall (24) astounded by running fifth until a stub axle broke. "It looks as if Texas has another international caliber driver ready to take Carroll Shelby's place now that Shelby has announced his retirement," wrote *Competition Press*. Pete Lovely's Cooper-Ferrari (not pictured) finished behind Daigh. With the title decided, Enzo Ferrari decided not to send cars to the United States. But he allowed drivers Wolfgang von Trips and Phil Hill (9) to take rides with other teams. Hill's aging Cooper Climax finished sixth.

F1 MAVERICK

Charles and John Cooper

Many are the major innovations that were not invented by the people who made them famous. Charles Cooper was not the first to build a rear-engine Formula One car. Auto Union had done it successfully prior to World War II. But it was the Coopers, father and son, who foresaw the modern F1 car and said the cart should come before the horse.

As with many innovations, you instantly wondered why more people hadn't tried it previously, and why everyone else didn't copy it sooner.

Even Cooper himself downplayed the thinking that led to the first rear-engine Cooper. It was a small 500cc single-seater powered by a chain-driven motorcycle engine, and he said it was simply more practical to locate the engine near the driven wheels.

But a rear-engine layout allowed for lower weight (no driveshafts or separate differentials), lower center of gravity, better weight distribution, and generally superior aerodynamics and vehicle dynamics.

Coopers walked the World Championship in 1959 and 1960 before the adoption of 1961's controversial 1.5-liter engine formula. In 1959, titlist Jack Brabham, Bruce McLaren, and Stirling Moss won five of the eight pure F1 rounds. The following year, the team took six of nine rounds—again, excluding the 500.

Cooper still had arguably the best car in 1961, but Ferrari were first with a great engine built for the formula which they duly put in their first rear-engine F1 car. At a serious horsepower deficit, Cooper won no races and finished fourth in the Constructors' Championship.

It was a milestone season nevertheless for another reason. Rodger Ward convinced the Coopers to bring one of their cars to Indianapolis, where Jack Brabham finished ninth in the 1961 event, precipitating the rear-engine revolution in Indy car racing as well.

Thereafter, Cooper's F1 fortunes steadily eroded. It won only three more races after 1960 and never seriously threatened for another championship. Charles died in 1964, and John sold the team the following year. Cooper left the sport after the 1969 season, but the Coopers' place among F1's immortals had long been secured.

Charles Cooper, arms folded, shares a moment with drivers Jo Siffert, left, and Jochen Rindt, right.


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CHAPTER 2: 1962–1964

SIMPLIFY, THEN ADD LIGHTNESS

What the Coopers started, Chapman improved upon.

As 1962 began, and armed at last with competitive engines—that hot new Climax V-8—the British teams not only caught but passed Ferrari. Graham Hill and BRM collected the championship, but it was Colin Chapman and Team Lotus who showed the way forward.

Chapman's philosophy was, he said, to "simplify, then add lightness." For the rest of his career, his cars would generally be lower and lighter than anything else out there. No model better exemplified this than his Lotus 25, the first F1 car with a fully stressed monocoque. Monocoque construction had been used for years in aviation, where light, strong structures are essential. It had been tried previously in the racing world as well, but it was Chapman who made it stick.

In simple terms, you want a racing chassis to be as rigid as possible and as light as possible. If the chassis flexes, it's impossible to tune it effectively to maximize performance for a given track. Previously, most F1 cars had space frame chassis that carried all the loads, to which were added body panels, fuel tanks, engines, and everything else. With the Lotus 25, Chapman asked, what if you integrated those elements as much as possible? What if the fuel tanks and body, for example, were part of the structure instead of added to it; wouldn't that result in a lighter, stiffer car?

It would. The results were instantaneous. During the 1962 season, Jim Clark's Lotus 25 took pole in six of the nine races and registered fastest lap in five. Only the unreliability of the new car kept it from capturing the championship. Champion Hill's BRM scored points in all nine rounds. Clark failed to finish four times.

Perhaps there was no greater evidence of the Lotus's superiority than the season-ending, nonchampionship Mexican Grand Prix. Clark took over teammate Trevor Taylor's car after his own had

The Lotus 25 transformed the sport as the rear-engine Cooper had before it. The first fully stressed monocoque, it nearly swept the board during the 1963 season. Clark (9) scored seven poles, set six fastest laps, and captured seven wins of the season's 10 races on his way to his first Drivers' Championship. *Bernard Cahier/The Cahier Archive*

been disqualified twenty minutes into the race for an illegal push start. Clark left the pits sixty-eight seconds behind the leader. Over the remaining fifty laps, he proceeded not only to reel in two-time champion Jack Brabham, but to win by over a minute. Wrote Robert Cumberford in *Car and Driver*, "He demonstrated an ease at the wheel which has been seen only a few times in years past, when Ascari or Fangio or Moss have been at the top of their form. If Clark does become World Champion, it will be no surprise to anyone who was in Mexico on last November 4."

As they had done when the Coopers demonstrated the superiority of a rear-engine layout, all of the other teams began to copy Chapman's monocoque, although not necessarily immediately. Brabham would persevere with space frames through the end of the decade in part because it was one of the increasingly small number of teams that sold customer versions of its cars. Racing cars frequently get bent or pranged over the course of a race weekend. It was more difficult to repair a bent monocoque in the field than a simple welded conventional frame, especially for the privateers who comprised Brabham's customer base. It's a tribute to the cleverness of Brabham and partner Ron Tauranac that their nonmonocoque cars remained competitive into 1970, winning two championships over that span.

Having ironed out the new car's glitches during the 1962 season, the Lotus blitzed 1963. The F1 calendar was expanded to ten races, and Clark won seven of them. Seven times he put the Lotus on pole. Six times he set fastest lap. He collected at least one of the three milestones—victory, pole, fastest lap—at every venue. How dominant were the Scot and the 25? Clark's record seven wins in a season would not be equaled until 1984 (Alain Prost) or exceeded until 1988 (Ayrton Senna), at a time when the F1 calendar had been expanded to sixteen races.

It was in the midst of this period that F1 began to lose the nationalism that had defined Grand Prix racing from the beginning. It had been conceived at the outset as a contest in part between nations and their national automotive industries. Starting as early as 1900, cars competing in international events appeared in national colors. The Italian cars wore red. The Germans, silver. The British cars were British racing green. Ever wonder why Dan Gurney's Eagles were blue and white? These were the American racing colors. At the end of each race, they played the national anthems of the top three finishers.

This flag waving was more than skin deep. The makeup of the teams reflected their countries of origin. Ferrari was comprised almost entirely of Italian designers and mechanics and, just as importantly, Italian ideas. Hence Enzo's hesitation to appropriate the British innovations of rear engines and disc brakes. The Germans had their way of doing things. So did the British. The cars reflected those differences. Dissimilar cultures and mindsets were so characteristic of the sport that in 1960, Academy Award–winning British actor, humorist, and Formula One fan Peter Ustinov released a popular comedy album lampooning them. In *The Grand Prix of Gibraltar*, the multilingual Ustinov did all the voices, from the very properly British Foss (Moss) to the Argentinean Fandango (Fangio), and the rigidly Teutonic Wolfram Von Grips (von Trips) and Albauer (Mercedes-Benz team manager Alfred Neubauer). At one point, Albauer explains to the interviewer that after great study, the Germans have determined that it is essential for their drivers to blow their nose exactly seven and one-half minutes before the start of the race because

the extra weight of a handkerchief kept in the right or left breast pocket "would completely destroy the balance" of the car.

The purity of each nation's heritage began to ebb when John Surtees joined Ferrari for the 1963 season. The Englishman had driven Lotuses and Lolas previously and saw how both the British and Italian cars could be improved by adopting the best practices of the other. The British teams were using fiberglass body panels, which were lighter and therefore helped the car go faster. Surtees convinced Ferrari to follow suit and to start looking beyond Italy's borders for other good ideas. The same epiphany was occurring at the other teams. Gradually, F1 became a little more global and a little less provincial. The cars got faster, but also more homogenized. A little of the charm and ambience were gone.

If 1963 had been a rout, the 1964 season would prove one of the most competitive on record. Once again, Clark's Lotus was the fastest car; once again, it was let down by reliability issues. Clark won pole for fully half of the ten races, but retired four times. Graham Hill's more reliable BRM seemed in control of the championship heading into the final race in Mexico, but a controversial collision with Surtees's Ferrari teammate Lorenzo Bandini put Clark in position to snatch the title. Which he had firmly in his grasp until the final lap, when an oil leak dropped him from the lead. Whereupon the Ferrari team hastily signaled Bandini to let Surtees through to finish second behind American Dan Gurney and in so doing accumulate enough points to take the title by one over Hill. Surtees's pace throughout the year was abetted by the superb semimonocoque Ferrari 158 chassis designed by newcomer Mauro Forghieri, who would prove himself to be one of the greatest technical directors in Scuderia Ferrari's history.

Speaking of nationalism, a new entrant was the all-Japanese Honda team, and just so no one would be confused, its RA271, fitted with an earsplitting V-12, was painted to resemble a giant Japanese flag.

As had been the case going back to the late 1950s, all the teams were using Dunlop rubber. It's hard to imagine today just how primitive F1 tire technology was then. Cedric Selzer, one of the mechanics on Clark's 1963 championship-winning team, remembers going three or four races between tire changes.

"They were a pretty hard compound," Selzer says. "Normal road tires of today were probably ten or twenty times better than the racing cars' tires of that period. Things move on."

They were about to move on in a big way.

MEXICAN GRAND PRIX

October 25, 1964

Mexico City

5.000 km (3.107 mi)

Pole Position: Jim Clark (1:57.24)

Fastest Lap: Jim Clark (1:58.37)

Winner: Dan Gurney (+1:08.94)

American Dan Gurney gave Jack Brabham's team its first and second F1 wins, in France and here in the season finale in Mexico.

Above: Two of the greats of the Maverick Era, Ferrari's Mauro Forghieri (left) and John Surtees. By weekend's end they would clinch Ferrari's second and final World Constructors' Championship of the 1960s.

Right: Team Lotus waits out qualifying. Colin Chapman (seated) and nail-biting Jim Clark will be relieved to learn Clark's 1:57.24 will take pole by almost a second from Gurney. The Scot will have the title in hand until his engine seizes on the final lap.

F1 MAVERICK

Colin Chapman

No one better epitomizes the Maverick Era than the man whose career neatly bookends it. Anthony Colin Bruce Chapman's Team Lotus made its initial foray into Formula One at the 1958 Monaco Grand Prix, and he was still at the helm when he died of a heart attack at fifty-four in 1982. During those twenty-five seasons, Chapman led Team Lotus to seven Constructors' Championships and six Drivers' titles.

But beyond the trophies was the way he led and shaped the sport in technical innovation. Some people succeed by doing the same things everyone else is doing, only smarter and better. Others succeed by ignoring what everyone else is doing and blazing their own trail—which the rest end up following.

Chapman belonged squarely in the second category. When he introduced the first fully stressed monocoque, the other teams followed. When he introduced inboard front brakes and side-mounted radiators, the other teams followed. When he introduced ground effect in 1977, the entire sport followed. "Downforce without any drag," as Mario Andretti put it. Chapman had changed racing forever.

"He was just very innovative and a very futuristic thinker," says Eamon "Chalkie" Fullalove, a mechanic for Lotus from 1965 through 1969 save for 1968, when he went to Brabham. "He was an aircraft designer, so he understood what needed to happen in a Formula One car. He wasn't afraid to tackle anything. Not a thing. His mind was so fucking flexible it was unbelievable. Once he had one car done, that was it. All he thought about was the next one, even before it had been on the racetrack."

Chapman was obsessed with simplicity and weight reduction. "Adding power makes you faster on the straights," he'd say. "Subtracting weight makes you faster everywhere." In the early days, before the advent of superlightweight materials, it made a big difference. Lotuses were often the lightest—and lowest—things out there.

Some felt the obsession went too far. The list of drivers who perished or suffered career-ending injuries in Chapman's cars following suspected mechanical failure is long: Jim Clark, Stirling Moss, Bobby Marshman, Ricardo Rodriguez, and Jochen Rindt among them.

More than one driver refused to drive for Chapman. American Parnelli Jones passed on an offer to pilot the Lotus 56 STP turbine the year after he'd nearly won the 1967 Indianapolis 500 in the previous STP turbine *Silent Sam*, because he was skeptical of the former's engineering. The front wishbones, he said, didn't look any stouter on the 56 than on any other Lotus—and this one had four-wheel drive.

Chapman invited Jackie Stewart to join his team twice.

"I refused both times," Stewart told *Motor Trend* in 1970, months before Rindt died. "I like to race for people like Ken Tyrrell. Not just because he was the one who gave me my first true chance. But because he is the most serious of all present team managers. He is a man who knows how to figure out every risk. He would rather lose a race than lose a driver."

But longer is the list of drivers who would give anything to drive a Chapman-designed car—and who enjoyed their greatest career success in his designs. Chapman supplied the car that made Emerson Fittipaldi, at twenty-five, the youngest-ever World Champion, a record that stood for more than three decades.

"I always say Colin was a genius. I never worked with anybody who had so much intuition about how a race car is working," 1972 titlist Fittipaldi told *Motor Sport*. "He was the best school a driver could have.

"Sometimes if my car wasn't working right, we went for dinner, I told Colin exactly what it was doing, he'd go back to the garage to think about it, and the next day it was better. His solutions to problems always came so quick. And he always wanted to win. He was absolutely committed to winning."

Like any successful team leader, he had help. Not just a terrific group of mechanics like Bob Dance, Chalkie Fullalove, Cedric Selzer, David "Beaky" Sims, and too many more to list, but first-rate designers and engineers like Len Terry, Maurice Philippe, Tony Rudd, Tony Southgate, and Peter Wright.

But it was Chapman who had the vision, set the direction, ran the show.

"Despite his interest almost only in new ideas, Colin Chapman has to be considered the greatest innovator of the [Maverick Era]," says former technical director of Williams Grand Prix Engineering Sir Patrick Head, "whether it be the Lotus 25 with its monocoque chassis, or the Indy cars including the turbine 4WD cars. Although the 4WD F1 cars were unsuccessful, the Lotus 63 was probably the best.

"[In later years] Chapman started taking on many challenges, in boats and road cars, including the DeLorean project, and this took his attention away from his racing team and car designs, but 'ground effect' awakened his interest. No doubt in my mind that Colin Chapman had the most influence in this period." ▚


5

CHAPTER 3: 1965

IT WAS A VERY GOODYEAR

Technically, the modern tire wars in F1 began in 1964, when Portuguese driver Mário Veloso de Araújo Cabral participated in the Italian Grand Prix in a Derrington-Francis ATS shod with Goodyear tires. Everyone else was on Dunlops. But the proper start came in 1965, when Goodyear enlisted Honda and Brabham.

The battle would intensify the following year when fellow American tire giant Firestone joined the fray. The open warfare between tire makers introduced two fundamental changes to the sport. One, the way it was funded. Suddenly, teams were being offered large amounts of money to align with one of the three firms. Two, the role of testing. The tire companies would invite their teams to frequent development sessions, during which they also developed their cars. It helped everyone improve.

It was a fairly moot point through most of 1965. Lotus introduced the successor to the 25, the 33, and with it, Clark won six of the first seven races and his second title. The exception was Monaco, which he skipped to win the Indianapolis 500. Hill was runner-up for BRM, followed by teammate and rookie sensation Jackie Stewart.

"Three times in that first year, I finished second to Jim Clark," Stewart says. "That was an enormous achievement for me, for the two Scotsmen to be on the podium, and there was all the jokes going around that it was Batman and Robin—and there was no doubt as to who was Batman and who was Robin!"

Goodyear faced a steep learning curve, as did its teams, but it began to come good in the second half of 1965. Gurney was on the podium at each of the last five races, showcasing Brabham's potential, and Richie Ginther broke through at the Mexican season finale to score his, Goodyear's, and Honda's first Grand Prix victory.

Ginther would never win another F1 race. Goodyear was just getting started.

In a season in which only a driver's six best finishes counted, Clark (5) came to Mexico having won six times and long since clinched the title.

MEXICAN GRAND PRIX

October 24, 1965

Mexico City

5.000 km (3.107 mi)

Pole Position: Jim Clark (1:56.17)

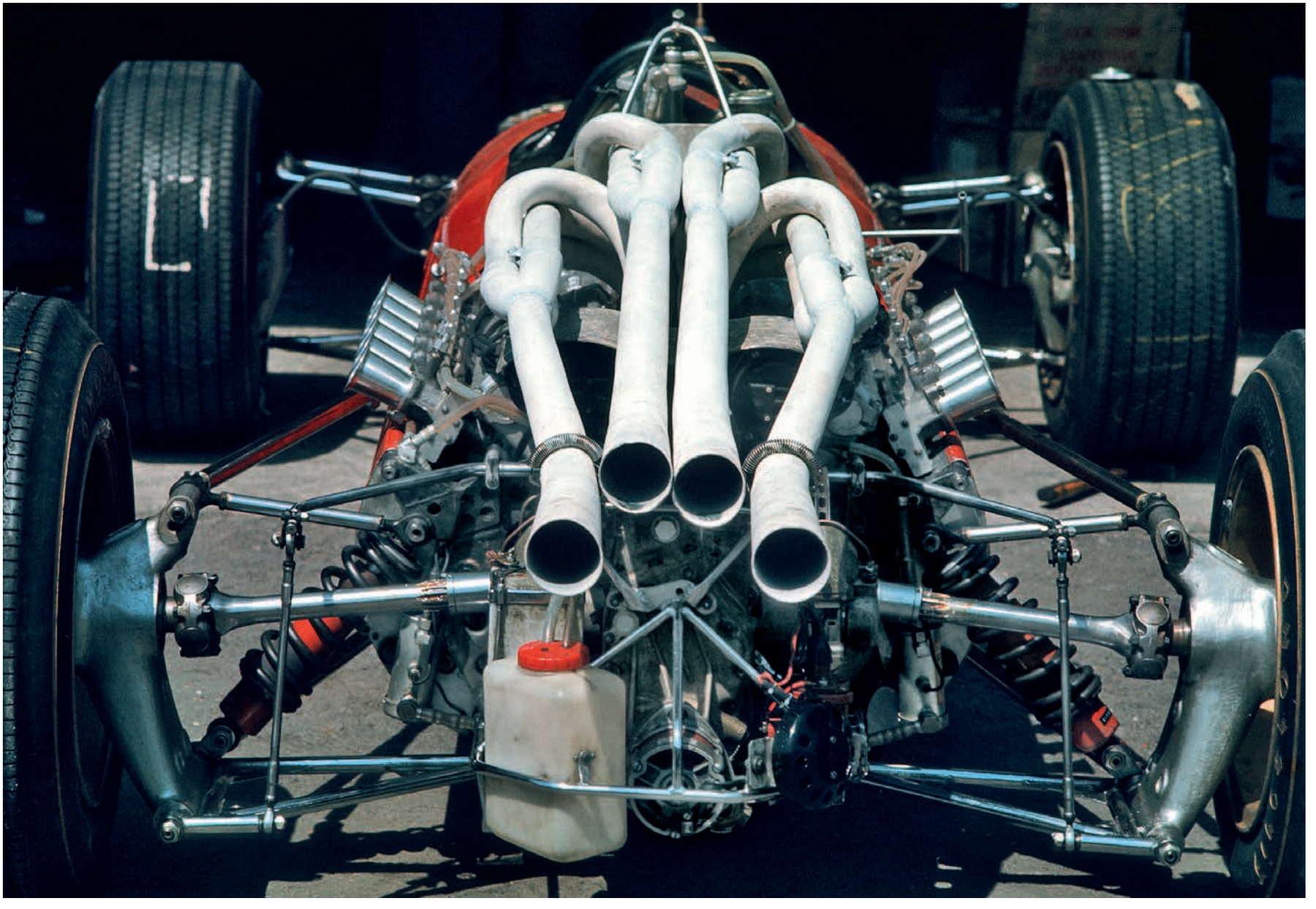
Fastest Lap: Dan Gurney (1:55.84)

Winner: Richie Ginther (+2.89)

A year dominated by Lotus and BRM—up until Mexico, only champion Jim Clark and BRM twins Graham Hill and Jackie Stewart had won races—ends with a triple breakthrough victory for Honda, Richie Ginther, and Goodyear.

Above: Mexican hero Pedro Rodriguez (24) makes another North American start for Luigi Chinetti's North American Racing Team, the Ferrari importer for whom both Rodriguez brothers shined in major sports car races. He'll finish seventh.

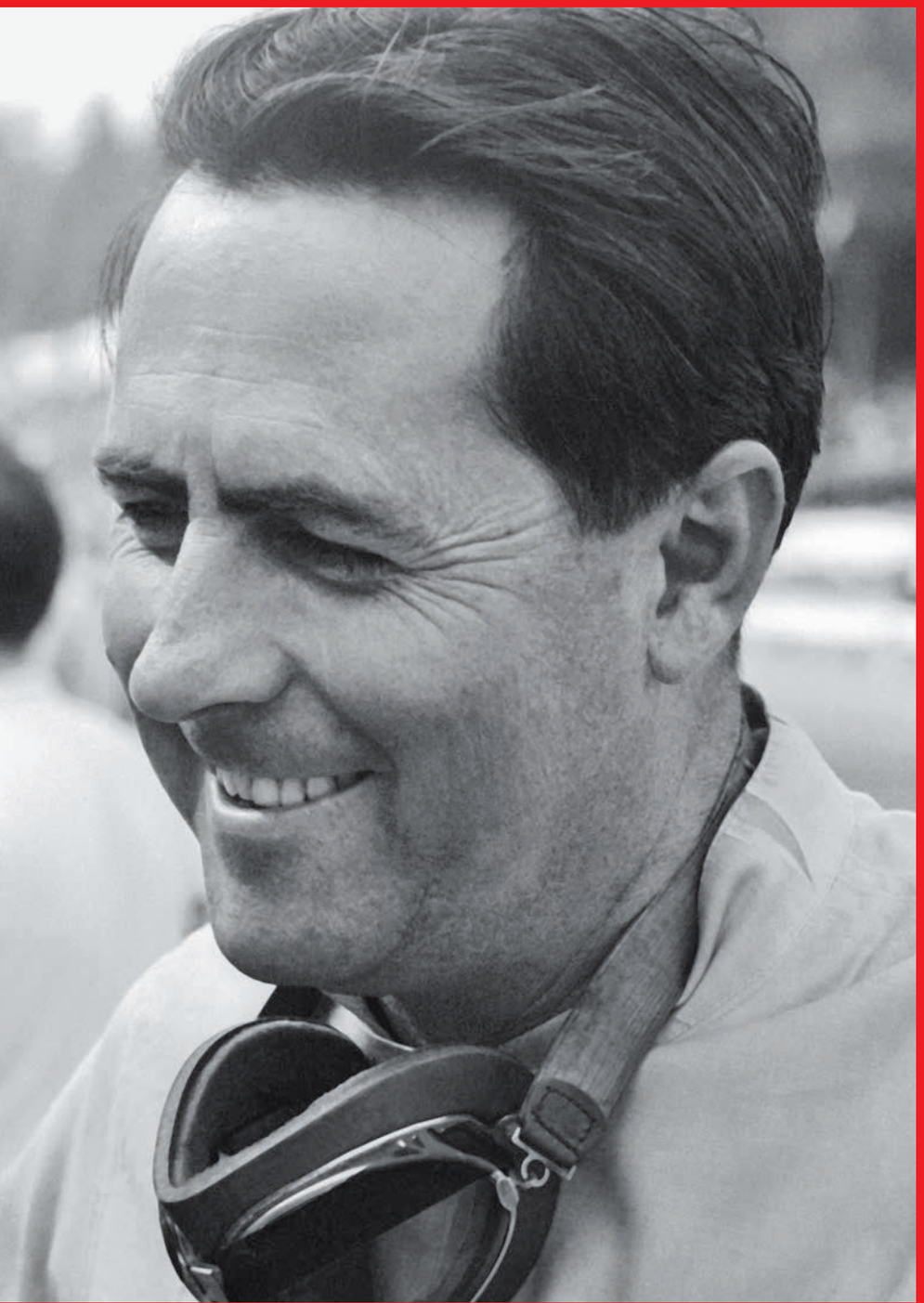
Left: The Honda team is almost all Japanese outside the cockpit. Formula One teams represented their countries of origin in the early days of the Maverick Era.



Mexico is also the last race of the 1.5-liter formula. All of these engines, including this gorgeous Ferrari V-12 with its “bundle of snakes” exhaust, Colin Chapman tells *Road & Track*, are “fit now only for giving away with corn flakes.”

Above: During the early days of the Maverick Era, mechanics' coveralls still got dirty, and even the drivers—in this case, Lorenzo Bandini—pitched in.

Right: Or sometimes they just wondered how they might fare in the race ahead. American Ronnie Bucknum will finish a best-ever fifth, his sole points finish in eleven career starts.



F1 MAVERICK

Jack Brabham

All the time Jack Brabham was at Coopers, he wasn't just driving. He was watching and learning. At a certain point he decided, "I can do this better myself."

Leave it to Jack to show that he could. In 1966, he became the first (and is still the only) World Champion in a car of his own construction and name. Said Dan Gurney, the driver who gave *Brabham* its first Formula One victory in the 1964 French Grand Prix, upon the Australian's passing in 2014:

> **A motor racing giant has left our planet whose combined achievements of F1 World Championship driver and car constructor in all likelihood will never be equaled. Dark-haired "Black Jack" was a fierce competitor, an outstanding engineer, a tiger of a driver, an excellent politician, and a hands-on creator and visionary; he opened the rear-engine door at Indianapolis and raced there. He was a doer, a true Aussie pioneer!**

The son of a grocery store owner, Brabham had become a capable mechanic while serving in the Australian Air Force in World War II. It was in Australia that he met fellow racing fan Ron Tauranac and they quickly found that their talents for mechanical engineering complemented each other. Soon Brabham progressed from the rough-and-tumble of Australian circle-track racing—where he got his trademark tail-out style—to international road racing. He made his Formula One debut in 1955 in a Cooper he'd, appropriately enough, built himself. He began driving full-time for the factory in 1958 and contributed

mightily not only as a driver but in the engineering of the cars. A year later he won the first of two championships.

He started his own team then with Tauranac, and they entered their first Grand Prix in 1962. Tauranac would handle the designs; Brabham would do the testing and manage the team. He sold Brabham to Tauranac in 1970 after fulfilling a promise to his wife to retire from Grand Prix racing at the end of the year. When he left, he had "plenty of gas left in my tank," as he put it, even at age forty-four. He won the opening South African round in that farewell season, looked a likely winner in Spain until engine woes, and lost the Monaco and British GPs on the final lap.

Said former McLaren executive chairman Ron Dennis to the *Independent* upon Brabham's passing:

> **When I started out in Formula One in the late 1960s, I worked first for Cooper and then for Brabham. Even as a callow youth, I could recognize greatness when I saw it, and I'll always regard it as an honor and a privilege to have worked for Sir Jack.**

His influence went far beyond Formula One and Indy. In the 1960s, Brabham was said to be the largest producer of customer open-wheel racing cars, and he found outstanding success in Formula Two and Three. And Jack himself mentored and inspired other driver-constructors, most notably Gurney and his Cooper teammate Bruce McLaren.

As the sport has grown, and teams now are composed of hundreds of specialists, it seems unlikely we'll ever again see someone so thoroughly immersed in and adept at every aspect of the undertaking. Former Lotus driver Jackie Oliver, who would later form the Arrows team, remembers Jack Brabham from his childhood:

> **My father took me to Brands Hatch when there were some Formula One cars testing there. And Jack Brabham was pretty famous then, before I even started to be a professional driver. And the thing that really struck me was, he was sitting in the car with a spanner to do something up in the car, and then he threw the spanner onto the ground outside, started the car up, and drove out for practice. And as a young person then, I thought, why didn't he have someone else to do that job?**

As Brabham explained shortly before he died, "I had just as much enjoyment out of being a mechanic and looking after and getting the cars to the line as I did out of driving. The driving part was just relaxation after it had all happened."

Few have ever done so much so well.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CHAPTER 4: 1966

ALL HAIL THE DRIVER-CONSTRUCTOR

If you thought that the lords and masters of Formula One, having been caught out once by a change in engine displacement five years earlier, would have been better prepared this time, you'd be greatly mistaken. The year 1966 saw the doubling of engine capacities to 3.0 liters. Near chaos ensued.

Lotus, Cooper, and Brabham found their best-laid plans scrambled when Climax abruptly decided to abandon the F1 business. There were still plenty of the smaller Climax engines around, but no new 3.0-liter. That should have left Ferrari once again in the catbird seat, but neither its 2.4- nor 3.0-liter engines proved as competitive as Ferrari had hoped. The team blamed the drivers.

The advantage should have gone to the other organization building its own engines; BRM stood for British Racing Motors, after all. But in perhaps the most crucial decision in its history, BRM forsook both V-8 and V-12 options and put all its chips instead on an H16 configuration, in essence a doubling of one of its 1.5s: four banks of four, arranged in essence like two flat eights. A neat but overly complicated solution further sabotaged by engine castings that came in much heavier than planned. (The sports car–based Ferrari V-12 was also heavier than it needed to be, ballast that Mauro Forghieri's tidy 312 chassis could ill afford.) The H16 would never come right, dashing title prospects at both BRM and Lotus—Lotus had come hat in hand to the Bourne, England–based firm, once it sussed that Climax engines puffed out to 2.0-liters weren't going to make the grade. That quickly, both of 1965's top entrants were relegated to also-rans. The H16 would win only one race that counted, the United States Grand Prix late in the season, long after the title was out of reach.

The upstart McLaren team thought it had the solution in the Ford Indy engine, which had captured the 500 in both 1965 and 1966. Ford looked fondly upon McLaren. Bruce had done much of

Brabham became the first man in history to win a Formula One title in his own car.

the development work on the Ford GT and during the course of 1966 would win, with fellow Kiwi Chris Amon, the prize company chairman Henry Ford II lusted after most, the 24 Hours of Le Mans. Take that, Enzo. But the Indy engine, destroked from 4.2 liters to 3.0 and converted to run on gasoline, was a disaster.

In the end, the two entrants best positioned to capitalize on the new engine rules were the two that improvised the most cleverly, Cooper and Brabham. Cooper arranged with Maserati to take its ten-year-old V-12 out of mothballs and update it for service in the new F1. No, seriously. And it mostly worked. For its part, Brabham took a hard look at its 2.5-liter Oldsmobile-based aluminum V-8 Tasman Series motor and asked engine-building partner Repco, the Australian aftermarket parts maker, whether it could be expanded to 3.0. It could.

Brabham and Cooper took the first four places in the championship.

Beyond the change in engine formula, 1966 was also the year of the driver-constructor, a new phenomenon in F1. Brabham's outfit had been in operation for several seasons now, but over the course of 1966, Black Jack became both the first man to win a Formula One race in his own car and the first (and still the only) to win a championship. He was soon joined by Bruce McLaren and Dan Gurney in the pursuit. Each of the three had his own motivations for building his own cars, but part of it had to do with the recognition of a fundamental shift in the balance between driver and machine. In the 1950s, car and driver were felt to be roughly equal contributors to a team's success. A good driver could overcome a lesser car. Fangio and Moss proved that time and time again.

This was no longer the case.

"There isn't as much difference between the drivers as there is between the cars," McLaren told Peter Manso in 1969 in Manso's landmark book of F1 interviews, *VROOOM!!* "You can see it, just study lap times carefully—once you get a bunch of fairly good drivers, you've got the same lap times. If you take the best driver in the world, put him in a car of two years ago, he's going to be last. That's the reason for Gurney, Surtees,[1] Brabham, and my own relationship with [building] the car. The car, the quality of its engineering is 75 percent of one's success."

A turning point in the season came in the second race, in Belgium. Rain was common at Spa. Partly because it was Belgium, partly because the track then ran 8.77 miles, a large enough expanse that it could be raining on one part of the circuit and sunny on another. The weather this year was particularly bad. So much so that on the opening lap, half the starting field retired from the race, cars aquaplaning everywhere. Jackie Stewart ended up in a ditch by the Masta Kink, soaked in gasoline, trapped by the steering wheel in his twisted BRM with no means to cut the electrics. Not a marshal in sight. Only the brave intervention of Bob Bondurant and Graham Hill, both of whom had crashed nearby, and a wrench borrowed from a spectator to remove the wheel, kept the incident from turning into a disaster. Stewart would keep a wrench taped to the inside of his cockpit for the rest of his career.

It was a watershed moment for Stewart and an even bigger one for Formula One. The safety movement had begun.

Another turning point, one that would alter the trajectory of the Ferrari team, came at the end of the race. Belgium was the first championship F1 race for John Surtees since a horrific crash at Mosport the previous September had left him so grievously injured that there was longstanding doubt he would race again.

"Flat-out past the pits a front upright broke. The car went off, and over and over," he told *Motor Sport*.

1 Surtees would begin fielding his own eponymous entries in 1969, the same year McLaren spoke to Manso.

His legs were so badly damaged that even after several operations by the same doctor who had put Moss back together a few years earlier, they would never be the same length again. Ferrari graciously promised Surtees that there would be a car for him whenever he came back, even if it meant it had to be outfitted with an automatic transmission.

Fortunately, it didn't come to that, although the recovery came in painful stages: the first time he drove an F1 car after the accident, the mechanics had to use an engine hoist to lift him in and out. At Belgium, Surtees shocked perhaps everyone but himself when he put his Ferrari on pole. He followed this up on race day with a masterful victory over Rindt's Cooper.

Then the trouble started. Instead of congratulating Surtees's dramatic return to form, Ferrari team manager Eugenio Dragoni reported back to Maranello that Surtees had disgraced the team by running second for most of the twenty-eight laps to a Maserati-powered car. *How dare he.* Dragoni had either missed or ignored the fact that this was the strategy that had won Surtees the race. One of the dangers at Spa in those conditions was the streams of water that ran across the track, instantly inducing an aquaplane condition that could be impossible to recover from. Surtees had cannily tucked in behind Rindt, whose Cooper was on superior Dunlop rain tires, so that he could drive in his tracks until conditions improved.

The insult was compounded almost immediately.

"A few days later we were at Le Mans," Surtees told *Motor Sport*. "I said to Dragoni: 'The Fords are being driven by real racers—Gurney, Andretti, Amon, McLaren—and the only way we'll beat them is if I go flat out from the fall of the flag and try to break them.' But when Dragoni heard that Gianni Agnelli, the head of Fiat,[2] was coming to watch the race, he decided that my codriver Scarfiotti—who was not only Italian but was actually related to Agnelli—would drive from the start."

Ludovico Scarfiotti, a hillclimb specialist, had been proclaimed Italy's best driver in 1962 and 1965 and won Le Mans in 1963. But no one, including Ferrari, had ever considered him at Surtees's level.

The man the Italians called *Il Grande John* had had enough. He left the team and joined Cooper, where he might have challenged for the championship had Cooper enjoyed any reliability at all. It didn't. Surtees never finished lower than third in the remaining seven races, including winning the season finale in Mexico with that ten-year-old Maserati engine strapped to his back, but he dropped out of four of them. He came second to Brabham in the final standings.

Finally, 1966 was the year of John Frankenheimer's landmark film *Grand Prix*, which became one of the top ten grossing movies of the year and propelled F1 to a new degree of consciousness and prestige throughout the world.

Many felt the plot was pure hokum, but the racing scenes were spectacular. The most memorable lines were lifted straight from Robert Daley's bestseller *The Cruel Sport*, including when Yves Montand as Jean-Pierre Sarti says, "[When I was younger] I'd see an accident like that and be so weak inside that I wanted to quit—stop the car and walk away. I could hardly make myself go past it. But I'm older now. When I see something really horrible, I put my foot down. Hard! Because I know that everyone else is lifting his."

It was something Phil Hill had told Daley years earlier.

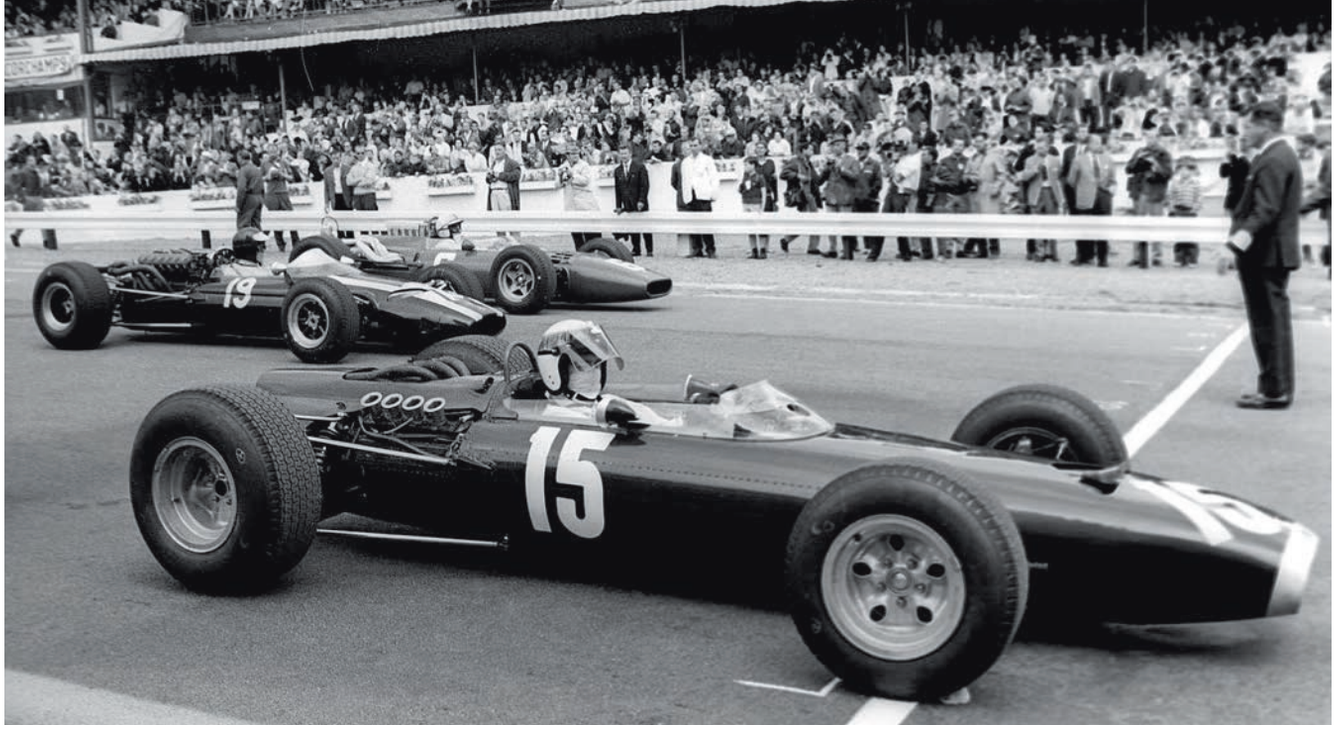
2 After negotiations with Ford fell through a few years prior, Ferrari increasingly looked to Fiat for its salvation. In fact, Fiat would go on to acquire a major stake in Ferrari three years later.

BELGIAN GRAND PRIX

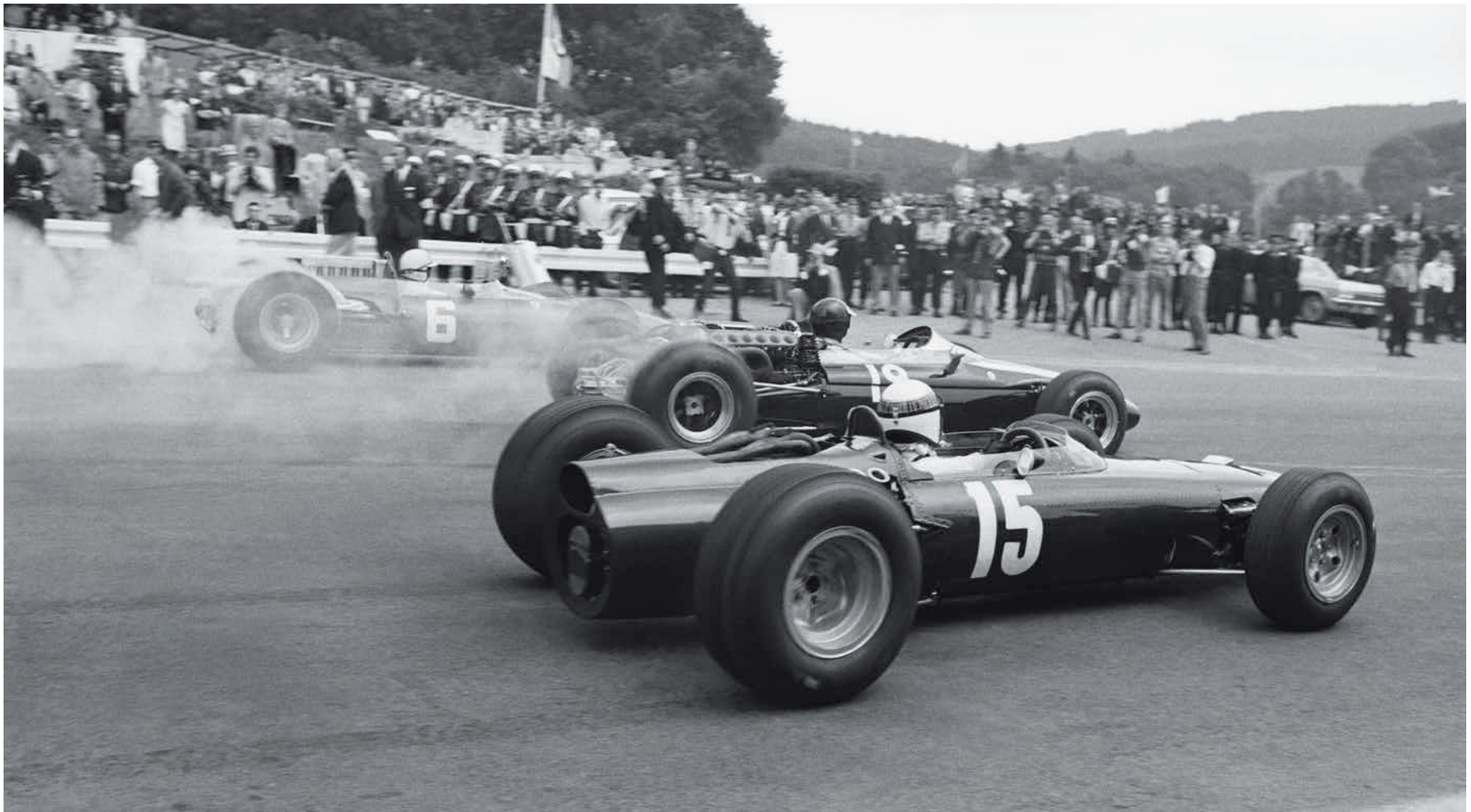
June 12, 1966

Spa-Francorchamps
14.12 km (8.770 mi)
Pole Position: John Surtees (3:38.0)
Fastest Lap: John Surtees (4:18.7)
Winner: John Surtees (+42.1)

"I made the decision to follow Jochen Rindt in his Cooper-Maserati, which had Dunlop all-weather tires," John Surtees said in his autobiography, "and sat behind him for some laps before passing and going on to a comfortable win. Only five cars survived the soaking conditions. Team manager Dragoni's response was to criticize me for having allowed a Maserati-engined car to lead!"



