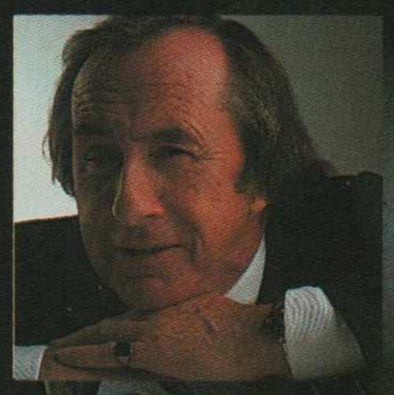
STEWART FORD

THE INSIDE STORY OF A NEW GRAND PRIX TEAM'S RACE TO THE FORMULA 1 GRID

"My toughest challenge," by Jackie Stewart



Two legends one dream

FORD: FIGHTING BACK TO THE FRONT

STEWART'S WINNING WAYS

MEET THE DRIVERS • INSIDE THE STEWART-FORD PIT • FIRING UP THE V10

If anyone harboured doubts about Ford's commitment to the sport of grand prix racing, events in 1996 must certainly have reassured them. In January came confirmation of the Blue Oval's revolutionary new partnership with Jackie and Paul Stewart. And by December – just 11 months later! – the first tartan-bedecked SF-1 was running in anger, guided by the experienced hands of grand prix stalwart Rubens Barrichello.

To have built not just a state-of-the-art Formula One car but an entire grand prix team in this time is a minor miracle. Of course, it would take something more than that to see Rubens or his team-mate, Jan Magnussen, celebrating Stewart-Ford's first victory in 1997. But make no mistake, this is a team filled with proven winners, and they mean to win again.

We hope the next 30-odd pages make it possible for you to follow the team's progress with even greater interest. For Stewart-Ford, the battle has only just begun.

Steve Cropley
Editor-in-chief, Autocar

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STEWART-FORD SUPPLEMENT

To most mortals, clinching a third world title would be the pinnacle of a dream Formula One career. To Jackie Stewart, it was only the beginning....

THE racer's edge

BY SIMON TAYLOR

Once a racer, always a racer. Jackie Stewart can't remember exactly when the idea of running his own grand prix team took root. But he's sure it's going to be the biggest challenge of his life.

Telling words from a man who has written his name indelibly into the history books as one of motor racing's all-time greats. A man who started 99 grands prix, won 27 of them, and was world champion three times in five years.

He arrived in Formula One in 1965 as a bouncy, cheeky young Scot, team-mate to the more patrician Graham Hill at BRM. Illness as a child, and dyslexia, meant Jackie had been a failure at school. Until he found he could reach Olympic standard at clay pigeon shooting, he'd never been much of a success at anything. Then he discovered motor racing, and immediately became a man to watch.

He scored a point in his first grand prix, and that first year went on to stand on the podium five times, winning the Italian Grand Prix and finishing third in the championship. Then the following year, in the Belgian Grand Prix, he crashed.

He'd just won the Monaco Grand Prix and was leading the world championship. At Spa he started from the front row, and half way round the first lap the field ran into a rain storm. His BRM ended up well off the track, upside down in a field, with

Stewart trapped inside, soaked in petrol. There were no marshals to be seen and it was left to two other drivers, unhurt in their own accidents, to free the injured driver from the wreck. Almost half an hour passed before an ambulance arrived to take him to hospital.

Jackie was racing again a month later, as quick and as bouncy as ever, but suddenly he'd matured. Now he was a man with a mission: he believed it was possible to remove a lot of unnecessary risk from the sport. Thanks to the campaign that he helped to initiate, motor racing has over the years become immeasurably safer.

His efforts did not always make him popular with the establishment, but Jackie is not an easy man to stop when he has set his sights on a goal. Generations of drivers now owe their lives to his crusading zeal, which has led to today's impressive medical facilities, infinitely safer circuits, and a general understanding of how to run motor racing properly.

By 1968 two vital partnerships had begun: with Ken Tyrrell, and with the Ford DFV engine. World Championships followed in 1969, 1971 and 1973. Jackie's status as Formula One's top driver lent authority to his determination to bring a new professionalism to the sport, while his fashionably long hair showed his understanding of the celebrity status he now enjoyed in the mass media. In a variety of ways, Jackie Stewart had made himself the first modern racing driver.

Main picture: "One down...." Jackie celebrates his first world drivers' crown after winning the 1969 Italian GP. Left: 1971 sportsman of the year meets his female counterpart, HRH Princess Anne. Below: Fashionably long hair won public and media approval!

AUTOSPORT

And when, at the age of 34, he retired from the cockpit, Stewart's racing fame became the springboard to a new career as an international businessman. Boardroom doors opened for him all over the world. His mix of canny shrewdness, easygoing charm and boundless energy earned him directorships of Ford and Goodyear, and involvements in a variety of other projects.

He was comfortable in front of a camera and with a microphone, and his image in the USA became so connected with the British way of life that an American TV network used him to cover a royal wedding. His flying miles on endless business trips around the world from his Swiss home near Geneva grew to be measured in millions. In his business career, he earned far more than he had in his nine years of Formula One.

Always there was the integrity, the relentless energy, the passionate attention to detail. If you ever got involved with a Jackie project, you found everything had to be right, no matter how long it took.

And still motor racing beckoned. Perhaps, like any fond parent, Jackie wasn't too pleased when one of his sons, Paul, decided to take it up. But, between them, they gave birth to Paul Stewart Racing, and a new chapter opened in Jackie's life. Now that has led to father and son working together to build a new Formula One team capable of competing in the toughest of racing environments. The white and blue cars with the tartan stripes may be brand new, but they have a great heritage behind them – and, crucially, the Ford relationship which began in the 1960s continues to be a central part of that heritage.

Jackie and Paul regard this season as the first stage of a long-term project. They are hungry for results, but they're also realistic about the time-frame, and are under no illusions about the magnitude of the task in this highest-tech, most competitive sport on earth. But the team has all the will, the determination, the professionalism and the talent needed to get Stewart-Ford to the very top.

For Jackie, the goal is there, and he means to hit it. Once a racer, always a racer....

Highland dynasty

PAUL STEWART RACING

It's not easy building a racing career as the son of a famous motor racing father. Damon Hill will tell you that. And when the 17-year-old Paul Stewart told his father he wanted to have a go, Jackie told him his university education had to come first.

It wasn't until 1988, when Paul was 21, that Paul Stewart Racing was founded to run a single Formula Ford car. Naturally, the approach was ultra-professional, and the team rapidly grew into the ideal base for many a young driver. As Paul's cockpit career progressed to Formula 3000 so PSR rose to prominence in numerous single-seater formulae.

The record speaks for itself: over nine years, the team has won an extraordinary 107 races and 10 championships – an unparalleled achievement. One graduate of the Stewart 'staircase of talent' was brilliant Jan Magnussen, who won 14 out of 18 British Formula 3 championship rounds in 1994 – and is now in his first full Formula One season with Stewart-Ford.

By the end of 1993, Paul had done three years in F3000 and was trying to put together a Formula One drive when he decided, abruptly, that his future lay away from the cockpit. A courageous decision, it allowed him to concentrate on developing Paul Stewart Racing, which now continues alongside the new team.

Anyone who heard Paul's emotional speech at the launch of the new car will know that the father-and-son bond is very strong. As chairman and managing director respectively, Jackie and Paul represent a remarkable motor racing dynasty. Their skills are complementary but, when results come, their joys will be the same.

Family business

"To be doing this with my son Paul is terrific. I don't think I could have done it without him"

Jackie Stewart tells ALAN HENRY *that the Stewart-Ford team is anything but a one man show*

LEAD PHOTO: TERRY O'NEILL

"A reputation is built on the past. But success is built on today and in the future, and that's what we have to deliver. We *have* to deliver. I've always needed to deliver in whatever I have undertaken, and I'll be trying awfully hard to do just that."

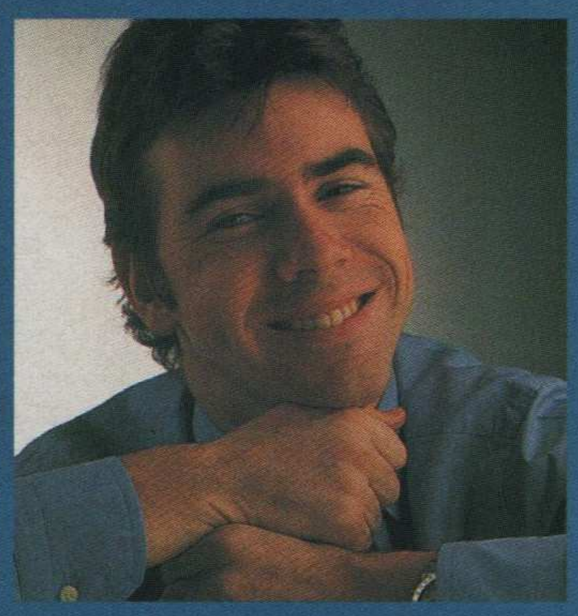
Nothing that triple world champion Jackie Stewart experienced during his nine seasons behind the wheel has matched the challenge which he and his son Paul faced in establishing the new Formula One team. It's been a tortuous road just to make it to the grid, but at last they have the team, the engine and the sponsorship – and now the real battle begins.

"Sometimes I find myself feeling that winning those three world championships seemed very easy by comparison. Seriously, winning world titles is never easy, but I had a fantastic team behind me with Ken Tyrrell and that helped me a lot.

"Now we have to fulfil that same role; we are those people behind the drivers. And it has certainly been a greater challenge, more complicated and more difficult than simply being a driver. I wouldn't take anything away from a Schumacher or a Hill, or any of the other current drivers, but it is easier than putting this together. I think even Alain Prost will one day say the same thing, because the complexities involved in establishing a team are *far beyond* anything that faces a driver.

"As far as the prospects for our first season in Formula One are concerned, I would expect we might be qualifying around 12th to 14th, and it would be a great achievement to score perhaps a few championship points by the end of the year. But we are very aware of the

JACKIE ON Paul



GREG BARTLEY

"Paul deserves huge credit for the way he has built up the new team"

I have been enormously proud of Paul's achievements. That goes right back to the time I remember telling him that I was totally opposed to his going motor racing on his own.

He came back from the 1983 British Grand Prix and produced a brochure from the racing school at Silverstone. Unknown to me, he had signed up for the course. He wanted me to help him, and I refused, telling him I really thought he should complete his university studies before he turned his attention to anything like that.

To be honest, when I told him that, I felt really bad. Here we were, sitting outside our home, with its pool and its tennis court, all those privileges having come out of what he was wanting to do – and I was telling him that he couldn't do it!

But Paul completed his studies and eventually went motor racing. We established Paul Stewart Racing originally as a vehicle just to enter his own car, and it is largely to Paul's credit that we were celebrating the team's 100th win by the end of the 1996 season – three years after he himself retired from driving.

As for the development of the Stewart Grand Prix infrastructure, Paul deserves a huge amount of credit. He has worked diligently behind the scenes with our technical director, Alan Jenkins, and I think the merit of those efforts will soon become fully visible. I don't think I could have established the Formula One team without Paul, and I don't think I would have wanted to do it without him either....

challenge which awaits us. There are many other teams out there with vastly more experience than ourselves."

Jackie is keen to make the point that he never promised any specific results when he was behind the wheel, and it is the same with Stewart-Ford. But he also believes that the most pressure to achieve success will come from within the team itself.

"I never promised a win or a championship when I was a racing driver," he insists. "I wanted to deliver the best that I could. If it was good enough, we would win; if we were really good enough, we would win a world championship. That is what we now have to do again, but in a much more complicated environment.

"You know how critical the media can be and I don't expect any quarter! I expect to get just what everybody else gets. Inevitably, there will be supporters and detractors. But we only have to deliver for us, the Stewart-Ford team.

"We can't worry what other people are saying. We have to do it in our own time, at our own pace, building the correct foundations for success. If you force-feed a tomato, you won't get the same flavour

"I am a very proud Scot. I feel a lot for my wee country – there are only five million of us, and our greatest export has always been the people"

out of it than from one you allow to grow in its own time. We've got to be given that opportunity, and I hope too many people don't expect too much too soon."

Of course, Jackie feels an enormous amount of pride in his Scottish ancestry, as reflected by the specially designed Stewart Racing Tartan which bedecks the Stewart-Ford SF-1.

"I am a very proud Scot," Jackie says. "The whole family were born in Scotland. I feel a lot for my wee country; there are only five million of us, and our greatest export has always been the people. So I like the idea of the team's tartan identification. My racing helmet wore Royal Stewart tartan, Paul's wore Stewart Hunting tartan, and the Stewart Racing tartan is a combination of the two."

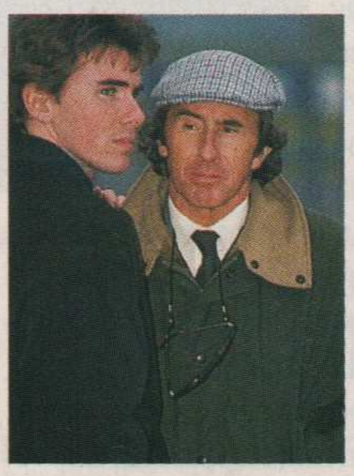
Jackie is acutely aware of his own motor racing heritage and how the opportunities he enjoyed effectively opened a path – many years later – for him and Paul to start their own grand prix team from scratch.

