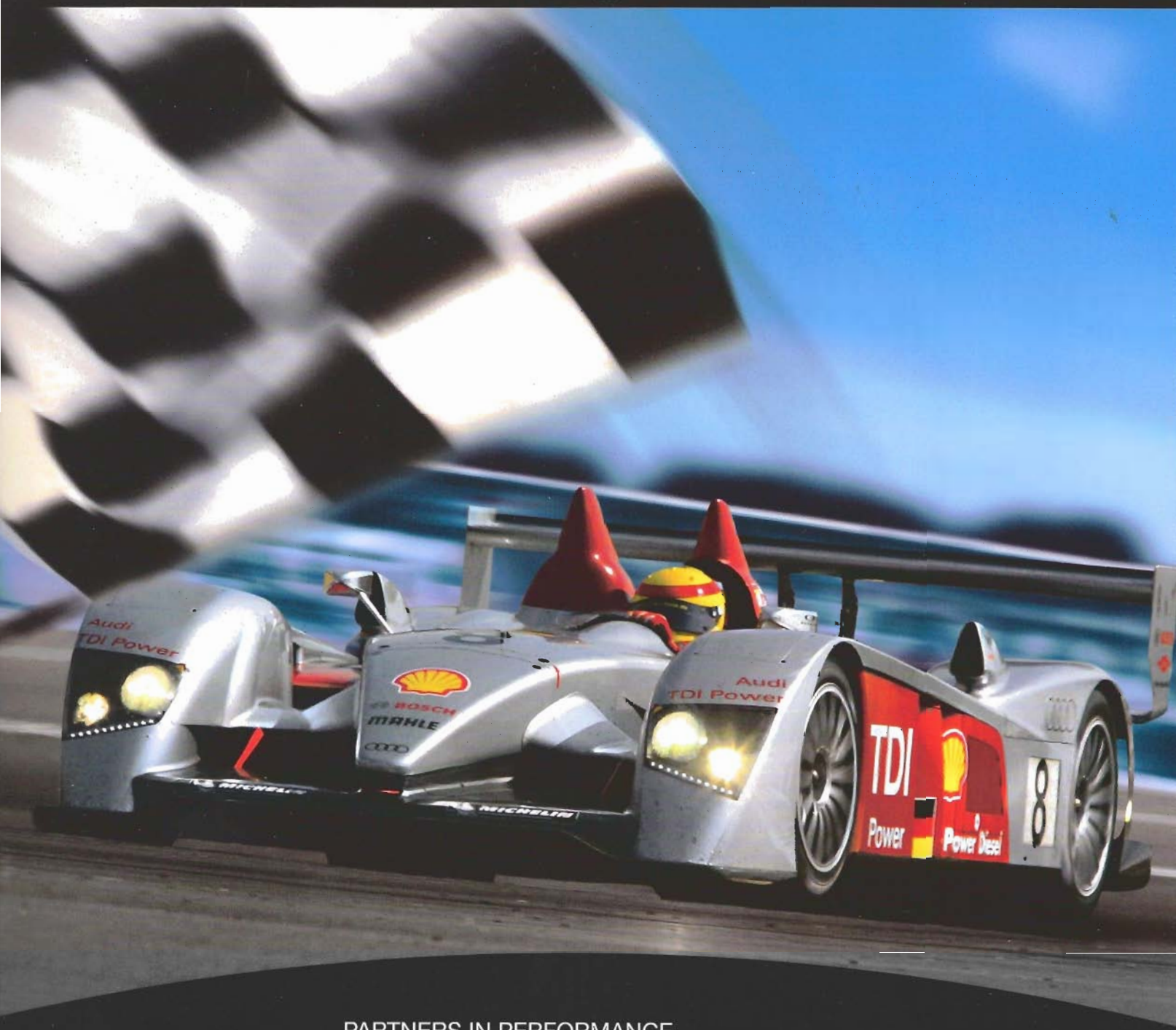
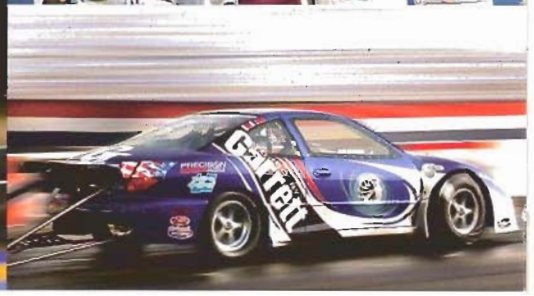
TurboRacing



PARTNERS IN PERFORMANCE

24 Hours of Le Mans: New Diesel Era

Honeywell



On Track

- The era of turbodiesel racing is upon us. Audi's stunning success at the 24 Hours of Le Mans in the Audi R10 TDI highlighted the power and performance of turbodiesel technology and opened a new chapter in racing history.

- Jim McGee is the most successful ever chief mechanic and team manager in Indy car history – but he still remembers the very day in 1968 that he first experienced the incredible power of turbocharging.

- Mario Andretti's turbocharged Indy 500 win in 1969 is regarded as one of the greatest victories. Arguably the greatest racing driver of all time, Mario still harbors an ambition for a final tilt at the 24 Hours of Le Mans.

- Twelve years ago Rod Millen's turbocharged 800hp Toyota Celica covered the 12.4 mile (20km) Pikes Peak International Hillclimb course, with its 156 turns, in just 10m 4.06s – and though some may have tried to better the time, no one has ever gone faster.

- Honeywell's Garrett® turbochargers have been an integral part of the racing world for almost 40 years. Today the commitment to race teams around the world and to the development of turbo technology is as strong as ever, thanks to the full time support of Honeywell's Motorsports team.

- The World Rally Championship is seen by many as the ultimate challenge for man and machine… and this year M-Sport is carrying the banner for Ford with an all-new turbocharged Focus piloted by two-time world champion Marcus Grönholm.

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Turbo Racing

The Power to Perform

From the Indy 500 to Champ Car, from the World Rally Championship to Le Mans, from drag racing to Pikes Peak… there's a unique place for turbocharging in the history of motorsports.