Start of the race. Third-fastest qualifier Jackie Stewart (15) in the Dunlop-shod BRM P261 waits for Jochen Rindt (19) in the Maserati-powered Cooper T81 and pole sitter John Surtees (6) in the Firestone-shod Ferrari 312. One of the mechanics has discreetly placed a sandbag under the BRM's front tire to keep the car from rolling forward on the slightly downhill starting line.

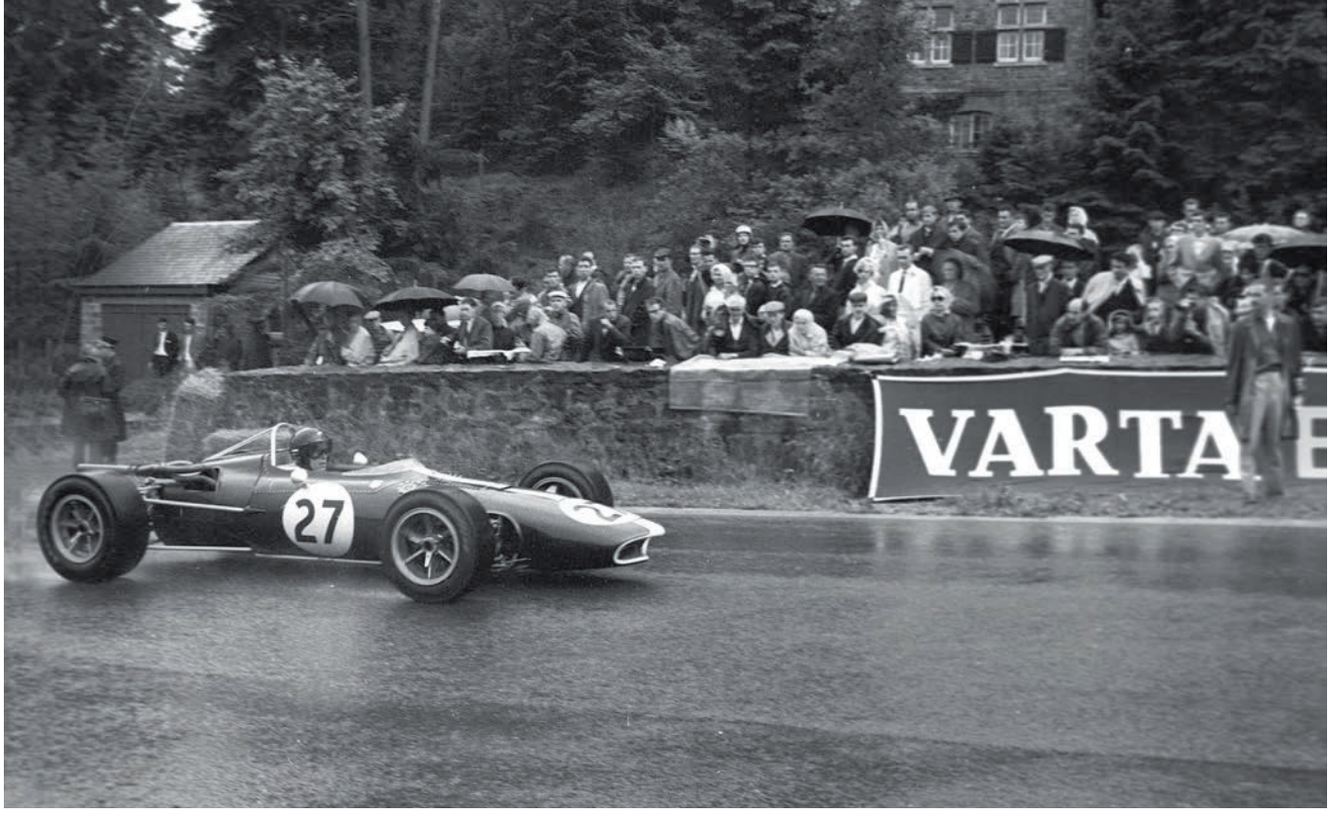



GOODYEAR

Opposite: During the weekend, filming continued on John Frankenheimer's epic *Grand Prix*. Here, Eva Marie Saint and Yves Montand, who played the Jean-Pierre Sarti character, face the camera. French singer-heartthrob Françoise Hardy leans against the pitbox wall. 1961 World Champion Phil Hill was allowed on the track in a Ford GT camera car to film the opening lap. Imagine that happening today.

Top right: *Grand Prix* star James Garner (right) with All-American Racers cofounder Carroll Shelby. "At the end of three hours, you felt as though you'd been in the races, not at the races," Garner said years later. "I think it's still the greatest auto racing picture ever made."

Bottom right: Frankenheimer (left) insisted on shooting much of the movie at the actual races. "When I look back, I don't know how the hell we ever did that film," he told *Motor Sport*. "We were always shooting, usually where we weren't wanted, and usually with everything out of our control. But we just *had* to get those crowds."



Left: The debut race for Dan Gurney as a driver-constructor. The Eagle used a creaky four-cylinder 2.7-liter Coventry-Climax as a stopgap. It would begin to fly later in the season when the Aubrey Woods–designed Weslake V-12 arrived.

Below: Privateer Guy Ligier would become a constructor after his driving days. Here the Frenchman enters the famous La Source hairpin, named for the hotel. His Cooper-Maserati struggled to sixth, just ahead of Gurney, but neither was classified because of the distance behind the race leaders.

Left: Back in the pits, Graham Hill describes the harrowing scene extricating his teammate Jackie Stewart from his twisted BRM . . .

. . . while (below) Lotus driver Jim Clark explains that his Climax engine had expired on lap one before he could reach the wall of water at Burneville.

F1 MAVERICK

Dan Gurney

Dan Gurney was the All-American racer long before he started the racing team of the same name. You can still find "Dan Gurney for President" stickers on racing toolboxes from the 1960s and 1970s.

Gurney grew up in the Southern California hot-rodding movement, then transitioned to road racing, where he made an instant impression. He was one of the first Americans in Formula One, having joined the circuit in 1959 for Scuderia Ferrari before moving to BRM in 1960.

He had a habit of leaving teams just before they got really good. Ferrari would win the World Championship in 1961 and 1964, BRM in 1962. After a couple of seasons with Porsche, Gurney joined the young Brabham organization, where in 1964 he scored the team's first F1 victory and outpointed team leader Jack all three of their seasons together. Gurney left at the end of 1965, just before Brabham won back-to-back titles.

To Dan that was incidental. He had left Brabham when he did to win a World Championship on his own—with an American car of his own construction.

"In 1966 we both went our separate ways," Gurney told www.PeterWindsor.com. "I followed the trail he had blazed by trying to build, race, and win with my own F1 cars. I have been told that only three men in the history of motor racing have managed to do that. Bruce McLaren and I won races, but Sir Jack Brabham won World Championships. He will be forever in a class by himself."

That first year was a humbling one for Gurney. The chassis was ready, but the Weslake V-12 he'd arranged for—typical Gurney, he was going to do it his way, including engine—was not. But in 1967, the AAR Eagle-Weslake, even with a power deficit and serious reliability issues, was one of the few cars to seriously challenge the DFV-equipped Lotus 49 for speed. When Graham Hill won a debut pole for the 49 at Zandvoort, it was Gurney who qualified second.

Dan's day of days came at the next race on the calendar, the Belgian Grand Prix, which he won a week after his triumph at Le Mans with fellow American A. J. Foyt. He was leading the German Grand Prix with only a few laps to go when an improperly machined half shaft failed. Reliability issues caused him to retire from every race except Belgium and the Canadian Grand Prix, where he finished third, but the point had been made. The Eagle had flown. The American national anthem was played at a Grand Prix, just the way he'd imagined it.

"Standing up there while 'The Star-Spangled Banner' was played was mighty high," Gurney told *Motor Sport*'s Simon Taylor. "I'll tell you something that addresses it a bit. In those days, flying back and forth over the Atlantic in heavy weather got a bit iffy sometimes. I used to say, 'Come on, airplane, don't go down, I haven't won a Grand Prix in an Eagle yet.' After Spa I'd say to the airplane, 'If you want to go down now, it's okay. . . .'"

By most accounts, including fellow American Mario Andretti's, Dan would likely have won one if not several World Championships had he continued driving for top teams instead of designing, building, and racing his own American Formula One car. Jim Clark's father told Gurney that he was the only driver his son feared. But mavericks aren't wired that way. After a long career that saw him take the checkered flag in F1, NASCAR, Indy, Le Mans, Can-Am and Trans-Am events; build championship-winning Indy and IMSA cars; and invent the Gurney flap, which revolutionized wing efficiency, he had no regrets about the path he had chosen. "Genuinely, sincerely," he told us before his passing in 2018, "I feel very fortunate to have done it the way we did."

The All-American racer's beak-nosed Eagle remains the only American-built car to win an F1 race

UNITED STATES GRAND PRIX

October 2, 1966

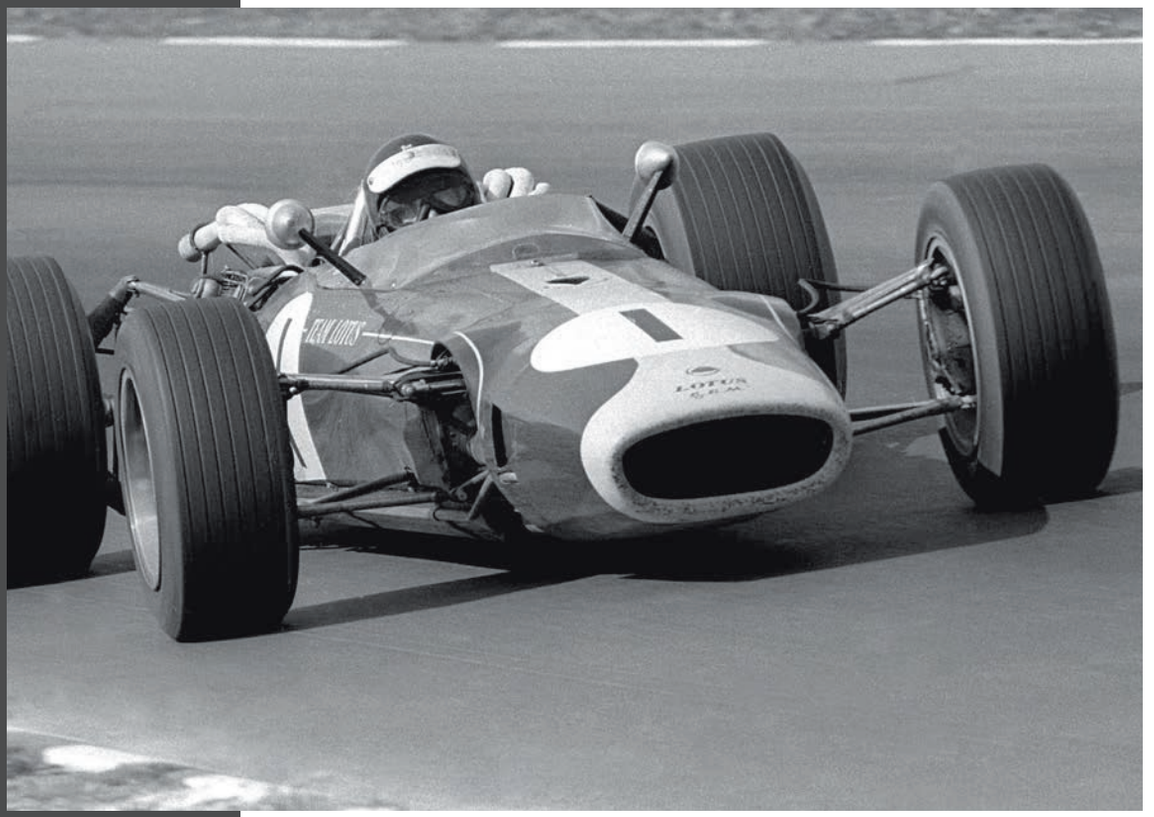
Watkins Glen

3.78 km (2.35 mi)

Pole Position: Jack Brabham (1:08.42)

Fastest Lap: John Surtees (1:09.67)

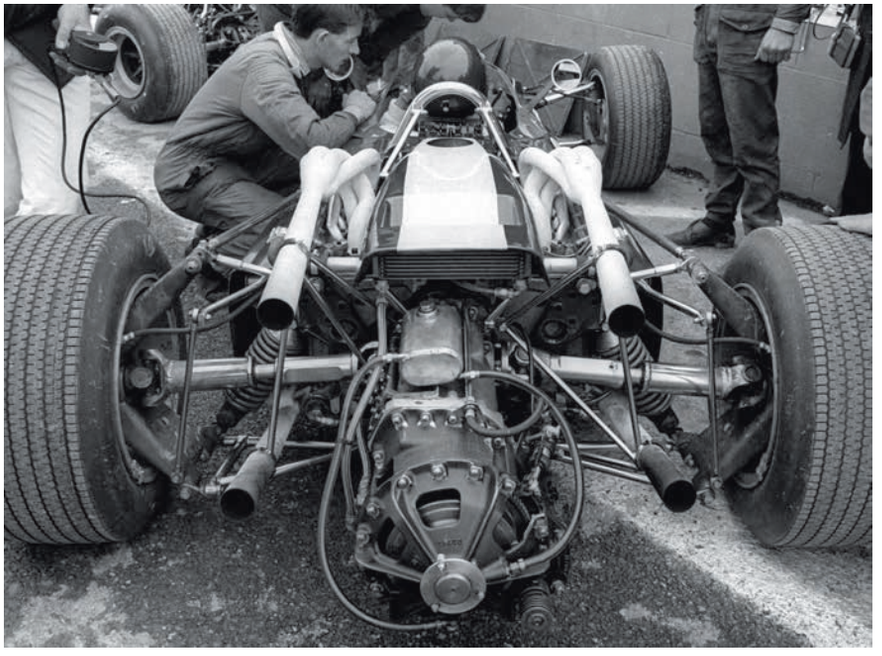
Winner: Jim Clark (+1 lap)

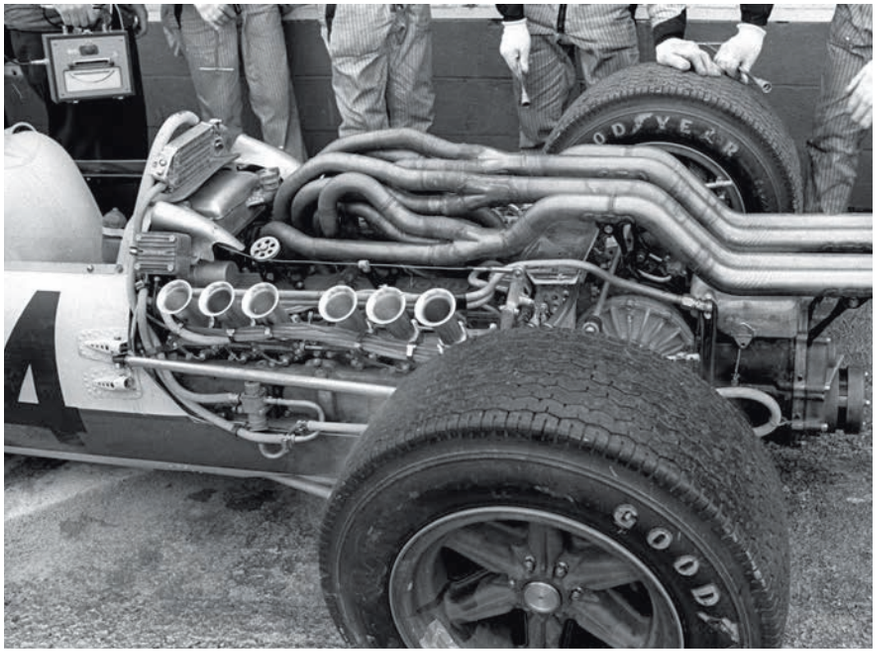


Clark in a very different frame of mind after capturing the rich United States Grand Prix at Watkins Glen, the BRM H16 engine's only championship victory and Clark's only victory during the 1966 season after dominating 1965. Lotus boss Colin Chapman (opposite page) tosses his cap in the air as Clark crosses the finish line in upstate New York. It was the fourth straight USGP victory for a BRM-powered car.

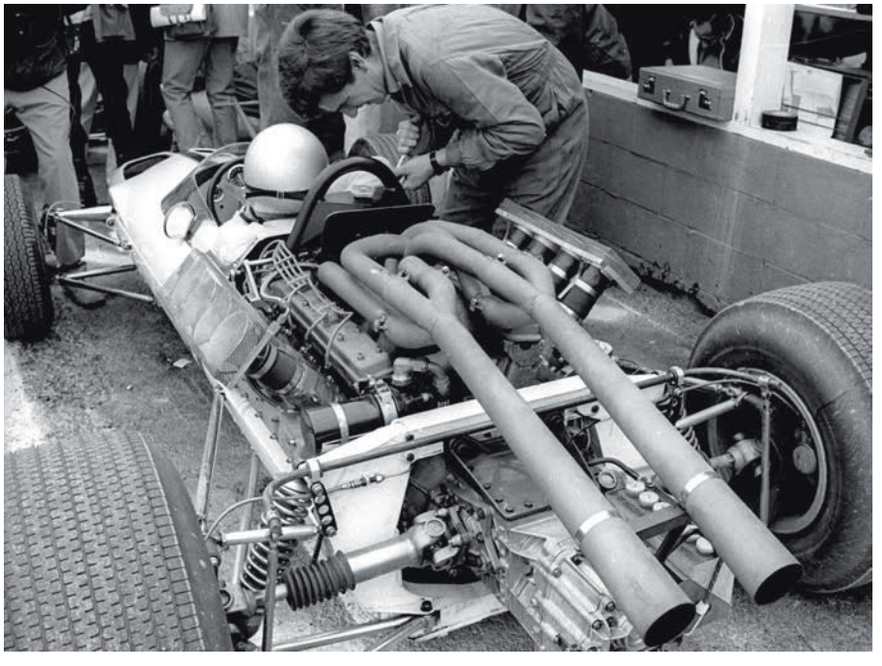

KENDALL MOTOR OILS

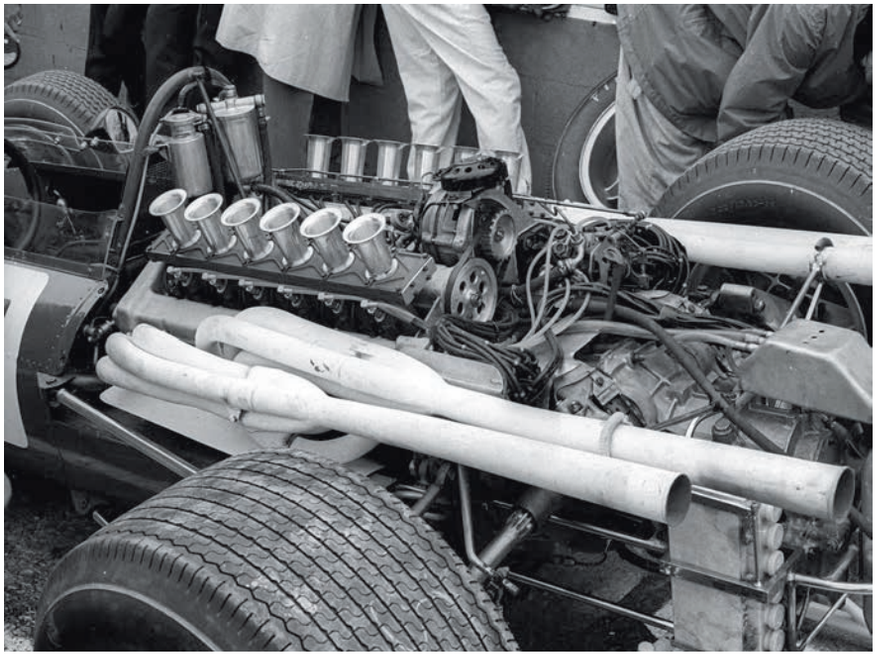
Above left and right: Clark was followed home by Cooper-Maserati teammates Jochen Rindt (8) and John Surtees (7). Bottom left: Clark enjoys a funny moment during practice with Chapman (right) and the lads. Bottom right: Bob Bondurant (16) holds court in the second Eagle, while team manager Bill Dunne (kneeling) and mechanic Mike Lohman listen. Neither Eagle qualified well or lasted long in the race. Opposite: Denny Hulme confers with Phil Kerr in the Brabham pits.

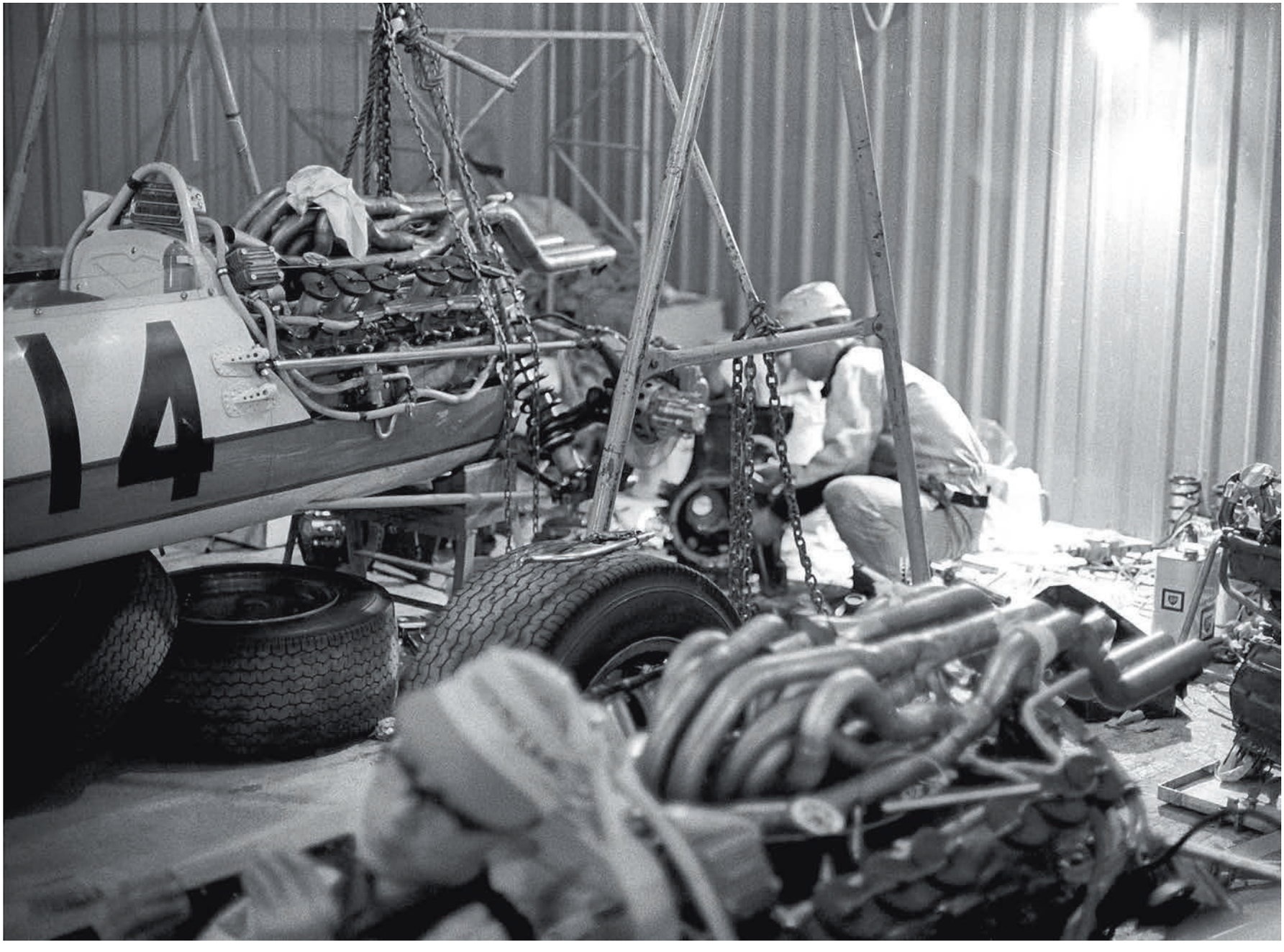




Clockwise from top left: The BRM H16 featured four separate four-into-one exhausts, one for each bank of cylinders. The 3.0-liter Honda V-12 showed up late in the season and set fastest lap in Mexico. The Maserati was big and old, but one of the revelations of the 1966 season. The four-cam Ford Indy engine never really translated to Formula One, much to McLaren's chagrin.







Honda mechanics burn the midnight oil in the Kendall Garage preparing the cars for Bucknum (14) and Ginther. Neither car would be classified a finisher.

MEXICAN GRAND PRIX

October 23, 1966

Mexico City

5.00 km (3.107 mi)

Pole Position: John Surtees (1:53.18)

Fastest Lap: Richie Ginther (1:53.75)

Winner: John Surtees (+7.88)

John Surtees (7) won easily from pole position, but the victory came too late to close the gap on titlist Jack Brabham. Note the half-buried tires to mark the corners and the proximity of the guardrail. Teammate Jochen Rindt (8) held second briefly before retiring with a broken ball joint. Cooper finished a close third behind Ferrari in the Constructors' Championship.

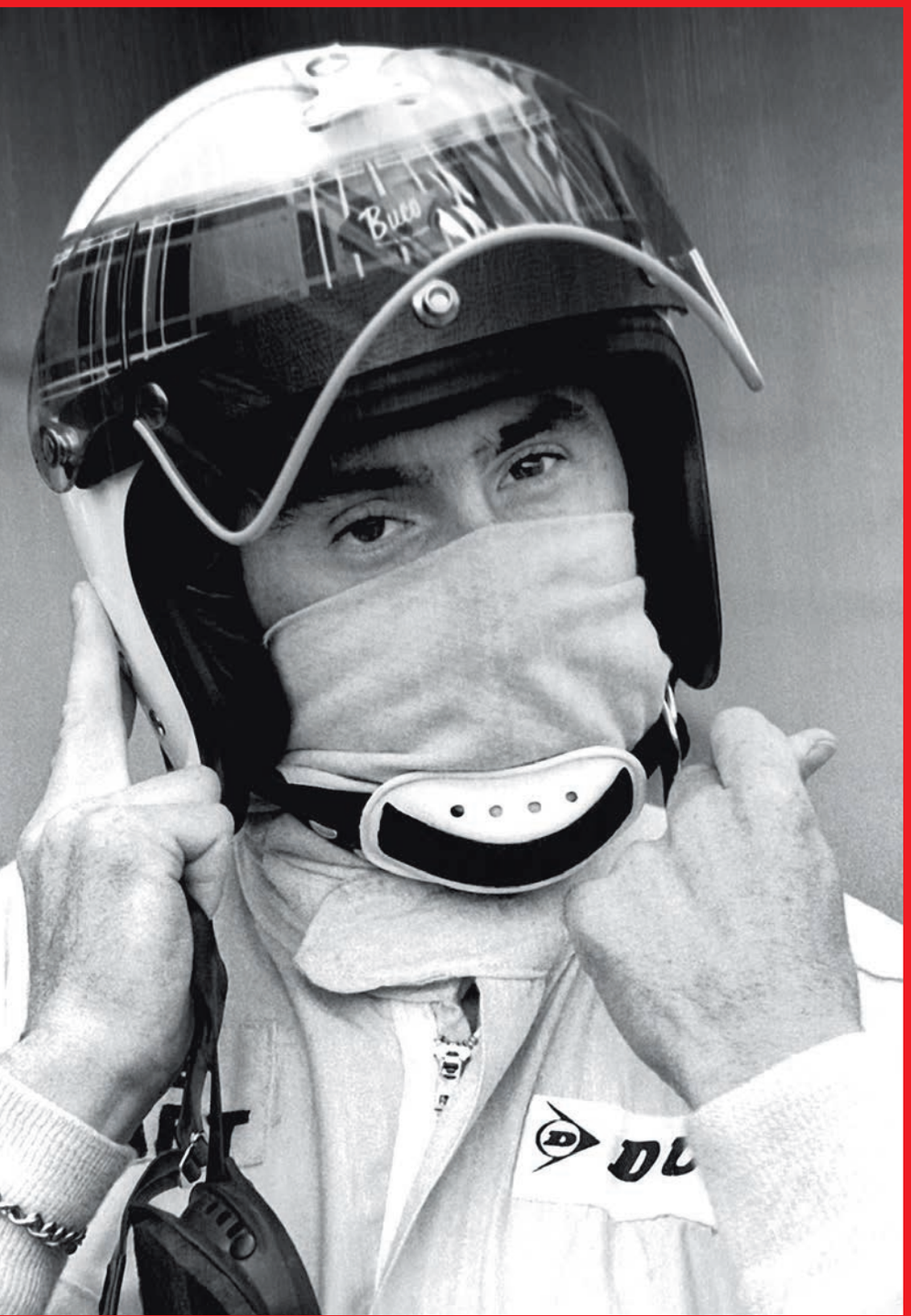

6
RINDT

Above: In his last F1 start, American Richie Ginther scored a fastest lap for Honda.

Right: Jack Brabham becomes the first man in history to win a Formula One title in his own car.

Above: Unlucky Mike Spence (18) was a Did Not Start after a hub bolt broke in practice, causing the wheel and caliper to fall off and a mighty crash thereafter. He was killed the following May in Indianapolis while shaking down a teammate's troublesome Lotus turbine. The Indy accident would help spur the introduction of wheel tethers.

Left: "After more than two hours and six minutes of hard work in Mexico," said Surtees in his autobiography, "it was good to have the company of the local señoritas on the podium."



F1 MAVERICK

Jackie Stewart

Perhaps no one had a more profound influence on the evolution of the sport than Sir John Young Stewart and the safety campaign he started in 1966.

Stewart himself will tell you that he was not particularly concerned about safety until a wreck at Spa in 1966 left him trapped in his twisted BRM soaking in a pool of gasoline. A single spark would have ended his life.

"I had a big accident myself in '66 at Spa-Francorchamps with the BRM on aquaplaning and really there was nothing to protect the obstacles that I hit," says Stewart. "I hit a telegraph pole, I hit a woodcutter's hut, I ended up in a car that was bent around me, very severely bent. Electrics were still switched on, it could've gone into fire, I was saturated in fuel, there were no marshals, there was no ambulance, there were no medical people there to help me."

It wasn't all the risks of the sport that he resented; it was the ones that he saw as completely unnecessary.

"Racing is too serious a thing to be taken lightly," Stewart explained to the American magazine *Motor Trend* in March of 1970. "I love the sport, but I know all about the money and the safety. I am safety-minded because I love my family. But I also go for safety because I want to be in this game as long as possible."

Stewart's campaign was threefold: he sought to make the tracks, the cars, and drivers' own protective equipment safer.

"I studied every aspect of safety," he continued, "not because I was afraid, but in order to put all the chances on my side. You can't go through life or racing without taking some risks. But your risks must be calculated. If you don't understand that, you are a fool."

He faced massive resistance. It's hard to imagine now, but many throughout the sport attacked him for the changes he was trying to bring about. The old guard questioned his courage, his sanity, even his masculinity.

That he was so blazingly fast was crucial. Anytime anyone questioned his courage, he could point to the stopwatch or his trophy cabinet, which without speaking posed the question *If I'm so much less brave than you are, why am I so much faster?*

If there was residual damage to his reputation, it's that even as a three-time World Champion, he rarely figures in conversations about the best of all time, despite having a higher winning percentage than Senna and Prost and being only a few ticks behind Michael Schumacher, and despite driving at a time when DNFs were far more common and rarely being in the fastest car.

How big a difference did Stewart's safety campaign make? A look back to the time of his accident in 1966 tells the story:

Of the twenty men who scored points that season, ten were killed behind the wheel of a racing car within six years.[1] Another six were seriously injured in accidents they were fortunate to survive, accidents so severe in some cases that several were forced to retire. Most of the remaining four, like Stewart, suffered painful accidents that were a spark away from ending their lives. That's 80 percent of the season's top twenty drivers who were killed or seriously injured over the course of their careers—frontline wartime casualty rates.

No more. Of the nineteen men who scored points during the 2010 F1 season, by contrast, none has died. Only one, Robert Kubica, suffered grievous injuries in a car—and it was a rally car on open roads.

That difference, a difference that has cascaded throughout the sport saving hundreds—possibly thousands—of lives, is attributable to no one more than Jackie Stewart. ■

FATE OF THE TOP 20 1966 F1 DRIVERS

POINTS	KILLED	SERIOUSLY INJURED	RELATIVELY UNSCATHED
1) J. Brabham	Rindt ('70)	Surtees	Brabham
2) J. Surtees	Clark ('68)	Hill	Stewart
3) J. Rindt	Bandini ('67)	Parkes	Ginther
4) D. Hulme	Scarfiotti ('68)	Bondurant	Gurney
5) G. Hill	Spence ('68)	Arundell	
6) J. Clark	Siffert ('71)	Hulme	
7) J. Stewart	McLaren ('70)		
8) M. Parkes	Bonnier ('72)		
9) L. Bandini	Anderson ('67)		
10) L. Scarfiotti	Taylor ('66)		
11) R. Ginther			
12) D. Gurney			
13) M. Spence			
14) B. Bondurant			
15) J. Siffert			
16) B. McLaren			
17) P. Arundell			
18) J. Bonnier			
19) B. Anderson			
20) J. Taylor			

1 Hulme died behind the wheel of a racing car, but of a presumed heart attack in his fifties at an Australian touring car race, so he's not included.

BRABHAM
1

CHAPTER 5: 1967

GAME OVER

Walter Hayes had already turned him down once.

Lotus's Colin Chapman had gone to the Ford of England motorsports boss previously to ask him to fund an engine program with Cosworth Engineering, the firm headed by Mike Costin and Keith Duckworth. With the withdrawal of Climax from Formula One, Chapman could see that the game had fundamentally changed. From now on he would have to either build his own engines or purchase them from rivals like BRM and Ferrari. And what were the odds over time that he would get the latest and best-spec engine from a rival on the grid?

The cost of the project was £100,000. That's what Duckworth told Chapman it would take to create the new engine plus four copies. No small sum now, a very large one then. Chapman didn't have it. Hayes wasn't going to provide it.

So here Chapman was, back in front of Hayes to ask him to reconsider.

To his credit, Hayes saw the absurdity of the situation, and the threat to both Lotus and Formula One if it was allowed to continue. Here was the man, Chapman, whom most considered the world's greatest race car designer, building machines for the gentleman, Jim Clark, just as many considered the world's greatest driver. And yet without a satisfactory engine they might be stuck at the back of the grid. How could that be allowed to stand? The Ford man also considered the value to his company should the valve covers on championship-caliber engines say "F-O-R-D" on them.

On second reckoning, £100,000 now seemed like a wise investment. Hayes said yes. He changed the course of F1 history for the next fifteen years. Nye again:

Keith and Mike were brilliant, just brilliant. They cut through all the bullshit and produced something that was small, light, compact, and that could be used as an integral part of the chassis

During this part of the Maverick Era, championships were decided by cars, engines, drivers—and tires. Brabham and Eagle were on Goodyears, most of the other top runners on Firestone. Note the pit board letters scattered on the ground.

because their DFV engine had a fully stressed crankcase and could be used in a structural role as well as providing the motive power.

Cosworth built brilliant Formula Junior engines. They then built brilliant Formula Three engines, brilliant Formula Two engines and ultimately with Colin Chapman of Lotus's encouragement Ford of Dagenham in the UK funded them to produce a brilliant Formula One engine. It was no accident that it won first time out.

The debut of the Cosworth Double Four Valve (DFV) in the back of Chapman's new Lotus 49 at the 1967 Dutch Grand Prix at Zandvoort was everything Hayes, Clark, and Chapman could have hoped for. The season, not so much. After victory in Holland, Clark would place first three more times, but also retire from three events, bringing his season DNF tally to five in what was now an eleven-race schedule. The more clockwork Brabham twins suffered only two DNFs apiece and as a result shaded Clark for the championship. This time Denny "The Bear" Hulme grabbed the honors ahead of Jack.

How superior was the Cosworth-powered Lotus 49?

Starting with Zandvoort, it was on pole at every race—at the Nürburgring by nearly ten seconds. Clark grabbed the top grid position six times, Hill the other two. Clark led every race. He and Hill set fastest lap at six of the nine remaining races. At the 1967 Italian Grand Prix, the 49 looked like it was in a different league entirely. Clark led for the first twelve circuits before suffering a puncture, which cost him a full lap. Thereafter he charged through the field to retake the lead on lap sixty—something previously thought to be impossible at a venue where slipstreaming was crucial—and continued stretching his advantage until he ran low on fuel on the final trip to the start/finish line. He ended up third. It exemplified the 49's first season.

Another noteworthy achievement during the 1967 season came in Belgium, where driver-constructor Dan Gurney took his one and only victory in the short-lived AAR Eagle program. Financed largely by Goodyear and never with an ample budget, Gurney had put together what is considered one of the most beautiful F1 cars of all time, powered by a Weslake V-12 created especially for it. Never quite as powerful as the Cosworth, Gurney nevertheless was able to top the field at Spa and was leading late at the Nürburgring when a half shaft broke.

Gurney's Spa triumph was one of five Goodyear victories that season. Among the major teams, Lotus, BRM, and Ferrari were aligned with Firestone. Brabham, BRM, McLaren, and AAR with Goodyear. Dunlop had Matra.

The combination of the larger, more powerful 3.0-liter engines; better, more rigid chassis; and giant, meaty tires meant that lap records were falling at virtually every track every year. Often in mighty chunks. A comparison of pole times at selected circuits during 1967 with the last year of the 1.5-liter formula tells the story:

	1965	**1967**
Monaco	1:32.5	1:27.6
Spa-Francorchamps	3:45.4	3:28.1
Silverstone	1:30.8	1:25.3
Nürburgring	8:22.7	8:04.1
Monza	1:35.9	1:28.5
Watkins Glen	1:11.25	1:05.48

Traction became the number one focus of every team and designer, in every dimension of performance: acceleration, cornering, and braking. The question on everyone's mind heading into 1968 was:

Where's it going to come from?

Surtees (3) finished the season with a solid fourth.

DUTCH GRAND PRIX

June 4, 1967

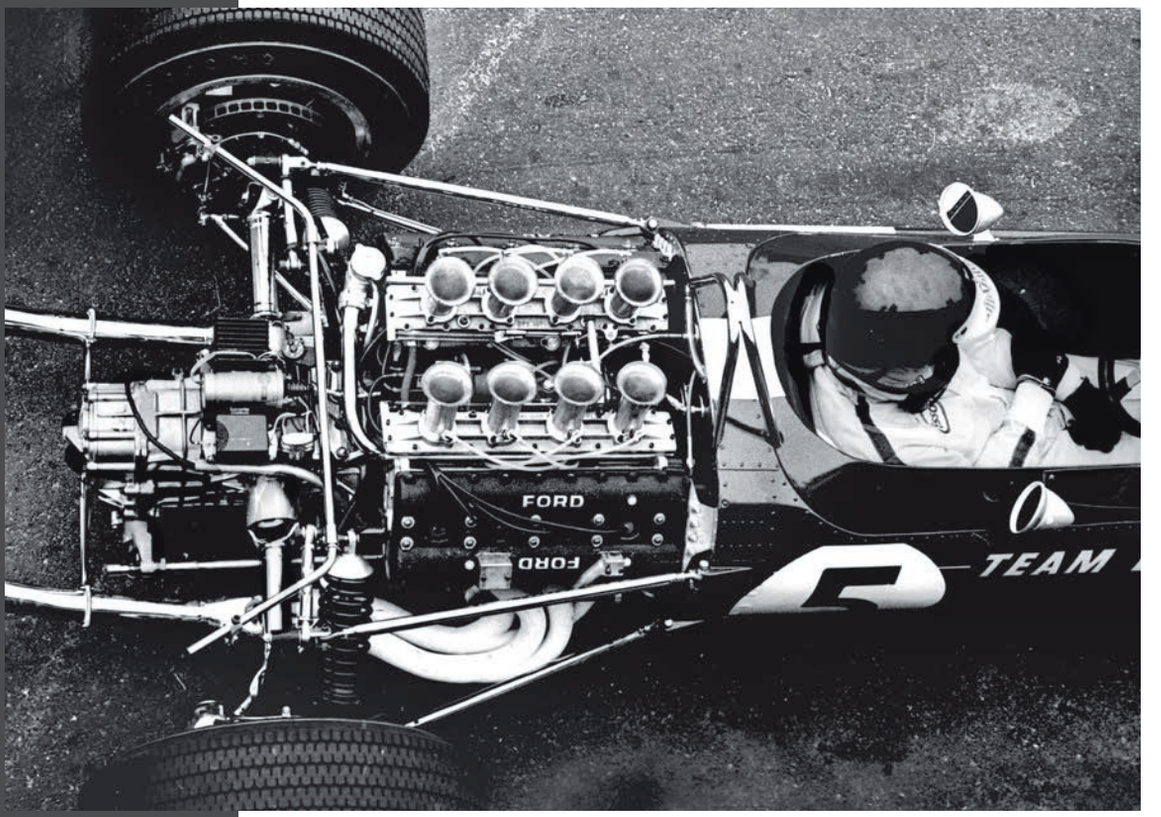
Circuit Zandvoort

4.252 km (2.642 mi)

Pole Position: Graham Hill (1:24.6)

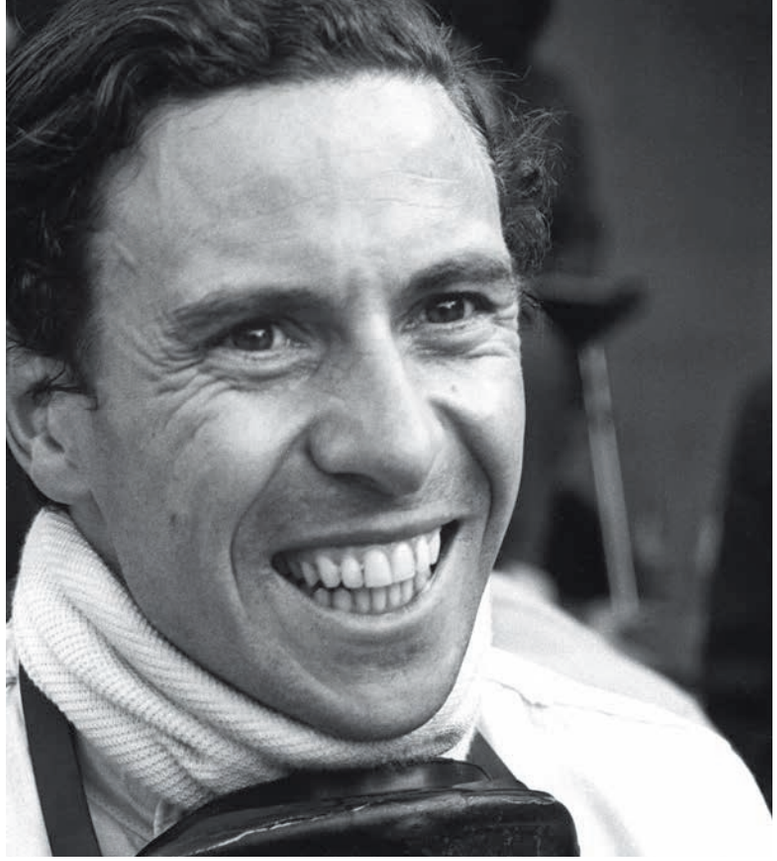
Fastest Lap: Jim Clark (1:28.08)

Winner: Jim Clark (+23.6)



Trumpets heralding a massive change. Suddenly, anyone who can afford a Ford Cosworth DFV can contend.