"When I announced my retirement from driving on 14 October, 1973, I surely could not have known what my long-term future would be," he reflects.

"You know how critical the media can be – I don't expect any quarter! But we have to deliver for us, Stewart-Ford"

"But I was surrounded that day by a loving and supportive wife, and two very little boys, Mark and Paul.

"I have been a very fortunate man. Motor racing has been my passion. The sport blessed me and my family with privileges, material benefits and opportunities which have allowed me to fulfil so many dreams. There might never



From the top: Jackie didn't take long to teach Paul a trick or two about racing. Paul put the lessons to good use, and Jackie was proud to drive with him in a demonstration run for the press. Wife Helen, little Mark and Paul listen to Jackie announcing his retirement in 1973. A tough challenge lies ahead

have been a Stewart-Ford team if Ken Tyrrell had not asked me to drive a Formula 3 car at Goodwood in 1964.

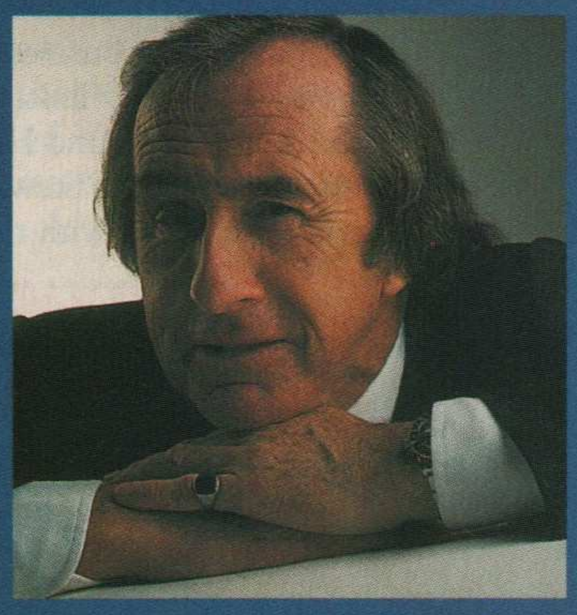
"There might never have been a Stewart-Ford team had not Walter Hayes put me under contract to the Ford Motor Company in 1964. And, in particular, we could not have reached the starting point for what has been a huge adventure without Neil Ressler, the vice-president of Advanced Vehicle Technology for Ford Automotive Operations.

"To have participated in this adventure with my own flesh and blood has been particularly nice. To do it together with Paul has been terrific. I wouldn't have done it without him, and I don't think I *could* have done it without him.

"And also to have my younger son Mark, who has a video production company, making a video which is going to go out as a TV special – it's been a whole family project. Poor Helen has been left a lot on her own, but she's been well used to that as a racing driver's wife, and she is long on patience.

"I just think it's been a great thrill for all of us – and the beginning of what I am sure will be a great challenge...."

PAUL ON Jackie



GREG BARTLEY

"I'm proud to say working with him is a great pleasure"

I think it is pretty obvious from the very fact that my father and I have worked together on these two projects, Paul Stewart Racing and the new team, that we are a close-knit family – even though I don't believe it is any secret he didn't want me to go racing myself when I first expressed an interest.

He didn't like it. His reaction, clearly, was that he thought he'd got away with it and that I was too old to go into motor racing. He was opposed to it, I think, because he had survived unscathed through what was a most dangerous period in racing, and now here I was all set to repeat the process.

But I did go racing and enjoyed it enormously. I was privileged to race at Monaco in Formula 3 and to outqualify Michael Schumacher at Macau. Fantastic moments which gave me a great deal of satisfaction.

But all these things happened because, to put it bluntly, of my father's success in motorsport. Clearly I had to represent him in the right way. I had to put in the effort and commitment, because otherwise everyone would have said "Jackie's son is a waste of time" and I would have looked like a joke. That I could never have lived with.

But I don't feel that being Jackie's son is a burden at all. The only thing I do worry about is that I always want to feel I'm doing justice to his reputation. I would hate to feel I was tagging on and not contributing.

On many occasions I'm asked: "What's it like to work with your father?" Well, I'm proud to say that it really is an enormous pleasure. I think this is reflected by the way the team has come together and the way in which, I hope, it will continue to grow.

Ford leads way with "dream" partnership

Thirty years after its debut Formula One win, the 1967 Dutch Grand Prix, Ford is spearheading Formula One's drive into the 21st century with its unprecedented input into the development of the new Stewart-Ford SF-1 challenger.

Never before has a major manufacturer been so fully involved in all aspects of a grand prix car's creation – from complex computer design and integrated electronic management to its cockpit ergonomics and pit-car radio communications.

"Working in this way with a major manufacturer is something which everyone in Formula One dreams about," says Stewart GP's technical boss, Alan Jenkins. "It takes a lot of commitment, but Ford have shown themselves more than willing. They have enormous capabilities and we are still only just beginning to learn how to harness them."

Careful management of the airflow over the SF-1's chassis is just one critical area where Jenkins called heavily upon the expertise of Ford engineers at the company's American headquarters in Dearborn, Michigan. As a result, the car's high sidepods feature steeply raked inlets with an unusually-shaped leading edge to optimise engine cooling, while still meeting Formula One's rigorous side-impact regulations and making best use of the car's turning vanes. "Every aspect of the aerodynamic package has been carefully optimised by this painstaking process," Jenkins confirms, "and many innovative details have emerged as a result."

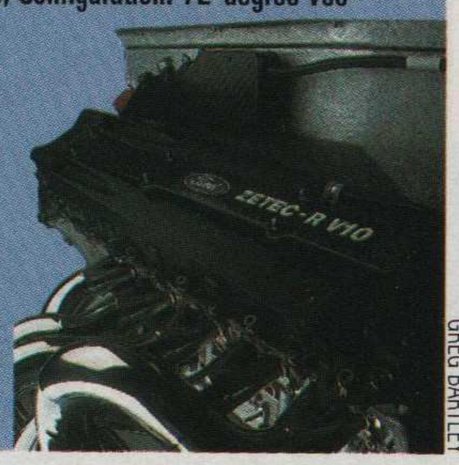
The technical characteristics of the SF-1 are simply mind-boggling. At speeds of up to 200mph, Ford's engine management system employs an on-board computer capable of 1.7 million commands *every second* – rather more powerful than the PC chained to your desk!

Ford's desire is to use the intense pressures of Formula One as a testing ground not only for the latest motoring technologies but also for its engineers. "Formula One encourages innovative approaches and quick, accurate responses," says director of European motorsport Martin Whitaker. "That can only improve every aspect of our products, our processes *and* our people."

FORD'S V10 – A WHOLE YEAR BETTER

Developed by long-term partners Cosworth, the Ford Zetec-R V10 which powers the Stewart-Ford SF-1 is a very different engine from the one that began the 1996 season. During the winter, Cosworth expanded its Formula One engineering team to speed its development, and the Zetec-R now boasts airflow improvements (from revised inlet and exhaust port design), higher combustion efficiency and reduced frictional losses. Working closely with Stewart on the engine's installation, Ford and Cosworth have also developed new components such as cam covers, oil inlet and outlet castings and a revised flywheel.

ZETEC-R V10 TECHNICAL SPECIFICATION
No of cylinders: 10; Configuration: 72-degree vee
No of valves: 40
Capacity: 2998cc
Length: 605mm
Width: 520mm
Height: 460mm
Weight: 120kg
Cylinder block & pistons: aluminium
Crankshaft: steel



GREG BARTLEY

Sponsor-friendly

By the time of the SF-1's official launch on 10 December 1996, Jackie and Paul Stewart were able to confirm that they had covered this season's Stewart-Ford racing budget with the sponsorship deals that emblazon the car.

By then, the budget had already been committed for 1997 from Ford Motor Company, the HSBC Group (one of the world's leading international banking and financial services organisations), Visit Malaysia – reflecting backing from the Malaysian government in the promotion of the country as a business and tourist destination – plus Texaco fuel and lubricants, Sanyo and Hertz.

Crucially, Jackie Stewart says any sponsor involved with the Stewart-Ford

FOUR FABULOUS FORD FACTS

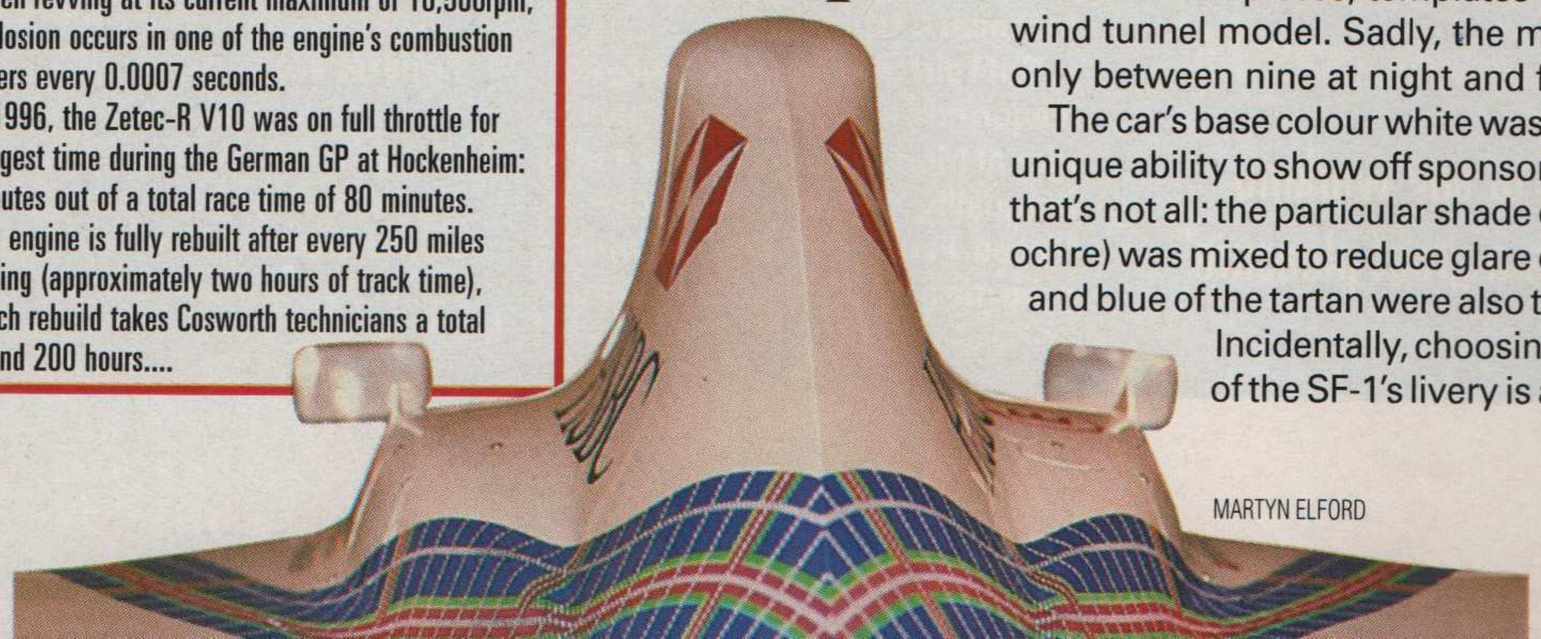
- Before the Zetec-R V10 had even run in a car for the first time (on 16 January, 1996), it had already done 329 hours and 49 minutes on Cosworth's test beds.
- When revving at its current maximum of 16,500rpm, an explosion occurs in one of the engine's combustion chambers every 0.0007 seconds.
- In 1996, the Zetec-R V10 was on full throttle for the longest time during the German GP at Hockenheim: 50 minutes out of a total race time of 80 minutes.
- The engine is fully rebuilt after every 250 miles of running (approximately two hours of track time), and each rebuild takes Cosworth technicians a total of around 200 hours....

White? Not quite

The pressures of building a completely new grand prix car from scratch played havoc even with the job of the SF-1's livery designers. With a month to go before its launch and the car still in pieces, templates had to be taken from the 50% wind tunnel model. Sadly, the model was available for this job only between nine at night and four the next morning....

The car's base colour white was selected for its TV visibility and unique ability to show off sponsors' full corporate colours. But that's not all: the particular shade of 'soft white' (cut with a little ochre) was mixed to reduce glare on camera, while the red, green and blue of the tartan were also tweaked for maximum effect.

Incidentally, choosing white also means the weight of the SF-1's livery is among the lowest on the grid!


MARTYN ELFORD

19 December, 1996: a moment of history. The Stewart-Ford SF-1 turns a wheel in anger for the first time in the pouring rain at Ford's Boreham test facility. The run also marked the first time any 1997 Formula One car had been seen in action. Rubens Barrichello was the lucky driver – Jan Magnussen had to wait until after Christmas....

JON NICHOLSON

Designer Alan Jenkins on the launch of the SF-1: "The last 24 hours were totally sleepless. When it touched ground for the first time, at 5am on launch day, fifty of us were there to see it. A great moment."