This special Honeywell supplement celebrates the skill of fearless drivers, the vision and technical flair of race team engineers… and the sheer excitement that comes from putting the pedal to the floor and watching the rev counter fly. It's a passion that crosses continents, that inspires generations and holds millions of people spellbound either at the trackside or through the power of television.

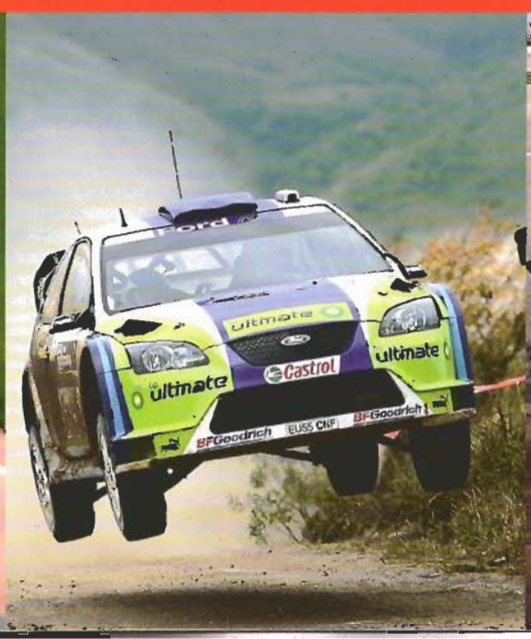
Through this supplement we share the exhilaration of turbo power, chart the technology's development, profile some of the biggest names in turbo racing… and look to a future that will challenge engineers and drivers more than ever before to optimize technology in the pursuit of the winning line.

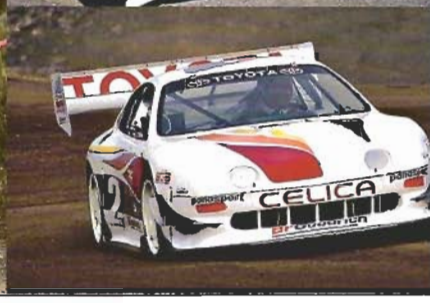
The journey for turbo racing started as long ago as the 1920s and 30s when compressor cars, which used supercharger technology, competed against each other. But it wasn't until the 70s that turbo power really came into its own. Teams competing in Indy Car, World Rally, Le Mans… even Formula One fleetingly… all adopted turbo to deliver the boost that gave them podium power.

Today, the turbo story continues whether it's on the race track, drag strip or negotiating the mountainous roads above Monaco.

"Last year, we celebrated 100 years of turbo and its impact on millions of passenger cars and trucks. This year, we are delighted to highlight the incredible success of turbocharging in the high octane environment of motorsports," says Adriane Brown, President and CEO of Honeywell Transportation Systems.

"Honeywell's innovation in racing has led to the development of turbochargers that optimize power, performance and reliability. This focus on succeeding through technology also drives our partnerships with OEMs, delivering turbo solutions that save fuel and reduce emissions without compromising engine performance."





Dawn of a New

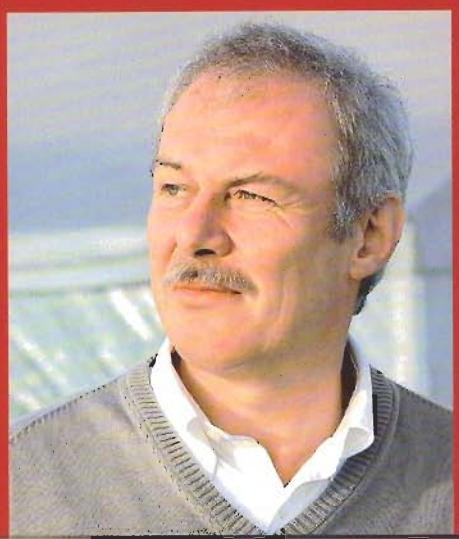
It ranks as one of the most astonishing feats in racing history – Audi took first and third place at 24 Hours of Le Mans 2006. Audi's stunning success with the all-new R10 TDI was not only a triumph of engineering, it marked the beginning of an entirely new era in motorsports... the era of the turbodiesel sportscar.

A perennial winner at Le Mans, Audi took the technological challenge to a new level in 2006... targeting the winning line by exploiting the full potential of turbodiesel power and performance.

A win at Sebring in March 2006 on its first outing had already raised expectations that Audi R10 TDI with its 5.5 liter diesel engine would add a whole new dimension to the world's most famous endurance race... and the millions of people watching the event unfold in June were not disappointed.

In the pitlane, the Audi R10 TDI is known simply as the "silver ghost"... not because of its stunning lines but because it passes other cars seemingly at a whisper. There are no exhaust flames when the foot hits the floor, no scream from the engine as the rev counter flies. This car stalks its prey... and then passes apparently without effort.

Ulrich Baretzky, head of race and special engine development at Audi Sport, gives us a view from the pitlane on Audi's astonishing victory at Le Mans.



How does it feel to have created racing history with the Audi R10 TDI?
We started this project with a blank sheet of paper and we tried something that nobody had ever done before in this form. We knew how big the challenge would be to win Le Mans with such a high-performance diesel engine – but the result was a real triumph for teamwork... for the drivers, the engineers and for our technical partners. It was a real example of the power of partnership working.

There are very few opportunities when you can open a new page in the history of motorsports... with the Audi R10 TDI we have created a new chapter for turbodiesel sportscars.

Diesel Era

How did you feel during the race?
Le Mans always harbors some surprises that cannot be simulated on a test bed or a test track. The team worked immaculately and always reacted correctly to everything that occurred.

It is fantastic that both cars finished, that both made it to the podium. The winning car ran almost faultlessly for 24 hours.

The R8 had been so successful, why did Audi opt for something so radically different with the R10 TDI turbodiesel?
This is all about being a leader. The first reason was that no one had ever won at Le Mans with a diesel car. It was also a great time to be embarking on this project because over 50% of the cars in Europe are equipped with diesel engines. In the past, diesel cars have had a reputation for being slow, smoky and noisy but we all know that this is no longer true. We wanted to prove our pioneering approach to new technology because we have been first in so many areas of automotive engineering.