Zandvoort marked the debut of both the Cosworth and Chapman's latest masterpiece, the Lotus 49, with a strong assist from designer Maurice Philippe. "Don't forget," says the great race reporter Pete Lyons, "that [Chapman] attracted a lot of very inventive, like-minded people around him, and generally was not so much hands-on designing the car as he was, 'This is what I want. Draw it up for me and we'll test it.'"

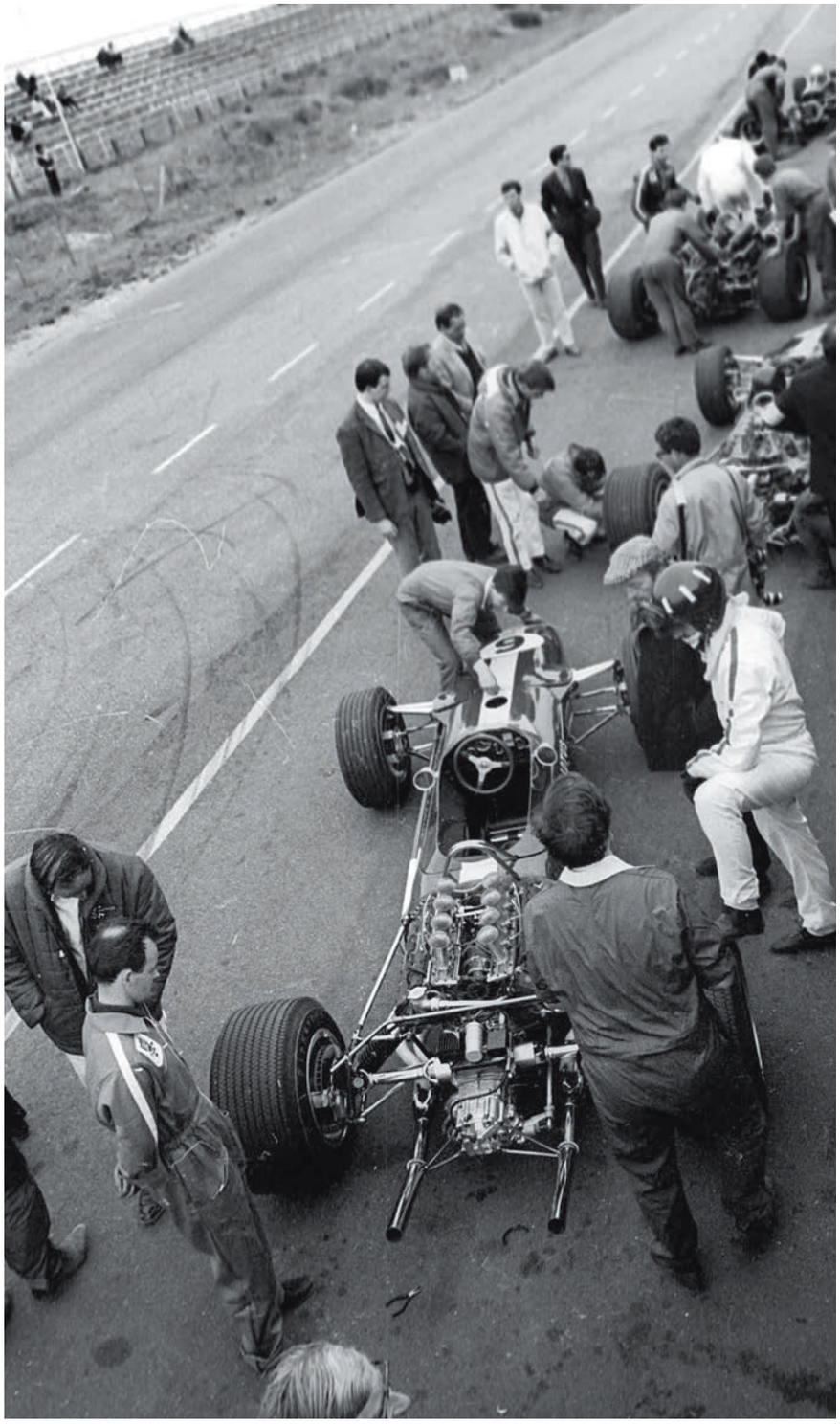


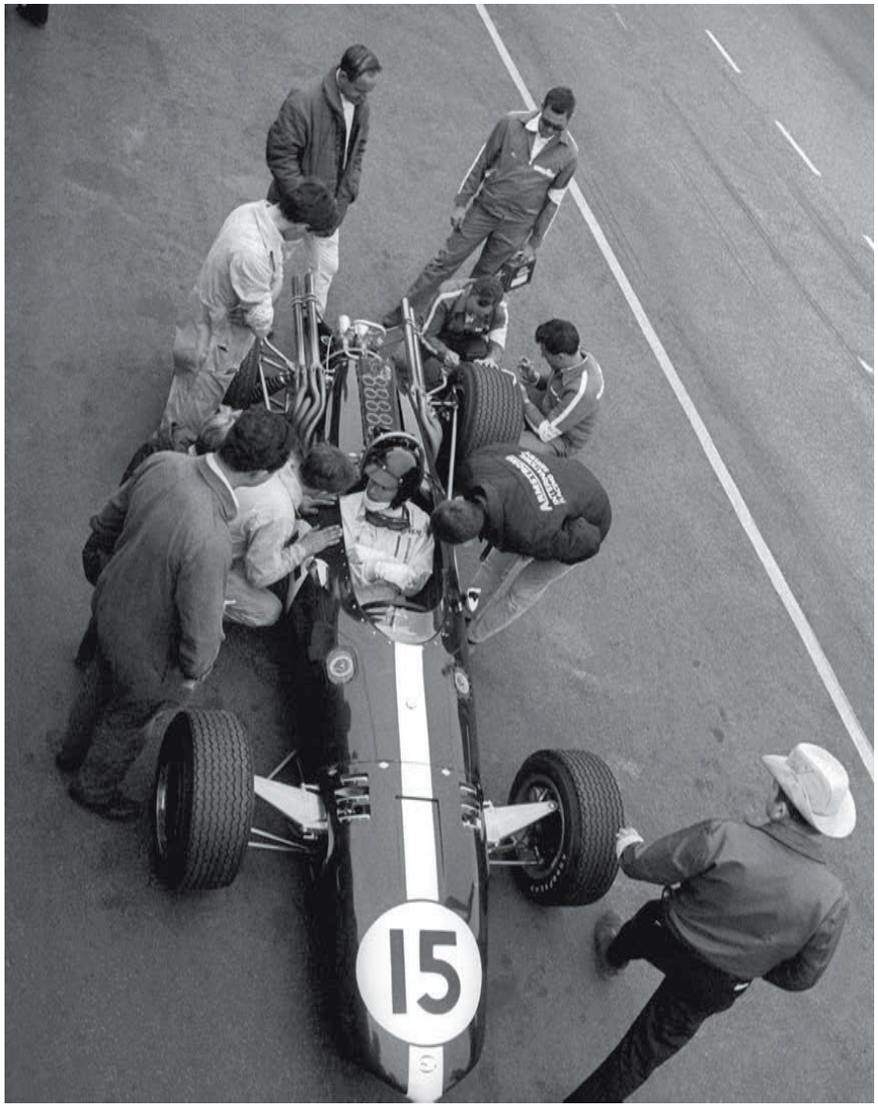
Above: Mechanical troubles during practice left Jim Clark eighth on the grid, but when the green flag waved, the Scotsman steadily sliced toward the front.

Right: In the early going, second qualifier Gurney leads a group including Amon (3), Clark, Rodriguez, and Stewart. This was photographer Pete Biro's first trip to Zandvoort, and when he arrived at the hotel he found he and Goodyear's Larry Truesdale were sharing a tiny room, which Truesadle pledged to remedy. "When I returned from the track, I went to the desk, and the Concierge said, 'Yes, Mr. Biro, we have a different room for you. Come with me.' We went to the lift and he pressed 'P.' Penthouse? Yes. It was amazing, almost the whole top floor of the hotel. I wondered how Larry pulled this off. A few minutes later I hear a key in the door, figuring it would be him. It wasn't. It was Jackie Stewart. He introduced himself (wasn't necessary) and said, 'Helen [his wife] couldn't come this trip and Larry said you needed a place to stay. Would you like some tea?' He rang the desk and had two pots of tea delivered. What a wonderful surprise and a start of a long friendship." Imagine that happening today.


15

Ludovico Scarfiotti chats with Ferrari team manager Franco Lini (left) and technical director Mauro Forghieri (right). The following race at Spa would be the Italian's last start for the Scuderia.





Above: Now equipped with its twelve-cylinder Weslake engine, the Eagle was perhaps the stiffest competition for Lotus on pure pace.

Left: Chapman confers with Hill in the Lotus pits. Note the other drivers eagerly inspecting the new 49s.

Above: Graham Hill set pole and drove superbly until forced to retire from the lead after eleven laps.

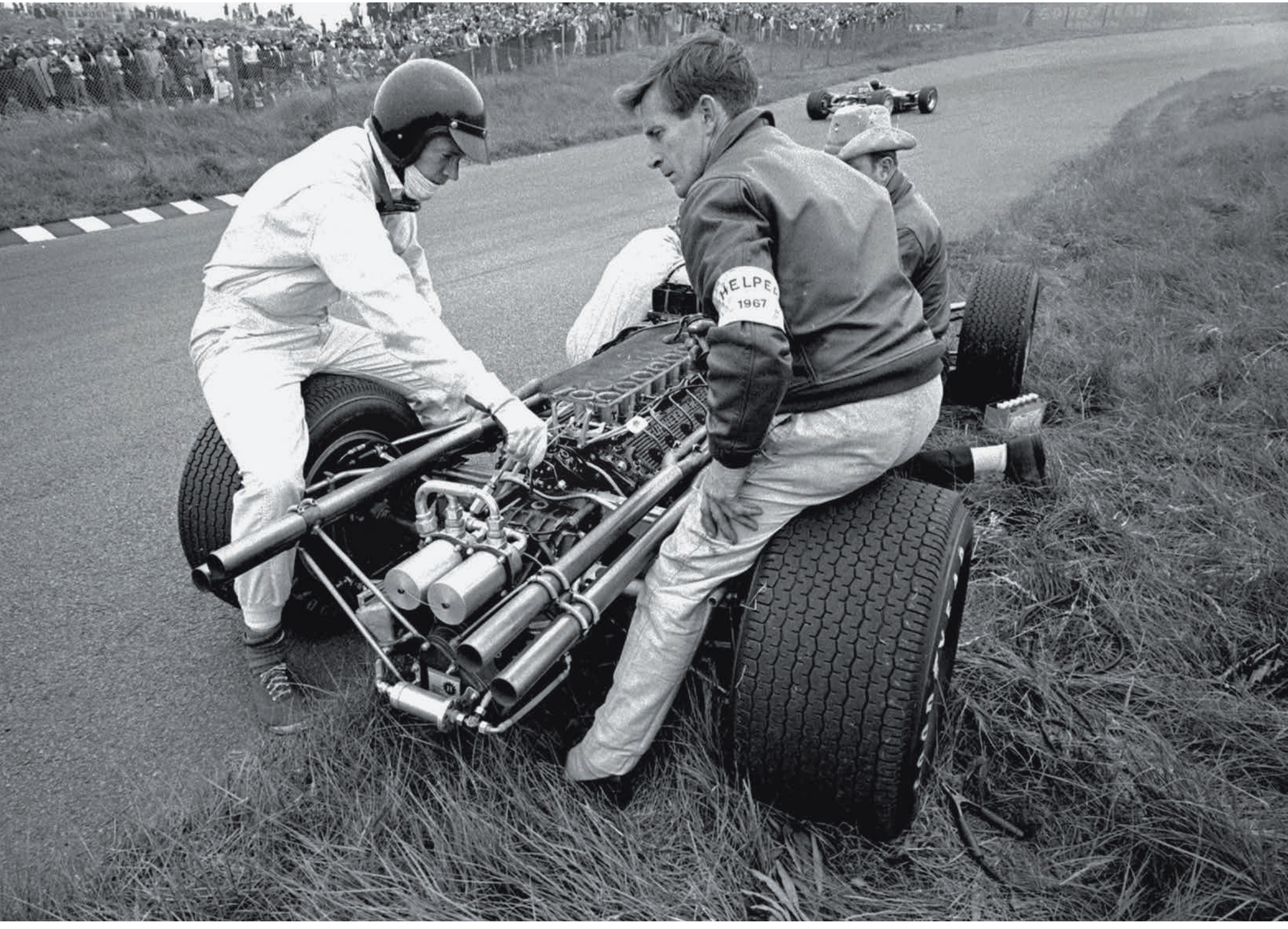
Left: Jack Brabham (foreground) and Ron Tauranac (right) seem amused by something in the rear suspension. Teammate Hulme looks on over Jack's shoulder.

So new was the DFV that Lotus had only one each for the two 49s. Fortunately, Clark's held together for the full ninety laps.

Above: In addition to the Weslake engine, the AAR crew had retrofitted the Eagle with a large number of weight-saving magnesium and titanium components.

Right: Gurney discusses strategy with team manager Bill Dunne.

Opposite: A broken fuel injection metering unit left Gurney by the side of the road. Dunne and mechanic Tim Wall have come to his assistance.


HELPER
1967

BELGIAN GRAND PRIX

June 18, 1967

Spa-Francorchamps

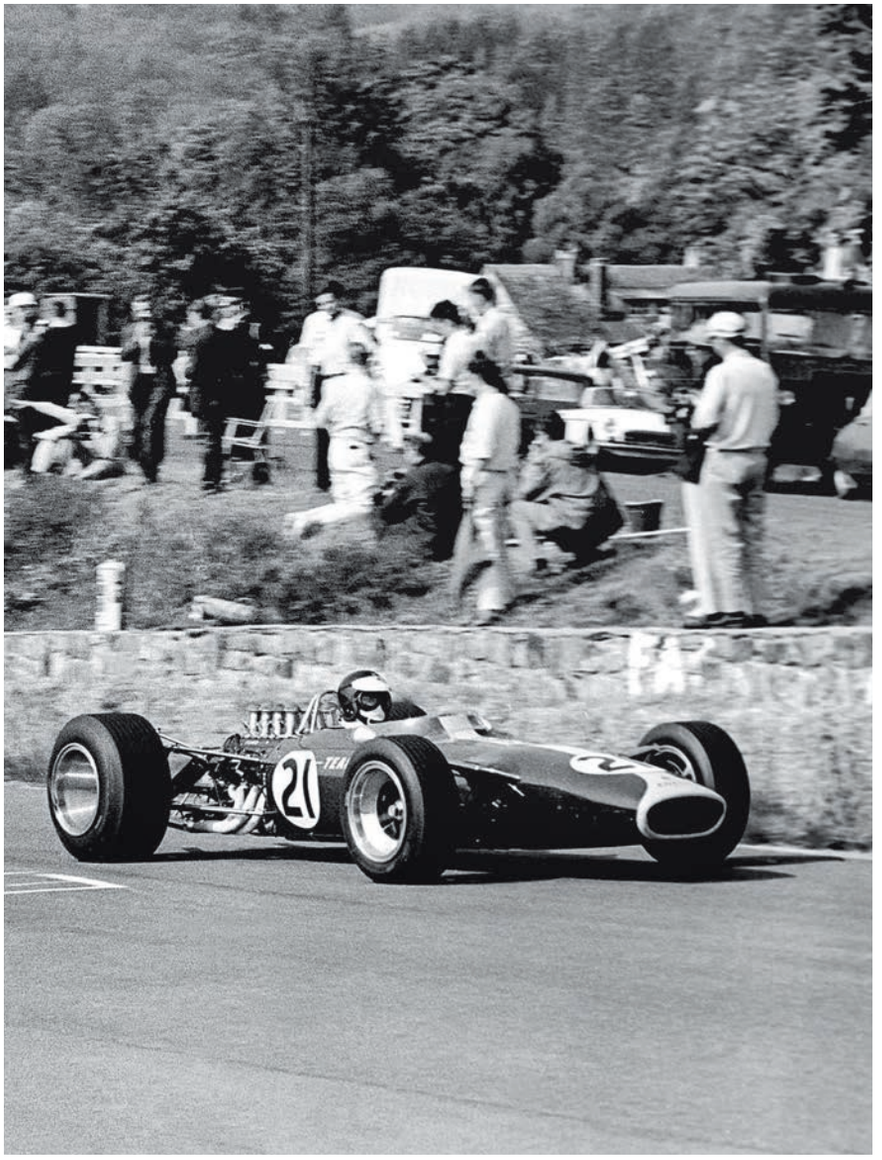
Pole Position: Jim Clark (3:28.1)

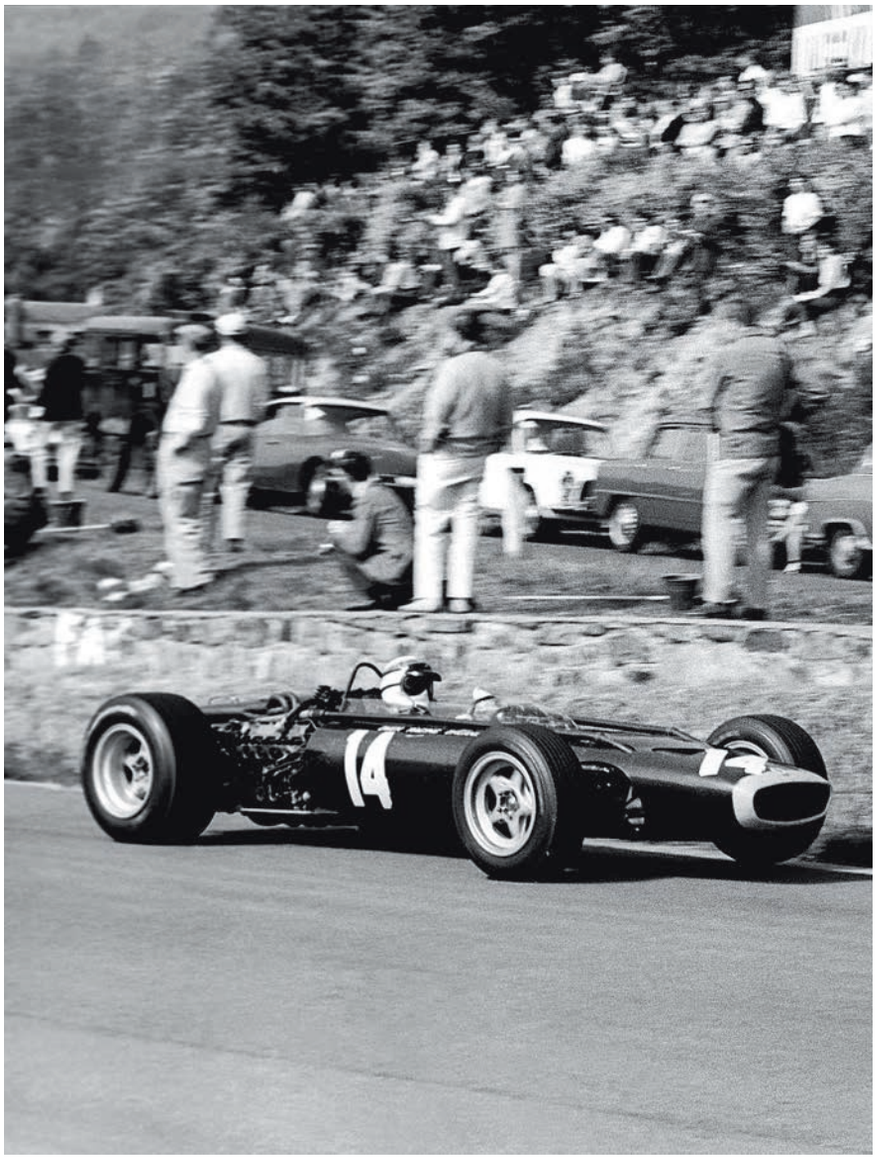
Fastest Lap: Dan Gurney (3:31.9)

Winner: Dan Gurney (+1:03.0)

Once going, Gurney made up for lost time. The Eagle's beak swoops down on the entry to the La Source hairpin.

Clark leads the pack away from the chaotic start. The green flag waved moments after the thirty-second warning, catching several including Gurney off-guard. He hadn't yet put his Eagle in gear.





Clark (21) would run away from the field until forced to pit on lap twelve for spark plug issues that would knock him out of contention. Jackie Stewart (14) took over in the BRM, helped by a Gurney stop for faltering fuel pressure. But once returned to the circuit, the American came storming back, setting fastest lap and overtaking the "Wee Scot" when the BRM H16 developed gearshift issues. *Sports Illustrated* writer Bob Ottum was at Spa that weekend to document Gurney's win in an article entitled, "Apple Pie, Mom and Mr. Gurney." Ottum, a born and bred New Yorker, didn't drive, so he hired Pete Biro to ferry him around. "When Ottum finished his writing, he asked the press chief where the phones were. He had to call his story in to the magazine in New York," Pete recalls. "The press guy handed Ottum an army surplus field phone and told him, 'Go outside and you will find a wire sticking out of the wall to hook up the phone. You then turn the crank to get an operator.'" State-of-the-art reporting in the Maverick Era.

A week after victory at Le Mans, Dan Gurney makes history again at Spa, winning a Grand Prix in his own car.

UNITED STATES GRAND PRIX

October 1, 1967

Watkins Glen

3.78 km (2.35 mi)

Pole Position: Graham Hill (1:05.48)

Fastest Lap: Graham Hill (1:06.0)

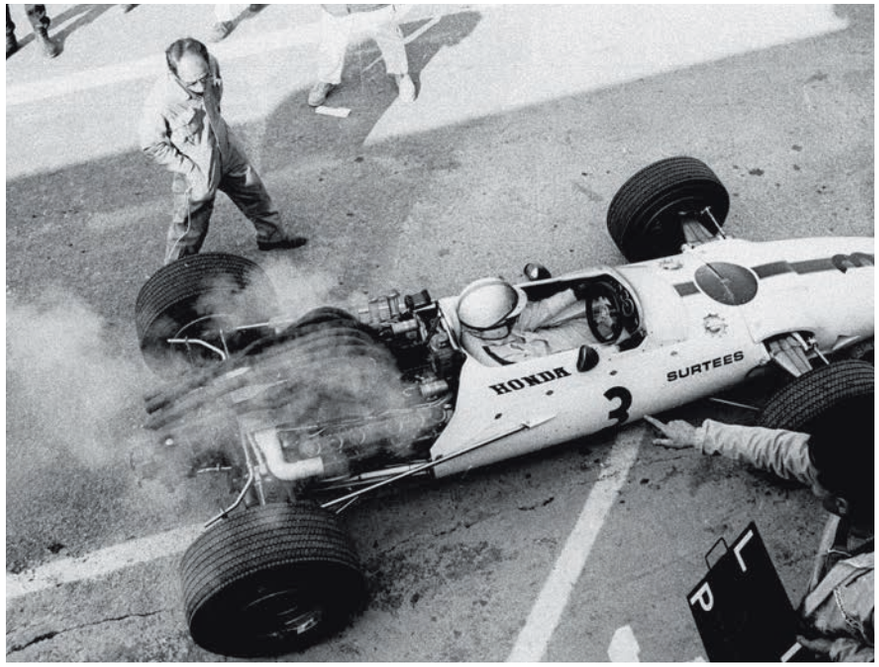
Winner: Jim Clark (+6.3)

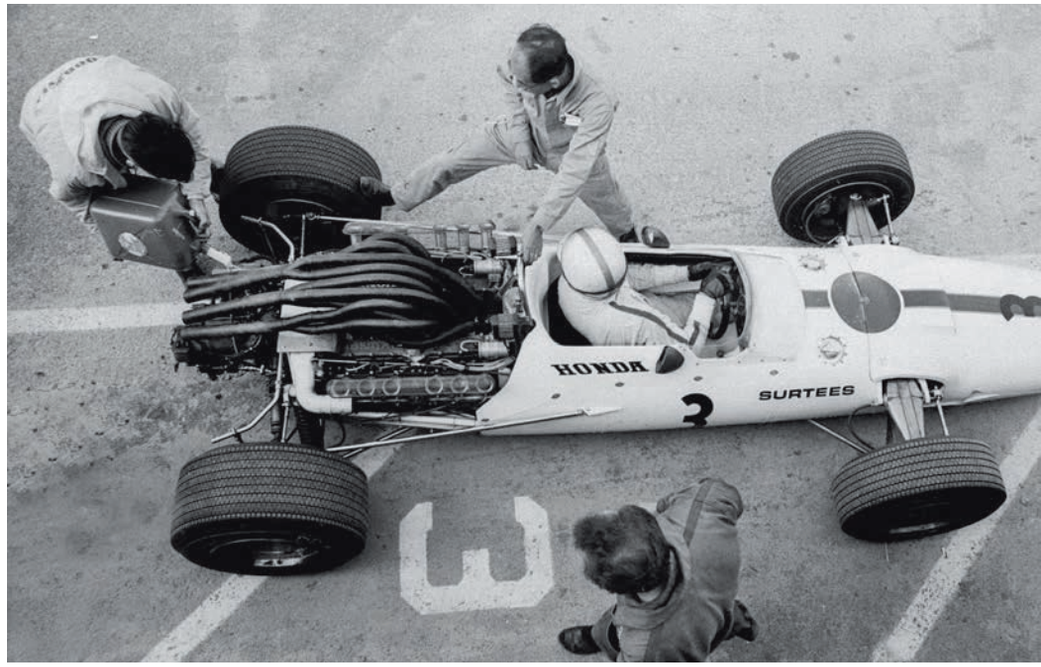
Once again, mechanical issues hobbled both Lotuses, but Clark (5) and Hill (6) were able to nurse them home to finish 1-2.


6
HILL

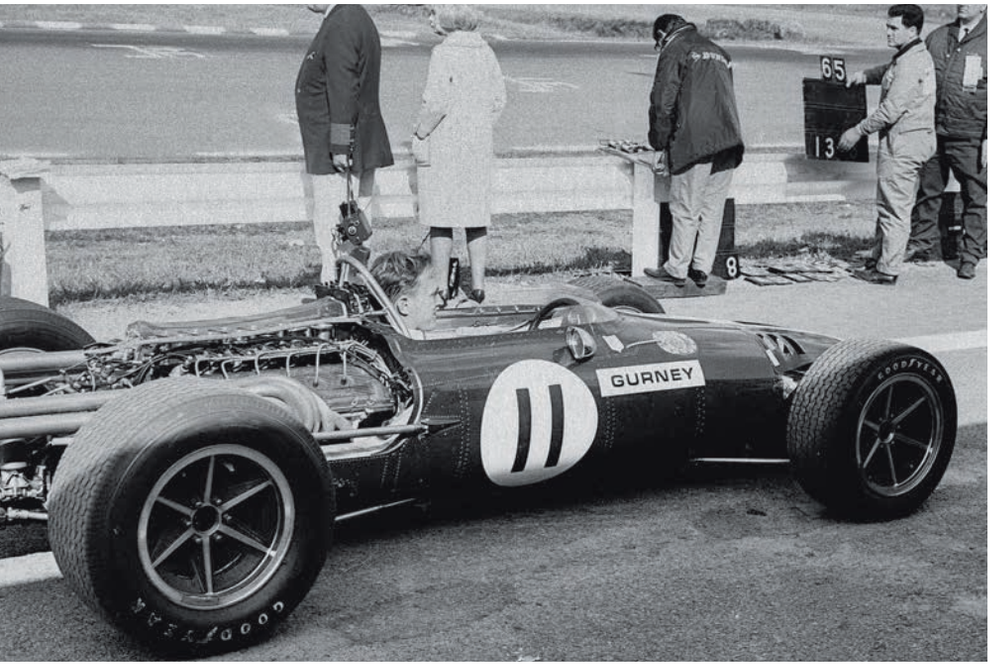
Clockwise from top left: Kiwi Chris Amon (9) was quickly developing into one of his generation's top drivers. John Surtees (3) delivered Honda its most successful season yet, including a win at Monza and fourth in the final standings. Jean-Pierre Beltoise (22) would help French aerospace firm Matra develop into a title threat in 1968. Many felt BRM's Chris Irwin (17) had World Championship potential, but his career would be cut short by an accident the following spring.

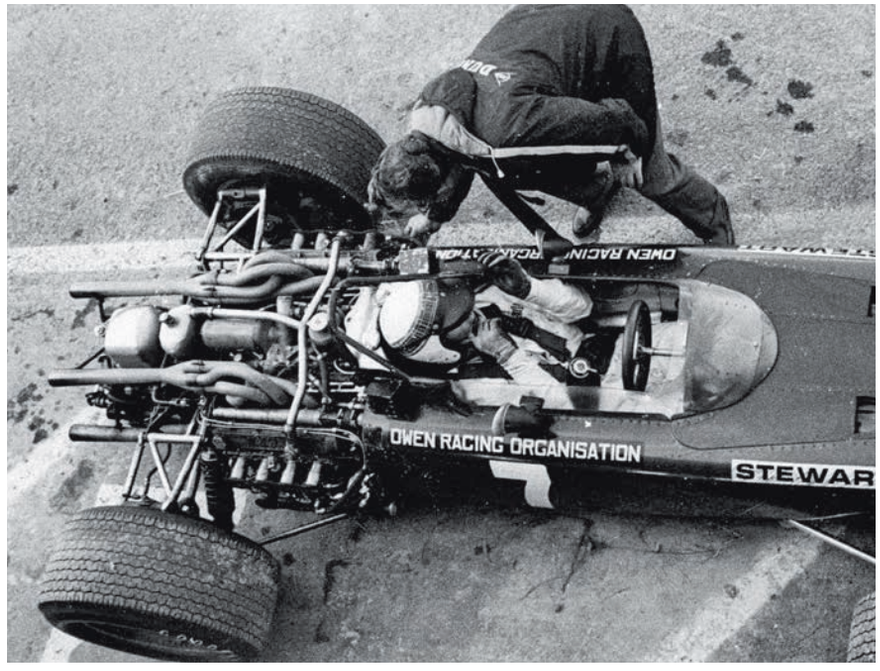
The Lotuses have already disappeared, but third-fastest qualifier Gurney's Eagle was once again "best of the rest," leading Brabham (1), Amon (9), and Hulme (2).

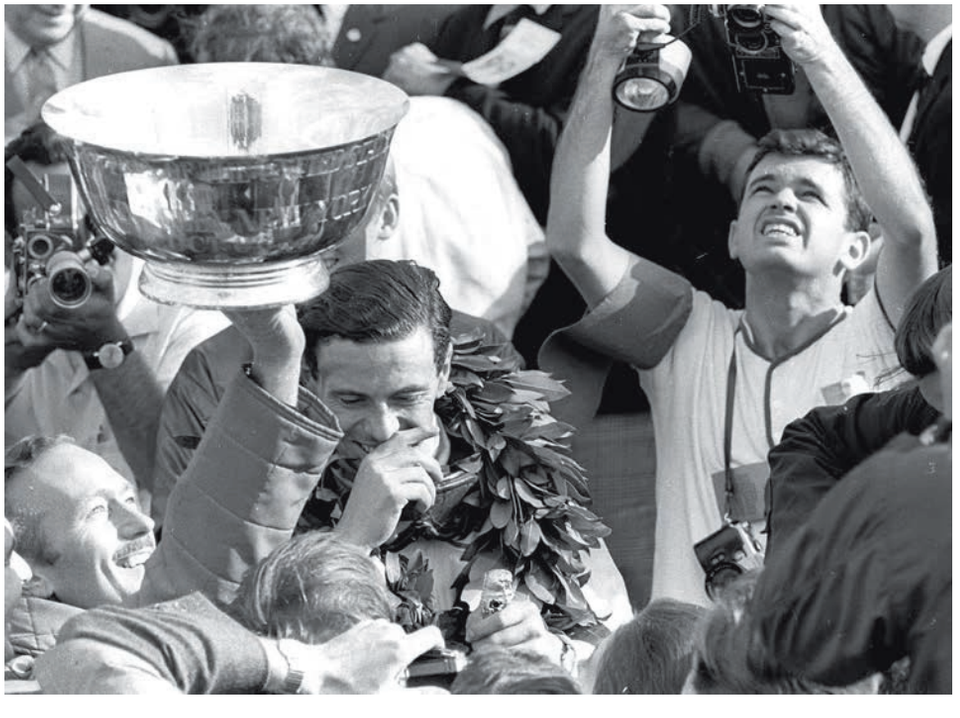




Top left and right: Honda mechanics try to calm Surtees's (3) overheated engine. Bottom left: Gurney's Eagle (11) is one of the few cars with a roll bar high enough to protect its driver. Bottom right: Stewart (7) is one of only a handful of wheelmen using safety belts.







Above: New Zealander Denny Hulme (2) patiently works his way through traffic and will leave the Glen with a five-point lead over his boss going into the season finale.

Left: Jim Clark celebrates as Lotus head Colin Chapman hoists the trophy. Clark would lead every race he started in the 49 and win a season-high four races, but five DNFs would leave him out of championship contention.

MEXICAN GRAND PRIX

October 22, 1967

Mexico City

5.00 km (3.107 mi)

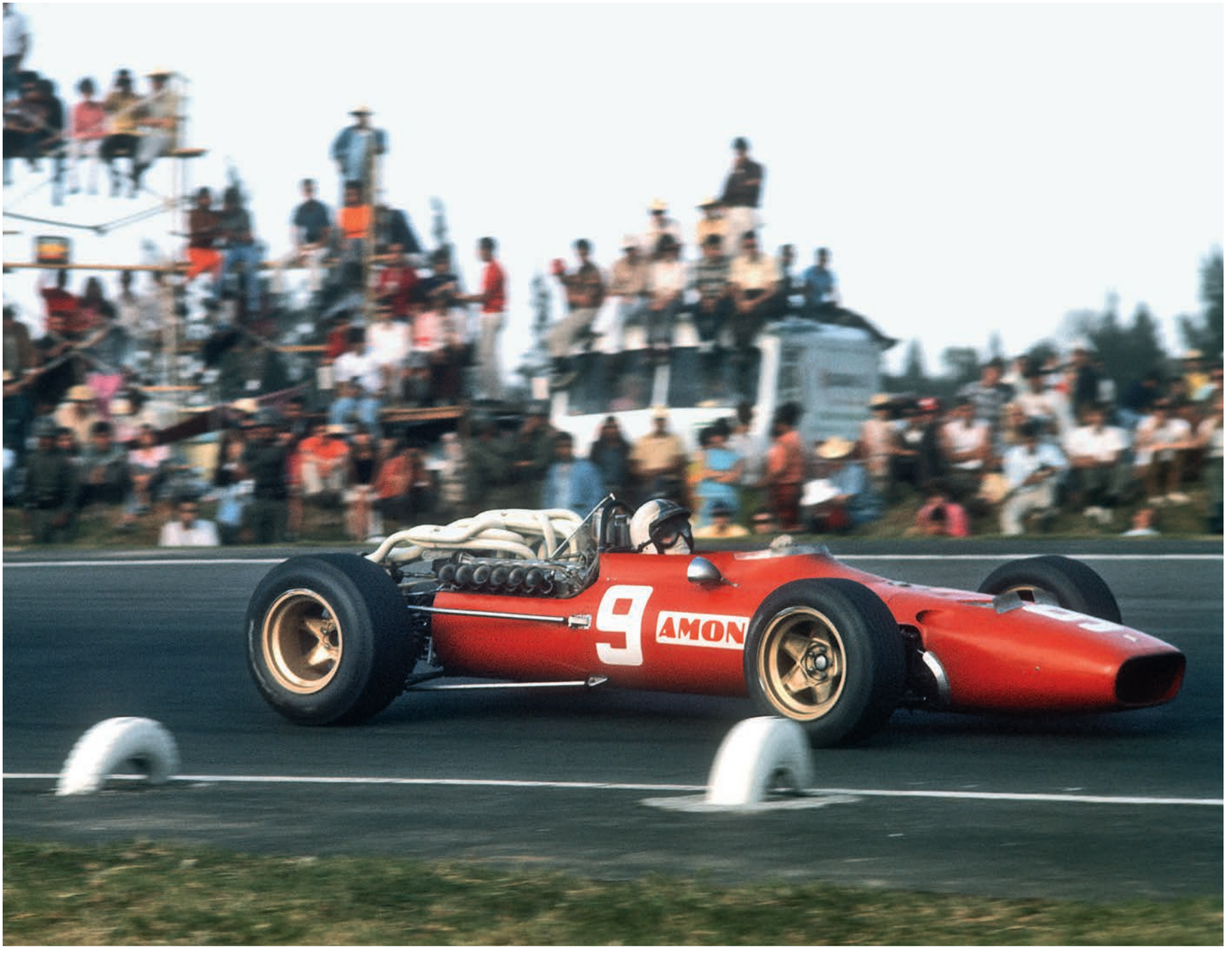
Pole Position: Jim Clark (1:47.56)

Fastest Lap: Jim Clark (1:48.13)

Winner: Jim Clark (+1:25.36)

Chris Amon (9) will start from the number two slot on the grid and finish fifth in the Drivers' Championship. No one would have imagined then that it would be his highest-ever ranking. Hulme (2) won only twice but finished out of the top three just once (South Africa) the rest of the year to clinch his first and only title.


2
8



Chris Amon's (9) victory at Le Mans the previous year with Bruce McLaren "influenced my career greatly because it was a direct result of that I got offered the Ferrari drive for 1967."

Above: Hemingway once wrote, “There are only three sports: bullfighting, motor racing, and mountaineering; all the rest are merely games.” The prize-giving ceremony in Mexico was held at a local bullfighting ring. Part of the festivities involved winner Clark (helmet) wielding a cape. (They used calves, not full-grown fighting bulls.) Mexican Shelby Mustang driver Freddie Van Beuren showed good form.

Left: In a class by himself. Clark actually stalled the start, causing Gurney to bump into the back of the Lotus, giving it a timely shove. Clark took off. Gurney (15) retired a few laps later having punctured the Eagle’s radiator. *Bernard Cahier/The Cahier Archive*

The magnificent Ford Cosworth DFV engine won its debut race and changed the face of Formula One. Mastermind Keith Duckworth kneels beside Clark.

F1 MAVERICK

Mike Costin and Keith Duckworth

There have been times in F1 history when the teams with the best engines won. Often because those teams, understandably, refused to supply anyone else. Real advantages in F1 are hard-fought and usually temporary. In 1961, Ferrari drivers came in first, second, and fifth in the championship[1] because Ferrari adjusted to the new 1.5-liter formula better and more quickly than everyone else. The following year, they were nowhere.

But from 1967 to the early 1980s anyone with a checkbook could buy an engine capable of winning races and championships, thanks to a couple of mavericks named Mike Costin and Keith Duckworth, who combined their names and intellects to form Cosworth Engineering. Commissioned by Ford at the behest of Lotus to develop a new engine for the 3.0-liter formula after a disastrous year with the BRM H16 engine, Cosworth immediately reset the F1 hierarchy.

"The biggest explosion was Keith Duckworth producing the Cosworth engine," says Jackie Oliver, who drove Cosworth-powered cars for Team Lotus after Jim Clark's death, then became a customer when he formed the Arrows team in 1977.

"Engines have always dominated Formula One," he continues. "It's 30 percent of the reasons why you can do it and win, and still is, so someone like me, when I wanted to start my own Formula One team, I had thirteen people to make an aluminum monocoque, and I went down the road and bought

1 They conceivably could have finished 1-2-3 had Ferrari not decided to forsake the United States Grand Prix in the wake of von Trips's death.

six engines (from Cosworth) at $25,000 to $30,000 apiece, and I could go racing. There was an explosion of constructors in the early 1970s because there was a race-winning engine available at an affordable price."

The 3.0-liter DFV didn't just win its debut race, it stuck a dagger into the heart of every rival team. Doug Nye:

Tony Rudd, who was the chief engineer of the rival BRM team, and who was building rival Formula One engines, told me that at Zandvoort in 1967—when he looked at the Cosworth DFV engine for the first time—and then saw how it performed on track in the new Lotus 49s, he thought to himself, "Well that's it. Game over!" Just like that. That's it. Game over.

I've always thought that was a brilliant quote, because it sums up a complete turning point in history. That turning point was confined to Team Lotus for that first season, 1967. Colin tried hard to maintain exclusive use of the engine through 1968 and 1969, but Ford thought otherwise and made it available to McLaren and to the Ken Tyrrell Matra team. That really was the rebirth of Formula One as a kind of Grand Prix racing "Formula Ford," almost everyone using the DFV engine.

It wasn't just the power of the new unit. The DFV engine also served as a structural member. The 49's monocoque ended at the driver's back. The engine carried the suspension.

"It was Keith's idea that the engine should be a structural member, not Colin's," Costin told *Motor Sport*. "It was held onto the monocoque by two bolts at the bottom and two at the top. It wasn't that big a deal, structurally. The torsional loads going through the engine in heavy cornering were only about 4,000 pounds. Our big-end bolts were much smaller, and stood a load of 10,500 pounds in each one."

Despite being introduced at the third race of the year, the Cosworth nearly propelled Clark to a third championship. Unreliability dropped him from the lead time and again, opening the door for Brabham's Denis Hulme and Jack Brabham. Cosworth engines went on to win the next seven F1 titles.

In all, Cosworth-powered cars captured 155 races and powered twelve F1 Drivers' Champions and ten Constructors'. At the 1974 British Grand Prix, twenty-nine of the thirty-four entries used Costin and Duckworth's engines.

Says longtime F1 mechanic John Dennie, "The biggest innovation in that whole 1967 through the turbo era I think would be the Cosworth DFV. It dominated Formula One through the whole period."


BOSCH
3
SHELL
STP
3

CHAPTER 6: 1968–1969

WINGS OF CHANGE

As 1968 began, Colin Chapman and Jim Clark were looking forward to possibly their greatest season yet. The 49 was finally sorted. Clearly no one had an answer for the Cosworth engine, which Clark had demonstrated with an exclamation point at the season-opening South African Grand Prix, where he steamrollered the field to collect pole, fastest lap, and his twenty-fifth F1 victory, eclipsing Fangio's record of twenty-four.

The team's chronically precarious financial position was improving markedly as well, thanks to a groundbreaking deal with the Gold Leaf cigarette brand. Governments throughout North America and Western Europe had banned cigarette advertising on TV, forcing tobacco companies to look at other advertising venues. As Player's Cigarettes promotions manager Tim Collins told *Motor Sport* in 2015:

[Someone] suggested that we should look at Lotus, so I spoke to Colin Chapman and we began to discuss terms. It all happened fairly quickly, over two or three months, and we didn't talk to anybody else. Besides, Colin offered us a dream team of Graham Hill and Jim Clark, so why would we have wanted to go anywhere other than Lotus?

It wasn't quite so straightforward. Chapman resisted changing the name of the team to Gold Leaf Team Lotus right up until the night before the launch. But in the end he agreed to exchange British racing green for Player's Tobacco greenbacks.