Jackie banks on bigger business

team will get more than simply global television exposure for their investment.

"The biggest thing for us is to give our partners value for money by creating new business opportunities for them," he explains. "For example, we believe HSBC, operating in 76 countries around the world, will generate a lot more incremental business than the amount they spend on the Stewart-Ford team.

"To bring more people over to Malaysia is also a priority. And it's good to be starting with Bridgestone tyres. Sanyo, on the other hand, are old professionals at Formula One, as are Texaco – indeed, we regard it as something of a coup that we have got them aboard, as another huge global player with 22,000 outlets.

"That is," Jackie is quick to add, "22,000 opportunities for exposure for *all* our sponsors....

"Of course, Ford Motor Company is our major partner," he says. "Without them, we simply could not have done all this. The fact that I am still with Ford after a 32-year relationship says it all. They have been absolute giants in putting together our particular set of jigsaw puzzles."

ALLSPORT

Announcement of the HSBC deal

YES, IT'S A GENUINE TARTAN. WITH A PROUD HISTORY, TOO....

The new "Racing Stewart" tartan is a hybrid of those worn by Jackie and Paul on their own helmets. "Royal Stewart" (Jackie's, left) was traditionally a battle tartan and Paul's "Hunting Stewart" was, predictably, worn when hunting. The new tartan was commissioned in 1995 and is registered with The Scottish Tartan Society.

DRIVER BRIEFING

NO 22: RUBENS BARRICHELLO

BORN 23 May, 1972; Brazil.
CAREER HIGHS
1984: Brazilian junior kart championship runner-up.
1985-'86: Fourth in overall Brazilian kart championship ('85), winner Category A ('86).
1987-88: Brazilian kart champion, '87 and '88. 1987 – 125cc South American champion; ninth in world championship.
1989: Brazilian Formula Ford championship, fourth overall.
1990: GM Lotus Euroseries with Draco Racing. Six wins out of 11 races, seven pole positions, seven fastest laps.
1991: British Formula 3 champion with West Surrey Racing. Four wins from 15 races, nine pole positions, seven fastest laps and four track records.
1992: Third in FIA International F3000 Championship with Il Barone Rampante.
1993-96: FIA Formula One World Championship (all four seasons with Jordan). 17th overall in '93, then sixth in '94; eighth overall for past two years.

JACKIE'S VIEW

"Only 24 years old, and already he has four years of Formula One experience under his belt – impressive by any standards. A man with great potential, as was seen when he won the 1991 British F3 title and was competitive in F3000. But I think people might have been expecting too much too soon. Racing drivers *are* tough; they take a lot of knocks driving Formula One cars with no suspension movement. But mentally they can be very fragile. Drivers need special handling, and I don't think Rubens has yet realised all his latent potential. I think he's quite vulnerable and that hasn't been recognised in the past."

DRIVER BRIEFING

NO 23: JAN MAGNUSSEN

BORN 4 July, 1973; Denmark.
CAREER HIGHS
1984-'86: Danish karting champion.
1987: Junior world karting champion.
1988: Winner of Austrian Kart GP.
1989: Junior world karting champion.
1990: Senior world karting champion.
1991: Formula Ford debut.
1992: Third in British Formula Ford championship, seven wins. Winner Formula Ford Festival at Brands.
1993: Opel Lotus European series. F3 debut with Paul Stewart Racing: fourth and third in two races entered.
1994: British F3 champion with Paul Stewart Racing, winning 14 out of 18! First Formula One test: McLaren.
1995: McLaren Formula One team test driver. Formula One debut in Pacific GP, 10th. International Touring Car series runner-up, despite earlier broken leg!
1996: McLaren test driver. Four Indycar races in works Penske.

JACKIE'S VIEW

"Jan is only 23, yet already a three-time world champion kartist. He also became British F3 champion in dominant style. He has as much talent in a racing car as I've ever seen – with as good a head as anybody I've ever seen in this sport. I don't think he ever wanted to go touring car racing; he shouldn't have left single-seaters. But he thought he would get a lot of Formula One seat time, which did not happen. I think that, in turn, affected his attitude towards touring cars, because he saw it as a 'second best' situation. I believe that we have the ability to motivate Jan, and create for him what I sincerely believe will be a springboard to major success."

MARTYN ELFORD

Right: Stewart's information-technology expert, systems manager Steve Nevey, checks on the new car via the Unigraphics CAD system. The only time an image is generated on paper is to aid a supplier without such technology....

DARREN HEATH

Put down that pencil, you CAD!

"To the best of my knowledge, this is the first Formula One car to have been entirely designed by computer from the outset." Jackie Stewart's assertion is a stark reminder of the philosophy that drives the Stewart-Ford alliance. But this desire to employ the very latest technology would have been impossible without the computer hardware and software made available by the team's technical partners.

"Having committed ourselves 100% to computer-aided design (CAD)," says Stewart's IT systems manager Steve Nevey, "we immediately forged a strong partnership with EDS, who provided our Unigraphics CAD software system. As strategic partners, they have *stayed* involved, constantly monitoring and updating the system to suit our precise requirements. That's the real advantage of this kind of sponsorship arrangement.

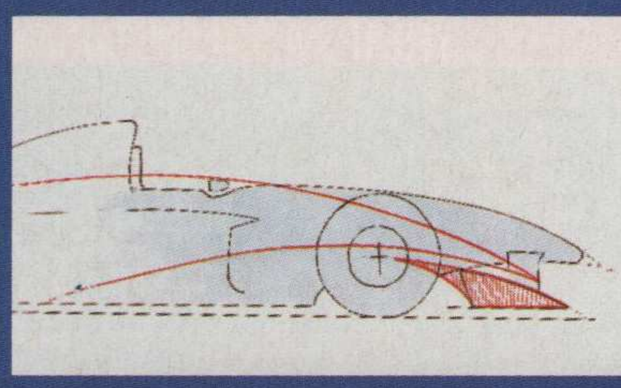
"We have a similar relationship with Hewlett-Packard. Not only do they provide all of our computer hardware (a very considerable investment in this high-tech team), but the heads of their California laboratories have already been over to discuss development projects. They're particularly strong on measurement, so they asked us what we'd like to measure that is currently out of reach. Hopefully we'll be able to acquire some fairly unusual data before long."

MSC complete Stewart-Ford's triumvirate of computer partners – its Patran system allows the team to simulate stress tests on newly-designed components, saving all-important time in the intensive (and never-ending) development process required by Formula One.

"The reason these companies enjoy working with us," Nevey adds, "is that we represent a fascinating model of a high-tech manufacturing industry. And since our priority is to reduce lead times in all areas of design and production, we're constantly looking to hone all our systems – which can only benefit them as well."

Is it a bird...?

No, it's the Stewart-Ford logo, conceived and generated by ace London design consultants Carter Wong & Partners – who also created the logo for Formula One's governing body, the FIA. The company's designs also adorn many well-known high-street products. The Stewart-Ford logo was completed over the latter half of 1996.



The origins of the Stewart-Ford logo can be found in profile drawings of the SF-1 itself. Early sketches show how the 'nose' of the logo approximates the front end of the new car.

"So, what do *you* want to do when you grow up?" Two youthful observers at the SF-1 launch were Paul Stewart's toddler Dylan (he ended up posing in the cockpit for photos!) and HRH Princess Anne's son Peter Phillips, who's been working with the team.

RALPH HARDWICK

FACTORY VISIT

'Interviews and shopping lists....' How to set up a new F1 team

The speed and directness of Ford's decision to partner this all-new team contradicts any tendency to portray the huge multinational company as a lumbering, conservative giant. The deal was not finalised until January 1996, yet the first Stewart-Ford car was running on the track before the end of that year.

Such a momentous achievement relies heavily on assembling the right team as quickly as possible. Indeed, as Stewart's technical chief Alan Jenkins points out: "In many respects, this project has been more about assembling a design and technical team than building a car.

"We started literally with an empty room. At one stage, Paul (Stewart) and I were doing nothing but interviewing. We have a staff of over 100 now, but to reach this level we've had to interview well over double that number."

Of the current staff (soon to go up significantly again as the test team is established), around half have come from elsewhere on the Formula One grid, bringing with them crucial experience for the fledgling organisation. Their reward has been an opportunity to shape the team's development.

"Perhaps where they've been before," suggests team manager Dave Stubbs, "they might not have had the opportunity to put their opinions forward. Whereas we're on a fairly steep learning curve, and we're pretty open minded. It's been a golden opportunity to hand-pick people and put the right team together, and in that sense I think we've been pretty fortunate. It's worked."

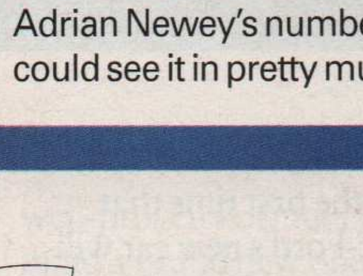
Stewart's Milton Keynes base has more than doubled in size to accommodate the Formula One team, despite the termination of the Formula 3000 arm of Paul Stewart Racing. Little of the F3000 equipment was transferable, which meant one huge shopping list had to be drawn up...

"We went along to the Nürburgring race last year," Stubbs recalls, "to see what other people used. Then the chief truckie and I went to Canada to see how things operate these days at a flyaway race. The list of equipment we drew up was massive – everything from transporters to tool kits!

"Obviously, when you go and look in someone else's garage, they don't let you poke around too much. But I don't think we've left anything out. As we've brought in people from other teams, they have helped us complete any bits of the jigsaw that might have been missing...."

The first of the team's two artics arrived last December

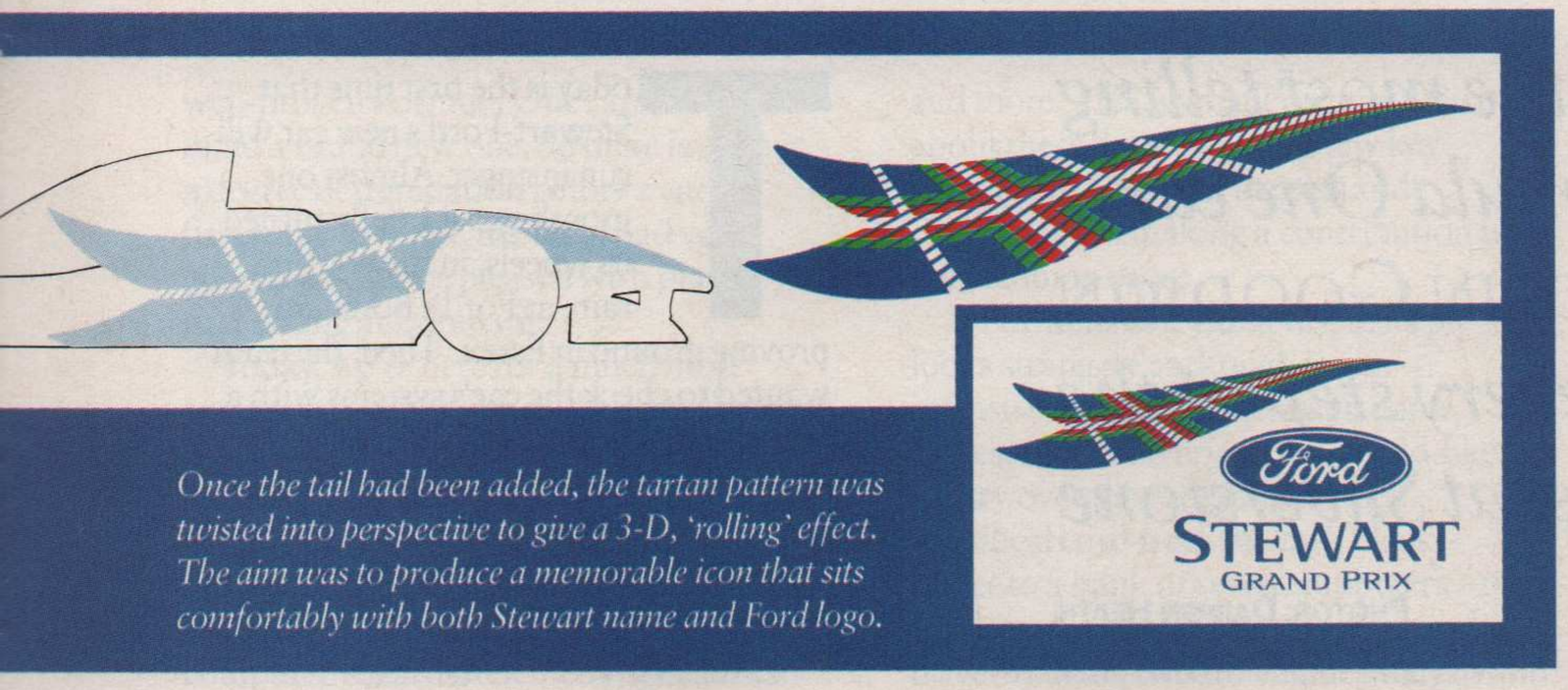
Designing Swiftly on both sides of the Pond...



