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THE SPORTS PROTOTYPES VOLUME 2 1973-1978

ROY SMITH

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ALPINE & RENAULT

THE SPORTS PROTOTYPES VOLUME 2 1973-1978

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Contents

Author's introduction

In my introduction to volume one of this work, I said I never really wanted to be a detective. However, research for my previous book about the development of the first turbo Formula 1 car, and of course volume one of *The Sports Prototypes*, proved that detective work was indeed required, as I found that the full chassis/race history had never been completely collated. There are of course some excellent books and many articles that cover parts of the subject; they were my starting point for three years of research, which has led here to the second volume in our study of Alpine and Renault: The Sports Prototypes 1973 to 1978.

Every enthusiast who remembers the dramatic sports prototypes of the 1970s will, I hope, be enthralled by the efforts of the Renault Alpine team. It is now many years since the team won at Le Mans and, as commented on in my introduction to volume one, I crave the indulgence of the older hands who are aware of some of the history; we are now reaching out to a generation or more of new motor sport enthusiasts, who may not even know that these cars existed, or indeed that the 1975 Alpine Renaults were some of the first turbocharged cars. Even more importantly, for those who read or speak English there is very little detail available about the 'Alpines,' as opposed to the Renault Sport cars, or about the many European and World Championship races of the years that ran up to the famous victory in 1978 – and how it so nearly didn't happen.

Since the 1950s the Alpine company had been primarily a privately owned organisation, captained by a man with vision and passion: Jean Rédélé. Throughout the following decade, Renault gradually became more and more involved with Alpine

Jean-Pierre Jabouille, Nürburgring, 1974. (Photo MF)

to the extent that by 1973 it was supporting the company financially to a significant level. Jean Rédélé was finding that his own investment was insufficient and the financial situation became worse as the world reacted to the problems of the rising cost of oil and everything associated with it. Something had to be done to save Alpine from financial disaster.

Renault was to make a decisive investment, acquiring a 55 per cent shareholding in the company, which from then on was to be known as Renault Alpine by all those within the group (though until 1977 the general public still saw cars carrying the name Alpine Renault). Renault finally took over Alpine completely in 1977. It made a huge commitment and leap of faith in an attempt to conquer the legendary Le Mans 24 Hours. A new era had begun that would eventually see not only victory at Le Mans, but entry into the fiery furnace that is the Formula 1 World Championship, in which their presence continues. (The F1 story can be studied in my other work, *Alpine and Renault – The Development of the Revolutionary Turbo F1 Cars*.)

Our story here in volume two begins at a time of regeneration. Alpine was about to win the first World Rally Manufacturers' Championship. The failings of the V8 sports prototypes in 1969 were history, and the state-owned Elf Oil company was becoming deeply involved with Alpine and Renault in Formula 3 and Formula 2. The Formula cars proved fairly successful, and Elf wanted to move forward with Renault to maintain the marketing momentum gained during 1971 and 1972. Elf put an order in to Renault for an engine, and put up the money. François Castaing, then a technical engineer who had worked with Amédée Gordini, was given the task of creating a new engine, a racing 2-litre V6 aimed at entry in the European Sports Prototype Championships.

This book looks into the politics and the plans, the ideas and the development of the engine and the cars. Although the Renault-powered Alpines walked away with the European Sports Prototype Manufacturers' and Drivers' Championships in 1974, things became difficult as the team tried for the first time to come to terms with the turbocharger, setting out on a long road where the target was outright victory at the Le Mans 24 Hours. This is that story – a true story, devoid of myths – and we will see through dozens of interviews and the words of the men who were there the reality of the struggles of a dedicated and tenacious team, which started as Alpine, Gordini and Renault, but in 1976 metamorphosed into the formidable team of Renault Sport under the direction of the highly accomplished driver, team boss and Renault competition general manager, Gérard Larrousse.

Le Mans and the 24 Hours feature heavily in the later chapters, but first the cars had to be made competitive, and again we see the highs and the lows through the words of men who were there, who became the beating heart of the Renault Sport team. As ever, it was the drivers who took the glory and, yes, the huge risk of injury or even worse, but they put their trust and faith in the engineers who created and built the cars. We see the great responsibility that fell on those who organised and took the decisions, as the sport came to be regarded as part of a huge marketing exercise – especially for the likes of Renault.

There was great pressure to succeed – after all, it said 'RENAULT' on the engine, and the interests of a huge motor corporation were at stake. This is an epic journey of sweat, tears, and sometimes blood – what it took to win the Le Mans 24 Hours.

Finally, I hope the reader will find interesting some new information that came to light during my research, and which is set out in the last few pages of this volume – the answer to the long-time mystery (to some, that is) of what happened to the engines at the end of the Le Mans programme. With help, I have managed to trace them, and it forms a fascinating epilogue.

Roy Smith

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During my research I was loaned an internal Renault Sport dossier containing many letters and 'notes de service' (memos) that provide indisputable facts and records for the years 1977 and 1978. My grateful thanks are extended to the owner of this private collection.

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IMAGES

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A huge thank you is due to János Wimpffen, whose amazing work *Time and Two Seats* has, with his permission, yielded a lot of race record details concerning the World Sports Car Championship with additional permission to use images from this work and his other books *Winged Sports Cars* and *Spiders and Silhouettes* in conjunction with permission of LAT Photographic. Also John Horsman for the race and test records of Mirage, and permission to use information from his work *Racing in the Rain*.

A special thank you is due to a man who, over a period of time that would eventually turn out to be the last three years of his life, became a friend and provided the initial introductions that allowed me to bring this work and my others to fruition. I thank him for his outstanding knowledge, which he shared with me over several pleasant lunches, for the contacts he gave me, and for his good will in constantly putting in a good word here and there to open doors for me. Sadly he passed away shortly before this work was published. That man is the late Jean Sage.

Again I must thank my dear Helen for her continued unstinting work on translations and initial editing, and for correcting my terrible spelling and grammar (which you will not see, thanks to her efforts). Without her, the preparation of these two volumes, which have taken over three years to research and make ready for publication, would not have been possible.

Finally, may I thank Veloce and Rod Grainger, my publisher, for having the confidence, patience and faith in my humble efforts to record for posterity this racing history of the Alpine sports prototypes.

Even in a work where one has conducted so many interviews and made every attempt to obtain permission, verify comments, statements, data and information, there may still be omissions, miscredits and/or some differences of opinion. I hope the errors are few; everything contained within this work is published in good faith and in the spirit of bringing the history to the reader above all other considerations. I apologise now for any technical, photographic or acknowledgement errors or omissions.

GÉRARD LARROUSSE

There are so many stories and memories which come to my mind. Many friends have asked why I don't write a book about them. I have always refused because, as a certain man by the name of Smith told me one day, my memory is rather selective as I tend to remember only the good things and not the less attractive side, and in a study such as this we have to look at it all.

So I think Roy will do it better than I would – I can trust him to tell this wonderful adventure of men and machines, the good parts and the bad, conscientiously and in detail.

I had the good fortune to drive the A440, A441 and A442. The A440 was my introduction to that fabulous atmospheric V6 engine which was to have such a fantastic career, undreamt of at the time.

The A441 gave me some wonderful driving memories and fine victories in two litres. The turbo cars hold two great memories for me: the first race, with our victory in the Mugello 1000km where I drove with Jean-Pierre Jabouille in 1975, and the superb victory of Pironi and Jaussaud in the Le Mans 24 Hours in 1978. Between these two events, things were not always easy and there was a succession of 1000km races without much glory in 1976, including a drama at the Nürburgring and the confusion at Enna. Then came the disappointment of our first attempts at the Le Mans 24 Hours in 1976 and 1977 – we quickly put that memory behind us.

Le Mans 1978.

In 1976, I had moved on to an important new step in my life: from driver to race director. The opportunity arose at the end of the 1975 season, which overall had been disappointing for the A442 due to its lack of reliability. Renault asked me to take over the direction of its competition department. The challenge appealed to me. I was already well aware of the quality of the men and the equipment, but I'd had enough of seeing this potential wasted through a lack of strategic direction and the petty rivalry between the various competition units. We needed an ambitious project and someone to take up the baton and bring unity to this rather confused mix of talent. A few weeks after I started work as competition director, the Renault management put me in charge of the mission to win the Le Mans 24 Hours, which thus became our number one target.

I threw myself into the task with great enthusiasm, as I did not believe that a sports prototype programme based solely on 1000km races was of sufficient interest for the brand. I was very keen that Renault should benefit from my experience as a driver, my involvement with Porsche in the 908 and 917 and my two victories with Matra in 1973 and 1974. I had raced with some great teams and so my memories were still fresh. As soon as I got the instruction to win Le Mans, I decided not to waste a year but to enter the race straight away in 1976. I knew that our car was not ready for such a long and demanding endurance race as the 24 Hours, but I was sure that we would gain valuable experience both in the technical field for our engineers and on the organisational level for the whole team. Indeed this was what happened, as there's nothing like actually experiencing a race to understand its difficulties and subtleties. The car had to retire in the 11th hour, but we were satisfied, though there were critical remarks from some journalists who had not understood that for us it was a test under real conditions.

Armed with all this information, we mounted our battle plan to confront 1977 with the best chance of victory. First of

all we decided to create Renault Sport, a smaller subsidiary company of Renault bringing together the various competition departments of Renault, Alpine and Gordini, in order to rid ourselves of the administrative weight and inherent limitations of a large company. The logicality of this step led most constructors, including Peugeot and Citroën, to follow suit. We then needed workshops suited to the preparation of competition cars. The Alpine prototypes and rally cars and the Formula 1 A500 prototype had up until then been prepared in Alpine's production works in Dieppe. So we built a small, independent factory in Dieppe, later to become BEREX, where the Le Mans chassis and rally cars would be built and new cars such as the future R5 turbo designed. Next, we needed to create a team capable of winning the 24 Hours. This was certainly the easiest task, as virtually all the men we needed were already there, with the necessary competence in all fields: engine specialists, chassis engineers, aerodynamicists, designers, mechanics and drivers. My only problem was to get them to work together as one unit on this project. With François Castaing as technical director, we set about this task with tenacity, and I believe we succeeded in motivating the team and instilling in them the rigorous approach to preparation, the fine details, which had been missing up until that time.

Test followed test on circuits, airfields and motorways in France and in America. Our drivers pushed themselves tirelessly, night and day, often at more than 350kph. Our partners Elf and Michelin and our suppliers provided us with their finest products.

Everyone brought their very best to the 'project' and I thank them all from the bottom of my heart. In particular, I'm thinking of Didier Pironi and Jean-Pierre Jaussaud, who were instrumental in the victory, and Jean-Pierre Jabouille, our main test driver. To mention others would mean I should have to mention everybody, since each in his own way was part of this victory. After two years of very hard work, the victory belonged to everyone. Finally, I would like to pay tribute here to Christian Martin, Fred Knoflach and my good friend Jean Sage, all three of whom are sadly no longer with us.

Gérard Larrousse
Marseilles, France
Twice winner of the Le Mans 24 Hours; twice World Sports Car Champion 1973 and 1974
Renault Competition Director 1976-1984
Awarded the Légion d'Honneur

DEREK BELL

The mid-seventies was a most unsettled period in sports car racing. The rules were in disarray; manufacturers were not prepared to build cars, and, quite naturally, drivers had a dismal time finding drives and earning any fees.

The jewel in the crown has always been Le Mans, and the ACO has amazing leverage in steering the rules its own way! So everyone built cars for that race, and if they won they could shout about it for years to come. I was contacted by Gérard Larrousse, with whom I had contested many races in the preceding six years; I was most flattered, particularly when I learnt that I was the only non-French driver on the team. From the outset it was the infectious enthusiasm of this young team that caught the eye; they wanted to prove they could win Le Mans en route to F1. The French race teams were always the most 'cliquey', another reason I was so astonished at being asked to join the team. It cannot have been easy assembling such a team from within France, but they did, which has certain advantages. My French is passable, thanks to years in F3 and F2 racing against my French colleagues, so that helped me. Our 24-hour test programmes at Paul Ricard were really most arduous: all the drivers would be there taking shifts in the driving and trying to sleep in the 'Barracks' (the Airport Hotel) – not quite the same now with Bernie's 5-star retreat.

We tested endlessly; the car's handling was superb until something broke, then we started the 24 hours all over again until it ran perfectly, but I don't recollect ever doing a full 24-hour test. There is really nowhere that one can simulate that 6.5km Mulsanne straight, and when we were told by journalists that we would win, my years of development at John Wyer Gulf would rear up and remind me that we weren't ready yet. It is said that it takes three years to develop and be in a position to win the 24 Hours. I hoped I was wrong in my assumption, and after 14 hours with Jean-Pierre Jabouille in 1977, when we were leading by several laps and cruising along, I thought I had been wrong. Unfortunately, within a couple of hours a piston went and wrecked another engine and our chances of victory – the Mulsanne had done it again!

A considerable amount of development had gone on in the run-up to that 1977 Le Mans, and over the following months we did even more. Then, having successfully passed an 18-hour test at Paul Ricard, the car was flown to the GM test track in Michigan over Thanksgiving in late November, where chicanes were set out just before the two bankings of the 12km track. We ran a number of hours there to bring the test to a total of 24 hours including the Ricard test, so felt cautiously optimistic

Goodwood 2009. (©RS)

this time, but although we were running flat out we could still not simulate the sustained constant high rpm of the Mulsanne straight.

I remember one test at Paul Ricard on one cold winter night in 1977. I was running at over 320kph on Les Signes when suddenly the rpm shot up. I thought it was the clutch, but it was a damp strip across the track that had suddenly frozen – wow, that woke me up! We halted testing for a few hours.

An astonishing amount of work was carried out over the ensuing months, including the development of an almost enclosed cockpit, which assisted top speed. All the cars ran really well and absolutely on the limit. Jean-Pierre Jarier was my team mate one night, and I remember after one of my stints Larrousse told me I would have to run faster. I told him the gearbox would not stand being driven harder. It broke an hour later! In 1978 we felt we could win, and of course Pironi and Jaussaud did, and it was still only really the second year of seriously trying.

For me it was disappointing that our car did not feature in the results, but it was a magnificent achievement for the Renault team and the great engineers that had created such a car. The next few years in F1 would be somewhat harder for them all. It was a most memorable period in my career. They were thoroughly professional, dedicated and enthusiastic. Here, Roy tells the whole story exactly as it was.

Derek Bell MBE
Pagham, England
World Sports Car Champion 1985 and 1986
5 times winner of the Le Mans 24 Hours

FRANÇOIS CASTAING

It was about 10pm on Saturday 28 September 1968 when Teso, Gordini's head mechanic, asked me if I wanted a ride back to the hotel. He and most of the other mechanics had decided to enjoy a good night's sleep. A few months earlier I had been hired by Amédée Gordini and my dream had come true. I was in the pits at the Le Mans 24 Hours, where Alpine Renault had populated the starting grid with five A210s and four A220 3-litre V8s, all equipped with Gordini engines. Stunned, I asked: "What happens if one of the Alpines develops an engine problem?" Liber responded that with or without his crew the outcome of the race would be the same: Alpine could not win! Alba (Giuseppe Albarea), Alain Marguet and I of course stayed wide awake in the pits through to the end of the race, which sadly turned out to be an unhappy time for Renault: the engines' performances were not competitive and Alpine had not run its racers through 24-hour endurance simulations or sustained high-speed tests. Many of the drivers did not know they had been hired until that week. Most were driving with limited enthusiasm, especially in the rain at night. As a result everybody was blaming everyone else. I missed the 1969 edition, but learned that it had turned out to be another calamitous race for Alpine Renault and Elf – the last straw, which caused Renault to reconsider its entire motor sport approach.

These sad 1968 souvenirs were with me when in 1972 Renault charged us in Viry-Châtillon with the development of a new V6 to be raced in a new generation of Alpine sports prototypes: the A440. But those memories were omnipresent when in the autumn of 1976 Renault reminded all of us at a nascent Renault Sport that winning the Le Mans 24 Hours was the paramount priority. While we were competing in the World Manufacturers' Championship, in Formula 2, and making progress with the new F1 turbo V6 and assembling the core of our F1 organisation, Renault's message was unambiguous: just win it, as Matra had proved it could be done!

The Alpine 442s were fast but not reliable, and this obviously had to be addressed. But what was really needed was one seamless, winning team instead of two improving but distinct organisations, one in Viry-Châtillon and one in Dieppe. Starting in the autumn of 1976, it was decided that above and beyond the daily exchanges between engineers, Gérard Larrousse and I would spend at least a full day every week at Dieppe to further the integration of the two organisations. There our master plan to win Le Mans in 1977 was finalised and its execution monitored. It included the immediate building of a new endurance dynamometer to test the entire power train, the recruitment of Jean-Louis Coste to create a dedicated gearbox department, and funding Jean Coquery in his efforts to capture more objective data about all aspects of the cars on the track. Several long tests run at Paul Ricard and on military runways with our partner Michelin became the milestones of our preparation for the race. At Le Mans in June, Renault Sport lined up three much-improved A442s on the starting grid. We did not win, but we all thought we could have. It was clear internally and externally that our organisation had grown tremendously in professionalism and effectiveness.

We learned from our defeat and together went back to work. The gruelling preparation for the 1978 24 Hours was not much fun. We assumed that Porsche had by then realised how close we were and was working hard to improve the 936. The pressure of Renault senior management was on us, with the expectation of a growing number of its employees: we needed to win. Everyone knows that Le Mans race track is unlike any other and only accessible for practices a few days shortly before the race each year. But these realities were weighing on me more and more as we were getting closer. I was increasingly optimistic that we were onto something big with the F1 turbocharged V6 and afraid that another unsuccessful attempt at Le Mans would delay the Formula 1 project or even cause its cancellation. But fun or not, we prepared for the 1978 race more thoroughly than ever. And Renault Sport won, along with Michelin and Elf. After so many years of trying, this victory brought such a sense of relief and pride, not only to us but to the entire Régie Renault, from Bernard Vernier-Palliez and Bernard Hanon all the way to the workers on the assembly lines. This is that story and Roy Smith has covered it all in significant detail.

François Castaing, 2008. (Photo FC)

François Castaing
Arizona, USA
Former Vice-President,
Chrysler Corporation
Technical Director,
Renault Sport 1975-1979

JEAN SAGE

I met Roy Smith for the first time only a few years ago when he asked me to help him research the history of the first turbo F1 car. His enthusiasm and thirst for detail were obvious, and as I had some knowledge of the subject I was happy to help. I had collaborated with Bernard Dudot and Jean-Louis Moncet in 1991 to write the first book in French about the Renault turbo Grand Prix cars. But the difference was that Roy was now looking at a world market and his book was to be published in English, bringing the story for the first time to a wider group of enthusiasts beyond those passionate people in our native France. His work produced an excellent book, so when he asked me if I would help with another project, this time about the sports prototypes, I immediately agreed.

I took part in my first real race in June 1959, co-driving a special Citroën DS, and since that time I have had the good fortune to be involved with racing and especially the long-distance races. In 1966, I ran a Mustang in the Spa 24 Hours, following many outings in Alpines on rallies since the early 1960s. In 1966 I was a stunt driver, too, and advised on the film *Grand Prix*. I had got to know Gérard Larrousse during those years and our paths crossed often at Monza, Montlhéry, Sebring and in 1970 at Le Mans. That year I remember Willy Kauhsen spun on the entrance to the Mulsanne corner and I arrived at high speed to find Willy driving straight at me, coming the other way! That year I was also involved in *Le Mans*, the film that Steve McQueen was making, being responsible for the 12 sports and GT cars rented by Jo Siffert to Solar Productions, the film maker; again, I did a lot of driving, too.

I entered my own Porsche at Le Mans in 1970, '71, '72 and '73 and ran at the Daytona 24 Hours in 1971 and the Sebring 12 Hours with Chevrons. Gérard Larrousse had also asked me to take on a non-driving management role in 1973 with the team he was driving for, Equipe Archambeaud, running Lolas. Then in 1974 we ran the Archambeaud/Larrousse Switzerland team together, running the Alpine A440 and A441s and securing sponsorship from the Swiss Cheese Federation. That season is graphically described by Roy in chapters two and three.

For 1975 we consolidated the team to run the A441-3 for Marie-Claude Beaumont and Lella Lombardi, both wonderful girls who won the 2-litre class, beating the men at their own game in the Monza 1000km. The Elf Switzerland team, as it was known for that year, was a great team, though we had a big hiccup at Le Mans when we ran out of fuel – the girls were not pleased! The same year we were running Gérard and Jean-Pierre Jabouille in the Elf F2 car. In 1976, when Gérard moved over

Jean Sage (1940-2009) while at Renault Sport, 1978. (©R)

to Renault, I took over the running of the Elf F2 team and we won the European Championship with Jabouille. From 1977, those engineers went on to become the nucleus of the team for the new F1 turbo car that was being created and in January of that year I was asked to join the new Renault sports car team responsible for logistics and with the F1 team as team manager.

We were also going for victory at Le Mans. Boy, did we work hard! We tested on airfields, on motorways, dozens of times at Paul Ricard; we literally ate, slept and drank to the sound of the sports prototypes. My feet hardly touched the ground, organising testing for the sports protos or working at the races or at the F1 races – yes, the logistics for that were my responsibility, too. They were great days – busy, sometimes heart-breaking like Le Mans in 1977, but then in 1978 came that magical victory. Sadly Renault decided to stop there, but on reflection it was mission accomplished, a business decision, as Formula 1 was beckoning and Formula 1 would be my life for the many years that followed.

However, sports-car racing is in my heart and I commend Roy for his hard work and diligence in chronicling for the first time in English the complete story of both the early years of Alpine and its sports prototypes and the later years of the Renault Sport era. The ups, the downs – he covers it all with a passion and attention to detail including dozens of interviews that will leave a lasting record for the future and bring back many memories for those who were there.

Jean Sage
Annecy, France
Motor racing historian
Renault Sport prototype logistics manager 1977-78
Renault Formula 1 team manager during the 1980s

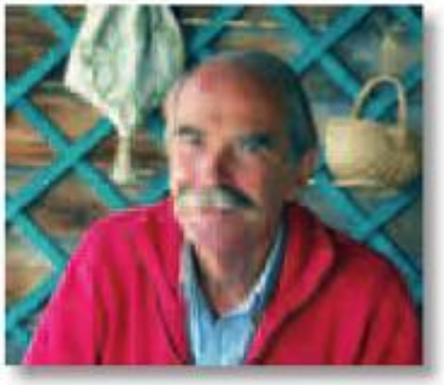
FRANÇOIS-XAVIER DELFOSSE

Thirty years! Can it really be more than thirty years? Le Mans – the Le Mans 24 Hours, that unique pinnacle of world motor sport! Last year I saw the 77th edition, which took me back all those years. The battle of the French Lion against the German Audi, holder of many titles, brought our French victory of 1978 back to me. It was all very familiar: a great French constructor against a German many-times victor, victory too at the third attempt, a clear and faultless victory acknowledged by the vanquished; thanks to today's media progress, I was able to live the race from the inside, identifying with the actors; for 24 hours I was thirty years younger – and it did me good.

True, I have been well prepared for it by a number of requests over the past few years to help retrace our history, by Alpine last year to celebrate at Le Mans Classique the 30th anniversary of our victory, by *Berlinette* magazine, also in relation to this event, and lastly by Roy Smith, who, having completed an admirable book on Renault Formula 1 turbo cars, has undertaken the painstaking task of preparing a second work on Alpine's adventures at Le Mans.

A Brit interested in Alpines – something of a surprise for a Frenchman! It is true that the British passion for cars and motor sport remains a phenomenon of society. You only have to observe the enthusiastic hordes that leave England for the week of the 24 Hours and take a look at the spectators' car park at the event to prove that.

So the idea of an Englishman passionate about Alpines suddenly seems more natural. When I had the chance to meet him and to appreciate his quest for detail and historical truth, I could only admire and respect the work he has done and do my best to help, as many others have done, to satisfy this thirst for knowledge.



François-Xavier Delfosse in 2007.

Having seen the quality of his work in his first book, I can't wait to see the second, which I'm sure will make me feel thirty years younger again. Thank you, Roy!

François-Xavier Delfosse
Thonon, France, 2009
Test technician, Alpine 1973-1975
Responsible for delivering the Le Mans prototype testing and race programme 1976-1978

The second coming

In the final chapter of volume one of *Alpine and Renault – The Sports Prototypes 1963 to 1969*, we saw a sad end to Alpine's ambitions when Renault called a halt to all sports prototype racing activities. In the summer of 1969, Renault had also acquired a 70 per cent majority share of Amédée Gordini's company. Pierre Dreyfus, chairman and managing director of the Régie Renault, and Marc Ouin, his secretary general, were looking very closely at the activities of Alpine and Gordini. It is certain that at that time they were pretty unenthusiastic about the benefits of sports prototype racing.

In the shop window that was the 1969 Le Mans 24 Hours, only Alain Serpaggi and Christian Ethuin had salvaged the Renault name by winning their class and the performance index. They were the only Alpine Renault pairing to cross the line at the finish, with six other Alpines having nothing to show for their costly efforts. On the Alpine side of things, the design seemed to be working satisfactorily; the chassis and mechanics had been better developed than in the previous year, but, try as they might, they could not succeed with the low-powered V8 Gordini engine as they had done with the smaller-capacity units and the A210 sports prototype.

Although Renault put a stop to sports car racing, it had decided that Alpine could continue to compete in rallies with the Dieppe-built Alpine Berlinettes and participate in a single-seater racing formula, in which it was proving successful.

Renault had moved Gordini to its new home outside Paris; the Régie had plans, though they would not suit everybody. Giuseppe Albarea, Gordini engineer since 1963 and later with Renault Sport, said: "After the move to Viry-Châtillon in 1969, we could see that some things were not working out. Amédée Gordini spoke with the board management at Renault and said he wanted to leave. They preferred him to stay, and a compromise was reached whereby he would return to the empty factory in blvd Victor to start work on a new engine design. He asked me to go with him because he had several projects in mind, with many parts to be designed. Marc Bande came along, too. Renault had said OK and we re-installed ourselves in the old design office and began to design the monoblock engine, an all-in-one engine with no separate cylinder head. We even got the block cast, and over the next couple of years we also had the internal parts machined, but in the end the engine was not made. Early in 1972 Georges Sauvan (then manager of the Renault-Gordini engines division) had asked me to return to Viry. They had decided on the creation of a new engine which they had previously spoken to me about: this was the V6 project."

"Back in 1969 many of the mechanics from Gordini said it was crazy to go so far because at that time Viry-Châtillon was like being in the countryside," said Alain Marguet, Gordini engineer from 1966 and also later with Renault Sport. "It was a long way from the centre of Paris and most of the older generation at Gordini didn't want to go. At that time people were not really used to travelling any distance to work. For me it was not a big problem; I lived with my grandmother near the Gordini works and after the move I rented a small flat close to Viry-Châtillon, and for me the move was fantastic, because we had a brand-new dyno and eventually three different dynos, including one for gearboxes, all modern ones."

In 1970, Elf, the state-owned oil company that was sponsoring Matra, had a problem. Founded in 1967, the go-ahead petrol brand had been looking from the start to create an image of technical quality and a creative and dynamic outlook, and it wanted to communicate this to the public through competition. Market research had shown that in the predicted vibrant economy of the 1970s, the man in the street would take notice of winners, especially in the high-profile world of motorsport. Elf had started and succeeded through its association with Matra, which had the same ambitions, and it had won the French Formula 3 Championship (1967), the European Formula 2 Championship (1968) and the World Formula 1 Championship (1969) with Jackie Stewart. The next target was victory in the 1970 Le Mans 24 Hours. However, the rules of the ACO (Automobile Club de l'Ouest) in 1970 placed the 3-litre Matras in the same class as the dominant Porsche and Ferrari 5-litre teams. Victory escaped them, and Matra was also now joined in partnership with Simca, which was owned by Chrysler; Chrysler's partner was the petroleum giant Shell.

At Matra, the contract with Elf was up for renewal at the end of 1970, and Elf had to make a choice to go on with an

François Guiter, Elf Marketing Director. (Photo *MMiles*)

Jean Terramorsi. (©R)

Christian Martin. (©R)

agreement, which might mean competing with Shell, or to go it alone with another partner. Being a French national company, it really had only one choice: Renault.

François Guiter had been appointed marketing director of the new company in 1967, and it was he who persuaded his boss, Jean Prada, to go with Renault. As it happened, in 1968 Elf had negotiated a contract with the Régie Renault to use its lubricants for every road car that left the production lines. This production car lubricant contract was also up for renewal at the end of 1970, and of course Elf wanted to maintain its up-beat, high-profile image. It wanted to put money into a new competition programme with Renault, because without Matra it would no longer have any circuit-racing presence. Alpine-Renault's rally programme, favoured by Renault after the 1969 Le Mans debacle, though it was bright, promising and successful, was not sufficient to satisfy the dynamic management in the Elf boardroom.

Renault and its management unfortunately would not be moved to go on with sports car racing after the 1969 decision, so François Guiter, who was also project manager for Elf's sports strategy, set about getting an agreement from Jean Prada to organise and finance a programme directly with Alpine; the idea was to develop Alpine's successful Formula 3 cars. As luck would have it, an opportunity arose at the end of 1970 with the announcement of new Formula 3 regulations: they would stipulate that from 1971, engines must come from a series production unit, have a capacity of 1600cc, and be fitted with an inlet restrictor. Engine specialist Bernard Dudot at Alpine in Dieppe was already working with Marc Mignotet, the engine tuning guru and competitor to Gordini, to provide a suitably tuned unit for the new Alpine single-seaters as an alternative to the Gordini units they had been using. Renault's new R16 engine would be perfect for the task. But before suggesting any plan, Elf had to decide where it could get the support within Renault and forge a good link with Alpine if it took that route. It found three men at Renault: Claude Haardt (then director of Renault-Gordini engines division), Jean Terramorsi (head of publicity) and Christian Martin (then in commercial management). The key man at Alpine who would provide essential support would be Jacques Cheinisse, Alpine Competition Manager.

Claude Haardt was a formidable leader of men and an unrivalled salesman. On joining Renault he was put in charge of marketing in the engine division. It was under his direction that Amédée Gordini had abandoned his original plan in 1967 to move his company to Noisy-le-Roi from the blvd Victor, and had instead relocated to a new factory in Viry-Châtillon, a move that took place in February 1969. In June 1972 Claude Haardt was appointed chairman and managing director of Renault-Gordini in Viry-Châtillon.

Jean Terramorsi had been working for a publicity and marketing company, his main responsibility being Renault's account. Since 1967, he had frequently come into contact

with François Guiter of Elf. Eventually Terramorsi moved to Renault permanently, taking over from Marc-Antoine Pampuzac the job of managing the Renault publicity department and all the marketing for the company. He was given special responsibilities, including the overall management of Renault's competition interests.

Christian Martin was in the commercial management department and was an acquaintance, though not a close friend, of Jean Rédélé, and had a soft spot for Alpine and its efforts. He looked after Renault sales to the then Eastern bloc countries.

There were some in the Renault management higher offices, however, who were not so keen on the small company from Dieppe, which they regarded as 'mercenary'. But, like Terramorsi, Martin had a greater vision, and could understand that competition raised the profile. Renault wasn't keen to put money in at this stage, but the point was not missed that maybe Elf and its ideas could give the racing programme a boost. Martin was aware that it had some new young Frenchmen racing single-seater Alpines and showing great promise: Alain Serpaggi, Michel Leclère, Patrick Depailler and Jean-Pierre Jabouille. French national pride was at stake.

Jacques Cheinisse could see potential in a joint initiative with Elf that involved Alpine. Well known in motorsport circles and especially in rallying, he would eventually lead Alpine to the World Rally Championship Manufacturers' title in 1973. François Guiter had found his men, and with the enthusiastic Haardt and Cheinisse they decided to take the risk, hoping that Renault senior management would get involved in this joint competition venture with the persuasion of Terramorsi and Martin.

An agreement was reached, although Guiter, who had his sights set on farther horizons, would have to make do with Formula 3 to begin with, to avoid offending any sensibilities within the Renault management. Elf put up the finance, and Guiter with his accomplices gained support within the Régie. Cheinisse put together a small group with three of their Dieppe-based young men: André de Cortanze (chassis), Bernard Dudot (engine) and Marcel Hubert (aerodynamics). Their target was the French Formula 3 Championship for the 1971 season.

André de Cortanze was a graduate of INSA Lyons (National Institute of Applied Sciences) with an interest in design. As we have seen, he had driven many times for Alpine in the 1960s. Bernard Dudot, who had joined Alpine in 1968 after persistently offering his services to Jean Rédélé following graduation from CESTI (engineering college), was charged with developing and co-ordinating the activities of the new engine department at Alpine. Jean Rédélé was also concerned that Alpine had no control over what Gordini had been producing: his engineers had never been allowed to do any work on the sports prototype engines in the 1960s and what had started out as a happy relationship in 1963 was strained by the end of 1969. Rédélé's team was also already working with Marc Mignotet.

Dudot and his group were given the responsibility of developing the R16 engine on the one test bench they had at their disposal, their task being to turn it into a competitive Formula 3 unit. Renault had brought out the R12 Gordini and was hoping that Alpine would help promote it. Dudot was to work closely with Mignotet during this period.

Marcel Hubert would play a key role, too. In the new era he was now a very experienced aerodynamicist. Having trained with Lucien Romani at BEST (Bureau d'Etudes Scientifiques et Techniques), he had joined Alpine in 1962, first as a freelance then as a company employee. His work on all the prototypes had played a major part in creating the beautiful low-drag bodies that had seen the small-engined Alpines achieve some amazing performances at Le Mans over the previous years. François Castaing, of whom we will hear more in a moment, says: "Marcel Hubert was Alpine's secret weapon; he was simply a genius." Marcel Hubert was in fact still thinking about sports car racing, as we will see.

For the Formula 3 drivers, François Guiter enlisted the proven expertise of Patrick Depailler and Jean-Pierre Jabouille. Jabouille: "I went to talk to François Guiter. I thought Alpine might have something interesting for us, so we went to see them." A deal was done, but would this set-up – Elf financing, Alpine's specialist chassis knowledge and Renault engines prepared at Alpine – be sufficient to impress Pierre Dreyfus (PDG of Renault)? Both Alpine and Elf were shocked to find that at the official launch of the 1971 Renault competition programme the promotional information documents relating to the Formula 3 cars and engines were withdrawn from the press pack at the very last moment. It was a big surprise to François Guiter and his colleagues in the Alpine team at the time, but although some of the insiders in the Renault company had convinced several members of the senior management, Dreyfus was standing firm; Renault's name was on the engine – suppose it failed as in 1969? Elf, Alpine and the committed believers in Renault ended up wearing a broad smile when Depailler and Jabouille dominated the French Formula 3 Championship.

For 1972 Elf wanted a new engine to move forward to Formula 2. The problem was that Renault's programme had no engine capable of going to the next level. During 1971 the ebullient François Guiter was still thinking of bigger things

– F1 again – and Le Mans was still unfinished business. Elf had no interest in standing still. Much effort and money had been expended to get the F3 cars to the top of the podium; now that it had decided to go into F2 it would do it with or without Renault – that was the plan. It started to look at March Engineering in the UK.

François Castaing (back at Renault Gordini following his military service, which had started in 1968 a few months after he joined Gordini) says: "Sometimes Elf was a bit too impatient and the March thing wasn't really too helpful." Renault, however, was not prepared to build an engine for the formula itself, though it could see a possible opportunity if Alpine proved successful with Elf finance. It was behind the scenes and with some reluctance that management had to concede that Alpine was doing well with the F3 cars. Elf met with the Renault management, with the result that Elf was allowed to go to Alpine and ask it, with the agreement of Renault, to build a Formula 2 single-seater. But whose engine would it use? As we have seen, Renault did not have one, nor was it interested in building one. The Elf decision: a Ford-Hart engine! Cheinisse gave it the thumbs up.

The Elf 2 with the Hart engine. (Photo RS)

Terramorsi and Martin gasped and put their hands over their eyes, but parted their fingers to watch! The Renault-Gordini men at Viry-Châtillon were not best pleased.

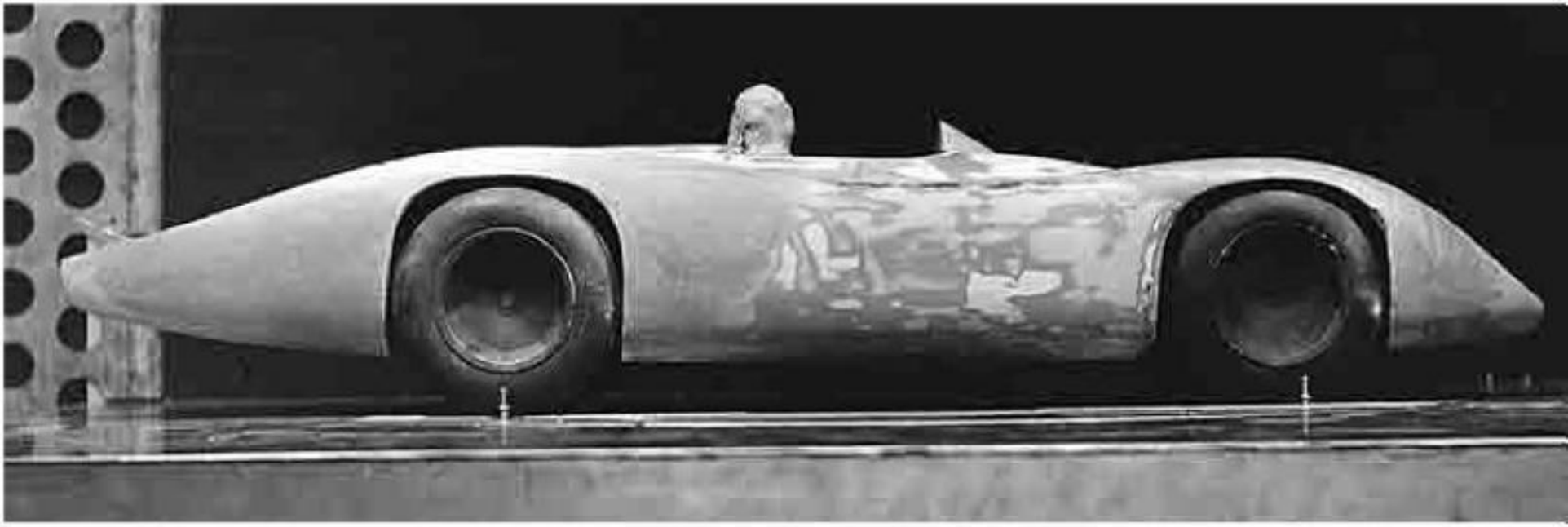
André de Cortanze was put to work designing the car, an Alpine named the Elf 2. In May 1972 Depailler, Jabouille and François Cevert tested it at Magny-Cours. The team, headed by an Englishman, John Coombs, was run as Elf Coombs. Jabouille finished in 14th place that first year in F2, and the team continued through into 1973 with this car, though with limited success.

As one might imagine, there was more than just gasps of anguish at Renault, and the pressure was further increased when it was found that in 1971 François Guiter had asked his boss, Jean Prada, to persuade Renault to make a real competition engine for Elf, maybe for F1 or an engine suitable for Le Mans. Guiter, a Frenchman, felt it had to be a Renault – a French engine and a good one. But to Guiter's amazement, the top management of Renault had stood firm behind a curtain of caution. However, Dreyfus and his team were starting to think of an alternative way; they could see that there might be some mileage in the idea this time, but were not yet prepared to put their own money in. Elf, though, had plenty of money. François Guiter had already been secretly to see his good ally in Renault-Gordini, Claude Haardt, to see if he could convince Renault to build a true competition engine. Haardt, having brought together Renault engines division, Renault Marine and now Renault-Gordini, was extremely interested.

The Régie's stance changed: 'If Elf wants an engine, OK – let it order it and pay for it!' Elf's reply was simple: 'How much do you need?' A figure of 300,000FF was suggested. Elf sent a cheque. Even so, in a letter written by Christian Beullac (then number two within the Renault top management) to Jean Prada of Elf acknowledging receipt of the order and the cheque, he wrote, "Have we got the men capable of doing this?" Some in Renault still lacked confidence.

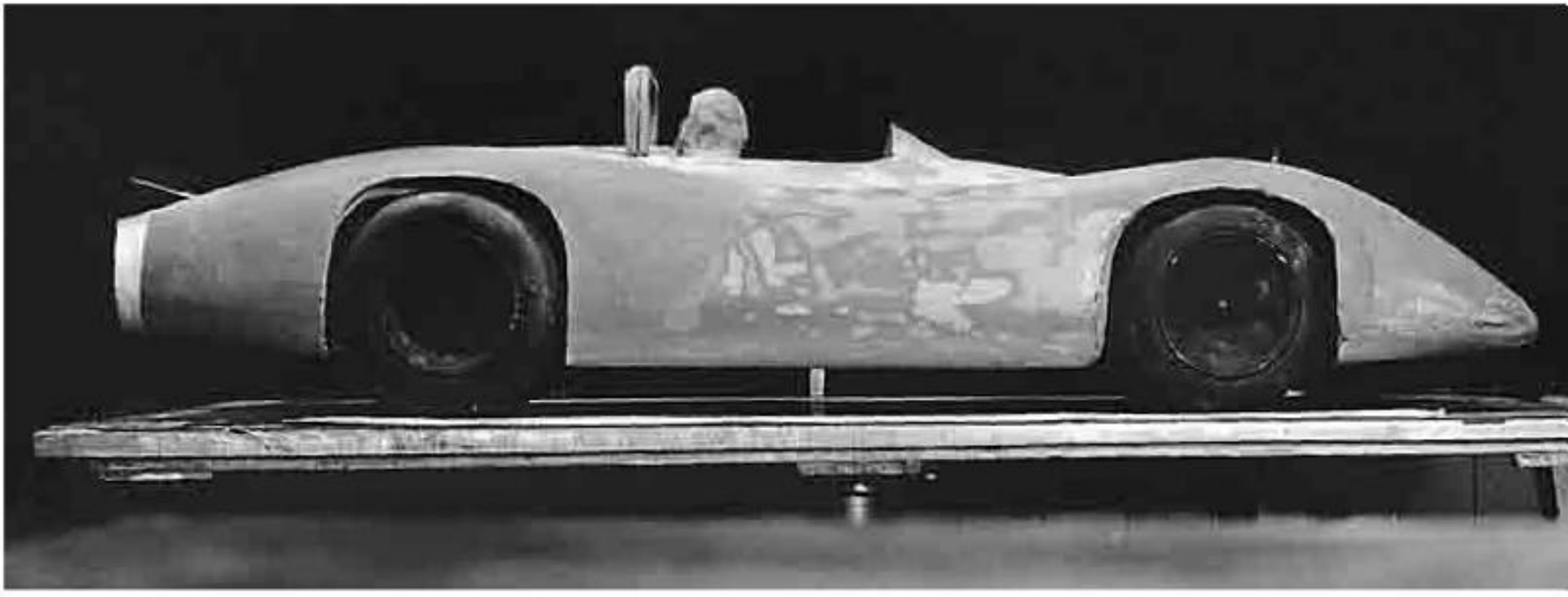
In fact, as alluded to earlier in this chapter, up in Dieppe a secret study had been started by Marcel Hubert in the early months of 1970. A replacement for the A220 was the first idea, and this had started to develop; its influence on what came after is clearly evident.

Marcel Hubert, of course, had a good relationship with ex-Alpine man Bernard Boyer (long-time designer with Alpine in the 1960s), and Bernard was to be influential in creating the Matras of that period. Hubert had of course also witnessed the Porsches – the 908, the 917 – and the Alfa Romeos; his mind was already working.



Long tail open sports car. (Photo JLF)

Short tail. (Photo JLF)



The thoughts of Marcel Hubert. (Photo JLF)

Longer tail: an insight to the future. (Photo JLF)

These photographs (pp19-20) from the archives of Jean-Luc Fournier show the evolution of the future sports prototype, influenced of course by the thinking of the period. The study was never completed, as the design direction turned to the Formula cars; it was put to one side, but would form the first thoughts of the new era and come to life again in 1972.

The die was cast, the old era of the 60s sports prototypes was over, and by January 1972 three years had passed; there were new men at Renault-Gordini and new management to run the programme. Jean Terramorsi was well aware of the considerable publicity advantage that the team had gained on the back of Elf's successful efforts during 1971 – also, it was a state-owned company and it was unthinkable that Elf might, if pushed, withdraw from Renault.

The order from Elf for the new engine was passed to Claude Haardt and Georges Sauvan at Renault-Gordini in Viry-Châtillon; they decided to put François Castaing in charge of the project. Things started to move fast, and at the end of January the Régie, with Elf finance, gave the now well-established Viry-Châtillon-based Gordini engine division the go-ahead to build a V6 2-litre prototype, in essence to replace the Gordini V8. It was exactly the ammunition Haardt wanted. François Castaing: "I remember vividly that one morning we were with Sauvan and Boudy [Jean-Pierre Boudy, Gordini engine specialist] and it was then that we agreed that we were going to do a 90 degree V6."

Alain Marguet, Renault-Gordini engineer: "François came back to work with us after his time in the army in 1969-70, and I remember we became good friends. In those early days, two years before the V6, François had a big problem: he could not wake up in the mornings! So he said to me, 'Before going to work, please will you come and knock on my door and wake me up?' Even though he had a big alarm clock on a plate with coins on it to make more noise he still sometimes didn't wake up. And one time I went and knocked: no answer. I thought he had probably already left, so I went to the factory. François wasn't there; he was still sleeping! However it didn't stop him from making a very successful career and those days were great fun. The V6 programme was the break we needed."

François Castaing again: "When I returned from military service in 1970, Renault had completely taken over Gordini and I found myself in Viry-Châtillon. We had a great deal of difficulty in 'placing' our engines at Alpine, which at that time preferred to develop its own ideas with its own man and wasn't interested in the new R12 Gordini which had come on the scene. Bernard Dudot had links with Mignotet, so we set out to prove that we

were just as good at developing the small 1600cc engine by doing some customer projects. We also worked on the PRV (Peugeot Renault Volvo) V6 project as well as the R12 Gordini engine, until Georges Sauvan came to me at the beginning of 1972 and we agreed the way forward in the meeting mentioned previously, to make the new competition engine that had been ordered by Elf in a team with Jean-Pierre Boudy and Giuseppe Albarea."

The PRV engine and the new V6 racing unit had nothing in common. The Renault design team decided on a 90 degree V6 because it gave a lower centre of gravity than a classic 60 degree V6. It allowed the fuelling system and other items to be placed in the middle of the V, making the unit compact.

François Castaing again: "In the drawing office, the control of defining and designing the new V6 was in the hands of Jean-Pierre Boudy, Giuseppe Albarea and me. Additional support was provided by Igor Bourimoff, a Gordini veteran, and three young draftsmen: Patrick Jean, Jean-Michel Pialot and Patrick Babonnaud. George Sauvan, our boss, suggested we hire Moteur Moderne as a consultant. This was all done within a week. For some reason it never crossed our minds to just go out and purchase a Cosworth FVC or BDA to look at them closely and learn from their work. Through February and early March, Jean-Pierre and I were busy fixing with the team the overall basic specification of the new motor:

- Power objective: 300bhp at 11,000rpm
- Bore/stroke: 86 x 57.3mm
- Thin wall cast-iron 90 degree block like the Gordini 3-litre V8
- Belt-driven 16-valve
- Narrow inlet valve to port angle at Moteur Moderne's suggestion
- Compact combustion chamber
- One high-pressure oil pump
- Three scavenging oil pumps

"A detailed calendar was established for the completion of the general layout, various calculations, the detailed drawings of every part and its fabrication, the completion of a valve train test bed, etc. Our ambitious goal was to have the V6 running on a dynamometer by early November 1972.

"Key suppliers were selected and invited to become members of our design team: Renault advanced foundry for the engine block, Mondial for the pistons, Schmitthelm for the valve springs, Lucas for the fuel injection system, etc. In our busy drawing office everyone had the use of a drawing board and a slide rule (no computers, of course). On the central table, the master layout of the engine grew progressively into its final form with Alba, Jean-Pierre and me working on it in turn. Quite regularly, the Moteur Moderne consultants would visit us and give their critical reviews of our design and recommendations for the use of special materials, which were always welcome. The task of drafting the manufacturing drawings was distributed: Igor the engine block, Alba the heads. You know, he was more than just a draftsman: he had great experience of how an engine worked. The angle on the valves was quite small and I remember that Moteur Moderne recommended that we go for four valves per cylinder, which we had not done before at Renault. But when I was at the Arts et Métiers, in my last year, in 1967-68, the type of engines we were learning to design were 4-valve engines, so this was not the first time for me, nor was it the first time for Alba, who had been involved with the 4-valve V8 engine for Gordini. The engines we drew at university, though, were never made. How much we learned, good and bad, from Moteur Moderne! The con rod design was a remarkable creation; it survived all the turbo years and is still in use today (see chapter seven). We were the ones who decided to do the H-design con-rod, Jean-Pierre Boudy and I.

"Our ambitious goal was to have the V6 running on a dynamometer by early November 1972." – François Castaing

"Every drawing carried the V6 code name ZZ1; this was later changed to CH1 – CH after Claude Haardt, whose untimely death stunned us all. As the summer arrived, the project moved across to Serge Soupison, head of fabrication and procurement for Renault-Gordini. As well as the tight schedule, certain advanced materials that we had selected created technical challenges, especially the steels of the connecting rods and their bolts. Fortunately by September the parts had begun to flow through the metrology lab. The valve train test bench was running, and during October we were assembling the first engine, with great care and expectation; it ran for the first time on the dynamometer in November. By early December our new 2-litre V6 was screaming all the way up to 11,000rpm without any significant problems and meeting its power target too, as it was a lot more powerful than the old 3-litre V8 Gordini."

Giuseppe Albarea: "We knew that Moteur Moderne had worked with Matra on the V12 and with Alfa Romeo and had experience of engines which ran quickly. We had found there were certain problems which we didn't know how to solve,

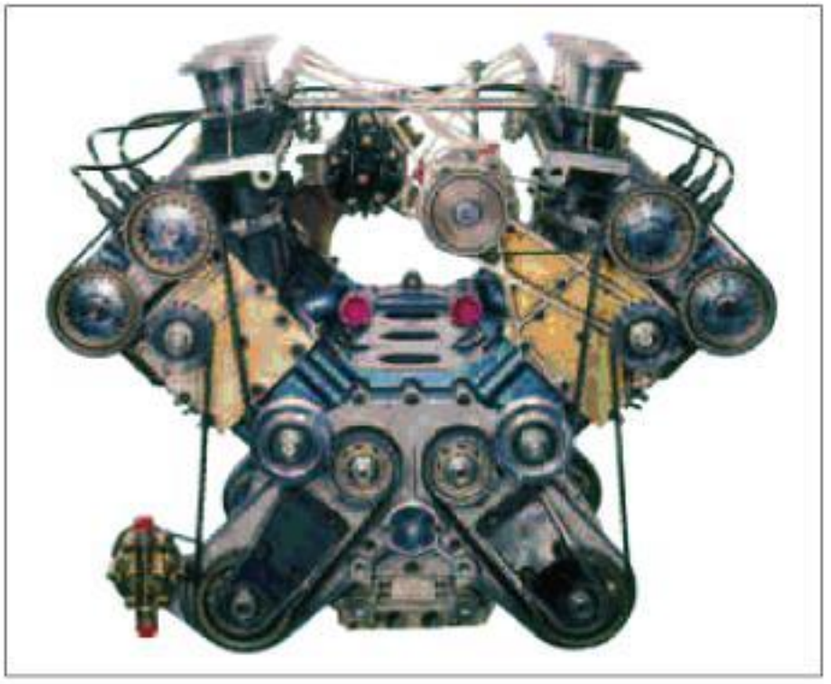
probably because our team was relatively new. So it was very useful to work with them. Bernard Dudot, who was still working with Alpine, undertook the design of the water and oil pumps and built the first ones for us while we worked on the engine itself in Viry. The cylinder block had been designed by Igor Bourimoff; we had decided on cast iron because that was where our experience lay, and when I arrived back from the blvd Victor I designed the alloy cylinder head. Jean-Pierre Boudy took charge of the construction of the power distribution system. It was a good team; everybody would get round the table, each giving his opinion, and we tried to judge which was the best road to take. Castaing led us and Boudy and I worked to build it together. The engine had to be brought out quickly and we immediately went with injection – no carburettors. We also used Marelli ignition."

The work of Castaing's team was completed in record time due to that cooperation with Moteur Moderne. It also recommended a dry-sump oil system. The engine was ready to run on the dyno in the first few days of November.

Alain Marguet: "It was designed and built extremely quickly. I remember the first day it ran. It was an anxious time: most of the factory staff were assembled in the corridor behind the dyno. It started with no problem and the first apparent fault was very minor: a leak in the crankshaft oil seal at the level of the distribution pulleys a few minutes after it was started up. It was nothing. It seems laughable now, but it was really one of my proudest moments, as I was the one working the dyno. The atmosphere at that time was incredible: François Castaing led the team, giving it huge dynamism. It was an intoxicating period. As he says, we had created a new design of connecting rod. Before then, all con rods were cast in one profile – round or square, oblong or oval – but we created a design with the profile in an H pattern; that was a new concept. Also, we designed the outside rubber belt cams and ancillary drives; everybody said we were crazy, that it wouldn't work. I think it had been tried on some road-car engines but on a racing engine, again we were the first." It is believed that around twenty of these successful normally aspirated engines were eventually constructed between the first running in November 1972 and October 1974.