It was a seminal moment in the sport. The floodgates were opened. Soon you would need a major sponsor in order to field a competitive F1 team. There was another effect as well. With

After Clark's death in April, Graham Hill became Lotus's team leader and took his second title.

sponsors came new visual identities. Within seven years only Ferrari would still be flying its national racing colors. That "foreign country" that F1 had been was starting to seem very far away.

There was more good news for Lotus in America. In late March, Clark and Chapman went to Indianapolis to test the new Maurice Philippe–designed Lotus 56 four-wheel-drive gas turbine. The previous year's 500 had been a disaster for Lotus. Neither Clark nor Graham Hill had been able to qualify higher than sixteenth, and neither factored in the race. Now, with a brand new Formula One–style chassis and a dramatic, forward-leaning wedge shape, the planned three-car STP "superteam" of Clark, Hill, and Stewart looked set to dominate. The test only cemented those hopes. On his return to England, Clark told friends he had just driven the car that was going to win the 1968 Indianapolis 500.

A week later he was dead.

Clark's death in a Formula Two race at Hockenheim sent a chill through the F1 community. As his friend Ferrari ace Chris Amon put it, "I wasn't alone in thinking, 'If it can happen to Jimmy, it can happen to me.'"

Derek Bell, then an up-and-coming Formula Two driver, had long admired Clark and was thrilled to meet him that weekend:

> **I'd met him the night before and had tea with him and I even had breakfast with him and (Lotus teammate) Graham Hill and we went to the track together, the three of us in a car, and that was the last I saw of Jimmy. So to meet your hero and then to have him die the next morning was pretty traumatic.**

But the Scot's demise was just the beginning of F1's most deadly season. A month later, former teammate Mike Spence, drafted to replace Clark in that oh-so-promising turbine at Indy, was killed during practice while trying to help sort teammate Greg Weld's car.[1] A month later, Ludovico Scarfiotti, who'd retired from F1 in part because of the death and career-ending injuries to Ferrari teammates Lorenzo Bandini and Mike Parkes the previous year, was killed at the Rossfeld hillclimb in Germany. After three deaths on the first weekend of three consecutive months, there was talk of postponing, at least for the time being, future events on the first weekend of the month. That's how jittery everyone had gotten.

Perhaps it wasn't such an illogical idea after all. On July 7, three months to the day after Clark's crash, Jo Schlesser burned to death in his Honda at the French Grand Prix. While the 1968 season is remembered for these four fatalities in four successive months, they weren't the only casualties. Rising star Chris Irwin was so severely injured at the BOAC 500 the same weekend as Clark's accident that he never raced again. Imagine: five current or former (in the case of Scarfiotti) F1 drivers gone in little more than ninety days.

There was an inherent tension created when so many dollars were flowing into Formula One and so many drivers were being carried out in body bags. The first would not be sustainable without some means of reducing the second. The teams accepted death as part of the sport. Sponsors were not nearly so tolerant. Why invest millions in associating their brand with a top driver, knowing that not only could he disappear tomorrow, but the

1 After Clark and Spence were killed and Stewart suffered a wrist injury, the STP "superteam" ended up being Graham Hill, Joe Leonard, and Art Pollard. Leonard seemed to have the race in the bag until a fuel pump failure with nine laps to go.

lasting image of him might be his lifeless form next to the sponsor's crumpled logo?

Stewart's safety crusade suddenly had a lot more support.

From a technological standpoint, the biggest development of 1968 came at midseason with the arrival of wings, and with them serious downforce. Remember how at the end of the previous year everyone was looking for traction? This was one of the ways they found it. Downforce may be the single biggest change to the sport since the introduction of closed-loop lubrication systems.

There's a legitimate question why it took until 1968, two full years after Jim Hall demonstrated the potential in the North American Can-Am series with his seminal Chaparral 2E, for F1 to follow suit. Jackie Stewart thinks he knows why:

> **Not-Invented-Here Syndrome. Colin Chapman was one of the great innovators, but if he didn't invent it, then (in his mind) it couldn't have been right. They just didn't do it. Jim Hall was ahead of the world in that.**

Perhaps that also explains why the early attempts at wings in F1 were so ham-fisted after Hall had essentially provided the blueprint for anyone who wanted to pay attention.

Ferrari's Mauro Forghieri was the first to try, installing hydraulically adjustable wings on his lithe Ferrari 312 for the Belgian Grand Prix. The team abandoned the adjustability feature after a series of failures—Chris Amon went cartwheeling into the trees at Monza later in the year, fortunately without major injury—but soon every F1 car was sprouting wings on the front and back.

Jackie Oliver was drafted in to replace Clark at Lotus and was nearly killed himself at the French Grand Prix when Chapman insisted on mounting an especially large wing on especially skinny struts. Just because. This is how Oliver remembered the incident in *Motor Sport*:

> **There was never any question of going testing with any new bits. Colin would have an idea, and insist it was on the cars for the next race. So there was this giant wing above the back of my car. I was the test rig. Stick it on Oliver's car and see what happens.**
>
> **I looked at this thing up there on stalks, nobody in the team could tell me anything, so I went and asked Chapman what it was all about. "Aerodynamics, lad," he said. "It's the future." I gave one of the struts a push, and it moved from side to side. I said to Chapman, "Is it meant to do that?" He said, "You know when you look out of the window of a Boeing 707 and you see the wings flapping up and down? It's the same. It's got to be flexible so it doesn't break." I said, "Oh, okay," and out I went. There was no, "Go out, do one lap, come in for a check." It was, "Go out and get on with it."**

He did and was lucky to survive the massive shunt that occurred when the wing collapsed whilst Oliver was going flat out past the pits. Nevertheless, by the time of the season-ending Mexican Grand Prix, there were giant skyscraper wings on virtually the entire field.

Lotus did, in the end, win the 1968 title, but there was little joy in the enterprise after Clark's demise. Surprisingly, Hill won just three races, in part because Lotus no longer had exclusive use of

the Cosworth engine. Chapman had lobbied Hayes hard to limit its availability to his team. But Hayes saw that it would be in the best interests of both Ford and the sport to make it available to others, including McLaren, Matra, and Rob Walker's privateer Lotus effort.

All three won races.

In fact, every event save one on the twelve-race schedule was captured by a Cosworth-powered team. Only the rain-soaked French Grand Prix went to Jacky Ickx in the twelve-cylinder Ferrari. Ferrari did manage four poles—three of them to Chris Amon—but the New Zealander's notoriously awful luck prevented him from wearing the roses anywhere.

A new force in Grand Prix racing was Ken Tyrrell's Matra team. Tyrrell had had the foresight to sign Stewart after a 1963 test. Tyrrell had recognized the potential of the new Cosworth engine at its debut in the 1967 Dutch Grand Prix and set about organizing a team combining Cosworth engines, Matra chassis, Dunlop tires, and Elf sponsorship.

It was a revelation. In part because the "wee Scot" was fast emerging from Clark's shadow to become the undisputed best driver in the world. Stewart finished second to Hill by twelve points in the title race despite missing two early-season events to a broken wrist. (It's why he missed driving the Lotus 56 at Indy as well.) Hulme finished three points further back in the suddenly transformed McLaren.

In 1969, Tyrrell and Stewart showed that they were just getting started. Stewart won six of the eleven events and won the championship in a landslide, almost thirty points ahead of second-place man Ickx. Jochen Rindt had left Brabham for Lotus but suffered breakdown after breakdown—six in all—and missed Monaco entirely after Chapman once again installed still bigger wings on the now 49B-spec Lotus in Spain and saw both of his drivers crash heavily after the flimsy appendages collapsed at the same point on the circuit. In fairness to Chapman, others experienced wing failures in Spain, prompting the FIA to outlaw high-mounted ones before the next race, Monaco.

Remember we were talking about traction?

Another major trend during the 1969 season was the development of four-wheel-drive chassis. The first 4WD F1 car, the front-engine Ferguson P99, debuted back in 1961. As you might imagine, it offered no great advantage during the 1.5-liter era, but its one great claim to fame was the last-ever Formula One victory by a front-engine car, albeit at a nonchampionship event. BRM followed in 1964 with its P67, which appeared at the 1964 British GP but was withdrawn after qualifying an unpromising last. BRM put it on the back burner while it concentrated on its new H16 engine. Interestingly, BRM included room in the H16 for a second driveshaft should 4WD appear more useful in the coming 3.0-liter "big power" era.

Three teams developed 4WD chassis for the 1969 campaign: Lotus, Matra, and McLaren. Four if you count Cosworth. Keith Duckworth had enlisted the brilliant young McLaren designer Robin Herd to create a 4WD chassis around the DFV engine. We asked Jackie Stewart about them:

Lotus kept it longer than anybody else. Matra: we did testing and we never raced it. Cosworth: Mike Costin and his staff made up a Formula One car with four-wheel drive and that didn't work either. I was one of the few people ever to drive that car, I tested it at Silverstone as a favor. Ken Tyrrell asked me to do it as a

favor to Keith Duckworth, because obviously we were using the Cosworth engine, so it was an easy decision to make.

The four-wheel-drive system that Matra used was a development of the Ferguson 4WD from earlier in the decade. Even when testing showed that there was no real advantage in dry conditions, Stewart thought it was worth pursuing for low-traction conditions.

"I thought we should have a four-wheel-drive car just for rainy days," says Stewart, "just for a wet race."

So what happened?

"In fact, it wasn't even as quick in the wet."

There were several factors working against 4WD. For starters, the increased weight and complexity, two things you don't want in a top-level racing car. But more importantly, advances in tire technology and downforce made it redundant. The designers could achieve the necessary traction through other means. Just in the span of months between when the teams first started designing their 4WD cars and started putting them on the road, they were obsoleted by other developments.

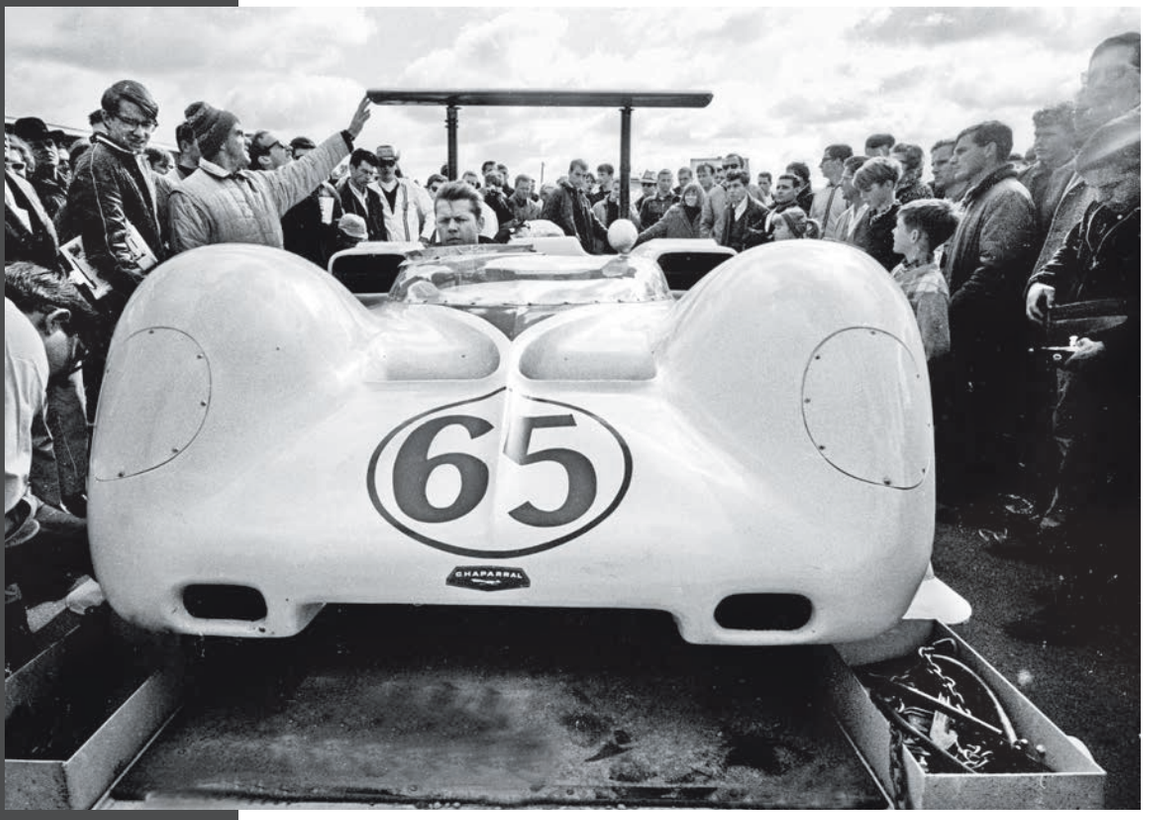
All but Lotus gave up on the concept by the end of the year. Not to worry. The ever-fertile mind of Colin Chapman had something else in store.

Chris Amon has been a sensation, but seven retirements in ten starts will rob him of several wins.

BRITISH GRAND PRIX

July 20, 1968

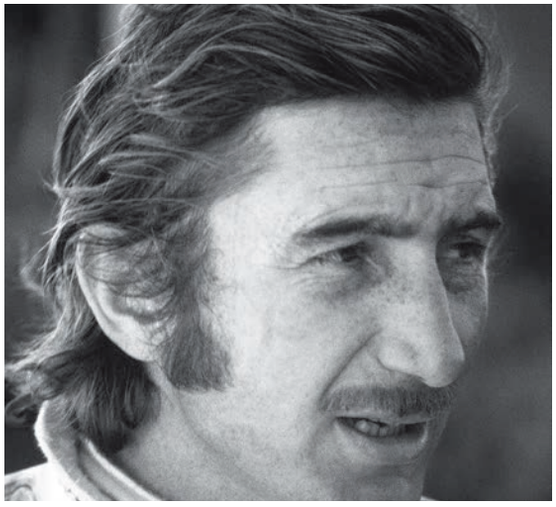
Brands Hatch
4.265 km (2.650 mi)
Pole Position: Graham Hill (1:28.9)
Fastest Lap: Jo Siffert (1:29.7)
Winner: Jo Siffert (+4.4)

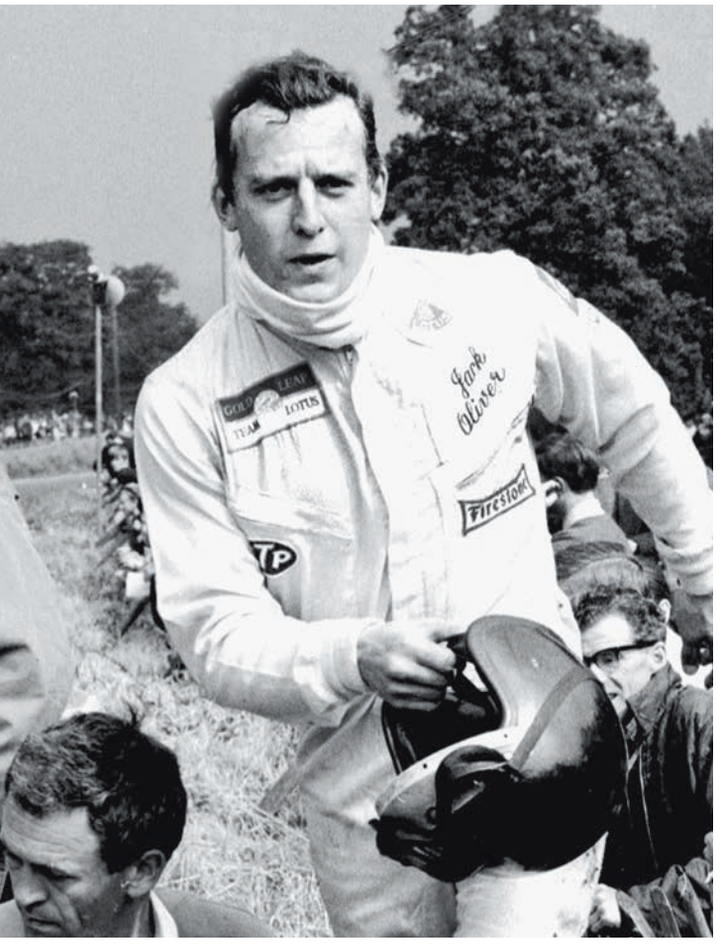


Jim Hall's Chaparral 2E had shown two years earlier at Bridgehampton, New York, that wings needed to be mounted high to operate in clean air for maximum effectiveness and needed to have sturdy supports to be safe. In this case, Formula One was well behind North America's Canadian-American (Can-Am) Challenge Cup.

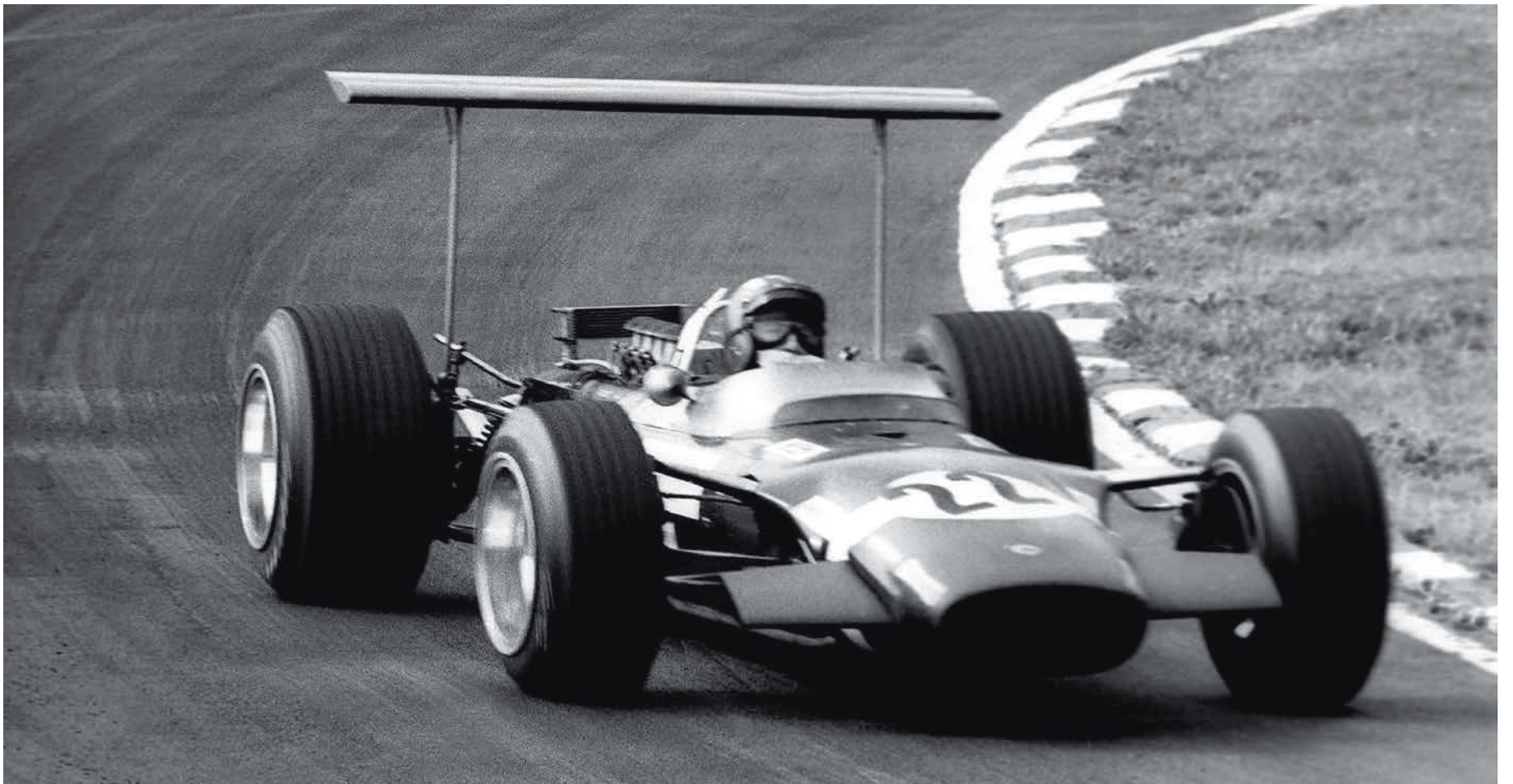
The great story about the 1968 British Grand Prix is that due to crashes in previous races, Lotus was out of cars. All they had were the two for factory drivers Graham Hill (8) and Jackie Oliver (9). Normally not a problem, except privateer Rob Walker had ordered a new Lotus 49B long before and threatened Colin Chapman with canceling if he didn't receive it in time for their home race. So Chapman struck a deal. He sent Walker Oliver's just completed 49B, and borrowed Walker's older 49 for Oliver. The sad part is that this would probably have been Oliver's day of days. At the start, he burst into the lead ahead of Hill and Walker driver Jo Siffert (22), despite being in the older-spec car. Oliver led until the halfway point, when a plumbing line on his hastily updated Lotus burned through. (It had been routed too close to the exhaust.) Thus, Siffert won in what is considered the last true privateer victory. A fantastic home win for Walker and the first of two GPs Siffert would capture over the course of his career.

Track and spectator safety have evolved a long way by 1968, but a lot of the charm, aesthetics, and sightlines are gone. Note marshall station (right) on the outside of a turn. History does not record who thought this was a brilliant idea.





Clockwise from top left: Endurance ace “Seppi” Siffert wins one for the underdogs. Yellow flag signifies a disabled car ahead. Jackie Oliver hotfoots it back to the pits, not knowing his last best chance of becoming a Grand Prix winner has slipped away.



The aero wars begin. Counterclockwise from top left, Mauro Forghieri had fired the first shot a month earlier at Spa with the midmounted wing on Chris Amon's (5) Ferrari. Already the other teams have followed the Italian's lead. Siffert (22) had the latest Lotus setup with a tall, wide wing in back balanced by substantial canard wings in the front. Honda tried a tall wing on John Surtees's (7) car, which collapsed. It would not be the last.

GERMAN GRAND PRIX

August 4, 1968

Nurburgring
22.835 km (14.189 mi)
Pole Position: Jacky Ickx (9:04.0)
Fastest Lap: Jackie Stewart (9:36.0)
Winner: Jackie Stewart (+4:03.2)

Many consider his drive here in driving rain and dense fog not only Stewart's greatest race, but one of the greatest drives in Grand Prix history. He won by four minutes–plus over Graham Hill.

Left to right: When Jackie Stewart's deal to drive for Ferrari fell through, he and Ken Tyrrell joined forces with Matra to run a Cosworth-powered version of the French machines. Immediate frontrunners, they might have vied more seriously for the title had Stewart not missed two races with a broken wrist. Months later, you can see the splint he still wears. Stewart qualified fifty seconds behind the man Ferrari signed instead, polesitter Jacky Ickx (9). Bruce McLaren (2) scored a historic win at Spa months earlier, but struggled here.

Gurney (14) introduces full-face helmets to F1. Jo Bonnier (center, above) shares a relaxed moment with former Porsche racing boss Huschke von Hanstein after the Swede had withdrawn his privately entered McLaren. British GP winner Jo Siffert (16) retired before half distance. Pete Biro rode to the circuit with Gurney: “I was blown away by how many spectators there were. I asked Dan why there was such a huge crowd even though it was raining so hard. He said, ‘If you’re a racing fan, wouldn’t you want to see the best drivers in the world run in the wet?’”

Clockwise from top: A puncture on lap three dropped Gurney (14) to twelfth after a stop, but thereafter he put on a clinic. Easy camaraderie among rivals: Graham Hill (left) leans in to chat with (left to right) McLaren's Phil Kerr, driver Denny Hulme, Alan McCall, and Honda's John Surtees. Lotus chief Colin Chapman calmly reviews his notes while Bette Hill anxiously awaits husband Graham, whose second place will keep him four points ahead of Stewart in the title chase.

CANADIAN GRAND PRIX

September 22, 1968

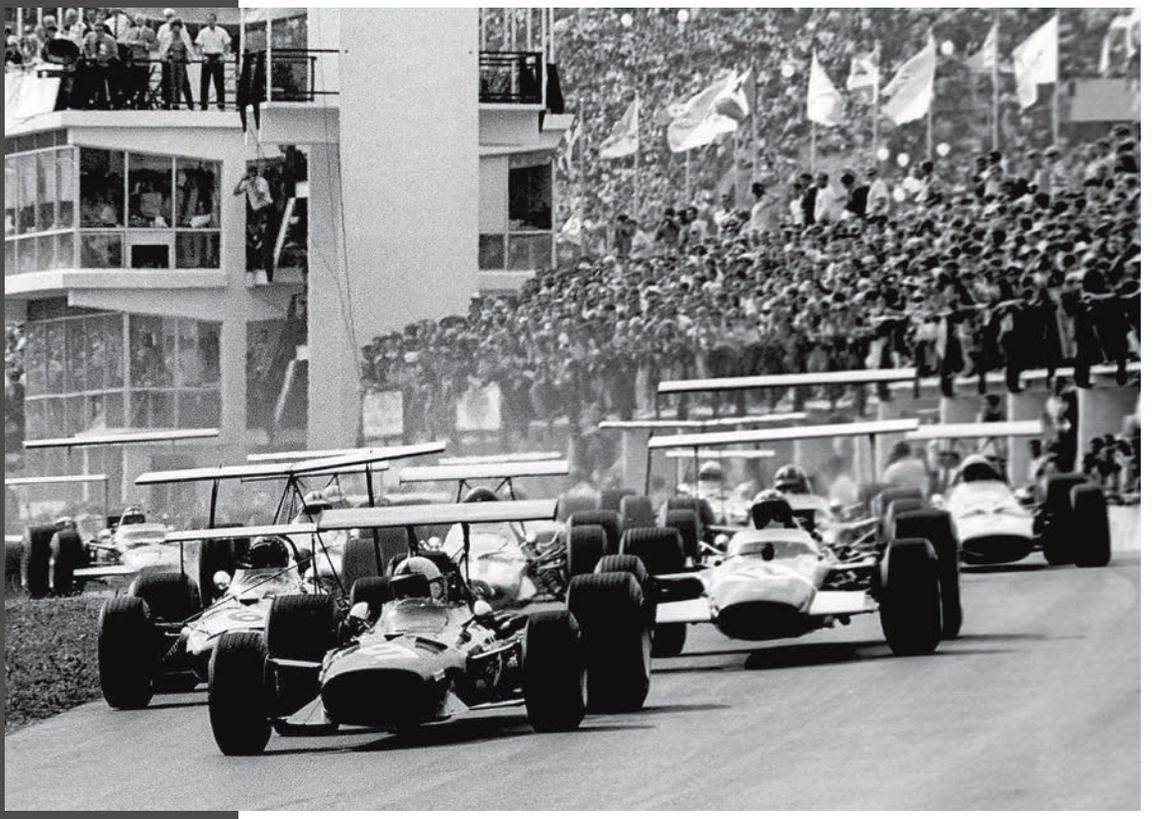
Circuit Mont-Tremblant

4.265 km (2.650 mi)

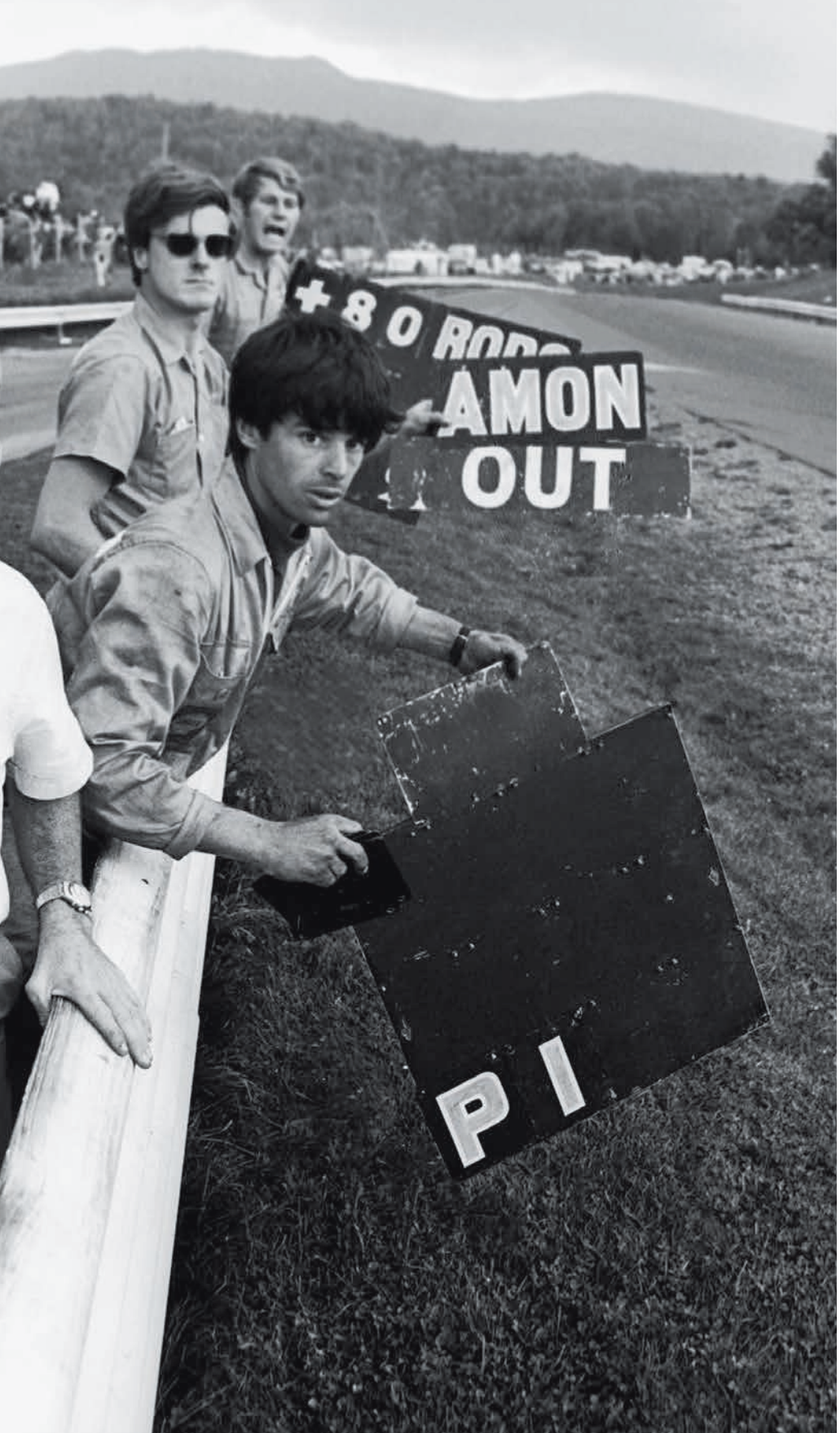
Pole Position: Jochen Rindt (1:33.8)

Fastest Lap: Jo Siffert (1:35.1)

Winner: Denny Hulme (+1 lap)

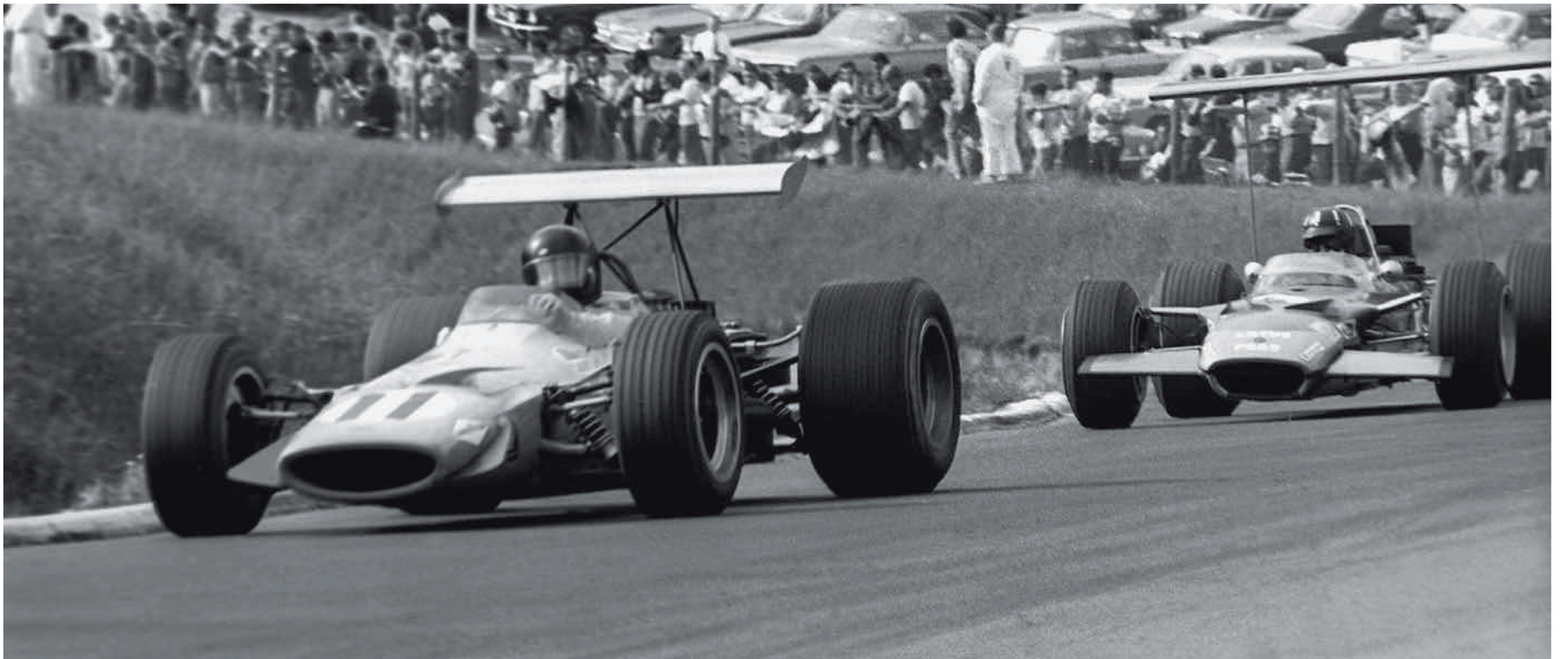


Left to right: Chris Amon (9) blasts into the lead from second on the grid and has the race in the palm of his hand until lap seventy-three of ninety when his transmission fails. Communication circa 1968: McLaren mechanic Alan McCall informs Hulme he's in first place, Alastair Caldwell explains why, and Tyler Alexander tells him he has an eight-second cushion over BRM ace Pedro Rodriguez. Hulme (1) will lead home a McLaren 1-2.


AMON
OUT
PI

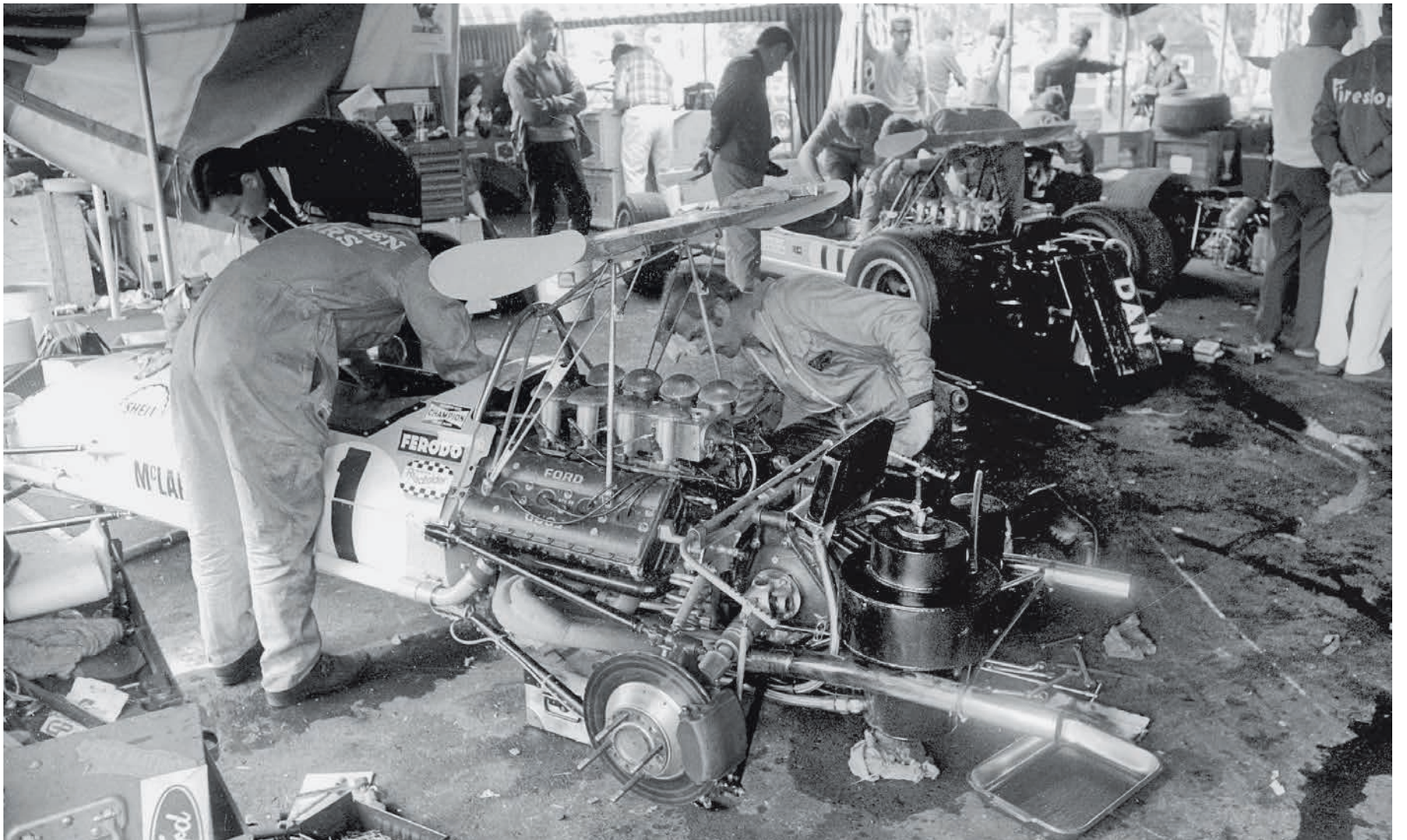

Jenny Hulme
CHAMPION
FERODO
Roadholder
FORD

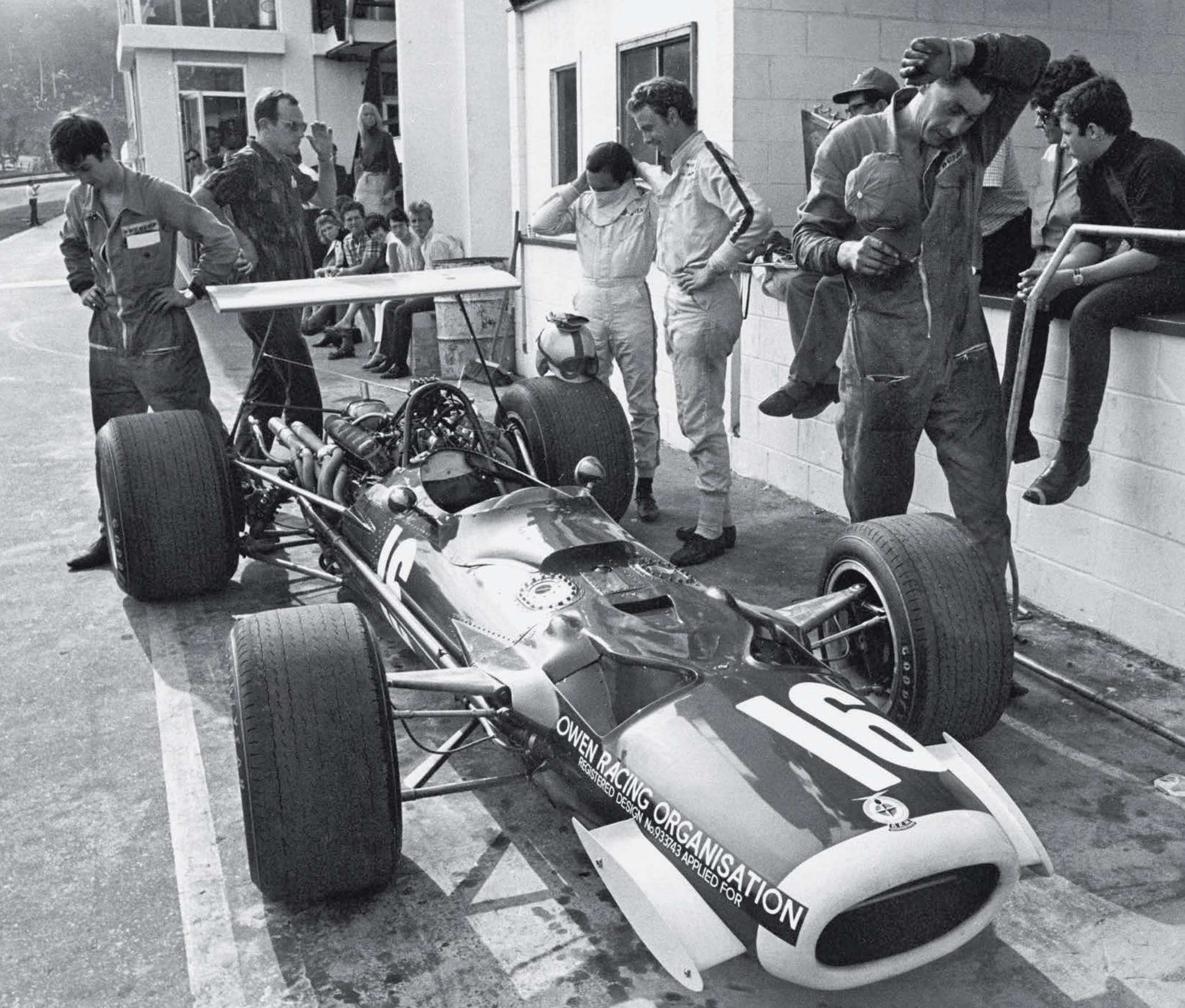
Hulme's replacement at Brabham, Jochen Rindt (standing) won pole here; boss Jack couldn't be happier. Out of funds to continue the Eagle project, Gurney (11) accepted a ride from friend Bruce and proceeded to outqualify both McLaren aces and championship leader Graham Hill (3). His storming run will end on lap four.