RICK GRAVES

The Swift wind tunnel, used by Stewart-Ford to test its 50% prototype model of the SF-1, is acknowledged as the best of its kind in the world today. And its location across the Atlantic in San Clemente, California, highlighted another crucial benefit of the team's computerised design philosophy.

"A critical aspect of our CAD system," says Steve Nevey, "is that everyone works off one database. That includes the guys in California. They were connected to the factory by modem, so if an update was made in the factory, our aerodynamicist over there, Egbhal Hamidy (previously Adrian Newey's number two at Williams), could see it in pretty much real time."



Once the tail had been added, the tartan pattern was twisted into perspective to give a 3-D, 'rolling' effect. The aim was to produce a memorable icon that sits comfortably with both Stewart name and Ford logo.

A TEAM OF RACERS

The size of the Stewart-Ford team is, says Dave Stubbs, very much on a par with the rest of the Formula One grid. "We've just got fewer people on the manufacturing side, because we aren't doing so much in-house yet...."

The race team's structure breaks down like this: Overall organisation by team manager Stubbs and technical team manager Andy Miller. Technical director: Alan Jenkins. One senior engineer; two race engineers; two data loggers. One chief mechanic; six mechanics (three for each race car); two gearbox engineers; three mechanics for the spare car. Six truckies for three trucks (two artics for the cars and one rigid to carry pit gear).

Testing, testing....

Outside a race, the most telling time for a Formula One car is during testing. COLIN GOODWIN *follows every step of the SF-1's first test at Silverstone*

PHOTOS: DARREN HEATH

Today is the first time that Stewart-Ford's new car will run in anger. Almost one month ago it briefly turned its wheels, in the pouring rain, at Ford's Boreham proving ground in Essex. Then, the team wanted to check the car's systems with a few up-and-down runs. Rubens Barrichello did the driving, and the exercise went well.

There is, after all, an enormous amount of technical equipment that can, and does, go wrong, even with

well-proven Formula One cars, never mind a brand new one. So there is always a degree of trepidation before a car's first run. However, the team had very good reason to be pleased with that first outing at Boreham.

Today, we're here for a much more extensive test, and the evidence of that is obvious. The marquee that the team has erected next to Silverstone's South Circuit is crammed full of people. I've never seen a pit so crowded. People from Ford, from Cosworth, from Bridgestone, computer wizards, telemetry specialists and more. This is what Formula One is about these days; not just a few key people, but a mass of experts and suppliers each making a contribution to the common cause.

A Formula One car at rest in its pit looks strangely as though it is in intensive care. From all over it come cables, tubes and hoses. A scaffold-like gantry over the car guides a thick umbilical cord from the car's black boxes to a bank of seven computers – two for data storage, two for gearbox and drive-by-wire, two for engine analysis and one for engine calibration. A small cable goes to a lap-top computer that is used – along with a hand throttle – to start the engine.

At the back of the car a mechanic is warming the gearbox with a serious-looking hot air blower. This is not only to warm up the oil, but also to pre-heat the casing and bearings. The gearbox is built to such close tolerances that running from stone cold would do it no good at all. Eventually, all the systems have been checked, the gearbox sufficiently pre-heated and it's time to start the engine.

A portable starter motor with a long shaft is inserted into a slot at the back of the transmission. No one needs to be in the car, as the Cosworth technician can start it with his hand throttle and lap-top computer.

The Zetec-R V10 bangs and pops but doesn't start. It's pretty cold here, and it seems that the engine needs more fuel pressure and the gearbox is still a bit on the chilly side. An industrial heater is aimed at the rear of the car and an electric pump is plugged into the car's fuel filler to boost fuel pressure. Within minutes the V10 cranks into wailing life. Once it has run for a few minutes and has been checked for leaks, it is time to install the driver.

For non-Formula One people the drivers are the key figures, the heroes, the talents, the men whose relative merits are discussed over pints. In this world, the nitty gritty of Formula One, they are just another component. One that's difficult to control and one that can cause the biggest havoc. A single mistake from the driver can means hundreds of hours' extra work for the team.

Rubens Barrichello will be taking it easy here, though. It is the first test; really a systems shake-down before the team departs in a few days for Jerez in Spain for a full test session. Besides, he will be unpopular if he breaks the 75mph speed limit. I'm not joking. This is one of the many bizarre aspects of modern grand prix racing. The FIA, Formula One's governing body, says: No testing on non-FIA-approved circuits. Now, since the Silverstone Grand Prix Circuit currently has the road menders in, Stewart-Ford has to use the South Circuit, only about three-quarters of which is common with the Grand Prix circuit. For the section that isn't, there's a 120km/h speed limit, enforced by a radar gun....

Chassis No1 crackles and wails out of the marquee into the bright sunshine, the experienced Brazilian slipping the hand clutch and keeping the Zetec-R V10 lit by the fly-by-wire throttle. We had a late start this morning because this area showed some teething troubles at the factory last night, which meant an all-nighter for the team. Such is the Formula One life, especially in a brand-new équipe with a brand-new car.

Barrichello does one lap and then comes in. This is standard procedure for the first run of the day, to check whether all is well with the car. It is, so after swapping the slicks for wets he goes out for another three laps. The tyres are a source of much interest. The new Bridgestones could help to give Stewart-Ford a very useful boost.

Still no problems. This is impressive. It's a shame about the speed limit, though. It robs those in the pits of the joy of hearing up close their creation emitting all its anger. More importantly, it means no meaningful times can be taken and limits how hard the car can be pushed. There is

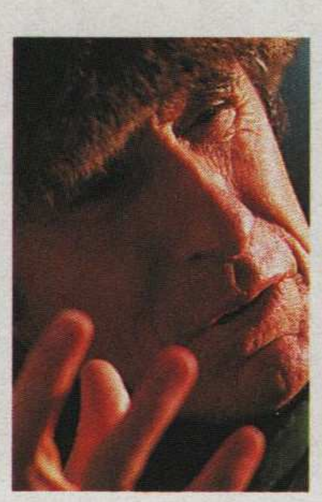
"The car sounds fantastic. You can hear it around the back of the circuit, the gears slotting in neatly. The team looks relaxed"

time for another five laps, on slicks again, before the lunch break.

Nine laps, no problems. If this doesn't sound that much of an achievement, it certainly is. These cars are massively complicated. This has more to do with the high-tech on-board computers than with the way that grand prix cars are put together. All it needs is for the car's black box to fail to communicate properly with the engine's black box and the gears won't engage. I've seen Williams' engineers spend ages trying to sort out just this problem. On a tried and tested car, to boot.

After lunch it is Jan Magnussen's turn in the cockpit. Magnussen hasn't driven a Formula One car since last summer but he does not look in the least bit fazed. The only time he has looked a little non-plussed today is when Jackie Stewart was giving him a talk about looking smart – his team-supplied Boss jacket was a poor fit, apparently. Stewart himself is wearing a hat entirely appropriate for the freezing conditions, but it still looks rather curious. Yet the man that he is, Stewart is laughing off the wry comments about his excessively furry hat. He spends a lot of time laughing and joking, both of which are much needed in Formula One.

Magnussen goes out on wets for four laps. No stalling, just confidently out on to the track and then accelerating in a scream as soon as he's out of the speed limit area. The car sounds fantastic. You can hear it round the back of the circuit, the gears slotting in neatly. The team looks remarkably relaxed. Even with the thorough preparation Stewart-Ford puts



Above: Jackie Stewart started and ended the day a happy man.
Above left: Seldom has a car attracted so many people to the pits.
Middle left: Jan Magnussen discusses the SF-1 with a team technician.
Bottom left: the moment that Jan Magnussen has been looking forward to: in the SF-1's cockpit with Silverstone awaiting him

The insider's story

Today is really going to be a shakedown test. All we really need to know is that the thing starts, stops, changes gear and can go around a corner. It's a nuisance about this daft speed limit. We could do with running the car hard, bouncing it off a few kerbs, to see how well it holds together. Second thoughts, since we're going to Jerez in a couple of days and this is the only car we have, it's probably not such a bad thing.

"It's a mammoth task starting up a team from scratch. And it's not just a matter of building the cars. All the support equipment has to be acquired or built. We went to around four grands prix last year and had a nose in a few garages to see what people had. I've been out of Formula One since 1989 and this team is a total newcomer. We've had to get hold of these banks of computers, build the fuelling machine, fabricate stands, trolleys, starters and much else.

"When the season starts at Melbourne in March we'll have three cars, and by Monaco there'll be four. That's the point at which we can think about setting up a test team. Without a test team you have a serious disadvantage.. The grands prix that are in far-flung places – such as Argentina – eat up valuable testing time. You really need to be testing back here at the same time. Still, we don't have our race team sorted yet, so it's a bit early to be worrying about a separate team altogether.

"Today has gone very well. Plenty can go wrong on a new car, but this one's been exceptionally well behaved. We haven't learnt as much as we could have had we been able to run at a pace, but at least we'll be going to Spain with a racing car that's fit. It's a good starting point."

David Stubbs, team manager

in, there is always the potential for terminal problems. So far, so very good.

Next time the young Dane goes out he's back in only one lap. The dash lights have gone out, the ones that give him the vital information about the car's health and function. A connection has most likely been disturbed when the steering wheel was taken off. It is soon fixed and he is out again. Five laps later he is back in, this time requesting a change in brake balance. The rears are locking up early, apparently. Normally, he would have a brake bias adjuster in the cockpit, but that hasn't been fitted yet so the mechanics carry out the job by adjusting the length of rods from the pedal to the master cylinder.

It's 3.30 now and there's a beautiful sunset unfolding across the Northamptonshire sky. It is getting colder, though, and no sooner has Magnussen left the pit than he's back. There's ice on the track. That's it for today.

And what a successful day it has been for Stewart-Ford. One small skirmish in a long campaign, but a promising note on which to start the long haul to success on the race track.

Pride . AND joy

Technical boss Alan Jenkins had to design a new Formula One car from scratch – and create the factory that could produce more like it. He explains how

By Steve Cropley. Photos: Darren Heath

When, last December, Paul and Jackie Stewart drew back the tartan cover to reveal the first ever Stewart-Ford grand prix car, one of the widest smiles among the onlookers was worn by Alan Jenkins, the new team's technical director. The event was public confirmation that he had not only brought a new Formula One car to life, he'd also successfully designed the factory that could produce more like it.

When 41-year-old Jenkins joined Stewart at the beginning of March 1996, the size of his task was far larger than the one most Formula One designers face. As well as devising a car that would meet both the team's expectations and budget, he was charged with recruiting the best possible design team, then staffing and devising an affordable manufacturing system.

Fortunately, Jenkins already had plenty of experience in each area. An industrial designer by training, he joined Ron Dennis and John Barnard at McLaren in the early 1980s, and was a key member of that team through its period of greatest expansion and success. In the middle 1980s he moved to Indycar


HSBC
Ford
Havoline
STEWART

legends Penske, working at their design base in Dorset on the south coast of England. There, Jenkins drew the car that won Indianapolis (with Danny Sullivan driving) in 1985. After that, he set up the Onyx Formula One team, before joining Arrows in the late 1980s.

It was at Arrows that Jenkins first met Paul Stewart, when Stewart was invited to test a Formula One car towards the end of 1993. The pair got on well together. Jenkins, a wry sort of bloke not given to hyperbole, appreciated Stewart's realistic attitude to his driving ability and racing aspirations. "Paul was much more straightforward than most of them," he says. "I liked him straight away."

During 1995 Jenkins learned of the Stewarts' Formula One aspirations – although he stayed committed to Arrows while it made its initial preparations. But when the Stewart technical director's job came up towards the end of the year, he had no trouble deciding to take it.

"There were very few instructions about the kind of car I was to design," Jenkins says. "The limitations – in so far as there were any – were placed by the need to have a credible car on the grid at the start of 1997, and by the budget, which wasn't exactly a shoestring but wasn't excessive either. There were certainly ceilings on personnel. The idea was that I should avoid spending money on a fully-equipped factory, but find suppliers who could deliver what we wanted at the right kind of quality."

"There were very few instructions about the kind of car I was to design, beyond the need to have it on the grid at the start of 1997"

By the end of his first month, Jenkins had begun recruiting his design staff. "We put priority on the race and design people, intending to build on that foundation as time went on. From the

The fast route to the grid

The Stewart-Ford SF-1 took comparatively little time to reach the track, given that its chief designer started work only nine months before the official launch, and the team's Formula One works had to be set up. Here are the key dates....

- MARCH 4 ALAN JENKINS STARTS WORK
- MARCH 30 INITIAL CAR LAYOUT COMPLETE
- MAY 2 DEAL WITH XTRAC TO BUILD GEARBOX
- JUNE 1 DESIGN TEAM RECRUITMENT COMPLETED
- JULY 1 WIND TUNNEL TESTS START IN CALIFORNIA
- AUGUST 8 BASIC BODY SHAPE OF SF-1 IS FINALISED
- AUGUST 9 CONSTRUCTION OF SF-1 CHASSIS BEGINS
- AUGUST 23 CAR COMPLETES CRASH TEST SIMULATION
- SEPTEMBER 17 £25M HSBC SPONSORSHIP DEAL ANNOUNCED
- NOVEMBER 13 FIA ACCEPTS TWO-CAR TEAM ENTRY FOR 1997
- DECEMBER 10 STEWART-FORD SF-1 IS LAUNCHED IN LONDON

Main picture: team manager Dave Stubbs oversees the stripping down of the first SF-1 after its debut runs at Ford's Boreham facility on 19 December 1996

beginning, we decided to take only the best: if we couldn't get fifteen good people, we'd make do with twelve until the right ones came along." Inevitably, some Stewart-Ford people have come from other teams; there are staff from Benetton, Ferrari, Williams and Arrows, among others.