We pushed the boundaries with the R8... now we are doing the same with the Audi R10 TDI. For example, the R10 is absolutely clean – we're running with particulate filters that include materials that are likely to be seen in Audi cars in the near future.

How big was the challenge of going racing with a diesel engine?
The challenge was huge – in fact there was nothing to compare it to because nobody had ever tried this on this scale. When we started the project we consulted with our suppliers and race partners – and they all backed the concept 100% even though they thought it was almost impossible to achieve.

One of the biggest challenges was developing a turbo system for the 5.5 liter engine because diesel requires a completely different approach to a conventional gasoline racing engine. But we have a very strong partnership with Honeywell – they took the time to understand exactly what we wanted to achieve and committed completely to the program, just as they did with the R8.

Facts About Audi's Le Mans Victory

The race winning car with the numbe 8 completed 380 laps in the 24 hours – one lap more than the previous record set in 2004 around the current circuit layout.

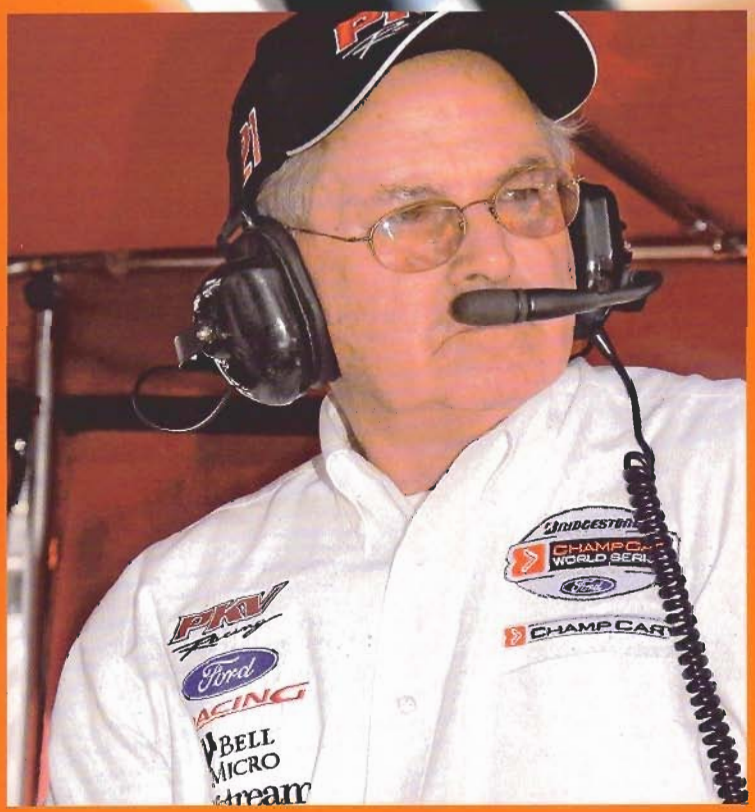
380 laps is the equivalent of 5,187 kilometers or almost the entire distance of every Formula 1 race in a season.

The winning car's average speed over the entire distance was 215.409kph. Thanks to the economical Audi V12 TDI engine, the Audi drivers only had to pit for refuelling once every 14 laps.

The V12 TDI engine's gear-shift rev threshold is at the unusually low level of 5000 revolutions per minute for a race engine.

The winning car made only 27 pit stops during the 24:04:47.325 hours, and spent less than 30 minutes in the pits during the entire race.

The Chief of Rac



Jim McGee celebrates his 48th year of competition in 2006. He's the most successful manager/chief mechanic in the history of USAC/CART/Champ Car racing with 90 wins, including four Indy 500 victories, and nine national championships. He's worked with world's best drivers, most famously helping Mario Andretti cross the winning line in the Indy 500 in 1969.

When did you first develop a passion for racing?

I used to visit the local oval track and got involved with an engineer who was building an Indy Car Roadster in his basement... that really got me into it. Then I met Clint Brawner, who was the premier Indy Car mechanic in the 50s, and he offered me the chance to go racing. So I drove to Indianapolis, worked with Clint for 12 years and became his chief mechanic in the mid-60s. Then we hired Mario Andretti and that was a big break.

How do you characterize your relationship with Mario?

We came into racing at the same time and we both shared a passion for pushing the boundaries. We were always looking for something new and as a result we forged a strong bond that carried on right through most of Mario's career. He loved a challenge and that's why he drove in so many forms of racing – F1, sportscars, stock cars, Midget sprint cars... and all the time he'd bring back ideas that we could apply. I was his chief mechanic for his first win in 1965 and his team manager for his last win in 1993.

What was your first experience of turbocharging?

Mario was our driver and we'd won the USAC Championship in 65 and 66 and then in 1968 turbocharged engines started to come in. We weren't having a lot of success, so mid-way through the season we decided we would use a turbocharged Offenhauser engine... and the very first time we ran it at Trenton we won with Mario behind the wheel. It was incredible – we just put that engine in and we won two or three races at the end of the year. From then on we were turbocharged, although even then no one really understood the incredible potential of a turbocharged engine. We were getting way over 1,000hp from a 160 cubic inch engine and eventually the sanctioning bodies had to bring in some controls. In 1969 Mario won the Indianapolis 500 and the Championship with a turbocharged Ford engine.

e Mechanics

Champ Car Turbocharging

The turbochargers in Champ Car are matched with 800hp engines and handle twice the flow of air as turbos in Le Mans sportscars.

What's unique about Champ Car turbocharging is that while there is a low boost limit for safety reasons, there's also a "power to pass" facility that can be used at the driver's discretion to give extra boost for 60-second total duration over the course of a race. Not only does this give emphasis to race tactics, it makes for great excitement at the trackside and on television.

How valuable has the technical support been for the turbocharger?

What's always impressed me is how people at the Garrett Corporation (Honeywell's predecessor company) from the earliest days right up to today know how to take the information we give them and then help us to develop a competitive package. And of course as more restrictions are put in place we really rely on Honeywell to help us find innovative solutions.