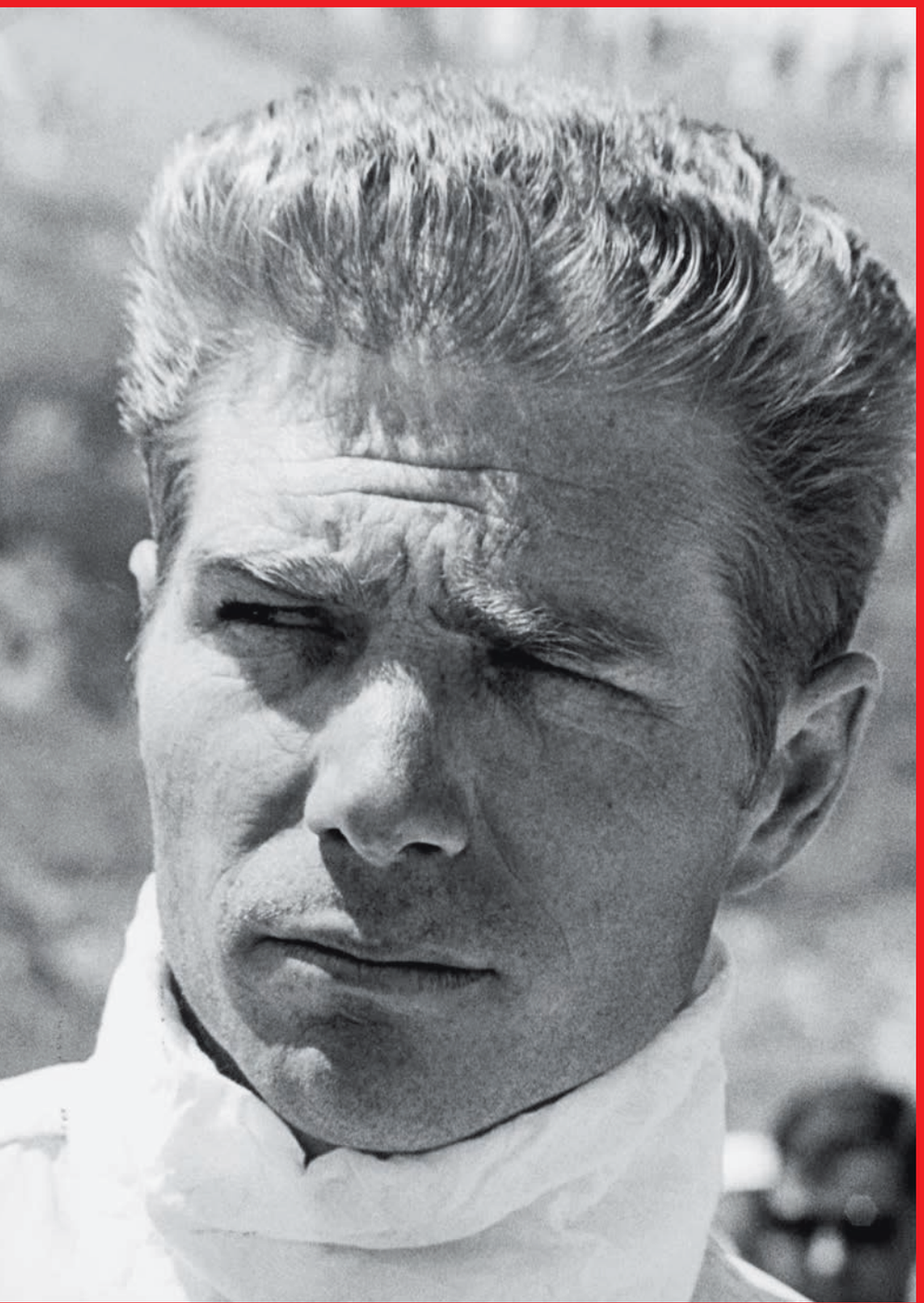
Left: Helmeted Frenchman Henri Pescarolo (19) will fight the good fight for God and country, but the glorious-sounding V-12 Matras can't compete with the Cosworth-powered ones. Neither he nor teammate Jean-Pierre Beltoise looks particularly pleased.

Below: Final preparation of Hulme's winning Robin Herd- and Gordon Coppuck- designed McLaren M7A (1).




OWEN RACING ORGANISATION
REGISTERED DESIGN No.933743 APPLIED FOR
16

It's doubtful that the winglets on the nose of Pedro Rodriguez's Len Terry–designed BRM P133 (16) are doing very much. The Mexican prepares for battle next to teammate Piers Courage. Former hot rodder Gurney (11) was fascinated by the mechanical side of the sport.



F1 MAVERICK

Jim Hall

Some would ask why the Texan, who never built a single Formula One car, should be considered one of the great F1 mavericks.

Others consider him one of the most important of all.

Hall's first direct involvement with F1 came at the 1960 United States Grand Prix at Riverside, when he ran a surprising fifth as a privateer—his pit crew consisted of his brother Chuck and mechanic Frank Lance—in a car that had no business being in the points, until a stub axle broke in the final laps and dropped him to seventh. A similar performance at the 1962 Mexican GP, when he nearly podiumed in an older four-cylinder car when all the other top drivers had newer chassis powered by Climax V-8s, led to his being invited to join the British Racing Partnership (BRP) team for the 1963 season. Little could Hall know that the team, which had won multiple Grands Prix in the preceding years, was about to go into decline. Hall scored a number of points finishes despite having an aging, underpowered Lotus, then left F1 to concentrate on his new, self-built Chaparral sports cars.

It was with the Chaparrals that Hall pioneered downforce. Others had toyed with the concept dating back to the earliest years of the automobile, but no one had mastered it the way Hall had. Hall turned it into one of the main pillars of performance in every race car from that point forward.

Hall introduced movable wings on the 1965 Chaparral 2C and 1966 Chaparral 2E, which was the fastest if not yet most reliable car in the inaugural season of Can-Am racing. It surprises him to this day that no one in F1 copied his

innovation until 1968, but soon every car had wings. They still do. Wings and downforce have been essential to winning in Grand Prix racing ever since. Says Peter Wright, F1's foremost aerodynamics expert, credited with discovering modern ground effect while with Lotus:

I think Jim Hall started it all going with the wings on the Chaparral, and basically alerted everybody to the benefits of downforce. And I guess I introduced ground effect in the Type 78 Lotus. Motor racing has been on that groove ever since.

Chaparral-style high-mounted and/or movable wings were outlawed in Formula One after the near-catastrophic Team Lotus accidents at the 1969 Spanish Grand Prix. So there's no small amount of irony involved in the fact that after being banned for decades, movable wings are now a staple of modern Formula One. The drag reduction system (DRS) was introduced in 2011. It allows drivers within one second of the car ahead to trim their wings for lower downforce and therefore greater speed, just as Hall had proven in the mid-'60s.

In 1978, Formula One copied another Hall downforce innovation from eight years earlier, suction. During the 1970 Can-Am season, Hall shocked the racing world with his revolutionary Chaparral 2J "vacuum cleaner." It quickly proved the fastest car in in the series but was outlawed before it had a chance to contest a full season. Gordon Murray adapted the idea to create the Brabham BT46B "fan car." Unlike the Chaparral, which had constant downforce, the Murray car's downforce was tied to engine speed. Nevertheless, it was a revelation. It won the only race that it entered, the 1978 Swedish Grand Prix—going away—then was shelved by Brabham boss Bernie Ecclestone when the other teams began to mutiny.

The introduction of downforce to Formula One has not been without controversy. Wings and ground effect greatly increased the speeds at which cars could run alone on a track, but the turbulence facing trailing cars has made passing more difficult. Many argue this has reduced the quality of the racing, replacing Rindt-Stewart era wheel-to-wheel action with sometimes tedious processions. The movable wing elements in the DRS were created specifically to address the very issue wings helped create. But carping aside, downforce has led to staggering advances in vehicle performance. And Hall is the man who started F1's obsession with it. Wright thinks he knows why the innovation came not only from outside Formula One, but outside Europe:

The thing that's interesting is Grand Prix racing after the war, a lot of it was on very fast circuits. Rouen, Reims, Monza, Spa, places where there were long straights and power mattered and drag mattered. If you read Laurence Pomeroy's (landmark 1959) book, *The Grand Prix Car*, all of his analysis is power-to-weight and power-to-frontal-area. It's all drag, top speed, and acceleration. Nothing about cornering at all, and what Jim Hall did and Chevrolet R&D with their instrumentation (to support it), they said there is a benefit particularly on circuits that don't have very long straights, where you get more from downforce than you lose from drag. That's what he told the motor racing industry.

When Wright and Hall finally met each other at the 2007 Goodwood Festival of Speed, the Brit approached the man in the Stetson. "I suggested that between us we had wrecked motor sport. He grinned and just about agreed."


MOTUL
MOTUL
POLITOYS
37
MOTUL

CHAPTER 7: 1970–1971

FORWARD, MARCH

As time went on, Ford and Cosworth expanded availability of the DFV basically to any team that wanted one—and just about every team did. By 1970, all save Ferrari, BRM, and Matra had switched to Cosworth power—and BRM and Matra probably would have been better served if they had. Nye again:

> **The fact that it went on to 155 Formula One victories is its own measure of the quality of that thing. It was absolutely epochal change. You had as many as thirty-six or thirty-seven cars being entered for every Grand Prix, because customers could just go and buy a DFV engine off the shelf and bolt it—in some cases—to a complete load of junk and go Formula One racing.**

Only reliability issues had prevented Lotus from winning the championship during the Cosworth's inaugural campaign. Since then, DFV-powered cars had captured four championships in succession:

1968: Hill/Lotus
1969: Stewart/Matra
1970: Rindt/Lotus
1971: Stewart/Tyrrell

So crucial was the Mike Costin– and Keith Duckworth–designed engine that Ken Tyrrell left his very productive partnership with Matra after their 1969 championship year because the French

The "tea tray" March 711 was another Robin Herd design that punched well above its weight, finishing second to Jackie Stewart in the Drivers' Championship. "The 711 front wing was a standard profile," says Herd. "It was elliptical to minimize drag. It worked very well, giving a good range of downforce, enabling the aerodynamic balance of the car to be achieved easily. And it did not suffer problems when following other cars. Its weak point was that at a low downforce setting, when the wing would be relatively flat, the downforce produced would reduce quite a bit as the nose of the car rose. This became an issue in long and very fast corners when understeer would develop on applying power leaving the corner. Niki drove his first F1 race in Ronnie's sister 711 at Zeltweg in his home Grand Prix. The original Zeltweg circuit had more long and fast corners than now, and Niki felt 'power understeer' in very fast corners for the first time. I was told about it!"

aerospace firm wanted the team to replace their Cosworths with engines of Matra's own manufacture. An understandable position for the French concern to take, but Ken knew what he was doing. The Georges Martin–designed 60° Matra V-12 made a mighty roar but would never win a Formula One race.

The problem for Tyrrell was that he found himself with the best driver in Formula One and a championship-caliber engine and no car to put them in.

We'll come back to that in a moment.

For this and other reasons, 1970 would prove to be one of the most curious years in the sport's history. It is remembered as a runaway for Lotus, its new wedge-shaped 72, and star driver Jochen Rindt. But it wasn't as simple as that.

The 72 was the latest stroke of genius from Colin Chapman, the car being designed by Maurice Philippe under Chapman's direction. The core ideas were to increase downforce, reduce drag (in so doing improve acceleration and top speed), and reduce unsprung weight.

Bearing a strong resemblance to Philippe's earlier Lotus 56 turbine Indy car, the 72 achieved its goals in all three areas. The low-drag shape was enabled by splitting the traditionally front-mounted radiator and relocating the new halves to a less draggy position on either side of the cockpit, and replacing the tall, frontal-area-expanding front springs with torsion bars. In back-to-back tests, the 72 was about 10 miles per hour faster than the car it replaced. Unsprung weight was reduced by locating all of the brakes inboard.

It took a while to get it all dialed in. So much so that the introduction of the car was delayed until the Dutch Grand Prix. But once ready for combat, it proved transformative. After winning the German Grand Prix, Rindt remarked, "A monkey could have won with this car today. It's that good."

All was not bliss in Lotus Land, however. Rindt and Chapman clashed throughout the year, Rindt feeling that Chapman, in the pursuit of simple-but-light, didn't leave enough room for safety. For the Italian Grand Prix, Rindt implored Chapman to bring the Lotus 49 instead of the 72 because he felt it would be safer. Chapman refused. Rindt was killed in a Saturday morning crash at the Parabolica when his 72, running without wings, darted left under braking into the guardrails. Rindt's five victories had won him enough points to become F1's first (and still only) posthumous World Champion.

That said, the season wasn't as one-sided as it might have appeared. Jack Brabham won the opening round in South Africa and should have taken several more wins were it not for improbable twists of fate. Who could forget watching him crash out of the lead at Monaco when a backmarker forced him offline heading into the final turn? Likewise, Ferrari for the first time in years had a championship-caliber car in Mauro Forghieri's beautiful 312B, but appalling reliability issues scuppered its chances, Jacky Ickx retiring from five of the first seven races. Thereafter it never finished lower than fourth—and the fourth was a race it led until it developed a fuel line issue. With three victories in the season's final five races, Ickx finished just five points back of Rindt in the standings.

Which brings us back to Tyrrell and Stewart and an ambitious new entity named March. March Engineering was formed by four men whose initials gave it its name: Max **M**osley, **A**lan **R**ees, Graham **C**oaker, and Robin **H**erd. Their announced goal was to build cars for Formulas One, Two, Three, and Ford, plus the

Can-Am, immediately. For a while, the rightly skeptical media said March stood instead for "Much Advertised Racing Car Hoax," but when they launched their first F1 car, damned if Robin Herd hadn't done it again.

One of the questions fans and skeptics alike asked was where the money was coming from. In fact, there wasn't nearly enough. Today, Herd sums up the fledgling firm's F1 experience as "a permanent lack of the finance to compete properly."

If you knew the agony of trying to build a proper F1 car for year one in 1970 with £17,500 of capital and £10,000 of STP sponsorship. . . . We were on pole for the first four F1 races,[1] led them all, and won three. Only a tire problem in South Africa cost us a win in all four races.

Thereafter a series of unexplained and out-of-character engine-related issues hindered Jackie. His normal reliability would have seen us with the World Constructors' Championship in our very first year, instead of a mere third."

Part of the problem was that the team, desperate for cash, was spread too thin. Several cars were sold to Ken Tyrrell for Jackie Stewart and François Cevert. The STP money funded a factory entry for Chris Amon and occasionally Mario Andretti. Another car was commissioned by Porsche, in an attempt to retain Jo Siffert's services in the JW Automotive Gulf Porsche 917 sports car team. Part of the problem was that, built on a shoestring and in just three months' time, the March 701 required compromises that revealed themselves as the season went on.

As the shortcomings became more evident, Tyrrell decided to build his own car, to become at last a full-fledged constructor. The Tyrrell 001 wouldn't appear until the last three races of the season, and it wouldn't finish any of them. But it sat on pole at its first race and looked quick elsewhere.

The 1971 season proved how right Tyrrell had been to venture off on his own. Mavericks Ken and Jackie dominated in a way few teams ever have. Stewart won six of the season's eleven races. Teammate François Cevert took the finale at Watkins Glen long after the title had been decided. Ronnie Peterson finished a distant second for Lotus, twenty-nine points back.

So what happened to Lotus, seemingly so dominant just twelve months earlier? Three things. One, the team was still reeling from the loss of the man who may well have been the second-best F1 driver in the world after Stewart. Two, Chapman and the team were devoting a lot of time to the 4WD Lotus 56B turbine F1 car, which went nowhere; Lotus was spread thin too. And three, the increased grip of the 1971-spec Firestones revealed the previously hidden flex in the 72's otherwise standout chassis. Peterson and Fittipaldi reported their findings to Chapman, but to little effect.

"Colin didn't believe us when we said the cars weren't handling," Fittipaldi told *Motor Sport*. "But for the nonchampionship race at Brands Hatch at the end of the year, the one when Jo Siffert died, we had reinforced suspension, a whole new package. The car felt so different. Now we were looking good for 1972."

It was, in fact, an understatement.

1 Including two nonchampionship events.

DUTCH GRAND PRIX

June 20, 1971

Zandvoort

4.193 km (2.605 mi)

Pole Position: Jacky Ickx (1:17.42)

Fastest Lap: Jacky Ickx (1:34.95)

Winner: Jacky Ickx (+7.99)

Jacky Ickx (2) and Ferrari began 1971 where they left off the year before, including a dominant win here, but six DNFs in the next seven races meant Stewart (5) would capture his second title, Tyrrell's first as a constructor.


elf
5
Tyrrell-Ford

Left: Denny Hulme (26) wrestled his McLaren M19A to twelfth. Talented Dutchman Gijs van Lennep (30) placed eighth in his Surtees a week after winning the 1971 24 Hours of Le Mans for the Martini Porsche team; a pity the 1972 European F5000 champion never got an opportunity with a top F1 team. “I did eight Formula One races,” says van Lennep. “Finished sixth twice, eighth, ninth, tenth. So it looks quite good, but I never got the right car. My Formula One career was just one-off drives that Marlboro was sponsoring and in sports cars I more or less won everything.”

Below: Stewart’s teammate François Cevert (6) crashed on the twenty-ninth lap.

Ronnie Peterson (16) finished fourth in his STP March. Our man Biro is dressed for the deluge.

CANADIAN GRAND PRIX

September 19, 1971

Mosport Park

3.957 km (2.459 mi)

Pole Position: Jackie Stewart (1:15.3)

Fastest Lap: Denny Hulme (1:43.5)

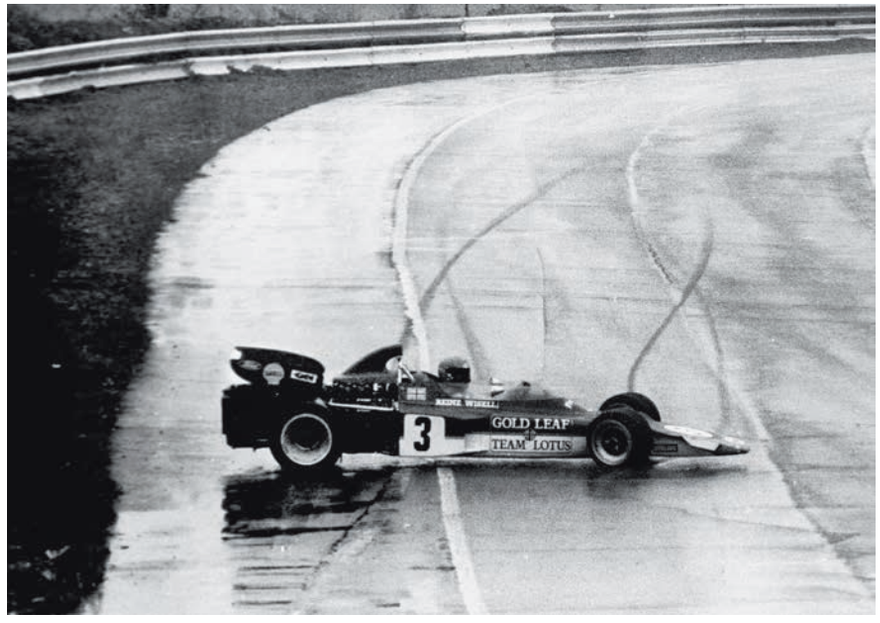
Winner: Jackie Stewart (+38.3)

The runner-up March 711, Herd's elliptical wing above a bullet nose.

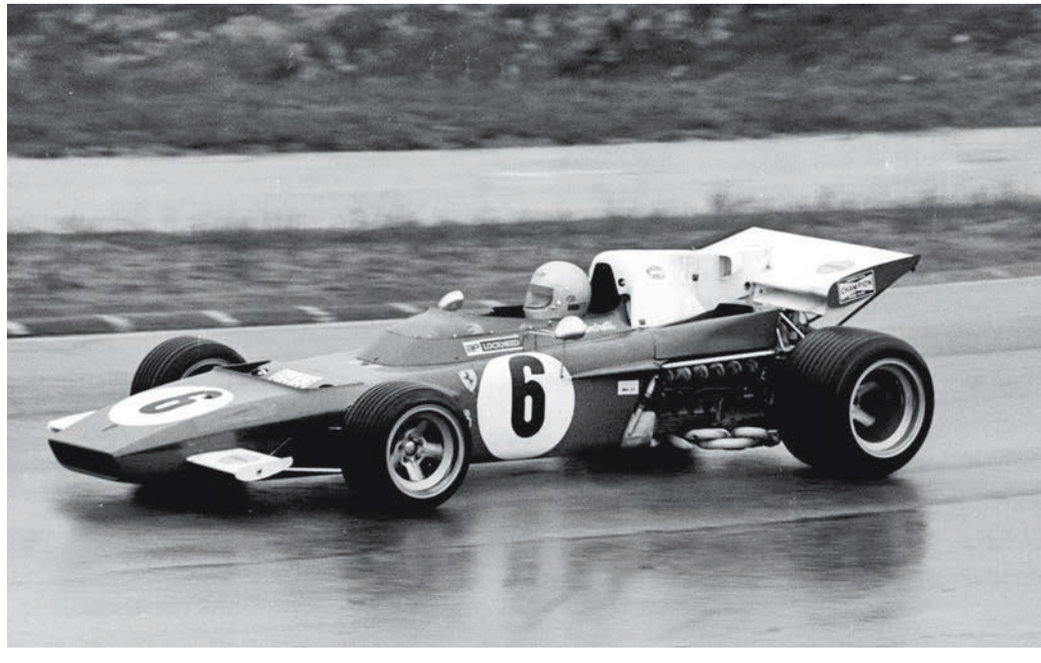
The weekend began bright and sunny. “Mod Scot” Jackie Stewart (left), seated in his Tyrrell, was building an image. “There was something else I needed,” he told the *Telegraph* years later. “Headgear to wear before and after my races, because my hair would get matted to my head. I decided a racing driver required something a little more trendy than a country gentleman’s cap or a baseball cap, and decided on a black corduroy cap, similar to the one worn at the time by John Lennon.” The cars had distinct visual identities too, before effective wind tunnel testing. The winning Tyrrell (11) ran a “sports car” nose at most races.

Clockwise from top: American Mark Donohue's (10) reputation as a driver and engineer was rising so quickly that he was brought in to help "fix" the troublesome McLaren M19A. A beaming Donohue after his stunning third-place finish in his first F1 race enjoys a moment with friend Biro. Earlier in the weekend, he discusses technical matters with Penske crewmember Earl "the Pearl" MacMullan.

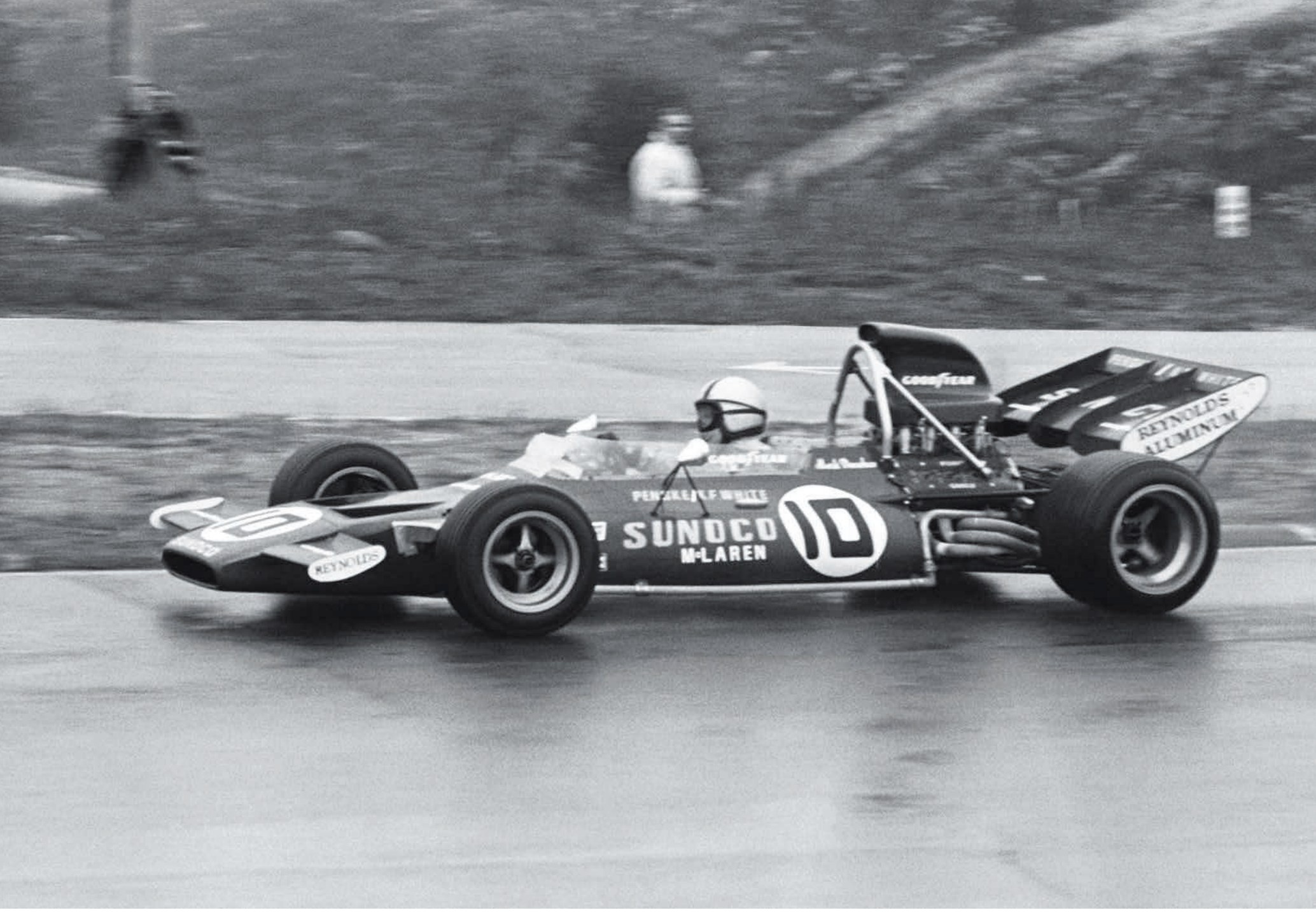
Race day is cold and rainy. Jo Siffert (14) splits the two Tyrrells on the front row, then gets the jump on both at the start. The Tony Southgate–designed BRM P160 was the marque's last great hurrah.



Clockwise from top left: The rain clouds force the photographers into wet-weather gear and black-and-white film. Reine Wisell (3) loses his Gold Leaf Lotus 72 on the way to fifth. All three Ferraris finish out of the points, including Mario Andretti (6). Peterson (17) trades the lead with Stewart until backmarker George Eaton moves over on him, knocking the March's wing askew. When fog reduces visibility to the point officials can't see from one marshaling post to the next, the race is red-flagged, the first such occurrence in F1 history.



François Cevert (12) finishes two laps down to Stewart and Peterson. Here he chases Mike Beuttler (19) in his sole factory drive for March.



Wrote *Motor Sport*: “Mark Donohue (10) confirmed what had long been suspected—that he is probably America’s best driver of road-racing machinery.”

Marshals scramble back to position after checking on Jean-Pierre Beltoise's bent Matra. Later, Jackie Stewart enjoys his sixth victory of a championship season.

F1 MAVERICK

Robin Herd

Paul-Henri Cahier/The Cahier Archive

Sometimes fate stands in the way of the success you most want, regardless of how talented you are or how hard you work. Even in Formula One.

Maybe especially Formula One.

Robin Herd is one of the brightest minds the sport has known. At eighteen, the Englishman passed on an invitation to play cricket for Worcestershire to enroll at Oxford, where he graduated with dual degrees in physics and engineering. He was working as a design engineer at Royal Aircraft Establishment (RAE) Farnborough, England's NASA, when Bruce McLaren called him out of the blue and asked him to come design his first Formula One car. Herd, a huge racing fan when he wasn't working on articulated engine fairings for the Concorde, thought it was one of his friends winding him up.

It was one of the smartest phone calls McLaren ever made.

Once at McLaren, Herd commenced work on the McLaren M6A sports car, the first of the "orange elephants" that crushed the competition in the Can-Am and established a large and enduring customer base for the new concern. He also designed the team's first Grand Prix cars, brilliant constructions hobbled by hopeless power units until the team was able to secure a supply of Cosworth engines, whereupon his M7A won the first race it finished. That victory at the 1968 Belgian Grand Prix made McLaren the second man, after former Cooper teammate Jack Brabham, to win a Grand Prix in a Formula One car carrying his own name.

Herd wasn't there to enjoy the victory.

The F1 community was a closely knit one in those days. More like a traveling circus, where everyone knew everyone and side conversations were a form of currency. Keith Duckworth had approached Herd to join Cosworth in late 1967. He needed someone with Herd's abilities to design the new 4WD F1 car he had in mind. With the DFV, Formula One cars now had more power than they could put to the ground. Duckworth was one of the first to see 4WD as the solution.

Herd was torn. He liked being at McLaren, but the team's survival in F1 would depend on obtaining a DFV. Which would only be assured, Herd was told, if he came to Cosworth to work on Duckworth's new car.

"It was a tortuous period, for I wanted to stay at McLaren—of course," says Herd. "And I had promised to say nothing of Keith's approach."

Part of the attraction for Herd was Duckworth's belief that he could convince two-time champion Jim Clark to captain the new team during the 1969 season. There are several, including Herd, who remember Clark in private expressing increasing dissatisfaction with Chapman and Lotus, particularly regarding the fragility of the cars. Jackie Stewart believes his close friend was seriously considering other options, but probably not Cosworth. What is certain is that Herd left McLaren for Cosworth, where work commenced on the 4WD machine early in 1968.

"Being unable to say anything to them," says Herd, "I realized that my best thank-you to Bruce and Teddy for giving me my start was to leave them! It hurt, and they were not happy. To this day I believe that McLaren never knew of the reason for my departure. It was a sore point. I still keep a very kind and lengthy letter from Teddy (a real and largely unappreciated hero in the early McLaren days)."

Thereafter Herd's efforts in F1 were, by his recollection, "always thwarted by one problem or another." Here is his accounting:

McLaren: the engine until I left when they immediately won races with my M7 car and said DFV.
March: a permanent lack of the finance to compete properly.

Recorded elsewhere in this chapter were the issues that beset the team in 1970, when Jackie Stewart was carrying the March flag and might have won a fourth title with better reliability. Herd continues:

1971: First full season (with) Ronnie Peterson was financially even more difficult, but Ronnie still came second in the World Drivers' Championship despite the extraordinary limitations imposed by our lack of money. Max (a top, top guy) and I were useless at raising sponsorship, yet without making any effort virtually everybody in every category sought to buy our cars.

1972: I was commandeered by BMW for their European Championship attack, in which the money existed to perform properly, releasing me from the pain of *our* F1 efforts. And we dominated that EC for several years.

1973 onwards in F1 for March was a DFV in the back of an F2 car! Engineered with real ability in the most dire of circumstances by Max, with intermittent remarkable performances.

For 1976 I was released by BMW, and Ronnie also rejoined the March F1 team. Poles, led races, and his memorable Monza victory upon the return to a race car of Niki (Lauda) were not enough to stop us selling the team at the end of the year.[1]

Then *selling* cars in all formulae (except F1) brought about a new company that was able to do things properly. Indy, of course, was the most important area. But IMSA championships, European championships galore, a Le Mans victory, and other championships throughout the Americas, Australasia, Africa, Europe, and Asia rolled in.

I am only sad that there is no racing in the Arctic and Antarctica! And, of course, those Can-Am McLaren days.

Herd's success in America was extraordinary. At one point in the 1980s, March chassis won five straight Indianapolis 500s.

It saddens me to this day, but I was so lucky to have those other opportunities. And to work with truly fabulous drivers and people like Jackie, Ronnie, Chris Amon, Bruce, Denny, John Surtees, Rick Mears, the Andrettis, and others. And similar level nondrivers like Max, Bernie, Roger Penske, Jim Hall, Adrian Newey, and many, many more.

Starting his own F1 team, victory at Indy, victory at Le Mans, Can-Am championships, IMSA championships, Indy car championships, European championships, and more. All attributable to the extraordinary young designer and cricketer who traded a career in aviation for the highest echelons of motorsport.

But the championship he wanted most remains forever beyond the next horizon.

1 Herd remained to continue to lead March design.


TEXACO
Special
TEXACO
JPS
Player

CHAPTER 8: 1972–1973

THE QUINTESSENTIAL F1 CAR

For 1972, Lotus's plump tobacco sponsor asked the team to switch the cars' colors from the red, white, and gold of its Gold Leaf packs to the black and gold of its John Player Special brand. Simple request, but one that would have far-reaching consequences. Overnight, the color scheme was an international sensation, elevating the visibility and perception of both the team (now renamed John Player Team Lotus) and Formula One and spawning black-and-gold production cars around the globe, including a few years later the *Smokey and the Bandit* Firebird Trans Am. Even today, many regard the black-and-gold Lotuses of the 1970s as the defining image of Formula One. Sometimes empires are equal parts substance and cigarette smoke.

The revised Lotus chassis, now designated 72D, was pretty good too. Fittipaldi won five of the twelve races, and in so doing became at twenty-five the youngest World Champion until superseded by Fernando Alonso in 2005. It didn't hurt that this was also the year Jackie Stewart was beset by ulcers, forcing him to miss one race altogether and limiting his form elsewhere, but Fittipaldi drove masterfully. He missed the podium in only four *grandes épreuves*, as they were called in the earliest days of Grand Prix racing—three retirements plus an uncharacteristic eleventh place in Canada due to car problems, one race after the championship had been decided.

Of note is that this was the first year that all tracks on the calendar met minimum safety standards. In fact, the Dutch Grand Prix was cancelled when requested improvements could not be completed in time. It would return the following year.

For 1973, with the season expanded to fifteen races, the championship order was reversed. Fittipaldi started the year with three wins in the first four races but never won again. In part because Chapman curiously refused to impose team orders on Fittipaldi teammate Ronnie Peterson, even though by the time

Designed by Colin Chapman and Maurice Philippe, the Lotus 72 won Constructors' Championships in 1970, '72, and '73.

of the Italian Grand Prix at Monza only Fittipaldi had a realistic chance of catching Stewart. Fittipaldi remembered the crucial moment this way to *Motor Sport*:

> **Colin, Ronnie, and I talk about it before the race and decide we will not race against each other. But near the end, if Ronnie is leading and I am second, Colin will give a signal to tell Ronnie I can come past. So in the race we are an easy one-two and I am waiting for the signal from Colin, and it never comes. I am going crazy, because I still have a chance in the championship. So I start chasing Ronnie, and Ronnie starts racing too. You can't blame him for that, because there was no signal. At the line he beat me by 0.8 sec. After, I went to Colin, very disappointed, and he said, "Well, I decided not to give the signal."**

Fittipaldi began talking with other teams the very next day.

In the end, Fittipaldi and Peterson accumulated fifty-five and fifty-two points, respectively. Stewart, meanwhile, tallied seventy-one to take his third and final title, despite withdrawing from the final race of the season at Watkins Glen after his friend, protégé, and intended successor François Cevert was killed in a practice accident. It would have been Stewart's hundredth Grand Prix.

He retired as the new all-time leader in Grand Prix victories, with twenty-seven.

There were two deaths in Formula One that year. The other was Roger Williamson at the Dutch Grand Prix. Williamson's was a particularly sad commentary on the still-primitive safety systems at work in Formula One. Williamson's car came to rest upside down on the side of the track, the driver conscious, unhurt, and alert, but unable to extricate himself from the overturned car.

The marshals were hopeless. The organizers were worse. A fire safety truck sat beyond the next turn. But because it would have had to drive against race traffic and the organizers elected not to red flag the race, it didn't move. Fans standing on the dunes by Williamson's car surged forward to help—it would have only taken five or six and a good shove to get the March upright—but security forces held them back. Meanwhile, fellow driver David Purley stopped at the scene and ran to his friend's aid. He tried to manage the rescuers, grabbing a fire extinguisher from one of them and putting his shoulder against the stricken car. To no avail. There was, after a damning interval, the telltale whiff of gasoline igniting and the car being consumed in flame. Williamson was burned alive.

The past is not always a quaint place to revisit.

That the Lotuses and Tyrrells did so well that year was in part because the other teams did so poorly. Ferrari, March, BRM, Brabham, Williams, and Surtees all had forgettable years.

The exception was McLaren, which introduced a new model, the M23, designed by Gordon Coppuck, supported by John Barnard. Outwardly, it resembled a Lotus 72. On the track it had the measure of everything else out there. Denny Hulme put it on pole at its very first race. Over the course of the season it captured three wins—one by Hulme, two by American Peter Revson—and seemed destined to improve on that performance.

Perhaps the surprise of the season was the new Shadow entry. Don Nichols was one of the foremost mavericks in the history of motorsports. His introduction to most fans came with the mysterious Shadow Mk1 Can-Am car he towered over on the August 1969 cover of *Road & Track*. Far lower than anything seen previously, it posed the question of whether a two-dimensional car could beat a three-dimensional one.

The project struggled until Nichols landed sponsorship from Universal Oil Products, a company that made unleaded gasoline possible. Unleaded gasoline had become critical to the auto industry with the arrival of new exhaust emission regulations and catalytic converters, which could not tolerate lead.

Nichols hired Tony Southgate to design both a Can-Am car and an F1 car. Southgate had worked for Gurney on his stillborn 1969 F1 Eagle. He moved on to BRM, where he gave the Bourne firm in 1971 one last season in the sun. In 1973, Southgate's Shadow DN1 scored two third placings amidst a flurry of retirements.

As 1973 came to a close, it had been nine full seasons since Ferrari had won a World Championship, and there was little to indicate that streak was about to come to an end.

Mauro Forghieri had other ideas.

American Peter Revson (8) had his best season in Formula One in Gordon Coppuck's M23 McLaren, winning twice and finishing fith in the title chase.

UNITED STATES GRAND PRIX

October 8, 1972

Watkins Glen

5.435 km (3.377 mi)

Pole Position: Jackie Stewart (1:40.48)

Fastest Lap: Jackie Stewart (1:41.64)

Winner: Jackie Stewart (+32.27)

On the rostrum, team owner Ken Tyrrell celebrates with Jackie and Helen Stewart.

Counterclockwise from top left: The season went to Emerson Fittipaldi and a rejuvenated Lotus, but here at the Glen, Jackie Stewart (1) led home a Tyrrell 1-2 ahead of François Cevert (2). The team entered a third car for Frenchman Patrick Depailler (3), who finished seventh. Derek Bell (31) tried his best with the underpowered Tecno PA123, but the car DNFed in all five races it started. Ronnie Peterson (4) finished fourth.

Above: Sam Posey (34) acquitted himself well in a one-off ride in a Surtees TS9B, twelfth and first among the independents.

Top right: Newcomer Jody Scheckter was a revelation in a third McLaren, running fourth until a late spin.

Right: Jacky Ickx (7) likewise won one race, but the Ferrari 213B2 was beginning to show its age.

Above: On François Cevert (2) becoming his teammate, Stewart told *Motor Sport*, "We knew it was a matter of, 'Who's the best French driver available?' and Ken asked me to keep an eye on François. I thought François was the best." After a couple of seasons together, Stewart felt he had championship potential.

Right: Denny Hulme (19) won just one race (South Africa) but four straight podiums, including third here, to put him third in the final standings.

MONACO GRAND PRIX

June 3, 1973

Circuit de Monaco

3.278 km (2.037 mi)

Pole Position: Jackie Stewart (1:27.5)

Fastest Lap: Emerson Fittipaldi (1:28.1)

Winner: Jackie Stewart (+1.3)

The latest Derek Gardner–designed Tyrrell (5) is all the racecar Stewart needs. In Monaco, he ties Jimmy Clark on the all-time list with twenty-five victories. But Stewart (left) is hiding a secret only he, Ken Tyrrell and Ford's Walter Hayes know: he's planning to retire at year's end.

Above: Stewart's main rivals for the title will be Lotus aces Emerson Fittipaldi and Ronnie Peterson (2), here being chased by McLaren's Denny Hulme (7) and former McLaren mechanic Howden Ganley's (25) Iso-Marlboro.

Opposite top: It will be a lost year for Ferrari, with only one podium for team leader Ickx and Arturo Merzario (4), here running against Emerson's older brother Wilson (7) in the Gordon Murray design that will spark Brabham's revival.

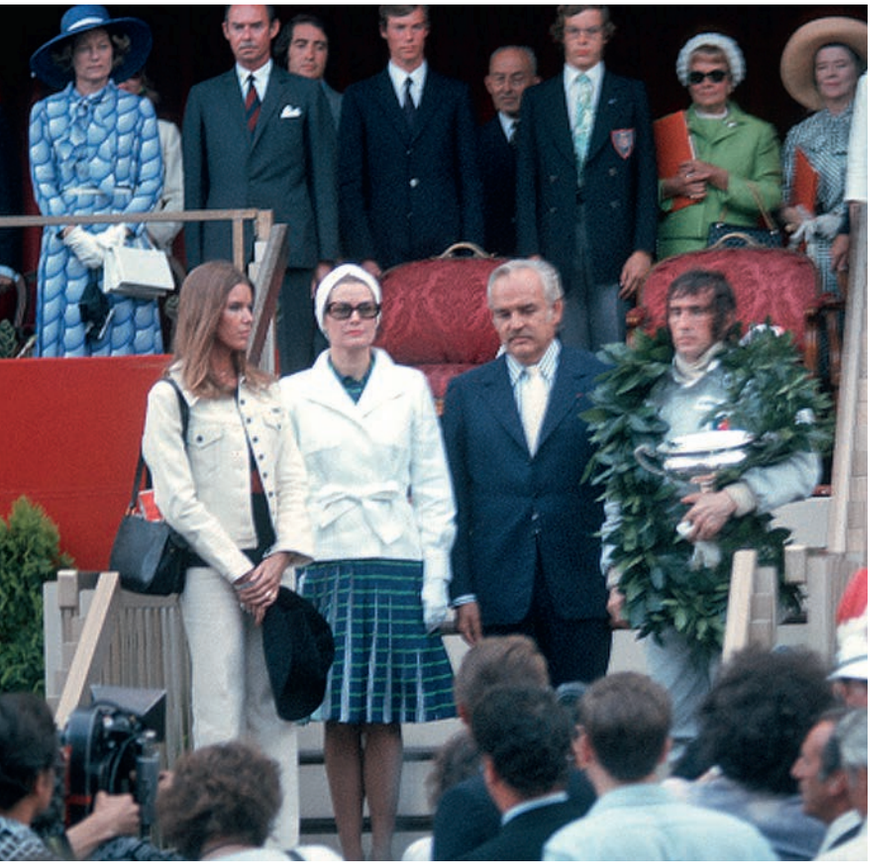
Opposite bottom: Jean-Pierre Jarier (14) and Carlos Pace (24) command their March and Surtees platforms. Cevert (6) will start and finish fourth.


lampes et appareil
lampe
auto
BRASIL
HEUER


STP
STP
STP
STP


24


elf
elf 6



Opposite and above left: Jackie and Helen Stewart enjoy another bottle of Moët and another meeting with Monégasque royals Prince Albert and Princess Grace.

Above right: Colin Chapman (center) will let his two drivers Peterson (right) and Fittipaldi race the season without team orders, helping Stewart to the title.

UNITED STATES GRAND PRIX

October 7, 1973

Watkins Glen

5.435 km (3.377 mi)

Pole Position: Ronnie Peterson (1:39.6)

Fastest Lap: James Hunt (1:41.6)

Winner: Ronnie Peterson (+0.668)

It was to have been Jackie Stewart's one hundredth and final race. But a crash during Saturday morning practice claimed the life of friend and teammate François Cevert (6).