Unfortunately, a tragedy occurred on 11 November. Just before Claude Haardt was due to go to the USA, he and his son were killed in an accident in one of the Renault Marine powerboats during a trip in the bay of Arcachon. As already mentioned, in memory of Claude Haardt the engine project named ZZ1 was officially re-named the CH1 when it was presented in public on 15 January 1973 at the Armenonville Pavilion in Paris.

Engine as presented to the press in 1973. (©R)



Note the space within the V. (©R)

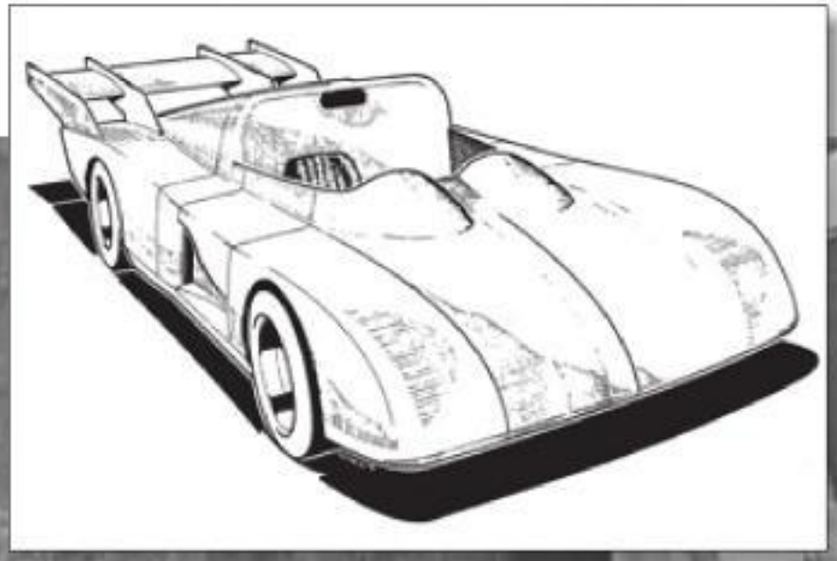
The specification stated that it was a 90 degree V6 to be installed longitudinally in a new car: 1997cc, bore 86mm, stroke 57.3mm, double overhead cam, four valves per cylinder, estimated bhp 285 at 9800rpm, fuel injection by Bosch Kugelfischer, drivetrain through a 5-speed Hewland FT200 gearbox transaxle.

Following the untimely death of Haardt, Jean Terramorsi was appointed to take over as chairman and managing director of Renault-Gordini – a move that was a catalyst for future change.

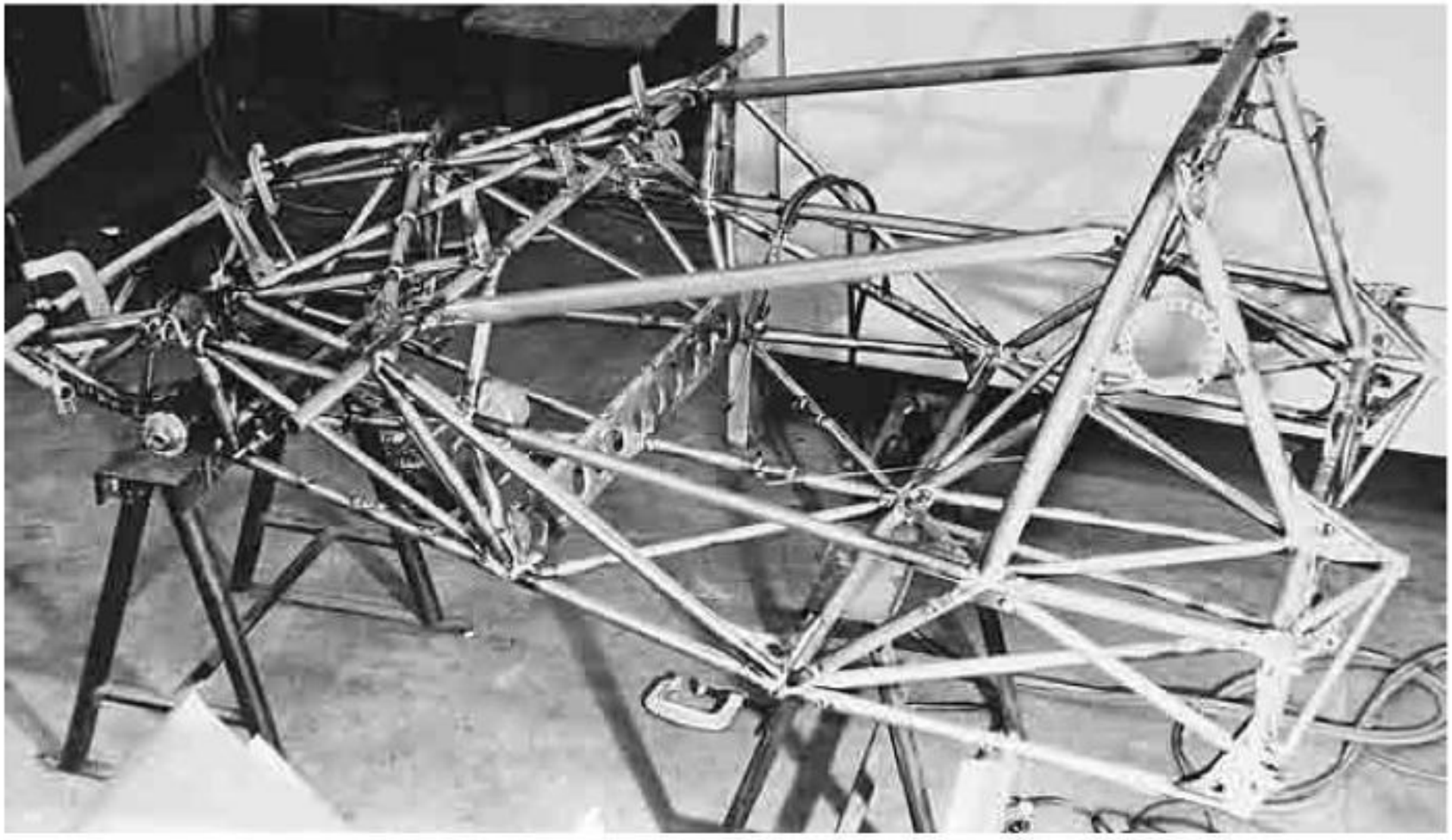
Once the decision had been made to go ahead with the engine, talks began with the Alpine chassis design team in May 1972, and as soon as Castaing had an engine block available it was shipped to Alpine, who had been told to think about designing a car.

François Castaing: "Our first question when we got the instructions to go ahead on the engine in January was what it was going to go into. We were told that Alpine would be asked to design a car to go sports car racing again. André de Cortanze came to see what we were doing mid-year 1972 and I went up to see them."

Journalist 'Jabby' Crombac, left, talks to Marcel Hubert and André de Cortanze. François Castaing is distracted. (Photo FC)



Marcel Hubert with the first ideas for the A440. (Photo FC)



Early days: the first chassis. (Photo GB)

De Cortanze was, of course, already aware of the study conducted two years earlier by Marcel Hubert, and would work with him to create the chassis. Construction began in September 1972 just before the first engine was started up. Project A440 had begun. Its specification was as follows:

Two-seater open sports prototype designed to meet the 1973 regulations for competition in the 2-litre European Championship and the 2-litre category of the World Sports Prototype Manufacturers' Championship. Wheelbase 2.3m, length 3.918m, width 1.94m, height 98cm (top of wing), weight 574kg empty. Ventilated discs with top and bottom wishbone suspension and side-mounted radiators. Tyres initially Goodyears or Firestones, 10x13 front, 14x13 rear. Max speed estimated 230kph.

Not yet a monocoque. (Photo GB)

The engine was not a stressed unit at this stage. (Photo GB)

First sight of the A440-0 in the open, outside the plant, March 1973. (©R)

Final adjustments: Jabouille waits, helmet in hand. (©R)

Six months later the new car, named the A440, rolled out of the workshops in Dieppe. It was a Barquette conforming to European Championship regulations.

The car was now a reality, and had developed from an idea into the finished article. There was still a lot of work to do, but all the basics were there, and on 19 March 1973 it was taken for its first test on the Paul Ricard circuit, where it was driven by Jean-Pierre Jabouille. Alain Serpaggi says he remembers that he was there, too, and also drove the car briefly.

Jean-Pierre Jabouille: "When I went to Alpine in the late 1960s as a professional driver, I first drove the old V8 A220. It was OK, but I know Gérard didn't like it. Neither did others: Mauro Bianchi and Henri Grandsire both had big accidents in it. The first year I drove it at Le Mans with Jean Guichet we didn't finish, nor did we finish in 1969, and by then I was doing the F3 Championship with Patrick Depailler. I was already passionate about technical things, suspension, etc. So of course I soon got into trouble – a young driver trying to throw his weight around! But we began to win races with the famous Alpine F3; that was after sports car racing had been stopped in 1969. Of course, they had run at Le Mans many times with the prototypes, but it was the old generation. Then as Renault became more involved

Jabouille feels his way. (©R)

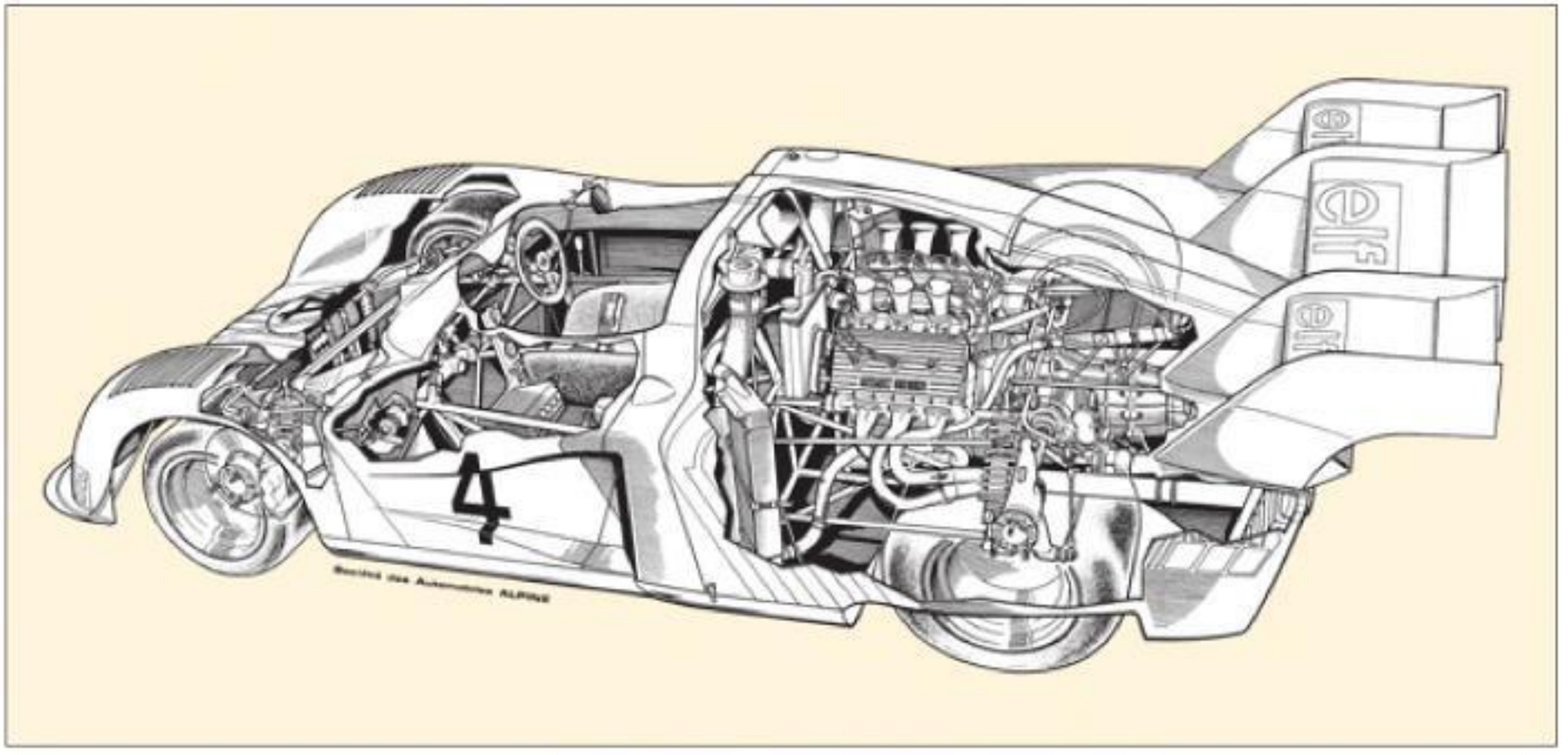
Out on track: so far, so good. (©R)

I heard that Alpine had been asked to build a new sports car for a new engine that one of the engineers who used to be at Gordini – François Castaing, who was then leading a team of guys at the new engine factory – had designed for the 2-litre class in the European Championship. Eventually that car was to be practically unbeatable."

The initial plan was to enter the first race on 8 April at Paul Ricard in the European 2-litre Championship. However, things did not work out the way it was hoped they would – the team suffered an engine failure. It also discovered a lack of power, and had reliability problems with some of the components. At that time, of course, spare parts were not yet plentiful, and so the race debut had to be postponed.

During these early runs Jabouille found the steering rather heavy, apparently due to its location with a vertical link to the shaft and rack that lay under the driver's legs.

The car was eventually ready for action on 29 April, and it was on 1 May 1973 in the Coupe du Nivernais at Magny-Cours that the A440 first ran in anger. Competing with race number 19



A440 cutaway. (Photo AAA)

and using Firestone tyres, the first new Alpine sports prototype since 1968 was raced by Jean-Pierre Jabouille. He encountered problems with the tyres in the first race, although he managed to finish in fifth. The second race that day proved to be more satisfactory – while he finished in fifth again, cumulatively it gave the new A440 and Jabouille fourth overall on the day. A promising start.

There were a few problems with the brakes, too, which did the car no favours, but a lot had been learnt, and it was clear that it could hold its place with the established front runners. There was a new kid on the block, and happily for France, it was an Alpine backed by the mighty Renault.

The team returned to Dieppe, and Jean-Pierre Jabouille continued his single-seater career for a few more weeks until the end of May. On 27 May 1973, there was a day of racing at the Croix-en-Ternois circuit near Dieppe, and the car was entered in what was basically a small-scale 2-litre race, a round of the French Sports Car Championship with entries of 2-litre Lolas, Chevrons and Abarths.

A muddy paddock, familiar to the rally men from Dieppe. (Photo CD)

Modifications completed, ready for its first competitive outing. (Photo CD)

Practice. (Photo CD)

The V6 is seen by fans for the first time. (Photo GB)

François-Xavier Delfosse, André Désaubry, Patrick Tambay, and Jean-Pierre Jabouille. (Photo FXD)

Problems with the tyres in race one. (Photo CD)

Ready for race two. (Photo CD)

A race report stated: "We know that Jabouille, a complete driver, has never been particularly lucky and it was hardly logical to put money on a victory on the second outing of a new car, however much the whole Alpine-Renault-Gordini team, including the driver, believed in it. But at the finish, Jabouille's satisfaction was not only because he had taken the Alpine Renault A440 to victory on its second outing but also because it was his first personal victory for 12 months." "If necessary," said Jabouille, "I would have let Bayard go past in the second race. My target was to win overall and I was 25 seconds up on Bayard in the first race." The races were run under radiant sunshine in the good-natured atmosphere of Croix-en-Ternois, but it was a pity that there was only a small entry of nine cars in the first race and six in the second, and various incidents that caused the withdrawal of Edwards and Lafosse in the latter.

In the first race Jabouille, on the right of the grid, got off to the best start. Edwards, on the second row, tried to get in front of Lafosse but didn't manage it. Jabouille was in the lead at the end of the first lap, a little ahead of Lafosse and Edwards; then came Walker, Obermoser, Noghès and Grob. Up in front Jabouille took off, and on the fifth lap he had a lead of five seconds. In spite of Lafosse's attacks, Jabouille, who was not obviously forcing himself too much, increased his lead. Halfway

Jabouille en route to first victory. (Photo AB)

through the race, Jabouille was nine seconds up on Lafosse and 16 on Bayard. Walker, who had gearbox problems, was losing ground, and on the 25th lap Obermoser blew up his engine. For Jabouille, the second race was a mere formality. On the eighth lap his lead over Bayard was already ten seconds. "I was doing 9500rpm instead of the usual 10,500," said Jabouille after his victory.

Results – race 1:
1st Jabouille, 37min 51sec (av. 120.475kph);
2nd Bayard, 38min 14sec;
3rd Walker, back one lap;
4th Lafosse (Lola T292 Chevy Cosworth) (including 1 min penalty);
5th Noghès, at 5 laps;
6th Grob, at 14 laps;
7th Obermoser (GRD BMW). The race was over 16 laps.

Results – race 2:
1st Jabouille, 38min 10.5sec;
2nd Bayard, 38min 15.5sec;
3rd Walker, 38min 17.4sec;
4th Grob, at 3 laps;
5th Noghès, at 4 laps.

The Alpine Renault A440 sports prototype of the new era had claimed its first victory. Based on what the team had learnt in those first two races, modifications were made and it was entered for another event, sporting race number 47. Again it was Jean-Pierre Jabouille who drove in the Trophée Benelli, a round of the European 2-Litre Sports Prototype Championships on 3 June at Imola. This was a two-race event, each comprising 30 laps of the 5.122km circuit.

Trophée Benelli, Italy. (Photo AM)

Thwarted by a stone at Imola. (Photo AM)

In the first race, starting from seventh on the grid out of 26 starters with a time of 1min 47.72sec, Jabouille got away well and was up to second place, creating a new lap record in the process. Things were looking good when on lap 17 a stone was thrown up and jammed in the exterior-mounted cam drive belt, causing it to dislodge, resulting in instant engine failure. It was not possible to start the second race. Jabouille had, however, got the fastest lap – 1min 45sec at 175.691kph!

Back to Dieppe. A replacement engine was installed and the team headed off for the next outing, which would be a home-country event: the 300km Trophée d'Auvergne race at the Charade circuit on 17 June. Jabouille put the car in third place

Alain Serpaggi testing. (©R)

on the grid with 3min 9.2sec. This was a one-race event over 32 laps of the 8.055km circuit, in the beautiful countryside close to Clermont-Ferrand. Unfortunately the engine dropped a valve on the warm-up lap, and Jabouille took no part in the race. Back to the drawing board. More engine tests, and then the team headed off to a further track testing session at Magny-Cours on 17 July 1973.

By now the car and its new engine were showing promise, but the team decided to miss the race at Enna, preferring to wait until the European Championship race on 1 September – the Nürburgring 500km, scene of many Alpine escapades, including two outright race victories in the 1960s. Jean-Pierre Jabouille put the new A440 on 11th place on the grid, behind the Chevrons but in front of all but two of the Lolas, with a time of 7min 58.2sec. Two races, each consisting of 11 laps of the 22.835km circuit, would decide the overall winner. The first race started well, though Jabouille found his car distinctly tricky to handle, as the suspension was evidently not suited to the Nürburgring's twists and jumps, eventually causing him to abandon. Adjustments were made, but it was to no avail, and in the second race the engine expired following a valve problem.

They decided not to enter the Austrian round at Zeltweg. However, better luck prevailed at Nogaro in France on 30 September, in a non-Championship race for which Alpine had built and entered a second car, chassis 01, for Alain Serpaggi, driving with race number 12. Running on Firestone tyres,

Covered rear wheels, one of many experiments. (©R)

Nürburgring. (Photo RS)

Jabouille, A440-0. (Photo FC)

Larrousse tests the Serpaggi A440-1 car. (Photo MM)

he finished second overall to Gérard Larrousse in the Team Archambeaud Lola T292.

Serpaggi: "I did the last race of the year – Nogaro. I was racing in the F3 event, and as there were two A440 cars there, André de Cortanze, who had been in charge of the project from the beginning, asked me to drive the second one. That was the first time I drove the car in a race, and I finished second. I remember I was in front of Jabouille in the second race when it started to rain and after a few laps my engine drowned – well, actually the spark plug leads got wet – water got into the car; I lost one cylinder, then two. The ignition definitely didn't like the rain. So I finished second and Larrousse in the Lola won. Jabouille was further back, five laps down, because he had problems with engine and suspension."

Interestingly, in a sign of things to come, Gérard Larrousse tried the new car before the race.

Back in Dieppe, it was time to take stock of the first outings and look at ideas for changes and improvements for 1974. Aerodynamics would be studied very closely, and Marcel Hubert was to update the cooling and shape of the car.

In the spring of 1973, the team saw the arrival of a new member, a man who was eventually to shape the organisation and add greater order and planning to the team. François-Xavier Delfosse had been trained as a construction civil engineer, and had latterly been employed by the French Motor Racing Federation to mastermind and create several race tracks to help develop the sport in France. During that work he had come into contact with Alpine and Renault, and, having been offered a position, had taken up a role within the team to get the Formula 2 and 3 cars back to their winning ways of 1971. By the end of the year, however, he was moved elsewhere to push forward and develop the testing programme of the new 2-litre sports prototype car in the field.

François-Xavier: "I joined Alpine in 1973 – March or April, I think – for what turned out to be the final year of the F3 programme. I was given this role because André de Cortanze had

Smooth, enclosed front on the early car. (©R)

been moved off F3 onto a new project in 1972 to start the design of the new sports car, which he began, I think, in September 1972. François Castaing was at that time in charge of the engines down in Viry-Châtillon, but was often up in Dieppe and always at the races during 1973, closely following the performances and looking at development of the car. Jean-Pierre Boudy stayed down at Viry-Châtillon and was in charge of testing and improvement on the new V6.

"I was told in private conversations that Alpine wanted to go back to Le Mans. It was Terramorsi, head of the public relations department at Renault, who wanted it for the publicity, and I could see he was a driving force in the company. It's sure that in 1973 it was not clearly set down, but he was certainly thinking about it. They had decided to make the V6 and the proto. André Renut and Marcel Hubert, both working with André de Cortanze, had the car nearly complete by the time I arrived. My first deep involvement with the sports car was later, in the autumn of 1973, my role being one of organisation to bring a methodical process to the testing programme.

"I asked Jacques Cheinisse for some more suspension development on the A440 sports car and to do a comparison with the new Elf Formula 2 car. We did a week-long test with Jabouille driving a car fitted with a rally engine, a strong but steady unit with lots of torque, to set up the chassis. These tests showed that if we widened the track front and rear we could achieve a better result and set up all the different aspects of the suspension geometry better and more correctly on the A440.

"After this October test we went back to Dieppe, where Marcel Hubert had almost finished the master model of the next car, the A441. They had had a lot of trouble during the 1973 season with the temperature on the A440 and the oil circulation system due to the rear-mounted cooler and lack of cooling to the radiators. At the tests we found the same situation, so we went back to Dieppe and, with Jean-Pierre supporting us, we said that if we wanted to make the car reliable enough we needed to make a number of changes. As a result of the tests, the body of the A441 would be narrowed, we moved the oil coolers and we cut the holes for brakes cooling and oil and water cooling. Everything went well, and by Christmas of that year we had it all in hand. I moved to Dieppe and my wife and I lived there from 1973 to 1986. Best years of my life – I loved it!"

At the end of the 1973 season, Renault – which by now had a greater control of Alpine (of which more later) – allowed the famous French journalist Johnny Rives to take a drive in the car at a test session at Magny-Cours before the modification tests at Nogaro and Paul Ricard. Here are some extracts translated from the original French, giving a flavour of Rives' piece for the daily sports newspaper, *L'Equipe*:

"It's an intoxicating brute! The cockpit was obviously made to measure for the tall Jean-Pierre Jabouille so André [Désaubry], the mechanic in charge of the Alpine A440, helped me to get comfortable with the support of some foam rubber. 'You must be held tightly by the safety harness,' says Jabouille, giving it a good tug, to which I respond with a few choice words! Jabouille says, 'Don't worry. Once you get going it will stretch slightly and you'll be fine.'

"'And no more than 10,000 revs,' calls André de Cortanze.

"It is a pleasure to hear the V6 growling away, changing with every gear: second, third, fourth, fifth! The impression of power is real." – Johnny Rives

"We test the Alpine Renault A440 over two sessions. The engine is fiendishly powerful. It crackles below 8000rpm but pulls so hard that I stay around 9500 rather than going for 10,000. The gear ratios are very close. It is a pleasure to hear the V6 growling away, changing with every gear: second, third, fourth, fifth! The impression of power is real. It is produced not so much by the sensation of being shoved in the back that you get with some engines, but by the irresistible progress of the rev take-up together with the animal growling of the exhaust. I realise I am taking all the corners a gear too high: in third where I should have been in second, and in second when it needed first. Each time I come out of a corner the engine crackles and the rev take-up is hesitant, but once the revs are correct the Alpine accelerates very healthily.

"'So?' asked de Cortanze and Jabouille when I stopped. But I was too unhappy with my own performance to give them any useful information. Fortunately, they gave me the chance of a second run in the A440. Meanwhile, I managed to get to know the Magny-Cours circuit better in a Renault 17 special which gave better visibility. Taking the wheel again, I was given my orders: 'No more than five laps – the other journalists are hungry!'"

(Author's note: José Rosinski was at this run too, and we will hear from him about further tests.)

Rives continues: "'Let's hope it runs out of fuel!' someone said, laughing. I immediately felt more at ease than during the first test. I accelerated hard, I now automatically trusted the car, perhaps because I had gained in confidence myself. In the hairpins, it really isn't easy to find first gear under braking, but

Interesting body moulds in the body shop. De Cortanze, left, with Castaing. (Photo FC)

driving is definitely more comfortable: the Alpine comes out like a rocket. You certainly have to be on your guard. In the double right-hander at the top of the hill on the new circuit, I managed to get round very well in the five laps I was allowed: the rear hung out in the first part of the corner, then the car returned to its understeer in the second part, which is tighter. More at ease, I was able to brake more decisively than before. The engine responded furiously to my dabs on the accelerator while changing gear; very stimulating. The intoxication of driving such a machine is incredible. What a pity I had promised the others I would stop so soon! This time, when de Cortanze and Jabouille came towards me, I was smiling. It had been a wonderful experience. François-Xavier Delfosse had timed me at 1min 32sec. Jabouille regularly clocks 1min 23sec. Never mind!"

1974 would be a different matter to the previous year; a huge leap forward. Of the two A440s that were built, one (A440-1) would be supplied to the new Larrousse-Archambeaud team financed from Switzerland. The other (A440-0) would stay in Dieppe for the time being.

Something else was cooking behind the scenes, too. François Castaing: "It was becoming clear that the new V6 was going to work well and Jean Terramorsi, our new boss, had numerous discussions with us about the next step for Renault to consider, assuming we could win the European 2-litre Championship in 1974. Because of the success of the BMW 2002 turbo in the 1969 Euro Touring Car Championship, then Bernard Dudot's turbo engine in the Alpine in 1972, as well as the BMW 1972 production car and the impressive success of the Porsche 917 K turbo in the 1972 Can-Am series against the big-block V8s, our first choice for more power was to think about turbocharging. Bernard Dudot went off to the USA in October to investigate further."

The Alpine company, though having just won the first World Rally Championship in 1973, was facing serious financial difficulties, exacerbated by the huge rise in the cost of fuel brought on by the crisis in the Middle East. It was affecting industry in general and the entire Alpine organization. Jean Rédélé needed money to survive. Renault made its move and took a 55 per cent shareholding in the Jean Rédélé-owned company. From then on, it would be Renault that called the shots.

2 Domination

Before we go deep into the 1974 season, let's hear from the team's leading mechanic at the time, André Désaubry. "Ah, there are so many memories. The start-up of the A440 in 1973 had been a difficult moment, as in F3 (1965, '66, '67). For the mechanics it was always very difficult to get everything just right and ready in time. When the new 1600 F3 engine came along it was a euphoric time because we were winning races, and we dominated completely with the 'Dinosaur' [A367], with Alain [Serpaggi], Patrick [Depailler] and of course Jabouille – they were good times. Before that, although we didn't always have a competitive engine, we had the extraordinary 1000cc Gordini engine in the '60s; it was amazing what they could get out of the little R8-based unit.

"I was transferred to the A440 2-litre project in 1973 and we began to learn the car. There was a problem the first time we went to Magny-Cours where we took the first A440. Jabouille set off; our friend Marcel Hubert had made us a nice engine cover in epoxy, and on the straight at speed it ripped off.

"I remember too one of the many niggling problems that the new 2-litre engine had showed up at the Nürburgring – a problem with the cam drive belt (the engine was one of the first to use a cam belt drive system) – and when we were changing the gear ratios we had to undo certain parts to get at the gears. We did a ratio change. Jabouille went out again but came back in and said that the car was running on 'five legs' [five cylinders], so everyone had a look. We couldn't see anything wrong with the spark plugs, but we put new ones in and he went out again, but came straight back and said the same thing. So we checked the distributor and cam belt and we noticed that it was out of sync by one notch. By watching it closely we saw that the distributor toothed belt would jump out one notch each time we started it. We didn't understand why it was happening, and then we noticed there was a problem with belt tension and we had to modify the drive-wheel bearing to increase the tension around the pinion, to ensure that the belt was correctly wrapped round the distributor drive. There was a lot to learn; this was just one tiny incident!

"The first happy moment with the car was at Croix-en-Ternois when we won with Jean-Pierre, the first victory

A mouse-eye view of the factory: the new A441. (Photo CD)

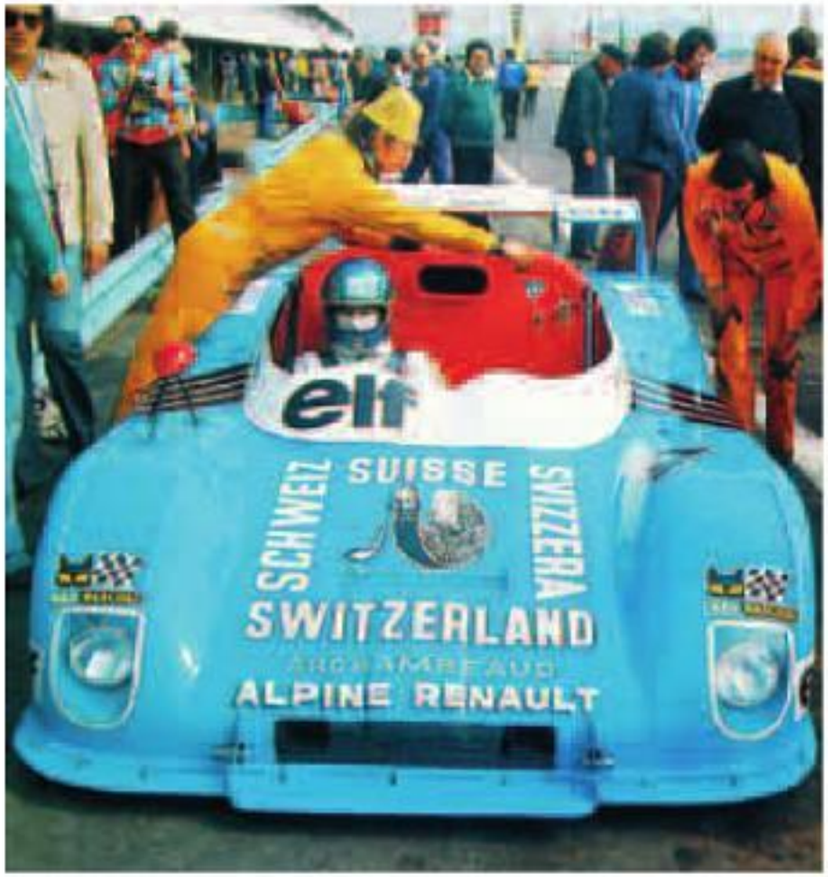
for that car, but it was far from performing at its best because there was not enough cooling for the brakes. The circuit required a lot of braking, and when the car stopped everything was smoking. But we were happy; we had won for the first time with this car. We knew it was not perfect, but it had great potential. We learnt a lot, which allowed us to develop; also we had a new testing structure which had been set up with the arrival of Delfosse. At first he was with Alain [Serpaggi] and the F3 cars; then he was asked to develop the sports car testing. He organised everything. He didn't have much experience in the beginning, but he was very meticulous and a good organiser. It was a bit annoying at first, as we had been preparing cars for at least ten years; we thought we knew our job and he now called everything we did into question, because he wanted to know how we did everything, and see everything, and organise everything. It took some time, but later we certainly realised that it had all been beneficial. We had to learn that we were developing a new team for a new era; the way we had done things in the 1960s was the old way."

François Castaing: "I'll tell you a funny story about André – a nice guy. One day when a new engine was installed in the car he undid his shirt and leant over the inlet trumpet stack. He said that depending on how much suction he was getting, he could tell if it was a good one or not!"

Following the first experiences with the A440 they looked at modifications and improvements. The body width had been reduced to 1.878m and a new chassis was created, designated the A441-0. The engine was located further back in the chassis and was now a partially stressed member of it, as opposed to being fitted on engine mounts as in the A440 chassis. They installed the oil radiator in the front. At the rear, André Désaubry's mechanical team created a quick-release system as used in Formula 1 to ensure that in the event of the engine and transmission units having to be dismounted they could be

The fabrication shop. (Photo GL)

More cooling in the front. (Photo CD)



Adjustable splitter and flap for radiator air inlet on the Larrousse car. (Photo CD)

removed quickly, in one piece. Désaubry had also spent much time developing special bolts and mountings to allow his team to get at the mechanical parts quickly.

However, even with all the modifications and attempts to reposition essential items to get a better balance and cooling, the cars were still tail-heavy with a bias to the rear of 72 per cent, which would have interesting aerodynamic effects. In the spring of 1974 the chassis was still of tubular construction stiffened with aluminium sheets and carrying the polyester bodywork. The engine, now a part-stressed member, was specified for 1974 as a 24-valve, 1996cc unit producing 285bhp, with its accessories driven by two notched belts. Transmission was the BV Hewland type FG400 manual 5-speed. The brakes were four ventilated discs (rear in-board) by Lockheed. The wheelbase was 2.31m; length 3.91m; width 1.87m; weight 575kg.

The second of the first two chassis, A440-1, was rebuilt and supplied to Gérard Larrousse, who the year before had been running Lolas with the Archambeaud-Switzerland team. It had been managed by Jean Sage, another man who would become a highly respected authority in the years to come. The team worked out of the Garage Archambeaud, a Mercedes concessionary in the rue de Domrémy in Paris. Mr Archambeaud was passionate about racing, and obtained sponsorship from the Swiss Cheese Federation, which had supported Jo Bonnier before his untimely death at Le Mans in 1972. Archambeaud continued with its support of Gérard Larrousse in 1973. For 1974, the team would still be entered as Team Archambeaud as a historical point of reference, but directed by Gérard Larrousse with two Alpine Renault cars, the A440-1 and a new A441-1. Gérard Larrousse proved to be something of an innovator as well, as his own team of mechanics applied some of the technology he had learnt about from his many previous drives at Matra and Porsche.

Behind the scenes at Renault and Alpine, some of the management was already thinking about Le Mans, but there are no formal minutes of meetings or a record of any discussions at this stage. However, anecdotal evidence suggests it was thinking that if the cars went well in the European Championships, they would go for a run in the World Sports Prototype Championship in 1975. In 1973, the search for more power led Jean Terramorsi to consider turbocharging. The sports prototype regulations allowed it, so it was thought a turbo engine might be the way to go.

There were many changes within Renault, too, during 1973. The competition department was placed directly under the full responsibility of Jean Terramorsi, and was to be attached to the planning department of the Régie, which was headed by Bernard Hanon. Hanon held world ambitions for Renault, and was convinced of the media impact of competition. His opinion was that rallying, whilst popular, reached only a limited market. Moreover, it was clear that the regulations were becoming increasingly restrictive. Circuit racing, on the other hand, allowed the boundaries to be pushed. Hanon had the ear of Dreyfus who, though cautious, trusted him as he did Marc Ouin, who by now had been won over. Terramorsi had been put in charge of competition, and Hanon had the confidence and influence at the top of the organisation. With Elf finance and the presence of François Guiter, they made a formidable group.

Jean Terramorsi had watched Bernard Dudot's efforts with the F3 engines and the Holset turbo from England that had been fitted to the 1600cc engine and had noted with interest Thérier's victory with it in the 1972 edition of the Critérium des Cévennes rally. Terramorsi wasn't a great technician, but he was both open-minded and intuitive and respected the views of Jacques

A lot of tests for aero and body panels. (Photo GL)

Tests for cooling. (Photo GL)

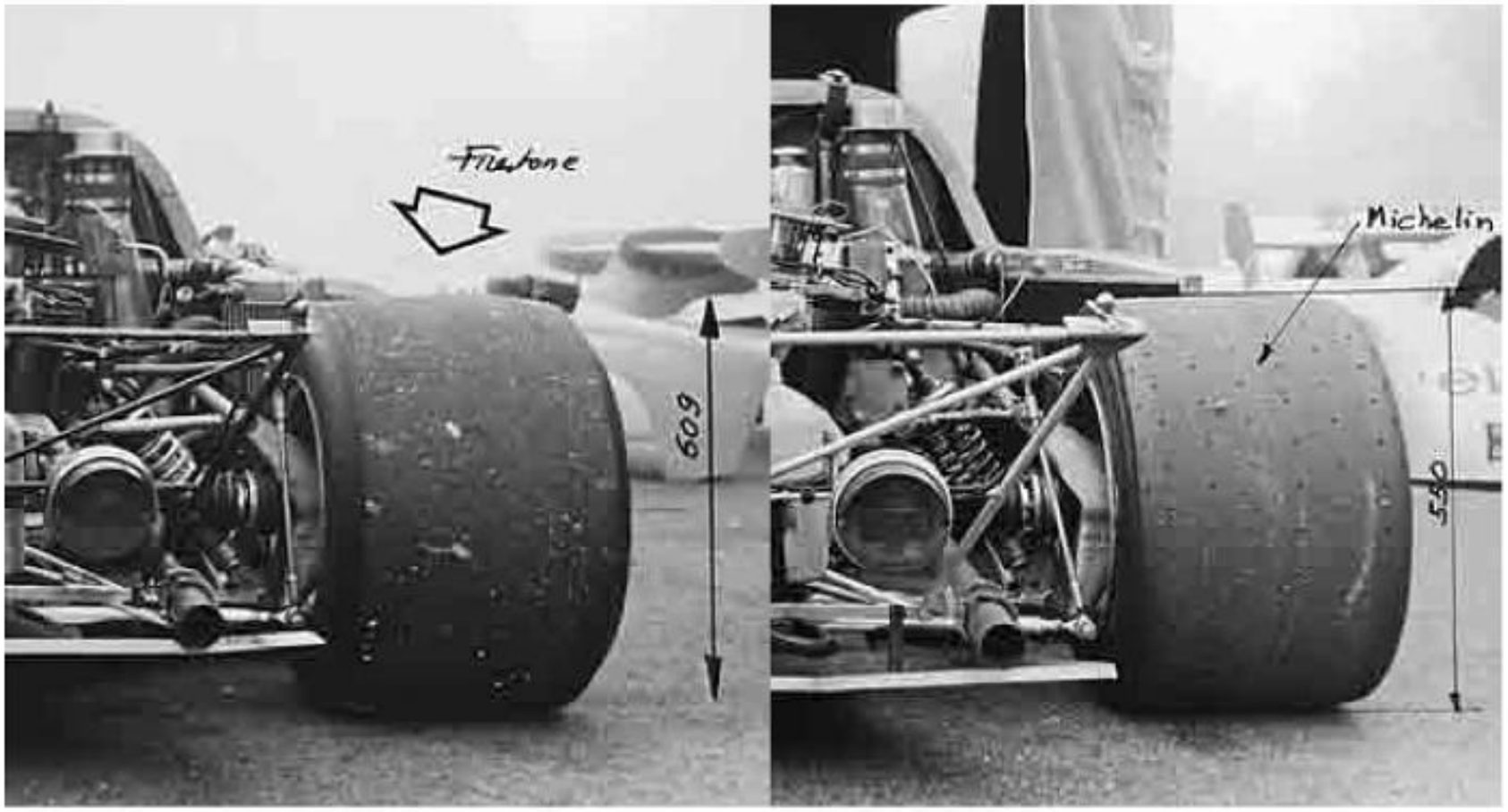
Cheinisse. In the latter part of 1973 the two agreed that Bernard Dudot should go down to Viry and also on a mission to study turbos in the USA. He formed a very positive relationship with Garrett, and became convinced that here lay the future.

Bernard Dudot: "Following my work on the A110 and the turbo 1600 in 1972, I continued to study the principle of the turbo and how it could be applied. I had been moved down to Viry-Châtillon, and in the autumn of 1973 I spent three months in America. I visited many of the Indy teams and other manufacturers, but mainly the objective was a meeting with Garrett. This meeting was surprising for me, because although I was very enthusiastic about the idea of competing with such an engine at Le Mans, I found that they were too! Generally the Americans had little knowledge of Le Mans, though there were several teams that had competed there, including, of course, Ford, but as a nation it didn't interest them as much as the Indy-type cars that ran in the Indianapolis 500. The guys at Garrett became very enthusiastic and they told me, 'No question: with such an engine, 2-litre with a turbocharger, you could achieve much more than 500bhp, and you should be able to compete during 24 hours with no problem, maybe even win the race.'

"Together we studied the technicalities of the idea, and after many investigations I came back to France with some assurance. We immediately set about something very simple; our first unit on the dyno had a single Garrett turbocharger and a new injection (Kugelfischer) mechanical system. With the added parameter of the boost pressure we had to create a special device to operate it properly; the Kugelfischer was a three-parameter type, also very simple in its first format. All my investigations were taking place during the fuel crisis, and on my arrival back from the USA I was told the project was on hold. However, we quietly continued development, and in May 1974 got the full official go-ahead. First results were very exciting, and we decided with Terramorsi's blessing to build an engine which, according to the 1.4 multiplication formula, would allow us to compete in the 3-litre formula and to run a car in the World Prototype Championship for 1975."

Against this background – a taster of the story to come – we reach the spring of 1974. A full season of racing was ahead before the turbo era would begin.

François-Xavier Delfosse: "We had tested the new A441-0 several times at Paul Ricard, and the first race was to be at that circuit. Terramorsi had decided we should enter three cars and we were told that Larrousse had decided to use the A440-1. The contract with his team was in fact not very fair for us. We were to give Larrousse-Archambeaud an A441 car with the same specification as the works car, and we had to tell him all the

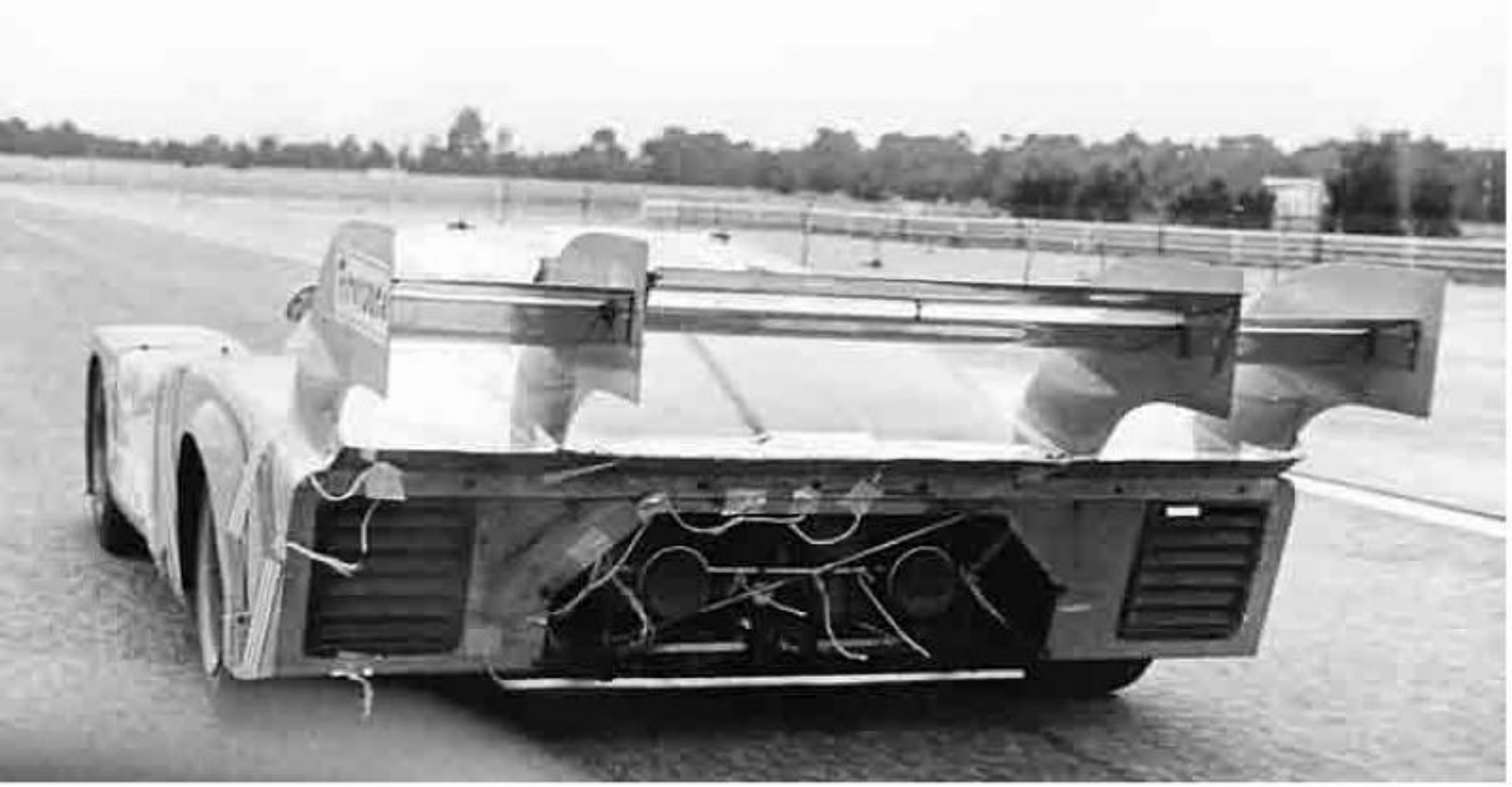


Tests on tyres: left, Firestone; right, Michelin. Note the profiles. (Photo GL)

modifications we did. However, if he did modifications within his team he was not obliged to tell us! It was Terramorsi's idea to push the works team to beat Larrousse."

The team was ready to go racing. So what was the new A441 really like to drive? José Rosinski, the very experienced racing driver of the 1960s and an accomplished journalist, was at Paul Ricard and was invited to try it out. Rosinski: "I had had the chance to test this car in its 1973 version, as a type A440, at Magny-Cours, when Johnny Rives had also tried it (see previous chapter). I had been a bit disappointed. At the time it understeered a lot, its steering was very heavy and I felt that its engine was not giving as much power as it might. Since then, I can tell you a lot of work had been done. The chassis of the new A441, though still a tubular structure, was now reinforced by riveted aluminium panels, and the engine was now more F1-like and a partly stressed member."

Note the air intakes on the engine cover. (Photo GL)



On-car view: aero tests. (Photo GL)

However, as stated by engineer Marcel Hubert, responsible for aerodynamics, "The Cx (Cd) of the A441 is not as good as that of the A440. The reason is that we were trying to resolve the road-holding problems that we had had at the beginning of the season by considerably increasing the aerodynamic downforce. However, we reached a limit in February when we were doing the first A441 tests, and then we realised that the suspension could be improved. When that was done, we were able to return in aerodynamic terms to the point where the car that you are driving today has only one quarter of the initial 'wing' used back in February, thereby reducing drag. Indeed, the huge wing which was originally installed has been reduced to much more modest dimensions.

"Although it looks different, particularly at the front, the suspension of the Barquette is now similar to that of the Elf 2. For example the wheels and tyres have the same dimensions. However, there is a substantial difference between the cars in terms of weight distribution: in the sports prototype it varies much less in relation to the volume of fuel in the tanks, those of the A441 being placed exactly at the centre of gravity, while those of the single-seater are elongated and lateral."

This positioning of the fuel tanks was to prove very interesting. Hubert: "The minimum weight allowed for the 2-litre sport category of 575kg is not quite achieved. The A441 weighs just over 580kg." Rosinski: "The maximal torque is without a doubt lower than that of a 4-cylinder BMW Schnitzer engine, but the torque curve and the power curve are so much gentler that in terms of usage, the V6 is incomparably more pleasant to drive. Acceleration across the gears is perfectly harmonious, and of course this makes driving much easier. With a 5-speed gearbox and a usable range of 1700rpm in the BMW Schnitzer, you cannot hope always to be 'in the revs' – there will be some circuits where on at least one or two corners the gear you choose won't be what you need, so the driver must adopt a compromise solution, sacrificing one corner for another which he considers more important. With the V6, the operational range is considerably wider, so this problem doesn't arise. That's its great advantage. The steering is fairly firm and now it has impeccable precision. You could almost speak of 'comfort', as the reactions of the car are gentle and the flexibility of the V6 seems inexhaustible. This is impressive, and while the F2 car excites, this sports prototype car seduces."

A440-1 with modified nose for Larrousse. (©R)

Jean Terramorsi had persuaded Gérard Larrousse to run two cars, his thinking being, as we have heard, to push the Alpine factory team, which was being financed by Renault. The new team that Gérard Larrousse had formed out of the Equipe Archambeaud was sponsored by the Swiss Cheese Federation. Larrousse was able to acquire not only the A440-1, but also a very new chassis, A441-1 (the factory team started with A441-0). "The two-car team plans had started at the end of 1973," he says. "Archambeaud was running with very little money, and I remember that Jean Sage and I decided to run the team by ourselves. As it happens I was very good friends with Jean Terramorsi and François Guiter, and they had an idea that we should run an Alpine, so I think the two of them organised things for us to get a car; but, you know, at first it was just the one.

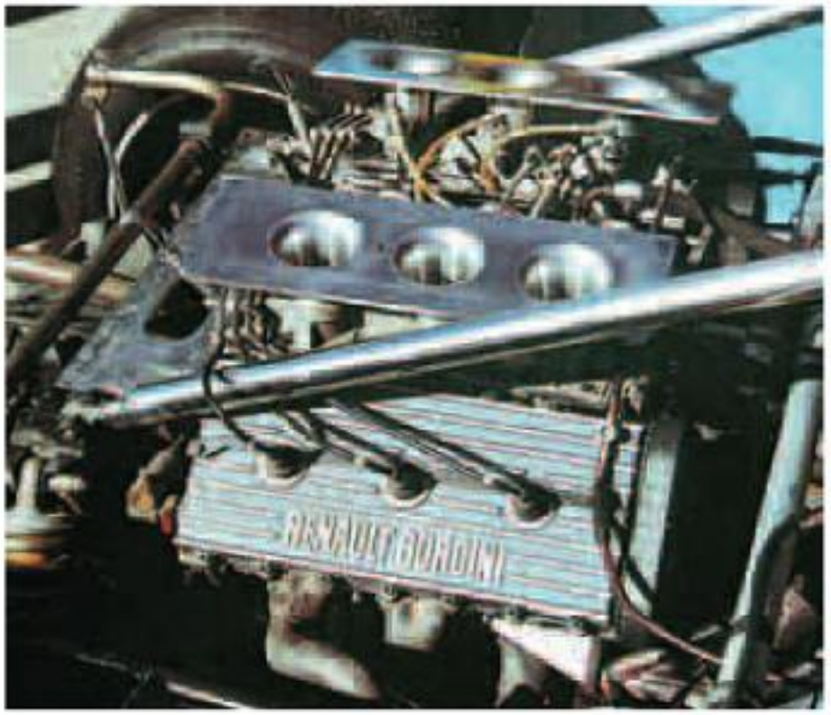
"I had had some good results with Lola at Archambeaud and our Swiss Cheese sponsor and Renault said it wanted to have a good alternative to the Alpine factory team for 1974. So the A440 arrived in our workshops in early 1974. Then Renault decided we could run a second car – a new A441 – but it didn't arrive until just before the first race. I know some think that I was not confident with the new car from Alpine, but it was rather that for the Ricard race my mechanics had worked very hard on the A440-1; we had a separate engineering team, of course, to that of Alpine and we did a very good job modifying and setting up the car to our liking. That is why I chose to drive the older car rather than the new one. I took the decision myself. As it happened, it was not the right choice, as the new car turned out to be more competitive."

"... if Gérard had taken Cudini's car he would have won the Championship at the end of the year." – François-Xavier Delfosse

François-Xavier Delfosse again: "We had delivered the A441 right at the last minute, the week before the race. Perhaps he was unsure of its reliability against the car he done a lot of testing in, but it's certain that if Gérard had taken Cudini's car he would have won the Championship at the end of the year." Isn't hindsight wonderful?