What is your current experience of turbocharging?

From my point of view it has so much more of an advantage over a naturally aspirated engine. Turbocharged engines give us so much flexibility in the Champ Car series in terms of power range and reliability. I also think that the public generally doesn't fully appreciate how efficient a turbocharged engine is or understand the level of power you can get from the technology in everyday production cars. It's even got a sweeter tone – not the ear-piercing sound you tend to get from a normally aspirated engine. It's a much more enjoyable experience if you're watching from the grandstand.

"Honeywell is the only turbo manufacturer to give full time support to race teams around the world. We go beyond the technology.. that's why Honeywell is the turbocharger supplier of choice for so many formulae and series – from Champ Car to Le Mans, from drag racing to World Rally." Rick Widden, Vice President, Marketing and Product Management, Honeywell Turbo Technologies

Master Class

He's won just about everything there is to win... but offer Mario Andretti the chance to drive the new Audi R10 and he'd be behind the wheel before you could say "pole position."

Mario is widely acknowledged to be one of the greatest ever racing drivers – not just for his unique ability on the track but for his extraordinary success across a huge range of different racing series. Whether it was Formula One, Indy 500, Champ Car, Le Mans, Pikes Peak or karting, Mario was the man to beat. He was the first driver ever to win both the Formula One and Champ Car championships.

"All the way through my career, I was always motivated by winning and by the sheer love of driving and passion for the sport – I just couldn't think about doing anything else," says Mario. "For me, just competing was never enough. That's why I challenged myself in so many forms of racing. I loved the experience of playing in someone else's sandbox… and winning at their game."

Mario's talent first emerged in stock cars, then midgets and then in USAC events. In 1965 he won the first of four Champ Car national championships – and it was during this time (at the Trenton 200 in 1968) that Mario got his first experience of a turbocharged engine. Midway through a relatively quiet season (for him), the team installed the turbocharged Offenhauser engine… and Mario immediately drove to victory.

"With a normally aspirated engine, the power is progressive," says Mario. "With a turbocharged engine, it's like an explosion and as a driver I liked that. The kick, the power from a turbo is something you don't experience with anything else."

Perhaps Mario's most celebrated victory came at the Indianapolis 500 in 1969, when he overcame all the odds to win the classic in a backup car, despite an overheating problem. Yet Mario looks elsewhere for the crowning glory of his career.

"Indianapolis for American open-wheel racing represents the mecca and from a career standpoint there's a lot of pressure to win because you're judged very much by your performance there.

"For me, though, having been raised in Italy, Formula One is what started this fire inside me and winning the F1 world championship in 1978 was certainly the most satisfying aspect of my racing career."

Mario officially retired from open-wheel racing in 1994 but a year later he was claiming second place at the 24 Hours of Le Mans, a race he also contested three more times after that.

And he would still consider an offer to compete in this classic endurance race, particularly if the call came from Audi to drive with Tom Kristensen in the new R10 turbodiesel sportscar.

"If the call came, I'd pack up my race gear and my helmet and I'd be there in a minute… because I know I'd have a good chance of winning."

The Turbocharged Win

Mario's celebrated Indianapolis 500 victory came in 1969 at his fifth attempt.

Yet his preparations didn't start well. Mario wrecked his non-turbocharged Lotus-Ford in a practice run but his team pulled out all the stops and got Mario to the start-line in the backup vehicle – a Hawk-Ford boosted by a Garrett® turbo.

In a news report filed on May 30, 1969, Nick Acocella captured the nature of the fierce competition between Mario and his fellow competitors: "In today's race, Andretti, starting from the No. 2 position, sailed past pole sitter A.J. Foyt on the first turn to take the lead, a spot he held for 116 of the 200 laps. Victory was virtually assured when his strongest challengers – Lloyd Ruby (after 105 laps), Roger McCluskey (157) and Foyt (181) – all were forced to drop out."

But things did not go completely smoothly for Mario.

"Andretti's biggest concern came on the No. 2 turn of the 150th lap when he got caught in the draft of another car, turned sideways, and almost hit the wall. However, he straightened out in time and, running at a record average of 156.867 miles per hour, cruised to victory by two laps over Dan Gurney."

Mario's famous victory in a backup car assured a place in racing history for himself, his team and the power of turbocharging.

Technology

Today's racing turbochargers owe as much to aerospace engineering as they do to automotive design. Advanced materials and leading-edge technologies are taking turbocharger performance on the race tracks and rally stages of the world to higher levels.

"Keep it light, keep it low" – that's what race teams want from their turbochargers according to Honeywell Motorsports Manager Doug Milliken. "Light" because race cars want to carry as little weight as possible and "low" in terms of packaging and center of gravity.

Certainly as far as weight is concerned, there have been dramatic reductions over the last decade or so as a result of new materials and improved turbo aerodynamics. Many of these performance gains have been leveraged from collaboration between Honeywell's turbo engineers and their aerospace counterparts.

Says Doug: "The use of titanium, magnesium, and ultra thin stainless steel has reduced the weight of a racing turbo to about one third the weight of an equivalent commercial turbo."

Almost all Honeywell's Garrett® racing turbos utilize ball bearing technology to exert the advantages of ultra-low friction and to deliver fast turbo response.

"In most race series, the rules define very clearly the parameters of engine design. So whether it's power, reliability and fuel efficiency at Le Mans, the high boost and rugged performance required by rally cars or the 'power to pass' demanded by Champ Car, our role is to optimize turbo performance through partnership programs that embrace advanced materials, leading-edge design and world class manufacturing processes."

The most recent challenge for Doug and his team has been to develop the turbo technology for a new generation of diesel endurance sportscars. Compared to their gasoline equivalents, turbos for diesel racing engines are required to operate at significantly higher boost pressures and speeds. However, the type of compressor wheel design that gives optimal performance at high boost sacrifices flow range – so Honeywell engineers have developed "ported shroud" technology to meet the race team's objectives.