The layout of Jenkins' first Stewart-Ford car, the SF-1, mirrors current grand prix practice. It consists of a carbon fibre monocoque "tub" for the driver, which carries the Ford Zetec-R V10 engine and six-speed longitudinal gearbox (unique to Stewart-Ford) as fully stressed members. Front and rear suspensions are by double wishbones with spring/damper units mounted inboard. Weights and major dimensions are tightly dictated by the legislation of Formula One's governing body, the FIA but, like previous Jenkins cars, the SF-1 features elegant design details that reflect their creator's early grounding in product design.

Despite the call for a car whose major components were sourced largely from suppliers, Jenkins changed the rules in two major ways. Firstly, he argued

"I think our car is up with the best on aerodynamics. I don't believe we're going to give anything away"

through a plan to build a half-size wind tunnel model (only the richest teams make them so big) and test it at the Swift Engineering wind tunnel in California, the most advanced in the business. Secondly, he got the Stewarts to agree to build the chassis in-house.

The use of a 50% model reflects Jenkins' career-long preoccupation with the science of aerodynamics. He still believes it possible to steal a march on the best of the opposition in this area.

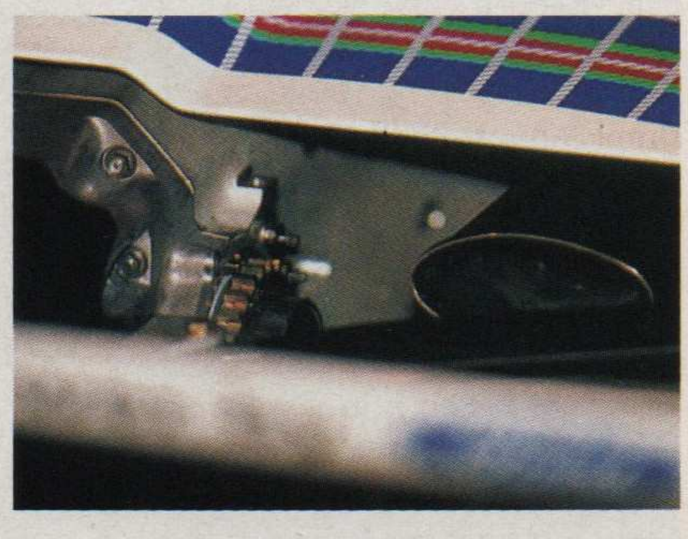
Naturally, the technical director won't reveal exactly where his design tweaks are (at launch, several areas of the SF-1's rear bodywork remained shrouded in tartan fabric) but the team's priorities are evident from the hiring of Egbhal Hamidy, an aerodynamics specialist who was formerly number two to Adrian Newey at Williams. "I think our car is up with the best on aerodynamics," says Jenkins. "I don't believe we're going to give anything away."

While proceeding with initial design work – "getting the large lumps in the right place" – Jenkins' early task was to work out a realistic timetable for the car's production. "We found out early on that the wind tunnel would become available from 1 July, and we based everything around that. The things which take longest are the chassis and the gearbox, so we worked out schedules for those first, and came up with a car launch date of 18 December. Somebody said that was a week too late, so we adjusted things and made it the 10th."

The SF-1 was duly launched on that date – having been completed for the first time at just 5am the same morning....

LAT

Left: the shapely SF-1 sits proudly on its London launch pad. Right: the tartan trim cockpit uses the latest in computerised ergonomics to ensure a comfortable fit for its drivers. Below: the exhaust area of a grand prix car is critical in achieving maximum levels of downforce. Below left: the SF-1's detachable cockpit display



LAT

As well as refocusing the Stewarts' approach to aerodynamics, Jenkins also persuaded them to build the carbon fibre chassis in a well-equipped workshop he ran across by chance, just a mile from the team's headquarters in Milton Keynes, 25 miles north of London. "Building the chassis ourselves was an enormous advantage," he says. "It meant we could react to small, subtle issues that continually arose as the design proceeded."

Jenkins, like the Stewarts, is cautious about predicting success for his new car. After more than 15 years in the racing car business, he knows it doesn't come easily. But that same experienced eye also helps him recognise a team which is working well together, and he's confident about the prospects of Stewart-Ford in the longer term.

"There's a lot of people here who know what it takes to win," he says. "Let's just say I think we're going to cause quite a few surprises." ■

Forward with Ford

Stewart's technical commitment has, says Alan Jenkins, been matched all the way by its partners at Ford

A debutant it may be in technical terms, but the Stewart-Ford team draws on the resources of some of the biggest guns around. Principal among them is of course Ford, global car maker and a long-time backer of both Stewarts in racing.

"We've got an enormous commitment from Ford's top management," says SF-1 designer Jenkins. "They are really enthusiastic about the project. Neil Ressler, their technical chief, has been particularly supportive. Initially, some people were a bit hesitant about working around their differences, but Ressler told them they just had to get in there and make the thing work. So they did.

"Now we've got genuine co-operation going on wherever you look. Our car's fly-by-wire throttle is a terrific example. The software was written by Ford in Dearborn, Michigan. The electronics are in a box made by PI Research in Cambridge. The whole thing was tested on one of Cosworth's dynamometers, and now we're packaging it into the car here in Milton Keynes. That's co-operation for you!"

Stewart-Ford has also made other, unexpectedly early steps forward with the car's electronics. Right from the first grand prix, it is using what Jenkins describes as "complete unique trackside computer workstations", built from scratch exclusively for the team. Meanwhile, Stewart-Ford and engine builders Cosworth have rationalised their data collection systems so that both sets of engineers can work in harmony.

"In the end," concludes Jenkins simply, "everybody in the team just wants to win."

Chip OFF THE OLD block

Thirty years after its landmark first Formula One victory, Ford goes into the 1997 season more motivated than ever. ALAN HENRY *finds out why this new venture represents a commitment to the sport above and beyond anything Ford has undertaken previously. For the first time, the company is a true partner with its chosen 'works' team in grand prix racing.*

Since powering Michael Schumacher to the World Drivers' Championship in 1994, Ford has had only moderate success in Formula One over the past two seasons. But now its bedrock involvement in the Stewart-Ford team indicates a serious and vigorous effort by the global car maker to re-assert its position as a leading force in motor racing's most demanding discipline.

The decision to endorse its confidence in Jackie and Paul Stewart's ability with a five-year contract signals that Ford is more serious than ever about its Formula One investment.

"You have to remember that the 1997 Formula One season represents a tremendous milestone for the Ford Motor Company," explains Martin Whitaker, the company's director of European motorsport.

"It marks the 30th anniversary of Ford's first victory in grand prix racing. As a company, we've accomplished a great deal in the intervening three decades, with a record 174 Formula One victories and 13 World Drivers' Championships to our credit.

"That said, you bask at your peril in the glow of past glories in a sport as competitive as Formula One motor racing. With that thought in mind, Ford has entered into a long-term partnership with the brand-new Formula One team formed by Jackie and Paul Stewart.

"Announced at the beginning of 1996,

"Far from simply supplying its Zetec-R V10 engine on an exclusive basis, Ford has been able to bring many of its advanced engineering skills to bear on the project. As a result, the Stewart-Ford SF-1 benefits from significant Ford input in such key areas as suspension and chassis design, aerodynamics and electronics," observes Whitaker.

The European motorsport boss believes Ford's involvement with Stewart has stimulated its entire approach to Formula One. It is, he says, no longer simply about participation but, in the long term, about displaying the levels of technical capability required to win a world championship.

"The most important aspect of the Stewart-Ford partnership is to show that Ford have become firmly recommitted to Formula One. I think that, since Michael Schumacher won the 1994 World Championship in a Benetton-Ford (a triumph described by many people in the sport as Formula One's best-kept secret), Ford in many ways have lost the impetus behind their involvement in Formula One. We've had two years in the wilderness, if you like, and now we're emerging with renewed determination."

Whitaker concedes that, at times during 1996 – the debut season for the

Ford's Formula One roll of honour

DRIVERS

The following have won the World Drivers' Championship with Ford power:

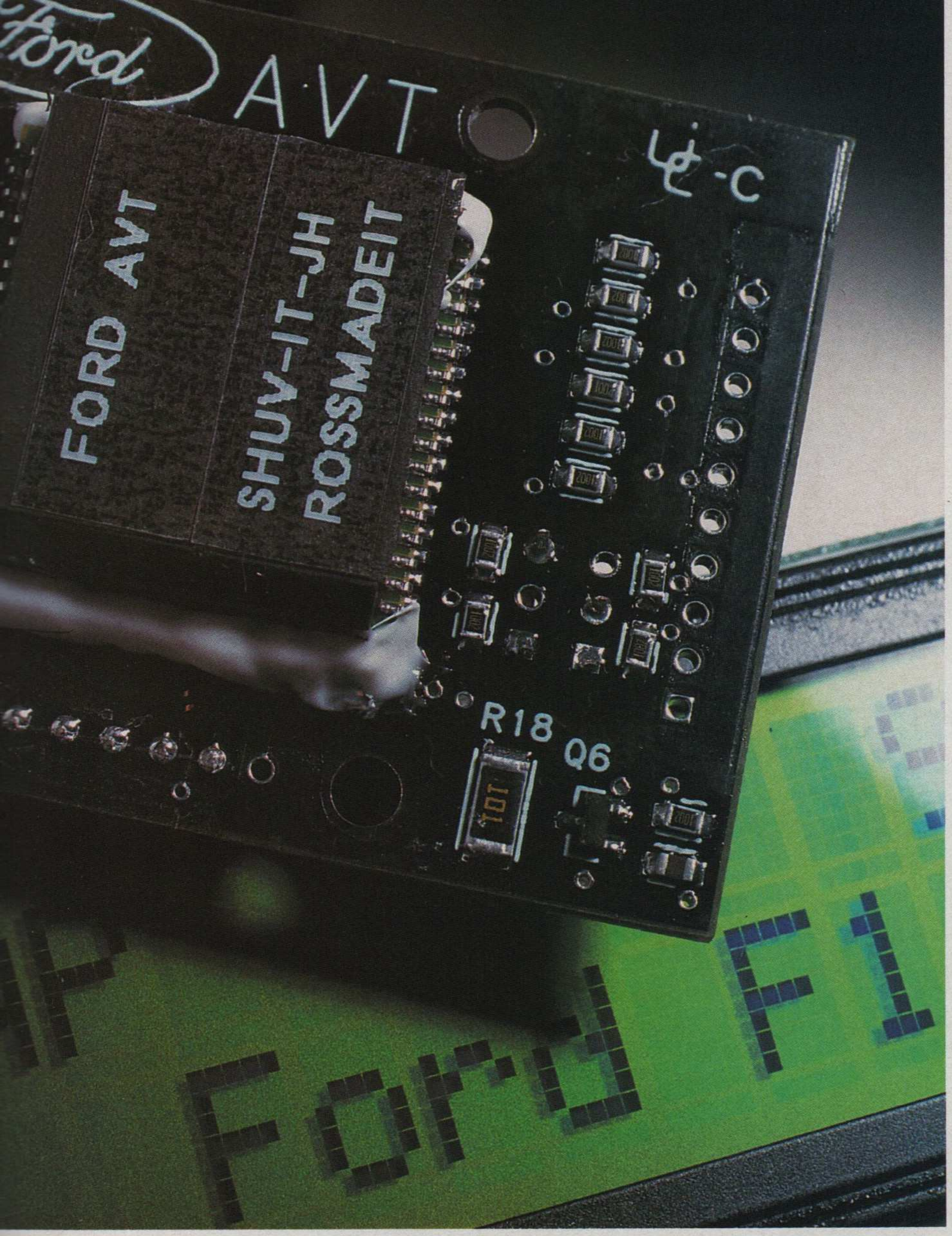
Graham Hill: 1968
Jackie Stewart: 1969, 1971, 1973
Jochen Rindt: 1970
Emerson Fittipaldi: 1972, 1974
James Hunt: 1976
Mario Andretti: 1978
Alan Jones: 1980
Nelson Piquet: 1981
Keke Rosberg: 1982
Michael Schumacher: 1994.

Other drivers to have contributed to Ford's record total of 174 Grand Prix victories include: Ronnie Peterson, 10 (Lotus-Ford, March-Ford); Denny Hulme, 8 (McLaren-Ford); Jody Scheckter, 7 (McLaren-Ford, Wolf-Ford); Jim Clark, 5 (Lotus-Ford); Ayrton Senna, 5 (McLaren-Ford); John Watson, 5 (Penske-Ford, McLaren-Ford); Jacques Laffite, 3 (Ligier-Ford).