Round one of the European Sports Prototype 2-litre Championship at Le Castellet circuit, Paul Ricard, 7 April 1974,

Practice: Jabouille. (©R)



The latest A441 installation. (Photo AB)

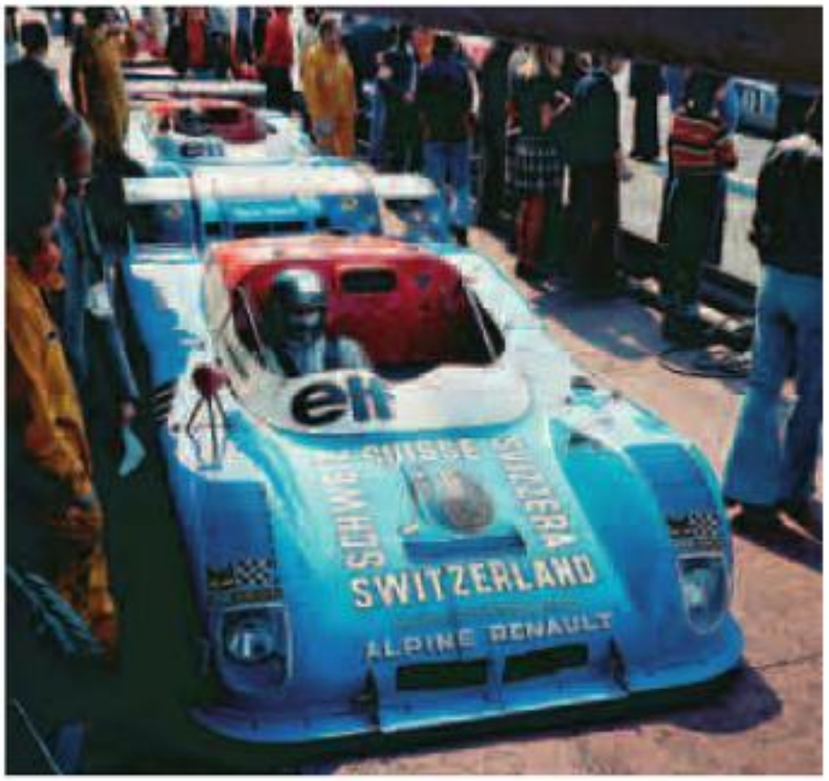
involved 68 laps of the full 3.3km (2.05 mile) circuit – a solo drive for each car of just under 1½ hours.

Alpine entered Jean-Pierre Jabouille, who put in a practice and qualifying time of 1min 14.7sec in A441-0, giving him pole position in car number 6.

Gérard Larrousse had chosen to drive the number 4 car, A440-1; his qualifying time for fourth on the grid was 1min 15.6sec.

The third car, the second Larrousse-Archambeaud entry driven by Alain Cudini, was numbered 5 and was alongside Jabouille on the front row of the 17-car field, with 1min 15.1sec.

As the cars got away at the beginning of the race it was Cudini from Larrousse, Jean Ragnotti in the March and Jean-Louis Lafosse in the Abarth-Osella. Cudini had blasted away and continued to take the advantage while Jabouille was having a frustrating time behind him. Flooding his engine at the start, Jabouille got away late, but charging after the pack he clocked up the fastest lap and the lap record of 1min 15.8sec, eventually coming in eighth, some five laps down. Larrousse had fuel pump problems and only completed 30 laps, finishing down in 14th.



Larrousse waits to go out, with Cudini behind. (©R)

Pole for Jabouille. (©R)

Larrousse car, A440-1. (©R)

Cudini's A441-1, with a slightly different splitter on the front. (©R)

Jabouille playing catch-up. (©R)

Victory for Cudini's A441-1. (©R)

Cudini on top with Jean Ragnotti (front left) and John Lepp (right). (©R)

Victory went to Cudini in the car Larrousse had chosen not to drive. Cudini's race took just 1hr 28min 5sec, finishing 56 seconds ahead of another future Alpine employee, Jean Ragnotti in the March 745 BMW. First blood to the Alpine, but also to the Larrousse-Archambeaud team. As a point of interest, both cars were on Firestone tyres.

The second outing was at Nogaro for the Easter Cup meeting on 17 April, a non-European Championship event. The Coupe de Pâques was a French Championship round. Jabouille was once more in chassis A441-0, with Larrousse in the Archambeaud A441-1 (race number five), and Cudini in A440-1. André Désaubry: "I remember we had a problem here with the shock absorbers. Our car was jumping all over the place and there was a lot of work to do to correct it. Also, I remember that Jean-Pierre had problems with the gear lever; it had worn and kept jumping out of gear so we had to make a new gear lever and fit it quickly." Whatever problems he had, it did not stop Jabouille from getting pole with 1min 14.7sec from Larrousse on 1min 15.2sec, and then Alain Cudini on 1min 17.8sec. It was a tour de force for Alpine, as both teams put on a demonstration to finish first, second and third. Jabouille also took the fastest lap with 1min 15.3sec at an average speed of 149.163kph.

The first day of May saw a visit to Magny-Cours for another French national race, where the Archambeaud-Larrousse Swiss Cheese entry A441-1, driven by Larrousse, took victory. The 35-lap race was completed in 49min 37.7sec. Initially it looked as if it would be an Alpine one-two as Jabouille's factory Alpine car led the field, but a broken water pipe induced overheating and he abandoned on lap 13, leaving Larrousse a clear run to the chequered flag.

On 12 May, Montlhéry was the scene of the Grand Prix of Paris – again, not part of the European Championship – and Alain Cudini was entered in A441-1. Ten other cars lined up, amongst them Jean Ragnotti in the March 74S. Cudini put the Alpine on pole with 1min 22.8sec. Ragnotti chased hard throughout the race until his challenge disappeared in the final laps, and Alain Cudini won with Ragnotti 12 seconds back. Two races, two victories for Cudini.

Next up, Renault decided to put the factory Alpine into the lions' den (or maybe, as in the 1960s, the hall of the mountain king) at that circuit of terrors, the Nürburgring, in a World Championship round (the 750km) on 19 May. The Larrousse-Archambeaud cars stayed away from this one. Larrousse was there, though, fulfilling his contract to drive for Matra.

Larrousse, nearest camera. (Photo RS ©U)

François-Xavier Delfosse talks with Jabouille; François Castaing, right rear. (Photo FXD)

Practice. (Photo MF)

For Alpine it was a return to a championship it had last entered in 1969. It would be in the up-to-2-litre Sports Prototype class, but of course was also up against the bigger 3-litre cars from Matra, Porsche and Alfa Romeo. Significantly, this was not a Société Alpine entry but an official Renault entry. Jabouille qualified 13th on 7min 59.4sec, running race number 24. This was impressive, as the full Championship circus had turned up – 84 cars had been entered, 55 qualified and 52 started. Most of the top cars and drivers in the world at that time were there. Patrick Depailler accompanied Jabouille as his partner at the change-over.

The Matra Simca of Henri Pescarolo and Gérard Larrousse set the fastest qualifying time with 7min 10.9sec for the 14.189 mile (22.835km) circuit – a blistering pace. In the 33-lap race the sister Matra of Jarier and Beltoise took victory, but with a near trouble-free run, Jabouille and Depailler came home tenth on 29 laps and second in the 2-litre prototype class. A good performance.

Next up in the European Championship rounds was Clermont-Ferrand and the 300km Trophée d'Auvergne on 23 June, which enticed Alpine to enter Alain Serpaggi and Jean-Pierre Jabouille. A second A441 factory car appeared: the A441-2. Which driver drove which chassis is a matter for speculation, as the author has not found reliable proof. Larrousse-Archambeaud also had two cars; this time Gérard Larrousse used the A441-1 to good effect, and handed over

Jabouille cresting a brow. (Photo MF)

Alain Serpaggi. (Photo GB)

Marie-Claude Beaumont. (Photo CD)

the A440-1 to female rally star Marie-Claude Charmasson, who entered all her races as Marie-Claude Beaumont.

Gérard Larrousse, A441-1. (Photo GL)

Gérard Larrousse: "Elf had a good association with Marie-Claude, an accomplished driver. For sure, she was good publicity for them, which is why we took her on, although she was not at that time a proper circuit-racing driver. I remember I went to Dijon with her to test the car and she was quite a bit slower than me. She was disappointed, so I said to her, 'You should come with me in the car,' and she agreed. I did some laps while she watched my braking points, etc., then gradually I went faster and put in some very quick laps. She was a very keen learner and a good driver and learnt a lot that day; she eventually became very fast in later races."

Larrousse was on pole with a 3min 06.4sec lap of the 8.055km circuit. Second was Jabouille (thought to be driving A441-2) on 3min 06.5sec, with Marie-Claude back in 23rd slot, still getting to grips with the car. Unfortunately it was not her day, as the engine failed when it dropped a valve on the first lap. Ironically, Jabouille's car also failed (piston) on the first lap. Nothing daunted the top two, however, and Larrousse took victory after 1h 41min 49sec with the Alpine factory entry of Serpaggi just 48.5 seconds behind, and very low on fuel by the end.

By now it was evident that the V6-powered A441 Alpines were going places. Renault issued a press release, which demonstrates that control of Alpine was by then fully under the wing of Renault and its publicity machine. This is the press release translated from the original French:

ONE-TWO FOR ALPINE-RENAULT-ELF AT TROPHÉE D'AUVERGNE

Second event in the 2-litre Prototype European Championship, second victory for Alpine-Renault-Elf, thus giving it 20 more points in the classification for this Championship, the primary target in 1974 for Renault.

After Alain Cudini, victor at the Paul Ricard circuit in April, it was Gérard Larrousse in the Alpine Renault of the Archambeaud stable who, eight days after his victory in the Le Mans 24 Hours, where he was driving for Matra, won at the celebrated Charade circuit (51 corners) after a passionate fight between the main European constructors in the discipline (Lola, Chevron, Abarth).

Charade was also a one-two for France. Alain Serpaggi, in the second factory Alpine, was placed second, a place of honour for which he had fought hard, and which, despite the bad luck he has suffered in F2 since the beginning of the year, shows Serpaggi as one of the most adaptable and experienced French drivers.

Two drivers did not make the finish: Jean-Pierre Jabouille, who retired shortly after the beginning of the race with mechanical problems, and Marie-Claude Beaumont in a 1973 Alpine Renault, who also retired for the same reason.

The speed and reliability of the Renault-Gordini V6 2-litre engine are therefore becoming more evident with each race.

The next event in the 2-litre Prototype European Championship will take place on 20 July at Misano (Italy).

CLASSIFICATION IN EUROPEAN CHAMPIONSHIP (after two events)

1st:	*Alpine Renault Elf*	*40 points*
2nd:	*Chevron*	*24 points*
3rd:	*March*	*16 points*
4th:	*Lola*	*12 points*

Left: A440-1, the old car from 1973. Right: A441-1. (©R)

Note the air box (A441-1) – this is at a later race. (©R)

On 7 July 1974, in a non-Championship race, Jean-Pierre Jabouille took chassis A441-2 to victory at the Nogaro circuit. Larrousse came second in A441-1 and Alain Cudini third in A440-1, both Larrousse-Archambeaud cars.

Misano, Italy, 21 July – a two-race European Championship event. Run over 40 laps on the 3.488km circuit for the Trophée Etienne Aigner, it brought a surprise. François-Xavier Delfosse: "The surprise for us in the factory team was that Gérard's Archambeaud team car A441-1 turned up with a visible modification: an air box. It was a square type of unit, an early experiment. Up until now the air intake had been in the bulkhead behind and to one side of the driver. This was one of those occasions when the Larrousse-Archambeaud team did a modification but due to the contract was not obliged to tell us, the factory team!"

In the first race Jabouille for Alpine put the A441-2 on pole

Earlier air intake point (the black unit on top of the engine) under the rear bodywork. (©R)

Four Alpines – one with the air box. (Photo FXD)

with 1min 15.5sec, with Larrousse in the Archambeaud team car A441-1 in second with 1min 15.8sec. Alain Serpaggi's A441-0 (Alpine team) was fifth on the grid with 1min 17sec. A new guest driver for Larrousse-Archambeaud, Bernard Darniche, was at the wheel of the old A440-1, numbered 45 (driving in place of Marie-Claude Beaumont), in 17th at 1min 19.8sec. Larrousse was trying several different drivers to see who was best suited.

The race winner was Jabouille in 52min 39.6sec, and Serpaggi was in second, just eight seconds behind, for an Alpine factory one-two. Darniche came home 14th, whilst Larrousse in the other Archambeaud car had a bad day at the office when his cooling system failed on lap four. He was not able to run in the second race. So much for the new modifications!

In the second race Jabouille again took victory, this time in 52min 12.3sec, with Serpaggi again in second place, but only 1.3 seconds adrift this time. Darniche came in tenth. Overall Jabouille took the maximum points, and in the second race he set the fastest lap of 1min 16.6sec. Serpaggi took the honours for second place overall, and Darniche was 11th. Larrousse went home with a no-score.

Next it was off to Enna-Pergusa in Sicily for the 2-race European round of the Coppa Città on 11 August, and a complete change of fortune for Larrousse. His A441-1 (number 15) claimed pole, going round the 4.845km circuit in 1min 23.1sec, and won both races – the first in 43min 02.2sec and the

Jean-Pierre Jabouille. (©R)

second in 43min 57.3sec – so taking overall honours from the two 30-lap races. Maybe it was time for the factory team to look at the Larrousse modifications more closely.

In the first race Jabouille was second in car 12, the A441-2, and in the next race he came third, finishing second overall at the end of the day, just ahead of Serpaggi, whose car 14 A441-0

Left to right: François-Xavier Delfosse, Alain Marguet, Jean-Pierre, an Italian journalist, and John Ward, Firestone technician. (Photo FXD)

Powered by Swiss cheese! (©R)

pipped him to second place in the last race. Jabouille, though, had beaten Serpaggi in the first race by a bigger margin: 23 seconds to seven seconds. For the record, Jabouille qualified in second place with 1min 24.1sec and Serpaggi with 1min 25.2sec.

Towards the end of August it was off to Germany for the European round of the Prix des Nations at Hockenheim on the 25th – two 20-lap races of the 6.790km circuit. Again, it was Larrousse in the A441-1, car 2, on pole with 2min 01.9sec, this time from Jabouille's A441-2, car 3, on 2min 04.9sec and car 4, Serpaggi's A441-0, on 2mins 06.3sec. It can be seen from photographs that Larrousse decided to use an earlier design of front bodywork for the nose of his A441.

The series was now being totally dominated by Alpine, and this time it was Larrousse from Serpaggi in the first race, Larrousse finishing in 41min 42.7sec with Serpaggi just 7.8 seconds back. Darniche, now a regular in the A440-1, was on seventh spot, whilst Jabouille went out on the first lap. The second race was not so good for Ecurie Archambeaud as Larrousse had engine failure on lap ten and Darniche spun off on lap seven. Honour was upheld for Alpine by Jabouille, making a comeback from his first race maladies to win in 41min 39.7sec, ahead of John Lepp driving the Chevron, with that man Serpaggi again on the podium in third, 53.4 seconds back. From the two races the overall general classification saw Alain Serpaggi first with Jabouille back in fifth; Larrousse and Darniche had failed to score. Serpaggi was by now steadily amassing points with regular top 3 finishes.

Just a week later, on 31 August/ 1 September 1974, two cars were entered for the Urcy hillclimb – one of the major events of the French Mountain Championships. They were both Larrousse-Archambeaud entries: the A441-1 of Gérard Larrousse and the A440-1 for Marie-Claude Beaumont. The 122 entrants carried out practice runs to whittle down the field to the fastest 75 cars. Unfortunately, Marie-Claude Beaumont was not fast enough and did not qualify. There is a story behind this. Gérard Larrousse: "When it came to her first run up the hill it seems that

Serpaggi won the second race. (©R)

her progress was slowed by the intervention of a marshal on the track. A protest was made and the organisers gave permission for her to do another timed qualifying run during the free practice on Sunday morning. The problem was that it was wet, so she had no chance."

During qualifying on the Saturday, Gérard had put in the fastest time, 1min 28.8sec, just ahead of the Formula 2 Marches of Pierre Maublanc and future privateer Alpine driver Jimmy Mieusset.

Gérard Larrousse: "I had an electrical problem on the Sunday morning; fortunately, because Marie-Claude was not running, we were able to use components from her car to put on mine." However, come race time it was Pierre Maublanc who was fastest on 1min 29.3sec, closely followed by Jimmy Mieusset on 1min 29.69sec, with Larrousse coming in third with 1min 30.92sec.

A441-1 – the Larrousse car. (Photo JS)

A441-1, Larrousse. (©R)

A break of three weeks allowed the teams to regroup before returning to Italy on 22 September for the Grand Prix de Mugello – two races, each of 25 laps. Jabouille was on pole in a time of 1min 51.3sec, and it should be noted that for this race the factory team had modified one of its cars to include the large air box, although it was a different shape from the one being used by Larrousse. However, it was Larrousse and Serpaggi who dominated, with the former winning the first race in 48min 04.10sec in the A441-1 (number 3) from Serpaggi's A441-0 (2), without the new air box, by 31.38 seconds. One can see in the photo below (car 2) that Jabouille's name has been taped out – maybe it was originally to have been his car.

Serpaggi. (Photo AB©U)

Jabouille with new air box. (©R)

Jabouille in car 1 got away quickly from pole, with Larrousse in close attendance, but it was the 'Swiss Cheese' car that went on to win, with Serpaggi finishing in second. Jabouille suffered a problem, though: the rear bodywork became dislodged and he could only creep home in eighth. In the second race it was a reversal of fortunes as Serpaggi took victory with a time of 47min 44.05sec. Just 1.08 seconds back was first-race winner Larrousse and then Jabouille, tight on their heels, 1.36 seconds behind in third.

By now it was victory for Renault and the Alpine factory team, as with the results from this race the Championship was wrapped up for Serpaggi, who had amassed 77 points including the one overall victory (some events were over two races, remember, giving a cumulative score), three second places and a

Jabouille just ahead of Larrousse at the start. (Photo FXD)

Oops! (Photo FXD)

third, compared with the three overall victories of Larrousse, who with only one race to go could not catch the factory driver. It was a jubilant Alpine team that returned to Dieppe to celebrate. For the steadily consistent Serpaggi, it was a major achievement.

The same weekend, 22 September, saw Marie-Claude Beaumont appearing for the Archambeaud team in the Coupe de l'AGACI at Montlhéry, driving the old A440-1. It was her second victory of the day, the first being in the Henri Greder Opel Commodore. With her A440 win, there was a double celebration that weekend for Larrousse-Archambeaud.

Marie-Claude at Montlhéry. (Photo RS ©U)

The Larrousse Emmental promotional A441-1. (©R)

Larrousse tucks in behind Ragnotti. (Photo FJ)

On the grid: three A441s at the front. (Photo CD)

Marie-Claude's victory was followed by a second trip to Montlhéry for the Archambeaud team, for the Coupe du Salon on 6 October, the traditional race series run at the time of the Paris Motor Show. A non-Championship event, it was race number eight, the feature event, and the programme shows Gérard Larrousse in car 2, the A441-1, and Bernard Darniche in car 4, the A440-1. Jean Ragnotti was again present in the March. From the entry application for the race, it can be seen that Equipe Switzerland Larrousse-Archambeaud was still working out of the rue de Domrémy address at this time.

"... after a while I found I could only use first and fourth gears and the engine was vibrating so much that I could see nothing in my rear-view mirrors." – Jean Ragnotti

Larrousse took pole, with Jean Ragnotti alongside; it was close, and Ragnotti suffered serious braking problems during practice, but perhaps it was no surprise to see the now quite quick March-Antar in the lead after the first lap, while Darniche in the Alpine A440-1 had to retire with gearbox problems.

Jean Ragnotti says, "We always had a good battle, and in this race we kept passing and repassing until after a while I found I could only use first and fourth gears and the engine was vibrating so much that I could see nothing in my rear-view mirrors."

Ragnotti held on in front of Larrousse until the seventh lap but had to yield on the eighth to Larrousse, who squeezed past and was off and away to an easy victory. Larrousse's winning time was 20min 41.5sec, average 148.14kph, from Ragnotti some seven seconds back.

At the end of the season the European Championship runners arrived in Spain for the last race on 20 October. It was now almost inevitable that Alpine would win, and this time it was Jabouille's turn to take both pole and victory in this single-race 72-lap event over the 3.406km course. Called the Jarama Two Hours, it actually finished in 1hr 45min! Jabouille's pole time in the A441-2 was 1min 23.17sec, with Larrousse in A441-1 for the rival Archambeaud team on second, in 1min 23.57sec. Jean Ragnotti in the March pipped Serpaggi for third place on the 18-car grid. Marie-Claude Beaumont returned for this event for the Archambeaud team and qualified tenth in the old A440-1 on 1min 28.88sec, finishing in 11th overall at the end of the race. Already on 77 points and with the Championship decided, Serpaggi hoped that he would extend his lead, but this time it was his A441-0 that had a problem on lap 54, caused by a valve failure.

The race was dominated by Jean-Pierre Jabouille in the factory car. Over a lap behind came Gérard Larrousse, with the March of Jean Ragnotti a further lap back. For Larrousse, it was a question of what might have been, but for Terramorsi it was mission accomplished as the factory team had beaten the customer team, as he had hoped and schemed! It was total domination by Alpine Renault, who took the European Prototype

Jabouille en route to victory with improved air box. (©R)

Serpaggi, overall European 2-litre Prototype Champion. (©R)

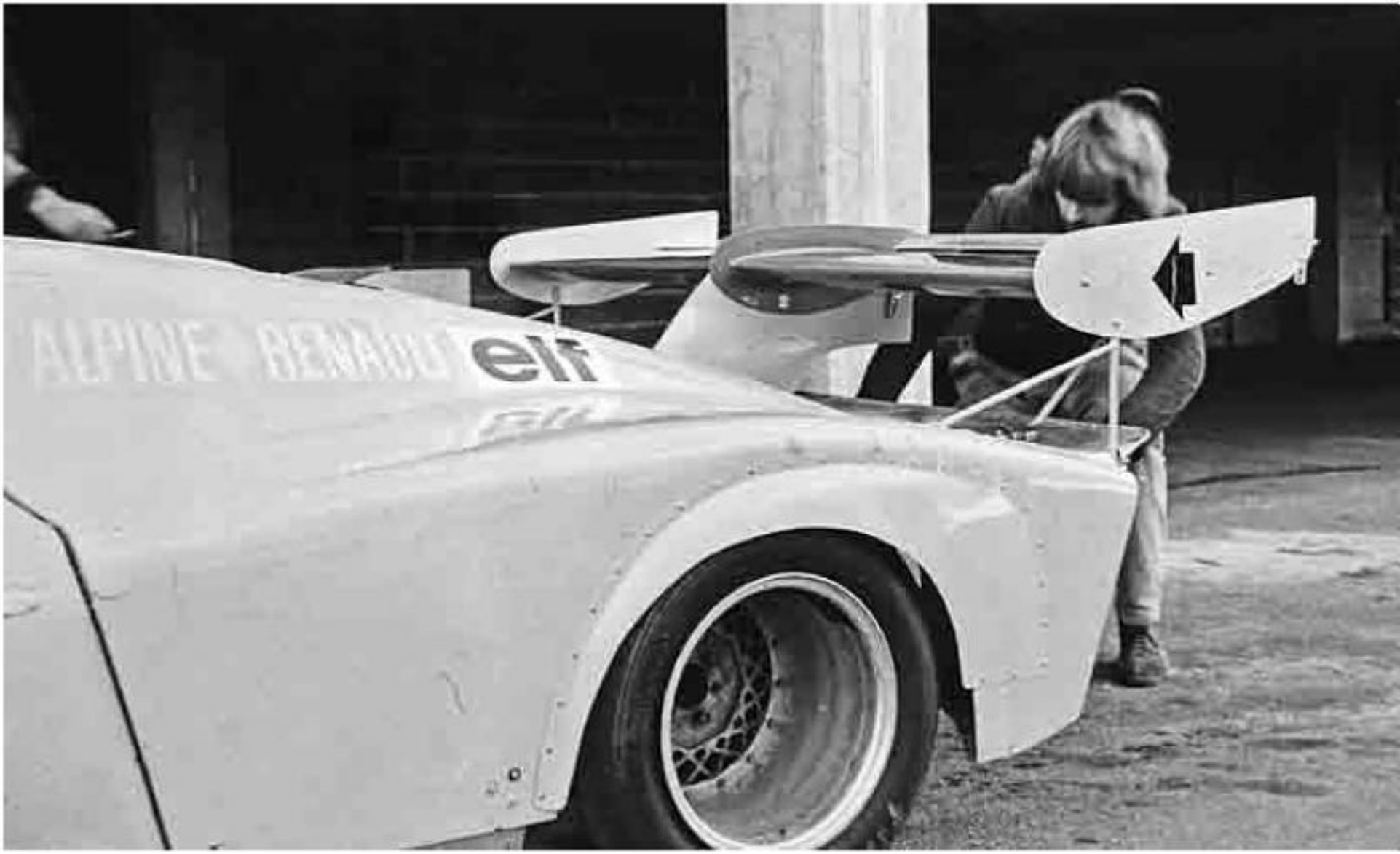
Championship for Makes with a huge 100 points in front of Chevron Cars on 49. March came third with 46 from Lola on 41. Alain Marguet: "We always seemed to win – it was fantastic! Generally when you win everything is easier. When you don't win, it's then you have a problem. What I remember from this year is that it seemed very easy. No big problems. The only thing was that because we had both the factory Alpine team and the Equipe Larrousse-Archambeaud, it was really quite difficult sometimes to keep everyone happy, because Alpine thought that we at Renault-Gordini were giving the best engine to Larrousse. The Larrousse team thought we were sometimes favouring Alpine, but I can say here it really was not the case.

"Larrousse had his own mechanics and his own workshops and sometimes relationships, though not seriously bad, were not particularly friendly. For instance, Larrousse was allowed to modify his cars without telling the factory team. Alpine was not happy about this. The air box was the most visible item and also I'm sure there were some other aero changes too. But in the end Serpaggi won the Championship for the factory Alpine team so they and we were happy."

From a racing point of view it had been a wonderful season, all-conquering, albeit in the smaller European Championship. Now it was time to think about the World Championship – and maybe Le Mans?

At the end of the year the top eight Drivers' Championship standings were:

Position:	*Name:*	*Car:*	*Points:*	*Races (best five results to count):*						
				1	*2*	*3*	*4*	*5*	*6*	*7*
1st	Alain Serpaggi	A441 Alpine	77	-	15	15	12	20	15	-
2nd	Gérard Larrousse	A440/A441	75	-	20	-	20	-	20	15
3rd	Jean-Pierre Jabouille	A441	73	(3)	-	20	15	8	10	20
4th	Jean Ragnotti	March 74S/Ford/BMW	45	15	-	-	6	-	12	12
5th	John Lepp	Chevron B26 Hart/Ford	41	12	12	2	-	15	-	-
6th	Fred Stadler	Lola T294 ROC	38	-	10	8	-	10	-	10
7th	Jorge de Bagration	Osella/Chevron B23	22	-	-	6	8	-	-	8
8th	Alain Cudini	A441 Alpine	20	20	-	-	-	-	-	-



Alpine factory experiments, late 1974. (Photo GL)

Gérard Larrousse: "The A441 was a very good car, very nice to drive, very easy. All year, we nearly always had a good fight with Jabouille and Serpaggi; there was quite a bit of rivalry, especially as we could do secret modifications and not have to tell them! Some of the modifications were very good but we did some bad ones, too. So did the factory! I remember we came to every race with a new little secret. Sometimes it was an absolute disaster but sometimes we had good races. It was a good season for me as I was racing a lot with Matra and other teams as well as our own. The A441 car was mostly very reliable; the engine was good, strong. Castaing and his team were doing good work and we had few problems with the engine. So different from the year before, when we had the Schnitzer in the Lola which was breaking everywhere; it was very fragile in comparison – the Renault engine was very strong."

In fact Gérard Larrousse also won (driving for Matra) the

No, I don't think so! (Photo GL)

Le Mans 24 Hours, Six Hours of Kyalami, 1000km at Zeltweg, and Imola. He won the Targa Florio in a Lancia Stratos and the Tour de France in a Ligier. He was also World Sportscar Champion. Like he said, "it was a good season for me!"

Renault was looking to the future. Jacques Cheinisse had been commissioned by the Régie to do a study relating to the evolution of competition and Renault's raison d'être, the politics of racing and the future prospects for marketing and the company's image.

The result was a document dated 1 July 1974, entitled *Evolution de la Compétition Automobile Internationale*; it carried the logo 'Alpine Renault'. In this document, Cheinisse

investigated the role of the teams, public perceptions of racing, the publicity potentials, the role of the governing bodies, and the relationships between the public's perception of motor sport and other sports. He looked at the types of racing that Renault was involved in and those where it was not. The six-page document covered every aspect of the values of racing compared with rallying, future prospects and the way the regulations might go in all areas of motor sport. He concluded that in the early years of the 1970s there were three events that had captured the European public's attention and afforded the best potential for publicity:

The Le Mans 24 Hours
The Monte Carlo Rally
The F1 World Championship

The document went on to suggest how funds might be utilised to offer the best cost effectiveness in terms of publicity. It was presented to the directorate of the Régie Renault in July 1974. After studying the report and discussing the situation, the planning department made a decision: the number one official target would be outright victory in the Le Mans 24 Hours. Renault must win it; nothing less would do.

Jean Terramorsi was already ahead of the game. He knew that to win Le Mans they had to have the power that, due to the regulations, was really only available from a 3-litre engine, and since Renault did not have a 3-litre he had to try something else. As we have seen, he sent Bernard Dudot off to the USA in the autumn of 1973 to study turbocharging, because within the small clique of his team a decision had already been taken to fit a turbo, maybe from Garrett, to the V6 2-litre. Dudot returned at the end of that year, but the Yom Kippur War in October put pressure on oil supplies, leading to the petrol embargo. This alarmed everyone, and the brakes were put on the development of the turbo. Early in 1974 the team had to review its position. However, Bernard Hanon, who was then head of planning at Renault, felt convinced that on paper the turbocharging route suggested by Terramorsi for the future was justified; they would pursue the idea, though they still had to demonstrate it in practice. They both reasoned that they had to acquire the necessary know-how to move on further.

Fortunately, by May 1974 the fuel situation had eased and the world could relax. Dudot, who had been quietly working away in Viry-Châtillon, had already started to see results after fitting a turbocharger to the V6 engine on the test bench – in fact, it was already running by the time Jacques Cheinisse presented his report.

The die was cast. If they wanted to win Le Mans they would need to perfect the car, and the only way to do this effectively, it was decided, was by racing against the competition. The best way to do that would be to enter the World Sports Prototype Championship.

"... the number one official target would be outright victory in the Le Mans 24 Hours. Renault must win it; nothing less would do."

The plan was that the A441-1 that Larrousse had used during 1974 would be returned to Dieppe and modified to become the car that would be known as the A441T for the 1975 season. Another new A441 – the A441-3 – was built at the end of 1974 for the restructured Larrousse-Archambeaud team, which was to be renamed Elf Switzerland. It was a normally aspirated car that would eventually mark the official return of Renault to Le Mans, when this car ran at the 1975 24 Hours. Marie-Claude Beaumont and Lella Lombardi were the contracted drivers. Elf Switzerland would also concentrate on the European Formula 2 Championships running an Elf 2 for Jean-Pierre Jabouille and Gérard Larrousse. For this a new Formula 2 Elf was being created, designed by Jean-Pierre Jabouille and his race engineering man, Jean-Claude Guénard.

For the turbocharged sports prototypes, the focus changed. Instead of competing against each other, albeit with the encouragement of Terramorsi during 1974, for 1975 the Larrousse-led team and Renault worked together. The entry was 100 per cent Renault, with the car being built in Dieppe. This cooperation was already taking shape in December 1974 when the modified A441-1 turbo-engined car first saw the light of day in secret testing at Paul Ricard.

As you can see, the very first car did not have an air box. François-Xavier Delfosse: "At the birth of the A441T in 1974, air feed was provided by a semi-dynamic hole in the engine bulkhead. The pipework feeding air to the turbo was directly behind the bulkhead, the air intake being the same as on the standard A441-0. For the first test in November, there was a compressed-air heat exchanger located just behind the original A441 air box intake behind Jabouille's head." However, this was quickly changed for the tests in December for the soon-to-be-familiar trumpet-type snorkel air box.

An interesting aside to the end of 1974 came when Jean Terramorsi had an idea for Renault to sell "a limited number of

On track. (Photo FXD ©U)

barquettes" for private drivers and teams, provided they supplied achievement records and all relevant guarantees (organisation, technical resources, etc). The price of a car, with engine ready to run, tuned and tested, was fixed at 240,000FF + tax, with delivery times spaced out between 15 February and 15 March 1975. Alpine would not undertake to provide maintenance of these cars, but chassis repairs could be done at Dieppe, while at Viry-Châtillon clients were offered an engine servicing schedule. It didn't happen in 1975. However, it was under this scheme that Jimmy Mieusset, a speed hillclimb specialist from Lyons, acquired one for the French and European Hillclimb Championships at the beginning of the 1976 season. His Alpine carried sponsorship and the colours of Norev, Motul, Var Matin and Cellier des Dauphins that year. One car also went to Japan, but the sales scheme to produce cars on a regular basis never took off and was dropped.

The 1975 season loomed large as the teams packed up for Christmas. Soon a new car would surprise the world of sports prototype racing – the first step on the way to Le Mans.

Back-to-back tests, December 1974: A441-0 and A441-1T, now with snorkel air intake (in background). (Photo FXD)

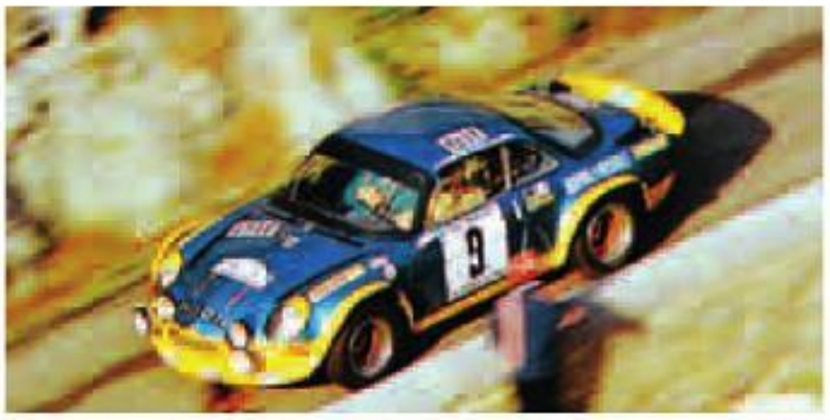
3 Turbo time

Matra decided to withdraw from the Sports Prototype World Championship at the end of 1974. It seemed that Alfa Romeo had also withdrawn permanently a few months earlier, and Porsche had withdrawn its factory team, too. Things were looking bad for the big prototype class. In fact, at Daytona at the beginning of 1975 the organisers abandoned the Group 5 class due to lack of entries. The long and short of it was that world finance was going through one of its downturns, and the money markets and big businesses, including the car manufacturers, were having a bad time. In a reflection of the economic situation, the ACO (Automobile Club de l'Ouest), organiser of Le Mans, changed its rules, deciding that the cars would have to run a set minimum number of laps between refuelling, thus imposing a fuel consumption control on the race. The stalwarts at the FIA were unmoved and deleted the Le Mans race from the World Championship! The 1974 European 2-litre Championship looked even worse; its lesser status saw few cars being entered, and only two races.

However, by the start of the European races for the World Championship classes at Mugello, things had started to look up. Businessman, entrepreneur, passionate race fan and former driver Willy Kauhsen put up the money to run a team. Alfa Romeo rose to the challenge, and was suddenly back to give the Kauhsen team factory support with its 33TT12s. The driver line-up was formidable: Jacky Ickx and Arturo Merzario in one car and Derek Bell and Henri Pescarolo in the other. Ranged against them were the 3-litre Maserati-powered Ligiers carrying Gitanes sponsorship, a lone Gulf Mirage GR7 and a host of private entries in the smaller classes. But all eyes would be on what the fans saw as a new Renault: an Alpine A441 turbo running in the 3-litre class and putting out a claimed 500bhp+. Was Renault to follow the route taken by Porsche, BMW and Alfa Romeo? Maybe it would be an interesting season for the prototypes after all.

Jean-Pierre Jabouille: "Jean Terramorsi had this idea about turbocharging, and in 1972 I remember he put one in an Alpine rally car. They also used the same engine in a single-seater, the 1600cc, putting out nearly 200bhp. They had put Bernard Dudot, the engine man at Alpine, on the project. I was driving in F2 at the time and was a factory driver at Alpine in the sports prototypes, when I got to hear during 1974 that they were going to try to turbocharge the V6 and I thought it was a great idea. It was our old friend François Guiter of Elf who had persuaded his boss to pay to get the V6 built. Guiter had got involved in the turbo project and eventually they also paid for the first two F1 engines made at Renault. The throttle lag was terrible at first, but after a long time and a good deal of frustration we won Le Mans, and also I won the first Grand Prix to be won with a turbocharged car in 1979."

Bernard Dudot: "When I joined Alpine in Dieppe in 1968, after chasing Mr Rédélé for many months, he said he wanted me to develop an engine department. They were working with Mignotet and Gordini and Moteur Moderne, but Jean Rédélé wanted his own development department. After a while spent getting the engine side of things better coordinated, I was allowed to stretch my ideas a bit and set up my first test bench [the first dynamometer in Alpine Dieppe] – I think it was 1970 – in the kitchen, because I needed a good supply of water! And it was there in that kitchen, after I had worked on several other engines, that Jean Terramorsi and Jacques Cheinisse suggested I start to look into the idea of using a turbocharger and so I started to investigate. BMW and Porsche were already in the



Jean-Luc Thérier wins the Critérium des Cévennes with the first turbo Alpine Renault. (Photo CD)

game. I contacted the British company that manufactured turbos, Holset. I remember the people there were very helpful and I fitted and tested a turbocharger for the first time on the 1600cc unit. That was the first modern-era Renault turbocharged engine – designed and created in the kitchen at Alpine in Dieppe! That engine was put into an A110 Berlinette and it won on its first outing. The turbo lag was dreadful, but Jean-Luc Thérier was such a good driver that he was able to overcome this failing and used the enormous 200bhp power in that Alpine A110 to the full."

Moving ahead, Bernard Dudot continues: "We had come a long way from the early days in the kitchen and with our enthusiasm and hopes it was decided to try to fit a turbo onto the 2-litre V6 sports prototype engine. In the October of 1973 I had gone to Los Angeles to study turbos and came back just before Christmas with information that would decide the way forward during 1974. By the middle of 1975 the Renault-Gordini factory at Viry-Châtillon would be fully occupied with the 2-litre turbo programme and was starting to think about going for outright victory at Le Mans as the main objective. But first we would use 1975 as a development year and run in the World Sports Proto Championships. Early in 1975 we also started to look at a turbocharged Formula 1 engine that would be developed by Jean-Pierre Boudy and a small team in the utmost secrecy. Jean-Pierre's team was very small: two mechanics and a designer under the direction of Giuseppe Albarea, by now the head of our design office. Two secret prototype engines based on the 2-litre turbo V6 were built."

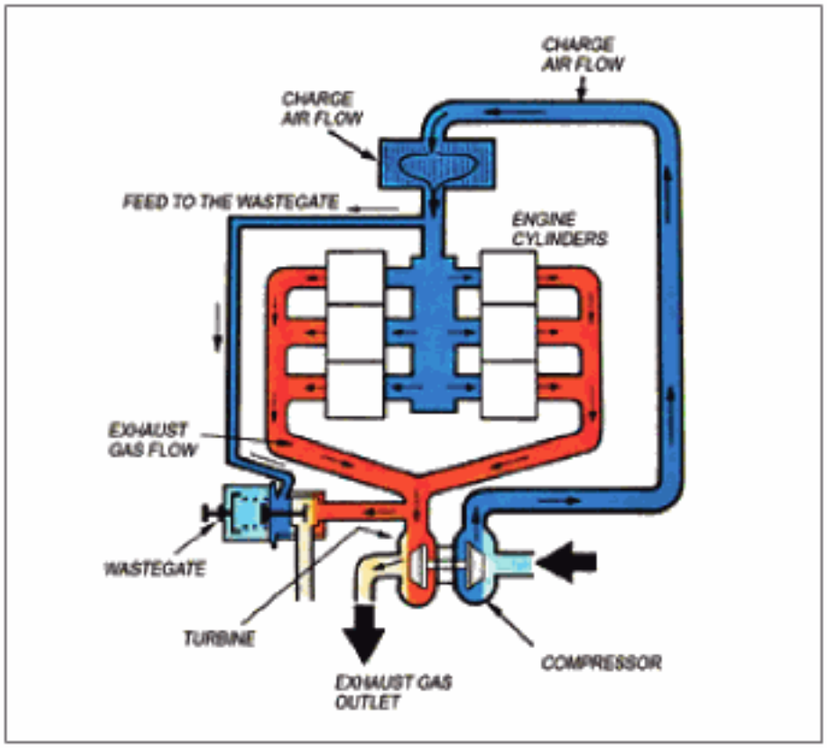
So what is a turbocharger? Bernard Dudot again: "The turbocompressor [turbocharger] is the means by which the engine is fed by fuel and air boosted above atmospheric pressure. The idea had been thought of many years before – and even by Louis Renault – but it was the French engineer Rateaux who was the first who actually used it in 1917. A turbocompressor is a mechanical device comprising:

– a hot section receiving the exhaust gases: the turbine (rotor wheel and housing);
– a cold section that compresses the air destined for the induction: the compressor (rotor wheel and housing);
– a shaft that links the turbine and compressor rotor;
– a central housing supporting the shaft and the rotors and linking the turbine and compressor rotor.

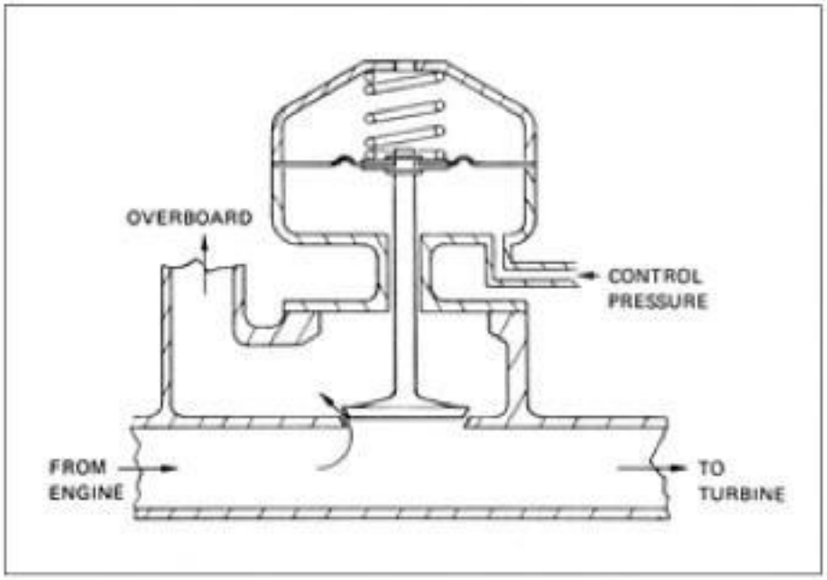
"An internal combustion engine delivers exhaust gases from the combustion chamber at a high temperature and at high speed. It is the energy from the speed of the gas which is recuperated in the turbine and causes the compressor wheel to speed up. Air is taken in at the inlet side of the compressor at atmospheric pressure and put under greater pressure in the compressor chamber by centrifugation. The fast-moving assembly of shaft and wheel can reach 180,000rpm in the case of small turbocompressors such as those we eventually used in Formula 1 V6 engines."

Bernard Dudot continues: "Our 2-litre atmospheric unit had been developed during the previous year to a point where around 300bhp was available in atmospheric form. We knew we would need more power than that to win at Le Mans; we also knew the regulations allowed us to go up to three litres for prototypes and so we set about the calculations needed in order to design a turbocompressor. It is too easy, though, just to say that we went the turbo route: a lot of things needed to be considered and we were not the first to use a turbocharger unit in a sports car.

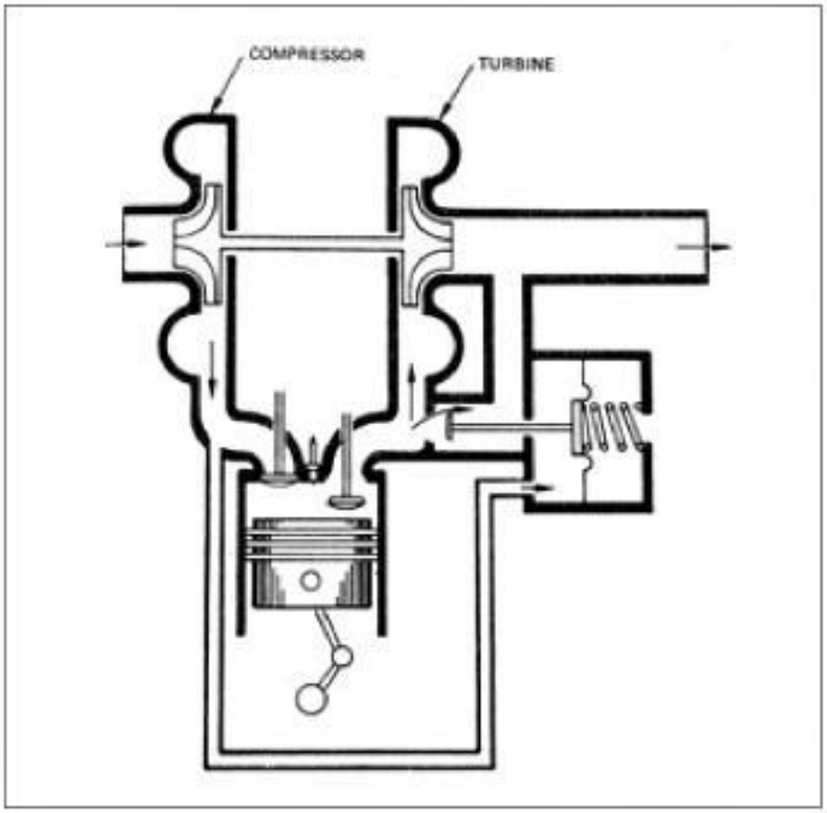
"In the case of an engine with controlled ignition," Dudot explains, "we know that 35% of the energy released by the combustion process is evacuated from the combustion chamber



Gas flow. (©R)



Simple poppet-type waste-gate. (Image ©BD)



Schematic of how the system works. (Image ©BD)

in the engine down the exhaust pipe as exhaust gases. Only a part of this energy, though, is recoverable. We need to catch this energy to turn the turbine, which turns the compressor, which feeds the fuel air mix under pressure to the engine.

"For the turbo technicians the trick lies in the application of a range of variables: 1) the representative points of the engine's air requirements in the best possible efficiency zone while remaining short of the maximal speed of the compressor; 2) the A/R of the compressor housing; A being the surface of the section of the volute (scroll) at the inlet mouth; R being the radius of the centre of the section; 3) the 'turbine ranges' which match the value of the exhaust gas throughput with the dimensions of the turbine chosen; 4) sweeping efficiency and the behaviour of the exhaust valves and pistons to achieve the best possible combustion efficiency; 5) the volumetric ratio which determines the maximal pressure obtained in the chamber during combustion.

"Generally, as you had to begin somewhere, more often than not you based the calculations on an analogy with known engines. We found that with a big turbo you got lots of power and torque but the pick-up lag was bad; if we changed to a smaller diameter unit the pick-up would be faster but the power less. We had to learn from Garrett how to determine the volumetric ratio as this would determine the size. Excess energy in the turbo is evacuated direct to the atmosphere prior to the turbine inlet, through a bypass usually known by turbine designers as a 'waste-gate.'

Garrett turbo cutaway. (©R)

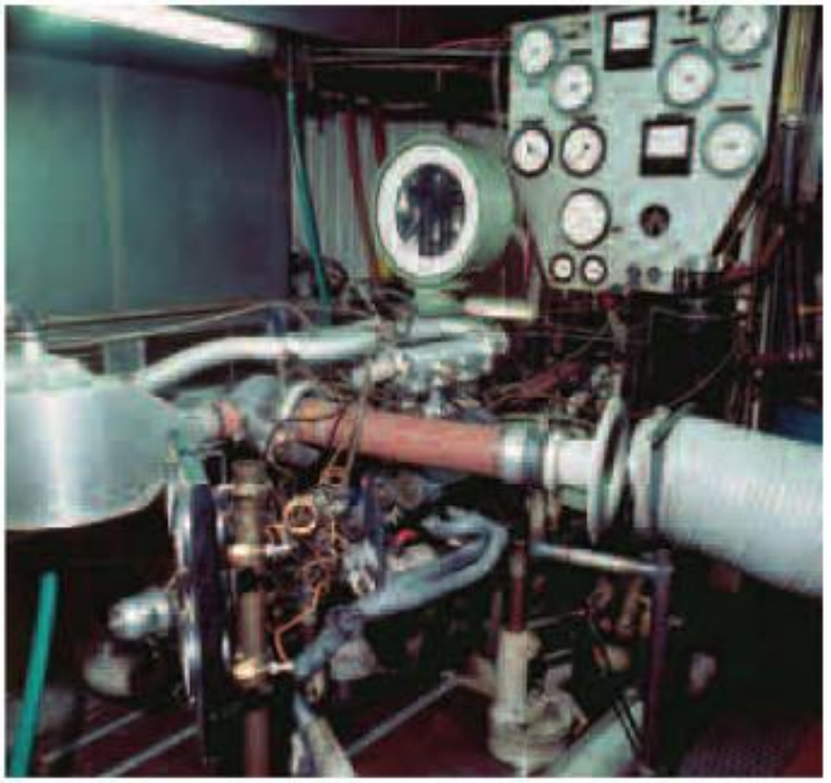
"Initially, the waste-gate was used in the simplest possible way, and just as it was delivered to us by the turbocompressor manufacturer. A spring held a supporting valve in its seat and, when the induction pressure was reached, the pneumatic effort exerted on a membrane counterbalanced that of the spring, the valve opened and the excess exhaust gases escaped into the atmosphere.

"The first proper test of our new engine in a car was a great moment. It took place at the Paul Ricard circuit at Le Castellet in November and December 1974 [see previous chapter]. In the greatest secrecy, we had fitted one of our Alpine A441 sports prototypes with the first turbo; of course, at that time we had nothing to compare the engine behaviour with, other than our 2-litre atmospheric car ... On this first occasion it was a matter of clearing the ground to make way for more significant tests, and certainly after his first contact with our future engine Jean-Pierre Jabouille was guarded in his enthusiasm. However, although only a few people from the factory were directly concerned in this first trial run, enthusiasm within the Viry-Châtillon team was high." Testing continued into 1975 with Jabouille driving.

"Many problems arose due to the level of knowledge of our subcontractors relating to thermal and mechanical loads on such small parts, which was rather limited at the time." – Alain Marguet

Alain Marguet, Renault engineer: "At the beginning, the first engine gave us around 485bhp – a bit less than 500. For us power was not the problem. The first problem was reliability, because at this time nothing was adapted for such a system. For example, on a turbo car you also have an air cooler and this cooler was very heavy – at the time unbelievably heavy – and we had a lot of problems with temperature, vibration and cracked coolers and if you have a leak you lose turbo pressure, and that was a bit of a problem. It was the same for all the hoses. The clips were not strong enough at first to retain them because of the temperature – it was very hot – and the pressure. All these parameters were completely different and completely new for us, plus we had a lot of problems of reliability. Many problems arose due to the level of knowledge of our subcontractors relating to thermal and mechanical loads on such small parts, which was rather limited at the time."

Giuseppe Albarea: "Although the turbo itself initially came from outside Renault, there was a lot of work to be done in-house. There were quite a few things to consider; in particular, the valves had to hold up because we had gone from atmospheric temperature to the temperature of the turbo, which was nearer to 1000°C. So we designed hollow-stem valves. We hollowed out the stem of a valve and put sodium in it; this was a known trick, but had not been used on the first V6 atmo engine. To do this we had to increase the diameter of the stem, which of course impacted upon the design of the valve guide. At the time we had 7mm diameter on the atmospheric engine and we had to go to 8mm on the turbo. Because the regular manufacturers had no experience they did not believe what we wanted to do. We had to tell them, 'No, we need larger diameters – make a hole!' It was quite difficult.