Stewart was convinced Cevert simply lost control of the ultrashort-wheelbase Tyrrell over unforgiving bumps. Of Derek Gardner's Tyrrell 005/006, Stewart told *Motor Sport*, "I reckon I was at my peak in my last year, but I remember Emerson [Fittipaldi]—who was driving the Lotus 72—saying, 'I don't know how you drive that car . . .' He and I were fighting for the championship, so a lot of the time he was watching my car from behind, and he was right: it was a handful." Tyrrell boss Ken (right) was grooming Cevert to be the team leader in '74. The remaining cars for Stewart and Chris Amon (29) were withdrawn.

Ronnie Peterson (2), right and above, won a race-long battle with newcomer James Hunt (27). So closely fought was their battle that Hunt quipped afterward to the *New York Times*, "I got up nose to nose going around the first turn . . . but coming out of the turn, I decided to back off and not try to pass. He looked fiercer than me." Hesketh, Hunt's team, was one of the last old-school, rich-guy privateer teams. The team's only advertising was the patch on Hunt's overalls, "Sex: Breakfast of Champions."

Above: Two-time World Champion Graham Hill (12) had formed his own Embassy Hill team, using customer versions of Tony Southgate's Shadow DN1.

Left: The underfunded Surtees team made it difficult for Mike "the Bike" Hailwood (seated) to repeat the success of his boss, John Surtees (standing). Surtees remains the only man to win World Championships on two wheels and four.

The team's fortunes steadily improved, especially as Ecclestone gave more and more responsibility to brilliant young designer Gordon Murray, seen here conferring with driver Carlos Reutemann (7) at the 1976 Long Beach Grand Prix.

F1 MAVERICK

Bernie Ecclestone

If Colin Chapman was the front man for technical innovation in the Maverick Era, the man who may have been the most responsible for the sport changing from what it was to what it is is Bernard Charles Ecclestone.

Ecclestone was a driver before several accidents convinced him that his best opportunities lay outside the race car. He started managing other drivers in the late 1950s, notably Stuart Lewis-Evans. Later Ecclestone managed Austrian Jochen Rindt, who was torn between remaining with Brabham for 1969 and accepting an invitation from Chapman to join Lotus. Ecclestone told *Motor Sport* that he advised his client, "'If you want to win the World Championship, you've got more chance with Lotus than with Brabham. If you want to stay alive, you've got more chance with Brabham than with Lotus.' It wasn't a bad thing to say—it was a matter of fact. That was what the pattern was, for whatever reason: people did get killed in Lotuses."

In 1971, Ecclestone became a team owner when he purchased the Brabham team from Ron Tauranac. A sign of his maverick personality revealed itself when it came to deciding which people to keep and which to let go, when he singled out upstart designer Gordon Murray.

Together Murray and Ecclestone would win a number of races and eventually championships, but it was when Ecclestone formed the Formula One Constructors' Association in 1974 with fellow owners Colin Chapman, Ken Tyrrell, Max Mosley, Frank Williams, and Teddy Mayer that he really found his métier and transformed the sport. Rising to chief executive in 1978, he controlled F1's television rights, which propelled it to

After giving up on becoming a driver himself, Ecclestone began to manage others, including Austrian Jochen Rindt (8), who went on to become 1970 World Champion for Lotus.

new heights and made Ecclestone one of the world's wealthiest men. A worldwide television audience overnight made Formula One attractive to multinational corporations, and the money flowed in. We asked Ecclestone how the changes came about:

When you look back at the sport during the Maverick Era, what drove the major changes?

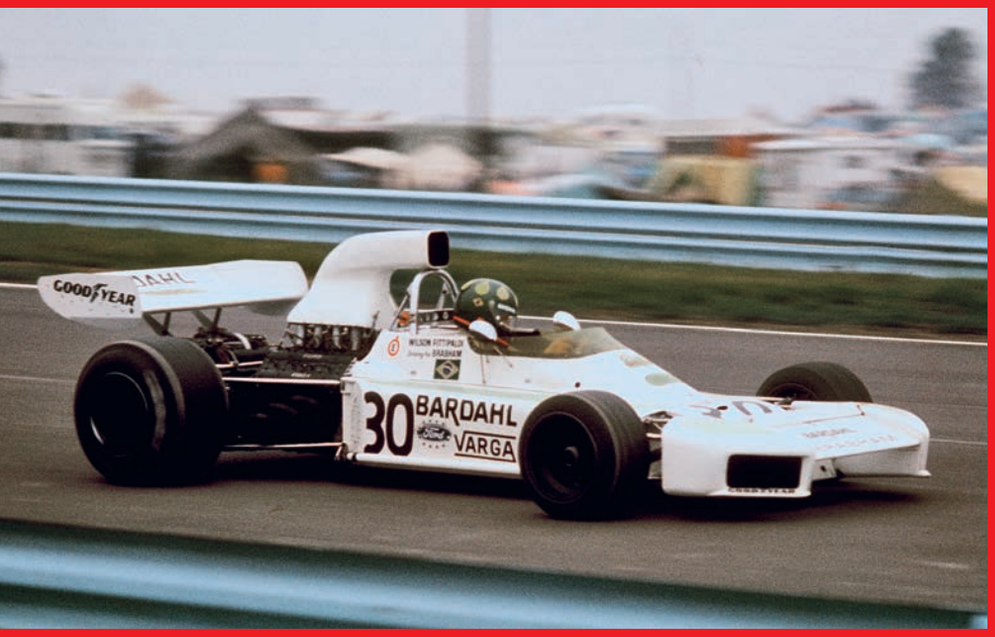
It could all be attributed to one very simple thing: a lot more money arrived in the sport.

How did the money get there, and how did it change the sport?

Basically, because manufacturers and a lot of larger companies came in and made more money available. And the minute you do that, whoever it's available to will spend it—in my opinion, not perhaps in the right way, but they spend it. And obviously the people who've got the money normally have got one ambition: to win. Not thinking long-term or anything, but they want to win. And that's what happens.

Where did the money come from? Are we talking about the first major sponsorships, like Gold Leaf with Lotus in 1968, or other types of backers?

People coming in who bought teams and invested in teams. *[Ecclestone purchased Brabham in 1971—Ed.]* Drivers who had friends that had a little money and sort of bought a seat for them. Plus the fact that I generated quite a lot of money, which went to the teams. But not really in that period, because it wasn't until the 1980s that we really started making a lot of money.



When he bought the Brabham team in 1971, it wasn't clear it would even survive. Here Emerson's brother Wilson Fittipaldi (30) wrestles with the Ron Tauranac- designed BT34 "lobster claw."

If sponsorship became prevalent in the 1970s, what changed in the 1980s?

Television. Worldwide television, which attracted people. We did a lot of things early on, but really it wasn't until the 1980s that it really caught on. And the other thing was, when I think we were most successful was when everybody had the same engine, the DFV (Cosworth) and the Ferrari. And it was a lot better. Now we've got—well, we don't want to talk about now! Things have changed.

Why were things better when you had the DFV and the Ferrari engines?

Genuinely different people. People owned the teams, like Colin Chapman and Lotus and Teddy Mayer with McLaren. We all owned our own teams. I owned Brabham. And it was an awful lot different. We could make decisions. What was good for the sport in general didn't hurt us and we could (proceed accordingly). . . . But nowadays it's all completely different. It's very corporate.

Talk a bit of the balance between the sport and entertainment. That changed during the Maverick Era as well.

Very much so. Very, very much so. People are always saying about the good old days and they don't even know when they are, but anyways. . . . People were there because they liked the sport and wanted to win. Didn't have massive egos, nobody was in it for any reason other than to win races if they could.

Designer John Barnard told us in the 1960s the driver was perhaps 50 to 60 percent of the equation. Today, the driver is about 15 to 25 percent of the equation. Do you agree that the role of the driver has changed? And if so, how did it happen?

The technology. The amount of money that's floating around. This allows the engineers to spend and makes the cars very, very sophisticated. Now I think you could take one of the guys at the back of the grid or more or less at the back and put him in one of the cars at the front of the grid and he may do just as well. And the opposite; you set one of those stars at the front, put them at the back, and they'd be in the same position. So in the end the answer is exactly what I said earlier: it's the amount of money that's come into the sport.

In the 1960s you had technology that people could see that made the cars different. Today it's largely invisible, and if you're not a PhD, it's a little hard to understand. What is the role of technology in F1, and how has it changed?

It's what I've been saying for a long time: nobody cares what's hidden. They don't see it and don't care. They want to see guys racing. Today, all the money that's being spent, or most of it,

goes into things that are hidden, that people can't see. So it's not something fantastic for the [fans].

Is there a cure?

No. It doesn't matter how much money comes into the sport, it's where the money is spent. If we [can't] find a good way to make the technical regulations so it doesn't matter how much money you want to put into the business, it ain't gonna help. Because you can't.

Safety changed tremendously during the Maverick Era. How important was safety to the sport going from where it was in the 1960s to where it is today?

Well, I think it's one of those things that happened (where) we couldn't keep losing people. And that's why [Dr.] Sid [Watkins] and I got together [in 1978] with the intention of making sure that if the inevitable accident happened, at least the drivers would be safe. [FIA president] Max Mosley got behind testing the cars and making sure the cars were much, much safer. Me and Sid, our position was making sure if there was an accident and if the guys got hurt, they could be looked after.

Half your collection of vintage F1 cars are from the 1960s through the 1980s. Is there anything special about that era compared to others?

These are cars that I've got a history with them. I've got the car that won James Hunt the championship and from when John Surtees won the championship. Those are the sorts of cars I like to collect. Maybe if I was still around in twenty years I'd be collecting the cars we've got today.

By the early 1980s, the Murray/Ecclestone tandem began to dominate, winning World Championships in 1981 and 1983. A big factor was Nelson Piquet (5). But over this period, Ecclestone began to concentrate more on his duties as the top man in Formula One, bringing giant success—and profits—to the sport.


GOODYEAR
HEUER
12
Agip
GOODYEAR
Agip

RED TEAM RISING

Emerson Fittipaldi was perhaps the first great driver Chapman let slip away. It may have been the costliest personnel decision he ever made. The Brazilian took his talents and his Texaco money to McLaren and immediately won the 1974 World Championship. Lotus immediately went into a swoon.

The title was contested primarily between three teams: McLaren, Ferrari, and Tyrrell. Now Lotus's lead driver, Ronnie Peterson won three races—the same number as Fittipaldi—but six retirements in the fifteen-race schedule left him fifth in the final standings. He only broke into the top five after the ninth race and never rose any higher.

The title chase was a close-fought thing through the first eight rounds. At that point, Fittipaldi led new Ferrari man Niki Lauda by a single point and Lauda's teammate Clay Regazzoni by three. Jody Scheckter, the new Tyrrell team leader after Stewart and Cevert were gone, was eight points back. Three races later, the deck was reshuffled. Regazzoni now stood atop the standings ahead of Scheckter, Lauda, and Fittipaldi, all of them separated by just seven points. Thereafter an appalling string of DNFs put paid to Lauda's and Scheckter's title hopes; the Austrian failed to finish any of the last five races. That left Regazzoni and Fittipaldi deadlocked at fifty-two points headed into the season finale at Watkins Glen.

In the end, it was a decidedly dramatic if unheroic finish to a Grand Prix season. Both of the main protagonists struggled. Fittipaldi soldiered home in fourth. Regazzoni came eleventh after several stops. It may not have been obvious at the time, but Regazzoni's last best hope of a World Championship was gone.

It was a euphoric moment, by contrast, for Team McLaren. Bruce's firm took both the Drivers' and Constructors' titles after

You can't keep a good scuderia down. Ferrari had last won a title in 1964 but was now about to embark on a run of four Constructors' Championships in five years.

nine years in the category. Difficult to appreciate today is just how few people were involved in the accomplishment. Team manager Alastair Caldwell:

I always like to tell people that I've got a nice photograph of the McLaren team—complete—outside the factory at the end of 1974 when we won the World Championship, we won Indy, we won the Formula 5000 championship, we won some Formula Two races with Scheckter. We built all the cars. We built five Grand Prix cars, because there were two teams. We built the Indy cars. We built the 5000 car. We built the Formula Two car.

The whole factory's outside and it's thirty-four people. That includes two tea ladies. There was almost more tea ladies than anybody else. Two tea ladies, an accountant, a receptionist, you had the works manager. . . . Thirty-four total employees to do all that and win all the races.

But if Fittipaldi was most deservedly the new champion, Niki Lauda was the new fastest man in Formula One. After years of struggling with inferior machinery, Mauro Forghieri's 312B3-74 was the newest chariot of the would-be gods. The Austrian put it on pole nine times. If they could find reliability, where might they finish in 1975?

First, it turns out. With a reliable car at last—he'd finish the 1975 campaign with just one DNF in fourteen starts, after suffering eight the previous season—Lauda won the championship going away. Once again he sat on pole nine times, finished first in five races, and set two fastest laps.

Lauda's cause was aided slightly at the Spanish Grand Prix on the Montjuich circuit when Fittipaldi refused to race because of the danger. As the reigning champion, the Brazilian had become a leader in track and driver safety issues. He'd done an inspection of the circuit a few days earlier and found guardrail sections that were just propped in place. Unbolted. When the organizers refused to act, Fittipaldi said he would do the opening lap, then retire the car. When he followed through on the threat, Jean-Marie Balestre and the FIA commission—which had declared the track safe—revoked his license and suspended him for three races.

Fittipaldi got on a plane and flew home to Switzerland. Fittipaldi told *Motor Sport*:

When I landed at Geneva airport, there was a TV crew waiting to interview me, I assumed because I'd walked away from the race. What I didn't know, what they wanted to ask me about, was Rolf Stommelen hit the barrier and was launched into the crowd. He had broken legs, wrist, and ribs, and four people in the crowd were killed. We wasted four lives for nothing. Montjuich was never used again and, of course, I heard no more from Balestre about my ban.

As always, progress on safety in Formula One came slowly and was paid for in blood. For a long time almost every safety change came about in reaction to tragedy. A small sampling:

Driver:	Accident:	Action:
Lorenzo Bandini	1967 Monaco Grand Prix	Discontinue use of hay bales.
Jochen Rindt	1970 Italian Grand Prix	Have medical team at races.
Jo Siffert	1971 Race of Champions	Require piped oxygen supply.
Mark Donohue	1975 Austrian Grand Prix	Recess helmet visors.
Ronnie Peterson	1978 Italian Grand Prix	Station medical director in safety car.
Elio de Angelis	1981 Practice Session	Ban flexible skirts.

Lauda and Ferrari looked set to repeat in 1976 and were well on their way to doing so until the German Grand Prix. At that point, Lauda led the title chase with fifty-eight points to Hunt's thirty-five. The Austrian's accident there would trigger one of the great comeback stories in sports, well-covered in a number of books and the 2013 Ron Howard film *Rush*. Lauda missed the next two races after Germany. He was back in the car for the Italian Grand Prix at Monza. At the final race of the year, in Japan, it rained heavily. Lauda took the start but then decided to retire. The team offered to say the car broke. He said no. His decision was his decision. Hunt thereby won the World Drivers' Championship. Ferrari took the Constructors' title.

These were heady times for the McLaren team. It also won the Indy 500 that season for the second time as a factory, third overall.

To crank up the drama in *Rush*'s cinematic retelling of the Hunt-Lauda battle, the filmmakers portrayed the pair as bitter rivals. They were, in fact, good friends. The movie men also left out a lot of the humor that was still part of the scene then. McLaren had arrived several days early at the Fuji finale. When Lauda walked over to say hi to James, he found that the radiator and engine intakes on the McLaren were covered with a fine mesh screen. McLaren, which had arrived in Japan several days earlier, explained that there were so many loose pieces of rock and gravel on the circuit that they had found it necessary to install ballistic screen to protect the radiators and injectors. Lauda immediately went back to Ferrari, which then spent half a day going into Tokyo to locate the necessary screening.

It was all a ruse.

There was no problem with rocks at the circuit, and by the time Ferrari had obtained their screen, McLaren had removed its own. Simpler times.

Lauda's accident had one more consequence that would change forever the character of the sport: for 1977 the Nürburgring and the other extralong circuits, like the 5-mile Charade and old 8.7-mile Spa, where it was difficult to provide adequate marshaling, were dropped or shortened. ■

1974 saw a short-lived resurgence of American makes, with Mario Andretti (55) behind the wheel of the Parnelli VPJ4 and Mark Donohue coming out of retirement to pilot the Penske PC1. Both entrants would fold their tents by the end of the 1976 season.

UNITED STATES GRAND PRIX

October 6, 1974

Watkins Glen

5.435 km (3.377 mi)

Pole Position: Carlos Reutemann (1:38.97)

Fastest Lap: Carlos Pace (1:40.6)

Winner: Carlos Reutemann (+10.73)

A season of change. Brabham hadn't won a race since Jack retired, but Gordon Murray's BT42 was a revelation, propelling Carlos Reutemann (7) to three wins.

Watkins Glen saw Emerson Fittipaldi (above) clinch the championship, breaking a tie with Ferrari's Clay Regazzoni heading into the final round. If anything, Regazzoni's teammate Niki Lauda (12) seemed a bigger reason for the team's newfound success, but DNFs in the season's final five races wasted his early-season brilliance. That kind of thing happened often. "Back in the days when I was covering racing, a 50 percent finishing ratio in a 200-mile race was perfectly normal," says Pete Lyons, who covered F1—exquisitely—in the mid-1970s for *Autosport* and *Autoweek*. "You just accepted it. I highlighted somebody one year; they had a finishing record of 54 percent in the season's races, and that was pretty good. They won the championship." Fittipaldi's teammate Denny Hulme (6) won the season opener, but thereafter had only one podium and decided to hang up his helmet at the end of the year.

Above: The very tidy McLaren M23 (5).

Left: A year after his last race, Jackie Stewart (dark glasses) confers with new team leader Jody Scheckter (center) and Tyrrell designer Derek Gardner (right).

Some of the Glen faithful give a shout out to now-broadcaster Stewart (top photo) while others root on his South African replacement Scheckter (bottom).

UNITED STATES GRAND PRIX WEST

March 28, 1976

Long Beach

3.251 km (2.02 mi)

Pole Position: Clay Regazzoni (1:23.099)

Fastest Lap: Clay Regazzoni (1:23.076)

Winner: Clay Regazzoni (+42.41)

Clay Regazzoni scored a rare grand slam: pole, fastest lap, and victory while leading every lap.

Above: New to the calendar for 1976 is the United States Grand Prix West through the streets of Long Beach, California.

Left: Dan Gurney won the support race for Grand Prix legends, including Juan Manuel Fangio (left) and Denny Hulme (right).

The support race showed just how much F1 technology had changed during the Maverick Era. Counterclockwise from top left: Fangio drove his front-engine 1954 Mercedes W196. Jack Brabham (24) was reunited with the rear-engine Cooper that began the sea change. Maurice Trintignant (33) competed in period-correct headgear.

Right: Defending World Champion Niki Lauda (1) brought his Ferrari 312T home second. The Austrian had four wins and two seconds in the season's first six races.

Bottom left: Chris Amon (22) came eighth in the Ensign.

Bottom right: Ronnie Peterson (10) qualified sixth for March, finished tenth. Tyrrell's Patrick Depailler (4) finished right behind the two Ferraris.

UNITED STATES GRAND PRIX

October 10, 1976

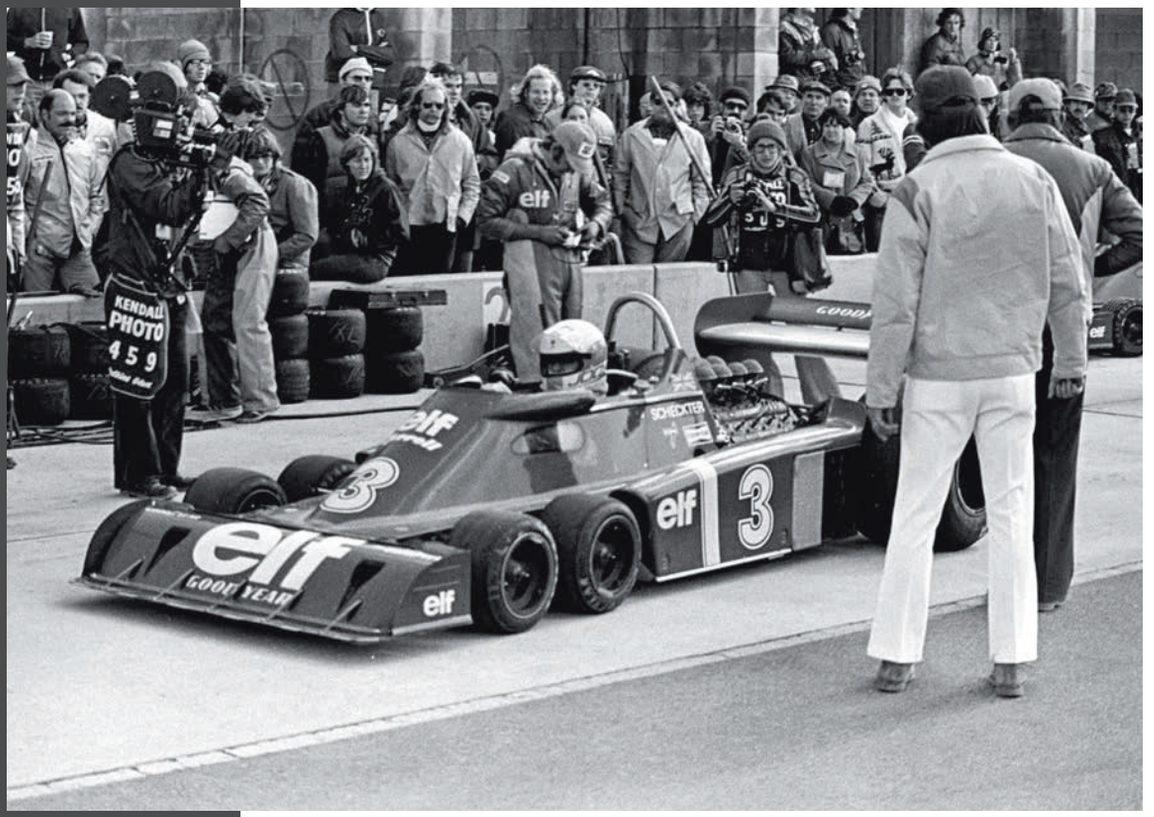
Watkins Glen

5.435 km (3.377 mi)

Pole Position: James Hunt (1:43.62)

Fastest Lap: James Hunt (1:42.85)

Winner: James Hunt (+8.03)



James Hunt (right) needed to win here to keep his title hopes alive by outscoring defending World Champion Niki Lauda. He did so by winning from pole and setting fastest lap, heading to the season finale at Fuji just three points in arrears. Jody Scheckter (3) had little love for Derek Gardner's most audacious design, the six-wheeled P34, but he scored one victory and four seconds, including here at the Glen.

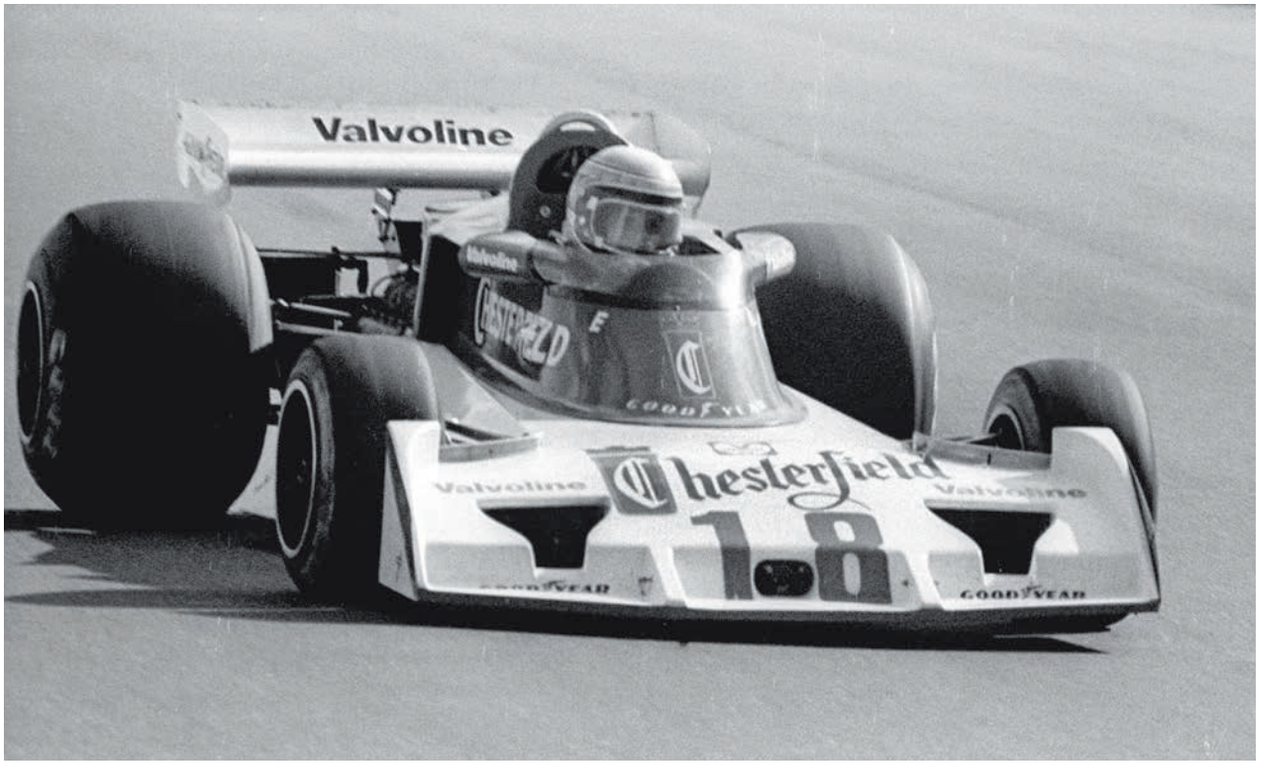

James Hunt
AMS


Marlboro

Opposite and bottom left: When Gordon Coppuck's McLaren M26 struggled initially, the team continued with the updated M23 (11), still a force to be reckoned with in James Hunt's hands.

Left: The crew, led by Teddy Mayer (looking at clipboard), waits for their man.

Bottom right: Hunt enjoys the fruits of the weekend's labors.



Reliable aero data is still hard to come by, so teams still experiment with very different aero packages. Irishman John Watson's Penske PC4 (28) uses a wedge-and-canards nose similar to the Lotus 72 and McLaren M23. American Brett Lunger's Surtees TS19 (18) deploys a sports car-style nose. Arturo Merzario's Williams FW05 (20) and Jacques Laffite's Ligier-Matra JS5 (26) split the difference, with wing sections for downforce and fairings intended to smooth airflow over and around the tires. Even Mario is having difficulty making the Lotus 77 (5) stick. The new rolling ground plane in the Imperial College wind tunnel will help Lotus, then Williams make major breakthroughs—and begin the great homogenization of body shapes.


20

F1 MAVERICK

Mauro Forghieri

When we asked 1979 World Champion Jody Scheckter to what he attributed Ferrari's stunning resurgence from 1975 through 1983, a period during which Ferrari won six of nine Constructors' Championships and three Drivers' titles, he responded with two words:

Mauro Forghieri.

He is not alone in his esteem for the Italian engineer. Forghieri had come to Ferrari in 1960 and was put in charge of all motorsports activities the following October.

He was twenty-six.

"I was scared," Forghieri told www.F1i.com. "And I told Ferrari so, but he reassured me by saying he was behind me. He taught me that you never have to feel defeated beforehand."

His talent manifested itself quickly, through designing the Ferrari 158 with which John Surtees won the 1964 championship. As time went on, his maverick mindset showed itself more and more. Forghieri was the first to put a wing on a Formula One car. At the 1968 Belgian Grand Prix, wrote *Motor Sport*'s Denis Jenkinson, "Ferrari came out with an elaborate aerofoil mounted high above the gearbox like a miniature Chaparral." Not just a wing, but a movable one like the Chaparral, although activated by the transmission rather than a separate pedal. Ever the skeptic, Jenkinson posited that any benefit to this aerodynamic apparatus was "purely psychological."

Apparently it had a beneficial effect on Amon's psyche; he put the Ferrari on pole by *3.7 seconds*.

Despite his inventiveness, the later 1960s were dry times for Ferrari. Although the various V-6 and V-12 engines sounded glorious, they struggled against the all-conquering Cosworth. Which is why Forghieri commenced to build the flat-12 "Boxer" engine. Amon, a Forghieri fan but impatient for a car he could win with, left at the end of 1969. He could sense the potential of the Boxer, but it kept blowing up during testing.

"Ferrari's problems were ongoing, and I honestly believed I couldn't get anywhere in F1 without a DFV," Amon told *Motor Sport's* Simon Taylor. "So I told Ferrari I'd changed my mind [about continuing]. It was the biggest mistake of my life, but frustration does that to people. I said to the Old Man, 'You know how things have been, and I can't go on putting all my effort into this.' 'All right,' he said, 'but I'll win a Grand Prix before you do.' He was right."

Forghieri's flat-12 engine would put Ferrari back at the sharp end of the grid for more than a decade. Chapman's new wedge-shaped, hip-radiator, torsion-barred Lotus 72 grabbed all the attention and the championship in 1970, but the more conventional-looking 312B was arguably its equal. Only horrible reliability in the first half of the year kept Jacky Ickx from mounting a stronger challenge. As it was, from the French Grand Prix on, Ferrari won five of eight poles and set six of eight fastest laps—including the last six races in a row.

His 312T, which debuted in 1975 and was in its fifth iteration during the 1980 season, was the dominant car of its lifespan, scoring twenty-seven wins and sixty-one podiums in just ninety races. The T stood for *trasversale*; its transverse gearbox could be located ahead of the rear axle for a lower polar moment.

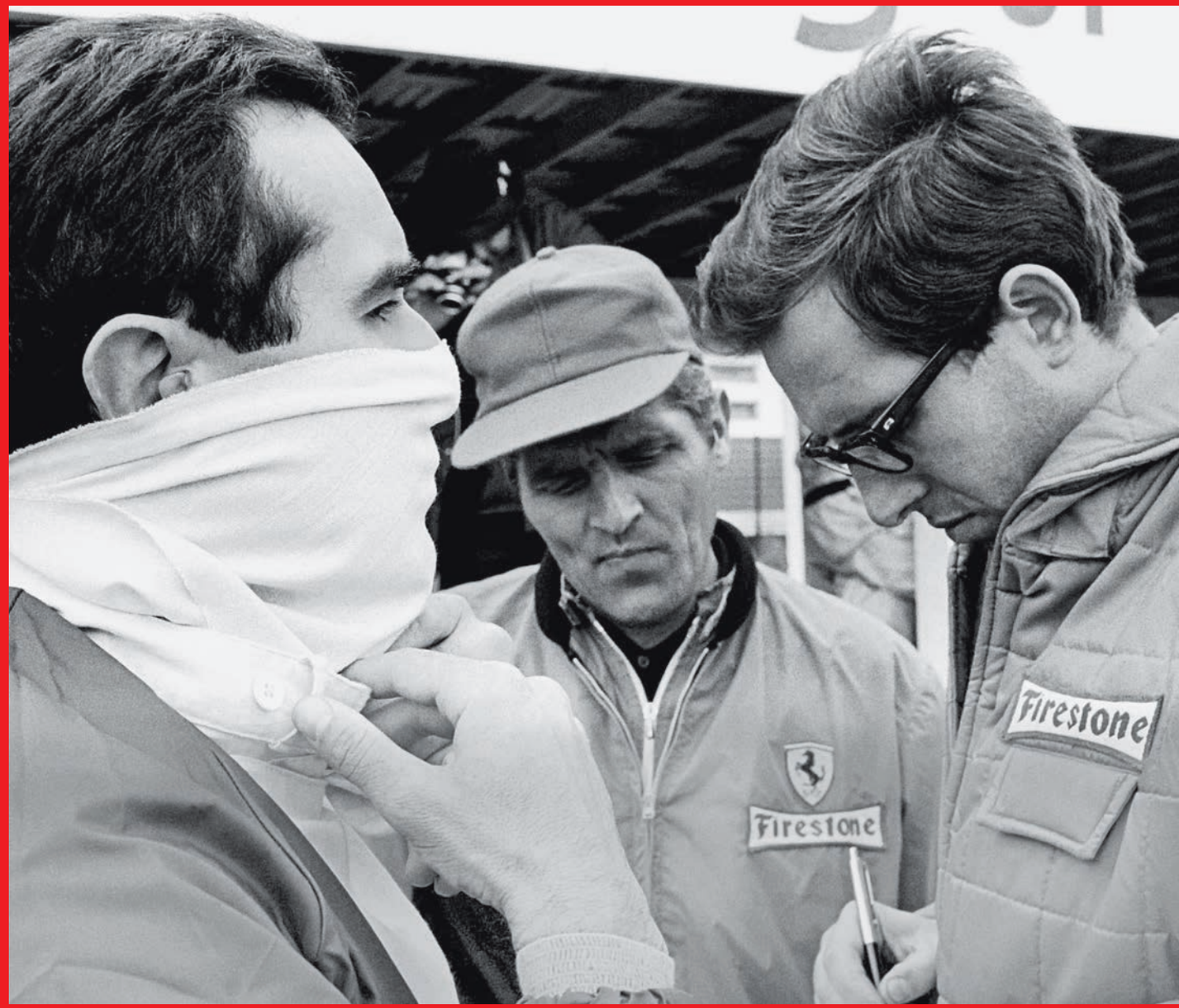
Forghieri's record is unassailable. From 1975 through 1983, Ferrari won six of nine Constructors' Championships

(1975–1977, 1979, 1982–1983) and three Drivers' titles (1975, 1977, 1979). Had Niki Lauda decided to race in the season-ending Japanese Grand Prix in 1976, it might have been four.

Forghieri spoke about the nature of Formula One during the Maverick Era in a 2013 www.Petrolicious.com interview:

> **In that era—say from roughly 1962 to 1980 or 1984—racers had to be men before they were champions. Do you understand what I mean? Drivers ate with mechanics and technicians; it helped maintain a friendly, familylike atmosphere. Today, there is too much money involved, and sponsors have destroyed the spirit of the championship.**

Ferrari would not win another championship until Ross Brawn and Michael Schumacher arrived on the scene in the late 1990s.



Forghieri (right) takes notes as driver Lorenzo Bandini (left) describes what the Ferrari is doing.


John Player
John Player Special
6
Valvoline
Valvoline

CHAPTER 10: 1977

SOMETHING FOR NOTHING

The single greatest advance in vehicle performance during the Maverick Era was downforce. It began in earnest with wings (thank you, Mr. Hall) and progressed from there.

But the key to the next great advance in downforce was the development of better wind tunnels. Wind tunnels are inherently artificial. Developed originally for aircraft, they differ from real life by having the aircraft stationary and having the wind moving.

When racers and manufacturers started using them to determine the aerodynamic efficiency of vehicles, they simply sat the vehicles on the wind tunnel floor and blew air past them.

This introduced distortion in at least two areas that people hoped would have made no difference. One, in the real world, the road was moving in relation to the vehicle. Two, the tires were rotating. Turns out both things matter. Especially with a Formula One car with exposed tires. This only became apparent in the mid-1970s with the introduction of moving ground or floor planes. That's right. Now when they turned the air on in the wind tunnel to, say, 100 miles per hour, they were able to have the "road surface" (actually a large conveyor belt) move at the same speed. Tony Southgate was one of the premier designers of the period and one of the first to understand and exploit this new development:

When wind tunnel testing you are after the most accurate performance figures and the best that can be recorded about your new race car. That way you can calculate the on-track performance of the new car. Wind tunnel testing did not get going bigtime in F1 until the 1970s (in the UK). Until then the car's designer was responsible for the aero shape, basically producing aesthetically pleasing shapes. Wind tunnel models were quite basic at the beginning, but with the advent of the moving floor plane the model had to become much more realistic, featuring suspension, full

The World Championship-winning Lotus 79 was the team's second ground-effect car. "We should have won the championship with the 78 in 1977," said aerodynamicist Peter Wright, "but we had engine problems."

water and oil systems, etc. The result was very accurate downforce and drag forces plus the very important center of pressure or pressure distribution to the front and rear axles.

The moving floor was introduced in 1975. I was the first in the UK to develop a new design using it. The car was the Shadow DN5, which when it first appeared was aerodynamically the best car on the grid.

The greatest reason for this was that the center of pressure was completely different when measured with the floor moving, 10 to 15 percent less on the front axle, so I simply reengineered the distribution by creating larger front wing sections and downforce-generating nose shapes. The wing sections were also at an advanced level.

The comparison was very easy to check; you simply switched the floor off when running the tunnel to get the old figures.

Imagine designing a race car suspension and not realizing the engine should be 10 to 15 percent farther fore or aft than it was. Imagine plotting the trajectory of a lunar mission and not only being 10 to 15 percent off, but not realizing it until your man was on his way to the moon. That's the way it'd been for racing designers prior to moving ground planes.

Race car builders had been putting their designs in the wind tunnel for years, only to get to the track and find that the cars often didn't behave the way they expected. This was famously the case with the Ford GTs of the mid-1960s. When testing at Le Mans, Gurney said, "You need to fix this, the front wheels are lifting off the ground on the Mulsanne Straight." "Nonsense," one of the engineers said, "This car was tested in the wind tunnel. There's no lift." Whereupon Gurney invited the engineer to ride with him for a lap. When he got out of the car, the now very ashen-faced engineer turned to the other Ford people in the pit and said, "We need to fix this. The front wheels are lifting off the ground."

Moving ground planes made wind tunnels much more reliable for race car development.

The problem with downforce was that it usually came at a great cost in drag. Jim Hall introduced movable wings to his cars when he realized that fixed spoilers and air dams cost almost as much speed on the straightaways as they provided in the turns.

Thus began the search for "free" downforce. Using the air in such a way that it didn't incur a severe drag penalty. One solution was the Chaparral 2J "vacuum cleaner" of 1970, whose powerful fans created constant downforce with minimal drag. It was quickly outlawed but not forgotten. When Southgate went to work for Lotus in the mid-1970s, one of the first things Colin Chapman asked him to explore was a way to achieve fan-driven downforce within the existing F1 rules. It never went beyond the idea stage. (It would take until 1978 for Gordon Murray to crack the code, as you'll read in the next chapter.)

The next great advance came when Peter Wright and others went to the Imperial College wind tunnel to measure the effectiveness of the new Lotus 78. The side pods on the wind tunnel model kept sagging, giving inconsistent results, so they added card stock to keep them an exact height off the surface. The card stock served as side skirts, and the downforce numbers went through the roof. Lotus was exploiting the Bernoulli Effect, which describes the decrease in static pressure as airflow speed increases. The shape of the underside of the side pods promoted it. Massive downforce with relatively little drag.

The results were so staggering and the cause so easy to keep hidden that Lotus launched a disinformation campaign to distract the other teams from the side pods. Their newfound speed, Lotus leaked to selected pressmen, was due to a revolutionary new transaxle . . .

You would think that the first ground-effect car would have dominated. It did and it didn't. Andretti's Lotus 78 took seven poles in the season's seventeen races, one more than McLaren's James Hunt. And he registered four wins, also more than anyone else. But a series of DNFs caused in part by Chapman making a special deal with Cosworth to run more powerful but unproven development engines gave the once again impeccable Niki Lauda and the Ferrari 312T2B the Drivers' and Constructors' titles. Lauda left the team with two races to go—Maranello politics again—but had already clinched his second World Championship.

Jody Scheckter finished seventeen points aft of Lauda in the blue-and-gold Wolf, which had been the surprise of the early season before a rash of DNFs midyear. In one eight-race stretch, Scheckter failed to finish six times.

In other news, Alan Jones piloted the Shadow to the marque's first and only F1 victory. What was impressive about it was that Don Nichols' upstart team had now won in every category in which it had competed: F1, Can-Am, and Formula 5000.

At Lotus, there was a fair argument for just bulletproofing the 78 for the following season, but Chapman decided to pull out all the stops and develop a new car, the 79, and forego the development engines. In retrospect these were both excellent decisions.

How important had that moving ground plane been in discovering ground effect? This story from Peter Wright provides an indication. He told *Motor Sport*:

> **We heard that when the type 78 came out, Ferrari built an equivalent version and tested it in a tunnel in Italy. I'm not sure which one, possibly Pininfarina, but without a rolling road, and they said, 'Ah, it doesn't work.' So yes, if you don't have a rolling road, you will definitely get the wrong airflow conditions underneath the car.**

More than Ferrari had failed to grasp where the Lotus's advantage lay. ■

UNITED STATES GRAND PRIX WEST

April 3, 1977

Long Beach

3.251 km (2.02 mi)

Pole Position: Niki Lauda (1:21.65)

Fastest Lap: Niki Lauda (1:22.75)

Winner: Mario Andretti (+0.773)

Second-row qualifier Jody Scheckter's (20) Wolf WR1 rockets past first and second qualifiers Niki Lauda (11) and Mario Andretti (5). But it's Lotus's day. Mario will become the first American to win a Grand Prix on home soil and score the first victory for the new ground effect Lotus 78.


THE MOVIE
ADULTS ONLY
"SATAN WAS A LADY"
&
"TEENAGE SEX KITTEN"
MARIO
25 2


PROFESSIONAL
TV
SALES · SERVICE
RENTALS
GINO'S
Beauty
SALON
LIQUOR
Marlboro
TEXACO
Marlboro
1
GOODYEAR
FINA
7
MARTINI
BRABHAM
GOODYEAR
TOYOTA
YOU ASKED FOR IT.
YOU GOT IT.
Marlboro
INSTRUMENTS
Player Special
5

Above: Shadow would have a star-crossed season. Many felt it had a future champion in Tom Pryce, killed senselessly in South Africa when a marshal ran across the track. But later it scored its first and ultimately only F1 win when it convinced another future champion, Alan Jones, here turning down Linden Avenue, to give F1 one more try. "Pryce was killed at Kyalami, and [team manager] Jackie Oliver came on the phone," Jones told *Motor Sport*. 'What are you up to, Alan?' 'Nothing much.' 'Come and drive for Shadow.' 'Well, trouble is I've got this contract with Surtees.' 'Let me handle that,' said Jackie. I don't know what happened, but he did handle it, and I became a Shadow driver for 1977. [Shadow owner] Don Nichols was a bit different—anybody who wears a black hat and a black cape is a bit different—but Alan Rees was a good team manager, he made things happen. We had a podium at Monza and a couple of fourths. And I won the Austrian GP."

Left: Mario (5) was fortunate to escape the first-turn accident that launched defending World Champion James Hunt's aged McLaren M23 (1) high into the air. Amazingly, Hunt soldiered on to finish just out of the points in seventh. As part of his duties at Long Beach, lensman Biro was in charge of the photographers. Friend Dale von Trebra asked him where he should shoot the start. "Outside of the first turn," said Biro. That's where von Trebra captured this iconic image. *Dale von Trebra*


CD-2
STEWART-WARNER
INSTRUMENTS
CD-2
LIQUOR
TV
RENTALS

The brainchild of former travel agent Christopher Robin Pook, who was convinced Southern California could support a Monaco-like race through the streets, the Grand Prix of Long Beach drew large crowds. Converting the streets into a racecourse was an enormous undertaking, but the event helped revitalize the city and remains a fixture to this day, albeit as an Indy car race since 1984.

F1 MAVERICK

Peter Wright

There was a time when F1 careers could start like this:

I did engineering at [Cambridge] University, but I contacted Tony Rudd at BRM during my second year, and asked him if I could come and work for BRM. And he said, "No, you don't want to do that."