"This latest program demonstrates the power of our partnerships with customers in delivering technological advances – ideas that often find their way into the production cars of the future."

Racing Turbo Innovation

How has Honeywell's Garrett® TR30vGT32 racing turbo reduced its weight from 24lb (10.89kg) in 1990 to 9.6lb (4.35kg) at present?

The following innovations played their part:

1990 First magnesium compressor housings

1993 Introduction of ball bearing turbochargers

1994 Development of thin wall stainless steel turbine housings

1995 Aerospace grade materials used for turbine wheel

1996 Speed sensors introduced into center housing

1998 Introduction of titanium center housing

2002 Turbocharger redesign includes thinner walls

2006 Turbo for diesel race car – Audi R10

King of the Mountain

It's a performance that really stands the test of time... but Rod Millen's record turbocharged run at the Pikes Peak International Hillclimb in 1994 shows just what can be achieved with meticulous planning, advanced engineering... and a super fast rally driver.

Rod literally re-wrote the record books 12 years ago when he took just 10m 4.08s to cover the 12.4 mile (20km) Pikes Peak course in an 800hp Toyota Celica boosted by a Garrett® T04S, a large frame high-boost ball bearing turbo that could handle 800hp. The 156-turn mountain course is world-renowned for rising from 9,500ft (2900m) to 14,100ft (4300m).

Says Rod: "I grew up in New Zealand reading about the Pikes Peak event, and it really is the ultimate hill climb. In the year we set the record, we designed a vehicle specifically with Pikes Peak in mind – the turbocharged Toyota engine, a 4-wheel drive system, a body with excellent aerodynamics and downforce and specially designed tires.

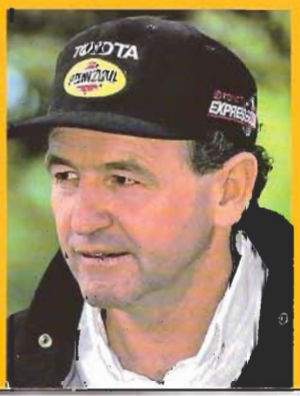
"These key elements gave us a big advantage and we knew we would be quick – in fact we broke the record by 35 seconds. It will be beaten of course – I'm just surprised it's taking so long."

Rod admits that he had rare near-perfect weather conditions all the way up on his record run and in the subsequent years he couldn't improve on the time even though he had quicker cars.

"For me, Pikes Peak is a typical rally road – but the biggest difference is the altitude and the forever changing weather conditions. It can change every 10 minutes... snow, ice, sunshine, wind, rain and all in the same run! That's what draws you back year after year."

Rod got the racing bug in his formative years in New Zealand, where he could be found negotiating the gravel back roads on his way to the surfing beach! He became the first driver to win three consecutive New Zealand Rally Championships, raced in Australia and competed in the RAC Rally in England before moving to California and claiming his first North American Race and Rally championship. His success continued in the SCCA PRO Rally series and the Asia/Pacific series.

Today Rod is still as fast as ever behind the wheel but he gives much of his time to Millen Works, which provides technological engineering and design support not only to race and rally teams around the world but also to car manufacturers, government agencies and other companies that require his unique qualities.



Boosted Across

Honeywell holds a unique position in the world of motorsports. Not only is its Garrett® turbocharger the overwhelming choice of race teams, no other turbo company gets close when it comes to providing dedicated, year-round technical support.

Heading up the Honeywell Motorsports team is Doug Milliken, who has been working with race teams and engine manufacturers for the last 10 years and is widely regarded as racing's turbocharging "guru."

"From the earliest days of our involvement in racing, we recognized that while the technology was the 'enabler' it was the people that made the difference," says Doug. "Everyone in the Honeywell Motorsports team has petrol in their blood and I'm certain that this commitment makes a real difference to our customers."

From the late 60s, turbocharging has put the "wow" factor into motorsports, whether in Champ Car, at Le Mans or boosting drag racing or world rally cars.

Every era and every race series has brought its own unique challenges, but Honeywell has always responded with leading-edge solutions – from ultra-responsive ball bearing technology to the application of advanced lightweight materials such as titanium and magnesium.

"And the challenge continues," says Doug, "particularly with the trend towards turbodiesel sportscars in endurance racing and the likely increasing impact of turbocharging in Champ Car from 2007. Nothing stands still in motorsports... and it's the way we respond that keeps us as the front-runners."

Turbocharging through Racing History

From Le Mans to Indianapolis, from world rallying to Champ Car, turbocharging is renowned as the technology that powers race cars from pole to podium. Here Doug Milliken, Motorsports Manager at Honeywell Turbo Technologies, reviews some of the key moments in the history of turbo racing.

Formula One

It was one of the most exciting eras in any form of motor racing. In 1979 Renault saw the potential of turbocharging in F1 – the team had already seen the success of the Garrett® turbocharged 2 liter Gordini V6 developed for the European F2 Championship, before racing it at the 24 Hours of Le Mans in 1977 and winning it in 1978. Developing this experience, Renault reduced the stroke of the Le Mans engine to bring the displacement to 1.5 liters as required by F1 rules, adding a single Garrett® turbocharger. Renault's first turbocharged race win in 1979 ushered in the "Turbo Revolution" and soon Ferrari, BMW, Porsche, Honda, Ford and Alfa Romeo became turbo powered. In what proved to be a golden era of turbo racing in the 1980s, Garrett® turbochargers boosted 10 F1 race wins with four manufacturers.

the Winning Line

24 Hours of Le Mans

The classic endurance event – made all the more exciting as a result of turbocharging. Porsche and Renault were the first teams to achieve success with turbocharged engines at the 24 Hours of Le Mans, with Porsche being the major player from 1976 through 1987. Turbocharged engines were proving unbeatable in endurance racing not only in terms of performance, but also from a reliability and fuel efficiency standpoint. In the 21st century, the race has been dominated by Audi, first with its 3.6 liter twin Garrett® boosted V8... and now with the ground-breaking turbodiesel Audi R10 TDI. Turbocharged cars have won the 24 Hours of Le Mans no fewer than 22 occasions since 1976.