Dyno at Viry-Châtillon, 1975. (©R)

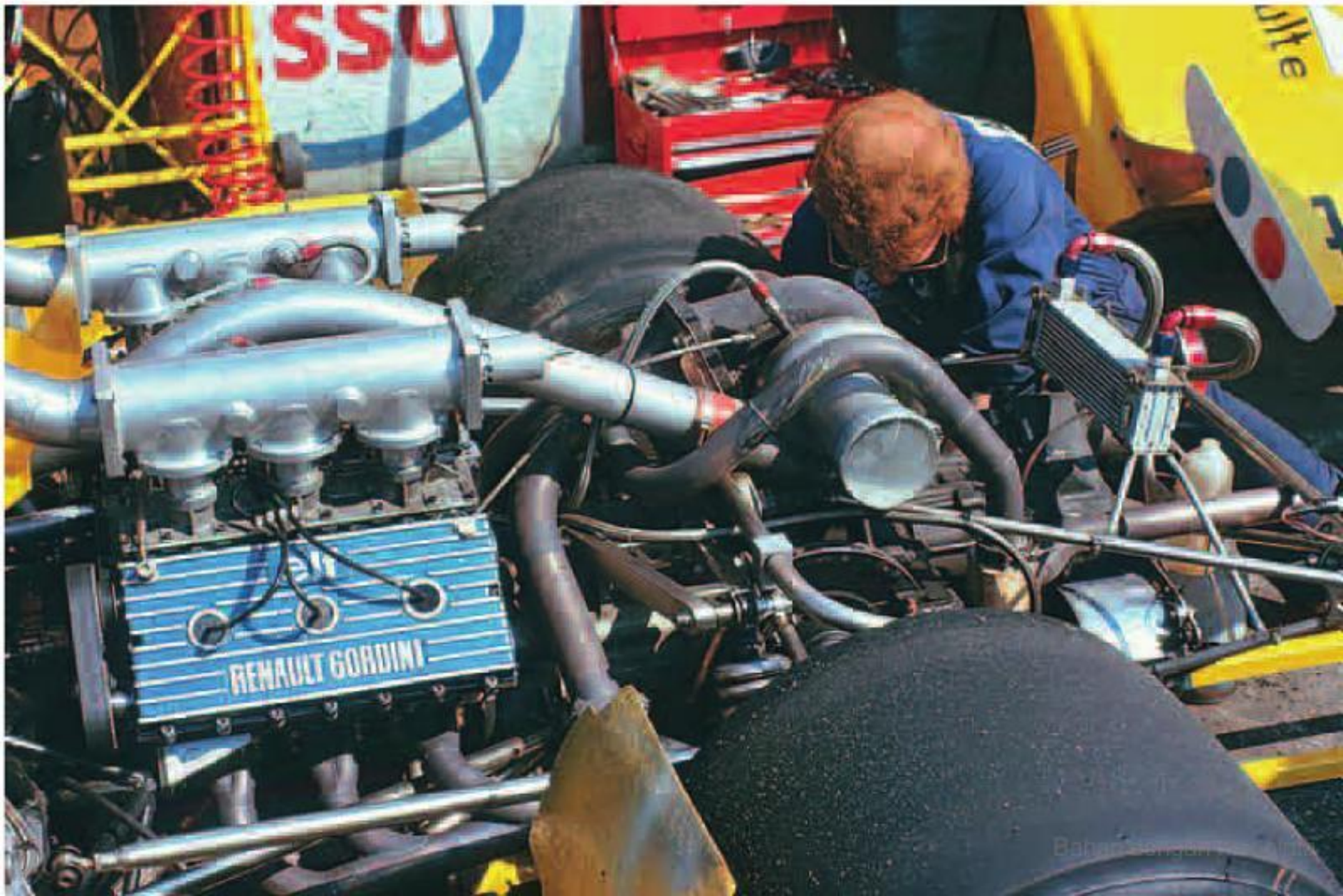
"When we ran with these valves on the test bench it worked well. Testing became complicated. We now had injection by a special cam and you had to measure all the points on the test bench, then as modifications were required the design office had to draw the new part and then manufacture it. There were no computers at the time; we used conventional machine tools and everything was done manually. Then it had to be heat treated, so when they said they were going to design a new part – say, a cam – it could be more than a month before it was ready. Today you type in the request and change the cam profile immediately."

François-Xavier Delfosse: "The basic engine size is identical in the atmospheric and turbo versions and it was fitted in the A441 and the A442 in the same way; both installations are practically the same. The difficult areas are the exhaust exit pipes

that go towards the turbo, the evacuation of hot gases and the cooling of the compressed air. We thought for a long time about what we could do. At the time, I fought hard for the development of the engine with two small exhaust collectors and two small turbos and not with one large single turbo, because I believed it would be better to have a lateral turbo exhaust as opposed to a single rear outlet where the exhaust has to pass through the transmission area and the suspension, especially in a prototype where you have only a small space inside the bodywork in front of the rear wheels. But this idea was not taken up, and we carried on with a large single turbo above the gearbox with rear outlet.

"A few years later, under François Castaing, Renault Sport did go for twin turbos in F1 and the engine worked much better! It's a pity that they didn't do it in 1975, as I'm sure we had the potential. Anyway, management decided to develop a solution which placed the turbo above the gearbox, with the heat exchanger in front of the engine, above the fuel tank, and it worked well. We later decided, too, to use an air box similar

Single turbo mounted above the gearbox. (Photo AB)



to the one on the last A441s; at first we tried a sort of sleeve attached to the early standard air intake alongside the driver's helmet."

Tests continued through the winter of 1974. Results were promising, and come the following spring the stage had been reached where the Renault Alpine team could go into the 1975 World Sports Car Championship with a lot of optimism.

The Alpine A441 turbo chassis development team was led from Dieppe by André de Cortanze, assisted by François-Xavier Delfosse's organisational talents at the tests and André Désaubry's mechanical team. Renault management employed the drivers, Jabouille and Larrousse.

After the Matra pull-out, Gérard Larrousse, who had been one of its key drivers, was also running the Elf Switzerland team and driving the F2 cars with Jean-Pierre Jabouille in the European F2 Championships, leaving the day-to-day management of the team to Jean Sage. The Elf Switzerland team's new sports prototype A441-3, a normally aspirated car, was driven by Marie-Claude Beaumont and Lella Lombardi. The factory turbo prototype cars were still called Alpine Renaults, but the team was in effect an all-Renault venture, with overall boss Jean Terramorsi keeping a close eye on everything.

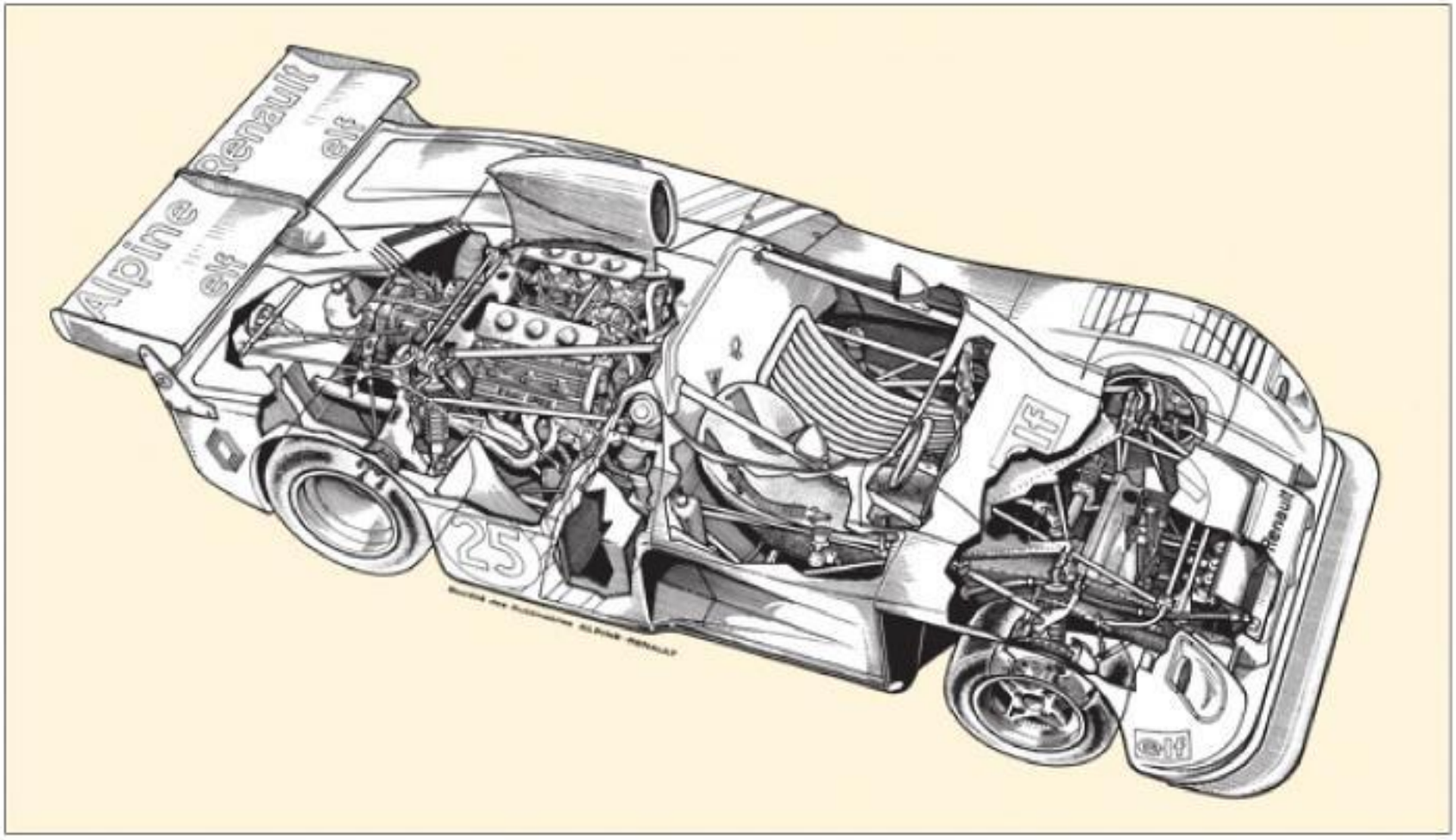
The Elf Switzerland team was working out of its new workshops at Châtenay-Malabry. Jean Sage: "It was really good, a great team – the same people we had the year before, but also with Jabouille and his engineer Jean-Claude Guénard on the F2 side." The Switzerland part of the name reflected the continued sponsorship from the year before from the Swiss Gruyère and Emmental Cheese Federation, which was a significant organisation in Switzerland. Jean Sage again: "They were happy with what had gone on in 1974 and got on very well with Mr Archambeaud. When he decided the year before that owing to financial problems he would not continue, Gérard and I went to see the Swiss Cheese Federation and it was agreed that they would carry on with their sponsorship. The same thing happened for 1975, not only with the new A441-3 sports prototype car but especially the Formula 2 side. Elf was also on board and with a larger investment. The car was called an Elf 2, designed from scratch by Jean-Pierre Jabouille and built by Jean-Claude Guénard. Because of this joint sponsorship, the team was named Elf Switzerland. Through 1975, the Elf 2 continued to be developed and turned into a Championship winner in 1976, when the European Formula 2 Championship was taken by Jean-Pierre Jabouille."

Sports prototype racing began with Mugello on 23 March – 150 laps of a 3.259 mile (5.245km) circuit. In an attempt

Testing continues through the winter. (Photo FXD)

Elf Switzerland Formula 2. (©R)

to increase the number of entries for the World Prototype Championship, which was now separate from the one reserved solely for Group 5 Silhouettes, the FIA decided to authorise the participation of the 2-litre prototypes. Renault decided to enter both the 2-litre and 3-litre Championships. In certain circumstances, fuel consumption would favour the atmospheric engines rather than the turbos. The turbo A441-1, the old Larrousse team car re-designated the 441T and now painted in Renault yellow, would be accompanied by a second car, a normally aspirated A441 (the new chassis A441-3). Run by Elf Switzerland with full factory support, they were going for the 2-litre class win whilst the factory car, the turbo, would run in the 3-litre class.



The A441-3 normally aspirated 2-litre car. (Image AAA)

The A441-3 had the following specification:

- Tubular chassis stiffened by aluminium plates
- Bodywork: polyester
- Engine: semi-stressed member
- Power: 295bhp at 12,000rpm
- Kugelfischer indirect mechanical injection
- Transmission: BV Hewland, type FG 400, manual 5-speed.
- Suspension: triangular wishbone with helicoidal springs and struts.
- Brakes: ventilated discs, in-board at rear, Lockheed system.
- Dimensions: wheelbase 2.31m; length 3.91m; width 1.87m; weight 575kg.
- Maximum speed: 292kph

The new A441-3: a press release photo. (©R)

Preparations at Mugello. (©R)

Driven by Marie-Claude Beaumont and Lella Lombardi, it proved to be very fast. It also had a new steering rack, different aero package and greater road-holding capabilities compared with the preceding A441 cars. The drivers reported that it was also a great improvement in terms of driving comfort.

The first race of the year for the World Manufacturers' Prototype Championship had been over in the USA at Daytona, and Renault had decided not to go. Mugello in Italy was the first outing, and it was the first time that year for the World Sports Car Championship circus to stretch its legs in Europe. The word had

The A441-1T, now in yellow. (©R)

got round: Renault was coming with a turbocharged car! Nobody was worried. OK, it had won the European 2-litre Championship in 1974 pretty convincingly but hey, this is the World Championship! Matra may be gone, but Alfa is back. "It's only a test," said the Renault PR men. "Don't expect anything special!"

On 21 March the teams began to turn up, and on 22 March the track action began.

In early running the team could not make the turbo work properly. It was terrible, and Larrousse, who was driving the car for the first time, was frustrated. "I had not driven the turbo

Practice: Marie-Claude in the A441-3 atmospheric car. (©R)

Huge Michelins. (©R)

Clear view of the layout on the turbo car. (©R)

Marie-Claude and Michelin man Georges Bresson. (Photo GL)

car before we got to Mugello," he said. "In 1974, although I could drive our own team's A441s in the European 2-litre Championship, I was forbidden to test the A441 turbo because it was a Renault project and I was contracted to Matra for the World Championship sports car programme. Of course when that finished I was free for 1975, but did not drive it until Mugello. Jabouille did all the testing." Jean-Pierre Jabouille: "In the beginning at Mugello it was just like testing: sometimes it was OK and then sometimes it was useless, very annoying. It was just not fast enough on the first few laps of practice, but we were in for a surprise."

Bernard Dudot and Alain Marguet got to work, and suddenly, as if by magic, near the end of qualifying the Alpine A441 turbo became a revelation. Although it got pipped to pole position by the Arturo Merzario/Jackie Ickx Alfa Romeo 33TT12, the 786km race over 150 laps of the 5.2km circuit was set to be a cracker.

Car 5, the Jabouille/Larrousse Alpine, second on the grid, qualified with 1min 48.89sec while the pole-sitting Alfa did 1min 48.83sec. Alain Marguet: "For me this race was unbelievable, because during practice we were in real trouble; the engine was not working even though we had done lots of tests. I remember it was a problem with the Kugelfischer injection. With the turbo we'd had to modify the Kugelfischer system, which is normally used with an atmospheric engine, to make it compatible with the turbo and the pressures required. The Kugelfischer was operated by a piston which worked in conjunction with the pressure of the turbo. Turbo pressure gave the signal to this piston,

Jabouille in practice. (Photo GL)

An amazing first race victory for the turbo. (Photo GL)

Lella Lombardi. (Photo GL)

activating a cam on the injection pump which supplied more fuel as required. Each piston was fed by its own injector, with all six pistons being fed by a cam driven by the turbo pressure unit, which itself had a piston and spring. We could change the strength of the spring and the position of the camshaft relative to the piston by a rack mechanism.

"During practice in the days before the race, we were not sure exactly what it was doing, especially when the engine was not working efficiently, so between the practice and qualifying we opened the Kugelfischer pump and made some adjustments. I can't even remember what they were – we were just desperate to get the car out on the track. Then suddenly the engine started to run well and Jean-Pierre jumped in, tore out and put it on the front row! We were amazed, and so was everybody else. We pretended to stay cool, but they had no idea how we were really feeling – the competition wasn't aware we had any problems! But in fact we were praying like we had never prayed before. During warm-up, too, the engine was working fantastically and to be honest I'm not sure even today what we did! Bernard Dudot wasn't sure either, but we had no time to worry and no opportunity to test it. Whatever we had done was working, though I wasn't sure why."

At the start of the race the Alfa got off in front and continued to pull away; then it reached a point where the gap between it and the Alpine became stable. On lap two Jabouille started to close the gap, and on lap three he got by. Then four laps later

Hectic pit stop: Lella in after Marie-Claude. (Photo GL)

Pit stop for Larrousse. (Photo GL)

Merzario retaliated, only to be passed again as Jabouille put nearly ten seconds into the Alfa just before the first pit stop. Larrousse then took over and the lead swopped again and again as the pit stops unfolded, with the Alfa at first taking the advantage. Then the Alfa came in to change brake pads; a pad had welded itself in and several laps were lost as the A441T closed in and went by with the Alfa still in the pits. Now the choice of turbocharging the V6 looked like the best decision ever; it was running superbly and was absolutely dominant as the Alfa rejoined the race a distant second.

The weather was cold but dry and this suited the turbocharged car, which put in the fastest lap of 1min 49.8sec. All was going well, as it was also for Lella Lombardi/Marie-Claude Beaumont in the non-turbo Alpine A441-3, which was having a cracking wheel-to-wheel race with the Hine/Grob Chevron, swopping positions many times. The A441-3 Alpine qualified on tenth spot with a 1min 55.94sec lap. In the race it was pipped to fifth place overall by the Chevron, but it was up front that the excitement was mounting in the Alpine Renault camp. The team was almost speechless; this was a new car, barely tested and running on new-style Michelin tyres, but it was giving a flawless exhibition as Jabouille/Larrousse sailed to victory.

The celebrations began. André Désaubry: "Mugello was a good memory. Delfosse was there with Dudot and Marguet – all of us together. We had a bit of a party afterwards with the team.

The Alpine workshops directly after the Mugello race. The old A220 from 1969 is in the left foreground; car 6 is the new A442 in preparation; near to the camera is the front of the A441T. (Photo CD)

I remember Marcel Hubert had had quite a bit to drink and at one point we saw him going up and down in the lift several times because he didn't know which floor he was on! We were waiting to take the lift, and we kept seeing Père Hubert going past us, up and down!"

The team returned to Dieppe in buoyant mood. Terramorsi's gamble, Dudot's and Boudy's expertise and Castaing's excellent V6 engine had done the job first time out with a turbo. Next up would be a race on home soil – the Dijon 800km. Could they repeat the Mugello win? First they would need to prepare properly. They knew within the team that Lady Luck had played her part in the Mugello win. The car's systems were new; it was not fully developed and in terms of a turbo it was only an interim car. The design team was ready to launch a new car to be called the A442 – not just a development of the A441 but a car designed specifically for the new turbo engine.

The 1974 A441-2 in the foreground, with the A441-0 earlier car alongside, and the turbo in the background. (Photo CD dated April 1975)

A441T, the Mugello victor, in testing at Dijon. (Photo GL)

6 April 1975. The Dijon 800km: 245 laps of a 2.044 mile (3.289km) circuit. The pressure was suddenly on, with the French followers of sports car racing expecting another victory. It was the second time that Dijon had run a round of the World Championships, and it was a pity that only 30 cars started in this prestigious Championship event. Alpine had three cars on hand: the new A442-0, of which more in a moment, the A441T turbo that had won at Mugello, and the A441-3 Elf Switzerland car. The A441T was to be used extensively as a mule, a test car, as Renault was still developing the turbo engine and as yet no one knew its limits, especially after the victory in Mugello which had gone amazingly smoothly – too smoothly.

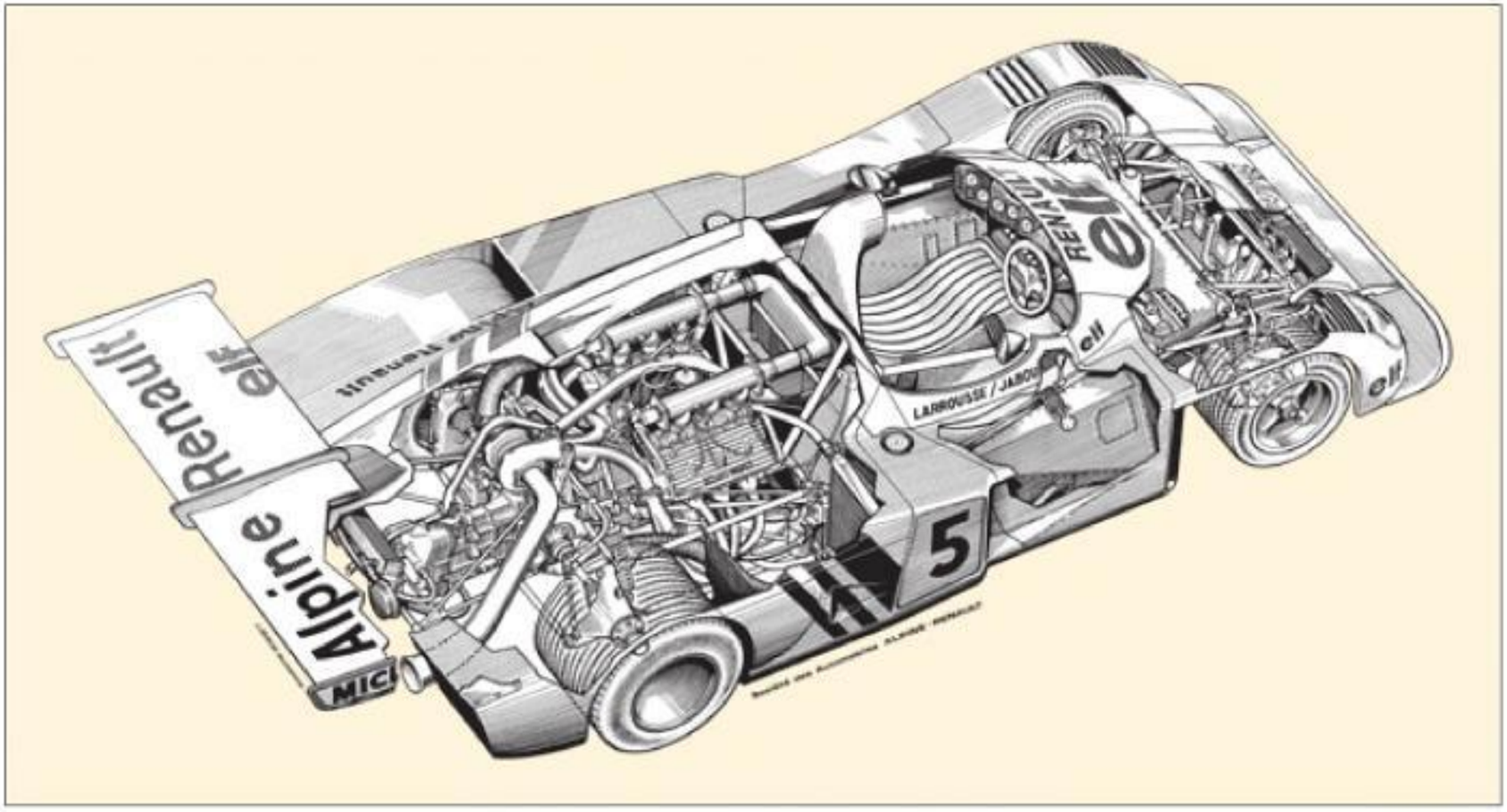
Car 60, A441T, used only as a test vehicle from now on. (©R)

The new A442 took pole. (Photo CD)

Everyone in the team was nervous. However, it was the new A442-0 that surprised everyone with a blistering time equalling the 1min 00.9sec of the Willy Kauhsen entry of Henri Pescarolo/ Derek Bell in the Alfa 33TT12. Larrousse had been at the wheel and the Alpine was given pole position, as it was the first of the two teams to record this time. Strangely, it was one of several identical times through the grid that day. Now it was one victory and the first pole position in only its second race.

François-Xavier Delfosse: "For this race we were still really only testing, in spite of our victory in Mugello. As can be seen, all three cars – the A441T, the A442 and the Elf Switzerland car – had different dynamic air boxes. Those of the A441T and the A442 formed an elbow, with a more pronounced curve than on the later A442, and a longer air inlet, situated higher on the A441T. There was no elbow on the A441-3; its air inlet was a horizontal box, profiled at the rear and mounted on a vertical support above the engine hood. As far as I recall, the A442 had a snorkel air box from the beginning. But we tried different versions, and in the end, looking at the photos, I can see the one chosen for this race at Dijon is a sort of 'gloute' as on the A441T.

A441T again in practice tests. (Photo CD)



A442-0 monocoque turbocharged 2-litre car. (Image ETAI)

"When the first A442-0 appeared with an air box, it was not to feed the engine, but had the sole function of feeding cold air to the cooler matrix, the feed of air for the compressor being provided by a NACA inlet on the left side of the rear hood. This design was changed in the 1976 season as the air box was divided into three sections. The A441T, wearing number 60, only ran in practice. The new A442-0, number 6, did both practice and race."

The A442 chassis was lighter – the first Renault all-monocoque construction as opposed to the A441's tubular chassis. It had the largest legal fuel tank of 120 litres and many new, exotic materials were used in its construction.

François-Xavier Delfosse: "Our dream of Le Mans really got going in 1975 at Dijon. But not everything went brilliantly. We were testing with the A441T and had got the new car out when suddenly the weather changed and it started to snow.

A441-3 with Marie-Claude. (Photo AB)

Jabouille on a charge. (Photo AB)

Gérard Larrousse. (Photo GL)

We waited all Saturday for the race, not knowing if it was on or off. The weather did improve during the afternoon but the track was still very wet. We had a problem with the turbocharger and the heat exchanger; the air circulation system under the engine cover was a big box in two sections, a top and a bottom. We had long discussions with Marcel Hubert about air flow and size and weight of parts, etc. A new material, Kevlar, was around then and we decided to make a mix of Kevlar and resin parts. However, the aluminium parts on the bottom section of the air box did not fit together properly with the Kevlar top part, so we used steel bolts to hold it all together and seal it. But the heat given off by the turbo was very high and caused the different materials to react in different ways, causing a distortion which cracked the joint between the plastic and alloy sections. Result: the turbo failed. A cooling pipe failed as well, for the same reason, so we designed a new joint between the two parts. It was essential to keep the seals in the turbo system completely tight and pressure in the area constant. We also had quite a lot of difficulties with the exhaust outlets on the turbo cars, the evacuation of hot gases and the cooling of the compressed air. We thought for a long time about what we could do."

For the race, it was freezing cold, but the snow had melted and cleared from the track quickly, so it was fairly dry as the cars left the line to start the first of 245 laps. Jabouille was almost caught napping by the third-placed Pescarolo Alfa as Merzario took advantage of an early lead. After qualifying and the start the team felt optimistic. As Jabouille dived under Merzario on lap

Head gasket failure. (Photo GL)

three to take the lead and pull away, the awesome power of the turbo was plain to see.

On the tight Dijon circuit, the leaders soon caught the backmarkers as they ripped round and round at a cracking pace. Jabouille and Merzario, now in closer order, came upon one of these backmarkers. Jabouille got by on one side, but Merzario, passing on the other, clipped the slower Lola and spun off, allowing his team-mate Pescarolo to pass. Exciting stuff – and it got more exciting as a charging Merzario tore back into the race. Jabouille was running comfortably at the front, but disaster was around the corner as he came in on lap 57 to hand over to Larrousse. A pool of water appeared under the car, its trail visible as it left the pits. Larrousse was back in the pits on the next lap: the water gauge had gone off the scale. The head-gasket had failed – the car was out.

After qualifying in ninth place on 1min 04.9sec, Marie-Claude Beaumont and Lella Lombardi were also hurtling round in the so-far ultra-reliable A441-3. Marie-Claude was wrestling with the Chevrons and the Lola of Alan Jones and again doing well, until suddenly on lap 180 the engine expired, dumping all its oil on the track at the end of the straight. Game over for Alpine Renault and Elf Switzerland.

Just before the big bang. (Photo GL)

Monza: lots more testing with both cars. (Photo GL)

Larrousse waits to go out again in the A441T. (Photo GL)

Two weeks later the teams were due to head off to Italy for round four of the World Manufacturers' Championship, the Monza 1000km held on 20 April – 174 laps of a 3.592 mile (5.7km) circuit; no banking now, but still an enormously fast track. Would the team have time to recover from the Dijon setbacks? Fresh engines were installed, and off they went to the superfast circuit. Although they took the A441T, which was used in practice to conduct tests, only one turbo car eventually took part.

In practice, the Alpine team struggled when an accident involving Gérard Larrousse in car 4, the A442-0 shared with Jabouille, saw it spending a lot of time in the pits. The two drivers

Lella Lombardi. (Photo GL)

Storming away ahead of the Alfa. (Photo GL)

Running strongly at this stage. (Photo GL)

then took to the A441T for testing, and ran successfully while the A442 was being repaired. Eventually, they got the repaired car back out and recorded fourth fastest lap with 1min 30.34sec. The Mirage Ford of Jochen Mass/Tim Schenken was on pole with 1min 28.97sec, a good bit quicker than the A442.

For Elf Switzerland, Lella Lombardi and Marie-Claude Beaumont put the normally aspirated A441-3 on 12th place on the grid with 1min 37.73sec. A long way down the grid, one might think, but a surprise result was in store. On a warm, dry day, 40 cars lined up to start and from fourth place Larrousse steamed into the lead using the turbo power to great effect on the first lap. The Mirage tucked in behind, and for several laps the lead was swopped many times as Monza's famous track facilitated slip-streaming.

Before the first pit stops Larrousse had pulled out a 20 second lead. Things were looking good. Lella Lombardi had

Lella Lombardi. (Photo LAT/JW)

Marie-Claude awaiting her turn. (Photo GL)

also put car 15 in the front of its class. After the first pit stops, Jabouille – now driving the A442 – took over the lead as the other cars made their stops. All was going well with the car itself, but not the tyres: suddenly, just after half-way, it suffered two punctures, resulting in two stops that slowed down its progress.

Meanwhile an ailing Marie-Claude Beaumont had taken over the A441, and depite feeling terrible she was driving reliably; thus far the scheduled stops were routine and had caused no problems. Jabouille began to storm back after the punctures, determined to wring the maximum from the powerful turbo, and due to the other cars' stops and his strong driving, was back up to third place when he clipped one of the Lola DFVs, getting a third puncture in the accident. So far, apart from the tyres, the team was having a failure-free run, and after a wheel change the car was quickly sent back out to finish with a hard-earned third place and 170 laps completed.

During one of his stints, Larrousse also set the fastest lap of 1min 30.2sec, an average speed of 143.343mph (230.687kph), but it was the Merzario/Lafitte Alfa Romeo 33TT12 of entrant Willy Kauhsen that would dominate and take victory after 174 laps, with the Porsche 908/3 of Reinhold Joest/Mario Casoni on 171 laps in second, the pole-sitting Mirage of Jochen Mass/Tim Schenken having had gearbox failure with 128 laps gone. The Alpine's solid third placing, which surely would have been higher without the punctures, was backed up by an amazing performance from the women's team in the Elf Switzerland

Larrousse out, Jabouille in. Engine guru Bernard Dudot on the right. (Photo GL)

Marie-Claude not feeling well, but a great result. (Photo AB)

Car 15: winner of the 2-litre class. (Photo GL)

A441-3, coming in just behind in fourth place on 166 laps and winning the 2-litre class. The girls had beaten the men at their own game, as well as thirteen 3-litre cars! There was a lot of muttering in the pit lane ...

After the cut and thrust of Monza came the Spa 1000km on 4 May. The Renault Alpine factory team entered, but then decided to give this round a miss, leaving Alfa to clean up in first and second. Likewise, the Elf Switzerland team did not race. Two weeks later, it was time to go to Enna-Pergusa in Sicily for the 1000km Coppa Florio on 18 May. The factory team decided not to run the A442 in the big class, so only the Elf Switzerland team entered with the A441-3, car 10, for Lella Lombardi/ Marie-Claude Beaumont. Once more they would be battling with the Hine/Grob Chevron, and started proceedings by taking pole in the class and fourth overall on the grid with a time of 1min 27.21sec. But strange things were happening: on each of the practice days the car had an accident, both times caused by a broken rear suspension arm. Fearing a bigger accident in the race and unable to understand why it was happening, the team decided to withdraw. Jean Sage: "It was the right decision. We couldn't fathom the suspension failures; maybe it was faulty parts from the factory or maybe there were other factors, but it would have been both irresponsible and dangerous to let the girls race when we didn't know what was causing the breakages, so I withdrew the car." Apparently they spent the very hot day in swimsuits, renting a rowing boat on the nearby lake, relaxing and enjoying themselves away from the noise of the race.

By now there were some interesting developments behind the scenes concerning wheels and tyres. Without going into

Fourth overall and 2-litre class win: Lella, centre left, with Marie-Claude. (Photo GL)

minute detail, the long and the short of it was a rule change that restricted rim widths. This became quite an important issue for the Renault Alpine team, because Michelin had been at work on a new compound for its tyres. Pierre Dupasquier, Michelin: "We had realised, during private testing with Ferrari, that we had to use specific rubbers depending on the track surface and temperature. Back in the late sixties we had already noticed that our new 'slicks' picked up balls of rubber that had worn off from other tyres during a race at Le Mans. Our technicians pondered over this situation and apart from the realisation that we needed to develop tyres that did not do this, we also started to realise that if they were doing this they were becoming sticky. As technology improved, a lot of tests and new chemical mixes of different compounds had shown us something quite remarkable for the time. We started to use very special tyres just for qualifying; they were very sticky and would only last a few laps. This was a new concept in 1975."

It was on 31 May 1975 at the Nürburgring, the day before the race, that the first car with what we now call qualifying tyres was finally ready. No one in the pit lane noticed any difference – they were still just black and round! Gérard Larrousse and Jean-Pierre Jabouille were the drivers. Practice and qualifying showed how impressive these tyres were – so impressive that the A442-0 driven by Jabouille and Larrousse was nearly 14 seconds faster than the first Alfa Romeo, shod with Goodyears. The gap was huge.

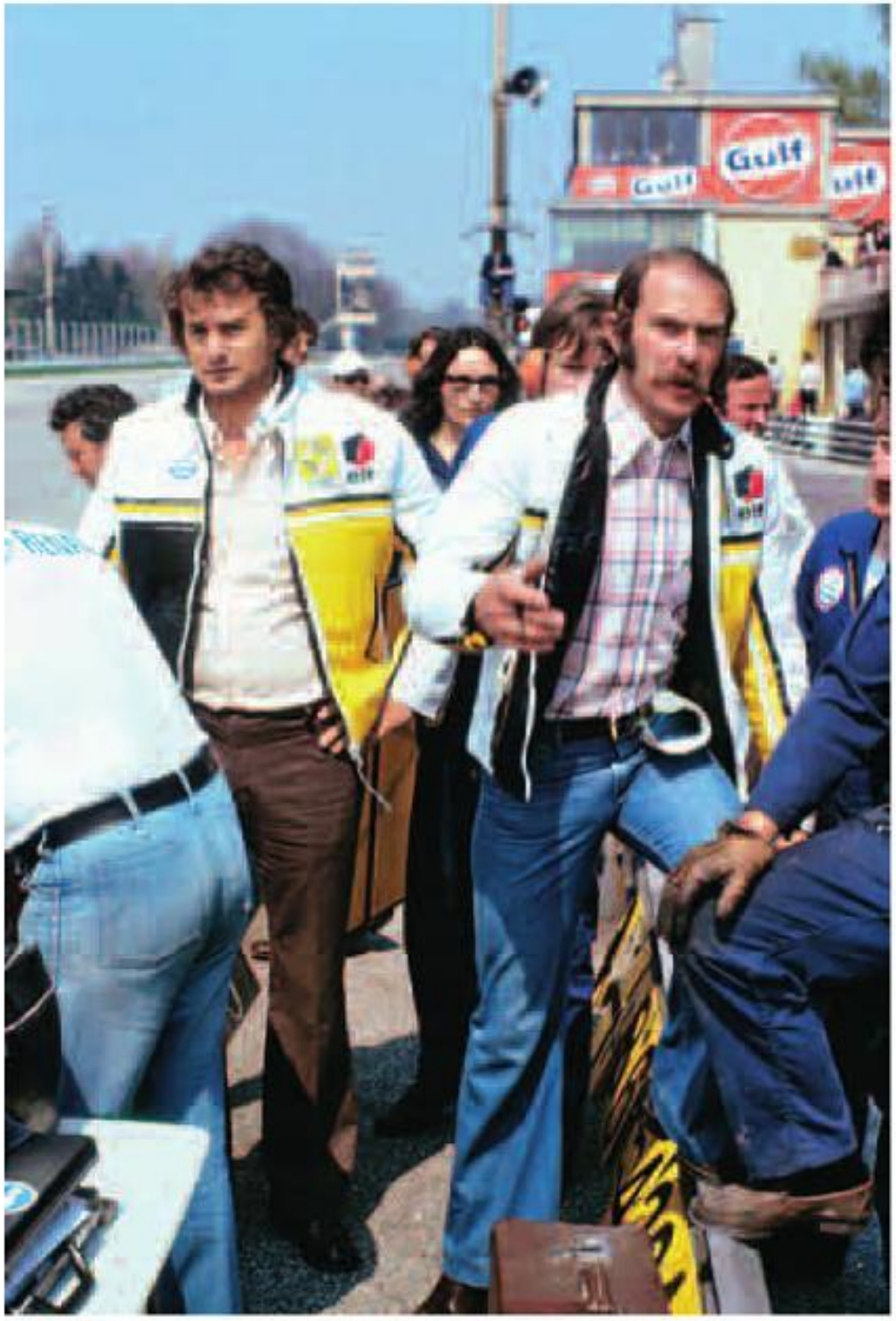
"... the first car with what we now call qualifying tyres was finally ready. No one in the pit lane noticed any difference – they were still just black and round!" – Pierre Dupasquier

Pierre Dupasquier again: "Bernard Dudot had already told me privately that a new engine had reached more than 500bhp on the test bench. Now we were trying this fabulous new rubber mixture, of which we had only one set of tyres. Perhaps our radial slick would also now be better than the conventional Goodyear?" Larrousse went out again seeking an even faster time, but he spun, and unfortunately flat-spotted the tyres at the same time, rendering the precious things unusable. So, the car had to take the start with the classic standard tyres. However, it just blew the field away until a mechanical problem halted its progress.

A tyre revelation in qualifying. (Photo AB)

New tyres; note the black rear wheels. (Photo GL)

Larrousse on race tyres. (Photo MF)



Jacques Cheinisse and François-Xavier Delfosse. (©R)

Gérard Larrousse: "Yes, I made a mistake at the end of the qualifying, the last lap. I remember very well where it was. I was trying to go very fast and I'm sure I was near to breaking everything. I made a mistake after the final corner before the straight. There were two corners with concrete, the first Carousel and the second Carousel: it was just after the second one."

On the wheel front, different types were being prepared, as François-Xavier Delfosse explains: "At the start of the season we had Dymag wheels front and rear, but when the new regulations for rear wheel widths came in, we had to rethink and come up with a width of rim that could take our new Michelins and at the same time adhere to the new regulations for overall dimensions. We went for Gottis, which had the advantage that the rim width could easily be changed as they had a fixed central casting onto which the different rim width could be bolted. This allowed us to try different rims and choose the best compromise. Before we arrived at the Nürburgring, Michelin had not been able to tell us exactly which would be the best rims to obtain the optimum width of tyre footprint on the ground."

Jabouille's pole position time had set pit-lane tongues wagging. Did Renault have an engine that was actually putting out much more than it was claiming? It was certainly working well, but it was the tyres that made the pole position time so remarkable: 7min 12.1sec for the 14.18 miles (22.835km). The Willy Kauhsen-entered Alfa 33TT12 of Henri Pescarolo/Derek Bell – also a turbo car, incidentally – could only manage a lap of 7min 26sec.

Although it was getting into summer, it was cold at the Nürburgring on 1 June for the traditional 1000km race. The mighty Nordschleife was ready for round seven of the World Manufacturers' Championship. The Elf Switzerland team chose not to enter as, under the wing of Renault, it was preparing for a tilt at

Renault leads from Alfa Romeo. (Photo MF)

the Le Mans 24 Hours, so at the Nürburgring it would be only the one car against 81 other entries; 71 qualified and 59 started. Larrousse started the race by poking the car's nose in front at the first left-hander, but some laps later it was Jochen Mass in the third Alfa that was ahead by two seconds at the first driver changeover, Pescarolo's Alfa having gone off on the second lap at the Adenau corner.

With only one car in the race, the team decided to settle down and track the Alfa for several laps. At the first pit stops Jabouille took over with a full fuel load as the two Mirages starting from sixth and eighth places on the grid went into the lead. But of course they had to stop, too, and Jabouille moved back into the lead ten seconds ahead of Scheckter, who had taken over Alfa number 3 from Mass. Approaching the second stops, Schecker drove determinedly to close on Jabouille, but his efforts were halted when he had to pit with a huge vibration problem. This left Jabouille 3min up on the nearest Mirage, now in second place.

With such a lead, the Alpine pitted and Larrousse went back out, shortly afterwards putting in the fastest lap of the race: 7min 20.8sec. With the team now expecting a second win, the A442 was steaming to victory when suddenly the car started to slow.

Jabouille at the Carousel. (Photo MF)

The engine had gone off song. It was barely noticeable at first, and Larrousse carried on for several laps. However, the problem at the Ring was the lap length, and when he stopped at the pits to investigate he had dropped a couple of places. François-Xavier Delfosse: "A compressor/exchanger link had broken and we had lost boost pressure. With the very high temperatures at the outlet of the turbocompressor, the epoxy resin had softened a bit and destabilised the box. This took several minutes to fix and we lost more time, dropping the car to fourth."

"As a driver, I felt the mistakes were often between the engine and the chassis. We certainly could have won that race easily except for that." – Gérard Larrousse

Larrousse thought he had the victory in his pocket. Gérard Larrousse: "As a capable driver with the desire to win, I was getting really frustrated with the unreliability of the car. Except for Mugello, we nearly always seemed to have a problem. The car was not prepared as well as it should have been. It was a super package: very fast – Jabouille and I had proved that – but things kept going wrong. Also I could see that contact between the Alpine people in Dieppe and François Castaing's team in Viry was not good. It had been a difficult relationship for some of the Alpine people after the Renault takeover back in 1973 and it was still the same in 1975. Renault, too, had an organisational problem that did not help matters and that's why the car was not being developed properly. As a driver, I felt the mistakes were often between the engine and the chassis. We certainly could have won that race easily except for that."

In reality, fourth place wasn't so bad. The team had already stated that it was a test year, experimental, but drivers like to win – that's why they are there – and because the cars were seen to be very fast the Régie Renault wanted results. By this time there was a Renault engine department, a Renault motor sport department and Alpine up in Dieppe now being run by Renault – all separate departments with their own agendas and all under the wing of a now poorly Jean Terramorsi; unfortunately his illness was starting to affect his responsibilities.

Terramorsi had kept his health problems quiet. Pressing on, he and his close colleagues at Renault turned openly to the Le Mans 24 Hours – he had been thinking about returning to it for years. Unfortunately, this year the traditional Le Mans test weekend due to be held on 22-23 March had been cancelled due to a lack of entries, meaning the teams could not test on the Le Mans circuit. Renault held discussions with its team members and decided not to risk the turbo car; it was too thirsty to cope with the regulations for this year's 24 Hours, which required the cars to go a minimum of 20 laps before refuelling – meaning in general terms that the cars had to return better than 7mpg. This was a response to the worldwide fuel situation, the downturn in the economy, and the drop in attendance over the previous two years. However, Renault felt it had an ace up its sleeve – the Elf Switzerland A441-3 and the two formidable female drivers, Marie-Claude Beaumont and Lella Lombardi. This would provide a good PR story, too; publicity was guaranteed. It would be a coup for Renault, even though there was another all-woman team: one of its drivers was a young lady by the name of Michèle Mouton, soon to become world famous for her exploits in rallying. With the well-proven and generally reliable A441-3, Marie-Claude and Lella had shown great promise. So, did they dare dream of winning the Le Mans 24 Hours?

Renault decided that the team organised by Gérard Larrousse and carrying Elf Switzerland logos was good enough, and it was put into the fray. François Castaing: "We put together the team, mostly Larrousse's engineers. François-Xavier was there from the factory but not the Alpine guys from Dieppe. We did a big test with the girls at the Paul Ricard circuit. They put in the laps and then we stopped the car to carry out practice pit stops. One type of stop was to replace the transmission and see how fast we could do it. We trained hard – more than one stop, we did it three or four times – practising how to replace everything

Pre-race publicity shoot at Montlhéry: Marie-Claude, left, with Lella. (©R)

behind the engine, principally the gearbox. Because our team had women drivers it was a big deal at Le Mans. We made headlines. We kept training during the three days before Le Mans with our mechanics and got the time required to change the rear end of the car with the transmission down to below 5min. But it all came to nothing. When we made a mistake – a stupid mistake – we had no one to blame but ourselves."

In the weeks before the race there was a publicity programme to complete, the main photo shoot being held at Montlhéry, just outside Paris.

The Sarthe circuit had changed somewhat since Alpine was last at Le Mans six years previously, so there was new data to acquire in that department. It was even more important this year because the traditional April testing period had been cancelled and no tests could be carried out to set fuel loads, refine the aero set-up, etc. (remember there was the long, long Mulsanne straight to cope with here). The classes for the various indexes had also changed since the team's last visit. Now it was fuel consumption that dominated everyone's thoughts. The endurance test at Paul Ricard had been good; the car could go the distance and do it economically. The practice pit stops had gone well, including the planned tests to change the gearbox at the half-way point in the race (permitted this year).

Mid-June arrived warm and sunny. Jean Sage was put in control of the team with François-Xavier Delfosse, on loan from the factory team, in charge of the pits and André de Cortanze and François Castaing in charge of the technical side for calculations, performance, fuel, tyre stops, etc. No Alfa Romeos had been entered, as Alfa preferred to concentrate on the

Scrutineering, the Wednesday before the race. (©R)

Brake checks during practice. Larrousse (in helmet) waits. (Photo CD)

Prototype Championships. Without its presence, it was felt that Alpine Renault had a chance.

A total of 101 cars were entered to practise and qualify for the 1975 43rd edition of the race on 14 June. The Elf Switzerland-sponsored car for Lella Lombardi/Marie-Claude Beaumont having been thoroughly checked over and sorted, everything was ready. At scrutineering there was a buzz of interest.

The press looked at the entry list: no Alfa Romeos, no Alpine Renault turbo, lots of 911 Porsches, and there was the Mirage;

Note the more aerodynamic front – a change from the nose used for the publicity shots. (Photo CD)

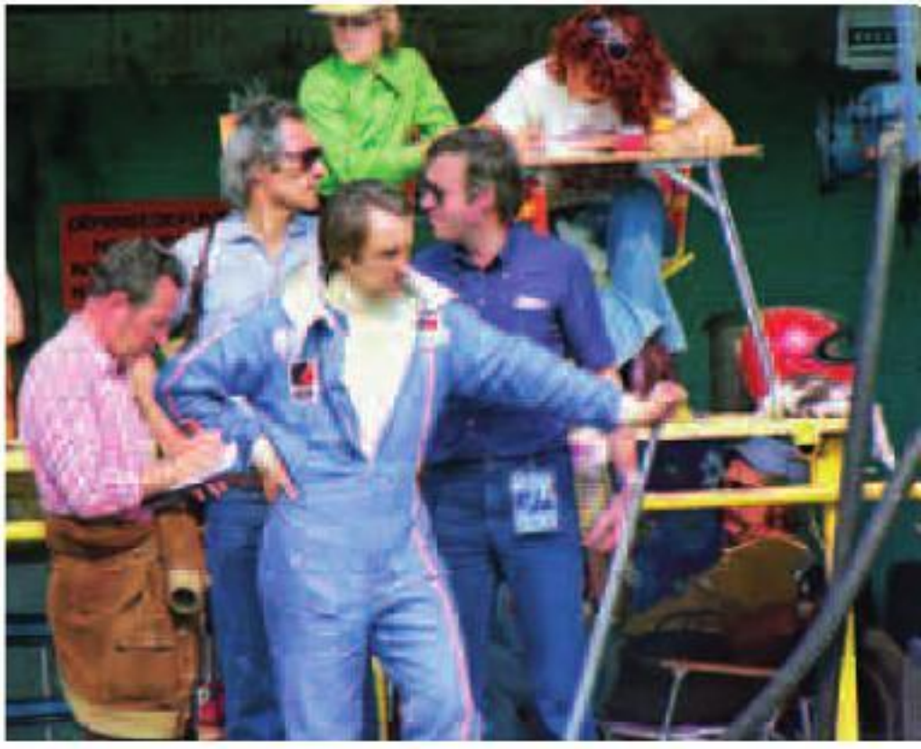
but (why not say it?), could a team of women win Le Mans in a French car? It looked good on paper!

The car weighed in at 619kg. Practice went well, and Gérard Larrousse tried the car to be sure it was perfectly set up. Then Jean Sage ruffled the young women's feathers when he got another driver, Pierre-François Rousselot, to do a few laps on the Thursday evening as a reserve driver. Gérard Larrousse, present on the practice days to witness preparations and test the car, was also driving in the Elf Formula 2 team this year, chasing the Championship along with Jean-Pierre Jabouille. The race at the

The girls are popular: Marie-Claude, left, and Lella. (Photo FXD)

Lella during practice. (Photo GL)

Larrousse tests the car during practice. (Photo FXD)

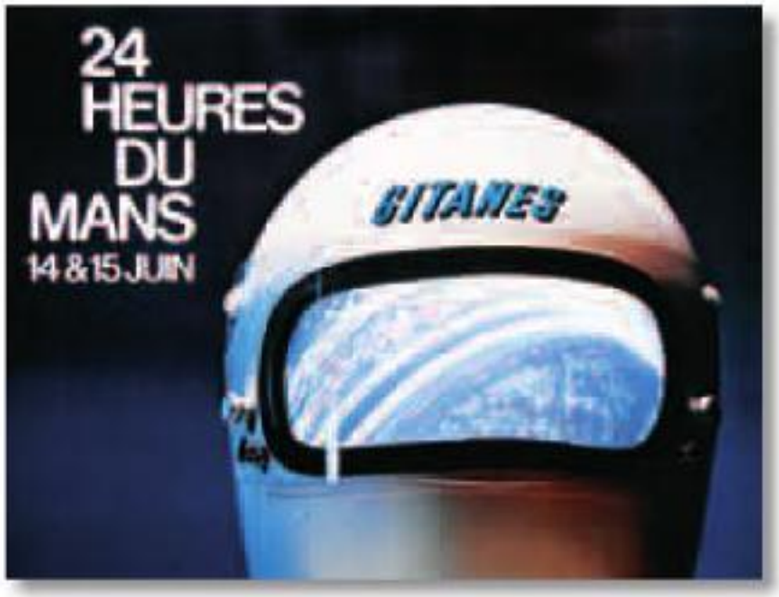


Deep in thought: Le Mans practice, 1975. (Photo MI)

Larrousse tests the car. (Photo CD)

Austrian Salzburgring track that weekend clashed with Le Mans, and he could not be in two places at once. He therefore left the team on the Friday in the hands of Sage and Castaing to fly to Austria. The A441 had qualified in eighth on 4min 2.9sec, well up the grid.

It was 4pm on Saturday 14 June, warm and thankfully dry, and Marie-Claude was scheduled to start. As the cars blasted away, the Gulf Mirage GR8s of Vern Schuppan/Jean-Pierre Jaussaud and Derek Bell/Jacky Ickx pulled into an early lead over Reinhold Joest's Porsche 908/3.



La Ronde Infernale. (Photo JSan)

Everything in the pit area and the start/finish straight quietened after the final car had passed. In eager anticipation of the long day and night ahead, the team settled down to wait for Marie-Claude to come by on the first lap. When she did, the car was sounding fine. A few laps passed and Marie-Claude had moved up to seventh, then sixth. Jean Sage and François Castaing looked at each other. Clearly, she was running faster than in practice and they began to calculate – remember, there was a new regulation limiting the laps between fuel stops to a minimum of 20. The car had regularly been running 26 laps between refuelling in practice, and calculations had been made on this basis. As the laps were ticked off they were becoming nervous, but all was going well so far – 15 laps gone, and to Marie-Claude and the team everything seemed on schedule. Five laps later the pit crew made ready with fuel and prepared to receive the car on the 21st lap. Marie-Claude got the signal on lap 20 to come in next time round.

The timing looked OK, and it also looked as if lap 21 would be the fastest so far. As she turned onto the Hunaudières straight heading past the signalling pits and Mulsanne village, there was no sign of any problem. Just under a minute later, as she came off the Mulsanne, the car coughed, not once but several times. The engine was gasping for fuel, and as she rolled to a halt in frustration she realised it had run out; a blockage was suspected. The radio call from Marie-Claude was urgent. Alain Marguet, the Renault engine man, jumped on a bike and headed off to find her. Pushing through the crowd he got to her but, of course, was not allowed to go over the fence; all he could do was shout instructions. She tried in vain to restart, and, after activating the fuel pumps, manually got it going, but only as far as the Indianapolis right-hander, where it stopped again.