CONSTRUCTORS

The following have won World Constructors' Championships with Ford power:

Lotus: 1968, 1970, 1972, 1973, 1978
Matra: 1969
Tyrrell: 1971
McLaren: 1974
Williams: 1980, 1981.



RALPH HARDWICK

1997. We've still got further to go but the development process is well on course. We have an engine which is far more driveable, and now we're looking for more horsepower."

Whitaker firmly believes that this sort of technological struggle is precisely what makes Formula One such a worthwhile exercise as far as the Ford Motor Company is concerned.

"Indeed, I think one of the clearest examples of Formula One's practical benefits to Ford is that it stands out as a perfect proving ground for the next generation of engineers," he explains.

"The timescale pressure in Formula One gives them the opportunity to turn things around in, say, six days which, under normal circumstances – inside mainstream engineering – they might not be asked to complete in six weeks, or even six months!"

And yet it remains the Ford Motor Company's personal, long-standing relationship with Jackie Stewart which provides the bond that holds this latest, high-profile Formula One deal together – reflecting a personal association between Jackie and Ford which extends back 32 years and pre-dates his own grand prix debut.

"Jackie and Paul now are very much part of the family," says Whitaker. "The long tradition of the Stewart family's relationship with Ford is central to this whole partnership, and there are tremendous benefits to be gained by everybody involved."

Zetec-R V10 which powers the new Stewart-Ford SF-1 – Ford made less progress with the engine than had been anticipated. However, he reaffirms that engine builder Cosworth latterly has made some giant strides forward, particularly through its enhanced development programme over the winter months. This progress should pay significant dividends as the year unfolds.

"I think the 1996 season was a pretty big disappointment for us all," he says. "Because of our history, I think a lot of people expected us to come out of the box with a competitive engine. And so it came as a bit of a shock when we didn't, even though lots of other manufacturers have struggled with V10s in the past.

"But Cosworth have worked pretty damn' hard over the past few months to make sure the engine is competitive in

How involved is Ford in motorsport?

Alone among manufacturers, Ford is active in what are generally regarded as the four most demanding forms of motorsport in the world: the FIA Formula One World Championship, the CART PPG Indycar World Series, the FIA World Rally Championship and the NASCAR Winston Cup. Ford-powered cars have also won each of these championships. Add in the Slick 50 Formula Ford World Series and involvement in a number of national touring car and rally championships, and the extent of Ford's commitment to motorsport worldwide is clear.

The real winners, however, are Ford customers. It is they who ultimately benefit from lessons Ford engineers and designers learn from participation in top-level motor racing and rallying and are then able to incorporate into Ford production vehicles.

Red hot partners

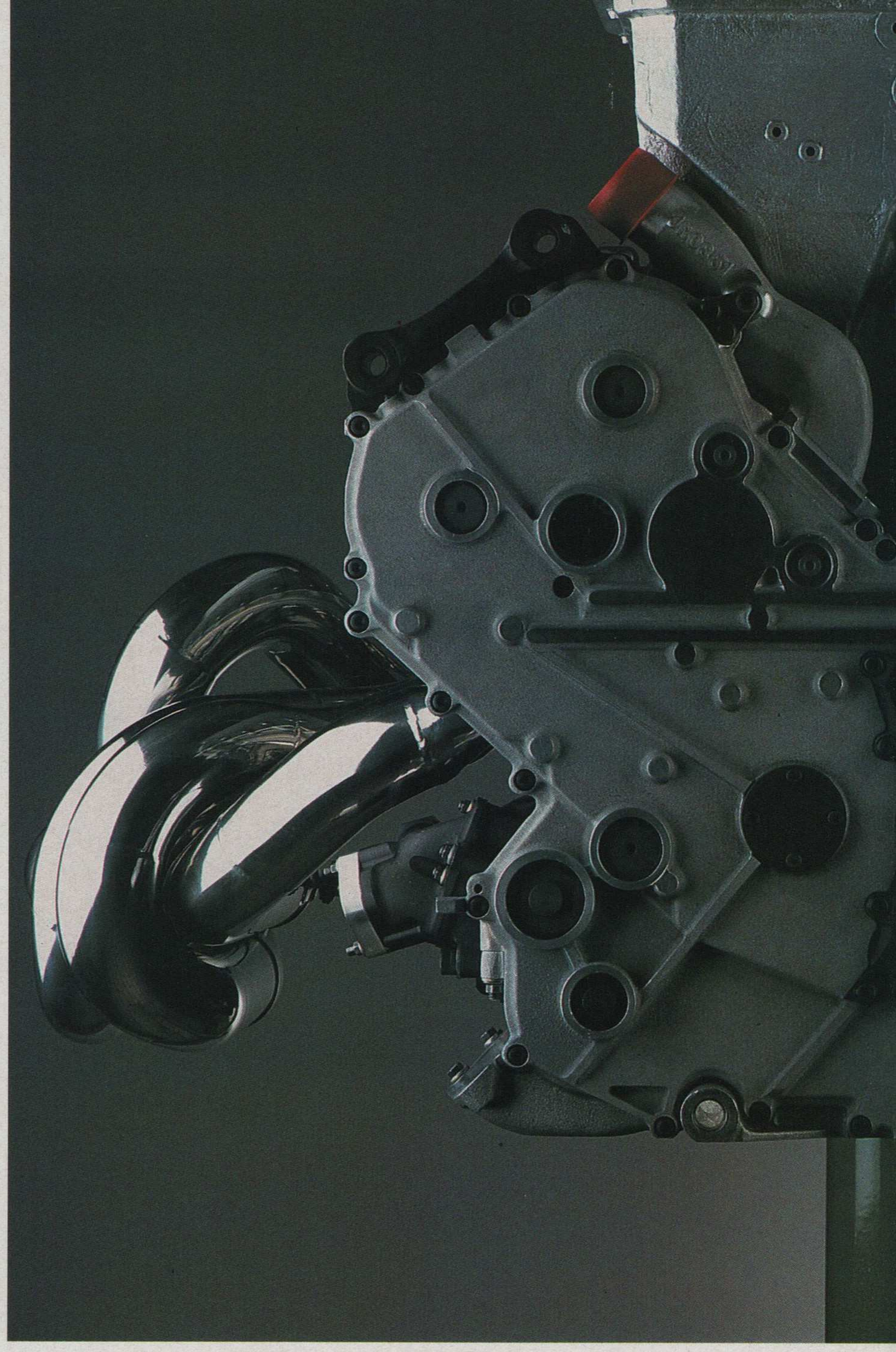
In the heart of every winning Ford engine beats the technical expertise of Cosworth. What's the secret of its success?

BY STEVE CROPLEY. LEAD PHOTO: DARREN HEATH

DARREN HEATH

Above: the newly-developed Zetec-R V10 glows red hot on the Cosworth Racing dyno. Right: Ford's 3-litre, 10-cylinder Formula One engine is externally similar to the 1996 version, but features updated inlet and exhaust port design, as well as new cam covers, oil inlet and outlet castings and a revised flywheel

GREG BARTLEY



According to Nick Hayes, leader of the 200-strong Cosworth team that has created and developed Ford's Zetec-R V10 race engine, one of the best qualifications for a grand prix job is the ability to keep a secret.

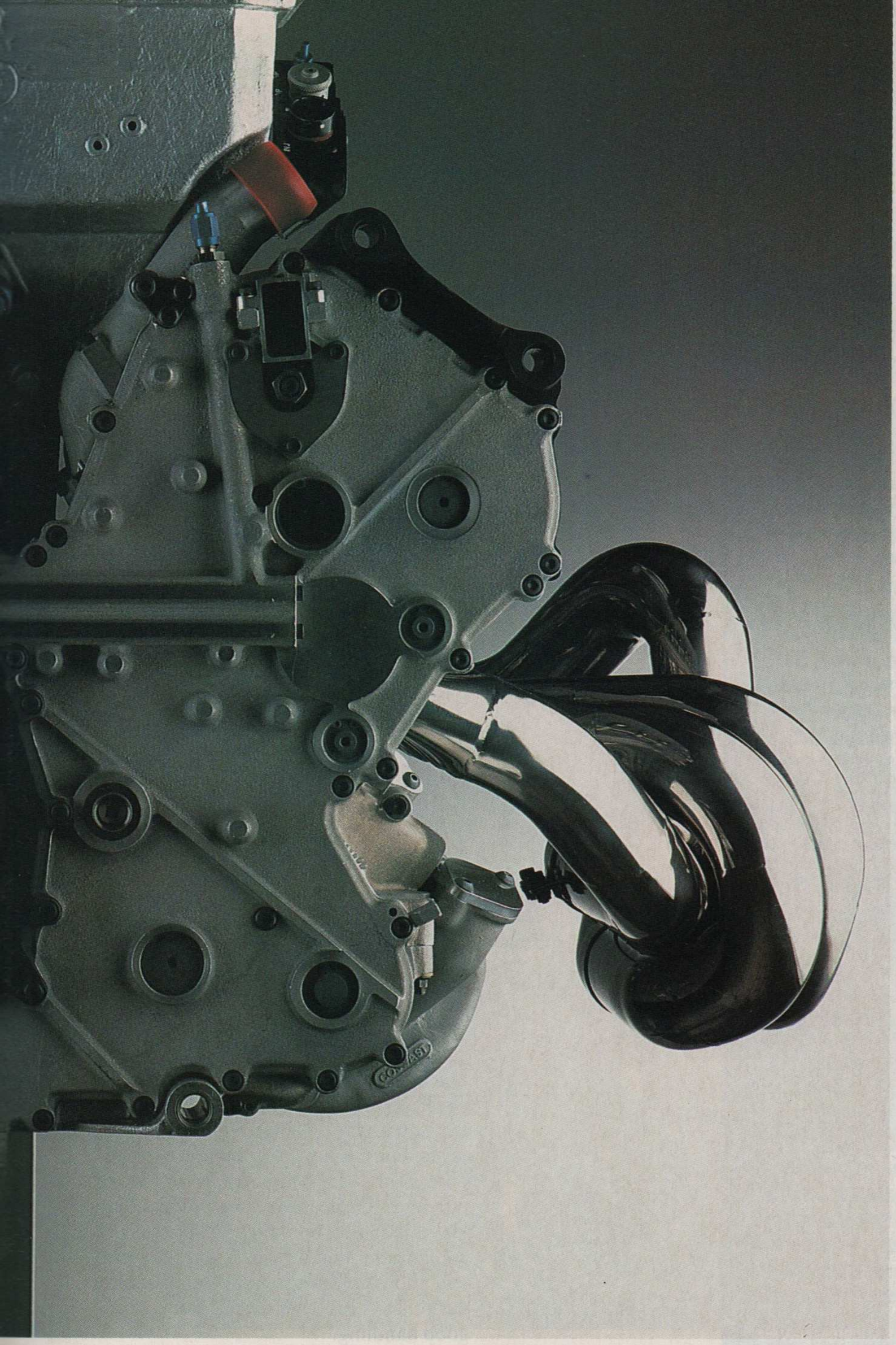
Soft-voiced and mild-mannered, 36-year-old Hayes would make a Swiss banker look indiscreet. He believes the heat of grand prix competition isn't only felt at the track, but is evident in every Formula One race shop and design office across Europe. And, he says, serious Formula One insiders don't boast about their achievements, which is why he won't give precise details about his race engine, or allow detailed photographs of its internals.

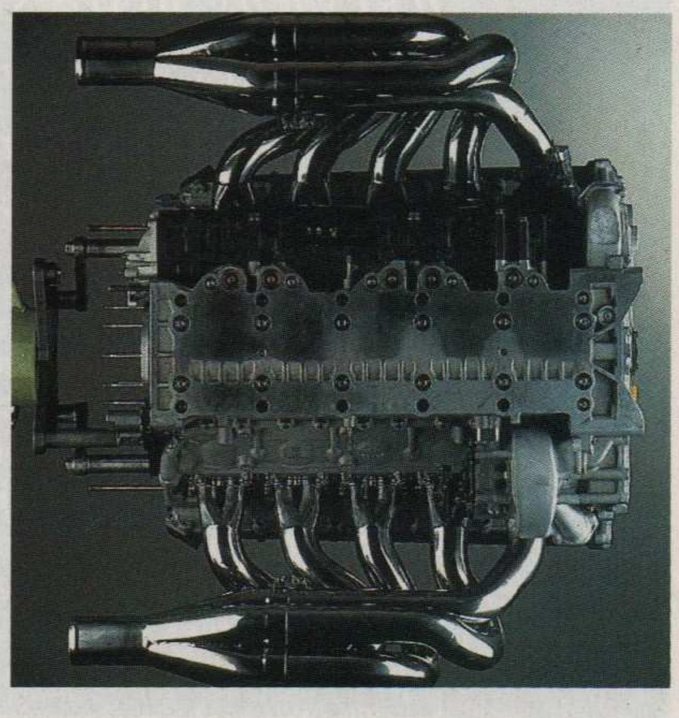
"You never know when an idea that you may consider normal hasn't occurred to somebody else," he says. "I don't want to risk providing my rivals with answers or ideas they don't already have."