Indy Car

In 1968, Bobby Unser became the first driver to win the Indianapolis 500 with a turbocharged spark ignition engine, setting in train an era that would see "turbo" dominate for the next 28 years. Prior to this, cars ran with superchargers, which were fast but prone to failure... whereas turbos offered much greater reliability over 500 miles. Fourteen of the 29 turbocharged wins in the Indy 500 were with Garrett® turbochargers, when some of the most famous names in the history of the event rode Garrett® boosted machines to victory. From 1966 through 1978 the cars that raced at Indianapolis competed in a full series under USAC (United States Auto Club) sanction. Garrett® boosted cars won six USAC National Championships between 1968 and 1978.

F.I.A. World Rally

Turbochargers first appeared at World Rally events in the late 1970s, with the first turbo victory recorded by Stig Blomqvist at the Swedish Rally in 1979 in a Garrett® boosted Saab 99. In 1980, Renault unveiled the Garrett® boosted R5 Turbo, which won the Monte Carlo Rally at the beginning of the 1981 season. That was just the beginning – from 1979 to present, Garrett® turbochargers have been the turbo of choice of the three most successful marques in the history of World Rally – Lancia, Ford and Peugeot.

From 1997, World Rally Cars replaced the Group A specification and this opened up the turbo technology to more race specific designs. In response, a rally-specific Garrett® turbocharger called the TR30R was developed for the Ford WRC team in 1999 – a lightweight aircooled ball bearing racing turbo that has dominated the World Rally scene since 2000 when Marcus Grönholm and Peugeot won the Drivers' and Manufacturers' Championships. In the six years from 2000 through 2005, Garrett® TR30R boosted cars have won 65 of 88 rallies, six Manufacturers' Championships (three Peugeot and three Citroën) and four Drivers' Championships (two Marcus Grönholm and two Sébastien Loeb).

Accelerating

"Whatever the challenge, we always strive for the winning solution for our motorsports partners. We constantly review technologies and embrace advanced materials to ensure that Honeywell turbochargers lead the world in terms of quality, performance and reliability." Russell Stoddart, Vice President, Worldwide Engineering, Honeywell Turbo Technologies

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1998 Introduction of titanium center housing

2002 Turbocharger redesign includes thinner walls

2006 Turbo for diesel race car – Audi R10

Focusing on

It takes a special kind of driver to fly along narrow forest trails and to skirt mountain bends at break-neck speeds... and a special kind of team to get man and machine to the finish line ahead of the rest.

Competition in the FIA World Rally Championship has never been tighter – just ask Malcolm Wilson of the famous M-Sport organization, who has experienced life either side of the steering wheel and who now spearheads the rallying challenge for the Ford team.

Citroën has been the dominating force in recent times, but this year there's a sense of anticipation in the Ford stable, with former WRC world champion driver Marcus Grönholm mounting a serious challenge for the silverware.

Ford developed its brand new Focus WRC in a staggeringly compressed timescale – but immediately found itself competitive with its 2 liter Duratec engine, boosted by the Garrett® turbocharger. Wins at the opening two rallies in Monte Carlo and Sweden raised the competitive temperature and it's clear that 2006 is going to see a real resurgence in Ford's bid for world rally glory. In fact, Malcolm Wilson himself believes that 2007 is a more realistic target for the drivers' championship – though he's determined to get Marcus Grönholm as close as possible this year and maybe even grab the constructors' prize.

"The margins between success and failure in 2006 are very small, sometimes just two or three seconds after 250 kilometers over three days," says Malcolm Wilson. "So much of the technology is now governed by regulation that all the teams are probably within 10hp of each other. So we need to give our drivers maximum advantage from every single aspect of the car – power delivery, torque, turbocharger response, weight distribution, center of gravity... these are the critical areas."

M-Sport, based in Cumbria in the UK, was formed by Malcolm Wilson in 1979 when he was himself a successful professional rally driver. A Ford man through and through, including a period as Ford's chief test driver, Malcolm Wilson developed his race team managerial skills so that by 1996, a year after he had retired from driving, his M-Sport enterprise had already notched up 11 rally championship successes around the world.

Then came the partnership with Ford.

"For me it was a dream come true and we achieved some notable successes with the turbocharged Escort Cosworth, particularly with Carlos Sainz behind the wheel. But now, with the new Focus WRC, we've raised our game to a whole new level – and with Marcus Grönholm as our number one driver I believe we are serious contenders for both the drivers' and constructors' championships in the years ahead."

the Big Prize

Winning Lines

Two-times WRC Champion Marcus Grönholm, Ford's Number One driver, gives us his impressions of the new Focus WRC and of the challenges of rallying.

On the new Ford Focus WRC

"It's been a really positive start to the season and in some ways surprising just how well the car is performing given how quickly it was developed. The driveability and suspension are fantastic... and of course there are still many things we can develop and improve upon."

On his prospects for 2006

"Winning the first two rallies was great and it's clear that we have a car in which we can fight for wins – we are ready for the challenges that lie ahead."

On how rallying is changing

"Rallying has really changed a lot over the last three years and the competition is greater than ever before. The differences between success and failure are very small – there are no big gaps between the teams any more. This means that we have to be fast and consistent with no mistakes from the start right through to the finish."

On the most challenging rally in the calendar

"The hardest rally I drove was the safari rally in Africa because you had to adapt your speed and save your car. Today, I think the most challenging rally is Monte Carlo because you can get ice, snow, sun and wet and dry conditions all on the same day. Of course I'm happy that I won it this year in the Ford."

Blistering Perf

For sheer energy and explosive power, there's little to rival the turbocharged spectacle of drag racing – a roller coaster ride over a quarter of a mile. Tens of thousands of enthusiasts head for the strip every year, waiting for the green light before hammering the throttle and rocketing 1320ft (402m) to the finish line.

In 2006, Honeywell's Garrett® ball bearing turbochargers are the first choice for around 70 percent of teams participating in NDRA and NHRA Sport Compact Series.