Comfortable early laps. (Photo GL)

Lap 20. (Photo GL)

Disaster: Marie-Claude tries to restart. (Photo MJ)

Hope turns to despair. Marguet cannot help. (Photo MJ)

Alain Marguet: "The problem was that during practice the two girls were not really fast, it seems now with hindsight. Fuel consumption was good, but during the race they were faster and fuel consumption was higher. We had calculated the fuel fill on the practice and it hadn't entered anyone's mind that Marie-Claude might be faster in the race than in qualifying. But of course we had a plan: if the car stopped out on the circuit for whatever reason, I was to go and try by some means (legal or maybe otherwise in the eyes of the race organisers) to get the car back. We quickly got the message that she was thought to be out of fuel, but couldn't be sure at that time.

"I remember I went down to where she had stopped and exchanged words and signals. Even though we had a plan and I had a sneaky bottle of fuel in my coat pocket, there were too many people watching, so I couldn't put the plan into effect. You can imagine the embarrassment if we'd been found out at the time! All I could do was talk to her. But I had one idea: on the fuel system you have the fuel coming into the pump, fuel going into the engine and the excess fuel from the pumping chamber returns to the tank. I asked Marie-Claude to move some pipework to see if there was enough fuel in the pipes to get her back to the pits. She did that, found fuel, jiggled the pipe a bit, got in, started the car and moved off. For a moment I was relieved, but fifty metres further on she stopped. We tried again, but I still couldn't get close enough to throw her that bottle of fuel. She tried everything to get some more fuel from the pipes but to no avail and she gave up after an hour." A fault with the car, or a calculation error? It's irrelevant now – the car was out – but there is little doubt that it was a technical calculation error leading to insufficient fuel being put in at the beginning. François Castaing: "That's absolutely true. It was our error; as Alain says, the car went faster in the race, using more fuel than had been calculated for."

The 2-litre category was, however, won by a women's team: Michèle Mouton, Christine Dacremont and Marianne Hoepfner in a little car called a Moynet. The French press had its 'female' story after all, but not the one it had been expecting.

Derek Bell won the race with Jacky Ickx. These two were a formidable pair at any time, and the Gulf Ford Mirage GR8 entered by John Wyer would be the basis for things to come involving Renault two years later. The Elf Switzerland team crept back to the workshops quietly, away from the embarrassment. But that's racing – stuff happens! In motor sport there is no time to dwell on errors, only to learn from them.

The next round of the World Championships was the Österreichring 1000km in Austria at the end of June. Three cars were entered: the Elf Switzerland A441-3, still in excellent condition having run only 20 laps at Le Mans, the existing A442-0 chassis, and an 01 chassis, a second A442 turbo car. Patrick Depailler and Jody Scheckter put car 8, the A442-0, on third place on the grid with 1min 38.98sec. Gérard Larrousse was paired with Jean-Pierre Jarier in the other A442-1, number 7, taking pole position with a time of 1min 36.35sec.

Jarier in the car as Larrousse waits. (Photo GL)

By now the more reliable Alfa Romeo team which had stuck with the Championship rounds had wrapped up the points, but Renault had something to prove, and anyway, this was supposed to be an interim season of development before a full Renault attempt at Le Mans. They must press on. Lella Lombardi and Marie-Claude Beaumont were in the A441-3, this time car 34, and they made it to tenth on the grid with 1min 47.19sec.

103 laps of the 3.673mile (5.911km) circuit lay ahead on 29 June. It was warm and dry to start with, but a huge thunderstorm and torrential rain broke just before the off and all the teams had to rethink plans, change tyres and reset aero packages in the time allowed for the start delay. The race was to have started at 1pm, but at 12.45pm the track was suddenly flooded. Gérard Larrousse: "I remember the start of this race very well, because it was pouring with rain and there was so much water on the road that I jumped out of the car (I was on pole) just

Lella Lombardi getting wet. (Photo LAT/JW)

one minute before the start and all the other drivers followed my example. The organisers were angry, saying, 'Aren't you going to start?' I said, 'No, are you crazy? I'm not starting!' and I got out!"

The track was still saturated when the race director finally dropped his green flag for the warm-up lap at 1.30pm. Michelin had come with new wet-weather tyres, which had been quickly fitted, and on the first lap as the cars got away they were seen to be doing a good job on the waterlogged circuit. Larrousse went into the lead, pulling away with almost 10sec per lap advantage over the rest. Depailler, doing likewise, was running second. The Michelins were doing their job better than the Goodyears and Pierre Dupasquier was delighted until a few laps later Larrousse came upon a spinning car, taking a severe hit, and came into the pits. As they had a big lead at that time, they thought everything was OK for the A442s; the mechanics quickly fixed the damage and Larrousse's car set off again. However, a lap or so later the

fuel injection pump failed and he had to stop for good on lap ten.

Marie-Claude Beaumont and Lella Lombardi were having a difficult time. Having started from tenth on the grid, they splashed their way round until on lap 20 the engine failed and the car ground to a halt.

Depailler, in the A442-0, had taken over the lead with the earlier demise of Larrousse, and at the next pit stop handed over to Scheckter, who on the drying track put in the fastest lap of the race (1min 41.21sec) before his injection pump suddenly failed; luckily he was right at the entrance to the pits, so was able to coast in for repairs. The race continued as another downpour began, but this severely disrupted proceedings and the race was brought to an early end, with the leading Alfa Romeo of Bell/Pescarolo on lap 103 of the scheduled 170. The A442 of Depailler/Scheckter had crossed the line in sixth place with 88 laps completed and this became its finishing position. A strange race which promised much, but the weather added to the complications and made it a difficult weekend except for the good news about the new Michelin tyres.

At the time, there were quite a lot of arguments going on between the tyre manufacturers, concerning their respective products and their ability to operate in wet and dry conditions. Many teams shied away from Michelin tyres, believing that they did not give a wide enough range of operation. Pierre Dupasquier, Michelin: "Georges Bresson, now promoted to development director, was there. The Österreichring is composed mainly of long corners, one after the other, keeping the cars in a permanent state of transverse adherence, which specifically shows up the quality of the tyres. Trying to see what was happening beyond the hill, at the start I dragged Georges onto the pit roof where you had a great view of the corners. The sound was softened while the cars were in the lee of the hill, but suddenly, at the point we were looking at, two sprays of water exploded, preceding by a fraction of a second the powerful but muffled noise of the Renault turbo engines. We counted to six before a second spray announced the arrival of the first Alfa on Goodyears. Whatever happened later, the proof was there: even in poor conditions, our radial Michelins were undeniably better than the conventional competition.

"We didn't see things the same way as the other tyre manufacturers, which is why they didn't trust us. The method of application to the ground of the radial technology tread is different from that of the conventional tyre. We wanted to make it clear that at this level of competition our radial would allow us to use very efficient yet much lighter-weight rubber mixtures

Always lots of activity – Austria. (Photo GL)

without their degrading. Jody Scheckter had been able to prove this before the Austria race by finishing a long testing session that started wet, with our rain tyres on, and ended on practically dry ground.

"It must be remembered that the characteristic of a specialised rain tyre is that it works within a very limited temperature margin. It won't take excesses. On wet ground, the permanent lubrication of the tread and the evaporation of the water keep the rubber at around 40°C. Rain mixtures are therefore prepared in order to meet adherence requirements at these temperatures. If you drive on dry ground, i.e. without the presence of cooling due to evaporation, the temperature rises quickly to reach levels of around 60°, 80° or even 100°C.

"The Austrian 1000km gave an irrefutable answer to these questions: the tyres on the Renaults were perfect." – Pierre Dupasquier

Clearly, a rain tyre subjected to this treatment would immediately disintegrate. Of course we didn't expect to escape this law, but in racing the slightest gain can result in precious tenths of a second. The Austrian 1000km gave an irrefutable answer to these questions: the tyres on the Renaults were perfect. At one point, after handing over the wheel to Scheckter, Depailler came directly over to us, removing his helmet and earplugs, and said: 'OK, guys, I can tell you something – you're a great hit! I can't tell you how much. It accelerates, it brakes and it takes the downforce. Fabulous!'"

Renault at the Glen – Jody Scheckter. (©R)

Preparations. (©R)

Larrousse in practice in A442-1. (Photo GL)

The last race of the season for Renault was the Watkins Glen Six Hours on 12 July 1975. And guess which car was on pole? Yes, an Alpine Renault – an A442-0 yet again, driven for the second time by the Scheckter/Depailler pairing and putting in a 1min 42.89sec lap. In second place on the grid was also an A442 – the new A442-1 chassis for Gérard Larrousse/Jean-Pierre Jarier on 1min 48sec. These cars were certainly super-quick. If only they could be reliable!

A busy stop: far left, Delfosse; right, Castaing and Marguet. (Photo GL)

The race was 152 laps of the 3.377 mile (5.43km) circuit, 513.3 miles (826.08km), six hours. The action began with the Alpines storming away, but it was not to last. Larrousse slipped from second place early on with an intake manifold leak again. This left Scheckter, who was pulling away from the field in the lead, until on lap 29 he missed a gear and over-revved the engine. It started to sound very unwell – driver error! Still, it was probably a blessing in disguise as the rain fell harder and then

Jarier at the wheel of A442-1. (Photo LAT)

A442-0, car 2. Scheckter at the wheel. (©R)

Push back for the restart. (Photo GL)

became torrential. This brought out the red flag and the drivers rested for just under an hour before a pace car set off with the remaining field in attendance.

In spite of its problems, the other A442 of Larrousse/Jarier managed to keep going, and in the end Larrousse ended up with fastest lap – 1min 45.95sec, set in the first part of the race – and a podium place with third overall, albeit three laps down on the winners, Pescarolo/Bell again in the Alfa Romeo. The race had been run at a very slow average speed of 85.22mph (137.14kph).

Michelin's Pierre Dupasquier again: "At Watkins Glen for the Six Hours, we achieved an identical performance on a dry track in practice and confirmed the earlier results from the wet race in Austria. The Alpines were in front from the start. Then the race was stopped due to a storm. On the restart we saw again what we had experienced at Zeltweg: our tyres now hugely dominated our competitors', to such an extent that when I turned towards the pit to share my satisfaction with someone, I found myself face to face with my counterpart at Goodyear – the guy who had written that our tyres would never be successful. I made an unambiguous gesture, like Steve McQueen did in the 1970 film – not exactly polite of me. It wasn't meant badly, but it greatly amused the journalists who saw it."

The World Championship points table showed Alpine in third place on 54 points, behind Porsche on 120 and Alfa Romeo, the winners, on 155. Willy Kauhsen's investment had proven to be a victorious one. Alpine Renault was also third in the FIA 2-litre trophy category on 47 points, behind Lola on 67, and the winners, Chevron, on 122. Maybe it was not so bad, but the team and the Régie did not see it that way. There was a lot of investment being made, yet there had been many mechanical failures, and as the months went by the early win at Mugello appeared more and more to have been a false dawn. Although they had gained four pole positions in seven attempts and four places in the top four, proving that the car had power and speed, there were still those niggling regular failures. The end-of-term report read: "Could do better." It was a case of 'what might have been'; the car was quick enough not only to get on pole, but also

to clock up several fastest laps, but the problem was reliabilty. And then there was that Le Mans debacle. There was much speculation in the press, but at that stage the journalists were not yet party to what was going on behind the scenes.

Back in the offices of the Régie, behind screens up in Dieppe, and in a secret part of the workshop in Viry-Châtillon, there were some exciting developments that would see the light of day during November 1975. Bernard Dudot: "We had built and run a new engine. It was time for the first test of our new 1500cc turbocharged engine, destined for Formula 1. The engine was in a car for the first time and it was a great moment. We went to Paul Ricard at Le Castellet on 18-21 November. In the greatest secrecy, we had fitted one of our Alpine A442 sports prototypes [thought to be A442-0] with this first 1500cc turbo designated 32T; a second, numbered 33T, would also be tried. Another A442 [believed to be A442-1] with a 2-litre turbo engine was to be used as a control car, a comparison. Jean-Pierre Jabouille was the driver and moved from one car to the other to compare engine behaviour. On this first occasion it was a matter of clearing the ground to make way for more significant F1 engine tests."

Jean-Pierre Jabouille: "I was told we were going to test this new engine secretly in a prototype. I went down to Paul Ricard and saw it in a car for the first time. It was the A442 sports car with this 1500cc in it. I remember that I did a lap or two and returned to the pit and said to Dudot that we may as well stop right away because it didn't work at all. You would come out of a corner onto the 200-300m straight before the Signes corner and

"It was time for the first test of our new 1500cc turbocharged engine, destined for Formula 1 ... it was a great moment." – Bernard Dudot

... there was nothing! It didn't work and I had a 100bhp engine! Dudot suggested, 'We'll change the turbo and you can tell us what it's like then.' So they changed the dimension of the turbo. At the time, the greater the diameter the higher the power, but the longer the response time. He put a small turbo on – I don't know how much power I lost, but it didn't matter much because the target wasn't power, the target was to be able to use it – and the response time was cut in half, so I said that if it produced that effect, certainly with some work it might be OK ... But it was a lot more difficult than we had foreseen, and nowhere near the performance of the 2-litre turbo car."

Patrick Depailler, who also tested it, had just finished his second Formula 1 season with Ken Tyrrell, and it was logical for Elf to combine Renault and Tyrrell. In fact, a model of the 1500cc turbo had been delivered to the English team to be fitted to its car, as well as one delivered to André de Cortanze up in Dieppe for what was being called the Alpine A500.

Bernard Dudot: "Obviously our target was to do as well with the 1500 as with the 2-litre. The most obvious fault, as was to be expected, was the response time, something which had not been a great problem with the 2-litre unit but was found to be much more of a problem on the 1500. The richness settings fixed on the test bench didn't seem to suit the needs of the engine in the car. Jean-Pierre Jabouille, who by now had wide experience in evaluating the behaviour of these engines, proved a valuable asset in the tuning process. At first the turbo lag was a disaster. Jean-Pierre was not happy, but as we improved we managed to get this first engine to run for 600km (372.8 miles) of tests. It was our first real result, and we were sure that if we had the reliability the tuning would progress. Enthusiasm within the Viry-Châtillon engine team was high. A second test, still in the A442 prototype using the 32T engine, took place a few weeks later, 16-19 December, this time with a new fuel injection cam and a Garrett T04/T05 composite turbocompressor, whose turbine and compressor did not belong to the same family in the Garrett range. Jean-Pierre Jabouille lapped within the times of the 2-litre turbo. We had made progress."

Jean-Pierre Jabouille was kept very busy in late 1975, as Renault had arranged for the A441-2 car that had been sitting in the Alpine workshops to be sold to a Japanese customer under the Terramorsi sales scheme (see previous chapter), and Jabouille went to compete in the Fuji 250km on 19 November. He practised, but a problem prevented him from starting. Marie-Claude Beaumont also drove the car a few days later in the Fuji 200km on 23 November, still carrying number 16, which it had been given for Jabouille's race, and finishing in tenth place. The A441-2 stayed in Japan until it was destroyed by fire some years later, and as it is no longer a factory car it will now slip out of the scope of our story. The A441-0 also moved on under the sales scheme into the hands of specialist French speed hillclimb champion Jimmy Mieusset. The A441-3 moved on to Giancarlo Naddeo and was raced in Italy during the following years before returning to France. The A442s that carried out the first F1 engine test at Paul Ricard were returned to Dieppe for preparation for the following year's sports prototype races. 1976 would see many more changes – not only mechanical, but also political and affecting personnel.

4 Close, but no cigar

From the beginning of 1974, Gérard Larrousse led his own team, Larrousse-Archambeaud, using the Alpine A440 and A441 sports prototype cars with 2-litre normally aspirated engines. Larrousse had taken over the team Ecurie Archambeaud with the blessing of Jean Terramorsi, who, as we have seen, saw it as a spur to help push the Alpine factory team. The result was eventually total dominance for the Alpine marque in the 1974 European Championship – seven victories in seven races, the constructors' title for Alpine Renault, and the drivers' title for Alain Serpaggi, the factory driver. Larrousse was World Champion in sports cars and had won Le Mans with Matra. During 1975 he had driven both Formula 2 and the sports prototype Alpines, whilst being the overall boss of the Elf Switzerland team. He had delegated day-to-day management to Jean Sage, and they successfully ran the last A441, chassis number 3, throughout the year. Except for the hiccup at Le Mans, the Elf Switzerland team had performed well.

The future of Renault and its sporting aims had been under discussion between Terramorsi and Bernard Hanon for some time. What should be the next steps in its plans for Le Mans and the secret Formula 1 project? How could it bring the separate sporting operations in Paris and up in Dieppe under one department? Renault already had control of Alpine since 1973.The sports cars were quick, but had reliability problems; the engineers – design, mechanical and chassis – although all very capable, needed to work more closely together, rather than as separate units as they had been doing. Problems in this area showed up during 1975 in the lack of design and production coordination, which led to failures on track.

In early autumn 1975, Bernard Hanon approached Christian Martin with the idea of asking Gérard Larrousse to coordinate and organise a separate competition-only department with the blessing of the Renault top management, which had decided to set its sights on that biggest prize of all: victory in the Le Mans 24 Hours, and all the publicity that would bring. Formula 1 could wait, and indeed would wait, until this had been achieved. The 1500cc turbo engine project was just a secret development, appearing in the records at Viry-Châtillon as "the design of a performance engine," ordered and paid for by Elf.

Bernard Hanon. (Photo *MMiles* – JJ Mancel)

Gérard Larrousse was coming to the end of a brilliant and eclectic career as a driver. He made his name in rallying, and had seized the occasion of his move from Alpine at the end of the '60s to develop his circuit racing career. He had driven for Porsche, Matra and others, teaming up with Henri Pescarolo in the conquest of two consecutive manufacturers' titles for Matra in endurance and two drivers' titles in 1973 and 1974, and he had taken two victories at Le Mans. Apart from his commitments as a Matra factory driver, he had also undertaken personal projects with the Archambeaud and Elf team that had demonstrated his organisational talents. Bernard Hanon said in an interview with *Mille Miles* magazine, "Gérard Larrousse brought together all the qualities necessary in my view to assure his role. He had a deep knowledge of racing lived from the inside; he was a good manager and he would fit in well with the structures we had at our disposal. He seemed to me to be well qualified to train, communicate, explain, define, organise. He was balanced and thoughtful."

Gérard Larrousse: "It was at Vallelunga on 12 October 1975 that they spoke to me. Michel Rolland came to me and we discussed the idea; he said it was a desperate situation for Renault: 'We're not reliable enough; the car's good but we can't win like this. We're sure it's the organisation, not the car, that's at fault: it's not well organised.' It was my feeling, too, but I was a driver and although I had my own team of Elf Switzerland that worked well I could only suggest things to Renault – I couldn't

Gérard Larrousse. (©R)

tell them what to do. So a contract for the new plan was agreed. I had to face up to the fact that I wouldn't race again!"

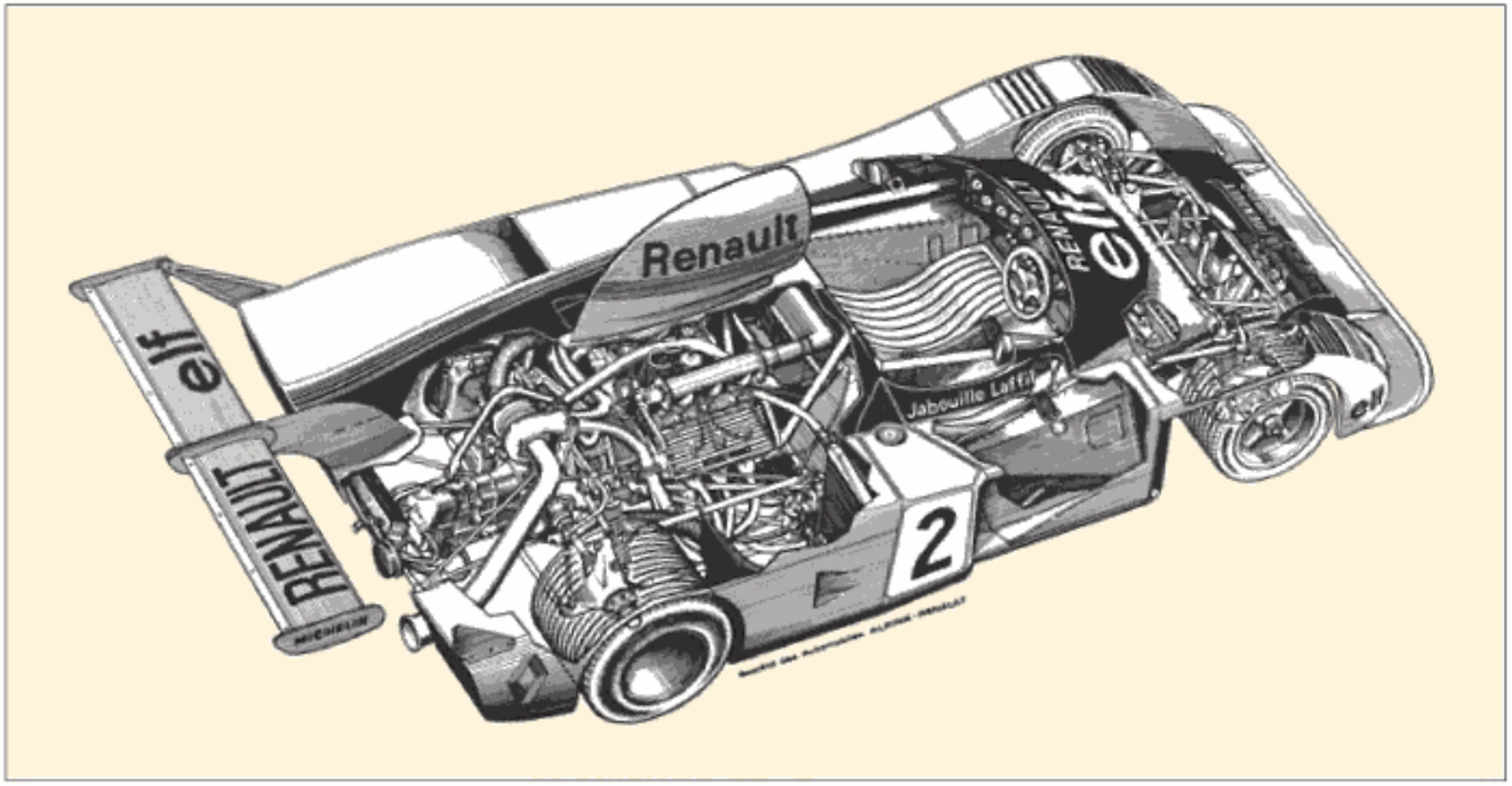
On 1 January 1976, Larrousse took on the new role of general manager of all the competition interests of Renault and set about creating a coordinated operation. Eventually he came up with a name for the organisation – Renault Sport – in the spring of 1976. By June the name could be seen on all the equipment, and it was finally officially launched to the world in December. At the same time, following the changes at the very top and the retirement of Pierre Dreyfus, who had been replaced the year before by Bernard Vernier-Palliez, Bernard Hanon was promoted to director. From then on, there were no barriers between the competition department and the general management.

Gérard Larrousse: "I was now employed by Renault as competition manager of all Renault sporting interests. I started to review the whole structure of the organisation, looking at everything and how things were organised. At the time, Jacques Cheinisse was running the Alpine competition department and there was another competition department in Renault for rallying, run by an engineer, Hubert Mollo. Each department organised its own affairs with few reporting responsibilities and, in many cases, without authorisation. I had Alpine in Dieppe on one side, Gordini in Viry-Châtillon on the other side, Renault Rally in the middle – it was a real mix-up. It was rare that any part of the group talked to anybody else; they did their own thing. That was my first job: to bring them all together and coordinate their work. Of course, it wasn't easy! I wasn't very popular and while some survived the changes, others did not. But in the end everything worked out for the good of the overall Renault organisation.
A few months later, I can't remember the exact date, I decided that we should create a company – a sports company – run out of Boulogne-Billancourt with a special image, and I decided to call it Renault Sport. It was always difficult to organise anything inside Renault. It's a big organisation, but we absolutely needed a small, very specialised, centrally coordinated group to run it; we decided that with François Castaing. He had been made a director of Viry-Châtillon by Georges Sauvan who was the president of the engine group at Viry."

"It was rare that any part of the group talked to anybody else; they did their own thing. That was my first job: to bring them all together and coordinate their work. Of course, it wasn't easy!" – Gérard Larrousse

Larrousse agreed on a top priority. He had been given his target – the Le Mans 24 Hours. Having regrouped all top-level sport activity into Renault Sport, he had a new building constructed in Dieppe. It was here from 1976 that the sports prototype department would be based. The target: victory at Le Mans.

The arrival of Larrousse in January 1976 had been met with a guarded response from the workforce. The task looked thankless and difficult. For Jacques Cheinisse and his faithful team at Alpine, it was quite a surprise. Renault and its sporting ambitions were under new management. Many things were changing and Jean Terramorsi, the great thinker, innovator – gambler, even, some might say – was by now very ill. For two years he had endured a heart problem but had ignored the warnings, pressing on with his undiminished love of life and living. Sadly, come August of 1976 he passed away, greatly missed.



The 1976 A442, first version. (Image AAA)

With the new management and organisation came a new order of personnel. The Formula 1 project was officially launched in December. Gérard Larrousse already understood the importance of geographical proximity between the engine and chassis departments if they were to develop the single-seater with the 1.5-litre turbo engine. This side of the programme led to the F1 Dieppe chassis team moving to Viry-Châtillon alongside the engine team. It was not achieved without some casualties, as some members of the team didn't make it. On the sports car front, the new Renault Sport operation in Dieppe during the year would develop into a proper racing workshop under the management of Fred Knoflach. The decision was also made to continue to enter some of the World Championship events to develop the cars, but the main objective would be a first run at Le Mans with a turbo car.

The A442 saw numerous modifications and developments at the beginning of the 1976 season. If things had been serious but relatively relaxed before, from now on the planning, organisation, and effort would be intense. There were also many changes to the regulations concerning who could race what. I won't go into great detail here; suffice to say a new World Sports Prototype Championship was established. It was perfect for the Renault Alpine cars, now under the umbrella of Renault Sport.

An updated, 24-valve Garrett turbocharged engine developed from Castaing's original V6 was fitted, and it was hoped this would be more reliable than in 1975. Alain Marguet: "I remember that because we were not fully confident of the latest engines we started to prepare a lot of spares, and during the year came up with ways of changing engine parts very quickly, even cylinder heads. We could change them very fast – not in ten minutes, but if a problem arose we were prepared to remove the cylinder heads if necessary. At this stage we had experienced only briefly the piston problem that proved to be the Achilles heel later on."

Pescarolo testing in early 1976. (Photo AM)

A441T on display in Paris, March 1976. (Photo CD)

François-Xavier Delfosse: "A lot of experience comes from mistakes, and we had learnt a lot in the preceding years. We made the A442 chassis more rigid, with more reinforcing panels in Duralumin. Then there was the development and preparation work – mechanics, aerodynamics, engine, etc. – though in reality there wasn't a vast difference between an A441T and the first A442 cars. One visible change that we made was the air box design and arrangement: there were now three channels inside the air box, as can be seen in the photographs. Right at the top was a small housing that directed part of the airflow onto the alternator situated at the interior of the V formed by the two rows of cylinders. The section just below this channelled practically half of the flow towards the air inlet of the compressor. The other section, at the bottom, fed the air/air exchanger matrix. It worked perfectly.

"As we have seen, there were regulation changes, and one of these made it obligatory to limit the size of the tyres and wheels at the rear. We had to modify the track to utilise maximum track within the defined bodywork. We had to make narrower rear rims, with a larger diameter. That changed the front/rear balance and tyre wear slightly, and in terms of balance this narrower width lost us some rear grip. So we developed a new suspension design and correspondingly adjusted the aerodynamic profile. The driver line-up was formidable: Henri Pescarolo, Patrick Depailler, Jean-Pierre Jarier, Jacques Laffite, Jean-Pierre Jabouille and Patrick Tambay would drive the cars."

François Castaing: "We also created a special gearbox department in Viry headed by Jean-Louis Coste. We decided that, over and above the daily exchange between engineers, Gérard and I would spend one day a week in Dieppe to ensure the integration of the two teams. We would arrive at 8am at Alpine and leave at 6pm. Gosh, that was tiring! It was on these occasions that the configuration of the cars was established and a very detailed plan of endurance testing on the engine dynos and on the track was set up. A huge logistic effort had to be put in place regarding the supply of materials and manufactured parts to ensure that the parts fitted to the race cars were absolutely identical to the parts validated by testing at Viry, Dieppe and in track tests. Preparation of the cars, the organisation of the testing, the pits for the race, spares, quick interchange of parts in a race – nothing was left to chance."

At least that was the plan. It didn't quite work that way at Dijon, and they hadn't told the drivers to be sensible, it seems, for the first race!

In early spring the A441T was put on display at the Renault showroom in the Champs-Elysées in Paris, as can be seen from the photograph dated March 1976.

A442-1 – Jabouille lifts a wheel. (©R)

Renault Sport chose not to go to the early Championship races in America, nor to the first two in Europe; its first race for 1976 would be the Nürburgring 300km on 4 April, in the Eifel mountains. It was a strange event; only 16 sports racing cars turned up to compete. There were still delays in the agreement of the regulations – lots of politics and arguments, mainly regarding the wheel widths for the Group 6 cars. In the end it was decided that 16in would be the limit. This worked well for the Renault Sport team. It had found that it could fit much bigger tyres but still keep within the 16in limit; an interesting arrangement. The cars now sported a smart new paint job, and it was in a high state of optimism that they turned out onto the track for practice.

Although a very quick Porsche 936 driven by Rolf Stommelen separated the Alpine Renaults on the grid, Renault started from yet another pole position. Patrick Depailler had gone

Depailler on the way to pole position. (Photo MF)

round in the dry in 7min 16.09sec, with Jean-Pierre Jabouille in the sister car A442-1 starting from P3 on the grid with 7min 22sec. Everything looked good. Well, pretty good – the Porsche looked as if it was going to be a problem. Race day arrived and it was wet, very wet, and ahead lay 11 laps in the cold mist of the Nordschleife. As the cars came round for the start excitement rose, the spray flew and the race was on; at least, it was for most of the field.

The Alpine Renaults' first race of 1976 was a disaster. Depailler led the way down to the first left-hander and held it as they went round the first right-hander, bringing the field onto the straight at the back of the pits. Jabouille then easily cruised past and held a lead of a couple of yards, down to the north curve heading towards the Hatzenbach. Suddenly Depailler, too eager to get back in front, left his braking far too late. Storming up the inside of Jabouille, he lost traction and went into a spin, forcing Jabouille to react to avoid his sliding team-mate. He too lost traction and both cars went off into the barriers, with Depailler's car coming to rest as a near write-off. It was crass stupidity: the classic error of taking on your own team-mate and, worse still, wrecking both cars.

Jean-Pierre Jabouille: "Oh, I remember that race very well! Patrick was an attacker, as I was. Both of us knew that whoever got to that point in the lead would stay there, as all the rest of the circuit was very demanding and fast. Our cars were quick. Patrick got pole, but the all-black Porsche 936 – Stommelen, I think it was – was in P2 and I was in P3. On the morning of the race it was raining hard, so we had to run on the short circuit to get used to the rain, but at the start after the warm-up a slightly drier line had appeared to the right of the middle. I got off well, Patrick too, and I placed myself to the right of the middle where it was a bit drier. We continued round the first corners and as we came down the straight at the back of the pits I had got in front and braked late on the slightly drier bit of the track to try to get away.

"At that moment Patrick, who couldn't see much because of the spray, was waiting for me to brake to brake himself, but he was too late and tried to pass between me and the right-hand railing where the line was wetter. When he hit the water he saw that he was going much too fast and he braked and swerved in front of me. I didn't want to touch him so I also swerved off my line and he went straight ahead into the Armco and I went into a spin. By bad luck, the rear right-hand side of my car just touched the barrier, ripping the wing off and breaking the rear suspension, so our race was finished. We stopped there and the two Porsches went into the lead."

Patrick getting used to the rain in warm-up laps. (Photo MF)

A murky, misty, wet start. Depailler leads into the first corner. (Photo AM)

Larrousse was angry, and Depailler was suspended for several months. It was all over, and the team returned home to Dieppe.

Gérard Larrousse: "It was a bit unfortunate, actually. Now if I were to restart the story, my mistake was perhaps not to have spoken to them more, insisting on the importance of driving sensibly as a team – of course I did speak to them, but they only

The remains of Depailler's disaster. (Photo MF)

half listened. The competition between Jabouille and Depailler came from their rivalry in Formula 3 many years before; they were both very competitive, as top drivers should be. Also, the decision to suspend Depailler was not made by me alone; I had a lot of senior people with me at the race – Bernard Hanon and so on – who at the time did not understand racing so well, nor the mind of a driver. I was perhaps mistaken to suspend him, but anyway, that's life. I don't think Patrick was really angry with me. He was more angry with himself."

Tempers cooled quickly, and in Dieppe the team prepared two new chassis that were already in a pre-production stage.

Monza – Pescarolo comes into the pits during practice in A442-2. (©R)

Car 32 A441-3 of Giancarlo Naddeo. (Photo SF)

The work rate was increased to finish them as the team prepared for the next trip to Monza for the Four Hours on 25 April. Depailler, though, stayed at home! 56 cars entered, three of which were labelled Alpine Renault. The third car was the A441-3, the ex-Elf Switzerland car, which had been sold to Giancarlo Naddeo, a Renault importer in Italy.

Practice was an exciting affair, with Jochen Mass in the Porsche and Jean-Pierre Jabouille constantly trying to outdo each other on fresh tyres and systematically lowering the pole position time with each venture onto the track. Eventually it was the Porsche 936 of Mass and his co-driver Jackie Ickx that took pole with 1min 32.23sec, but Mr Jabouille was hard on his heels with 1min 32.27sec for P2, and the Pescarolo/Jarier car on P3 with 1min 33.73sec. It was close at the front, foretelling a good race ahead. Giancarlo Naddeo had acquired the A441-3 due to his close links with Renault, and a deal had been struck that saw Naddeo in car 32 on the grid with co-driver Claudio Francisci, contesting the 2-litre Italian Sports Car Championship that was included in this round at Monza. The A441-3 was in 16th place on the grid with 1min 46.75sec.

New A442-3 – Jabouille before the smoke ... (©R)

The startling pace of the Porsche and the fight with the A442s continued into the race, and at the end of the pace-car lap, as the 'go' button was pressed, the Porsche and the two lead Alpine Renaults roared off in very close company. This formation continued for several laps until Pescarolo dropped off the pace a little and fell back a few seconds behind the duel at the front.

Suddenly, all was not well for Jabouille/Laffite. Jabouille found himself with a smoking engine, and eventually he was forced to stop on lap 16

Driver change and refuel. (©R)

with lubrication failure. At the first pit stop for the A442-2, Jarier took over from Pescarolo and set about chasing the leaders at an increased pace, setting the fastest lap with 1min 29.6sec. But the Porsche 936 was running like a dream, and put a lap on the Alpine Renault to take victory at the end of the four hours.

A mixed result for Renault. Bad news for car 2, but an excellent second place for car 1. Somehow, though, the paddock pundits had the feeling that Porsche had the advantage. Further back, the A441-3 of Naddeo/Francisci had gone out with accident damage on lap 59.

Scheckter in practice. (©R)

The next race on the schedule was at Silverstone in the UK. Renault Sport stayed away.

There were still mixed feelings within the team about reliability, and some even suggested it was down to bad luck, but any mumbo-jumbo had to be put aside as the team approached Imola for the 500km race scheduled for 23 May. Two cars – A442-2 and A442-3 – were entered again to take on the Martini factory Porsche 936. There was a third Alpine Renault entered, this time under the name of Nettuno. This was Giancarlo Naddeo in the 2-litre A441-3, but neither Giancarlo nor Claudio Francisci, his co-driver, started as the car suffered engine failure during practice.

Renault also took the old A441T, to have on hand for testing; it might even be needed if one of the other two had a problem. The two factory cars yet again showed their speed, each car with

Jarier puts it on pole, 22 May. (©R)

Two A442s on the front row. (©R)

a slightly different aero set-up, which was what separated the times in the end. Jabouille was away at the Salzburgring, chasing points in the F2 Championships, so Jean-Pierre Jarier had been drafted in.

The cars were now extremely quick. Car 2 of Jarier/Laffite stormed round the 3.107 mile (5km) circuit in 1min 40.23sec with car 3 of Scheckter/Pescarolo in P2 on 1min 41.77sec, some two seconds faster than the 936 of Mass/Ickx on this relatively short circuit.

Two Alpine Renaults on the front row. Now, could it happen – victory? They led on lap one, they led on lap two, they led on lap three, but on lap four it was only Jarier who passed the pits – Scheckter had pulled off the circuit, his engine out of

Jarier, fastest lap. (©R)

commission. Fears rose in the Renault pit. Not again, surely! Jarier gradually pulled away, and by half-way was 15 seconds ahead of the field.

"Laffite took over and was really going for it, eventually unlapping himself. With 25 per cent of the race still to run, he had a good chance of catching Ickx, now driving the 936."

Things were going to plan at last, and on lap 41 the team was beginning to prepare for a driver changeover. Suddenly, Jarier came upon the Zeccoli Alfa and was baulked as he came into a corner. Braking hard, he spun several times, flat-spotting his tyres. In the mêlée Jochen Mass in the Porsche 936 got by, and with an early unscheduled pit stop to change the flat-spotted tyres the Alpine went a lap down. Laffite took over and was really going for it, eventually unlapping himself. With 25 per cent of the race still to run, he had a good chance of catching Ickx, now driving the 936. And he succeeded. The crowd and the Renault team were going wild as he caught, passed and pulled away from the Porsche. But as he came up to lap the Peter Sauber-entered 2-litre Sauber driven by Herbert Müller, the two cars touched. The Sauber spun off, but the Alpine Renault continued. However, unbeknown to Laffite, his radiator had been holed, and on lap 74 his engine overheated and was destroyed. The reliable Porsche 936 of Mass/Ickx took another win, and it was a frustrated and dejected Renault team that returned to France. Close, but no cigar! That's racing. At least Jarier had clocked the fastest lap to prove yet again they had the speed; it was 1min 42.3sec – faster than the 936 had gone in qualifying!

Now it was time for the big one, the Le Mans 24 Hours. The embarrassment of 1975 was history. Now, in 1976, the regulations for fuel economy had been scrapped and the event was no longer part of the World Sports Car Championship. The ACO had opened up its race to nearly all classes of closed-wheel sports and GT cars, which led to a wide variety of machinery competing for a place on the grid, even including NASCAR stock cars from the USA. June was only a few weeks away, and Gérard Larrousse decided not to enter the team in the Nürburgring 1000km, preferring to concentrate on the target.

It was the middle of the year, and life at the new Renault Sport buildings in Dieppe and Renault Gordini in Viry-Châtillon was changing rapidly as everyone settled in. Renault Sport had been formally registered a few weeks before, and there was a sorting out of who did what on both sides. Many of the engineers from the earlier years were appointed to new positions. Some left the company, including Mauro Bianchi, who created his own business and successfully developed a reactive suspension system. Richard Bouleau and Alain Serpaggi were to be found concentrating on new car development, and were soon involved in a secret project with new man Michel Têtu: the creation of the R5 turbo mid-engined rally car. André de Cortanze was moved over to the new Formula 1 Alpine A500 project, which was the initial developmental stage of the first turbocharged Grand Prix car; this had its first track outing at the beginning of May at Dijon, prior to its first significant test at Jarama on 11-14 May.

Jacques Cheinisse, who had led the team in Dieppe, was initially offered a lesser role within Renault. However, he was also offered a better position in Italy as rally manager to the Fiat team, as Cesare Fiorio was moving to another position. When Bernard Hanon got to hear about this he intervened, and Jacques was offered a much more senior role as head of special projects, and eventually director of product planning, introducing many new models to the Renault range.

Just before Larrousse joined Renault permanently, François Castaing had been made a director of Renault Gordini, directly responsible to Georges Sauvan, and with the coming of Larrousse became technical director of Renault Sport.

The first turbo F1 car on test: the Alpine A500 laboratory car, Jarama. (©R)

He would oversee both the sports prototypes and the launch into Formula 1, as well as supporting the Elf Switzerland F2 team that took Jean-Pierre Jabouille to the 1976 European Formula 2 Championship title.

Preparations had been going on since the beginning of the year, using the races as test sessions as a prelude to Le Mans rather than a stand-alone Championship bid. They had hoped for wins and had come close, but although the cars had been very quick, they had still proved to be somewhat fragile in the power department. A number of test sessions at the Paul Ricard circuit were conducted with Jean-Pierre Jabouille, Jean-Pierre Jaussaud and Henri Pescarolo, who spent hours relaying each other, testing aerodynamics, engine parts, tyres, etc, looking for the reliability vital to the 24 Hours. Were they ready?

Tuesday 8 June, place des Jacobins, Le Mans: the traditional site of the technical scrutineering held on the Tuesday and Wednesday of race week. Le Mans always attracts drivers from all over the world, and that year, with the many different classes allowed, the Automobile Club de l'Ouest very nearly had something of everything. It seemed that it didn't matter what car you had, provided it complied with a recognised FIA formula. The idea was that there would be greater variety, and with the American IMSA models there would be even more interest – the public could see these cars racing against the best of Europe.

Monday was a public holiday, so things were a little slow getting under way. Alpine took along three cars – the two A442s and the A441T – each with a different aero package. The A441T was there as a spare. A442-2 had the standard cut-off "short tail". For the practice on Wednesday evening, chassis A442-3 would have a long aerodynamic tail section. New rules meant no more fuel consumption restrictions and no more old cars. From the varied field, only 70 cars were to be chosen by the selection committee and 55 selected to race. Driver selection eligibility was reduced, meaning that the cut-off point of 33 per cent of the fastest qualifying time was reduced to 25%. During the race, replacement of engine ancillaries was allowed but block, head or transmission changes were forbidden. With its race now outside of the World Championships, the ACO could operate its own rules, and admitted cars to the following classes:

- Two-seater (Group 6), 3-litre prototype or 5-litre stock block engines
- Special production cars to FIA Group 5 specifications
- GT cars to Group 4
- Touring cars to Group 2
- IMSA cars from USA
- NASCAR from USA
- Non-homologated GT cars
- GT prototypes meeting the special requirements laid down by the ACO

From this one can see the huge variety of cars that could run that year at Le Mans.

Jabouille was joined by Patrick Tambay for practice. The young René Arnoux had been considered; he was driving the Elf Switzerland single-seaters alongside Jabouille in the F2

The short tail (nearest camera), and race car A442-3 in front. (Photo CV)

The short tail at scrutineering. (Photo CD)

The A442-3 long tail. (Photo CD)

Championships under the management of Jean Sage, so was closely connected to Renault, but his stature (he is a small man) was unsuitable for a car that was to be driven by the 6ft-tall Jabouille. A reserve driver, José Dolhem, was also waiting in the wings.

This was the first time the new A442s ran at Le Mans. Marcel Hubert had come up with a fine and beautifully shaped car. It looked fast and indeed it was, but it was up against virtually every closed-wheel prototype around at the time, the quickest being the Porsches and the Mirages. And there were dozens of other slower cars to get in the way! There was even a special Silhouette car from Lancia – a full race Stratos – to add to a mix of GTP and, as already mentioned, an American NASCAR, a Dodge Charger. A new French name came out to play at this race, too, destined to become well known: Rondeau. Its team manager was none other than Vic Elford, prolific competitor and winner in many cars and a contemporary of Gérard Larrousse. French passions, though, were concentrated on Alpine Renault and the A442s. Renault Sport had already decided to run only one car to concentrate its efforts. It would decide which one after the Wednesday trials.

Starting at 6pm on Wednesday evening, the opening hours of practice saw Jabouille piling in the laps in the long tail A442-3, distinguished by its red band on the air box and red squares on the front wings. He ran an official 3min 33.1sec, which put him on provisional pole. "I could have gone faster," he said, "but was delayed by another car on the circuit. I could have got down to 3min 30sec." It was still one heck of a quick time. The car really did look fast, so clean out of the corners and very quick down the straight. The French press was getting

A442-3. Jabouille talks with Hubert as Delfosse listens in. (Photo CD)

The short tail was used in practice only. (Photo CV)

very excited about there being three cars at the race but, as we know, the only reason was that the team was evaluating the aero packages. However, the time of 3min 33.1sec with the long tail car was so fast that they only ran the shorter-tail car briefly.

It must have felt good to be on the front row so quickly, especially with Porsche – the long-distance experts supported by Martini – some six seconds slower than the Alpines. Porsche was not worried, though: it had plenty of experience and several stabs at victory. The 936 Porsche of Reinhold Joest/Jürgen Barth headed the third row with 3min 45.4sec. Derek Bell/Vern Schuppan were next up in the Mirage, which had won in 1975, fitted with a DFV. Bell set a time of 3min 48.1sec in the dark! A second Mirage joined the mix, in a team now owned by the American Harley Cluxton, who had JCB support and fuel from Total for the race. The second Mirage set a time of 3min 51.1sec.

Jackie Stewart (wearing cap) talks with Gérard Larrousse. (Photo FC)

Jackie drives the car. (Photo CV)

Of course, there were many more entries, but we will stop at the Mirages as they are of interest later on.

Jabouille's time, a lot faster than the Jackie Ickx/Gijs van Lennep Porsche 936, had sent spirits soaring among the team, and Wednesday night saw a beaming Jabouille in the pits, but there were many – especially those who had been at the earlier races that year – who were wondering if it could go the distance, or whether something would break.

There had also been some interesting action between the official practice sessions when (not yet Sir) Jackie Stewart donned his helmet and went out at the wheel of A442-3 for a few unofficial laps.

Practice and qualifying, as it is called today, continued on the Thursday between 5pm and midnight, and the team used this period to complete systems checks and tests. No one would out-do the flying Jabouille.

Jabouille: rapid progress in the early laps. (©R)

being smaller than those of the 936. But again he was in and out quickly, maintaining his third place. The second stop for fuel came on lap 27, when the mechanics also did a plug change.

Tambay took over, but the car was not running correctly, and after one lap he came back in. This time an ignition unit was changed and he rejoined in seventh place, two laps adrift of the metronomic Porsche. However, it seemed that everything was now working properly, and as others stopped so Tambay climbed back up to third after passing the Mirages.

Four hours passed and the race was stabilising for the long night hours ahead. Jabouille and Tambay were enjoying themselves and Jabouille was to set several fastest laps. Evening

Sign of the future: Mirage and Renault in close company. (Photo AB)

Pescarolo takes a look while Delfosse talks with Jarier in practice. (©R)

their race was over – the car had lost power because of piston damage. The A442 was officially retired at 3am. A brave effort; it was close again, but still no cigar.

The Ickx/van Lennep Porsche 936 romped on to take victory, covering 2963.898 miles (4769.923km) and 349 laps at an average speed of 123.496mph (198.747kph). The Renault Alpine team had the satisfaction of being on pole and had completed 135 laps before the demise of the engine – longer than it had ever raced before. The fastest race lap of 3min 43sec also went to Jabouille. A full analysis took place on returning to the factory, and a decision was taken to carry out an in-depth study to identify how this new engine problem had occurred. François Castaing and François-Xavier Delfosse immediately drew up a test programme to try to resolve it. The chassis certainly seemed good, and the engine was powerful but still fragile. They needed more information and decided to enter the Enna Four Hours – the Coppa Florio – to test more modifications and try to regain some confidence. But it almost seemed that the gods of racing were against them.

Pergusa, Sicily, 27 June: the Coppa Florio. Alfa Romeo was on home ground and the public had eyes only for the famous red cars. Carlo Chiti, boss of the Italian team, had put on a show for the fans, playing the part of the emperor enthroned on his personal armchair, which accompanied him to most of the circuits, his feet in a basin of water in an attempt to outwit the suffocating heat.

For Renault, a certain Mr Depailler had at last been forgiven for his Nürburgring indiscretion and was back at the wheel; the Porsche-Renault rivalry began again. The Depailler/Laffite car 2 made its presence felt immediately, the A442-2 going round in 1min 35.56sec, but it was not good enough for pole position on this 3.076 mile (4.950km) course. The crowd was not very enthused, even less so when the second yellow Alpine Renault A442-3, car 3 of Jarier/Pescarolo, came round in 1min 35.74sec. Then came Merzario/Casoni in car 1, the Alfa 33TS12, and the Mass/Stommelen Porsche 936. Renault was again proving that it had the speed. (Jabouille was away racing the Elf Switzerland single-seater on his way to winning the F2 Championship title.)

It was hot and dry at the start, but rain threatened as the cars rolled away on the warm-up lap. As they arrived back at the start, Arturo Merzario pulled into the pit lane with a broken alternator drive-belt. The mechanics rushed to the car amid great protestations and arm waving to the race start official to ask him to wait; this being Sicily, the race director held up the start. Engines continued to turn over on the grid and the two Renault

Depailler, Jarier, Merzario. (©R)

drivers put their cars in neutral to avoid wearing their clutches. Mechanics were not allowed on the grid. As the two Renault drivers were waiting for the one-minute sign to go up, there was confusion. Suddenly the start signal was given and in the A442s a panic ensued to get going.

Alain Marguet saw it this way: "The grid was three cars, two cars, three cars. We had two cars on the front row plus the Alfa Romeo of Arturo Merzario, who was in the pit lane by now.

"Both of them grabbed the gear stick and pulled it back, but with reverse so close and pulling it so violently they both went into reverse and all the other cars shot away while our cars lurched backwards!" – Alain Marguet

There was no one-minute signal. Merzario's car had been fixed quickly and suddenly there was the 'go' signal and they were taken by surprise. The reader needs to know that on the gearbox for this race there had been a modification; you had to select first gear by pulling the lever back, but reverse gear was also a pull to the left and back (similar to the 1970s Porsche dog-leg type first-gear selection). The drivers were sitting there in neutral; when the start was given without warning, they panicked to get into gear quickly. Both of them grabbed the gear stick and pulled it back, but with reverse so close and pulling it so violently they both went into reverse and all the other cars shot away while our cars lurched backwards! How they managed to avoid an accident I don't know! ... Big confusion. Larrousse nearly exploded!"

Depailler recovered and was soon up to second place. Mass had shot into the lead, but Jarier had not recovered as successfully and was running near the back of the field. Merzario had got away, but had a problem with his fuel pump and dived into the pits again at the end of the first lap; after a rapid repair he re-entered the race and was soon charging round again. Depailler eventually got by the lead Porsche to take the number one spot as the race settled down. Jarier, driving hard, succeeded in catching up with the other Group 6 cars in the front group and tucked in behind Mass for a succession of laps. At pit stop time Depailler came in to hand over, allowing Mass to retake the lead. It was Laffite now who came storming out, but it was all for nothing, as shortly afterwards his engine let go on lap 51. One Renault down, one to go, the other competitors no doubt thought. They were not disappointed. The second A442 hit

trouble, and at the next changeover Jarier advised Pescarolo of a gear-change problem. Gérard Larrousse instructed them to carry on, and even with the problem Pescarolo was going 2-3 seconds per lap faster than the lead cars – until lap 74, when the gearbox had finally had enough, and gave up the ghost. Jarier set the fastest lap of 1min 36sec, a fraction slower than his qualifying front-row time. They were still fast, that was indisputable; but reliable, no.

The overworked engineers in Viry-Châtillon worked hard to resolve the reliability problems, and it was against this background that they took the two cars to Canada for the Mosport 200 Miles on 22 August.

It was the first time the World Sports Car Championship had gone to Canada, and the organisers were keen to impress. Porsche had by now clinched the Championship, but the Alpine Renaults were back in third and wanted to salvage something of their season, hoping to put the current second-place team of Osella back a position. It was an expensive trip, but two cars were taken, one for Depailler and one for Jabouille. Their only serious challengers speed-wise, they thought, were the 936 Ickx Porsche and the John Horsman-managed Mirage, driven by Vern Schuppan, owned by the GTC team of Harley Cluxton. But they were not the only fast cars there. Quite a few Can-Am cars had been entered in the Group 7 class. An ex-Renault engineer had

Mosport: Jabouille. (©R)

a little story to tell when the author interviewed him in October 2008: "It rained a lot in Mosport and I remember the spectators did sliding competitions in the park behind the grandstands! There was a great deal of waiting around and there were a lot of big cars – American Can-Am stuff. Also I remember Depailler asked us to drill a hole in his new helmet so that he could smoke his Gitanes!"

This was one time that the Alpines were not on pole. They may have been fast, but the sheer horsepower of the mighty Can-Am cars was too much to overcome and Jackie Oliver's Don Nichols-owned Shadow DN4 took pole with a 1min 15.2sec lap of the 2.459 mile (3.957km) circuit. Next up was the Can-Am McLaren of George Follmer, with the 936 Porsche next, this time just pipping Patrick Depailler's A442 for third place on the grid, with Jabouille just behind. It was a gutsy race for both cars, but they stood no chance against the ultra-reliability and monster power of the Can-Ams, and Jabouille suffered a number of small, niggling problems, completing only 51 of the 80 laps. Depailler might have been third but for an unfortunate change of tyres, which allowed Ickx to get past by the end of the race. Not a great visit, but a few more points on the board brought them closer to the Osellas in the Championship, and a few more lessons had been learned.

Behind the scenes, an interesting development began to take shape after Mosport. Gérard Larrousse and Bernard Dudot stayed on for discussions with the Mirage team-owner Harley Cluxton III and his team manager John Horsman, with a view to supplying Mirage with Renault engines for 1977. A deal was eventually struck.