I said, "Yes, I do."

He says, "Oh, sod. I suppose you better come see me."

Rudd offered Wright a "summer vacation," what nowadays would be called an internship. Wright dug into his work there, and Rudd offered him a job as his personal assistant. He started full-time in 1967. He was twenty-one. Formula One during the Maverick Era.

The timing was auspicious. The following year BRM, like the rest of F1, was concentrating more and more attention on downforce. Something Wright was especially suited to, because he'd specialized in aerodynamics and thermodynamics at Cambridge. So when Rudd was asked to develop BRM's capabilities, "Tony just pushed the whole lot across his desk at me one day," Wright remembers. "He said, 'Wright, you can deal with all this.' John Harvey came up from the Imperial College and said, 'I think you guys need a wind tunnel.' And Tony said, 'Oh, yeah, I suppose. Yeah, Peter, go have a look! Find out what that's all about!'"

Wright spent crucial time testing out new ideas in the Imperial College wind tunnel, which was named for land speed record holder Donald Campbell. The 5-by-4-foot tunnel was suitable for scale models, not full-size cars, and its moving ground plane was still years away. But it was the best wind tunnel around.

It was Rudd who encouraged Wright to look beyond the wings then beginning to sprout on race cars around the world.

"Tony Rudd said, 'I don't like wings. I don't think they're a safe, nice thing. They shouldn't be on a racing car. Find another way of doing it,'" says Wright. "That's what [inspired] me to try and figure out a way of using the whole body of the car to create downforce."

Wright spent time in the Imperial College wind tunnel developing what he described in his excellent 2001 book *Formula 1 Technology* as "stubby, airfoil-section side panniers." Basically, airfoil tanks between the BRM's front and rear wheels. The initial tests were inconclusive, and then there was a regime change at BRM that saw Rudd leave for Lotus. Wright went to Specialised Mouldings, which was doing work on composites.

While there, Wright developed the graceful airfoil-section supplemental fuel tanks for Robin Herd's March 701. "But that was all without the benefit of wind tunnels, it was just off the top of my head, my concept of aerodynamics," says Wright. As with the panniers on the BRM, there was no clear gain in downforce, but Mario Andretti remembers under certain conditions where suspension loading brought one of the tanks in close proximity with the road surface there seemed to be a sudden, marked gain in traction.

Fast forward to 1976. Rudd is still at Lotus. Wright has just moved there, and Chapman has tasked both of them, in conjunction with designer Ralph Bellamy, with exploring new low-drag downforce systems for the upcoming Lotus 78. So

Wright and Bellamy went off to the same Imperial College wind tunnel, with its newly installed moving ground plane, armed with a quarter-scale model of the 78. By now, Wright had sensed that having a moving ground plane and rotating wheels was essential to generating effective results from wind tunnel testing.

We set up a very fundamental research program, we said, "What do we want ahead of the front wheels that will create the most downforce? Do we want wings, do we want a full-width nose? What do we want?" And we saw immediately that wings, as they approach the ground, worked better and better. Which was the first clue.

Then they looked at the center section of the car. Part of the concept of the 78 was to have a very narrow chassis, so Bellamy needed to add more fuel tankage and cooling.

All right. "So, why don't we make some streamlined side pods?" Airfoil-section side pods, put some fuel in them and put the radiators in them. And back we went to the tunnel.

Suddenly they were getting wildly inconsistent readings. Wright noticed the side pods were sagging and wondered if they needed to be propped up to their intended height.

We braced them and put some cards along to close the gap between the edge of the side pod and the floor, just leaving a tiny gap, and bingo! The results were so dramatic we didn't believe them. We had to do it about three times.

Wright, Tony Rudd, and Ralph Bellamy created the first ground effect race car. *Courtesy of the Revs Institute, Eric della Faille Photograph Collection.*

What they'd improvised simply to keep the side pods from drooping was what we now know as skirts. These prevented the massive suction created by the ground effect from bleeding into the atmosphere. Another innovation pioneered by Jim Hall, on the Chaparral 2J "vacuum cleaner."

Developing skirts that worked was the other half of ground effect. So once you have the aerodynamics right, then you've got to make the skirts work. That was a really fun time, because every time you made an improvement to skirts, the drivers came in and said, "Bloody hell!" They went a second a lap quicker.

A new age in downforce was born. It took the better part of a decade, but that was nothing to discover the racing equivalent of El Dorado. Downforce without the cost. Today, downforce is a fundamental design consideration of every major type of racing vehicle, from Formula One to Le Mans to Top Fuel dragsters and NASCAR stock cars.


TOYOTA
Valvoline
Valvoline
5

CHAPTER 11: 1978

MARIO'S YEAR AT LAST

Mario Gabriele Andretti's Formula One dreams began in 1954 watching Ascari and Fangio, winners of seven of the first eight World Championships, dueling at Monza. Now he was back at Monza, on the grid for the 1978 Italian Grand Prix, starting from pole, with one hand on a championship of his own. So superior was Colin Chapman's ground-effect Lotus 79 that only the 1967 Daytona 500 and 1969 Indianapolis 500 winner's great friend and teammate, Ronnie Peterson, was still in contention with three races left, and "Super Swede" Peterson was twelve points back. Furthermore, unlike 1973, when Lotus teammates Fittipaldi and Peterson raced to the end, there were team orders in place, meaning Mario would win the title barring a catastrophe.

Peterson, thirty-four, had agreed to the terms and honored them. When friends would point to races Peterson might have won, as if to say maybe he should have ignored the agreement, he would shut them down. A deal was a deal. Besides, Peterson said, it was Mario who'd done the lion's share of the development. The American, now thirty-eight, was a major reason the car was in a position to win. Mario had earned his number one status. My time will come, said Peterson.

Only sometimes one's time never comes.

The start of the race was chaotic. The rear of the grid was still forming when the starter gave the signal to *go*. Big mistake. Too many cars, too little space. Peterson speared into the barriers and sat trapped in his burning car, his legs badly damaged. As was too often the case back then, it was not the officials but fellow drivers who pulled him from the flames. Had we learned nothing since Roger Williamson? Peterson died of an embolism the following day.

Mario Andretti (5) started the season with the trusty Lotus 78, but when the 79 arrived, it would carry him to his first and Chapman's final World Championship.

Andretti:

The 1978 Italian Grand Prix in Monza had huge significance for two reasons:

First, I was back in my native Italy, in the exact place where the dream began for me. Monza is where I saw my first-ever race at age fourteen.

Second, this race was going to determine the Formula One World Champion. It would either be me—or my teammate and best friend Ronnie Peterson. At the start of the race, there was a horrific crash.

I won the World Championship that day . . . Ronnie Peterson died. It should have been the happiest day of my life. My lifelong dream had come true. I was World Champion. But Ronnie was dead. The combination of triumph and tragedy was unbearable.

So dominant was the new Lotus 79 that season that Andretti and Peterson still finished one-two in the Drivers' Championship, despite Peterson missing the final three races. Lotus won the Constructors' title going away. Ferrari, a distant second. Lotus won half the season's sixteen races, took eleven poles, and set six fastest laps. What Ralph Bellamy, Tony Rudd, and Peter Wright had theorized in the Imperial College wind tunnel was now proving itself the future of Formula One.

Carlos Reutemann had replaced Lauda at Ferrari and finished what could only be a disappointing third for Forghieri and the Prancing Horse crew despite four wins. Lauda, now ensconced as team leader at Brabham, came fourth.

For drivers like Jody Scheckter, who looked like a championship contender at Walter Wolf Racing when the Lotus 78 arrived on the scene, there was now the unwelcome realization that they wouldn't stand a chance without a ground-effect car of their own.

"You'd do twenty laps," Scheckter remembers with a chuckle, "and [the Lotuses] would be two seconds or quicker than you straight away, and from then on, that's what it stayed. And after, they'd say, 'Oh, look how [the Lotus driver] drove. He's so fantastic, he doesn't slide the car or anything.' Thanks a lot."

Which brings up another big change that ground effect introduced: the cars didn't move around anymore. Throughout the history of the sport, part of the thrill of spectating was watching different drivers' techniques through the turns. Before the advent of wide tires, all the cars "drifted" through corners. Even when slicks came in, there were still drivers like Jochen Rindt, Ronnie Peterson, and Hans Stuck Jr. who cornered in dramatic tail-out fashion. But ground effect worked best when the car was pointed as straight as possible; the great, graphic slides disappeared. And by their nature, ground-effect cars were more upset following other cars, so overtaking dropped off dramatically. That quickly, the great spectacle that was Formula One became a lot less spectacular. And it's never recovered since.

It was Lauda and Brabham who—briefly—posed the greatest threat to Lotus's newfound hegemony. As soon as Brabham recognized why the Lotus was so fast, they realized that not only did they need to build a ground-effect car of their own, but that even if they did so, its aerodynamics would be compromised in a major way by the girth of their flat-12 engines.

The team's South African–born designer, Gordon Murray, still just thirty-one, applied his trademark lateral thinking to the problem: an ingenious workaround of the F1 rule prohibiting movable aerodynamic devices. The resulting car was not just competitive with the Lotus; it was demonstrably faster. It won its one race, that year's Swedish Grand Prix, going away. After

Sweden, winning driver Niki Lauda was just eleven points behind Andretti with eight GPs still on the calendar.

The other teams were up in arms. Colin Chapman was furious. He led a protest of the new Brabham, just as McLaren had protested the BT46B's inspiration, Jim Hall's Chaparral 2J "vacuum cleaner," eight years earlier, but this time to no avail. The Brabham may have exploited a loophole in the regulations, but it exploited it well. The BT46B, the FIA affirmed, was perfectly legal.

Then, just as suddenly as it appeared, it was gone.

Brabham owner Bernie Ecclestone explains his thought process:

Well, it took us, Gordon probably told you, a couple of months really to develop that. Went through a lot of problems. Somebody like Chapman could have probably done it quicker, because we learned and then they would have learned from us what not to do or what to do. We would have had an advantage maybe for another couple of races, then everyone would have caught up. And the cars then would've been so quick, it would have been dangerous. So I thought the best thing to do (was to) save people spending an awful lot of money to get where we were and take the risk to withdraw it, so we withdrew it. Gordon wasn't at all happy with the fact that I withdrew the car, but never mind. That's what we did.

Furthermore, the FIA already had announced it intended to close the fan car loophole for the following season, which meant even if the advantage remained through the end of the year, that was it.

What undoubtedly influenced Ecclestone's thinking more was his still-solidifying role as head of the Formula One Constructors' Association. He'd just been named the group's chief executive. He was the point person for the increasingly lucrative television rights that over time would make him and the other team owners extremely wealthy men. Alienating the other owners would risk more in the long run than winning a few races might gain in the short.

Thus, Mario Andretti had his first Formula One World Championship.

Colin Chapman had his first Constructors' Championship since 1973.

Few who watched the black-and-gold Lotus 79s slash across the racetracks of Europe and beyond that season, wheeled by Super Swede and Super Mario, could imagine it would be Chapman's last. ▚

UNITED STATES GRAND PRIX WEST

April 2, 1978

Long Beach

3.251 km (2.02 mi)

Pole Position: Carlos Reutemann (1:20.63)

Fastest Lap: Alan Jones (1:22.21)

Winner: Carlos Reutemann (+11.061)

Reutemann will win here, edging Andretti, and finish third in the championship.

Pete Biro was one of the original staff members of the Long Beach Grand Prix Association. When he learned of plans to hold a victory banquet Dinner in the just-completed exposition hall of the Long Beach Convention Center (circular building) , he said, “Good luck. You won’t have the winning driver there. Soon as the flag falls and they get out of their cars, they’re off to the airport for the first flight home.” But Pete had his own maverick moment. “I had to do something,” Pete says. “They had sold out the banquet. I went to the Ferrari chief engineer, Mauro Forghieri, whom I had gotten to know at the Mexican Grand Prix a couple of years earlier. He was dating the daughter of my friend Fred van Beuren, and I was staying at the Van Beuren home. I told Mauro the problem and we came up with the following idea. He would have the chief mechanic drive the Ferrari right into the dining area, right between the tables, accompanied by the entire Ferrari crew. The problem was, however, that it was against the law to fire an engine inside the building, and if I asked my boss, Chris Pook, he would have to say no. I have to tell you, when that Ferrari lit the tires and came into the room at 10,000-plus rpm, it raised the hair on everyone’s neck!”

MONACO GRAND PRIX

May 7, 1978

Circuit de Monaco

3.312 km (2.057 mi)

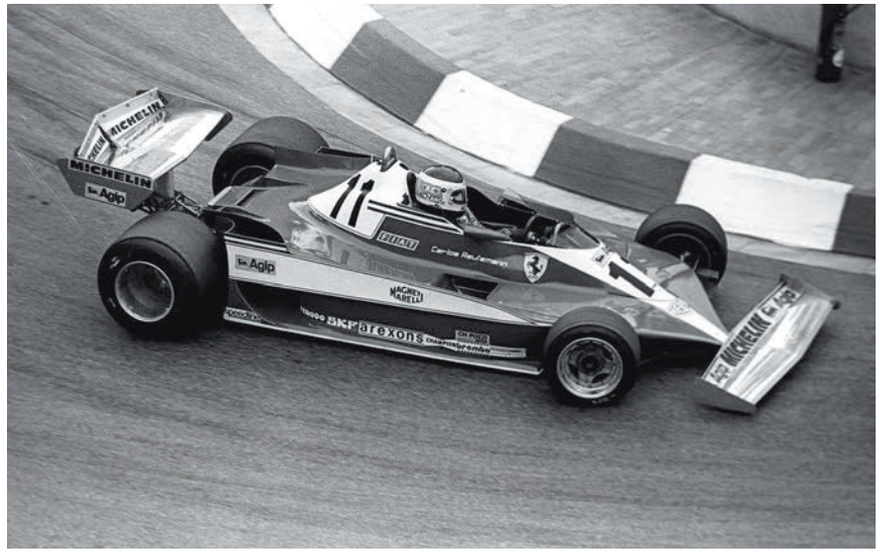
Pole Position: Carlos Reutemann (1:28.34)

Fastest Lap: Niki Lauda (1:28.65)

Winner: Patrick Depailler (+22.45)

The 1978 season will be remembered for the dominance of the new Lotuses and multiple wins by Ferrari's Carlos Reutemann and Brabham, but at Monaco a very different winner prevailed. The Grand Hotel Hairpin is one of the most famous turns in racing—and also one of the slowest.

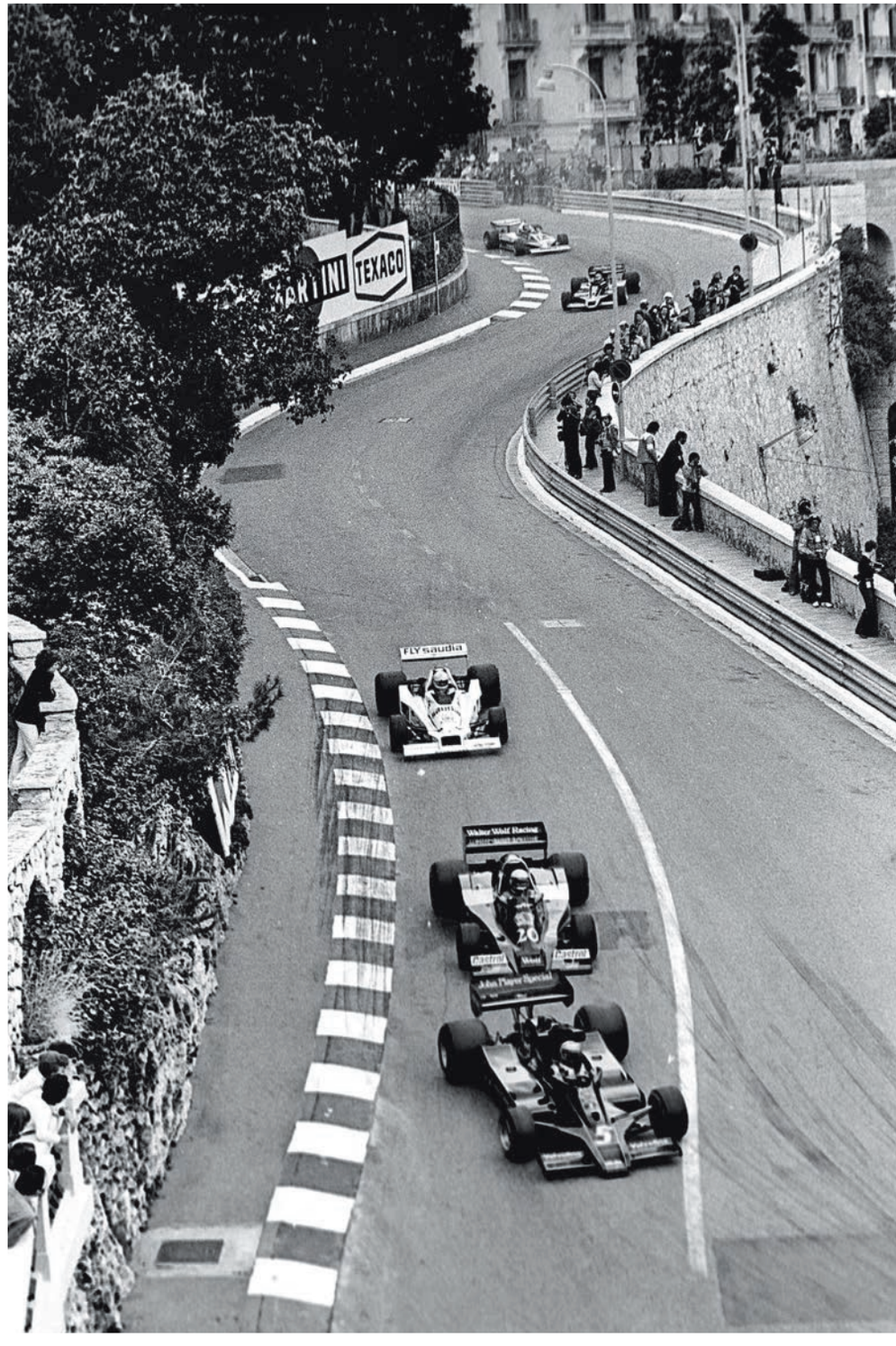
In six seasons, Mauro Forghieri's 312T series Ferraris won 27 races, three Drivers' Championships, and four Constructors' Championships. It is considered by some measures the most successful F1 design ever.



Patrick Depailler (4) scores a brilliant first win, one of only two in a career that will be cut short by a testing accident two years later. Reutemann (11) started from pole but had to pit for repairs after colliding with James Hunt's McLaren. For a while, John Watson (2), Depailler (4) and Watson teammate Lauda (1) ran in a train until about half distance when the Irishman went straight on at the chicane. "Niki was not only one of the finest drivers with whom I have ever worked, but also as good-humored and pleasant as any," says March maverick Robin Herd. "Considering he is up against Ronnie (Peterson), Jackie (Stewart), and the like, that is some compliment."

Above: On the season, Andretti (5) would win six races and Peterson (6) two, the Swede often dutifully following the team leader home.

Right: Biro captures midrace action from the roof of the Loews Hotel, Andretti leading third-place finisher Jody Scheckter's Wolf (20) and Alan Jones' Williams (27).



UNITED STATES GRAND PRIX

October 1, 1978

Watkins Glen

5.435 km (3.377 mi)

Pole Position: Mario Andretti (1:38.11)

Fastest Lap: Jean-Pierre Jarier (1:39.55)

Winner: Carlos Reutemann (+19.739)

Newly crowned champion Andretti (5) thrilled the home crowd by putting his Lotus on pole and into an early lead ahead of Reutemann and Jones.

Top left: Ultimately, Reutemann (11) put his Ferrari on the victory stand and closed the points gap to Peterson, who had been killed at the previous race in Italy.

Top right: Two-time champ Emerson Fittipaldi's (14) fifth place here would deliver Fittipaldi Automotive's highest-ever championship placing, seventh.

Bottom: Brett Lunger (23) soldiered up from twenty-fourth on the grid to finish thirteenth in Mo Nunn's handsome Ensign.

F1 MAVERICK

Paul-Henri Cahier/The Cahier Archive

Gordon Murray

Bernie Ecclestone remembers that when he bought Brabham in 1971 from Ron Tauranac, "Tauranac told me I should get rid of [Gordon Murray] and keep everybody else. So I kept Gordon and got rid of everybody else."

As usual, Ecclestone the master contrarian made the right choice.

Murray went on to become one of the greatest change agents in the sport, despite the fact that Brabham was in those years typically much smaller than the other major teams. "We were giant-killers," Murray told *Motor Sport*. For his final three years in F1, Murray left Brabham for McLaren, where his cars were untouchable, including in the 1988 season, when his MP4/4 won fifteen of the year's sixteen races. Over the course of a twenty-year F1 career, Murray's cars won fifty-six F1 races, five World Drivers' Championships, and three World Constructors' Championships.

The South African innovated in every aspect of the sport. Materials, where he was the first to use carbon fiber as a structural material and carbon brakes (although not the first to do a complete carbon-fiber monocoque). Strategy, when he calculated that a car designed to carry half a fuel load would cover a Grand Prix distance faster than a car carrying a full one even with the midrace pit stop this would necessitate. And performance technology, of which there was no better example than his 1978 Brabham BT46B "fan car."

The fan car was a direct reaction to the introduction of ground effect. Murray:

> **When ground effect was discovered in the mid-to-late 1970s by Chapman [and] Lotus, we were at a huge disadvantage because by the time people looked at the geometry of the venturis down the side of the car, the Cosworth V-8 being a 90-degree V-8 was perfect, because you could sweep the primary pipes up out of the way and you could have a really good-shape diffuser and venturi, whereas our flat-12 was right in the middle of where you needed to be. I said to Bernie, "We're sunk, really, because we'll never get a venturi past that engine."**

So he reread the regulations. And found a loophole big enough to drive a Brabham through.

> **I was quite good in those days at finding loopholes in the regulations. I reread Article 3.7 in the FIA book, which said that anything whose primary purpose was to have aerodynamic influence on the car had to be fixed and not movable.**
>
> **I stared at "the primary purpose" and I spoke to a couple of lawyers and I said, "If I've got two functions, what's the primary purpose?" They said the one that had the biggest influence.**
>
> **That's when I hatched the idea of cooling the car with a fan and having 55 percent of the (air) going through the radiator, which could be measured, and the other 45 percent sucked the car down to the ground. I never ever pretended it didn't suck the car down, but its primary purpose was to cool the car, that's why the car never got banned.**

The idea was to create a large area underneath the existing BT46 that would be sealed to the road surface with skirts. The fan, which was attached to the engine, would evacuate the air underneath the car to create massive suction. How much suction? "We couldn't measure it. We could calculate it," Murray says. "I know even at half revs the car would hold itself upside down on the ceiling."

The resulting car, renamed BT46B, was completed in just three months, in time for the Swedish Grand Prix, eighth of the sixteen races that year. Three months in which Murray and fellow designer David North did about one hundred design drawings, made all the parts, built them, put them on the car, and went testing. The fans alone went through three iterations, from glass-reinforced nylon to cast magnesium to hubs machined from solid aluminum. The skirts were just as complicated.

Somehow they made the deadline.

"Right up until a week before Sweden we were still breaking fans and fan hubs and all sorts of things," Murray remembers.

Once there, it was all the other teams who were going to pieces.

> **Chapman immediately went on a mission to get the thing outlawed . . . because he could see his championship gone. Nobody was going to beat this thing. He got Ken Tyrrell and various other team owners rallied around. They got drivers to say that the car was throwing stones out the back, which of course it didn't, the fan efflux is only 58 miles an hour.**

The cars didn't look dominant in practice, but only because Murray had told Lauda and teammate John Watson not to showcase their advantage. "We kept saying to the drivers, 'Don't go flat out. If you do, it will just make it worse for us if we're first and second on the grid.' But they couldn't go slow. Lauda kept saying to me, 'I'm trying to go slow, but I'm still doing these times.'"

When qualifying came, Murray made a split-second decision to insure the cars didn't set laughably fast times: he sent Lauda and Watson out on full tanks. And they *still* qualified second- and third-fastest.

During the race, Lauda hung back a while for appearance's sake, then disappeared into the distance. Clearly, if the cars continued to be reliable, Lauda would be the clear favorite for the title.

Then Bernie the contrarian flipped the script again, voluntarily withdrawing his giant-killer from the remaining races. "Bernie Ecclestone was just getting powerful in those days," Murray explains, "and taking over control of the racing [as head of] the Formula One Constructors' Association. And basically, [the other team owners] wrote to him and said, 'If you continue to race the car to the end of the year—because the FIA had said you can race it until the end of the year and then we'll change the regs—that's the end of the Formula One Constructors' Association.'"

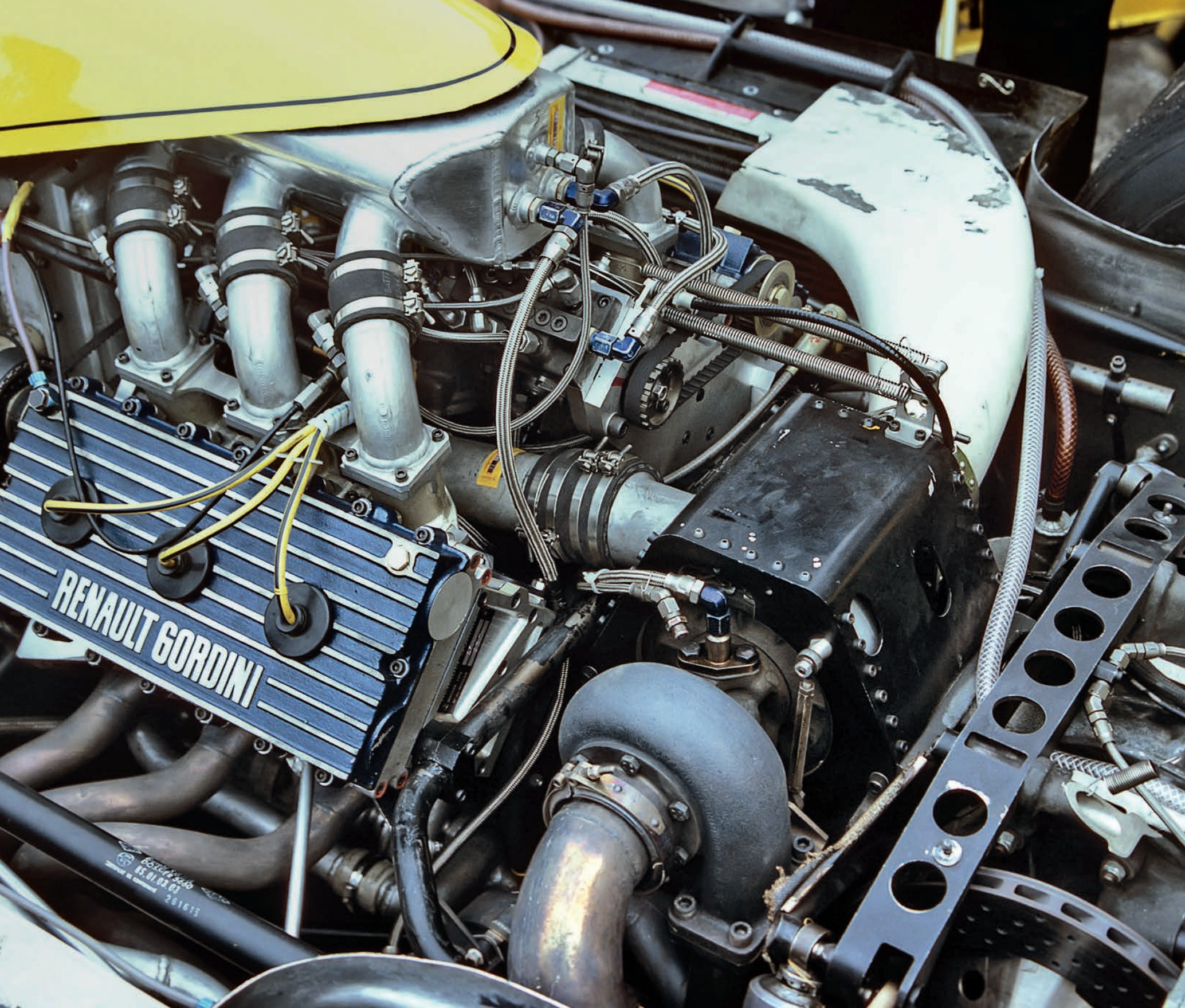
Bernie decided that concession was the better part of valor, and the BT46B was no more. But it lives on as one of many examples of Murray's genius and ingenuity.

So why did the South African native leave the sport twelve years later after winning both the Constructors' and Drivers' Championships at McLaren three straight years?

Basically, because the Maverick Era was long over by then. As Murray told *Motor Sport*:

> **The days of real technical innovation in F1, with big steps forward overnight, were rapidly disappearing, because of the increasing levels of regulation. Young engineers joining F1 now don't know any different, and for them it must be great, but it didn't appeal to me as much as the days when it was more sports- and engineering-driven. Now it was just all business.**

A business that was, thanks in many ways to Ecclestone, stronger than ever. And a sport growing less and less sporting with every passing year.


RENAULT GORDINI

CHAPTER 12: 1979

PARLEZ-VOUS TURBO?

On the surface it was Ferrari's year. Anybody could see that. The Scuderia captured both the Drivers' and Constructors' crowns. Joy in Modena. South African Jody Scheckter and Canadian Gilles Villeneuve each won three of the season's fifteen races and finished in that order in the points. Scheckter became the first (and is still the only) F1 titlist from a non-European, American, or Australasian country.

But it was two other teams, Williams and Renault, who pointed the way to the next horizon. The new ground-effect Williams FW07 initially was dismissed as a poor man's Lotus 79, but in short order insiders were forced to see the 79 as a poor man's FW07. That's how good Patrick Head's new car was. Introduced at the fifth race of the season with some technical issues still to be solved, it won six of the season's final eight events. Driver Alan Jones finished third in the championship.

Head tells us how they were able to one-up Lotus at the end of the next chapter.

Even more influential in the long run was the screaming yellow lawn dart that won the July 1 French Grand Prix at Dijon. This was the ultimate French victory. Gallic car (Renault), Gallic engine (ditto), Gallic driver (Jean-Pierre Jabouille), Gallic tires (Michelin), Gallic fuel (Elf). In front of an overjoyed French crowd.

But even more significant, this was the first time a turbocharged engine had won a Formula One race. (It was also the first F1 car, thanks to Michelin's entry into the sport to challenge Goodyear,[1] to use radial tires.) Renault had debuted its 1.5-liter forced induction

1 Firestone had left during the 1975 season, leaving Goodyear as the sole major tire supplier.

According to the rules, turbocharged engines could have only half the displacement (1.5 liters) of naturally aspirated cars. It didn't matter. Renault proved they could develop gobs more power and other teams soon followed suit. *Paul-Henri Cahier/The Cahier Archive*

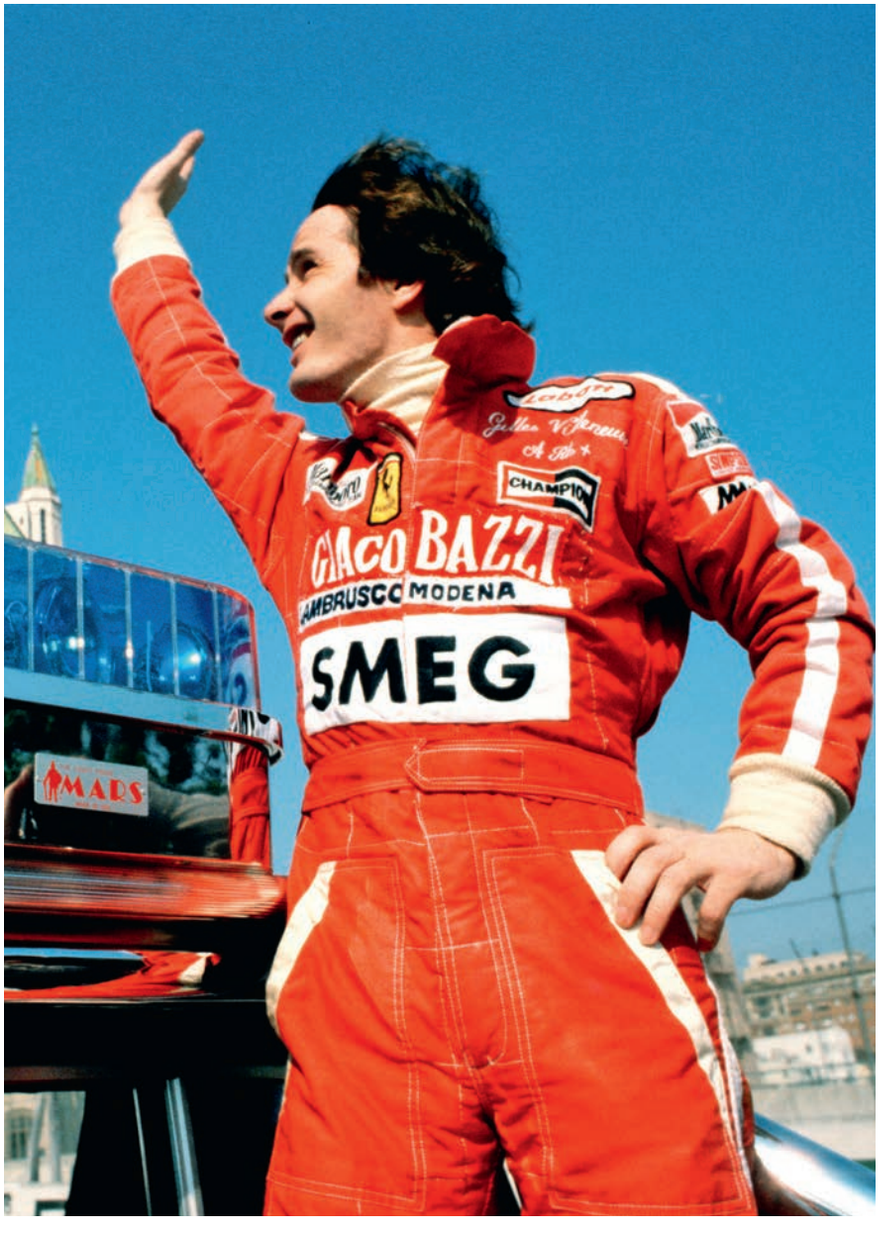
V-6 two years earlier at the 1977 British Grand Prix at Silverstone. It lasted sixteen laps. For quite some time after that, it appeared to be an exercise in futility. That first season, the car retired in each of the four races at which it appeared. The following year Jean-Pierre Jabouille DNFed or was unclassified in ten of the fourteen races he started. Ken Tyrrell started calling the Renaults "yellow teapots" because seemingly at every race they would boil over, and steam would come pouring out.

Slowly but surely it got better. In 1979, now with two cars at every race, one for Jabouille and one René Arnoux, the Renaults sat on pole six times, set two fastest laps, and had that breakthrough win at Dijon.

Renault would have to wait until 2005 to win a Formula One Constructors' Championship, but it had changed forever the course of F1 engine building, the heart and soul of the sport. In short order, turbocharged cars came to dominate so completely that, in the mid-1980s, F1 started awarding the Colin Chapman Trophy, a consolation prize for achievement among normally aspirated cars. In just a few short years, Renault engineers Francois Castaing, Jean-Pierre Boudy, Bernard Dudot, and others had changed not just Formula One but motorcars in general in a way few had ever done before. Castaing said:

[Dijon 1979] was the turning point for Formula One because everybody, all our colleagues in Formula One, said, "Next year we are going to be turbocharging our engines." And that's the way it happened.

Long story short, we turned the opinion of everybody on [turbos], not only for Formula One or for Le Mans, but for production cars. Until then, there was no market for making turbochargers. Overnight it became a big market and now it is a gigantic one.



Like Jochen Rindt and Ronnie Peterson, Villeneuve, waving to the crowd, didn't score a lot of wins in his too-brief career, but his drives were always memorable, including here where he sat on pole, registered the fastest lap, and took the checkered by almost thirty seconds over teammate Jody Scheckter, who later in the season would capture his first World Championship.

UNITED STATES GRAND PRIX WEST

April 8, 1979

Long Beach

3.251 km (2.02 mi)

Pole Position: Gilles Villeneuve (1:18.82)

Fastest Lap: Gilles Villeneuve (1:21.20)

Winner: Gilles Villeneuve (+29.38)

It's hard to explain now how much excitement Canadian Gilles Villeneuve (12) generated with his tail-out, never-say-die attitude at a time when, because of ground effects, it was thought sideways driving was a thing of the past.

F1 MAVERICK

Ken Tyrrell

Anybody who builds a six-wheel car—and wins with it—has to be one of our F1 Mavericks.

But that's only a part of what made Ken Tyrrell so special.

"In a time when motor racing was conducted with integrity and passion, one unique character graced the stage of Formula One. His name was Ken Tyrrell." So begins the film *Ken Tyrrell: Surviving Formula One*, produced by longtime Tyrrell driver Jackie Stewart's son Mark. Tyrrell was known as a kind, sometimes blunt, and almost unfailingly honest man who, with his wife, Norah, created a family-like atmosphere within his team. Amazingly, Stewart and Tyrrell trusted each other so implicitly that for most of their relationship together, their "contract" consisted of a handshake.

When Tyrrell decided to go F1 racing in 1968, he forged an improbable partnership between French missile-maker Matra, Ford's Cosworth engines (despite the fact that Matra had its own engines), and Dunlop tires. It achieved immediate success, winning three races that year and scoring the team's first—and Matra's only—World Drivers' and Constructors' Championships the following year.

When the French concern insisted on using its own engines in 1970, Tyrrell decided to forego its backing and fielded March-Cosworths before deciding early in the season to build his own chassis. The resulting Tyrrells, designed by Derek Gardner and built in a converted hut in Tyrrell's timber yard, won championships in 1971 and 1973 and provided a formidable challenge in 1972, despite lead driver Stewart's

battle with ulcers. (This was on the heels of Stewart's battle with mononucleosis in 1971. "I was so exhausted at the end of the 1971 season," says the Scot, "that I never even went to pick up my World Championship trophy. My wife did it for me.") Stewart retired at the end of 1973, withdrawing from what would have been his hundredth and final F1 start at Watkins Glen when friend, teammate, and would-be successor François Cevert was killed in practice.

"The aftermath of it was really awful," said a shaken Tyrrell. "I came close to giving up motor racing in the few weeks after the accident."

Thereafter, the team was never quite so competitive again, although it continued to run near the front for a time, most notably with Stewart's replacement, Jody Scheckter.

Perhaps Ken's most iconoclastic moment came when Gardner proposed a new design based on an idea he'd been dying to try for more than a decade: a car with six wheels instead of four.

Like the first Tyrrell, the car was built in utter secrecy in Tyrrell's timber yard.

The Tyrrell P34 was introduced in September 1975, complete with four tiny (10-inch) front wheels, and began racing partway through the following season. Over the course of two campaigns, the P34 won once and finished on the podium often enough that despite a rash of retirements Tyrrell ended up third in the 1976 World Constructors' Championship. Thereafter the car's viability began to ebb, in part because tire-maker Goodyear needed to focus on fending off a new radial-tire challenge from Michelin and could devote fewer resources to updating the P34's special 10-inch tires.

Others had looked into a six-wheel approach as well, including March, Ferrari, and Williams, but all of them put four wheels in the back and none of them raced. Robin Herd reckons the March 2-4-0 was the most profitable car the constructor ever made; Britain's Scalextric offered a slot car version that became so massively popular that the royalties helped fill March coffers.

Not long after, the FIA decided to permit only cars with four wheels and the six-wheel wonders were consigned to history's dust heap. Perhaps the biggest blow to the team's fortunes came with the arrival of turbo engines in the late 1970s, which Tyrrell steadfastly resisted using. Said Stewart in his biography, *Winning Is Not Enough*, about Tyrrell's later years:

> **He continued to run his F1 team during the 1990s but became increasingly disenchanted and at one stage raged against the introduction of the turbo engine. "It's unnecessarily expensive," he declared, "and beyond the reach of ordinary individuals, so it's turning the sport into the exclusive domain of the major car manufacturers . . ." And he would yearn for the relatively recent past, when almost every F1 car used the 3-liter normally aspirated Ford Cosworth engine, which was affordable so private entrants could compete on a level playing field; the result was probably the most exciting and competitive era in the history of F1 racing.**

It seems only fitting, then, that the last victory for a Cosworth-powered car happened in the back of a Tyrrell at the 1983 Detroit Grand Prix. In 1999, Tyrrell sold his team to British American Racing and one of the last great forces of the Maverick Era was gone.

"This sport would be a better sport by a million miles," says Stewart at the end of *Ken Tyrrell: Surviving Formula One*, "if there were more Ken Tyrrells in it."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CHAPTER 13: 1980

SUDDENLY IT'S 1962

For those who had been around F1 in 1962, 1980 seemed to have stolen its plot. In 1961, Ferrari had ruled the roost. So superior was the 156 that the championship, for all intents and purposes, was between Ferrari drivers Phil Hill and Wolfgang von Trips. The Scuderia won both the Constructors' and the Drivers' World Championships.

In 1962, Ferrari did a face plant.

Fast forward to 1979. Ferrari wins both championships again. And once more it is nowhere the very next year. This time, too, it's engine-related. Turns out Mauro Forghieri's exquisite Ferrari boxer engine that has powered a Prancing Horse renaissance has one crucial shortcoming.

It's a boxer engine.

As Formula One teams now began to pour unprecedented resources and technical focus toward aerodynamics, for this was where the biggest performance gains were to be found, they realized that the game now was to make ground-effect tunnels as wide as possible for maximum downforce.

They also realized this was a lot harder to do with a fat, wide boxer configuration than to arrange one's pistons in a taller, narrower V. It's the very reason Gordon Murray had developed the BT46B fan car, to work around the fat Alfa flat-12.

The Williams team didn't run the table, but they might as well have. Alan Jones and Carlos Reutemann finished first and third in the Drivers' Championship and scored almost twice as many points as runner-up Ligier in the Constructors'. Jones won five times during the fourteen-race campaign. Only once during the eleven races he finished did he end up off the podium, at Zandvoort, where Williams's critical downforce advantage was negated by damaged skirts, all that low-pressure air escaping.

Designed by Patrick Head, Frank Dernie, and newcomer Neil Oatley, the Williams FW07 dominated the 1980 season. Like the Lotus 78 and 79, it benefited from extensive development in the Imperial College wind tunnel.

Brabham driver Nelson Piquet won to close within two points of the Australian. By edging Jones in the next race in Italy, Piquet actually took a one-point lead. But Jones captured the final two races and the championship as Piquet failed to finish either.

Brabham's ascent was engine-related as well. After struggling for several years with that Alfa Romeo flat-12, the team had acquired Cosworth engines, and the BT49, built in just six weeks, was a clear winner.

The year 1980 also saw the debut of a young French driver at McLaren, Alain Prost. Gordon Coppuck's M29 and M30 did not provide an outstanding showcase for his talents, but a new chassis by John Barnard would.