Honeywell assigns an engineer to each race team to help them make hardware choices but also to assist in making everything work together – the wastegate, the blow-off valve, the drop across the intercooler, how to handle compressor surge issues... a true partnership approach from workshop to winning line. This level of commitment delivered stunning results in 2005, culminating in Ron Lummus taking the NHRA Sport Compact Series championship, boosted by Honeywell's Garrett® GT45R ball bearing turbo, with the largest points advantage in any pro class. He is the holder of three of four records in both the NHRA Sport Compact Series and the NDRA.

The Garrett® Pontiac Sunfire is currently the world's quickest front wheel drive unibody race car – accelerating to 190mph – as a result of an intensive development program between Honeywell and the Bothwell team. Says Steve Bothwell, the crew chief of Bothwell Motorsports: "Most people race their turbos at 70 percent because they cannot overcome all the other restrictions, such as air inlet, whereas we run our turbos at 110 percent – we spin it at 130,000rpm and we've had no failures."

ormance

Diesel Pick-Up Power

It may not be the average turbodiesel pickup truc – but the Sidewinder D-Max Type-R diesel-pow-ered road race truck from Gale Banks Engineerin still demonstrates all the winning qualities of its conventional diesel counterparts.

After a successful test session at Willow Springs Raceway, the truck, which features a Duramax diesel 6.6 liter engine, will be competing in the Super Unlimited class of the National Auto Sport Association race series.

The D-Max Type-R weighs in at virtually the sam weight as the Corvettes that run in these events – but the pickup will have far more torque and better fuel economy than its gasoline competitor

The Banks/Duramax racing engine is limited to 650hp with 800lb-ft (1085Nm) of torque, and is targeted to run at engine speeds as high as 5,000rpm – incredible for a diesel engine.

The engine is boosted by a Garrett® twin-turbo system capable of delivering 4:1 pressure ratio. The ball-bearing turbochargers feature stainless steel turbine housings and magnesium compres-sor housings as well as aluminum compressor wheels and nickel-based alloy turbine wheels.

"It's a short drive from race track to road. We push the operating envelope of turbocharging in racing and in doing so create new opportunities for our OEM part-ners and their customers." Olivier Rabiller, Vice President, Sales and Marketing - Europe, Middle East, Africa and India, Honeywell Turbo Technologies

Top 10 Turbo Ra

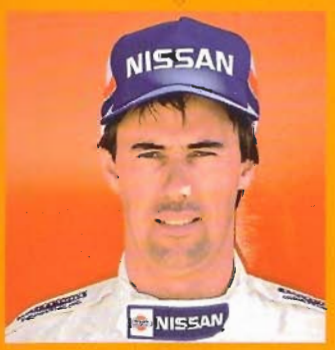
When we set about compiling our own dream team of turbo racers, who better to consult than Doug Milliken, who has been leading the racing effort at Honeywell Turbo Technologies since 1995. "This was a real labor of love," says Doug. "As a real race fan, I have chosen from those who have inspired me – and continue to do so." The drivers are listed alphabetically.

Mario Andretti

For pure talent, speed and versatility, no one beats Mario. He remains the only man to have won the Indy 500, the Daytona 500 for NASCAR stock cars, and the Formula One Championship. Mario won the 1969 Indy 500 with a Garrett® T06 turbocharger and was also four-time Champ Car National Champion.

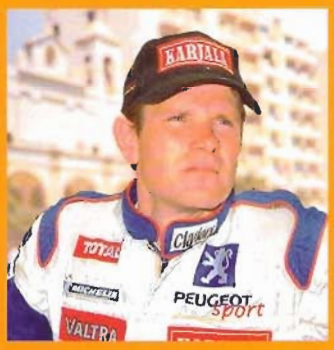
Sébastien Bourdais

Sébastien Bourdais would have been too young to make the top ten list only one year ago, but after winning two Champ Car World Series titles in a row in 2004 and 2005 in dominating style, it is safe to say here is a great driver in the making.



Geoff Brabham

Geoff Brabham dominated the IMSA GTP category of American sportscar racing, winning four consecutive Championships from 1988-1991 in the Nissan ZX-T and its replacement Nissan NPT-90. A rare feat indeed.

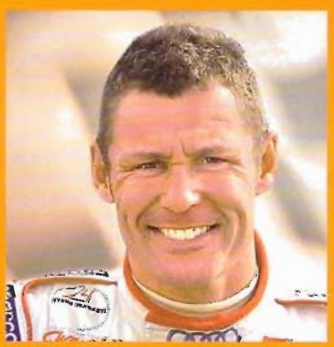


Marcus Grönholm

When Peugeot returned to World Rally in 2000, Marcus took them to the championship in their first year with the Garrett® TR30R boosted Peugeot 206. He then repeated the feat in 2002. Today he is challenging for the 2006 title in a Ford Focus and remains at the peak of his form.

Juha Kankkunen

Juha Kankkunen won three of his four World Rally Championships powered by Garrett® T3: his first in 1986 in a Group B Peugeot R5 Turbo, the second in 1986 in a 4WD Lancia Delta HF Group A car, and his third championship in 1991 in a Lancia Delta Integrale. Although he was never comfortable on asphalt, he was good enough on gravel alone to rack up enough points to clinch championships.



Tom Kristensen

With a record seven 24 Hours of Le Mans overall victories, Tom is clearly the greatest sportscar driver ever boosted by Garrett® turbos. The last six Le Mans victories were all twin Garrett® TR30R boosted, five with Audi and one with Bentley.