Back in Europe a couple of weeks later, it was off to Dijon for the 500km on 5 September. Home territory, and a veritable feast of speed that weekend – a range of other races on Saturday 4th, including a 6-hour race, then the running of the 500km on Sunday. Ickx and Mass were doubling up. Having run in the 6-hour event, they turned out again the next day in the Group 6 936 to take on the A442s, which were only doing the Sunday race. Depailler, sharing with Laffite, was the fastest of the Renaults in car 4 and took pole with 1min 0.09sec, with the Porsche just 0.03 seconds behind.

Depailler, the hole for the Gitanes clearly visible above the P. (Photo GL)

The A442s are outpaced by the Can-Am cars. (Photo RK)

The Jabouille/Jarier car 2 was third on the grid. At the start these three pulled away in this order, but it was not long before Jabouille was struggling, not with engine problems but with tyre choice: he was on softer Michelins and they were not giving him a comfortable ride. Laffite, too, was to have the same problem, though both drivers gradually managed to drive around the handicap. It was not an easy race, with the cars slipping and sliding all over the place.

There would be only one scheduled stop for fuel and a driver change. For Porsche it went like clockwork, but for Renault it was circus time! What had François Castaing said earlier in the year about nothing being left to chance? At around the

Driver change and fuel: practice. (Photo CV)

Depailler recovers. (Photo AB)

half-way mark of the 152-lap race, Mass in the Porsche came in and handed over to Ickx. Fuel, tyres ... perfect, magnificent even, and all in 30 seconds. Renault Sport had practised and practised its pit stops, and now was sure it was as quick as Porsche, in training at least. Jabouille came in and leapt athletically from the car. Jarier jumped in, settled, but couldn't get his belt done up and someone had to help him. Then a mechanic tripped over, and the wheels took longer to change as a wheel nut gun failed! What else could go wrong? He lost a lot of time, but eventually got away. In fact, the fun was only just beginning. Laffite roared into the pits and again jumped out in fine style. Depailler nimbly stepped in. Wheel change: perfect. Fuel in: perfect. Drop the jack and ... oh dear. All four of the new tyres were flat! Someone was about to be fired. Near panic ensued as a new set was found and fitted, and eventually Depailler went back out. Miraculously, in spite of all this comedy drama worthy of a French farce, he retained second place.

Spare noses and both short and long tails in the Dieppe workshop. (Photo GL)

Ickx, in the lead, slowed down to a cruise, the race in his pocket. This excited the French fans who, unaware of the fun in the pit stops, thought that Depailler was catching him. He was, but the race finished before he got too close. In the end it was Mass/Ickx again who took the laurels, with Laffite/Depailler second – on the same lap – then Jabouille and Jarier third, four laps back.

Renault Sport did not enter the cars for the last race at the Salzburgring on 19 September. In the end, the 1976 Sports Car Prototype Championship saw Porsche dominant on 100 points; equal in second were Alpine and Osella on 47 points, a huge gap. Gérard Larrousse clearly had a tough job on his hands, controlling the team and his drivers. However, they had learnt a lot, and the hard work of developing engine reliability would continue in deadly earnest. Body parts were almost plentiful by now as can be seen by the photo of the Dieppe workshop.

Motorway pit-work. (©R)

Silhouettes in the low, late afternoon sun. (Photo JC)

They also wanted to improve the aerodynamics, and went looking for a straight piece of road, as long as the straight at Le Mans, to test on. Marcel Callewaert was in charge of logistics, and his first job was to find a suitable stretch. There were no circuits with a straight that was long enough, so he contacted the Highways Department of the French Government and found that there was a new piece of unopened motorway between Grenoble and Chambéry. He approached the relevant prefecture, and obtained permission to use it for testing. The tests would primarily be to perfect the rear section body shape and wings. They would use one car and keep a second in the transporter in case they needed it for parts. Alain Marguet was there: "We had the team set up on this motorway. It was November and it was very cold – good for the turbo but not for us. The tests were mainly for aerodynamics and we had different wings and body parts to try on the cars. Jabouille had some concerns, too, because if he went off he was sure he would go under the barriers that had been fitted along the side of the road. It was an uncomfortable time for him, but we chose a flat 5km section and that helped."

The plan was to test the car at over 350kph (217.4mph). Jean Coquery, the engine electronics technician, joined the engine team with Marguet, Castaing and Dudot. François-Xavier Delfosse oversaw the test and looked after the organisation.

Jean-Pierre Jabouille: "We did so many tests: almost every week there was a test somewhere or other. I did a lot of kilometres with the proto 2-litre to begin, then the proto with the turbo engine, the tests for the Le Mans 24 Hours, the engine for the future F1 in proto, then testing for the laboratory car. Phew, we were really kept busy! Lots of drivers joined us, including Derek Bell - I like him, great driver. One day we went to the

Different body panels without central strut. (Photo JC)

Jabouille, maybe a little nervous. (©R)

A442-2 with the original wing, waiting for service on the motorway. (Photo JC)

Flat out on the way to Chambéry. (©R)

new, unopened motorway between Chambéry and Grenoble – crazy idea! The Armco rails down the sides and middle were a metre high. I was a young lunatic! I drove on that road with the railing this high [he gesticulates]. If there had been a dog or a deer running across ... I was doing 350kph+ – can you imagine? They were tests for aerodynamics, wings and top speed for stability. There was nowhere we could do those speeds except at Le Mans, but Le Mans was closed except for the 24 Hours. So the team found this place, before the motorway was opened. Today if you suggested doing that, they would say: 'Hang on! Are you kidding?'"

October and November saw more outings for Jabouille with the F1 laboratory car, as they tried a variety of front wings and nose cones before the car went off to be painted yellow.

The Alpine A500's last time in black before the repaint. (Photo GL)

Official launch of Renault Sport, 2 December 1976. (©R)

Following the A442 motorway tests and the laboratory Alpine A500 F1 turbo testing, the team regrouped back at HQ for the official press launch of Renault Sport on 2 December 1976. A week later, on 8 December, the plans to go racing in Formula 1 were officially unveiled. Renault Sport was moving up a gear.

It was the end of a hectic, stressful, yet exciting year. The final adventure to win Le Mans had begun. Formula 1 loomed, and the old cars that brought the team to this point have dropped out of our story. The old chassis A441-0 had been acquired by French hillclimb specialist Jimmy Mieusset. It was seen frequently in the French Mountain Championships, in the hands of both Mieusset and later Jean Ortelli, first in its original body shape and then with a new rear engine cover, as on the A441-2.

There was however, the new problem that had raised its head for the engine team: pistons. The A442 problem of piston failure experienced by the Renault Sport team back in June at Le Mans did not augur well, and there was a lot of work to do to ensure future reliability. Aerodynamics became more important, too, as the cars became even faster; the A442s had huge power and were now very quick. Renault and its top management were expecting a Le Mans result in 1977. It would be an interesting period.

The grand opening of a box! (©R)

The World Prototype Championship for Makes was not as healthy or as high profile as it had been, and so Renault did not enter. The target was outright victory at Le Mans in 1977. Renault's engineering team resources were stretched, as it announced its Formula 1 programme as well as its targeting of Le Mans. Fortunately, there were two teams created for the two disciplines, though many of the personnel were to cross over quite frequently as the year wore on.

By the beginning of 1977, the A442 was pretty well sorted mechanically. Its engines and the turbo were no longer a mystery – the technology was understood, at least so the team thought. Engine failures had been a problem, but they believed they had got on top of that. The engine capacity was still 1998cc, which with its turbo and the 1.4 correction ratio applied according to the regulations gave 2797cc. It had a compression ratio of 7:1 and they were running the Garrett turbo at 0.9bar; the turbo engine now produced up to 520bhp at 10,000rpm. Failure at Le Mans the previous year had stung the team and there was still a niggling valve problem. Larrousse and Castaing decided to embark upon a series of exhaustive endurance tests to study every component and fitting in great detail.

A man charged with huge responsibilities: Gérard Larrousse. (©R)

Aerodynamics continued to be reviewed and updated by Marcel Hubert. The long tail that was becoming familiar came to the fore, as the team sought absolute perfection in the way the air flowed over the car – critically important on the long straight at Le Mans. Regarding the chassis, up in Renault Sport's Dieppe workshops sustainable reliability engineering studies were taking place, and stronger but lighter components being created. One chassis was created later in the year to allow a longer wheelbase of up to 2.466m. The brakes, now installed outboard within the wheels, assisted cooling and pad and disc changes. The existing Girling brakes were replaced with Lockheeds, and the front wheels were changed to 14in diameter. The fuel feed, the vital component to the turbo engine, was modified and various small items such as oil catch tanks, etc, were relocated for better overall access and balance of the car. The image changed, too; the name Alpine Renault on the bonnet of the cars was reversed to read Renault Alpine, reflecting the power balance between the two companies. In 1977, Renault took a 100 per cent shareholding of the Alpine company.

Testing began with all the cars early in 1977. Larrousse had his orders; he had put a new management team in place, and an additional member, Jean Sage, joined the Renault Sport outfit at the beginning of the year. A strategy and logistics master, Jean Sage – no mean driver himself in the late 1960s and early 1970s – had turned to management and logistics in 1973, and then in 1974 joined up with team Archambeaud, which subsequently became the Larrousse-Archambeaud team. In 1975 he managed the Elf Switzerland team, and in 1976 secured victory in the Formula 2 Championship with Jean-Pierre Jabouille.

François-Xavier Delfosse, who had been with the Alpine side of the team since 1973, was put in charge of chassis development, working under Dieppe general manager Fred Knoflach, his title 'Responsable Technique Exploitation Le Mans', with Bernard Dudot concentrating as ever on the engines down in Viry-Châtillon, both men under the leadership of François Castaing, who reported to Gérard Larrousse, the sporting director for Renault Sport. By now André de Cortanze, who had been with Marcel Hubert on the early cars and latterly the first

The new workshops. (Photo FXD)

Formula 1 car, had moved away from the racing department to the development of Renault road vehicles.

In Dieppe many of the original Alpine engineers had been drafted over to the Le Mans engineering programme. Jean Rédélé was still around, but primarily as a figurehead. Jacques Cheinisse was on the brink of leaving the organisation, as he felt that after all his efforts he was being sidelined, but he was enticed to stay at Renault in a new senior position at Boulogne-Billancourt, responsible for new product development. He went on to be responsible for the development of the Renault Espace, Renault 25, Renault 19, R18 turbo, R21 turbo, Twingo (1993), Scenic, Kangoo and Trafic (1996), and was finally appointed product planning director for the company – a glittering career.

Bernard Vernier-Palliez, president of Renault, was looking for results and a new order was taking shape. Behind the scenes, Renault was about to enter the glamorous but piranha-like world of the Formula 1 Grand Prix Championships. François-Xavier Delfosse: "For 1977 we decided that we had to be even better organised than before. We had our mandate: we were not going after the World Sports Car Championship, but would be concentrating on Le Mans. Also, after the Mosport race of 1976 Gérard Larrousse and Bernard Dudot stayed on to visit and set up an engine deal with the Mirage team, run by a great character, Harley Cluxton III. He had John Horsman on board, and a team of guys who looked after his Ferrari team and the recently acquired British company, Mirage, and their sports prototypes, which up to the end of 1976 were using the Cosworth engines. We were going to have a lot to do!

"We began to prepare for tests with reconstructed chassis 422-0 and 1 and the newer one, 422-2. Actually, we were not altogether pleased about the Mirage deal; it meant we had more engines to look after. But at least we thought we could beat them, as their cars were definitely slower and they were heavier. Whatever happened it meant we would now have five cars to think about."

The team got back to work immediately after the New Year down at the Paul Ricard circuit at Le Castellet. For the first tests, Jean-Pierre Jabouille was joined by Jean-Pierre Jaussaud and Patrick Tambay. Jean-Pierre Jaussaud: "I laid siege to Larrousse as I've never done with anyone else. I didn't stop calling him. 'Gérard, let me race!' He said, 'No, I can't.' 'Let me do some testing! I only want to do testing.' Again he said, 'No; if you did testing I'd have to let you race. I can't let you race so you're not doing testing.' So I said to him, 'But that's all I want!' At that time I wasn't doing anything – I had no work, nothing. It was a crisis! If I could have done a bit of testing it would have brought in a little bit of money because they would have paid me and it would have kept me in practice. So I kept hammering at his door until in the end, one day in 1976, he said, 'OK, but there's not going to be any racing.' I said 'OK, fine!' And so I went to Paul Ricard. 'Hey! You're going very fast!' he told me. 'If you like I'll keep you on for testing, and this time perhaps in 1977 there'll be a race.'"

There was another new boy, too, to share the testing at the beginning of 1977: the now legendary Derek Bell, a man destined to be one of the greatest sports car drivers ever. Derek was at the time what he called a sort of "jobbing driver ... I couldn't believe it – they chose a Brit! Gérard Larrousse called me and said, 'We're going to make a big push to win Le Mans – do you want to join us?' Well, I did feel a bit flattered, though again it has to be said I had driven seven times at Le Mans by that time, and won it in 1975 with Jacky Ickx, came fourth in 1974 with Mike Hailwood and fifth with Vern Schuppan in the Mirage in 1976, so maybe they felt I had something to offer.

"First, though, Gérard had said we had a lot of testing to do – my God, what an understatement that was! Paul Ricard, in the south of France – I thought a nice bit of winter sun would be good. But it was freezing cold and the accommodation in those days was a nearby hotel – dreadful place, 12 or 16 rooms, desperately basic. We would drive for eight hours then go back to the hotel and sleep, if we could. You know, you could hear the car on track; sometimes the sound helped you to sleep. Then

the noise would change to a stutter or stop altogether and you woke up, realising that it didn't sound too good, then – silence. It's stopped. Great, I can sleep a bit longer! One day – well, night really, it was nearly midnight – it had been raining during the afternoon and evening and the water had been running across the road. In the car it was quite warm and I was concentrating extra hard. It was pitch black, of course, and I was driving only with the lights of the car. But I had forgotten that outside it was very cold and on the track the water was freezing. Suddenly, whoa! The wheels were spinning, the revs shot up and the car was travelling at 140mph on ice! I came in and Gérard or Jean – I can't remember who – decided to stop the test for that night.

"I had forgotten that outside it was very cold and on the track the water was freezing. Suddenly, whoa! The wheels were spinning, the revs shot up and the car was travelling at 140mph on ice!' – Derek Bell

"Actually, I remember we never finished a complete 24-hour run. Things were often breaking or not running correctly, but those guys in that team were incredible; they were driven, mentally driven like I had never seen before. If a problem arose it was all hands to the pump to fix it. I would stay in the car while the part was changed, then they would tap on my helmet and off we would go again. Remember I had raced for Porsche; they had been there and done it all. We had been through, or maybe I should say lived or survived, the incredible period of developing the 917 and the 936. At Porsche it was almost the same every year – you know, 'OK, lads, it's Le Mans time again! Let's get sorted!' Polish up some new wheels or fit a few new bits and away we would go. All the guys knew what to do, but they didn't go much for change.

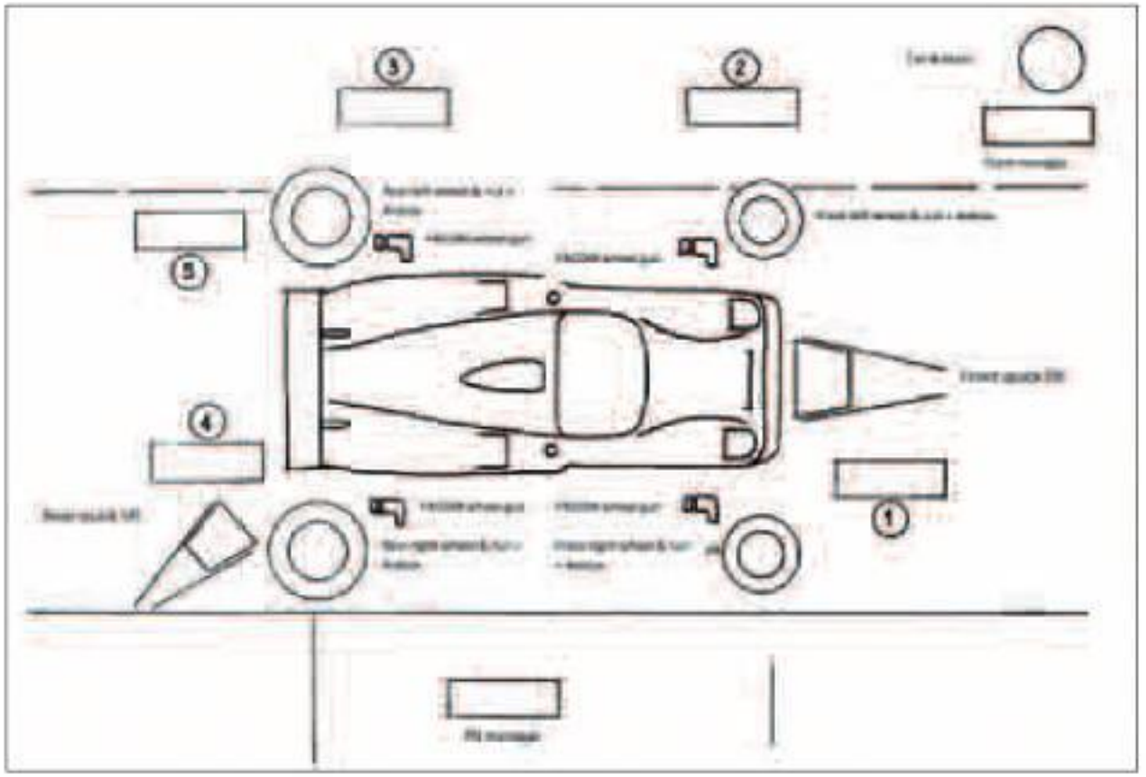
"Renault was an amazing organisation. Suddenly I became part of this team – all young, dynamic, not like Porsche's 'Been there, done that ...' It was: 'We need a team and we're going to win Le Mans.' The organisation was 21st century; it was fantastic. No disrespect to the other teams I have been with, but I have to say it was probably the most outstandingly refreshing of all of them. This was a serious, new, going-places outfit. Every time they went testing it was a big deal. They sorted the car, the drivers – everything. But they couldn't fix that awful Ricard Hotel; it's a flash, comfortable palace these days."

The testing began in January with Jabouille driving. A first stop was required to fix a gearbox problem. Then on the restart

Work in the pits – Jabouille, left, with Dudot. (©R)

Jabouille waits patiently in the winter sunshine. (©R)

Not all work! Four men in a boat, fly fishing with the master, Mr Jabouille. (Photo FXD)



The first drawing of the pit stop planning layout and personnel positions. (FXD)

the alternator started playing up – in fact, although this was not immediately recognised, it was an indicator of a belt tensioning problem that would eventually lead to valve damage.

François-Xavier Delfosse: "It wasn't a bad run – nearly 3600km – but we could see that bolts were coming loose and light bulbs failing due to vibration. The alternator problem needed attention and it was decided that the final drive did, too. We were not completely happy with the oil circulation in the gearbox, either, which may have contributed to a gearbox failure."

Renault Sport internal note de service 878 also states:

The 1K26130/8 Mahle pistons showed after testing to have vertical fissures at the bottom of the piston.

A sign of things to come.

We cannot be sure exactly which of the cars was being used for these tests, but it is thought it was A442-0 (the race number 2 visible in the photo is not significant), the chassis crashed by Depailler at the Nürburgring in 1976, now rebuilt and updated with just a two-post wing support and other modifications to test components. The team returned to Dieppe to prepare for another run a few weeks later. François-Xavier Delfosse was watching everything and making plans. Having many times observed the work required in the pits, he set about creating the perfect pit layout. Up in Dieppe, a replica of the Le Mans pit was built to enable the team to practise and to locate everything precisely, so that in the heat of the moment in a racing pit stop everybody would know exactly where to be, what to do, which tools

Jabouille at the wheel of a now travel-stained car. (©R)

to use and where they would be located, practising it so many times that they could almost do it in their sleep.

The management, too, was doing a lot of travelling. Gérard Larrousse: "I have many good memories of the testing and of the days François Castaing has mentioned, when we went to Dieppe from Paris every Tuesday. François would leave his car at my house and I drove us to Dieppe every week, leaving at six in the morning to be there at nine to start the day. I knew the road by heart and drove very fast every day – you could do that in those days when there was no radar! I remember working in Dieppe, trying to get all the team to work together to the new professional regime we needed if we were going to win; it wasn't always easy."

On 25 February the test team returned to Paul Ricard, this time for long runs that would again include a night test. The tests lasted over three days with the same drivers. Michelin also arrived to carry out endurance trials on its latest tyres. All was going well, until after a few runs the team found that the engine was overboosting. It would soon destroy itself unless it was changed, so a long stop was made and a new unit installed.

The car covered 4250km over the three days, providing much data for both the mechanical and chassis engineers. Included in the note de service 878 is the following:

10 pistons of 2 different types [one of which was at the suggestion of Mahle] were installed and we found the same type of incident occurred as before:
– Vertical fissures on each side of the axle (gudgeon) pin fixing.
– Horizontal fissures in the clearance between the piston head and the pin fixing.
– Fissures in the rib attachments linking the piston inner wall fixings to the piston head.

Daytime pit stop, 25 February. (©R)

Also, one of the consequences of installing the brakes outboard was a failure in the gaiters on the drive shafts near the universal joints, due to overheating. They had not needed these gaiters before, and of course this could lead to the escape of lubrication and failure of the component in a race. A rethink was needed. During the break in the testing programme, up in Dieppe the engineering team closely studied the technology employed by Porsche, the master of long-distance racing, and decided to move the drive shaft design away from universal joints and gaiters.

A Renault Sport internal report, written by Delfosse and dated 29 March, indicates the team also experienced oil and fuel pressure problems and accelerator cable failure. It also suggests changes to the onboard extinguisher operation. A further memo dated 1 April makes a number of suggestions to improve pit operation and personnel responsibilities.

Night-time pit stop, 25-26 February. (©R)

Preparing to go again – morning, 26 February. (©R)

The third test of the year saw a return south to Le Castellet on 5 April with another car (number 5), fitted with a new, updated engine. The test was scheduled to run over four days. François-Xavier: "This time, it wasn't things breaking or vibrating loose that bothered us – it was the new engine. It just wouldn't perform properly. We changed a lot of the engine accessories, but it still wouldn't run cleanly. All the drivers – Jabouille, Tambay, Jaussaud and Bell – had the same problem. We kept the car running, though, and did around 2000km. Jaussaud was in it for a long time to get experience, as he had not raced in anger for a while."

Jean Sage. 26 February was a cold but sunny day. (©R)

Eventually the team ran a complete test over 3500km with few faults, the only major item being a broken gear linkage. Jacques Laffite had also joined the driving team, and although running well he was the only one to have an accident, when he left the track at Signes corner. Luckily he regained control and returned to the pits, where examination showed no damage had been sustained.

François-Xavier: "During this test, to make sure that we had everything spot on, we rigged up cameras to record the activities of all of our personnel in the pits. As we've said, the pit itself was a replica of the one we would be occupying at Le Mans and identical to the one we had prepared at the factory. We filmed everything, we timed everything – wheel changes, pad changes, discs, turbo. Nearly everything was calculated down to the last detail.

"A preparation check list was created. It contained 80 points to be verified for each car. Included was a note that each car would hold 151 litres of fuel but in effect could only count on a usable 148 litres. Average consumption based on the 1976 race would be 42 litres per 100km and maximum 44.50 litres per

Another long day in the office. (©R)

Presentation of the team to the press: Jabouille standing, with Jaussaud and Tambay seated; Derek Bell in the car, hidden. (©R)

Relentless testing: Derek Bell. (©R)

100km [Author's note: this would prove to be a bit out – see later tests]. Oil in the engine and gearbox would be topped up every 16 laps (218km). If brake pads were changed, so were the tyres. Pads were to be changed every three pit stops and adjustment checked on the fourth stop. Sixteen stops were scheduled for the 24 hours over 380 laps.

"We filmed everything, we timed everything ... nearly everything was calculated down to the last detail." – François-Xavier

"All the information from the test relating to the pit stops was practised again and again in our replica pit in Dieppe. The cars had run well all through the spring, and we started to prepare all the other chassis to ensure that they were identical. The first chassis A442-0 went off to Hughes de Chaunac for a last-minute entry to Le Mans, although we did sort all the basic stuff and prepared a new engine before it went."

The deal with the team owned by Hughes de Chaunac, who since then has become a long-time stalwart of Le Mans, came about as he obtained sponsorship from Bendix. (Author's note: I wonder if anyone told him about the mileage on this 'used' car? It was the oldest car and the one that had done most of the testing; it was reputed to have done 24,000km.) The decision that de Chaunac's team would run a car came very late in the programme, and he got it just over a week before the qualifying for Le Mans. Needing to train, the team went to Magny-Cours for a shakedown and acclimatisation session. René Arnoux did the driving.

In Viry-Châtillon, concern was mounting after the engines were stripped down following the last test – cracks in the pistons were there again. Service note 878, reporting on this test, says the following:

After 6000km, some parts showed worrying fissures starting from the axle (gudgeon) pin holes towards the rings. One piston was badly damaged, while two others were practically unaffected. This difference led us to think that the variable quality of the machining of the axle pin greasing conduit at the axle pin outlet was the cause ...

MIRAGE TEST [Author's note: see details about the Mirage tyre and wheel situation later in this chapter] The pistons used on the Mirage were the same type as those on the third Alpine test. After 3000km under the conditions allowed by the Phoenix circuit, the pistons were in perfect condition, showing no fissures.

On 1-3 June, the Renault Sport team was back in Le Castellet for a final test. Three cars were there: the reconstructed A442-1 number 7 that Jabouille had damaged in the 1976 Nürburgring incident, A442-2 number 8, and A442-3 number 9. All were entered for Le Mans.

One final reference to the internal note de service 878, signed off by Bernard Dudot:

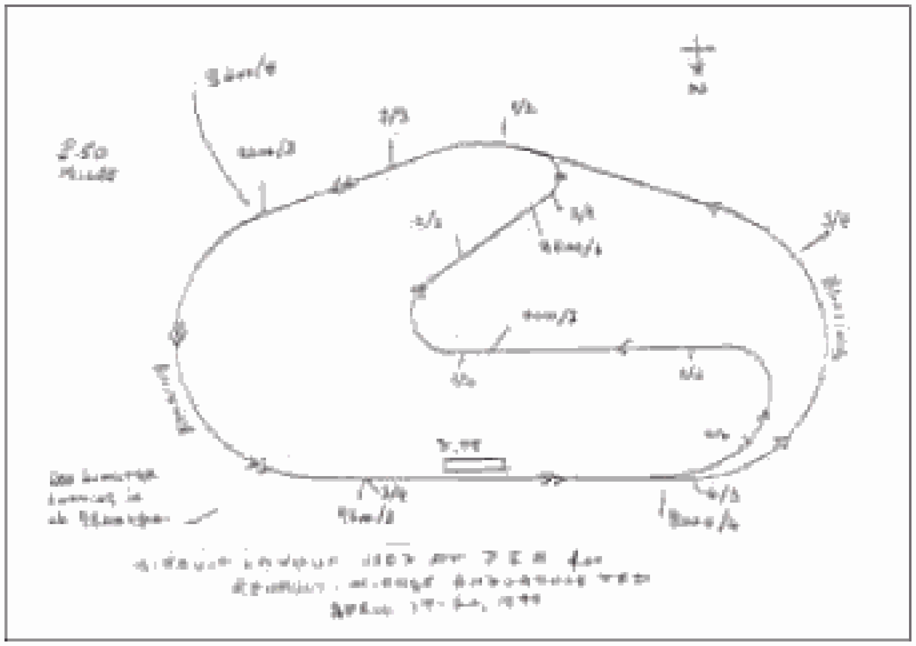
> For the race, Mahle will supply us with pistons whose machining has even finer precision. They also suggested machining some pistons with only one axle pin lubricating hole instead of two. As this test had never been done, we refused. To increase the endurance of the pistons in the test, we polished the outlet of the axle lubricating hole on all the pistons fitted to the engines.

With the A442-0 Bendix car, four A442s lined up on the Wednesday before the race at the scrutineering for the 45th edition of the Le Mans 24 Hours. But there were two more engines with Renault support, in Harley Cluxton's Mirage cars. Boss of Grand Touring Cars (GTC) Ferrari team and new Mirage owner Harley Cluxton III told the author in 2008: "If you had told me in September 1968 that forty years later I would happily tell you my 'French connection experiences', I would have told you impolitely to go away. Suffice to say that back in 1968 I was having major issues with the Michelin people and a rubber tree plantation owner – but we won't go there! Then again I had some French problems in June 1975, not in sunny southeast Asia this time, but on the starting grid of the Le Mans 24 Hours. Giancarlo Gagliardi was my co-driver in the Dino 308GT Ferrari. We went round in 4min 32.9sec, and the ACO said we did not qualify. The ACO and Luigi Chinetti Sr, boss of NART, our entrant, got into a major argument, which ended in Chinetti pulling out all five of our Ferraris. Incidentally, the Gulf Mirages finished first and third. The following year, March 1976, I bought the team; in the end it would cost me $10,000."

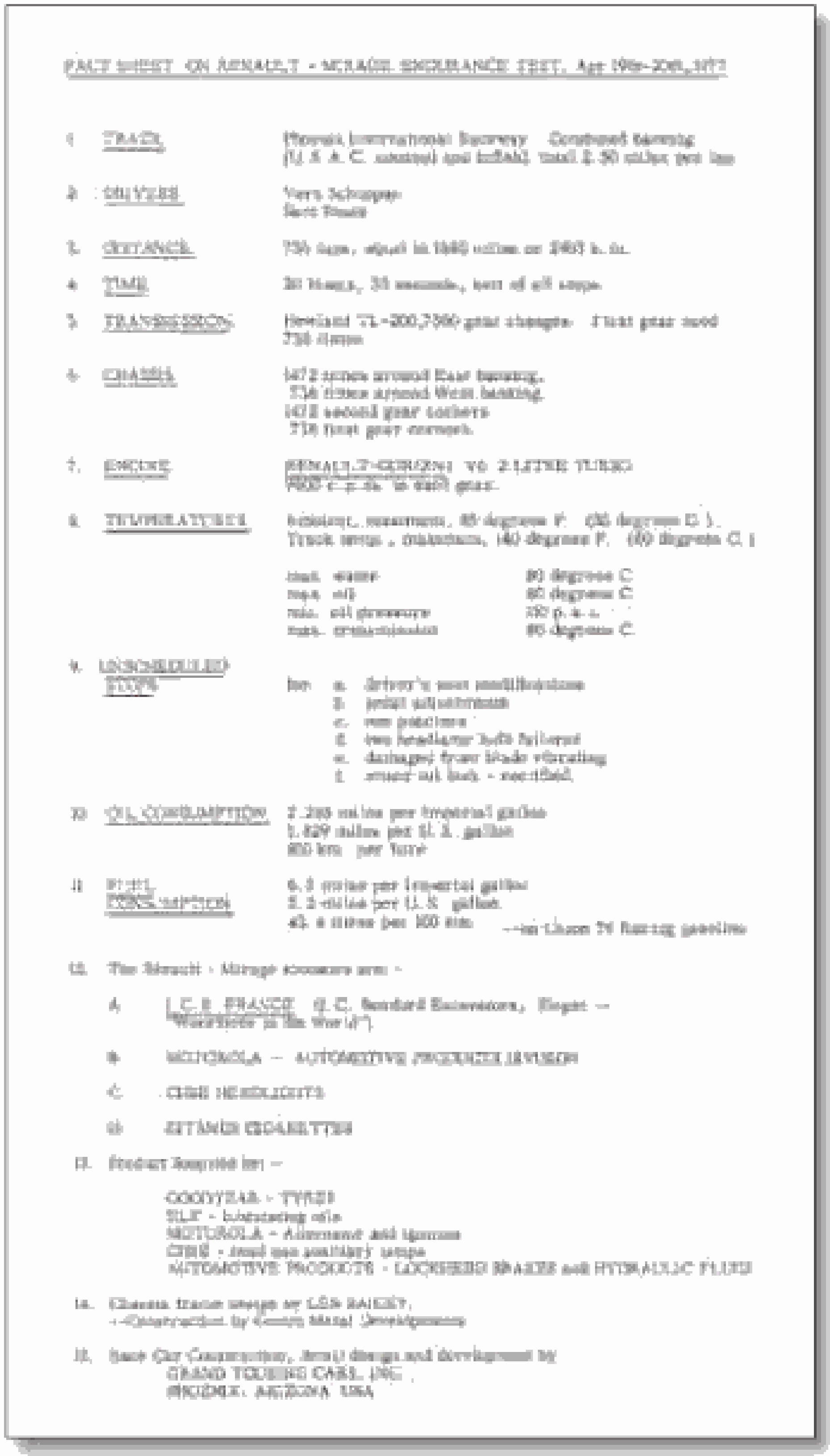
The shakedown was perfect; now they were ready. (©R)

In fact, Harley bought the team – which was up for sale at $140,000 – for $60,000, including the car that won the 1975 Le Mans. He sold it much later for $50,000, so in effect the Mirage team did only cost him $10,000! Cluxton again: "In 1977 we entered two Mirages for Le Mans. Our Mirage team manager John Horsman and I had met with Gérard Larrousse after the Mosport Group 6 race weekend in 1976 to discuss using the Renault turbo in our cars for 1977. The meeting went extremely well. Even 'Death Ray' himself [John Wyer] was cautiously optimistic. I, however, was still deeply conflicted over the issue of trust – whether Renault Sport would or could deliver. However, both Gérard Larrousse and Bernard Dudot convinced me that Renault Sport were on our side when they openly disagreed with Patrick Faure (Renault senior management) as to key points of the proposed contract, including information-sharing with us. (At the time, they had no idea I spoke French and understood what everyone was saying. I just played dumb, but for me it was like having listening devices in the bedroom and men's room!) The lines of communication between Renault Sport were always open and transparent. I am sure John [Horsman] will agree that as an engine manufacturer, as a team, and as individuals they never let us down."

John Horsman: "When we got the go-ahead from Renault I had Mike Coyte, who had come to the US with me from the UK, strip out the two GR8 chassis with the help of Wayne Beckwith [Author's note: long-time engineer with GTC and Harley Cluxton's Ferrari business]. The rear frames were returned to Maurice Gomm in Old Woking, England, and with drawings made by Len Bailey, who had designed the original M6 and GR8 tubs and had his drawing office above Gomm's workshop, Gomm made two new frames to replace the ones that had been used to carry the Cosworth DFVs. We used those Cosworth ones again when we went back to DFVs in 1979. [Author's note: Mirage was originally in the UK, based in Slough, before GTC acquired it and moved the operation to the USA. John explains the whole Mirage story in his excellent book *Racing in the Rain*.] The chassis then came back to Phoenix where I had assembled a team of guys, including Coyte and Alan Hearn, my chief mech from the Slough days, to build two M9 Mirages, now with Renault power, for 1977."



Team plan of the Phoenix track. (JH)

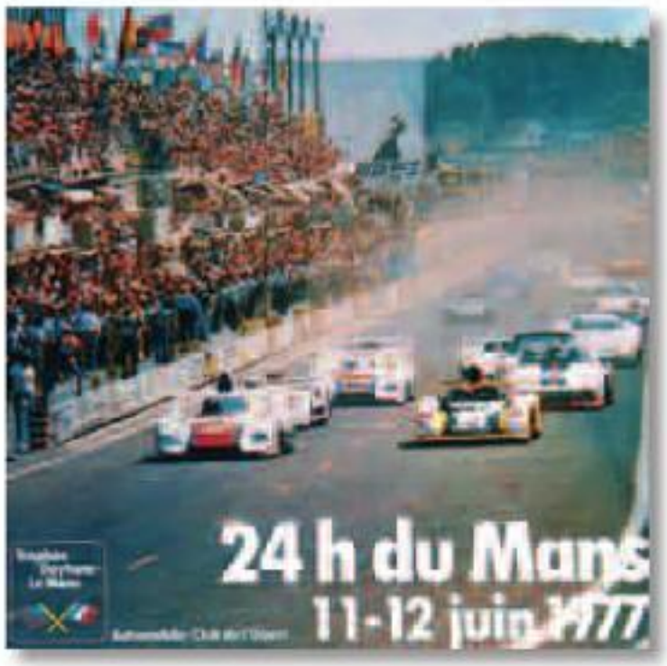


Mirage post-testing report sheet. (JH)

John Horsman continues: "It was all a bit of a rush for our small team, and we did not get to test until the spring of 1977. We went first to the Phoenix International Raceway on 19-20 April with the GR8/802. We didn't have any long test programme; we really only had time to ensure that the cars were stable and iron out any minor glitches, play with the turbo boost and learn how everything on the engine worked.

"The engine was smooth, devoid of Cosworth DFV vibrations, so the chassis had an easier time. There was nothing we could actually have done to the engine or the gearboxes, as Renault had run its own testing programme of the components. I was stretched to bursting point having to do everything, but I enjoyed it. Thank God for Alan Hearn, John Green and Chris Johnson – loyal and skilled ex-Slough men – who all came to help when called upon; also three or four local guys near to GTC. We were caught out by the Goodyear tyre diameters compared with Michelin, which limited our choice of upper gear ratios, but in fact it would work to our benefit in the end."

Sam Posey and Vern Schuppan did the driving in the April test, and on their endurance runs they completed 736 laps of the banked and infield track of the 2.5 mile Phoenix Arizona circuit. They ran a total time, excluding pit stops, of 20hr 35sec. They used 9600rpm in each gear, and made 7360 gear changes, noting that first gear was used 736 times! From this information, which comes from the official Mirage test report documents, the reader can see that GTC was testing in great detail. During



And so to a week in June. (Photo JS)

Scrutineering in front of Le Mans Cathedral. (©R)

that April test the car had a forced stop only six times for a) driver's seat modifications, b) pedal adjustments, c) a puncture, d) two headlamp bulb failures, e) damaged front spoiler, and f) a minor oil leak that was rectified. Oil consumption was one litre per 810km, and fuel consumption was 6.5mpg (43.4 litres per 100km). Pretty reliable.

One of the Mirage's problems was its frontal area, which was just too large compared with the low frontal area Alpines and Porsches. The late Phil Hill tested the car, and remarked "Among other things, at the back it was designed around rear wheels with 18in rims, and now the regulations this year permit nothing wider than 15.25in. Cluxton's Grand Touring Cars would love to build new Mirages with lighter chassis frames and slimmer bodies using long tails ... but that's a project for the future. The other immediate villain is that air box. Without the time to develop its own, the Mirage team has adapted the air box devised by Renault. However, in my test everything was fine."

Let us now leave the Mirage Renaults and pick up the story of the 1977 Le Mans 24 Hours. Internal note de service 871, dated 26 May:

On June 6 A442-0 and A442-3 will go to Savin-Calberson ready to go to Le Mans the next day. Engines are to be changed on A442-1 and A442-2 and go direct to Le Mans on 7 June.

As usual, scrutineering got under way at 8am that Tuesday, and continued through to 7pm, then on Wednesday from 9am to 12 noon. At 10.40am car 7 was scrutineered, followed by car 8 at 10.50am and car 9 at 11.00am. As it turned out, they were the last to be scrutineered.

"The crowds around the A442s were huge, as was Renault's presence. This year, after the failure in 1976, it was competing on a grand scale."

Car 7, the rebuilt A442-1(4), was driven by Jean-Pierre Jaussaud and Patrick Tambay; car 8, chassis A442-2, was for Patrick Depailler and Jacques Laffite; car 9, chassis A442-3, was the domain of Jean-Pierre Jabouille and Derek Bell, and car 16, chassis A442-0, was the Bendix DBA Equipe Renault

The four-post ramp for underneath checks. (©R)

Elf-entered car of René Arnoux, Guy Fréquelin, and Didier Pironi.

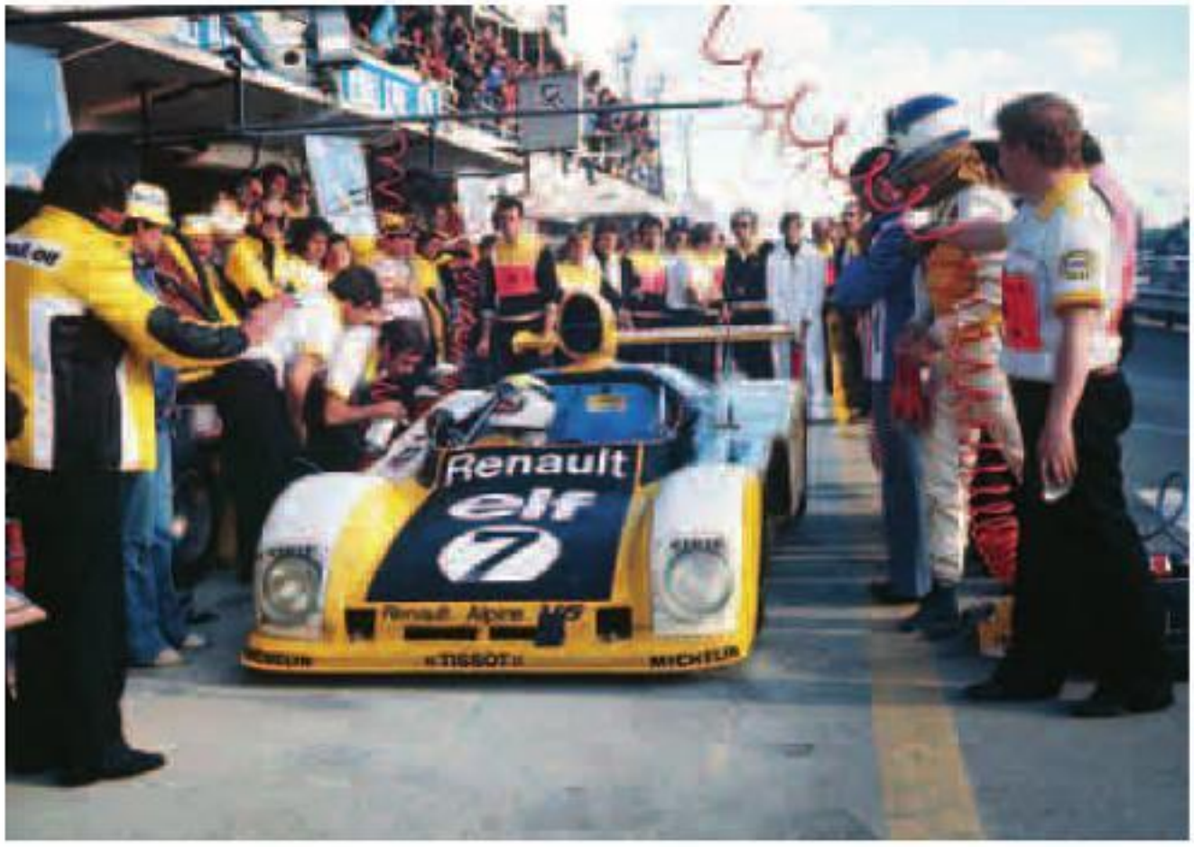
There was another Renault Alpine racing that year – the Jean-Luc Thérier/Bernard Decure A310 V6, entered by Bernard Decure, sponsored by Poisson Dieppois in the GTP category, and powered by the 225bhp PRV (Peugeot-Renault-Volvo) engine.

The crowds around the A442s were huge, as was Renault's presence. This year, after the failure in 1976, it was competing on a grand scale. Derek Bell: "At Le Mans they had built a village where each person had his own space, his own little room. You know in the '60s and '70s and even later one usually had a caravan of sorts – some great, some not so good, but whatever

The rush to get out, Thursday evening. (Photo GL)

There was quite a rush to get out on track as the teams were worried by the dark clouds in the sky. It was a fast session, and 18 cars lapped in under four minutes; there had only been 12 the year before. Jabouille set the target for pole position with 3min 31.7sec. His partner, Derek Bell, did 3min 32.3sec. Long gone were the days when Alpine Renault was 20 seconds or more behind the fast cars. Now it *had* the fast cars, and there was more to come. Top speed was the name of the game – the Depailler/Laffite car was clocked at 355kph on the Mulsanne straight, some 7kph faster than the quickest of the Porsches.

To rein in any excitement, Gérard Larrousse decided to set a lap time target of 3min 50sec for the newer drivers, Arnoux/Fréquelin and Jaussaud/Tambay. 'Newer' may sound a strange word to use, as all four were accomplished, race-winning drivers, but they had only recently come to the A442 programme. Jean-Pierre Jaussaud: "I had by now done a lot of testing with Patrick Tambay, so by the time we got to Le Mans we knew the cars well, but Gérard was not too happy to let us have our heads and go for it. We drove sensibly and qualified fourth with 3min 34.8sec – not bad for driving carefully!" Tambay did 3min 36.2sec.

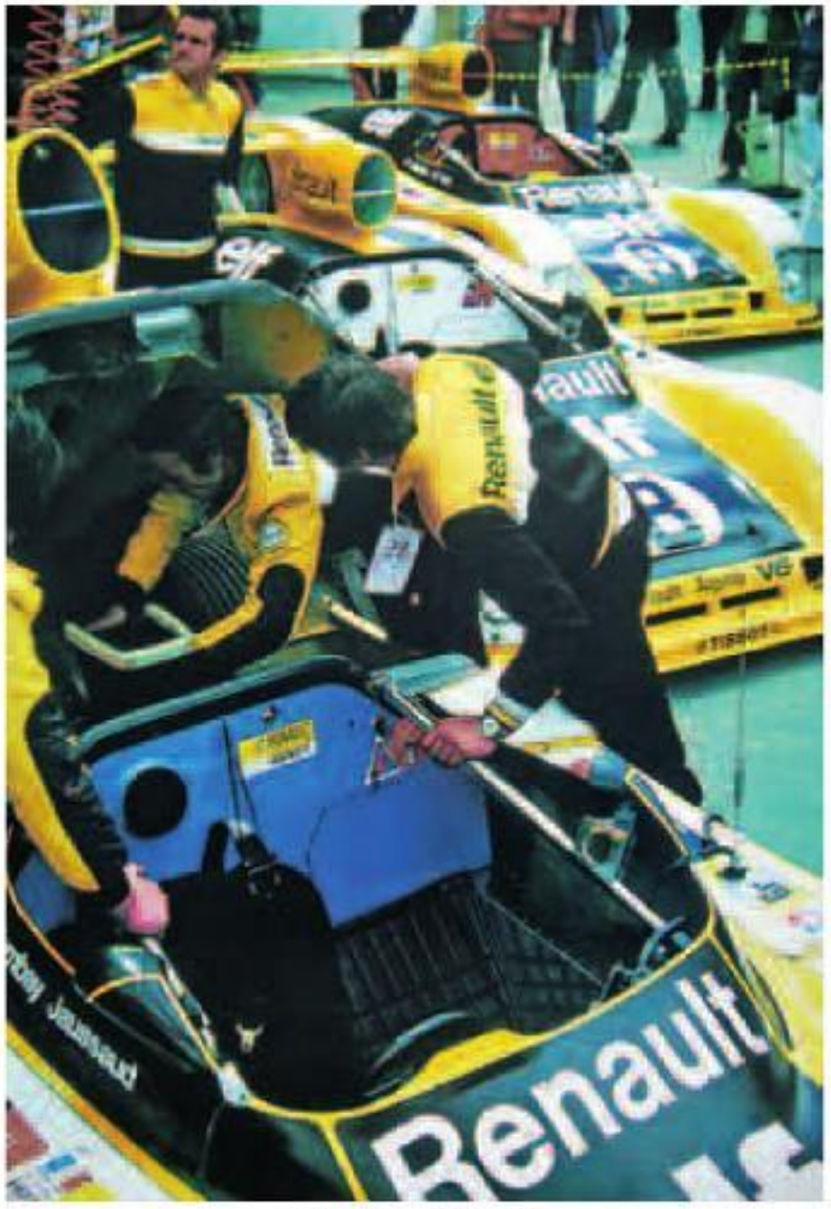


Patrick Tambay watches Jaussaud in the car. (©R)

It was Jean-Pierre Jabouille who had pulled out an even quicker time; he did that 3min 31.7sec for pole position on his first run, and with co-driver Derek Bell just fractions behind this looked like an unbeatable pairing – looked, maybe, but this is Le Mans!
Jean-Pierre Jabouille: "To have the best guarantee of victory at the 24 Hours a driver must have done Le Mans at least once. It is a special race. The driving pace is different from other races. You have to go fast with a good safety margin.
A Le Mans driver must give his all on the driving side and demand as little as possible from the car, i.e. brake early, don't ill-treat any of the car's elements, but take the corners as fast as possible. And then there are the pitfalls of night driving: the oil patches that you can't see, the early morning mist. Lastly, lots of traffic made up of different cars, some fast and some slow (from 250 to 350kph)."

Bell in practice. (©R)

Jabouille prepares to go. (Photo GL)



A busy time. (Photo CD)

Depailler presses on. (©R)

Race day – final checks. (Photo CD)

Second on the grid alongside him was the number 8 car of Patrick Depailler/Jacques Laffite, with a time of 3min 32.9sec set by Depailler. Here is what Jacques Laffite said as he prepared on the Saturday morning: "The only thing that interests me in the 24 Hours is to win. That's why I accepted Renault's offer. For the public it's important that we win this race. I think a Renault will win – the car Patrick and I will be driving, I hope!"

Renault Alpines may have locked out the front row, but hard on their heels was the Jacky Ickx/Henri Pescarolo Porsche 936 slotted into third place with 3min 33sec. Alongside them was car 7 of Jaussaud/Tambay on the aforementioned 3min 34.8sec. Directly behind the Porsche on the third row was the fourth A442, the Bendix car of Pironi/Arnoux on fifth place with 3min 38.6sec set by Pironi.

Following orders, 3min 50sec per lap: Laffite/Depailler. (©R)

Train à Grande Vitesse. (Photo CV)

side of the road and got out as fast as he could whilst the fire crews attended, but the damage was done and the blazing car was in a sorry state. The mechanics looking after it were shocked and dejected as they joined the other pit crews to help out. This was not Pironi's year.

Jabouille was setting consistent laps at around 3min 45sec. After 1h 15min he came in for a routine stop and Derek Bell took over, continuing to set the pace and consistently pulling away from his team mates lap after lap in car 8.

By 8pm, with the cool evening drawing in, it was the three Elf Renault Alpines out in the lead followed by the Porsche 935 of Georg Loos, which had been handed over to Hezemans, and then the two Mirages, running well. However, the second

On through the night: Derek Bell. (©R)

Mirage, car 11, was by now four laps down on the leader. The prime 936 Porsche of Ickx/Pescarolo went out when its engine let go, and Ickx transferred to car 4 with Jürgen Barth and Hurley Hayward, which had had a problem early on. At this stage it looked like there was nothing that could actually challenge the A442s for the lead. However, by 9pm that Porsche was recovering rapidly, and with night setting in and the funfairs and bars in full swing, the 936 moved up to ninth place as Sam Posey in the 11 Mirage ran out of fuel on the circuit. In the race records it says: "Driver observed fuel under the fuel pump when tail opened by side of track." Their fastest lap had been 3min 50.23sec, set by Michel Leclère. Sam Posey's fastest was 3min 51.72sec.

The performance of the well-maintained A442-3 was so impressive that by the time darkness fell it was a lap ahead of its Laffite/Depailler sister car. Come midnight, the Renault Sport cars were in first, second and third, albeit on various laps, but the Porsche was still charging hard and went onto the same lap as the number 7 Jaussaud/Tambay car at 1am. However, car 7 was showing the first signs of problems: its engine started to stutter, lose power and emit an alarming plume of smoke, then slowed dramatically. They just managed to get to the pits, having covered 158 laps and 2155.2km. The mechanics set about trying to find the problem. An hour later, Gérard Larrousse was concerned; it looked like piston failure. "Sure, I was concerned – all the three cars for this race were set up almost identically."

pop. The team thought it was a plug problem and changed them, but by now everyone was getting nervous, and on the next lap he crawled back in with an even bigger cloud of smoke and had to retire. It was found later to be another failed piston. Lap 257; 3505.48km. A bad sign.

That left just car 8, which had run well except for a couple of lengthy stops. It inherited the lead over the still charging Porsche 936. Car 8 had been piloted at the start of the race by Laffite, as Larrousse was still smarting over the incident that had seen Depailler take him and his team-mate out the year before at the Nürburgring. By now almost forgiven and back in the fold, he was proving a great asset, but team managers are serious guys and Gérard did not want his young driver doing anything silly this time in the excitement of the opening laps.

Jacques Laffite had been running steadily and let his team-mate Jabouille set the pace early on, with his own car running comfortably and thus far reliably. After a refuelling and driver change on lap 18, Depailler set off at a cracking pace, finding himself in second place after the demise of the top Porsche of Ickx/Pescarolo on lap 44. The car was running beautifully early on, and continued to do so through the night. As the light of Sunday morning started to show, Depailler, who was in the seat at that time, had experienced a gear selection problem, seemingly having lost fifth. He had to come in for a stop that lasted 26 minutes, as the team fitted a new fifth gear. Ickx in the Porsche got by during that time and relegated car 8 to third place. When it started to rain just after 6.15am, Laffite came in with ignition problems. Plugs were changed and electrics checked. It took 7min 30sec. He rejoined four laps down on the second-place Porsche as the Jabouille/Bell car was storming on in front.