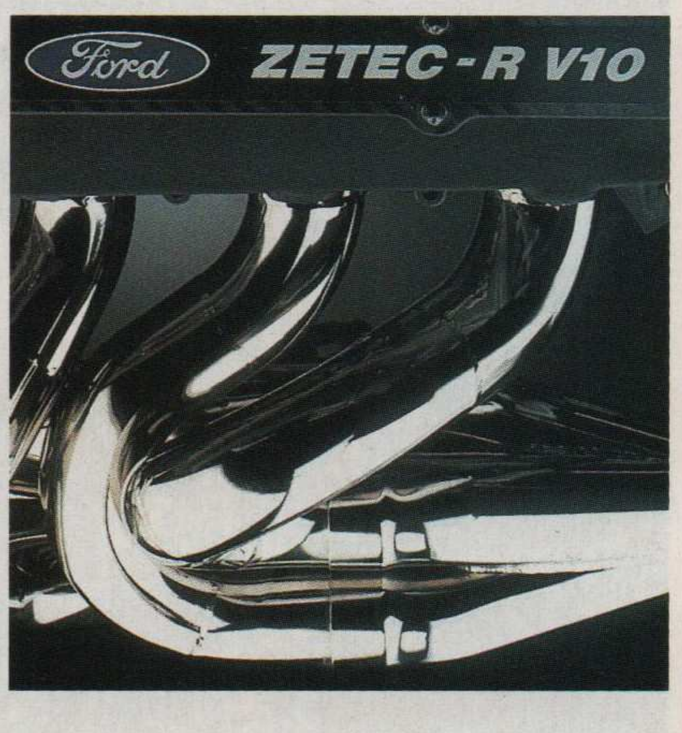
Despite this, quite a few key facts about the Ford Zetec-R V10 engine – which powered Sauber's cars in 1996 and will be used in improved form by Stewart-Ford in 1997 – have found their way on to the record. The engine has 10 cylinders, in two banks of five inclined to one another at an angle of "seventy-ish" degrees. Each cylinder's four valves are actuated by twin overhead camshafts, working with compressed air "springs" instead of the steel variety which are usual in lesser engines. The V10's fuel injection and electronic ignition are both controlled by a Ford engine management system, while its main components are made from aluminium, steel, titanium, magnesium and carbon.

"There are some other, more exotic materials in the engine which we don't talk about because we like to think the opposition don't have them," says Hayes. "But in reality I think they probably do...."

Most race engine makers have the majority of their components produced by outside suppliers, but Cosworth







Racing, who also builds Ford engines for "customer" Formula One and Indycar use, has the facilities to produce and machine most of its own engine components. Blocks and heads are cast, using advanced (Cosworth-patented) techniques, at the company's foundry in Worcester. Engine design, development and build take place at Cosworth's Northampton headquarters, where Nick Hayes himself is based.

"We still buy some highly specialised components outside," he says. "Things like piston rings, ball bearings and conrod bolts. But we're more self sufficient than most of the others."

Planning for the Ford Zetec-R V10 began in the last week of January 1995, after Ford and Cosworth decided that the successor to Michael Schumacher's 1994 championship-winning V8 should have 10 cylinders. The engine was running by the first week of October that year, and powered Sauber cars through the 1996 season. The 1997 version – considerably developed internally though similar in appearance – is being used exclusively in Stewart-Ford's SF-1 cars.

"There are some exotic materials in the engine which we don't talk about because we like to think the opposition don't have them...."

Why did Cosworth decide on the change to V10? It was a difficult decision, says Hayes. "In a modern grand prix car, practically speaking, you've got a choice of V8, V10 or V12. All things being equal, the V12 is most powerful, but it is also

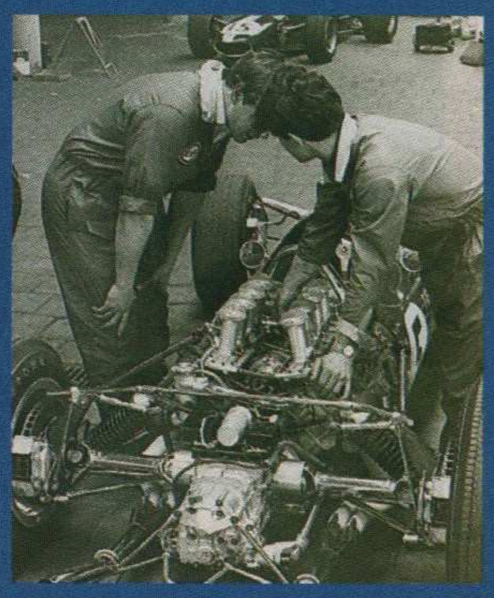
THE STORY OF

Cosworth

It's exactly 30 years since Ford's most enduring partner unleashed grand prix racing's most successful engine ever....

Cosworth Racing co-founders Keith Duckworth and Mike Costin first came together in spirit (and ultimately name) at the cramped premises of Colin Chapman's Lotus Engineering in north London. By the summer of 1958, the two men had resolved to go into business together.

Initially, Cosworth took on a range of projects, building the highly successful Formula Junior engine and elements of the Ford Cortina GT road car's power unit. Despite its founders' desire to keep the company small, their reputation grew,



AUTOSPORT

The Ford-Cosworth DFV is readied for its debut outing at the 1967 Dutch GP. Formula One would never be the same again

and so did the offers of race and road car projects.

Then, in the spring of 1965, Colin Chapman persuaded Ford to back the design of a new 3-litre Formula One engine. Chapman knew Duckworth was the man for the job, and so the Ford-Cosworth partnership was born. Duckworth was already working on a revolutionary new four-cylinder Formula 2 engine (the FVA), and its success paved the way for the engine that was to take Formula One by storm – the V8 Ford-Cosworth DFV.

Built initially for the Lotus 49, the engine had an immediate impact. On its Formula One debut, the 1967 Dutch Grand Prix, the Lotus driven by Graham Hill took pole – no other type of car would threaten the grid's number one spot for the rest of the year! Hill's team-mate Jim Clark won that first race, thus starting a record that would make the DFV (and its derivatives) grand prix racing's most successful engine ever. Its final victory – number 154 – came as late as 1983, when Keke Rosberg's Williams FW08C took the Monaco Grand Prix.

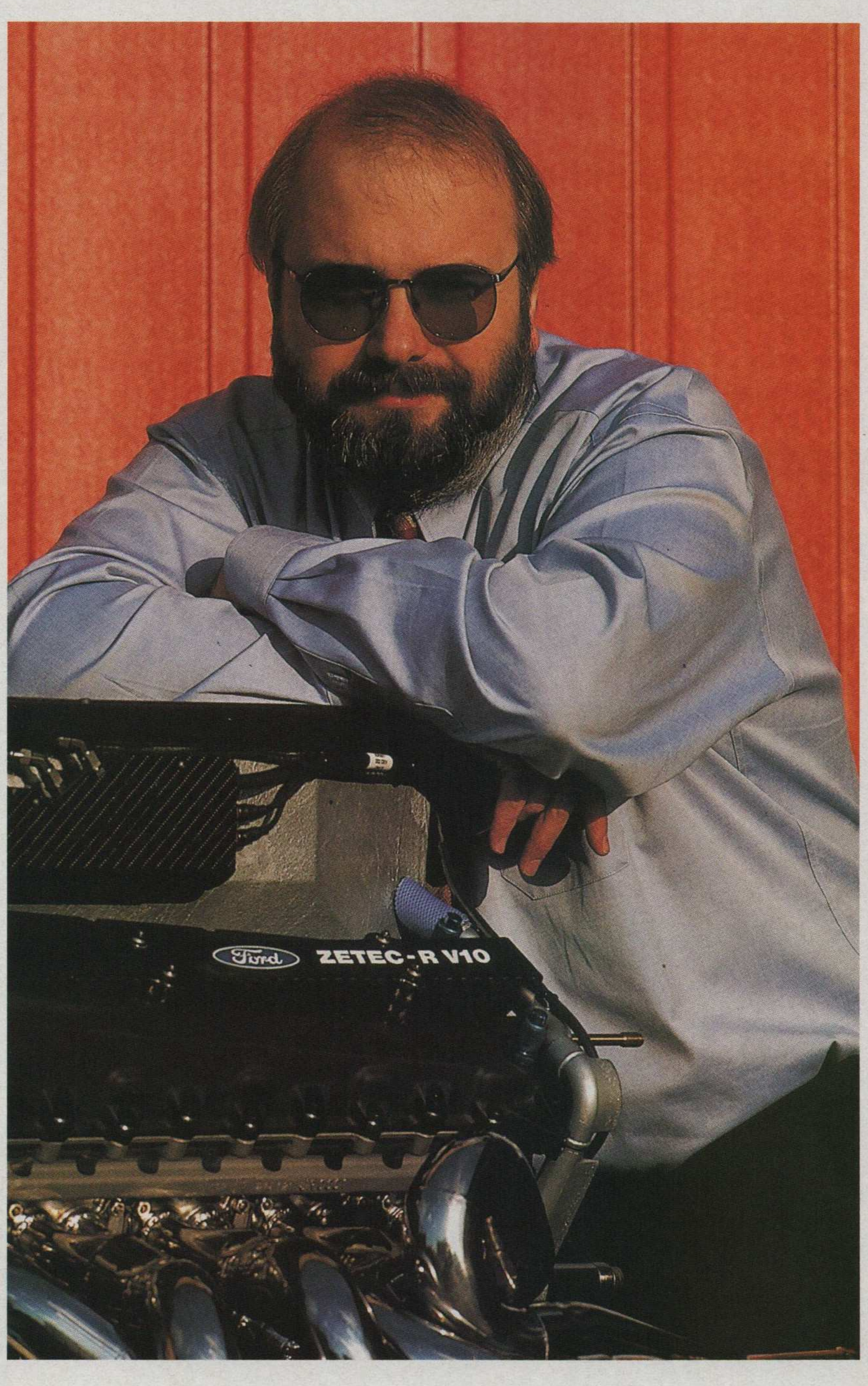
By 1989, Ford and Cosworth were back in the Formula One winners' circle, as Alessandro Nannini's Benetton B189 clinched the first win for the V8 HB engine. Then, in 1994, the 3.5-litre Zetec-R V8 powered Michael Schumacher to the world title, his Benetton B194 taking eight wins.

the biggest, weighs the most, needs the biggest radiators (which generate extra aerodynamic drag) and uses most fuel."

A V8 is the lightest and most compact, while it also uses less fuel than a V10 or V12. This, Hayes says, made it a very attractive option until mid-1993, when refuelling was reintroduced to Formula One. With low fuel consumption less of a priority, the V10 then became the preferred option, offering extra power potential without the ultimate size and weight disadvantages of a V12.

The exact power of a grand prix engine, and the rpm at which it operates, is information that's closely guarded by every Formula One team. But it's an open secret that today's "contender" engines produce well over 700bhp from their 3-litre capacity, and spin to more than 16,000rpm. But ask him to confirm such things, and all you'll get from Nick Hayes is an enigmatic smile. "Ultimate power isn't important," he says. "It's the performance of the total package that counts. If we could win races with 10 horsepower, we'd be happy to do that...."

When installed in a Formula One chassis, the Ford V10 must do more than simply produce power. As is normal grand prix design practice, it forms part of the car's actual structure, bolting rigidly to the back of the carbon fibre tub that carries the driver. At its other end, the clutch housing and gearbox are bolted on, with the rear suspension mounted directly to the gearbox. This is why, Hayes explains, both the engine block and its mounting systems have to be as stiff as possible. The overall rigidity of a car's chassis is a huge contributor to good handling.



Above: Nick Hayes, leader of the Zetec-R V10 design and development team, is one of six Cosworth engineers servicing the SF-1's power units at every grand prix this year. Left: Cosworth's Northampton base is handily placed close to the Stewart factory

DARREN HEATH

Stiff it may be, but durable? In fact, a modern grand prix engine does not have to last very long. Not in road car terms, anyway. Cosworth limit their Zetec-R V10 engines strictly to 250 miles of running, and rebuild them comprehensively after that. "Quite a lot of an engine's high stress parts go straight into the bin, to be melted down and recycled, as soon as we've examined them for unusual wear or distortion," says Hayes.

"We expect big components like heads, blocks and crankshafts to be used more than once. Often we'll machine blocks and heads before they're used again, because the loads they've been subjected to make them move a little bit. We could design this tendency out, but it would make the whole engine heavier."

In 1997, Cosworth will maintain a pool of about 25 engines to back the three SF-1s (including the spare). "We take at least 10 engines to a race," says Hayes, "along with five Cosworth people besides myself. We'll have a race engineer for each car, a technician to run the data collection system, and two engine fitters.

"Practice laps before a grand prix are limited these days, but at some of the longer tracks each car still needs a new engine every day. So sometimes we'll have more than 10 engines on hand – especially if we've got some development units we want to run. But normally we'll race the spec' we think is likely to be most reliable."

"Practice laps are limited before a grand prix now, but at some of the longer tracks each car still needs a new engine every day"

Modern data collection systems mean Cosworth's people can monitor literally dozens of engine parameters as the car laps the track – rather more than the familiar temperature, pressure, rev and throttle settings that road-going motorists are used to.