The season highlighted for many a changing of the guard in F1 that was almost complete. The great teams of the past were mostly gone or superseded. Cooper, Matra, BRM—consigned to the history books. Lotus and Tyrrell from this point forward would slip further and further away from the top tier. Brabham and McLaren remained, but these were no longer the Brabham and McLaren of Jack and Bruce. In 1981, Ron Dennis would begin buying out all of the original shareholders and reform the company in his own image. McLaren and Williams would dominate F1 over the following two decades. We asked Williams technical director Patrick Head why his team was able to do so well for so long:

I think we had a great passion for racing, and also for winning, possibly maybe also a contempt for losing. We engaged engineers with ideas and, I hope, were open to ideas from all within. A great workforce, many very skilled artisans, always seeking better ways to manufacture components.

We reinvested every year in better equipment; in the first ten years Frank and I took very little out of the company and invested as much as we could afford in facility.

No longer would the old ways of doing things suffice. The names had changed. But the passion remained.

The Maverick Era is ending, and the guard is changing—dramatically. The sharp end of the grid at Long Beach now features a Brabham (5) on point, beside René Arnoux (16) in the Renault turbo, followed by Patrick Depailler (22) in the Alfa, Jan Lammers (10) in the ATS, and eventual World Champion Alan Jones (27) in Patrick Head's brilliant Williams.


Marlboro
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UNITED STATES GRAND PRIX WEST

March 30, 1980

Long Beach

3.251 km (2.02 mi)

Pole Position: Nelson Piquet (1:17.69)

Fastest Lap: Nelson Piquet (1:19.83)

Winner: Nelson Piquet (+49.212)

Winner Nelson Piquet will have a breakout season in Gordon Murray's ingenious BT49, collecting his first three victories and finishing second in the championship behind Jones.

Left: 2019 Motorsports Hall of Fame of America inductee Linda Vaughn was a fixture and crowd favorite at Long Beach from day one.

Right: Piquet was joined on the podium by Emerson Fittipaldi (left) and Riccardo Patrese in Jackie Oliver's Arrows. Arrows would match but never surpass Patrese's second place here, and Fittipaldi Automotive would only once beat Emerson's third.[1] Over the course of the Maverick Era, starting a team became exponentially more expensive and risky. Arrows founder Oliver: "Someone said to me about four or five years ago, 'The grids are too small in Formula One. Why on Earth don't more people do it? So, why have we only got ten teams?' And I said, 'Because they went bust.' They said, 'Well, not many went bust.' I said, 'Well, how many teams do you think went bust trying to do Formula One from 1970 until today?' And he said, 'Five or six?' I said, 'How about sixty-seven?'"

1 Fittipaldi finished second at the 1978 Brazilian Grand Prix in front of his home crowd.

Paul-Henri Cahier/The Cahier Archive

F1 MAVERICK

Sir Patrick Head

There was a time when people wondered whether Frank Williams belonged in Formula One. Throughout much of the 1970s it looked like his team would be a perennial also-ran. Then, things changed. Suddenly, starting in 1979, Williams was a frontrunner, and it stayed that way for nearly twenty years. From 1980 through 1997, Williams won seven Drivers' and nine Constructors' Championships.

One of the biggest reasons was the arrival of Patrick Head. Remember, 1979 was the year following the championship-winning debut of the groundbreaking, ground-effect Lotus 79, a car many, including almost certainly Colin Chapman, thought would rule the sport for the foreseeable future as his 72 had done earlier. More puzzling still, at a glance the FW07 seemed little more than a 79 impersonator.

But it sure didn't perform like one. We asked Head how he and Williams were able to leapfrog Lotus so quickly and so comprehensively that Chapman's firm never again won a World Championship. In fact, in 1979 Lotus dropped to fourth in the Constructors' Championship and never placed higher than third (1984, 1986, 1987) in its remaining fifteen years in existence. Head:

Lotus, or Colin Chapman, was strong on ideas, but no good at interactive development, and the Lotus 79 of 1978 had a poor chassis, of thin aluminum skins riveted without adhesive (I think), and was not very stiff when new, but became "softer" when the rivets started moving a bit. It also had inboard

rear brakes that were not well cooled, often overheating during races and limited performance, plus, and maybe the most significant, a relatively short side pod (underside) that did not extend forward far, thereby requiring the car to have a large front wing to achieve aerodynamic balance.

Really, the car was not developed at all into 1979 as their efforts went into the Lotus 80, which was a failure for a number of reasons, mostly a curved skirt system which did not go up and down smoothly and would jam readily, resulting in a bouncing that became known as "porpoising." It also had a similar chassis construction to the 79.

The FW07 design aerodynamically came out of a week in the Campbell tunnel at Imperial College,[1] at which it was clear that the side pod worked much better with no disturbing wing in front, so we lengthened the side pod so that the car was balanced without a front wing, although we often used a small neutral profile for trimming.

The FW07 also had a bonded aluminum honeycomb chassis, as the small cross-section indicated that chassis stiffness would be a problem.

The FW07 also had outboard rear brakes (as at the front), which were well cooled and allowed a bigger airflow volume out from the back of the car.

Lotus had to retire the Lotus 80; the skirts were too big a problem, and the Lotus 79 was undeveloped from 1978 so was outdated. The pace of F1 development was high even then.

A new generation, inspired by mavericks like Cooper and Chapman and Forghieri, had come along with the express purpose of beating them. And Patrick Head was fast proving to be one of the best at beating the best.

1 The same moving-ground-plane wind tunnel where Peter Wright and Tony Rudd developed ground effect for the Lotus 78 and 79.


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MALIBU
The Official Family

CHAPTER 14: 1981–1982–?

END OF AN ERA

The 1981 and 1982 seasons were two of the strangest on record, in part because of the ongoing battle between FISA and FOCA for control of the sport. The Fédération Internationale du Sport Automobile (FISA), headed by Jean-Marie Balestre, was Formula One's governing body as a subcommittee of the FIA. The Formula One Constructors' Association (FOCA), headed by Ecclestone, represented the teams. The main points of contention were the amount of money the teams were receiving, the technical regulations, and the perceived bias on the part of FISA in favor of the manufacturers involved in the sport, mainly Ferrari, Alfa Romeo, Talbot-Ligier, and Renault. The conflict spilled out onto the races themselves. The first major conflict was at the 1980 Spanish Grand Prix, which was forced to run as a nonchampionship event. The following year the FOCA teams threatened to form a rival series under their own "World Federation of Motor Sport" banner, but the two sides reached an agreement after a single "outlaw" race had been run. Things remained heated in 1982, when the majority of the FOCA teams boycotted the San Marino Grand Prix.

The laurels in 1981 were split between the Brabham and Williams teams. Nelson Piquet won the World Drivers' Championship in part because the two Williams drivers, Alan Jones and Carlos Reutemann, between whom no love was lost, took points from each other. Jones was the nominal number one, but it was Reutemann and Piquet who went into the final race at Caesars Palace—replacing a financially troubled Watkins Glen—separated by a single point. Neither driver was in top form, but Piquet's fifth place allowed him to edge Reutemann by a single point. Jones was third, helping Williams to the Constructors' crown. In all, seven drivers won races.

Technically, the most significant advance during the 1981 season was the introduction by designer John Barnard of a full carbon-fiber monocoque in the McLaren MP4/1. It would

John Barnard would usher in a new era of performance with his super-rigid composite chassis McLaren MP4/1. "Really, the carbon monocoque was born because I was trying to get the absolute maximum surface underneath the car to create downforce."

revolutionize not just Formula One performance but safety as well, and the other teams quickly followed suit.

The following year saw an even more balanced distribution of success. In all, eleven drivers scored wins. The driving force behind this seeming parity was the loss during the season first of Gilles Villeneuve, killed at Zolder, and then Didier Pironi, who suffered injuries in Germany from which he never fully recovered. Both Ferrari drivers were favorites to win the title, and Pironi was the clear points leader at the time of his accident. In the end, Finn Keke Rosberg grabbed the World Drivers' Championship for Williams, while the four different men who drove for Ferrari accumulated enough points for the Constructors' trophy.

The open warfare between the organizers and the teams and the increasing division within the fields between the haves and the have-nots—turbos versus normally aspirated, giant factory teams versus independents—made it feel like the end of an era. But just as surely as an era ends, so another begins. The period from 1958 through 1982 had seen change unlike any before or since. Not just to the cars and the tracks but to the people and the sport itself. The *idea* of Formula One.

Peter Manso wrote two books that serve as exquisite time capsules of the F1 of the late 1960s and early 1970s. One is *VROOOM!!*, which consists of interviews with ten of the top drivers circa 1968 to 1969. Four were dead within three years. Only Ickx, Moss, and Stewart are still with us. The other book is the bestseller *FASTER! A Racer's Diary*, written with by many accounts the era's greatest driver, Jackie Stewart. We asked Manso to compare the drivers of that time with the drivers of today. Were they the same or different?

"The drivers were different as people, as sensibilities back then," says Manso. "There was an ethic that was embraced that amounted to a code that was more the stuff of a person's spine, essential and real, than what we have today, be it with race drivers or artists or the neighborhood handyman who came to repair your lowly kitchen sink."

Not only the drivers had changed, but the teams and the team principals. Today the teams are much larger. Where once they consisted of a handful of people, now they're in the hundreds. Prior to the 2018 United States Grand Prix, Mercedes driver Lewis Hamilton explained on the *Good Morning America* TV show, "There's a big team behind me. It's a different kind of sport. There's 1,800 people to build those two cars." Almost all of them specialists or with very specific areas of responsibility.

There are not that many because there have to be. There are that many because there *can* be. Colin Chapman could have used a hundred people but, in the early days, could never afford to. The economics of the sport have changed entirely, mainly due to Bernie Ecclestone and the TV contracts that have opened the floodgates to millions and millions of dollars in sponsorship. According to *Forbes*, the most recently public Ferrari F1 budget was $571.1 million.

There were still great mavericks in the sport bringing forth an ever-expanding collection of new ideas for how to win. Gordon Murray, John Barnard, Patrick Head, and others were every bit the innovators and mavericks as were forebears such as Chapman, Hall, Cooper, and Duckworth. But now the sport was less about finding new areas to explore than finding loopholes within an ever more constrictive rulebook to exploit. Even Murray's brilliant pit stop innovation today has been codified into mandatory stops to change tires that the regulators have made sure need to be changed.

In the end, it is up to you to decide whether the Maverick Era is any better or worse than the eras that preceded and followed it.

The only thing for certain is that we will never see its like again.

How crazy was the 1982 World Drivers' Championship? It was decided in a parking lot in Vegas, and the guy who finished second in points missed the last five of the season's sixteen races.

UNITED STATES GRAND PRIX WEST

March 15, 1981

Long Beach

3.251 km (2.02 mi)

Pole Position: Riccardo Patrese (1:19.39)

Fastest Lap: Alan Jones (1:20.90)

Winner: Alan Jones (+9.19)

The introduction of ground effects tunnels changed the shape and proportions of Formula One. The introduction of tall, narrow turbocharged engines changed them further. The Williams FW07 dominated from its introduction in 1979, and defending champion Alan Jones's FW07C (1) won here on its way to capturing a second straight World Constructors' Championship.

Nelson Piquet in the Brabham BT49C (5) will squeak by the two Williams aces to take the Drivers' title. Neither the French Ligier JS17 (below left) nor Renault 20B (below right) yet have that kind of reliability, but from midseason they'll win seven straight poles. Doug Nye: "Initially we called the [Renault turbo] the steam kettle because it would boil its way into retirement after very few laps in every race, all Puffing Billy, because it was just hopeless. It wasn't until the French Grand Prix in 1979 that they suddenly came on song. Then it was obvious that they had 650 to 700 horsepower, and it would survive race distance, whereas the Cosworth engine by that time was producing around 470 to 480 horsepower. It was just the passport to success, if they could make them reliable."

CAESAR'S PALACE GRAND PRIX

September 25, 1982

Las Vegas

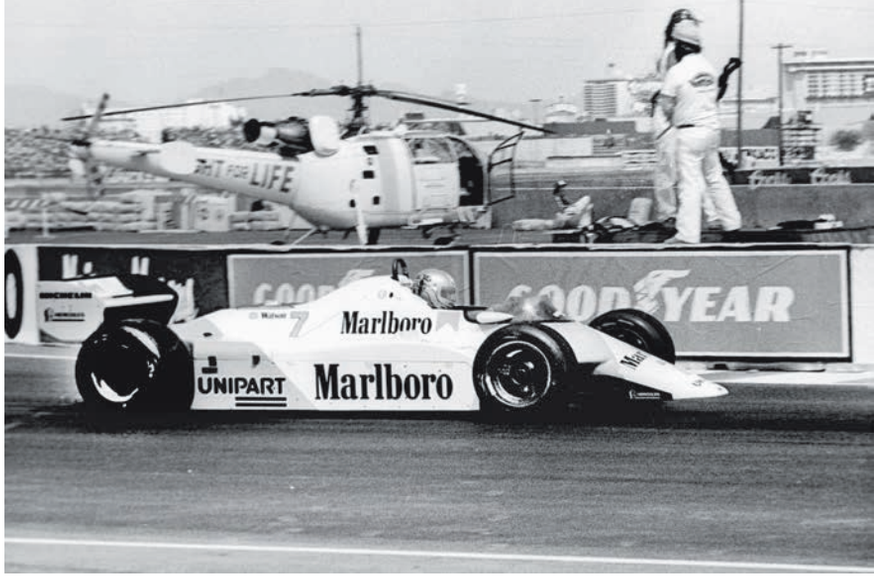
3.650 km (2.268 mi)

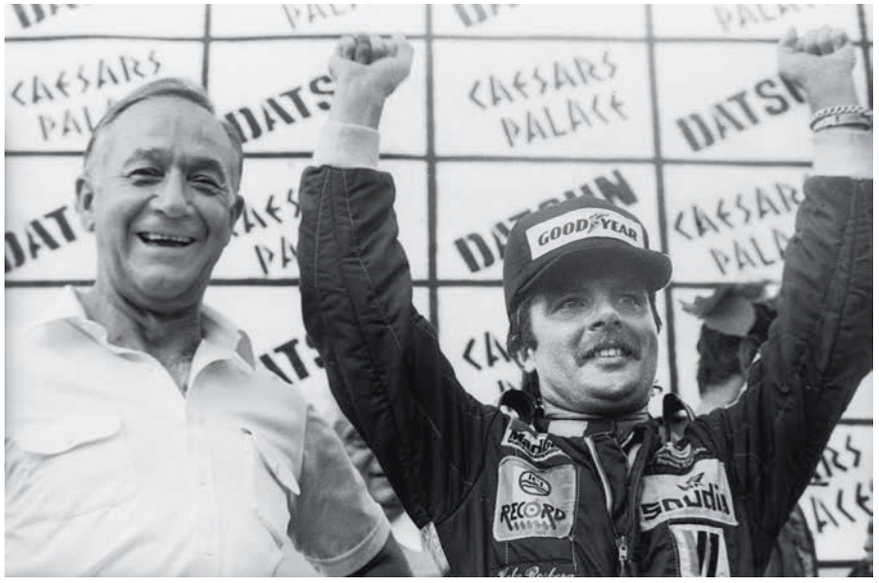
Pole Position: Alain Prost (1:16.35)

Fastest Lap: Michele Alboreto (1:19.63)

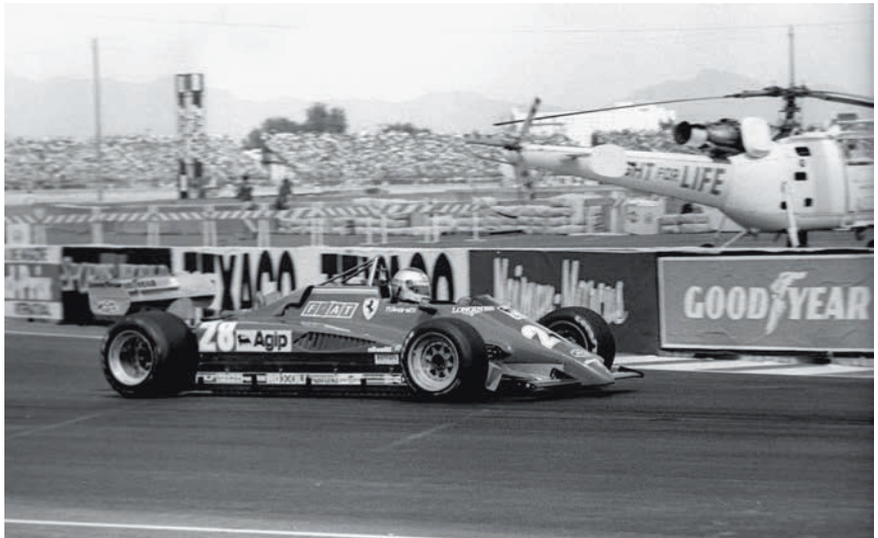
Winner: Michele Alboreto (+27.292)

Diana Ross lends star power to a podium featuring third place man Eddie Cheever (left), winner Michele Alboreto (center), and runner-up John Watson.





At the Caesars Palace finale, Williams's Keke Rosberg (above) and McLaren's John Watson (7) were the only two contenders who could grab the crown, and all Rosberg had to do was finish sixth or better to leave Watson in the cold. Rosberg finished fifth and Watson second behind surprise winner Michele Alboreto (3). It was Tyrrell's first win since 1978. The outcome ensured that Ferrari's Didier Pironi, whose career ended in a Hockenheim crash, would keep the runner-up spot in the title chase. Despite the musical chairs following Pironi's crash and Gilles Villeneuve's death earlier in the year (that's Mario Andretti pinch-hitting in the #28 Ferrari in his final F1 start), Ferrari still won the Constructors' Championship with the dominant turbo V-6 126C2. Another sign of the changing times: fourteen of the season's sixteen poles went to turbocharged cars.



Paul-Henri Cahier/The Cahier Archive

F1 MAVERICK

John Barnard

In addition to designing several of Formula One's most successful cars, the London native introduced two technologies that transformed the sport. At McLaren in 1981, he introduced with the McLaren MP4/1 the first carbon-fiber composite chassis, a giant step in performance and safety. At Ferrari later in the decade, he pioneered semiautomatic gearboxes, which have since been adopted by almost every high-performance road car. They can shift better and faster than even the best drivers can do manually. Barnard began his career in 1968 at Lola, where he helped design, among others, the cigarette-box T-260 Can-Am car. In 1972, he joined McLaren, helping the team win its first F1 and Indy 500 titles. After penning the first Indy car to win with the turbocharged Cosworth DFX engine, the Vel's Parnelli Jones VPJ 6, he designed the ground-effect Chaparral 2K "yellow submarine" with which Johnny Rutherford won the 1980 Indy 500 and Indy car title, and revolutionized Indy car construction. Many consider the 2K the prototype for every Indy car that followed. Barnard then returned to F1 with McLaren, Ferrari, Benetton, and Prost, where in addition to the aforementioned technologies he produced multiple World Championship winners. We asked him how he came to develop the innovations he did and how he views the sport today.

What do you see as the major technological changes during the Maverick Era?

First, the transition to rear-engine—actually mid-engine layout. Cooper started that. Then I suppose you got the wings on

suspension [in the late 1960s]. Which was the correct way to do it, but unfortunately, people didn't do it in a well-engineered way, and wings came off, and it all got very dangerous. So that was banned. Which is a shame. I hate banning things because of poor engineering. Then [in 1977] Renault introduced the turbo engine, and Lotus started the whole ground-effect thing. That really opened up a whole new area for us.

I took it to Indianapolis with the Chaparral. I'd seen the Lotus 78, which was probably the first Formula One car with proper ground effect. They had a wing on the side and I think brushed skirts initially. And then they did the 79. I don't know what the launch dates were, but the Chaparral was only a little way behind the 79 in coming out. *[The 79 debuted at the midpoint of the 1978 season, the 2K in early 1979—Ed.]* I remember some people said, "Oh, you've copied the shape of the Lotus 79." But, in fact, I hadn't seen the 79 when I did the Chaparral. It just seemed to me you had to use the whole of the underside of the car, take the whole diffuser and ground-effect undersurface to the rear of the car, as far as you could go really.

Then around about 1980 I did the carbon monocoque. A proper, full-carbon monocoque. *[Developed at Project 4, it became the McLaren MP4/1. —Ed.]* Lotus were playing around with a kind of hybrid version, but I did the carbon monocoque to give myself the opportunity to have maximum ground effect. Really, the carbon monocoque was born because I was trying to get the absolute maximum surface underneath the car to create downforce.

How did going from aluminum to carbon fiber make it possible to increase the surface area under the car?

My requirement was to make the chassis narrower so I could maximize the width of the tunnels. When you make the chassis narrow, you lose the geometry that is going to give you torsional stiffness. I started thinking, how do I make a narrow chassis without losing torsional stiffness?

I contemplated thin steel sheet. That's fine, but it gets heavy. I got into the carbon through visiting an aerospace plant, and I thought, well, that's the answer. It's a fundamentally stiffer material than aluminum, and it's fundamentally lighter, which is nearly everything you do in a racing car. But it was all aimed at giving me a narrow chassis to improve the ground-effect capability of the car.

Is there a simple way to quantify how much the carbon fiber allowed you to increase the Venturi area versus aluminum?

To pop figures off the top of my head is not easy at this stage—it's so long ago. But in terms of total what I call ground-effect area, I certainly increased the width of that by something like 40 percent. I should point out that having done the carbon chassis built around a Cosworth V-8, it was only about eighteen months later that I started working on a car with a turbo engine designed around the chassis (so the tunnels could be even wider). And that's when we came up with the Porsche turbo.

I had a package in my head where I could make the engine narrower than the Cosworth V-8, which we did. I sat down with Porsche, with a whole raft of requirements and specifications. In doing that, I was able to increase the aerodynamic surface under the car, as I say, it must have been by 40 percent. I know the numbers that we were getting from our [wind tunnel] model at the time were lit up. Our downforce was climbing massively because of the narrow chassis—and the [narrower] engine to go with it.

Really, about 1982 was the time when we really got to grips with the downforce created from underneath the car [with

ground effect]. And of course, then Ferrari were falling further and further behind in that area and started playing politics and fundamentally got the rules changed and brought in the flat-bottom cars in 1983. That put lots of our work in the dustbin, which was a huge disappointment.

Is it possible to compare the significance of advances? On a scale of one to ten, is ground effect an eight?

Ground effect was a big jump in cornering power—and cornering power that wasn't too costly. For example, up until the time we had honed our ground-effect cars, Renault had a turbo engine with probably 150 horsepower more than the Cosworth, in race trim. But in order to use that 150 horsepower, they were running more wing.

You can bolt on a big wing and make more downforce. That's great, but then you're going to increase your drag. They weren't getting their downforce without paying for it. With the ground effect, we were getting downforce and not paying for it. Then, at the end of 1983, when we started using the TAG-Porsche turbo engine, we would have probably been racing with at least 300 horsepower more than a Cosworth. I'm talking race trim; the horsepower jump in qualifying with some of those turbo engines was just astronomic, because they (mostly BMW) used to build an engine that would last for about four or five laps and that was it. The thing would virtually melt after that. But of course with the change in regulations that year to flat-bottom cars, we lost a lot of the downforce. If we'd been left alone to continually develop the ground effect and the turbo engine, we'd have had cars that were just mind-blowingly fast around corners and down straights.

Advances that couldn't happen until other advances did.

When I started in the business in 1969, carbon composites weren't even on the horizon. So that was one thing that came along and allowed us to do things. And if you look at where it's got to today, everything is carbon now—suspension and everything.

Electronics is another big thing that's happened. If I think back even up to 1983 or so, the electronics on the Formula One car was next to nothing, really. We didn't have all these onboard logging systems. If we had a logging system at all, it would be so big and clumsy, you'd never be able to race with it.

The mid-1980s was when it all kicked off with the electronics. Partly because of the turbo engine, because controlling the engine required electronic control of the fuel injection and all the rest of it to get the best out of it. Along with that you started collecting data, and it wasn't long before we started having onboard data collection systems with transducers and everything all over the suspension, measuring suspension travel and all that kind of thing.

Up to that point, the information we had as designers was very, very limited. It was based on trial and error, on some experience, on a few basic numbers that we would use for working out suspension strengths and so on. But when the electronics came along, then you're getting information back that is just a *huge* step forward.

What kinds of information?

Ride height, for a start. Actually monitoring damper travels and so on. We would know very closely the ride height of the car as it went into the corner, through the corner, out of the corner, down the straight. It was hugely important.

Now you've got traction controls and launch controls and all the rest of it that are literally taking [control] away from the driver. Taking away the drivers' skillset if you like.

Bruce McLaren said he became a constructor because the driver's role was shrinking. How do you see the driver/car equation from the 1960s till today?

I didn't really start in it till 1969, but in the 1960s and early 1970s, I would have said the driver was certainly 70 percent of the equation. You watch a guy like Jim Clark. Whatever he got in, he was quick or quickest, and that was his talent.

I go back to the 1980s where we're dealing with people like (John) Watson, Lauda, Prost, and so on. Watson was quite capable of beating Lauda, for example. I've seen him drive around the outside of Niki at Long Beach and win the race. The problem with John was that he used to struggle with the setup of the car through the practice [sessions]. He would be more finicky, I suppose, to get the setup 100 percent the way he liked it, and unfortunately he would take that to an extreme where he never left himself time to go out there and just do a banzai qualifying lap and put himself further up the grid. But in race trim, he was just as quick, say, as Niki.

And then, of course, along comes Prost and you put Lauda and Prost together, and again you come back to the qualifying issue. Prost nearly always outqualified Niki, because Prost just had those few tenths of a second available to him in qualifying. But again, you come to a race, and there was not much to choose. To me anyway you were still talking 40 to 50 percent driver back then.

I think it's even less now. Twenty percent? Difficult to put a number on it. There is still a difference in drivers. Qualifying is where you'll see it. Hamilton most times can pip [Valtteri] Bottas by two or three tenths. That's just him. That's his ability to drive a car fast. But that's kind of all you're looking at really. If you took somebody else on the back of the grid and put him in one of those Mercedes, they would be there or thereabouts, but Hamilton would still pip them by three or four tenths.

Was the Maverick Era unique from a technology standpoint?

The innovation in the cars from that period was far greater than it is today and greater than it had been up to that point. Because the British teams did not have the ability to develop the engine. Until Cosworth came out with their V-8, Ferrari were the engine people, and everything they did was concerned with the engine. The British teams, because they didn't have the engine facilities and capability in their locker, were forced to develop the car, the chassis, and the aerodynamics. So lots of interesting steps were taken to the point that people like Ferrari started to get left behind.

If you were twenty-one today, would you still get into motorsports?

I'm sure if I was twenty-one now, I would have the same absolute, total immersion in cars and racing cars that I had then. How I would get into it now, I'm not so sure.

We were lucky. People like myself, Patrick Head, people like that, we started at Lola's. Eric Broadley never got all the credit he should have. Because Eric was responsible for an awful lot of people getting into racing and learning the business from the ground up, and I think that's important.

We did everything. We did Formula Fords, Can-Am cars; you were able to deal in all kinds of different types of car and get involved in the building, testing, and running of them.

I think Formula One now is so big that the opportunity to get involved in all these different areas of the car just isn't there. There are just too many big departments. You're in suspension, or you're in gearbox, or you're in electronic controls.

But I'd probably still try and do it.


STP
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AFTERWORD

NIKI LAUDA

When Andreas Nikolaus Lauda decided he wanted to get into Formula One, he took out a massive bank loan he could only pay back if he succeeded. The Austrian knew exactly what he was doing. He went on to win three World Drivers' Championships (1975, 1977, 1984) and famously walked away from a potential fourth when he declined to participate in the rain-soaked 1976 season finale at Fuji, handing the title to friend and rival James Hunt. That was the year he was badly burned in a crash at the Nürburgring and given last rites. Six weeks later he was on the grid at Monza. He retired at the end of the 1979 season but was lured back in 1982 by McLaren, for whom he won his final championship two years later. He remained in racing as an adviser or team manager for Ferrari and Jaguar. Today he is the always-candid nonexecutive chairman of the Mercedes AMG Petronas F1 team. We spoke to Lauda early in 2018 about how the sport has evolved from the Maverick Era to the present day.

During your career you've seen lots of technology arrive in Formula One. Which has had the biggest impact on the sport, good or bad, and why?

For me in 1984, when the TAG Turbo was introduced in the McLaren. The situation was as follows. In 1982, I came back from nowhere with McLaren and I lost the championship that year against Rosberg, because I thought we were never going to win against the turbocharged cars,[1] and I never really pushed hard. When Villeneuve got killed in Zolder and Pironi got hurt in Hockenheim, it was too late for me to react and to go quick with the normally aspirated car, and Rosberg won the championship. He was always second, third, and so on.

Therefore, [for 1983] I went to Phillip Morris myself in Lausanne [Switzerland] and said to these guys, "In your contract with McLaren it is written that if there is a better engine available, you will use the turbo (that is, better) engine, because the TAG Turbo was already developed for McLaren. And as we were not winning anything, I said, "Put an engine in my car." I was called back by Ron

1 Because of the departure of the favored Ferrari drivers, it was one of the strangest title campaigns on record. The sixteen events were split among eleven drivers. Five, including Lauda, had two wins. None more. Keke Rosberg took the prize despite winning just one race, outstripping his rivals based on his Williams' greater reliability. Lauda, whose McLaren retired often, finished fifth, fourteen points back.

Lauda began his F1 career with March in 1971 and went on to win championships with Ferrari and McLaren.

Dennis, [who said], "Are you nuts? We are running the team and not you. If you do this once again, you're going to be thrown out."

I didn't let go. I pushed and pushed. Because [designer] John Barnard would have never put a car on the racetrack if he wasn't sure this design he had developed was as reliable as he wanted it to be.

Anyway, as the year was so boring, I forced them with Marlboro money, and at Zandvoort we had for the first time the turbo engine in my McLaren. When I came to the circuit and I looked at the car, I said, "This wing in the back looks a bit small." Barnard said, "Shut up, you have no idea." Because all of the turbo cars had twice as big a wing as I had. So then I went down the straight at Zandvoort [at, like, 350 kilometers per hour], I can't remember, but through the corners my car didn't work.

I said to John, "We have a problem with the rear wing." Anyway, to make a long story short, the last race, which was in Kyalami [South Africa], I was leading the race against all the other turbos because the car was so good, the engine was so good. Unfortunately, my generator broke in the race. So I was right to push them as hard as I could to start developing the [turbo car] the year before. Because if we would have started in [1984], no way would we have been finished. Whereas we did the other half season [in 1983 developing] this turbo thing and the wing, I really had a competitive car.

The only problem was this stupid, nice friend Prost turned up [for 1984], and then we both had this incredible car.[2] And these cars in these days were half a second quicker than anybody else. So the biggest fight I had with the turbocharger was the question with Prost to win by half a point the championship. So this was for me the most difficult car to drive. Because [with] the turbo power we had 1,200 horsepower for one lap [in qualifying trim and because the supersticky qualifying tires only lasted for one lap], then 600 to 700 [horsepower] for the race, because of the fuel flow and what you've got in your tank. This was for me the most exciting and best-ever combination, no question.

During the time you were in Formula One, were there technologies that were banned that you think should have stayed or vice versa?

Frankly, I would have loved if [the turbos] would have stayed[3] because we would have kicked everybody. . . . The Turbo Era was the most exciting car to drive because of the power difference [between qualifying and the race]. All the rest was in these days difficult. If you ask me, I would have loved to race today because no risk whatsoever, forty, fifty million being paid a year, and the cars, some of them, drive like Formula Three cars. The rule changes for last year were different, because afterwards the cars got more difficult to drive. But beforehand, the year before, it was easy in a way. They had power steering, everybody could drive it, and that was it. It was the worst Formula One for me, in 2016.

Have you seen the balance change between how much is the car and how much is the driver in deciding success?

You cannot divide this at all because you always need a driver and you need a car. But to drive on the limit in all these cars is always the same. There's the best driver in the world who can do it better, and the worst is two or three tenths slower. So to be on the limit is the same problem. But the operation of the car, to operate it, is ten times easier today. All you do is, you have power steering, and you drive—click, click, click [that is, you turn on the different

2 Lauda is referring to the not completely welcome arrival at McLaren of a very fast young Alain Prost, fresh from the Renault F1 team.

3 The FIA banned turbochargers starting with the 1989 season. They were reintroduced for the 2014 season at 1.6 liters displacement.

systems]—and then off you go. All anybody has to do. Only have to concentrate to keep on the limit and go quicker. In my time, with gear changes, you missed one gear and the engine blew up.

What do you think Formula One needs to recapture that excitement for the fans? What are the core ingredients?

The core ingredients to be exciting: get rid of all these stupid rules we all introduced. Start with five-places-back for gearbox, engines, ten-place grid penalties; all this manipulating the sport. We have moved away from basic racing, where you see how the drivers fight with the cars to their physical limits and then make mistakes, or not. Which makes the difference. All this is drifting away.

At the moment we are driving in a very boring Formula One time. Five years ago it was better. I think this Formula One boring time will continue until [the Concorde Agreement] is over in 2020. People are less and less interested. Not because the racing is boring. The whole attraction of Formula One is gone.

We all complain about this Halo bullshit, but if you look at the thing and what it does, the attraction is gone. You should see at least a human being sitting in the car driving, then you see maybe in his head movements how hard it is. But you don't realize. You don't even see it. Lewis did a lap in Bahrain or somewhere—six-tenths quicker than the others—and I don't even see it. Me, and I know what to look at. I don't even realize it. When I see the lap time, I'm like, "Fuck, he's quick." All this is going wrong.

Look at the [Moto GP] motorbikes. The motorbikes are still going as they were always going. Attractive. Aggressive. You see what these guys do. Why did we change Formula One around so stupid? We keep going backwards and backwards and backwards. Motorbikes are still exactly the same as one hundred years [ago], and they're still as attractive as at the first day. But why? Because they don't change the rules over time. The FIA doesn't get involved in making everything safe, putting Halos on the thing. They keep the basics going. We are destroying slowly the basics. We are going in the direction of, I don't know, a playground for . . . how are these things called? What the kids play? Computer games.

How much of that do you think is the circuits?

The circuits, it's a combination of having runoff areas everywhere and no more close guardrails where you see how quick they go. All of this development goes hand in hand. Circuits. Cars. Halos. All this is going, step by step, small steps into the wrong direction, I think.

If you could take a car from today and race it on one racetrack that you raced on in the 1970s to capture that excitement, where would you go?

Nürburgring. Nordschleife. But it can't be. If you ask me this question, I give you that answer. But you cannot go back and make it more dangerous. You can't go back. But we have to stop all these extra things we load onto Formula One in little steps to make it completely. . . . The only excitement today is the start [of the race]. At the start, they're all going into the first corner, the tires smoke, they go forwards and backwards and [at that moment] you think, ah, something unexpected will happen. After the start, more or less, most of the races are not interesting anymore. ▚

PETE BIRO

1933–2018

Pete Biro passed away shortly before F1 Mavericks was completed. Away from the track, Pete was a professional magician. He brought a magician's mindset to his photo assignments, always looking for an unexpected angle and inventing shots that left other photographers mystified as to how he'd gotten them—the very definition of magic. He will be deeply missed by his many friends in both communities.

My uncle, Edward Biro, was an amateur photographer and electronics whiz working for Bell Telephone. When I was about nine years old, he gave me the first of my cameras. I think it was some kind of folding camera. I started taking photos around the neighborhood, chased a few fire trucks, and took photographs of my friends playing baseball and members of the family.

After I graduated from high school, I was immediately drafted in the US Army, and luckily, during the Korean War, I went to Germany and wound up in the G2 (intelligence section) of the First Division. While in Germany I took a class in darkroom work and learned how to process and print my own film.

When I came home in 1952, I discovered sports cars. Before I went away, I had a 1932 Ford, but my dad sold it while I was gone. Looking for a sports car I wound up buying an MG TD. I paid $1,100 for it, had it for two years, and traded it for a Triumph TR2, getting $1,100 for it. Gee, I had a car for two years and got all my money back when I got rid of it. With these cars I went on a lot of rallies and started going to sports car races, and of course I brought my camera along with me.

When the digital age started to creep in, I immediately bought a digital camera, but it wasn't very good. I eventually wound up going through ten different cameras until the technology and quality reached the point where the photographs were as good as if not better than film cameras.

To put this book together I started digging through piles of photographs, boxes of slides, stacks of pictures in filing cabinets, boxes in my garage, you name it I had it, but it was in no particular order, since I am not a very organized person.

In the beginning, I was contacted to supply photographs to *Road & Track* for a story on the Barneson Special, a custom-made sports car with a big Chrysler engine. I spent an afternoon taking pictures of the car, sent them to the magazine, and got $80 for a couple hours' work. I said to myself, "This is a business I should get into." Up to then I had been working in the sign-painting business painting signs on windows, walls, trucks, and midget race cars. You name it, I painted signs on everything. One time I painted the numbers and sponsor names on A. J. Foyt's race car for the Daytona 500.

Following the Barneson story, *Road & Track* assigned me to cover the Pebble Beach road races. I was excited and when I got to Pebble Beach, I picked up my pass and started taking pictures in the pits. All of a sudden I heard my name over the public

address system. I reported to the office and it turned out John Bond, owner of the magazine, wanted my pass back because he had a guest he wanted to give it to.

Following that, a couple of us got together (John Kelly, John O'Donnell, and Fred Amundrud), and we decided to start our own magazine. That way we could assign the photo passes and give them to ourselves, and no one would be able to take them away. We named it *Sports Car Pictorial*.

We published this magazine for five years to the day, and as we were going to the printer with that edition, I told the guys, "We only have $30 in the bank." We decided to quit publishing and sold it to *Autoweek* for one dollar.

By that time David E. Davis Jr. had discovered my work and was giving me assignments for *Car and Driver*. In addition, I was shooting for *Hot Rod*, *Motor Trend*, and *Sports Car Graphic*. I also got some dream assignments from *Sports Illustrated*, most notably coverage of A. J. Foyt at his ranch in Houston.

Working with David E. Davis Jr. was unbelievable. We traveled all over, went to Europe, had great times, met a lot of great people, and luckily we were there in 1967 when Dan Gurney won both the Belgian Grand Prix and Le Mans. Sadly, however, the magazine lost most of my film from Gurney's two historic wins.

There are a lot of photographs that I've made that will not be in the book. Often I would send all the film to advertising agencies, they would select what they wanted, and sometimes

photograph by Tim Considine

they would send the film back to me, but other times it just vanished into their files never to be seen again. So, I hope you enjoy looking at these pictures as much as I did making them.

One of the great assets of this kind of life, traveling to all the races, was getting to meet, know, and become friends with so many of the drivers and other members of the press. I count Dan Gurney, Phil Hill, Bruce McLaren, Denny Hulme, Jackie Stewart, Bobby Unser, Tony Adamowicz, Sam Posey, A. J. Foyt, Richard Petty, David Pearson, and many others as good friends.

Looking back at the fifty years I spent on the road with a camera, I would do it all over again; probably the only thing I would change would be my socks and underwear.

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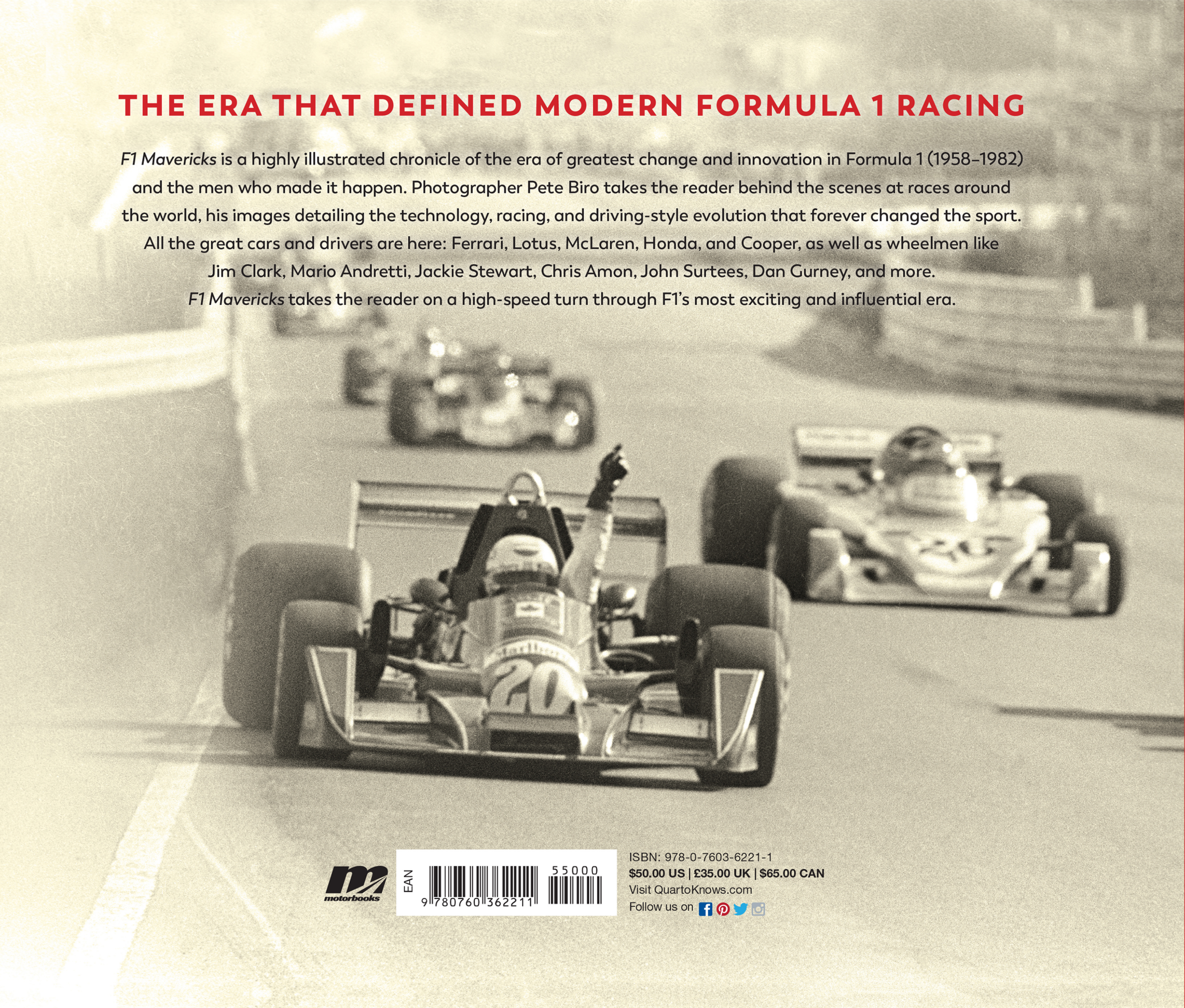
THE ERA THAT DEFINED MODERN FORMULA 1 RACING

F1 Mavericks is a highly illustrated chronicle of the era of greatest change and innovation in Formula 1 (1958–1982) and the men who made it happen. Photographer Pete Biro takes the reader behind the scenes at races around the world, his images detailing the technology, racing, and driving-style evolution that forever changed the sport. All the great cars and drivers are here: Ferrari, Lotus, McLaren, Honda, and Cooper, as well as wheelmen like Jim Clark, Mario Andretti, Jackie Stewart, Chris Amon, John Surtees, Dan Gurney, and more. *F1 Mavericks* takes the reader on a high-speed turn through F1's most exciting and influential era.



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