"... just 25 minutes later the radio crackled into life and Larrousse heard Depailler's words: 'The engine has blown!'"

Things in the team were looking good, and then came Jabouille's disaster and everybody started to worry. Laffite came in for a pad change, and Michelin's tyre genius Pierre Dupasquier and Gérard Larrousse decided to fit soft tyres and allow the drivers to have their heads to go after the Porsche of Barth/Hayward and Ickx, which had by then inherited the lead. From four laps down earlier in the morning, Laffite pulled back to 1.5 laps, rapidly catching Jürgen Barth in the 936, who was an excellent driver but not as fast as the Formula 1 pairing. At the driver change at 11.20am on the Sunday, Larrousse instructed Depailler to continue pressing on. He started going round six seconds a lap faster than the Porsche. The crowd was ecstatic: the yellow and black car 8 had started its final bid for glory.

Tension was rising in the Renault pit as the team began to get excited, but just 25 minutes later the radio crackled into life and Larrousse heard Depailler's words: "The engine has blown!" The crowd heard

Daylight, and tired men: Dudot, Marguet, Delfosse. (Photo GL)

The Mirage powered by Renault finished second. (Photo PK)

Sam Posey: a fuel leak brought disaster. (Photo CV)

the news over the speakers in the stands and around the circuit as Depailler reported: "I'm starting to walk back." Again, it was later found that a piston had failed. They had completed 289 laps and 3941.6km, their last lap being 3min 39.8sec.

Disaster for the Renault Alpine cars: yes. Disaster for the engine? Not entirely, because the Mirage Renault (car 10) of Vern Schuppan and Jean-Pierre Jarier had taken over second place. The Harley Cluxton/GTC-entered Mirage had qualified in 12th place with 3min 47.4sec, and was still running steadily. How had it managed to succeed where the Renault factory works entry had failed?

Jarier and Vern Schuppan had quality. John Horsman, interviewed in 2008: "The tests had gone well at Phoenix, and when we arrived at Le Mans the scrutineering went OK, too. We were well organised. With our signalling crew of Bob and Liz Legett with their team out on the Mulsanne, we were set up well. On the track, however, things were different. I knew the cars would not be as quick as the A442s but I was not expecting such a huge difference. Our cockpit was slightly larger and we had 'legal' roll bars compared with theirs! We found our drivers were suffering from severe buffeting in the cockpit. This was minimized by cutting a hole in the area behind the driver's head, and when they'd finished, Posey said the car was very comfortable to drive.

"Trying to solve the air box problem, we moved the opening forward four inches; it was causing us a lot of drag as the shape of our car was different from the A442s, and moving it helped

If the Porsche fails, we win! (Photo AB)

the flow but also gave us some more cooler air. We had another perceived problem – our gearing. We had larger-diameter tyres, and because of this we could not use maximum rpm in fifth gear, so we were losing time. But with some adjustments to gearing we got the engines to use 9200 instead of 9600. As the race got underway we were going OK until the Posey/Leclère Mirage failed to come round on lap 59. It turned out that the tank fuel low light had not come on and the pump had been pumping fuel out onto the track since the start! But car 10 kept going,

"Vern reported that the steering had tightened, so we lubricated the bearings and off he went. By then all hell was letting loose at Renault as the cars were dropping out one by one ..." – John Horsman

although five hours in, after 77 laps, Schuppan brought it in with the alternator light on. We fixed that and did a normal pit stop service and he returned to the battle."

As the race wore on it rained, dried out and rained again. Jean-Pierre Jarier had a slight altercation with the barrier and damaged the front of the car, but the panel was changed quickly at the next stop. Through the night and into morning, at the 18th hour Schuppan brought the car in on an unscheduled stop. John Horsman: "Vern reported that the steering had tightened, so we lubricated the bearings and off he went. By then all hell was letting loose at Renault as the cars were dropping out one by one, due to piston problems, so we were a bit worried. We had got up to second place and there was a very strong possibility of the leading Porsche's engine failing too, since Jacky's first car had holed a piston early in the race."

Incredibly, that's exactly what happened! The lead Porsche 936 engine holed a piston just like the other 936. But the Porsche had a huge lead and the race was nearly over. All it had to do was cross the line between 4pm and 4.15pm. Vern Schuppan: "Lap after lap I went by the pits thinking, maybe we can win this. The Porsche was sitting in its pit not moving; things were looking good, and I began to believe it was possible." But Barth's Porsche was still several laps up on the Mirage, and with one lap to go before the 4pm finish the Porsche team taped a huge clock to the centre of the steering wheel. Jürgen Barth was instructed to go out and drive one lap slowly and not to cross the line until at least one minute after 4pm. Gérard Larrousse was searching the FIA rulebook to see if Mirage could snatch victory in the dying seconds of the race. Jürgen set off, smoke pouring from the Porsche's exhausts, but he went too quickly and came by at 3.59pm, so had to go round again! Still another chance for Renault. The Mirage was chasing like mad, but it was not to be: at 4.04pm Jürgen Barth smoked the ailing Porsche across the line and the Mirage-Renault was second.

Not many laps left – a travel-stained Mirage. (Photo CV)

Vern Schuppan: "Jackie Ickx had blown his car up, and they plucked him out and put him in with Jürgen Barth. Jackie was just driving 110 per cent, and I remember at one point during the night he was behind me, and we were coming into the Ford chicane to go onto the pit straight, and I was out-braking someone into that chicane, and Jackie was on the outside of me trying to out-brake me! We all came through the corner like that, and he said to me after the race, 'I bet that gave you a surprise in the night!' Great driver, but with drivers like that you have confidence, and such manoeuvres are commonplace. The Mirage boys were very good people to work with and certainly when we were testing and things like that it was great, and to have such a beautiful engine, for me that was my first experience with driving the turbo car."

The Mirage was 11 laps down at the finish, but it had been a dramatic end to the race and one that certainly had the crowd on its feet. For Renault, though, it was frustration on the one hand and jubilation for Mirage on the other. So how had it happened? Answer: those tyres. The slightly increased diameter had limited the revs on the Mirage engine, with the result that the pistons were not as stressed at 9200rpm as at the 9600 on the A442s – it was just enough and the engine did not suffer the failure that had afflicted both Renaults and Porsches. The race data records show that the fastest Mirage lap was put in by Jarier in 3min 46.8sec, with Schuppan's quickest being 3min 47.8sec. They had covered 2805.39 miles over 331 laps.

Just a month later, on 16 July 1977, Renault entered the world of Formula 1 and the Grand Prix World Championship at the British Grand Prix at Silverstone in England. By the time the team arrived at Silverstone with the RS01, Renault's great Formula 1 adventure had run about 2500km in testing, utilising much of the development being applied to the sports prototypes.

Jean-Pierre Jabouille and the RS01 1500cc F1 car. (©R)

Jean-Pierre Jabouille managed to qualify in 21st position on the grid; his performance was more than satisfying. A completely new car, powered by a new 1500cc engine, had arrived.

François-Xavier Delfosse: "At Le Mans our cars had been very fast in the race, but failed because of the pistons again. It was the long straight that did it. The Mirage was slower so did not reach its limit, and we did not think it would be as fast anyway. We told the engine team that we would run up to 360kph on the straight, but they didn't believe us. Amédée Gordini didn't believe it, either, but with the new long tails that Marcel Hubert was creating for us it was necessary to gear the engine to maximum rpm, and his calculations showed us that we could achieve these figures; the official speed trap figure was 355kph."

Alain Marguet: "Immediately after Le Mans, François Castaing organised a big brainstorming meeting to get the opinion of each technician, and he asked everybody to start working towards 1978 very early, because we must win in 1978.

He also said he was going to try to improve our organisation, and to find a new solution to the problems. This was just a couple of days after the race. We worked a lot with the piston manufacturers (Mahle), and we also tried to understand how to cool the pistons better. It was not always the same pistons that failed in an engine; there was no pattern. So it was very difficult to identify a precise fault that was responsible all the time. I remember we worked with a microscope to analyse the piston because we did know that some of the problem came from what we call pre-ignition. Giuseppe Albarea would study everything."

On the 29 July at meeting number 19, the team examined the performance of the Martini Porsche team. The five-page report compares the precise activities of the Renault team with those of the Porsche team in great detail.

Giuseppe Albarea: "Analysis of the engines showed that in general the failure of the pistons was caused by a chain of events, all of which happened at high speed. Principally it was a state of pre-ignition, a weakness of the fuel in the combustion chamber that would cause a heat build-up that would damage the edge of the top of the piston and the rings, causing imbalance and a resonance which would set up metal fatigue and fissures in the parts."

Note de service 887, dated 13 July following a meeting on 11 July, states:

Present: Messrs Vuaillat, Larrousse, Castaing, Delfosse, Hubert, Renut, Coquery, Coste, Bresson

I. ANALYSIS OF PROBLEMS 1977

1.1 Engines

Car 7: Piston breakage, traces of janming (of the piston in the cylinder), broken rings and burning.

Car 8: Piston breakage, traces of janming and burning, one valve spring broken.

Car 9: Piston breakage, slight traces of janming and burning, one valve spring broken, one guillotine spring broken.

1.2 Gearboxes

Car 7: Klingelnberg joint: pitting and traces of janming (joint deteriorated more than on the Mirage). No incipient breakage on 5th gear pinion.

Car 8: Renault joint deteriorating, 5th pinion damaged in race – seizing after change of rear of maintenance bearing box of 1st gear idler pinion.

Car 9: Renault joint deteriorating, on 5th gear idler pinion tooth broken (fatigue).

Car 10 (Mirage): Klingelnberg joint and pinions in good condition.

"I remember we would think the engine was running OK on the dyno, then after a couple of hours – bang! We broke a lot of engines!" – Alain Marguet

Alain Marguet: "We did a lot of investigations and also tried many different clearances on the parts, friction, etc., and often there were very small differences – tiny, but very important. I remember we would think the engine was running OK on the dyno, then after a couple of hours – bang! We broke a lot of engines!"

Addressing the gearbox worries, the team decided to make modifications in the conical couplings. This would impact on Michelin, and in a letter dated 13 July 1977 from Renault Sport to Pierre Dupasquier, it said: "An examination of the 8x33 conical joints of the Le Mans 24 Hours Renault Alpines leads us to envisage for 1978 the study and endurance tests of a 9x35 conical joint which should be more resistant. Morever, the good performance of the pinions would indicate that they are not in question. As a result, we would like to know if Michelin would be ready to develop a rear tyre with external diameter 630-635 on a 15 or 14in rim, maintaining the overall balance and efficiency of the 1977 A442. A quick response would enable us to commence manufacture of the 9x35 joints. Moreover, we hope that the endurance tests planned with a view to Le Mans 78 will allow Michelin to test more advanced tyres (carcass, rubber, etc.) with a view to a possible increase in the level of performance over that of the competition in 1978. Finally, an experimental car, developed by Renault Sport, will be placed at Michelin's disposal for all the performance tests required." The letter was signed F Castaing.

François-Xavier again: "We needed more testing and we looked for a test track that had very long high-speed straights to test to the absolute limit. Whilst we were doing this research, our piston-maker Mahle was modifying the pistons and fitting an oil gallery. These would be the first pistons with an oil gallery; we did the same for the F1 1500cc turbo engine and Jean-Pierre Boudy designed an oil spray system under the piston to cool it. There were four sprays per piston. The fuel injection at full throttle was re-designed to add more fuel to cool the pistons and valves; the downside of this, of course, was that it used more fuel, possibly requiring more pit stops. We also decided a few weeks later to build another chassis for 1978: the A443-0."

The team was looking towards 1978 in earnest. An internal memo dated 29 July gives the budget proposal for 1978 as

8,273,000 francs (getting on for one million sterling). The previous year had cost 7,714,800 francs.

We now arrive to September. It is here that we first see the A443 mentioned in the notes of an internal meeting. Note de service 902 dated 7/9/77, item B:

12 new engines to be built to the 1978 planned specification.
5 new gearboxes Type TL 200 to be acquired plus two for Mirage.
Chassis (A442-0) to be refurbished following its fire at Le Mans for use in testing.
New chassis to be constructed to be the type A443.

Note de service 919, concerning a meeting on 12/10/77, states:

Tests planned at Paul Ricard from 7-11 November. Endurance tests USA planned on TRC circuit Ohio, 24-27 November 1977. Drivers to be: Jaussaud, Tambay, Depailler, Bell. Michelin, Elf and Thompson (radios) to be present.

Item two gives the cost of renting the TRC circuit – $1500 for 24 hours, $1200 for 16 hours, and $800 for nine hours!

Item B covered wind tunnel tests, and it is worth noting that this is where the team first developed the two snorkel inlets in the wing supports to add cooling for the rear brakes. There was also added cooling for the gearbox.

The A443 was in development and was scheduled to be tested on 6-8 December at the Paul Ricard circuit at Le Castellet.

François-Xavier Delfosse: "We now had a personnel setback: Marcel Hubert had an accident and was off work for three months, so I took over the wind tunnel work. We tried several different things, including fibre skirts and a cockpit screen. The skirts didn't touch the ground – we copied the idea from Lotus."

The team was also looking at star drivers, and a telegram dated 28 October 1977 shows that Mario Andretti was considered and approached, but was blocked by his contract with Goodyear. On the same day Gérard Larrousse politely turned down an approach from François Migault who had written to Gérard on 17 October. Technology loomed large regarding communications, and several letters went between Renault Sport and the Automobile Club de l'Ouest concerning the use of radios and the required transmission licences. Also mentioned is the installation by Renault Sport of photo electric cell measuring devices near post 59 at kilometre six on the course. Thompson-CSF was ever present in these negotiations, supporting Renault Sport in its representations to the ACO's man JP Moreau.

According to note de service 933, dated 1 December:

On October 7-8 the cars had run for 22 hours and covered 3550 kilometres, the only minor setback being a spark plug that destroyed itself. Dudot determined to speak to Champion [spark plug manufacturer] to seek a type which could better cope with the temperatures caused by the turbo. The Kugelfisher pump also needed attention.

Other than that it was a good test, and the team prepared to go to the USA. Of special note is the point that the engine revs in fifth gear were stated never to have gone above 9300rpm.

The search for high-speed tracks had brought up the name of TRC in Columbus, Ohio. The Transport Research Centre was developed by the State of Ohio as a research and development proving ground with the purpose of encouraging motor vehicle research and development activities in Ohio. The Centre began testing in 1974, and as can be seen from the pictures it has very long straights. It also has banked corners. Two cars were readied for transportation.

François-Xavier Delfosse: "TRC's 12km track had two chicanes and a banking at each end which allowed us to test at top speed – well over 300kph on the straights – for lap after lap."

The team changed the bodywork on the rear of the car and tested with new air intakes on the rear wing supports to cool the brakes. Everything was tried in a bid to get a reliable long-distance run at very high speed: turbos, fuel feed, the new pistons with the oil galleries and sprays ... everything.

TRC Ohio, with long straights. (Photo RS)

Flat out in Ohio. (©R)

Three wise men? Delfosse, Dudot, Bell. (©R)

The flexibility of the power range on the engine was improved and drivers Jean-Pierre Jabouille, Derek Bell, Jean-Pierre Jaussaud and Patrick Depailler relayed to drive over 2200km (note de service 933). However, the session had to end as the first of the winter snow arrived.

The new developments seemed to work, although a turbo had to be changed, and there was a rev counter failure, a tyre failure that caused minor damage to an oil tank, and heat build-up under the rear hood from the turbo required better cooling. In general, though, it too had been a good test. The team returned home after the session much happier and more enthusiastic about performance reliability.

Back in Viry-Châtillon the engine used at TRC was removed for inspection. One tappet was damaged, a scraper ring broken, and again valve springs broken and an alternator support damaged.

Next up were more tests at Paul Ricard 6-9 December. The A443 was run in anger for the first time. Derek Bell, Patrick Depailler, Jean-Pierre Jabouille and Jean-Pierre Jaussaud covered more than 3000km again. Air intakes were now integrated into the rear wing supports of the other cars, too, to improve the cooling of the rear brakes. In the engine, new valve springs were adopted and the turbo further revised. Apart from reliability, which was still a concern, this work aimed to extend the operational range of the V6 in order to make better use of the gearbox, whose operation and friction were reduced. A reinforced casing was employed and modified joints and new pinion bearings made its functioning smoother and stronger. The power, at around 500bhp, was practically unchanged, as Renault

We didn't expect this! Anyone for rallycross? (©R)

Sport believed that this was sufficient at Le Mans, and that a car as powerful as in 1977 could win, assuming, of course, that there were no serious mechanical problems!

At a meeting on 15 December 1977 François-Xavier Delfosse noted: "Dismantled gearbox. Primary shaft bolt loose. 5th coupling slightly damaged. Gearbox exit bearings damaged. Delfosse to inform Bresson (Michelin tyre specialist) for 630 tyres. Engine boost pressure control considered impossible on car." [Author's note: this item was reinstated later, and proved significant in the outcome of the 1978 race.]

Plans were laid for 1978 Le Mans:

- Two A442 chassis, 1 and 2 same as '77 except with a modified rear hood (A442-1 remodelled to be A442-4).
- One A442-3 bodywork, totally improved (this was to be the A442B).
- One A443, same bodywork as A442B.

For the January tests:

- A443: Test results. Track. Weight distribution. Prepare two versions – the original A442 wheelbase, and a lengthened wheelbase front track (possibly wider).

The next meeting was scheduled for Thursday 12 January 1978.

Renault now had a lot to think about. Desperate to win Le Mans, it went into 1978 more determined than ever.

Harley Cluxton told the author something interesting that links to chapter eight of this book: "I too would have liked to win at Le Mans. We had finished second twice – in 1976 with Ford and then in 1977 with Renault. I thought maybe we'll do it next year. And then? Then it will be Indianapolis!

6 Victory

We now come to 1978, and the last – and arguably the greatest – racing achievement in the relatively short history of the Alpine marque (22 years).

Before we go into this momentous final year of competition for the sports prototypes, it is worth considering two developments that have passed almost unnoticed: lubricants and fuel, and the development of the Michelin racing tyres.

First, let's consider lubricants and fuels. Elf Oils had developed a special lubricant for racing and had begun to look at special fuels. In 1976 Jean-Claude Fayard, who was to become the guru of fuels in the 1980s and onwards, had joined Elf as a technical specialist and tells this story: "Back in 1971, François Guiter, whose story is legendary – much of it with Renault, but also with Matra in the early days – asked the Elf research centre at Solaize, near Lyon, to research and supply better lubricants to Renault and the other teams sponsored by Elf to improve the reliability of their engines. Alain Robinet, a young engineer responsible for lubricants, decided to develop a new one on a polyglycol base (polypropylene glycol), a synthetic product possessing very interesting lubricating properties, and also a cooling capacity notably greater than that of mineral oils. But it had a disadvantage in that it was not soluble in mineral oils and even in conventional synthetic oils, so they foresaw problems selling it to the public for road cars. It was called 13000tr [i.e. 13000rpm, implying a rev range].

Renault Sport prototypes: the final year. (©R)

"As this technology was new, Renault insisted on very extensive testing over a period of more than a year. All went extremely well for more than nine months. More and more cars were tested with this miracle product. As I had a Simca Rallye 2 at the time, I myself was part of the test panel. Then to prepare for mass supply, the chemist (Ugine Kuhlmann) went on to do product synthesis in large-capacity reactors (100-10,000 litres). Unfortunately, they found that, made in large quantities, this synthetic product contained free radicals which, during the operation of the engines, led to a polymerisation of the oil – no good for the mass market. But the lubricant had a high level of viscosity; that is, its variation in viscosity at different temperatures was less than conventional lubricants (VI> 200), so it was good for racing engines where the oil is changed frequently. Plans for mass marketing and production were cancelled and it was kept for competition use only, and supplied in small quantities. We continued to improve it and it became successful – it was the lubricant used in the Renault Sport cars at the Le Mans 24 Hours in 1978.

"We had also been looking at fuels. I had been put in charge of development that year (1978) and we worked very closely with the Renault team to develop our product further and provide something special for the turbo engine, which up to that time was using standard high-octane fuel. It was the era of leaded fuels and in the competition field the fuel used was aviation fuel type 100LL, octane index higher than 120, which guaranteed problem-free operation for the atmospheric engines in use in those days and even initially the V6 turbo engine developed by Renault Sport. Most of the time it was the organiser who distributed the fuel to all the competitors and it was the obligatory fuel for everyone. But we realised as the turbo was developed that it would be interesting to develop a special fuel.

"André Duval, our engineer responsible for commercial fuels, selected the best chemistry for our product from the refinery at Feyzin to meet the regulations in force. I made my first attempt to formulate a special fuel when I managed to convince the various people in charge at Elf and Renault that

by carrying out an analysis of how the octane levels affected an engine, we could find a way of improving detonation within the combustion chambers, while alleviating the dreaded 'pinking' that was so common in the turbocharged engine and had been a contributory factor in the 1977 failures, yet at the same time staying within the limits of the rules. I eventually found a solution which consisted of adding a small proportion of toluene to the fuel. Renault gave its agreement to proceed with this modification. Regrettably, the development took time and many engines were to break before we could be certain of the correct chemistry and reach the levels of performance we eventually found for the F1 turbo cars in the 1980s. From 1978 to 1983, we developed about forty formulations of fuel which were tried or used in the Renault turbo cars. The 1977 problems, though, had made us study very carefully how the fuel would affect performance in 1978." So although all one saw was the name Elf as a main sponsor on the car, there was most definitely more to that than just the supply of oil and money.

The second development that Renault was able to take advantage of concerned tyres. Pierre Dupasquier, the principal architect of Michelin's sporting ambitions, says: "After 1969, when Renault pulled out of sports car racing with the Alpines, we of course continued to help with the early '70s single-seater programme, but had also gone to other manufacturers and were developing quite a large client base. By the 1974 Le Mans 24 Hours we were supplying no less than six teams. François Castaing and Bernard Dudot had created a very fast, powerful car. In the beginning the 2-litre sports car, although not at the time as powerful as some of the others, had allowed us to work on our compound mixtures, studying distortion of the carcasses and developing our slick tyres, etc. At Michelin, Daniel Chevillard, who had worked with Michel de Reynal since 1970, turned this work to good account by developing new carcasses and profiles which were the origin of a whole new family of products. By reducing the stress put on the various rubbers within the carcass and taking care that they were spread throughout the contact area of the tyre, it became theoretically possible to preserve the integrity of the tyre while achieving much lighter weight, therefore making it much more competitive.

"In the mid-1970s, Renault had been quietly thinking about how to prepare for victory in the Le Mans 24 Hours – its cars were already known to hold the road well and proved eventually to be very fast, easily capable of qualifying on the front row. We wanted to stretch our technology and try new tricks. A lot of work was done, but it was for the 1977 Le Mans 24 Hours that François-Xavier Delfosse was finally given full rein to organise a strictly planned schedule; it included tyre testing on a grand scale, which helped us and the Renault war machine to perform perfectly.

"Naturally, development had been ongoing since 1974, when the prototype cars had begun to run well and won the European Championship. By the 1975 Le Mans, we were well advanced with both qualifying and race tyres, though some apparently didn't think so: strangely, a report in a German magazine had said: 'Renault's decision to develop a turbo engine is interesting. Unfortunately, they use Michelins. A radial tyre will never be able to do anything in competition.' The article predicted that 'on a wet track the forecast would be even worse.' We knew differently [see Pierre's words in chapters three and four] and we were sure that Renault would win Le Mans one day soon. We felt that in spite of all the mechanical breakages, the turbo principle was not in question. By late 1977 the pistons looked as if they would go the distance. Only one shadow hung over the picture: the absence of regular competitions in 1977 and 1978 to test our tyres on the A442s to their limits. However, Renault Sport did go testing in a huge way after the 1977 failure, and we prepared our tyres for them in the hope that the cars would last. The words ringing in the Renault engineers' ears were speed, endurance, reliability. We at Michelin would be ready."

Pierre Dupasquier. (©R)

In the 1960s Jean Rédélé had dreamed of winning the Le Mans 24 Hours. He succeeded in the classes and indexes, and the team at Alpine had achieved much. Many would have been satisfied with those wins as a small-volume car manufacturer, but 'le Patron' wanted outright victory at Le Mans, and with the change in the regulations in 1967 for the 1968 season, he thought that maybe Alpine had a chance with the 3-litre engines. It was not to be, and as illustrated in volume one, the mighty Renault company, which was investing heavily, stopped everything in 1969 after the poor performances and engine failures.

In the seven years following that low point in Alpine history, much had happened. It had won the World Rally Championship, Renault had taken over, a new engine had

been developed, a new sports prototype car had been designed, Renault had revitalised interest, and there was new blood in the engineering team. François Castaing, Bernard Dudot, Alain Marguet and Jean-Pierre Boudy had joined the experienced hands of Marc Bande, Giuseppe Albarea and Igor Bourimoff from Gordini. Aerodynamics had come on leaps and bounds, and Marcel Hubert's expertise had developed into a significantly influential medium to keep the cars on the ground. It had won the European 2-litre Sports Car Championship in 1974. The turbo had arrived and boosted the power of the 2-litre to a level not seen before. The cars were now simply the fastest projectiles in sports prototype racing, proven by the many World Sports Prototype Championship pole positions and fastest laps in 1975 and 1976, and at Le Mans in 1976 and 1977. They were fast – very fast. A new management structure had been put in place by Gérard Larrousse, director of Renault Sport. François Castaing had overall responsibility for the technical side of the organisation, Bernard Dudot for the turbo engines, and François-Xavier Delfosse masterminded the testing and race organisation while Jean Sage looked after logistics. Everything now was specifically and officially targeted towards winning the Le Mans 24 Hours, which even today remains the greatest shop window for marques in the world. It is quite simply the pinnacle of sports car racing – for all classes, not just prototypes.

The late Jean Terramorsi's idea of using a turbocharger had been developed to a level that would soon completely change the world of Grand Prix racing, and indeed the thinking of

A443 – early secret test (no decals), with brush skirt and bubble. (Photo FXD)

The final version. (Image ETAI)

car manufacturers worldwide. Renault was even developing a road car that would become a cult item in later years: the mid-engined R5 turbo.

The sports prototype team entered 1978 determined to win. It had to: the Régie had told Larrousse that it could not support a push forward in Formula 1 until it won Le Mans, and after two failed serious attempts it must win in 1978.

François-Xavier Delfosse: "It was decided that we would build a bigger-engined car. It was top secret, and whilst most people know today, at the time I think only the engineers involved plus Jabouille and Depailler knew. A new chassis was being tested, the A443, and with the turbo rating in the regulations the engine was just inside the 3-litre limit at 2993cc. It gave us 20bhp more and better torque."

After the 1977 Christmas holidays, work started in earnest. Chassis A442-2 and 3 were completely rebuilt for 1978. A442-1 had been rebuilt in 1977, and was renumbered A442-4 for Le Mans (although in the internal records of Renault Sport it is listed as A442-1 throughout). The A442-0 damaged in the fire was restored for testing purposes, but did not run at Le Mans in 1978. However, in the superb collection of the aforementioned internal documents, there is a copy of an official entry to the ACO for A442-0 with a note attached, saying "In case of accident to either of the other cars ...": it was a spare chassis without engine! Each of the cars was redeveloped to make another challenge on Le Mans. The Paul Ricard circuit at Le Castellet became their virtual home for the next few months.

From the meeting on 12 January, we see in the official note de service 955 a report of the endurance test, and on a separate document presented to the meeting, the cumulative results of the tests at Ricard and TRC in 1977. It states:

At Paul Ricard:
Endurance test 1: 3050.25km

Average speed	167.06kph
Fuel	48.02 litres per 100km
Oil	0.86 litres per 100km

Average speed per driver:

Derek Bell	164.77kph
Patrick Depailler	169.62kph
Jean-Pierre Jabouille	164.85kph
Jean-Pierre Jaussaud	168.85kph

At TRC, USA:
Endurance test 2: 1137.40km

Average speed	257.92kph
Fuel	48.19 litres per 100km
Oil	1.14 litres per 100km

Average speed per driver:

Derek Bell	260.10kph
Jean-Pierre Jabouille	255.86kph

Endurance test 3: 883.3km
Average speed 254.66kph
Driver Jean-Pierre Jaussaud, using 49.05 litres per 100km, 3.74 litres of oil per 100km

Totals:

Km	5710.00
Average speed	194.02kph
Fuel	48.25 litres per 100km
Oil	1.42 litres per 100km

Planning preparation notice Le Mans 1978 (from personal record of FX Delfosse)
– Organisation chart – operations defined (except for chrono teams, signalling and admin)
– Allocation of cars by team after test number two (select drivers for each team)
Training of teams one and three from 1-3 Feb
– Training of teams three and four in April
– Training sessions
– Book Ricard for 27 March to 2 April
– TRC 11-14 April – possibly
– Last week April to first week May: run-in gear boxes, gearbox training for mechanics and maybe training at Croix-en-Temois, to be decided

Next test session:
– Delfosse to call Pironi/Jarier Thursday morning
– J Sage has been contacted by Delfosse for admin
No driver's car radio for testing
– Deliver gearbox to Dieppe beginning of week 23 Jan '78
– Engine ditto 23 or 24
– Chassis problem – rack – clutch

A443:
Aerodynamic tests with several heights of wing, either weekend 26 Feb or 5 March. With large exchanger. Send memo for test at Istres (military airfield) to GL. With new engine, plus testing long chassis + 150mm

Note de service 975 identifies the modifications to the engines envisaged for 1978. Amongst the items were:

New pistons with lubrication hole modified in the gudgeon. More rigid piston to avoid metal fatigue. Revised piston rings to reduce blow-by. Sodium-filled valves to be revised to reduce deformation due to temperature (ref failures in F1 engine). Revision of springs after recommendations from Schmitthelm. Lubrication injectors under pistons. Breather improvements. New regulator for lubrication of the turbo. Revision of ignition with indexing for the advance. Spark plugs to be tested G503R also test G56R following positive experiences in the Cosworth DFX. Revised injection system and Kugelfischer pump.

All of these were due for endurance testing. The full list is much longer; these are just to give a flavour of the efforts going in. In note de service 976, a detailed report on the gearboxes is recorded by Jean-Louis Coste, primarily concerned with modifications to the Klingelnberg conical couplings and pinions.

On 20 January communications took place between team boss Larrousse and Renault Germany with a view to Rolf Stommelen driving at Le Mans for Renault – interesting, but it went no further. The team headed south for Paul Ricard.

On a cold 1 February, Michel Leclère was drafted in to accompany Jean-Pierre Jaussaud. Everything started well, but the test had to be brought to a premature end when Michel went off the track, damaging the car. Record of test: total distance 518.28km, average speed 158.85kph, fuel consumption 46.12 litres per 100km. Average speeds of drivers: Jaussaud 160.65kph, Leclère 156.79kph.

"... I got hold of a plastic bin-bag and cut holes for my neck and arms, and that served as my waterproofs to try to keep dry!" – Jean Ragnotti

The car was repaired back in Dieppe, and a week later returned with more drivers – no Leclère this time, but Jarier, Ragnotti, Jaussaud, Pironi and Fréquelin were present. This time it was gearbox problems and various drivetrain issues that called a halt to proceedings. Then it poured with rain, which turned to snow, and the test was abandoned at the end of the second day. Jean Ragnotti, interviewed in 2009, said: "It was incredible – dry at first, then it turned very wet, even in the car, so I got hold of a plastic bin-bag and cut holes for my neck and arms, and that served as my waterproofs to try to keep dry!"

3230.36km were covered, the average speed was 151.46kph, fuel consumed was 47.81 litres per 100km, and oil 0.20 litres per 100km (measured over 2600km). The gearbox was changed at 1458.31km. Drivers' average speeds:

Guy Fréquelin	139.43kph
Jean-Pierre Jarier	175.88kph
Jean-Pierre Jaussaud	147.50kph
Didier Pironi	147.78kph
Jean Ragnotti	152.86kph

Note de service 978 identifies more preparations for Le Mans. It also contains details for the test at the Istres Base Aérienne (air base) 125. There had been many communications and meetings to locate a suitable place for high-speed tests in France. François-Xavier Delfosse: "Le Mans was a high-speed circuit. Its long straight required a car to be flat out for around 50 seconds. Absolute speed was vital, but we couldn't compromise road-holding. So we looked for somewhere where we could go really fast. A road in Morocco with a long, straight section looked ideal, but it had pebbles on the side of the road which could have caused serious damage if the car wandered off the straight and narrow. Then we looked at using a section of motorway again, as I knew one that was almost ready to open. Jabouille was concerned about the dangers of a possible suspension breakage or a tyre bursting at high speed, and also that if you went off the track the car would pass under the security rail – he had had the same worry at the previous motorway test.

"Finally we found the solution at the Istres Air Base. I had asked Gérard Larrousse to contact one of the members of the Renault administrative council who happened to be connected to the Army Ministry. We hoped through him to obtain the necessary introduction to the senior staff of the Air Force. But nothing was happening, so I decided to do it my way and went to the civil aviation authority to find out where the longest runways were, and they gave me a list of civil and military airfields. With the former, because of the amount of traffic, I thought it would be difficult to organise the tests as I intended. As for the latter, the longest runway was at Istres, where it was more than 4km, plus taxiways, security areas, etc. So I went off again to visit the Air Force Directorate at the Porte de Versailles in Paris. I eventually got an interview with the commanding officer of the Istres Air Base. Obviously, the condition was that we must be ready to drop everything if there should be an alert!"

On 21-22 March a meeting was called and held at Château de la Corniche to put into place the planning for the 24 Hours in June. These were the key items under discussion, which will give an insight into the detail involved:

Admin, meals: quality and quantity – limited to 80 people – org. M Dubosc **[Michèle Dubosc would return again to the team for this race]**. Accommodation teams – Château des Mortraits + Moreau [physiotherapist] – org. J Sage. Mechanics, Hotel Maine Atlantique, Bugatti 3 rooms, Novotel + Etoile. Precise numbers to be confirmed. Meals – on site at the 24H, Hotel Touristes. Caravans – 4 + 1 (office). Shop – Renault souvenirs. Organisation: Chauvel. Cars – no private cars in Parking 1. Security – by Renault during tests. Pits: walls to be yellow and black. Concrete ditto except block 5 pits. J Sage and GL to org. 5th car for show (this would be A442-0). Renault Le Mans factory on standby. Warehouseman: C Guerout (15 days beforehand). More manoeuvrable jacks from Facom. Training – allow for time on gearbox internals. Signs in paddock. Courier to transport material and caravan – Patrick Landon in charge. Speed measurement: J Coquery. 1 person Wednesday + Thursday, Mouillat. During race Mouillat + Breton + X (3rd opposite) + cellular radio contact. Line. Signage, pit boards to drivers - only 1 person per operational car + 1 in reserve. Spotting of cars, double Omega chronometers and systematic battery changes. Participation of signage team in 24H tests. 1 from each team Wednesday and Thursday then they go home and return on the Saturday. Liaison pits: signage, warn of departure of each car. New panels. Max 2 items of information at a time. Le Mans telephone impossible.

Thomson radio link, operational. 5-track link.
Team to be P Landon + assistant Bellondeau + 8 chronos and signallers.

Normand	Breboin	Piallot	Bourdelot
Bazile	Fournier	Cedille	Le Noe

Chronometry:
Followed by: Callewaert + Coquery – Chrono 1 Andrié + Michel (Wednesday test) 2 Santoni + Chasselut (Thursday test). Spy (team lookout, following other teams) G Alba + F Knoflach.

Mechanics team:
General management team A Marguet (+ Dudot) + M Soudé, JD Delestre (+ Hubert), L Bentini (+ Coste – gearbox), C Guerout, C Woussen, C van der Hauwaert, JC Cochelin.

Training endurance tests:
3 teams 2 and 4 Croix-en-Ternois. End April/beginning May, 4 teams Bugatti (circuit Le Mans). Updating of documents distributed (drivers, mechanics, general team, regulations) – Fuel Elf, engine oil: contact Elf for engine oil up to 2 April (before 24 April). Gearbox oil: RAS stock available.

Race (suggestions):
– Official race tests. 3 racing cars fixed 25 laps max, 4th car 443 engine and replacement gearbox exchanged after 1st session max 25 laps 2nd session. Bugatti circuit running-in gearbox using A442-0.
– A443 limit speed 9500rpm on the straight.
– Pace rather higher than last year, even if no danger.
– Politics for Renault Sport – Mirage well defined.
– Running table of technical data available to driver (engine speed and overfeed pressure).
– Presumably change 5th after 1st official session.

Tests A442-A443: Drivers for tests – A443 – Jaussaud, Jabouille, Tambay; A442 – Pironi, Jarier, Depailler. Mechanical team travels Monday 10; endurance begins Tuesday.

All was set; everything from the security of the venue to the tiny screws on the dashboard was to be tested.

On 7 April, François-Xavier Delfosse sent a cheque on the Banque de Crédit Industriel de Normandie for 30,000FF along with the official applications to enter the Le Mans 24 Hours to the ACO.

The team would finally test at Paul Ricard and at Istres on 11-12 April, and on 12-13 April at Ladoux; according to the records, they were at both Istres and Ricard with different cars, returning to Istres on 15-16 April with one A442 and the A443.

The cars looked great as they arrived at Paul Ricard on 11 April 1978. This was initially scheduled to be the last major series of tests on track before the big event.

Booked into the Hotel Manoir Fleuri in Ladoux from 11-13 April were Jean-Pierre Jabouille, François-Xavier Delfosse, Alan Marguet, and a mechanic, C Woussen. Larrousse and Castaing travelled between the three venues over the next week. A team truck with a trailer would do the shuffling. Jabouille ran the A443 over 559.065km at Ladoux with few problems.

At Paul Ricard, Jaussaud, Depailler, Jarier and Pironi did the driving after Jabouille had had to return to Formula 1 testing following Ladoux. At Ricard, the first problem they had to face was minor, though inconvenient: they had to stop to rectify a linkage that was causing the car to jump out of gear. All appeared to be going well after that, but then some kind of Ricard gremlin took a hand in events when a rabbit chose to cross the road without checking for traffic. It flattened itself

Note the air intake nacelles in the rear wing supports. (©R)

Same layout: single turbo, but everything tidied up. (©R)

L'Armée de l'Air looks on at Istres. (©R)

under the front of the car and distorted the front bodywork into the bargain. Sixteen hours of testing were completed, covering 2509.82km, but time was running out, and the team felt sure it would have to do it again; it needed some really high-speed testing. Average speed had been 164.290kph, using 50.77 litres of fuel per 100km. Oil usage was 0.852 litres per 100km. Drivers' speed averages were:

Depailler	166.535kph
Jarier	155.189kph
Jaussaud	166.544kph
Pironi	168.873kph

Now the team turned to Istres on 11-12 April, where the A443 had been brought direct from Ladoux. The runway with its link roads made a good track, and over the two days Depailler, Jarier, Jaussaud and Tambay drove in relays to a total of 2900km with 1848.6 at an average speed of 250.560kph. Fuel consumption was pretty much the same: 50.31 per 100km. In an A442 the same team of drivers covered 3231.10km, with 2670.20km being covered at an average speed of 244.147kph. (Author's note: as before, we do not have the exact chassis numbers for the cars at these tests.)

Mon Dieu, c'est impossible – it will never fly!(©R)

Alain Marguet: "Speed in a straight line was everything, and to simulate the straight we went to the airfield, which had a 4km-long runway. We had no trouble from any neighbours at this place, but I don't think the personnel on the base slept too well, as we tested at night as well as by day! It was mainly an aero test, but with the engine at maximum speed. I remember the car was fast – I think nearly 370kph. On one occasion when Jarier was driving up the straight a fire started in a disc and the brakes burnt. It was a long time before the car slowed – no brakes. You know Jarier? He was never afraid, but when he got out of that car he was white!"

Jean-Pierre Jaussaud: "Enormous efforts were being made on the engine side, because in 1977 it had been the engines which had let go. Then we worked on the aerodynamics. We tried the bubble over the cockpit. I had a fright on one run when suddenly a front wheel decided to part company and broke the suspension. I think a brake disc must have exploded. Suddenly, no brakes! It was a long time before I stopped: I was very happy we were at the airfield! Gérard Larrousse told me in recent times that it wasn't me but Depailler who lost a wheel. But I think there is a mix-up with another accident which happened to Depailler. He lost a rear wheel and the car went off into the countryside."

Gérard Larrousse: "I thought it was Patrick Depailler. Whoever it was, it's amazing how he held onto it. Luckily it didn't flip over, but checking the surface of the runway afterwards we measured it as 900m from start to finish – a big accident! There was some humour, too, at this Air Force base. During the next test on 15-16 April Jaussaud was with Ragnotti. Ragnotti, always the joker, was in the car going for a very fast trip up the runway; we could see he was flat out. Suddenly the radio crackled and he said, whilst travelling at around 380kph, '"Mayday! Mayday! Gérard, I'm pulling on the joystick but I can't make it take off!'" Jean Ragnotti: "Yes that's quite right. We always had several Air Force personnel watching the tests too; they were quite amazed at how fast the cars went. I did quite a lot of tests in this car at Ricard and then one at Istres. Jaussaud, Depailler and Jarier all had incidents but I don't remember exactly who had what problem. For me, I had no problems." For the record, 647.80km were covered at an average speed of 228.62kph, Jaussaud averaging 222.24kph and Ragnotti 237.77kph.

Adjustments before another run. (©R)

While all the action was going on for Renault in France, over in the USA Harley Cluxton's GTC Mirage Renault GR8 team had modified its chassis 801 and 802, after coming close to winning the year before. Both cars were now called GR9s. They tried them out in shakedown tests on a new section of unopened motorway – the new Phoenix to Los Angeles Freeway Interstate 10 – on 11 April.

John Horsman: "After the test on the 11th we went to the TRC in Ohio, where Renault had tested the Alpine in 1977. They were due to test again but decided against it, so we took up their slot in the programme. The test took place with Bernard

Preparations in the workshop. (Photo GL)

Dudot present on 29-30 April. The modifications included an improved frontal area and cockpit, which reduced the buffeting experienced the previous year, making it more comfortable for the drivers." Vern Schuppan: "Yes, the modification with a sort of scalloped cockpit area really improved driver comfort; with the old style you felt like your helmet was being ripped off!" John Horsman: "We covered 1611 miles (2595km) in total. Quite satisfied, we prepared to go to Le Mans."

Back in France, after the tests at Istres, François Castaing confirmed to Pierre Dupasquier in a letter on 26 April that the cars would easily achieve 350kph on the long straight,

Testing at TRC. (Photo GL)

Depailler demonstrates the bubble; also visible are the brush skirts around the front and sides. (©R)

reminding him of the need to ensure that the Michelin tyres were up to that level, following some questions that had been raised during an F1 test and experiences at Istres.

A letter from Larrousse to Colonel Simonpieri, thanking him for the use of his air base, included a nice touch. Gérard had added: "We will make six tickets available for you for the 24 Hours." We can be sure the Colonel was very happy!

The Renault Sport team now scheduled in a test and running-in period for the gearboxes at the Bugatti circuit at Le Mans on 5-8 May. François-Xavier Delfosse: "Gearboxes are always subjected to harsh treatment in the 24 Hours. In the 1000km races, we had used a Hewland-base gearbox and transmission system but for the 24 Hours we knew that the gearbox was potentially the Achilles' heel of the car. So we had developed spare gearbox and rear drive units which could be interchanged with the engines fairly quickly. We also developed other internal parts of the gearbox, especially the fifth gear pinion, which was the central, critical part of the box. All the internals of the boxes were rebuilt time and time again, with great care taken over the assembly of the parts. Then we subjected the cars to a fastidious process of running. The cars used were: 5 May A442-1, 6 May A442-2, 7 May A442-3, A443. On 9 May an additional test was carried out with drivers Bell, Pironi, Jarier, Jabouille and Depailler. These were training sessions for the mechanics to practise wheel and brake pad changes and other pit stop preparations.

"We were there for a week at Le Mans on the Bugatti circuit to run in the gearboxes and double check everything. There were four spare assemblies plus four gearboxes in spare parts; in all, we had 12 boxes that had to be run in. The running-in schedule

was firstly 100km without turbo boost, then 100km with a quarter pressure boost, 100km with half pressure boost and finally 100km with full boost. You can imagine the self-sacrifice of Jean-Pierre Jaussaud, as a race driver, methodically running in each of these gearboxes in turn!"

Alain Marguet again: "At the Le Mans Bugatti circuit, from what I remember, we also had at the front of one of the cars a special brush like a little skirt. But it didn't work very well so we changed the brushes for a conventional splitter; the compromise between speed and road-holding was more in favour of speed at Le Mans, and at the end we found that the overall performance on a complete lap was not giving the right balance when using the brushes, so we removed them at the front. This year we also planned for each car to have a slightly different gear ratio. We didn't have the same crown ratio in the differentials, because if there was a problem with one gearbox we might have the same problem with all of them. So we made the ratios a little bit different in each car; each would give the same speed, but would achieve it in a different way."

Alan Marguet operating the new engine dyno, May 1978. (©R)

Le Mans was getting nearer. Everything was being put into place, including a physiotherapist for the team from the Institut National du Sport et de l'Education Physique; his name was Jean-Pierre Moreau, and he was tasked with treating the stresses and strains put on the drivers' bodies.

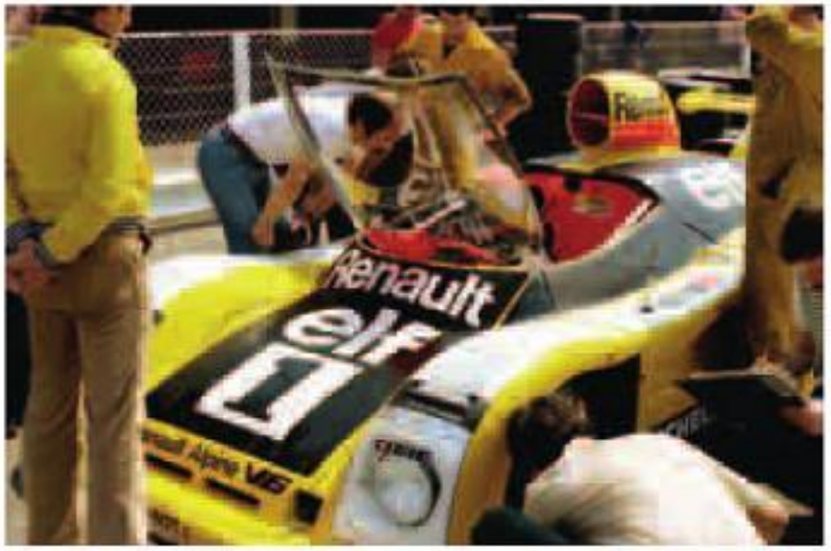
A major test had begun on a new test bench in Viry-Châtillon, the engine manufacturing plant. It had been constructed in 1977 and incorporated the latest technology of the time. By now the engine was thought to be near perfect, but there was a shock in store for the engine men when one of the engines broke during a night test, after 17 hours' running.

Nervous but undeterred, the technicians revised the car testing programme, and a final test was scheduled for 30 May, once more at Paul Ricard. The planning for this was concluded at a meeting in Dieppe on 11 May, when the results of the Bugatti gearbox work were reviewed, along with other checks that had been carried out on suspension linkages. Drivers were finally agreed upon, their overalls and helmets sorted, and final training of mechanics planned. At two further meetings on 16 May and 25 May the final test programme before Le Mans was arranged.

Note de service 1032, dated 26 May, was the last before the Le Mans 24 Hours:

> All 4 cars to be returned to Dieppe after the final run at Ricard by 2 June. A443 to be at the Champs Elysées for the press presentation, 9am Monday 5th, leaving at 5pm. Then on to Le Mans from Tuesday 6th at 12pm; five cars on site. From Wednesday 7th at 7am: each man responsible for a car takes charge of his team. Wednesday 7th by 12pm: all signage and chronometrics in place. 5pm: drivers' briefing at caravan. Same again for the Thursday. Friday 9th before 3pm: final decision on composition of teams. 3pm: briefing meeting for mechanics; 5pm: briefing for drivers; 6.30pm: radio briefing; Saturday 10th before 12pm: drivers on circuit.

All was ready.



The A443: Delfosse talks to Jabouille. (Photo JQ)

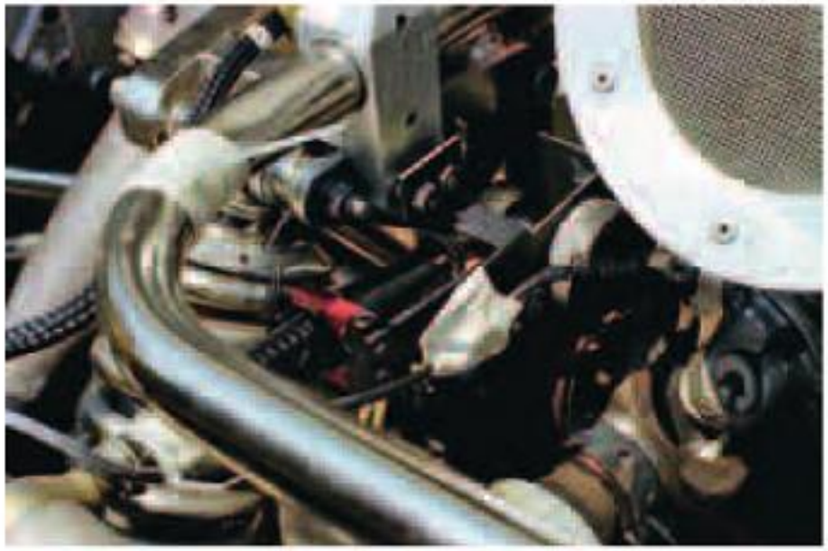
The big one. (©R)

Electronic systems data logging appeared as electronics technology developed. (Photo JQ)

Circuit Paul Ricard – the final shakedown. Here the existence of the new car was officially acknowledged to the press. The A443 was to be the team's secret weapon – at least, that was the plan.

With the aid of Paul Goiron from the Renault R&D centre, Jean Coquery, who was responsible for all the data logging and had worked closely with the engine development team from the beginning, had created a number of on-board measuring systems, which included a UV galvanometer recorder (blue box), converters (grey box), and different instruments to record:

- Turbo inlet temperature and pressure after the compressor
- Exhaust temperature and pressure
- Throttle position
- Rpm
- Suspension movements and spring compression



Sensors were now measuring almost everything. Here it's suspension. (Photo JQ)

Complex wiring! Jean Coquery in car. (Photo JQ)

Throttle movement sensors. (Photo JQ)

The last test for the A442 at Paul Ricard. (Photo MT)

They were mostly electrical and mechanically operated devices; these were, of course, still pre-laptop days. These instruments took the team into another dimension, and instrument testing was employed on the Wednesday practice just before the race. This final test at Paul Ricard was also used to prepare for the final publicity photos before the big event.

The A443 was tested with the addition of the clear plastic cockpit bubble. Jean-Pierre Jaussaud: "With the bubble it was very hot. Much more comfortable without it. But it meant a gain of 10kph at top speed. However, the handling suffered a little until they removed the front brushes; by doing this we regained more downforce and traction, but lost around 5kph at top speed. And at Le Mans 5kph could make a big difference over 24 hours."

The tall Jabouille found the bubble difficult in testing and during practice for the race, and eventually drove the race without it. The drivers of the A442B, Jaussaud and Pironi, were both of much shorter stature.

The presentation – A443 and Mirage GR9. Left to right: Depailler, Jabouille, Jaussaud, Larrousse, Ragnotti, Pironi. (©R)

headed by François Castaing. Marcel Callewaert was in charge of timing, logistics and fuel were the responsibility of Jean Sage, and Patrick Landon looked after communications. Bernard Dudot and his engine team, with Alain Marguet and Jean-Pierre Boudy, were ably assisted by Jean Coquery; all of them would support both the Renault Alpines and the Renault-powered Mirages. Jean-Louis Coste was in charge of the gearboxes, and Marcel Hubert would look after aerodynamics.

On Monday 5 June 1978 the team was introduced to the press at the Renault building on the Champs Elysées. For this year, as the previous year, the presence and effort put in by Renault Sport was enormous; the huge tented village, and the workshops and driver and team facilities in general, were again on a massive scale. The drivers stayed at the Château des Mortraits with their physiotherapist; the rest of the team were in several hotels around Le Mans.The preparations had been long and exhaustive. The cars were now ready, fast and stable.

From the preceding Friday to the first day of practice on the Wednesday, the paddock began to fill up, and this time it seemed to have outgrown itself. Prior to Wednesday's six-hour session, the teams had a lot of trouble finding enough space in the tarmac area behind the pits. Renault, of course, had itself well set up, but for others there were huge transporters being squeezed between caravans and private cars.

Scrutineering was Tuesday 6th between 8am and 7pm and Wednesday between 9am and 12pm. The cars lined up as usual at the Quinconces des Jacobins in front of the cathedral down in Le Mans city centre, three carrying the colours of Renault

Car 3, the V6 turbo 1997cc for Bell/Jarier, was chassis A442-2, and was looked after by Jean-Paul Castilleux and François Lhermoyé. It had a blue bulkhead and air box front. This car was also used as a camera car for a few laps during practice. François-Xavier Delfosse: "The observant may notice that although the race car has a blue bulkhead, the French film makers wanted to create the impression that they were on board with Jean-Pierre Jabouille, the best-known French driver and in the fastest car, the A443, so a spare red bulkhead board was inserted just for the filming. As soon as filming was over we replaced the car 3 bulkhead board with its blue one."