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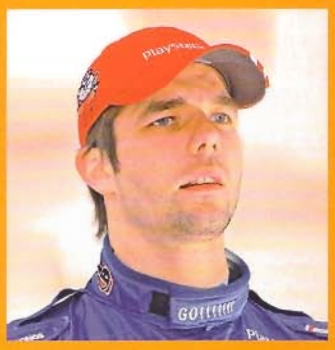
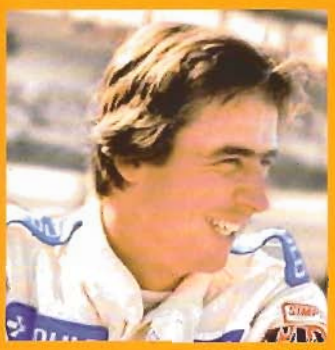


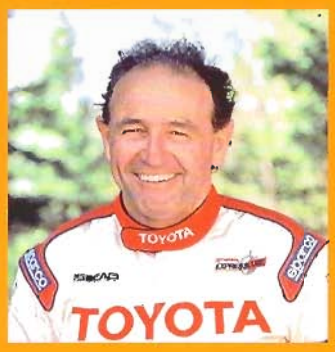
Sébastien Loeb

A year ago, he might not have made the top 10 list, but after winning the World Rally Championship in two consecutive years in 2004 and 2005, in only his second and third seasons in WRC, Sébastien Loeb is destined to become the most prolific winner in WRC history. He has already won 24 events in just 77 starts, closing fast on the all-time win leader Carlos Sainz, who won 26 times in 196 starts.



Rick Mears

One of only three men, along with Al Unser, Sr. and A.J. Foyt, to have won the Indy 500 four times. Known as "The Ovalmeister" for his patience and race strategy on the big ovals, he had a remarkable intuition for when to save the car and when to punish it. He won the 1979 Indy 500 boosted by a Garrett® T06 turbocharger and was also three-times Champ Car National Champion.



Rod Millen

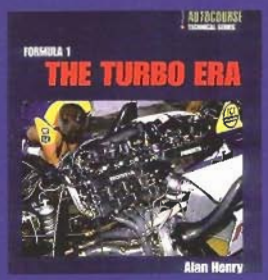
Rod Millen is perhaps best known for putting together a near perfect run up Pike's Peak in 1994. His overall record of 10 minutes 4.06 seconds in an 800 HP 4WD Toyota Celica with full ground effects and a Garrett® T04S ball bearing turbo still stands 11 years on. Rod had rare near-perfect weather conditions all the way up the mountain and laid down a time that many have tried but failed to better. The 12.4 mile (20km) course rises from 9,500ft (2900m) to 14,100ft (4300m) at the finish line.

Ayrton Senna

A national hero in his native Brazil and considered by many to have been the fastest, perhaps the most talented F1 driver of the modern era. Ayrton Senna's first F1 victory was in a twin Garrett® T3 boosted Lotus/Renault at the 1985 Portuguese Grand Prix. He went on to win three more Grand Prix in the Lotus/Renault and collected three Formula One World Championships.

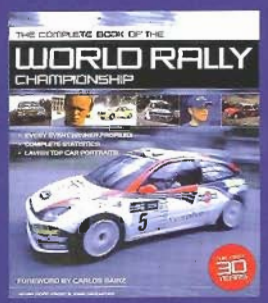
Speed Reading

Formula One



Formula 1 – The Turbo Era
By Alan Henry. 144 pages. Hazelton Publishing. 1998.
This book examines the evolution of some of the most powerful racing cars of all time.

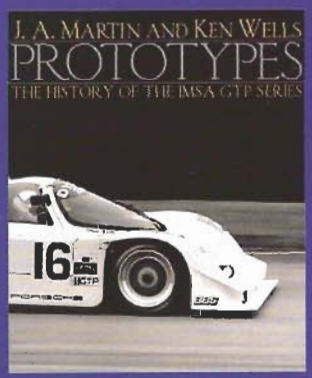
World Rally Championship



The Complete Book of the World Rally Championship: The First 30 Years
By Henry Hope-Frost and John Davenport. 350 pages. Motorbooks International. 2004.
With great writing and stunning photography, the book provides a biographical account of the 65 men who have won at least one World Championship Rally since 1973.

Rally Cars
By Reinhard Klein, David Williams and John Davenport. 600 pages. Könemann Verlagsgesellschaft mbH. 2000.
Featuring all rally cars with complete specification since 1960, the book is considered a must-have for rally enthusiasts. Superb photography.

Le Mans and Sportscar Racing

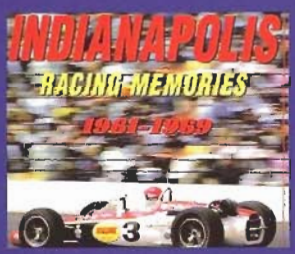


Prototypes: The History of IMSA GTP Series
By J.A. Martin and Ken Wells. 512 pages. David Bull Publishing. 2000.
A wonderfully illustrated book that covers all the major and many of the minor players in the IMSA GTP world.

Le Mans: The Porsche Years, 1975 – 1982
By R.M. Clarke and Anders Ditlev Clausager. 172 pages. Brooklands Books.
A collection of contemporary race reports, taken from British and American journals.

Le Mans: The Porsche and Jaguar Years, 1983 – 1991
By R.M. Clarke. 172 pages. Brooklands Books. 1999.
A collection of contemporary race reports, taken from British and American journals.

Indy 500 & Champ Car



Indianapolis Racing Memories: 61-69
By Dave Friedman. 160 pages. Motorbooks International. 1997.
Photographer David Friedman captures the most important decade of the Indy 500 with his access to the track, stadium and pits.

Indianapolis 500 Chronicle
By Rick Popely with L. Spencer Riggs. 416 pages. Publications International, Ltd. 1998.
This book tells the history of Indianapolis 500 from 1911 to 1996 complemented by great photography.

CART: The first 20 years 1979-1998
By Rich Shaffer. 224 pages. Hazleton Publishing Ltd. 1999.
A well-researched history of this racing series in US – from its troubled birth in the late 70s to its rise to popularity in the late 90s.

Indy Cars of the 1960s
By Karl Ludvigsen. 128 pages. Iconografix. 2001.
A wonderful collection of high-quality black and white pictures, including photos depicting not so successful but technically interesting cars.

Offenhauser: The Legendary Racing Engine and the Man Who Built It
By Gordon Eliot White. 200 pages. Motorbooks International. 1996.
A book about what is arguably one of the most successful racing engines ever designed – from its early conception to its last turbocharged days.