"We keep an eye on things like the supply of compressed air for the engine's air valves," Hayes explains, "because if that looks like running out, we've got the option of calling the car in and replenishing the air supply – although, in a race, we probably wouldn't do that. Imagine how we'd feel if the car was doing well, then we called it in and found that only the sensor was at fault, not the system...."

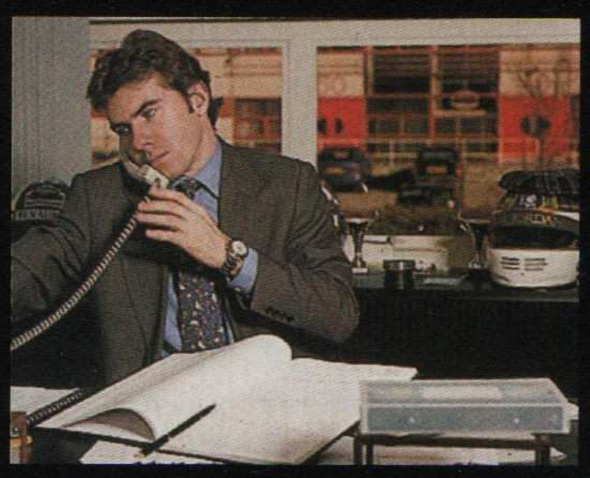
If there's one central key to success in grands prix, Hayes believes, it's getting the car and engine to integrate as a package. Of course, that calls for close co-operation between a team and its engine builder – something very much on the combined agenda of Stewart-Ford and Cosworth Racing for the 1997 season.

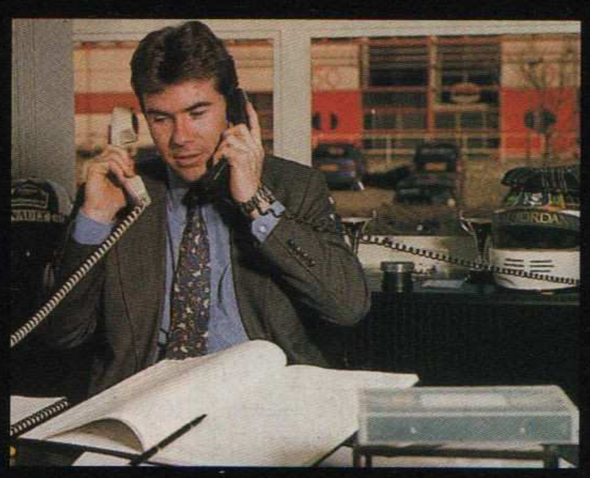
"They are close to us geographically, and that helps," Hayes says. "But most of all, they are close to us in mind; they're our kind of people. They are completely determined to win races, and so are we."

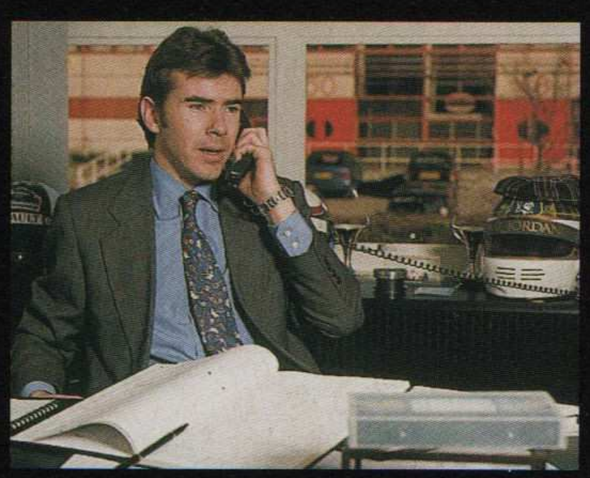
From the moment Ford gave the Stewarts the green light, Paul Stewart has been juggling all manner of balls (and phones). Now, at last, he tells ALAN HENRY *what life's really been like....*

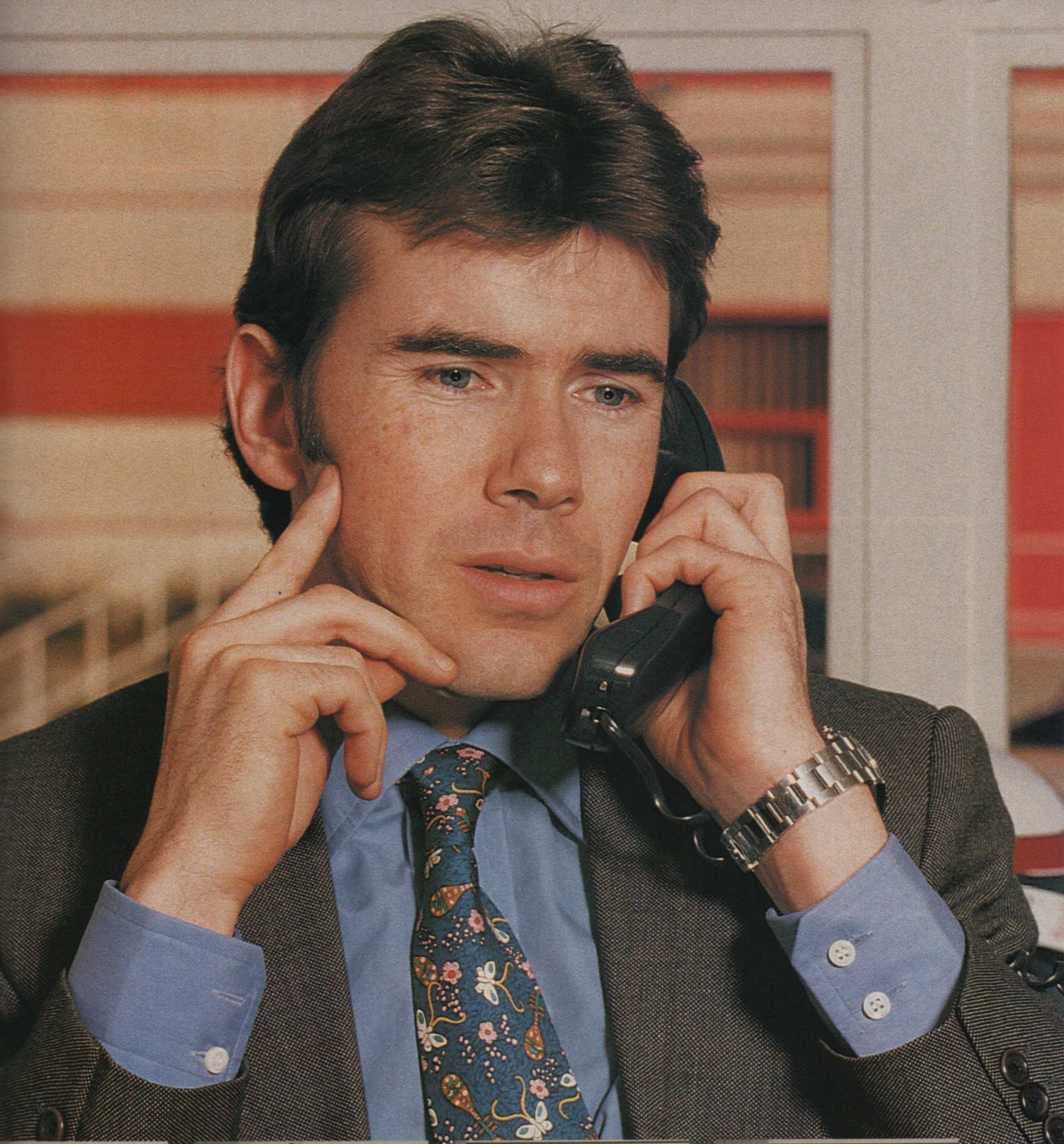
THE Ring Master

LEAD PHOTOS: TERRY O'NEILL









Since retiring from race driving at the end of 1993, Paul Stewart's whole focus has been on taking the "family team" to fresh levels of competitive achievement. In particular, that meant graduating to the high-pressure world of grand prix racing.

Thus, the arrival of Stewart-Ford on the Formula One scene is itself the realisation of a dream. It also marks a personal milestone for Paul, who has worked tirelessly for more than a year, building the company infrastructure required to underpin the entire operation.

Once the new Stewart team began to develop, how did Paul and his father share out the myriad responsibilities involved in operating the new company?

"I don't think we ever said: 'Well, you do this, and I'll do that'," recalls Paul. "Things just seemed to evolve in a logical manner. But I suppose, because I was the one who was actually based here at our Milton Keynes factory, I was the one who – together with Rob Armstrong, our commercial director – had to co-ordinate how it was all going to be done.

"We created our proposal to Ford with the help of J Walter Thompson in Detroit.

"It was very hard in the last few days before the new car's launch. The guys were working through the night regularly, not leaving until 7am and then back by 11 the same morning!"

You must understand, this was the most important proposal we had ever made. There was an opportunity there, clearly – the climate seemed right.

"Before that we were just looking for opportunities. We'd been round the world exploring various things.... The interesting thing is, the exercise we went through each time helped shape the proposal that we ultimately put to Ford.

"It was a very elaborate proposal indeed – not something we could have dreamt up overnight, if you like. In retrospect, if we had gone in cold, I suspect it might not have worked.

"Once we'd got the initial go-ahead, as I said, the demarcation lines between my father and I were never clearly laid out. In some ways, I suppose you could say that it would have been more difficult for me if my father had been based here at the factory. But because I was the one who *was* based here, that gave me the chance to take operational decisions which, had he been here, he might have taken himself."

Once the Stewart-Ford partnership was officially launched in January of last year, the delineation of responsibilities between father and son really became more established. Chairman Jackie and Rob Armstrong concentrated their efforts on the commercial side, while managing director Paul was kept busy organising the factory headquarters – including the recruitment of Alan Jenkins as the team's technical director.

"Working with Alan was very important for me," says Paul. "So too, of course, was bringing in the other key personnel, interviewing, setting up the systems and so on. But the really exciting thing was how much interest the team's official launch attracted from so many highly qualified figures within the sport.

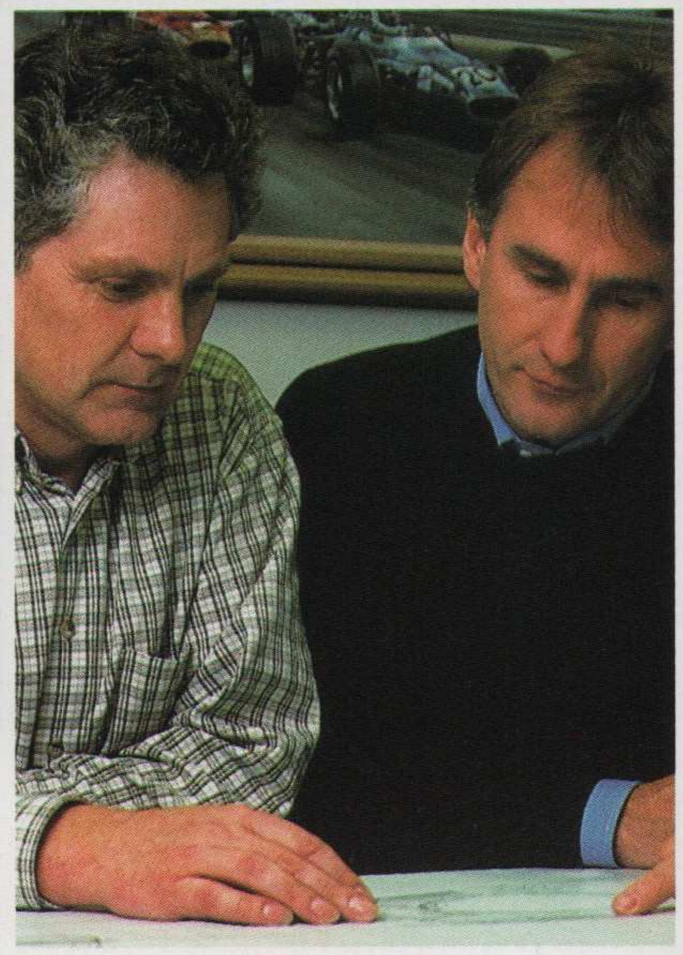
"There was also a fascinating degree of cross-fertilisation of ideas from all our new people. I think that could only have happened in a totally new Formula One environment such as this.

"Remember, we weren't working within an existing organisation that had established systems of operating. We really were setting up all of the structures to operate a new grand prix racing team as we went along!"

A 60-SECOND TOUR OF STEWART-FORD

Left: Checking the gearbox after the car's first test run. Above: Painstaking attention to detail is a way of life

DARREN HEATH



TERRY O'NEILL

Above: Technical team manager Andy Miller (on right) studies the finer points of the SF-1 with engineering manager Colin McGrory

DARREN HEATH

Above: Jan Magnussen (on left) discovers that all of the SF-1 carbon fibre monocoques are built in-house. Right: Jan's team-mate Rubens Barrichello inspects the 50% wind tunnel model

GREG BARTLEY

Ford

"Without Ford, Paul and I would not have contemplated this move into grand prix racing. Their support is incalculable"

JACKIE STEWART, three times world champion, at the launch of the Stewart-Ford SF-1

PHOTO: DARREN HEATH