Camera car for a few hours. (Photo CV)

Scrutineering for car 3. (©R)

End of scrutineering. (Photo CV)

and F Pressling looking after it. The Mirage team had the famous John Wyer in attendance, and was managed by John Horsman and J Moore. Technical expertise came from crew chief Wayne Beckwith supported by Bud Free (more of whom in chapter eight), with Jean-Louis Lefebvre drafted in from Renault to support the engine mechanics.

Another Alpine had been entered – the A310 from the previous year, repainted in new sponsor colours – but it did not qualify.

Alain Marguet: "In qualifying we had always been fast for the past two or three years and for me that wasn't anything special. The vital thing was reliability over 24 hours and the testing of everything had so far gone generally OK. This year every part was tested before the race and the racing engines had no brand-new parts (except one, and we will come to that in a moment). Crankshaft, connecting rod – these major parts and the block had already been tested, because if you have a problem with heat-treating the block, which can cause the tiniest of distortions, or with an internal crack in a crankshaft, you could be out. We had pit-to-car radio communications again – an improved version this year – and were using a lot of measuring and recording instruments to verify the performance of various systems; but remember, in 1978 there were still no computers as we know them today."

Maybe we should do the 24 Hours on bikes! Depailler and Jabouille. (Photo FC)

Wednesday 7 June 1978, 6pm to midnight. For practice, the drivers were instructed to have their cars set up within five laps of running, including checks for the lights, the bubble (where applicable), the seat, and all systems checks; and, of course, they had to qualify for the grid.

Practice, Wednesday; Jaussaud waits. (Photo MT)

A smiling Gérard Larrousse by the purpose-built pit. (Photo GL)

Three hours into practice Jacky Ickx (Porsche 936/78) chopped 1.2 seconds off Arturo Merzario's outright record of 3min 31.0sec; half an hour later he took another 2.2 seconds off that, too. His 3min 27.6sec was a sensational effort by the Belgian long-distance specialist, and everyone waited for Renault to reply. Renault Sport was already able to see just how much power the latest Porsche 936s had. Just after Ickx did that fastest lap of 3min 27.6sec, he lost a rear wheel at the Ford chicane on his last scheduled practice lap. Panic ensued in the team as the car was repaired for another run in case it was needed. In the end, though, his fast lap proved unbeatable.

Rolf Stommelen had turned in a respectable 3min 30.7sec in the Porsche 935/78, nicknamed Moby Dick, putting him on the second row. Bob Wollek, in the second 936/78, returned a time of 3min 35.2sec. On 3min 34.8sec and provisional third row was Patrick Depailler in the A443 car 1. Then came the A442B of Didier Pironi on 3min 35.8sec, followed by the A442 of Derek Bell on 3min 38.3sec.

Jean Ragnotti was on the eighth row. Although Guy Fréquelin had nearly cooked the engine when a stone pierced a radiator, he managed to get back to the pits without overheating it. The car was quickly repaired, and was used by José Dolhem, called in at the last minute. He had to do a few laps to qualify near the end of the session. Not a bad start, though the tall

Refuelling for car 4. (Photo CV)

Fastest of the Renaults; the bubble was eventually discarded – Depailler. (Photo CD)

Final practice: Jabouille with the bubble removed. (Photo MT)

Jabouille was having problems getting used to the bubble – he was not happy with it, as it locked heat into the cockpit. Both drivers also complained of a lack of downforce.

In the Mirage camp, Harley Cluxton's team was struggling with engine maladies in the Schuppan car, and he was also concerned about high tyre wear. Michel Leclère in car 11 was having problems with a fuel pipe. At 3am it was off to bed for a few hours; they would run again the next day.

Thursday 8 June 1978, 6pm to 11pm. Practice and qualifying began at 6pm and went on to 11pm. Jabouille's team was concentrating on aerodynamics as it searched for the source of the previous day's problem (lack of downforce). The brushes installed on the bottom of the front splitter were preventing air from flowing under the car, affecting aerodynamic efficiency at the front. They were quickly removed, as they had been during testing, while those under the sidepods were retained. Jabouille was informed that if they removed the bubble canopy they would lose 5 or 6kph of top speed on the straight.

Jean-Pierre Jabouille: "We had tested at Ricard, on the big circuit, and in the wind tunnel. I remember we had put the brushes on the front and sides, but they didn't work very well on the track, although they worked well in the wind tunnel. They had not been very good at Ricard, but the management wanted to leave them on, and so of course we weren't very quick at the beginning – we lost two seconds – so before final

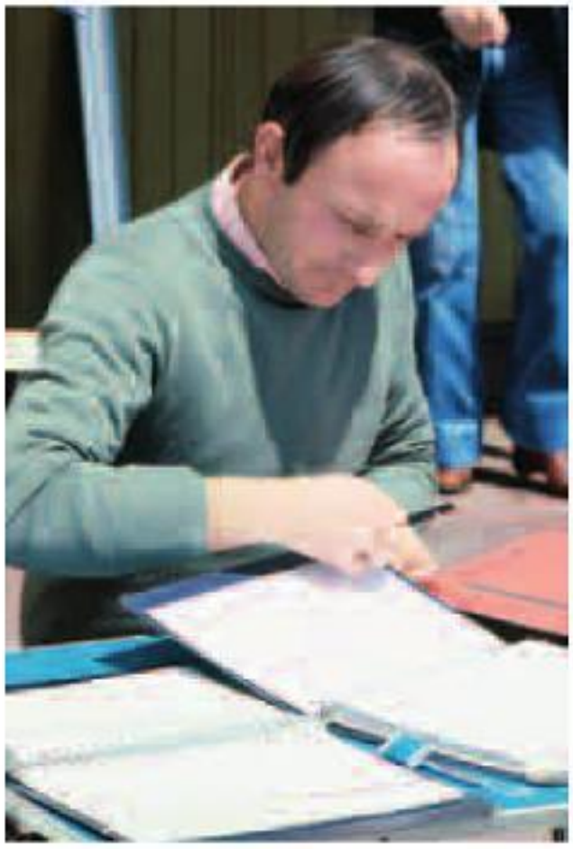
Jaussaud, Pironi and Têtu consult with a mechanic. (©R)

qualifying Patrick and I insisted that they take them off and the car ran much better. We took the bubble off for the race, too, because it was very claustrophobic and hot, and I was too tall for it!"

With the bubble he had put in a time of 3min 29sec, some four seconds faster than the day before. Depailler went even faster, putting the car on the front row with 3min 28.4sec. They then agreed together to remove the bubble in the interests of comfort over the 24-hour race. Pironi and Jaussaud were split as to whether or not to keep it. Pironi wanted to, but Jaussaud didn't. In the end they went with

Eight gearboxes and diffs were prepared. (Photo FC)

Castaing, Jabouille and Delfosse. (Photo FC)



Calculation checks – François Castaing. (©R)

Plenty of parts now. (©R)

The specially built pit counters created by Delfosse. (©R)

Pironi, but holes were drilled in the sides of the cockpit to improve ventilation. Ickx's 936 stayed on pole with his 3min 27.6sec from the day before.

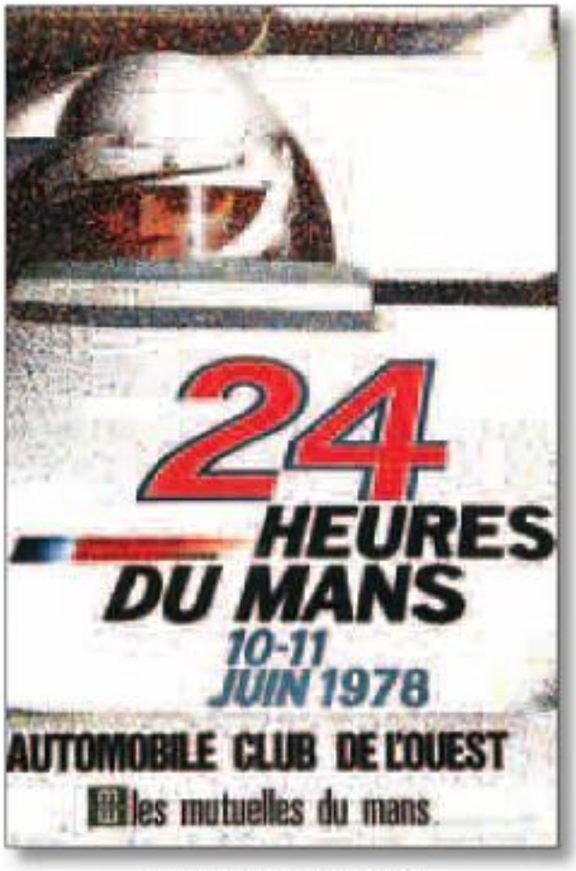
On the front row, then, were the 936 of Ickx/Pescarolo/Mass, and on P2 the A443 of Depailler/Jabouille. The second row comprised the 935 'Moby Dick' of Schurti/Stommelen/Joest and the 936 of Barth/Wollek. Third row: the A442B of Pironi/Jaussaud and the 936 of Haywood/Gregg/Mass. Fourth row: the A442s of Jarier/Bell and Fréquelin/Ragnotti/Dolhem. The Mirage Renaults were still at the mercy of mechanical problems, particularly oil cooling; Schuppan/Laffite could do no better than ninth fastest, and Posey/Leclère 12th.

Traditionally there was no track action on the Friday, as the teams worked hard to finalise their cars, pose for pictures and prepare mentally for the task ahead.

Thinking men: Alan Marguet (centre), Jabouille (close to camera) and François Guiter of Elf (with arms folded), look at car 2. (©R)

Jean-Pierre Jaussaud, Saturday morning. (©R)

Saturday 10 June 1978: the 46th Le Mans 24 Hours. The sun came out as race day dawned, white clouds occasionally drifting across to cool the spectators. As ever, the dust rose from the ground as they casually picked their way around the fairground and goody stands, buying small bottles of beer for large amounts of francs. A quarter of a million spectators gradually brought the Sarthe circuit to life. As the clock ticked on to 3.45pm, the crews moved away from their shining projectiles which stood ready on the grid, protected by a thin, dark blue line of policemen. The signal was given and the engines roared into life; the cars shimmered in the sun.



The programme. (Photo JS)

Moving onto the grid. (Photo FC)

Mirage looking good. (Photo CV)

3.30pm: Jaussaud, in different overalls now! (©R)

3.32 pm: Bell/Jarier car. (©R)

At 3.53pm, under a radiant sky, the competitors set off for the warm-up lap behind the race director's car. Relative silence returned to the pit straight while the crowd buzzed and the teams returned to their pits to await the start.

At 3.59 and 55 seconds the cars exited the Ford Chicane. The pace car pulled into the pits, and at 4pm under the clock they went, as the starter gave the pack its freedom.

Jabouille, second on the starting grid, immediately went into the attack and by the end of the first lap his A443 had a huge lead of 11.6 seconds over Ickx's 936, which had been on pole. Then came the A442s of Pironi and Jarier, followed by the Porsches of Haywood and Schurti. After them came Ragnotti, Leclère, Schuppan and Fitzpatrick. The first development came

Departure: green flag lap. (©R)

on the second lap when Ickx and Haywood stopped in their pits, both with accelerator problems.

The Belgian went out again after three minutes but returned on the following lap. This time the problem was diagnosed: the fuel pressure was too high and was blocking the guillotine, and hence the accelerator. Heat was the cause of this fuel problem, and the second fuel pump of car 5 was disconnected. On the fourth lap, three Renault Alpines were in the first three places in front of Wollek's 936 and Ragnotti's A442. The partisan crowd was ecstatic.

11 seconds ahead at the end of the first lap! (Photo PK)

Renault train. (Photo FC)

By the fifth lap, Ickx had already conceded a lap. On the tenth lap, the works 935 stopped for refuelling. 'Moby Dick's' 750bhp swallowed more than 80 litres per 100km, and because tanks were limited to 120 litres in the Group 5 class, its relays were never longer than ten to twelve laps.

At 4.52pm, the radio between Larrousse and Jabouille crackled into life. On his 14th lap, Jabouille felt a suspicious vibration and called in to the pits. After 1min 14sec for refuelling and changing the rear tyres, the A443 went out again with Depailler at the wheel, now in fourth place behind Wollek's 936, which Depailler soon overtook.

At the end of the first hour, the order was as follows: first Pironi, second Jarier, third Depailler, then Wollek, Ragnotti, Leclère and Schuppan. The Mirages were running OK, but slower than the Renaults at this stage.

By the 20th lap the leading cars had all refuelled – Jarier at 5.08pm (a 1min 06sec stop), and Pironi at 5.11pm (2min 12sec) when he came in with a blockage in the front vents that needed clearing. Ragnotti stopped for fuel at 5.13pm (1min 57sec). Shurti in the Porsche had already pitted twice by then. Taking the lead thanks to the refuelling stops, Depailler went back to his pit on the 24th lap for a wheel change, as the strange vibration was again in evidence. When he set off again at 5.39pm, the mechanics had refuelled the car and fitted new front bodywork. By 6.45pm the problem had been identified as the loss of balancing weights on the wheels, and the A443 was back in fifth

Jarier in car 3. (©R)

The Mirage Renault was slower than the Renaults. (Photo PK)

Car 11, destined to be out early on. (Photo PK)

Shadows in the evening – Jaussaud. (©R)

Early evening – so far, no drama for the Calberson car. (©R)

place following its fifth stop of the race. Two hours later it was back in the lead.

Mirage Renault was having a bit of a torrid time by now. When Michel Leclère in car 11 stopped for fuel at 5.10pm all seemed OK, but at 6.13pm he stopped at marshalling point 76 with electrical problems. He got the car going again, but only as far as marshalling point 83. This time it stopped for good, and the car was officially retired at 9.15pm. Mirage Renault number 10 was progressing well, although it had to have its fuel pump changed at 9.26pm. Laffite took over from Schuppan. In the A442B car 2, Pironi had stopped to hand over to Jaussaud and refuel. At 6.28pm they were running without problems, and by 9pm were in third place.

At Porsche, the 936 of Barth/Wollek had managed to match the pace set by the Renault Alpines and at this point in the race was in front. Back at Renault, Ragnotti, Fréquelin and Dolhem

Anticipation. (Photo FC)

Driver change and fuel for car 1. (Photo FC)

were having a trouble-free run with regular fuel stops and no dramas. Jarier and Bell, too, were running like metronomes. All in all, as darkness approached everything was looking good. Ickx had stopped in the pits. He'd had a gear selector problem on the Hunaudières straight, unable to get into fifth. The repair took 45 minutes, because to open the gearbox they had to remove the heat exchanger. At 9.01pm, Gregg's 936 stopped in a cloud of smoke. Replacing the broken turbo cost 13 minutes, and Porsches 5 and 7 dropped respectively to 19th and seventh places. At the end of the first quarter of the race, the Jaussaud/Pironi car was back ahead of Jarier/Bell, the A443 of Depailler/Jabouille and the 936 of Barth/Wollek. Fréquelin/Ragnotti/Dolhem were two laps back. Fréquelin had a scary moment at one point over the next hour as he took to the grass, but he got away with it.

By midnight the Renaults were looking dominant. Jabouille was cruising; retaking the lead, he had broken the lap record four times already and Depailler had also done his share. Between them, they finally lowered it six times. As the clock ticked past midnight it was car 1 from 3 from 2 from 4. The stops were now mostly routine – fuel, pads, wheels.

By the early hours, when the air becomes cooler, the race has usually settled and all the teams are concentrating on getting through the night. At Renault all was going to plan until 2.19am,

More work on car 2. (Photo FC)

Routine stop for car 4. (Photo CV)

when Jarier came in to have the front bodywork changed after he hit an animal. Refuelling was regular, and Bell jumped in and went back on track, but as the car exited Tertre Rouge it suddenly came to a halt with a broken transmission (this was later traced to a conical joint). Jean-Paul Castilleux, François Lhermoyé and Patrick Caron looked glumly at each other. For them, Derek Bell and 'Jumper' Jarier the game was over; car 3 was out, stopped at marshals' post 25.

However, the main hope for victory, Jabouille/Depailler in the A443, was in the lead as the first light of dawn started to spread over the Sarthe circuit. At daybreak proper it was still in first, two laps up on the 936 of Ickx/Wollek, but they were experiencing wheel vibrations and had to keep changing wheels due to component wear. Apparently by morning Depailler and Jabouille were not all that comfortable either, both complaining of pins and needles in the right foot. Undaunted, on the 226th lap, Jabouille broke the lap record again in 3min 34.2sec, an average of 229.244kph! Pironi/Jaussaud had come through the night and were running in third place, two laps down, with Fréquelin/Ragnotti/Dolhem four laps down. Their Calberson entry was having some gearbox problems but was able to continue after changing third gear at 7.45am. Ragnotti took over as the car rejoined in seventh place. Jabouille stopped a few minutes later at 7.58am to change the wheels and rear body section, and to fit

The cars space out as the race progresses into Sunday. (Photo PK)

new front brake pads and discs. Porsche's problems continued when Ickx, driving car 6, had to stop for 41 minutes, this time to replace the gearbox pinions. It was 9.30am when he left the pits. During that pit stop Jean-Pierre Jaussaud had slipped by into second place. At 10am, the order was Jabouille/Depailler (car 1) from Pironi/Jaussaud (car 2), with the number 6 Porsche in third.

Things were starting to look more than interesting. Jabouille and Depailler were flying – the car seemed unstoppable. The men who were watching at Renault, Jean Rédélé and Amédée Gordini, began to dare to dream. But they had no idea what was to follow.

Totally dominant until ... (Photo PK)

Hustling along, but a worry for Jaussaud. (©R)

The fact that it was a piston was not known immediately, but everyone felt it was that instruction that did it. It is now known that by lowering the boost, they reduced the flow of the fuel which was keeping the piston head cool and avoiding the dreaded pre-ignition. The moment the boost was reduced the fuel feed was unbalanced, and the engine immediately started to run on a weaker mixture. Everything got hot, pre-ignition occurred, and BANG! Depailler walked back, and the car was officially retired at 10.50am.

Now it was car 2 with Pironi at the wheel that went into the lead over the nearest Porsches, with six laps in hand. Ragnotti in car 4 also moved up a place as a result of the A443's demise. Then at 9.59am Porsche suddenly lost a car when Mass hit the barriers near to marshalling point 121. The A443 disaster had been a shock to Larrousse, who decided to put the now redundant Jabouille into car 4 to see if he could increase the pace of that car. This was done at the next fuel stop at 10.41am, and at 10.42am he stormed out onto the track, but the car would go no

Home at last in fourth. (©R)

got Didier out of the car. He collapsed and lay on the floor where they were throwing water over him. If we had realised how tired he was we would have forgotten all about this little clutch problem and I would have finished it. Didier lost 7kg during the race – he was completely dehydrated."

For the record, the first four cars looked like this:

– Car 2 Renault Alpine A442B chassis 3, 369 laps, 3134.519 miles (5044.53km), average speed 130.604mph (210.188kph)
– Car 6 Martini Porsche 936/78, 364 laps
– Car 7 Martini Porsche 936/77
– Car 4 Renault Alpine A442B

The Mirage GR9 Renault number 10 finished in tenth place.

After all its problems, tenth was not so bad. (Photo PK)

Champagne time. (©R)

PARIS ELYSEE 41/22-11-1900

OF
MONSIEUR VERNIER PALLIEZ
PRESIDENT DIRECTEUR GENERAL DE LA REGIE RENAULT
8/10 AVENUE EMILE ZOLA
BOULOGNE BILLANCOURT

JE VOUS ADRESSE MES TRES CORDIALES FELICITATIONS AINSI QU AUX TECHNICIENS ET TRAVAILLEURS DE LA REGIE RENAULT POUR CETTE BELLE VICTOIRE QUI FAIT HONNEUR A LA TECHNIQUE FRANCAISE

VALERY GISCARD D ESTAING

A congratulatory telegram from French president Giscard d'Estaing. (Image FC)

Winners together: Didier Pironi, Amédée Gordini, Gérard Larrousse, Jean-Pierre Jaussaud (©R)

The photo call: Jaussaud, Larrousse, Pironi.

at Le Mans, and overnight we became known by the whole nation, and would be remembered forever as the winners of the Le Mans 24 Hours."

Alain Marguet: "For me the race was torture. I was listening all the time to the sound of the engines, going from one car to the other. It's a long, long race. I was there for the full 24 hours. I was very tired at the end. It was a really difficult race because all we could think of was that we must win! We must win! And there were other pressures – we had to win if we were to go further in F1, and because we were passionate about going into F1 it was essential to win this race."

For Amédée Gordini and Jean Rédélé, it was the fulfilment of their dream to see the victory of a car with the Alpine name on it and an engine bearing the name of Gordini. Sadly, Amédée Gordini passed away the following spring. But in 1978, he saw his name on the winning engine at the greatest race of all. Marcel Hubert, the great aerodynamicist, had created the bodies of some remarkable cars. Bernard Dudot's work on the turbo had brought dividends. François Castaing could be proud that it was his team that had created the V6. For Gérard Larrousse, it was the vindication of years of hard work. He went on to add more victories in Formula 1 to an already illustrious career.

The Champs Elysées. (©R)

A Renault press release entitled 'The 25th Hour' stated: "The final destination: the Renault museum on the Champs Elysées. A very friendly crowd and hundreds of photographers accompanied car number 2 of Jaussaud and Pironi to the door of automobile history."

During the weeks that followed this victory there were many receptions, not least the one held at the invitation of the government.

Jean Rédélé had started with a dream in 1963. His Alpine team had many class wins, but it took Elf, Renault and several dozen dedicated men to bring together the team that would eventually create a sports prototype racing car that could win outright at Le Mans.

Spot some famous faces? A party thrown by the French government. Jean Sage (arms folded) muses ... (Photo FC)

As author of this work, I had the rare privilege of meeting many wonderful people from the team, looking into the lives of the men who were there and sharing the highs and the lows through their words. I hope you have enjoyed this story, and I thank all of those who helped create *Alpine and Renault – The Sports Prototypes*.

The last one. (©R)

7 Chassis overview

CHASSIS AND RACE SUMMARY CHART

This is for the factory cars only and excludes the use of the A441, sold to and used extensively in Japan post 1975. It also excludes the hillclimb events of Jimmy Mieusset and Jean Ortelli

DNS = Did not start • DNQ = Did not qualify • DNF = Did not finish • grd = grid position • T = Time • ov = Overall • L = Laps

Chassis	Race	Date	No.	Type	cc	Drivers	Result	Notes	Entrant
440-0	Magny-Cours	7/5/73	19	A440	1996	Jean-Pierre Jabouille	4th ov	2 races, 5th in each race	Alpine
440-0	Croix-en-Ternois	27/5/73	5	A440	1996	Jean-Pierre Jabouille	1st ov 2 races each 40 L	First victory, win both races	Alpine
440-0	Imola Trophy Benelli	3/6/73	47	A440	1996	Jean-Pierre Jabouille	DNF	7th grd, T 1.47.72	Alpine
440-0	Trophy Auvergne (Charade)	17/6/73	14	A440	1996	Jean-Pierre Jabouille	DNF	3rd grd, T 3.09.2	Alpine
440-0	Nürburgring 500km	1-2/9/73	4	A440	1996	Jean-Pierre Jabouille	Race 1 DNF	11th grd, T 7.58.2	Alpine
440-0	Nürburgring 500km	1-2/9/73	4	A440	1996	Jean-Pierre Jabouille	Race 1 DNF	–	Alpine
440-0	Nogaro	30/9/73	11	A440	1996	Jean-Pierre Jabouille	9th ov: broken susp	5 L down	Alpine
440-1	Nogaro	30/9/73	12	A440	1996	Alain Serpaggi	2nd ov	Larrousse tests car for first time	Alpine
441-1	Trophy Paul Ricard	7/4/74	5	A441	1996	Alain Cudini	1st ov	2nd grd, T 1.15.1	Archambeaud
441-0	Trophy Paul Ricard	7/4/74	6	A441	1996	Jean-Pierre Jabouille	8th, 5 L down	Pole, T 1.14.7	Alpine
440-1	Trophy Paul Ricard	7/4/74	4	A440	1996	Gérard Larrousse	Classified 14th	4th grd, T 1.15.6	Archambeaud
441-0	Nogaro Easter Cup	17/4/74		A441	1996	Jean-Pierre Jabouille	1st ov	Pole	Alpine
441-1	Nogaro Easter Cup	17/4/74	5	A441	1996	Gérard Larrousse	2nd ov	–	Archambeaud
440-1	Nogaro Easter Cup	17/4/74	–	A440	1996	Alain Cudini	3rd ov	–	Archambeaud
441-1	Magny-Cours French Champ	1/5/74	–	A441	1996	Gérard Larrousse	1st ov	–	Archambeaud
441-2	Magny-Cours French Champ	1/5/74	3	A441	1996	Jean-Pierre Jabouille	DNF: water pipe failure	–	Alpine
440-1	Magny-Cours French Champ	1/5/74		A440	1996	Marie-Claude Beaumont	DNQ	–	Archambeaud
441-1	Montlhéry – GP Paris	12/5/74	1	A441	1996	Alain Cudini	1st ov	Pole, T 1.22.8	Archambeaud
441-2	Nürburgring 750km	19/5/74	24	A441	1996	Jean-Pierre Jabouille/ Patrick Depailler	10th ov 2nd 2-litre class	13th grd, T 7.59.4	Renault
441-2	Trophy Auvergne (Charade)	23/6/74	1	A441	1996	Jean-Pierre Jabouille	DNF: engine	2nd grd, T 3.06.5	Alpine
441-1	Trophy Auvergne (Charade)	23/6/74	3	A441	1996	Gérard Larrousse	1st ov	Pole, T 3.06.4	Archambeaud

Chassis	Race	Date	No.	Type	cc	Drivers	Result	Notes	Entrant
441-0	Trophy Auvergne (Charade)	23/6/74	2	A441	1996	Alain Serpaggi	2nd ov	4th grd, T 3.06.8	Alpine
440-1	Trophy Auvergne (Charade)	23/6/74	4	A440	1996	Marie-Claude Beaumont	DNF: engine	23rd grd, T 3.22.6	Archambeaud
441-2	Nogaro	7/7/74		A441	1996	Jean-Pierre Jabouille	1st	Non-Champ race	Alpine
441-1	Nogaro	7/7/74	–	A441	1996	Gérard Larrousse	2nd	Non-Champ race	Archambeaud
440-1	Nogaro	7/7/74	–	A440	1996	Alain Cudini	3rd	Non-Champ race	Archambeaud
441-2	Trophy Etienne Aigner Misano	21/7/74	2	A441	1996	Jean-Pierre Jabouille	1st Race 1, pole T 1.15.5	Pole, T 1.15.5	Alpine
441-0	Trophy Etienne Aigner Misano	21/7/74	3	A441	1996	Alain Serpaggi	2nd Race 1, 5th grd T 1.17.0	5th grd, T 1.17.0	Alpine
441-1	Trophy Etienne Aigner Misano	21/7/74	44	A441	1996	Gérard Larrousse	DNF Race 1: cooling L4	2nd grd, T 1.15.8	Archambeaud
440-1	Trophy Etienne Aigner Misano	21/7/74	45	A440	1996	Bernard Darniche	14th Race 1	17th grd	Archambeaud
441-2	Trophy Etienne Aigner Misano	21/7/74	2	A441	1996	Jean-Pierre Jabouille	1st Race 2	Pole	Alpine
441-0	Trophy Etienne Aigner Misano	21/7/74	3	A441	1996	Alain Serpaggi	2nd Race 2	2nd grd	Alpine
440-1	Trophy Etienne Aigner Misano	21/7/74	45	A440	1996	Bernard Darniche	10th Race 2	14th grd	Archambeaud
441-1	Coppa Città Enna-Pergusa	11/8/74	15	A441	1996	Gérard Larrousse	1st Race 1	Pole, T 1.23.1	Archambeaud
441-2	Coppa Città Enna-Pergusa	11/8/74	12	A441	1996	Jean-Pierre Jabouille	2nd Race 1	2nd grd, T 1.24.1	Alpine
441-0	Coppa Città Enna-Pergusa	11/8/74	14	A441	1996	Alain Serpaggi	3rd Race 1	5th grd, T 1.25.2	Alpine
441-1	Coppa Città Enna-Pergusa	11/8/74	15	A441	1996	Gérard Larrousse	1st Race 2	–	–
441-2	Coppa Città Enna-Pergusa	11/8/74	12	A441	1996	Jean-Pierre Jabouille	3rd Race 2	–	–
441-0	Coppa Città Enna-Pergusa	11/8/74	14	A441	1996	Alain Serpaggi	2nd Race 2	–	–
441-1	Prix des Nations Hockenheim	25/8/74	1	A441	1996	Gérard Larrousse	1st Race 1	Pole, T 2.01.9	Archambeaud
441-0	Prix des Nations Hockenheim	25/8/74	4	A441	1996	Alain Serpaggi	2nd Race (1st ov)	3rd grd, T 2.04.9	Alpine
440-1	Prix des Nations Hockenheim	25/8/74	2	A440	1996	Bernard Darniche	7th Race 1	13th grd	Archambeaud
441-2	Prix des Nations Hockenheim	25/8/74	3	A441	1996	Jean-Pierre Jabouille	13th Race 1	2nd grd	Alpine
441-2	Prix des Nations Hockenheim	25/8/74	3	A441	1996	Jean-Pierre Jabouille	1st Race 2, 13th grd		
441-0	Prix des Nations Hockenheim	25/8/74	4	A441	1996	Alain Serpaggi	3rd Race 2, 2nd grd	–	–
440-1	Prix des Nations Hockenheim	25/8/74	2	A440	1996	Bernard Darniche	DNF: spin-off L7	–	–

DNS = Did not start • DNQ = Did not qualify • DNF = Did not finish • grd = grid position • T = Time • ov = Overall • L = Laps

Chassis	Race	Date	No.	Type	cc	Drivers	Result	Notes	Entrant
441-1	Prix des Nations Hockenheim	25/8/74	1	A441	1996	Gérard Larrousse	DNF: engine failure L10	–	–
441-1	Urcy hillclimb	1-2/9/74	31	A441	1996	Gérard Larrousse	3rd	–	Archambeaud
440-1	Urcy hillclimb	1-2/9/74		A440	1996	Marie-Claude Beaumont	DNQ		Archambeaud
441-1	Grand Prix de Mugello	22/9/74	3	A441	1996	Gérard Larrousse	1st Race 1, pole	1st ov	Archambeaud
441-0	Grand Prix de Mugello	22/9/74	2	A441	1996	Alain Serpaggi	2nd Race 1, 2nd grd	2nd ov	Alpine
441-2	Grand Prix de Mugello	22/9/74	1	A441	1996	Jean-Pierre Jabouille	8th Race 1	4th ov	Alpine
441-0	Grand Prix de Mugello	22/9/74	2	A441	1996	Alain Serpaggi	1st Race 2, 2nd grd	–	–
441-1	Grand Prix de Mugello	22/9/74	3	A441	1996	Gérard Larrousse	2nd Race 2, pole	–	–
441-2	Grand Prix de Mugello	22/9/74	1	A441	1996	Jean-Pierre Jabouille	3rd Race 2, 8th grd	–	–
440-1	Montlhéry GP AGACI	22/9/74	1	A440	1996	Marie-Claude Beaumont	1st	–	Archambeaud
441-1	Montlhéry Coupe du Salon	6/10/74	2	A441	1996	Gérard Larrousse	1st	–	Archambeaud
440-1	Montlhéry Coupe du Salon	6/10/74	4	A440	1996	Bernard Darniche	DNF L1		Archambeaud
441-2	Jarama	20/10/74	2	A441	1996	Jean-Pierre Jabouille	1st ov	Pole, T 1.23.17	Alpine
441-1	Jarama	20/10/74	3	A441	1996	Gérard Larrousse	2nd ov	2nd grd, T 1.23.57	Archambeaud
440-1	Jarama	20/10/74	4	A440	1996	Marie-Claude Beaumont	11th	10th grd, T 1.28.8	Archambeaud
441-0	Jarama	20/10/74	1	A441	1996	Alain Serpaggi	DNF: valve L54, 4th grd	4th grd, T 1.24.9	Alpine
441-1	Mugello	23/3/75	5	A441 turbo	1996	Jean-Pierre Jabouille/ Gérard Larrousse	1st 3-litre class win	2nd grd, T 1.48.89	Renault
441-3	Mugello	23/3/75	8	A441	1996	Lella Lombardi/Marie-Claude Beaumont	6th, 2nd 2-litre class	10th grd, T 155.94	Elf Switzerland
441-3	Dijon 800km	6/4/75	5	A441	1996	Lella Lombardi/Marie-Claude Beaumont	DNF: engine L181	9th grd, T 1.04.9	Elf Switzerland
442-0	Dijon 800km	6/4/75	6	A442	1996	Jean-Pierre Jabouille/ Gérard Larrousse	DNF: turbo L59	Pole, T 1.00.9	Renault
442-0	Monza 1000km	20/4/75	4	A442	1996	Jean-Pierre Jabouille/ Gérard Larrousse	3rd, 3rd proto 3-litre	4th grd, T 1.30.34	Renault
441-3	Monza 1000km	20/4/75	15	A441	1996	Lella Lombardi/Marie-Claude Beaumont	4th, 1st 2-litre	12th grd, T 1.37.73	Elf Switzerland
441-3	Enna Coppa Florio 1000km	18/5/75	10	A441	1996	Lella Lombardi/Marie-Claude Beaumont	DNS, withdrawn: suspension	4th grd, T 1.27.21	Elf Switzerland
442-0	Nürburgring 1000km	1/6/75	6	A442	1996	Jean-Pierre Jabouille/ Gérard Larrousse	4th, 4th 3-litre	Pole, T 7.12.1	Renault
441-3	Le Mans 24 Hours	14/6/75	26	A441	1996	Lella Lombardi/Marie-Claude Beaumont	DNF: fuel L21	8th grd, T 4.2.09	Elf Switzerland

Chassis	Race	Date	No.	Type	cc	Drivers	Result	Notes	Entrant
441-3	Austria 1000km	29/6/75	34	A441	1996	Lella Lombardi/Marie-Claude Beaumont	DNF: engine L21	10th grd, T 1.47.19	Elf Switzerland
442-1	Austria 1000km	29/6/75	7	A442	1996	Gérard Larrousse/ Jean-Pierre Jarier	DNF: fuel injection L11	Pole, T 1.36.353	Renault
442-0	Austria 1000km	29/6/75	8	A442	1996	Jody Scheckter/ Patrick Depailler	DNF: L88	3rd grd, T 1.38.98	Renault
442-1	Watkins Glen Six Hours	12/7/75	1	A442	1996	Gérard Larrousse/ Jean-Pierre Jarier	3rd, 3rd proto 3-litre	2nd grd, T 1.43.46	Renault
442-0	Watkins Glen Six Hours	12/7/75	2	A442	1996	Jody Scheckter/ Patrick Depailler	DNF: engine L30	Pole, T 1.42.89	Renault
442-0	Nürburgring 300km	4/4/76	2	A442	1996	Patrick Depailler	DNF: L1 crash with car 3	Pole, T 7.16.09	Renault
442-1	Nürburgring 300km	4/4/76	3	A442	1996	Jean-Pierre Jabouille	DNF: L1 crash with car 2	3rd grd, T 7.22	Renault
442-2	Monza Four Hours	25/4/76	1	A442	1996	Henri Pescarolo/ Jean-Pierre Jarier	2nd ov, 2nd in class	3rd grd, T 1.33.73	Renault
441-3	Monza Four Hours	25/4/76	32	A441	1996	Giancarlo Naddeo/ Claudio Francisci	DNF: accident L60	16th grd, T 1.46.75	G Naddeo
442-3	Monza Four Hours	25/4/76	2	A442	1996	Jean-Pierre Jabouille/ Jacques Laffite	DNF: L17 oil system	2nd grd, T 1.32.7	Renault
442-3	Imola 500km	23/5/76	2	A442	1996	Jean-Pierre Jabouille/ Jacques Laffite	DNF: engine L75	Pole, T 1.40.23	Renault
442-2	Imola 500km	23/5/76	3	A442	1996	Jody Scheckter/ Henri Pescarolo	DNF: engine L3	2nd grd, T 1.41.77	Renault
441-3	Imola 500km	23/5/76	24	A441	1996	Giancarlo Naddeo/ Claudio Francisci	DNS: engine	DNQ	Nettuno
442-3	Le Mans 24 Hours	12-13/6/76	19	A442	1996	Jean-Pierre Jabouille/ Patrick Tambay	DNF: piston L135	Pole, T 3.33.31	Renault
442-3	Enna Four Hours	27/6/76	3	A442	1996	Henri Pescarolo/ Jean-Pierre Jarier	DNF: gearbox L76	2nd grd, T 1.35.74	Renault
442-2	Enna Four Hours	27/6/76	2	A442	1996	Patrick Depailler/ Jacques Laffite	DNF: engine L52	Pole, T 1.35.5	Renault
442-2	Mosport 200 Miles	22/8/76	1	A442	1996	Patrick Depailler	4th, 2nd proto 3-litre	4th grd, T 1.16.7	Renault
442-3	Mosport 200 Miles	22/8/76	2	A442	1996	Jean-Pierre Jabouille	DNF: L52	5th grd, T 17.51	Renault
442-2	Dijon 500km	5/9/76	4	A442	1996	Jacques Laffite/ Patrick Depailler	2nd, 2nd proto 3-litre	Pole, T 1.00.9	Renault
442-3	Dijon 500km	5/9/76	2	A442	1996	Jean-Pierre Jabouille/ Jean-Pierre Jarier	3rd, 3rd proto	3rd grd, T 1.00.68	Renault
442-1	Le Mans 24 Hours	11-12/6/77	7	A442	1996	Jean-Pierre Jassaud/ Patrick Tambay	DNF: piston L159	4th grd, T 3.34.8	Renault
442-2	Le Mans 24 Hours	11-12/6/77	8	A442	1996	Patrick Depailler/ Jacques Laffite	DNF: piston L289	2nd grd, T 3.32.9	Renault
442-3	Le Mans 24 Hours	11-12/6/77	9	A442	1996	Jean-Pierre Jabouille/ Derek Bell	DNF: piston L258	Pole, T 3.31.7	Renault
442-0	Le Mans 24 Hours	11-12/6/77	16	A442	1996	Didier Pironi/René Arnoux/Guy Fréquelin	DNF: fire L1	5th grd, T 3.38.6	Hughes de Chaunac

DNS = Did not start • DNQ = Did not qualify • DNF = Did not finish • grd = grid position • T = Time • ov = Overall • L = Laps

Chassis	Race	Date	No.	Type	cc	Drivers	Result	Notes	Entrant
802	Le Mans 24 Hours	11-12/6/77	10	Mirage	1996	Vern Shuppan/ Jean-Pierre Jarier	2nd ov	12th grd, T 3.47.4	Harley Cluxton
801	Le Mans 24 Hours	11-12/6/77	11	Mirage	1996	Sam Posey/ Michel Leclère	DNF: fuel leak L59	11th grd, T 3.47	Harley Cluxton
443-0	Le Mans 24 Hours	10-11/6/78	1	A443	2138	Jean-Pierre Jabouille/ Patrick Depailler	DNF: piston L280	2nd grd, T 3.28.4	Renault
442-3	Le Mans 24 Hours	10-11/6/78	2	A442B	1996	Jean-Pierre Jaussaud/ Didier Pironi	1st	5th grd, T 3.35.8	Renault
442-2	Le Mans 24 Hours	10-11/6/78	3	A442	1996	Jean-Pierre Jarier/ Derek Bell	DNF: transmission L162	7th grd, T 3.37.9	Renault
442-4	Le Mans 24 Hours	10-11/6/78	4	A442	1996	Jean Ragnotti/ Guy Fréquelin	4th	8th grd, T 3.42.7	Renault
442-0	Le Mans 24 Hours	10-11/6/78	–	–	–	–	–	Car entered as a spare, but not used	–
802	Le Mans 24 Hours	10-11/6/78	10	Mirage	1996	Vern Schuppan/ Jacques Laffite	10th	9th grd, T 3.45.8	Harley Cluxton
801	Le Mans 24 Hours	10-11/6/78	11	Mirage	1996	Sam Posey/ Michel Leclère	DNF: electrics L34	12th grd, T 3.48.3	Harley Cluxton

8 Le Mans to Bonneville via Indianapolis

For Renault and for Alpine, sports prototype racing and competition in the World Championship and in the Le Mans 24 Hours was over. It was mission accomplished.

Renault Sport, under Gérard Larrousse, was moving in a new direction – Formula 1 – and it was with the full backing of the Régie that it was to make a challenge on the Formula 1 World Championship in the years that followed. It would come close but not succeed in the turbo era up to 1985, when under severe financial pressures Renault was forced to withdraw. Success came in later years.

One man, however, was to make his mark. We have seen how in 1972 Bernard Dudot tried out the first turbocharger on a Renault engine, and how he developed it to combine the idea with the V6 designed by François Castaing and his team, building the engine that would power the A442 Alpine Renault sports prototype to victory at Le Mans. His influence continued into the 1980s and the turbo era after the demise of the Renault Factory F1 team, when he continued with the Renault Sport engine department, having started in 1983 by supplying Lotus with a 'customer' turbo engine. Into the V10 era and later, Bernard Dudot was (and at the time of writing this work, still is) closely involved as a consultant in motor racing at the highest level. However, it was with some joy that I identified a pleasant but curious result of the work of Mr Dudot, when I discovered that one of the engines that he and François Castaing produced was being used to break a land-speed record, over 30 years after the Renault turbo concept was born!

In fact, the story of the V6 turbo engine continues after 1978. As Renault had decided to quit racing with sports prototypes and turn its sights towards Formula 1, the cars went to museums, mostly with an engine still in the chassis, but nearly all the spare engines went into storage. For many years there they stayed – so what happened to them? Quite a few had been built, and many parts were left over after the 1978 Le Mans race.

Histoire et Collection, the heritage department of Renault created in 2002, has been able to get sufficient parts to restore and successfully demonstrate and even race these fabulous cars at the biennual Le Mans Classique. As for the other engines, here is their story.

When I was researching my first book about the F1 turbo cars, I heard something on the grapevine that led me to ask a few questions and uncover an unusual twist to the end of our story, relating to what happened to the remaining 2-litre turbocharged engines. Enter again American Harley Cluxton and his company Grand Touring Cars (GTC). Through the good offices of John Horsman and François Castaing, I was able to contact Mr Cluxton, and he came back to me with some gems of information, for example a letter dated 10 August 1982:

> *From: Harley E Cluxton III, President, Grand Touring Cars Inc.*
> *To: Gérard Larrousse, Régie Nationale des Usines Renault, Boulogne-Billancourt.*
>
> *Dear Gérard,*
>
> *Our proposal is to prepare and race in CART racing in 1983/84. The team will be Mario Andretti, Rick Mears, Tom Sneva or Geoff Brabham. A complete test programme will be conducted with emphasis on Indianapolis [author's note: the Indy 500]. As we have discussed previously, motors will be the important factor in this effort. We have to establish that the motor can produce 800bhp out of 2.65 litres.*

GTC under Harley Cluxton and Renault was already talking about going Indy car racing in 1981. At that time Renault was totally committed to Formula 1, and was not keen to utilise its expertise from the then current 1500cc engines, but there was the question of where were the 2-litre engines that had been produced for the Le Mans sports prototype programme. This was the engine Harley Cluxton was thinking of. The engines were in store at Renault – some 15 or more of them, in various states of repair, some new and unused, some used, some rebuilt units, and lots of parts; just what GTC needed to develop a 2.6-litre to go to Indianapolis.

The friendly association between GTC and Renault had been maintained following Renault's pull-out after the 1978 Le Mans,

except that its refusal to let Mirage continue with its engines in 1979 meant Mirage had to return to Cosworths for the years that followed. But communications had continued, so when the above letter arrived on Gérard Larrousse's desk confirming a request, Renault decided to help.

Through its American subsidiary of the time, AMC, Renault was to supply a few engines for research purposes. They went to GTC for development. Harley Cluxton: "Our goal was to re-engineer the Renault 2-litre turbo into a 2.65-litre Renault Mirage Indy motor that would produce the same bhp as the V8 Cosworth DFX, but would have the advantage of being lighter and smaller, perhaps with better reliability."

The next name to appear on the scene is Chaparral. Jim Hall, the legendary team owner, was a friend of Harley's, and one of Jim Hall's engineers, Mike Fanning – who had been involved in a lot of development with the Cosworth DFX – started work creating a Mirage Renault turbo 2.6-litre engine.

Gérard Larrousse decided to leave Renault Sport at the end of 1984, after being sidelined by the Régie Renault in an internal move that seemed unreflective of the massive commitment he had made to the organisation since his establishment of Renault Sport. Certain individuals blamed him for the failures in F1 during the 1984 season. Renault appointed Gérard Toth in his place, and on 17 December 1984 Toth wrote to Harley Cluxton at GTC, saying: "I have reviewed the possibility of Renault going ahead with the Indy engine programme you have started. Although this means more work for us, I have decided to carry on and am pleased to let you know this."

Installed in the Lola T900 chassis. (©GTC)

"I have reviewed the possibility of Renault going ahead with the Indy engine programme you have started. Although this means more work for us, I have decided to carry on and am pleased to let you know this.' – Gérard Toth

On 24 April 1985 a more formal agreement was signed by Toth. Within this agreement it states: "After two years of investment estimated at approximately US$500,000, the engines developed by Grand Touring Cars appear to be competitive with the Cosworth engine at present powering 90% of Indy starting grids. Renault Sport is extremely interested in the possibility that a Renault-based engine might eventually be an Indianapolis winner."

An ex-Renault Sport team member says: "Yes, there had been quite a few engines in various states of repair that went over to the USA."

The agreement previously mentioned goes on to state: "After the initial assistance which is the subject of the present agreement, it is understood that Renault Sport will supply parts at Grand Touring Cars' request on a commercial basis.

"Article 1: Renault Sport will supply free of charge six sets of parts to enable Grand Touring Cars to build six complete engines that will be used for final development purposes."

There are several more articles to the agreement, including the regular supply of components to be invoiced as and when required.

So did it happen? Well, yes and no. The car was to be a Doug Shierson Lola T900 chassis. At the time, Shierson's team was sponsored by Domino's Pizza.

John Wyer and John Horsman, whom we have met in previous chapters, both of course well known in the world of sports prototypes, were also involved. Wayne Beckwith, ex-chief engineer of Mirage, says: "At the time, the rules as regards boost turbo power were favourable; they suited the Renault engine and made the project feasible. However, it was a bumpy road; the regulations changed and communications with Mike Fanning deteriorated. But the car was developed to the point where it had a fully functional engine, and it was tested at Jim Hall's

Al Unser Jr aboard; Bernard Dudot looks on. (©GTC)

Could Renault win the Indianapolis 500? (©GTC)

Rattlesnake Raceway with Al Unser Jr driving." On 25 September 1986, John Wyer wrote to José Dedeurwaeder at Renault in Paris:

"... to give my impressions of the present stage of technical advancement of the Indianapolis version of your V6 race engine. As you may know, I have been associated with this project as a technical consultant since its inception at the end of 1982.

"I am sure you will appreciate that the resources of this company (GTC), both technical and financial, are limited in relation to the magnitude of such a project. Nevertheless, operating as an engineer I am most favourably impressed with the progress that has been made. I now have confidence that with a minimum of further development and detail refinement the engine will be ready for limited-scale production and will be competitive against the Cosworth DFX which has dominated Indianapolis for so long." The letter then goes on to describe various detail problems and modifications. John Wyers' letter concludes with these words: "To sum up, we have an engine which approximates in maximum power very closely to the Cosworth DFX and which has run 500 miles, the Indianapolis race distance, at 90% full load. Work remains to be done in some areas, particularly fuel consumption where Bernard Dudot is now working on the metering unit ... I understand Renault has withdrawn from Formula 1 and you have already achieved your ambitions in endurance racing by winning Le Mans. I suggest that there exists the opportunity to enter Indianapolis, the only remaining prestigious motor race, with much of the groundwork already accomplished."

So, GTC and Harley's men were ready. Bernard Dudot had been involved from the beginning, and assisted the engineers in reaching the point where they had tested over the 500-mile distance. Harley Cluxton: "The GTC car still exists, though not sponsored by Domino's like in the pictures. The car is a Lola T900 chassis carrying the number HU19 and it's in Phoenix, owned by our GTC paint man, Glen Roberts. Al Unser, who drove for the Domino's Pizza team in 1985, 1986 and 1987 for Doug Shierson, did all of the testing for us."

So we can see that many of the Le Mans sports prototype programme engines were shipped out to the USA for a proposed attempt at the Indy 500. Imagine the headlines: 'Renault wins the Indy 500!' Well, it never happened. However, the car was built; it did run, and it was a serious attempt backed by Renault. Wayne Beckwith: "Just as the project seemed to have turned the corner, the boost regulations were changed and made the project obsolete, and so it was abandoned."

Sadly, it had come to nothing, though Harley Cluxton tried in vain to interest Renault in an engine for the new regulations; however, Renault was not moved, as market forces and worldwide downturn had led to the closure of the Renault F1 team at the end of 1985, and eventually the sale of the Renault USA arm AMC to Chrysler. In fact, the company had already lost interest by the time John Wyer wrote his letter.

But this was not the end of the sports prototype engine story. Bud Free, a man who worked with the team at Le Mans in 1978, is a talented engineer and passionate speed record man.

Over recent years, with his long-time friend, the aforementioned Wayne Beckwith, he has built several interesting Salt Lake speed record cars powered by ... yes, a sports prototype 1978 2-litre turbocharged ex-Le Mans project engine, labelled Renault Gordini. Exactly – one of those units from 1978!

Bud Free's car ran at first to a formula called 'roadster' that required an upright radiator and, using the ex-sports prototype engine, ran at the Bonneville Speed Weeks, a regular annual event held on the Utah Salt Flats, a dry lake bed in California where world land-speed records are set. Bud Free managed a run of 177mph in 2004.

When the author spoke with Bud Free in May 2009, he said: "I first came in contact with Harley in 1977 when he was preparing the Mirage cars for Le Mans. Wayne Beckwith, who worked for him, is a good friend of mine. He put me in contact with John Horsman and I did some machine work for him. His crew would drop a part off at night on their way home and pick it up in the morning. I went to Le Mans with Harley and the GTC team in 1978, 1979 and 1982. I haven't done any work for Harley in quite a few years, as he doesn't race any more. I still do work for other people, mainly machining parts for Ferraris and Lamborghinis for GT Car Parts (Bill Young). I retired in 2002 and went to Bonneville for their 50th anniversary and got the 'Salt Bug'. I started building the roadster in 2002. This was the first competitive type of racing I had been involved in since drag racing. [Bud was a top dragster driver in the 1960s and is in the Arizona Dragster Hall of Fame.]

"I talked to Harley about a Renault engine for the roadster. Harley provided the engine parts and Wayne Beckwith and I built an engine. I had seen a fancy H-patterned connecting rod in Harley's office [this was the design of the connecting rod devised by François Castaing's team in 1972]

The early car. (©BF)

Bud Free launches his Dragster, circa 1960s. (©BF)

checks [15-18 May 2009] at El Mirage dry lake in California. We went through technical control [scrutineering] on Friday 15 May with no problems.

"There were lots of comments on how nice the car was, and on Saturday 16 May 2009 we ran it for the first time. There were a few 'new car' issues but on the Sunday 17 May we ran a low-power test at 148mph (238.2kph). Everything seemed OK and, all in all, we felt the weekend was a success. The car went straight, and it looks like it is going to run the 300mph (482.8kph) we are looking for ..."

480kph+ from a Renault Gordini engine that was designed in 1972 and developed for the 1978 Le Mans programme ... yes, you are allowed to say wow!

Bud Free again: "So far since 2003 I haven't had any blow-ups. The engine is bullet proof, we still use a single turbo, I run approximately 35-40 pounds boost. I change gear at 9800rpm. The rev limiter is set at 11,000rpm. I have a 5-speed transmission. You have to keep the engine above 6800 or it will lose boost between gear changes. At Bonneville the course is five miles (8.04km) long. Most of that is flat out. Of course, all of the cars have a parachute to help braking. The current management system is a Haltec computer, installed and managed by B&R Automotive (Bob Reams). He tunes it on his dyno."

Back in January 1972 when François Castaing was first asked to create a V6 engine, he would not have dreamed that the same design of engine carrying the same Renault Gordini name would be running and chasing land-speed records 35 years after its inception. It is also a tribute to the turbo idea of Jean Terramorsi, developed by Bernard Dudot, that such a power unit is still in regular use today and still breaking records. Can this be the fastest Renault Gordini V6 in the world?

The sports prototype programme may have finished in 1978 but the Renault Gordini legacy lives on.

Renault Gordini in the back, where it should be! (©BF)

A proud Free family with the superb Renault Gordini-powered record car.(©BF)

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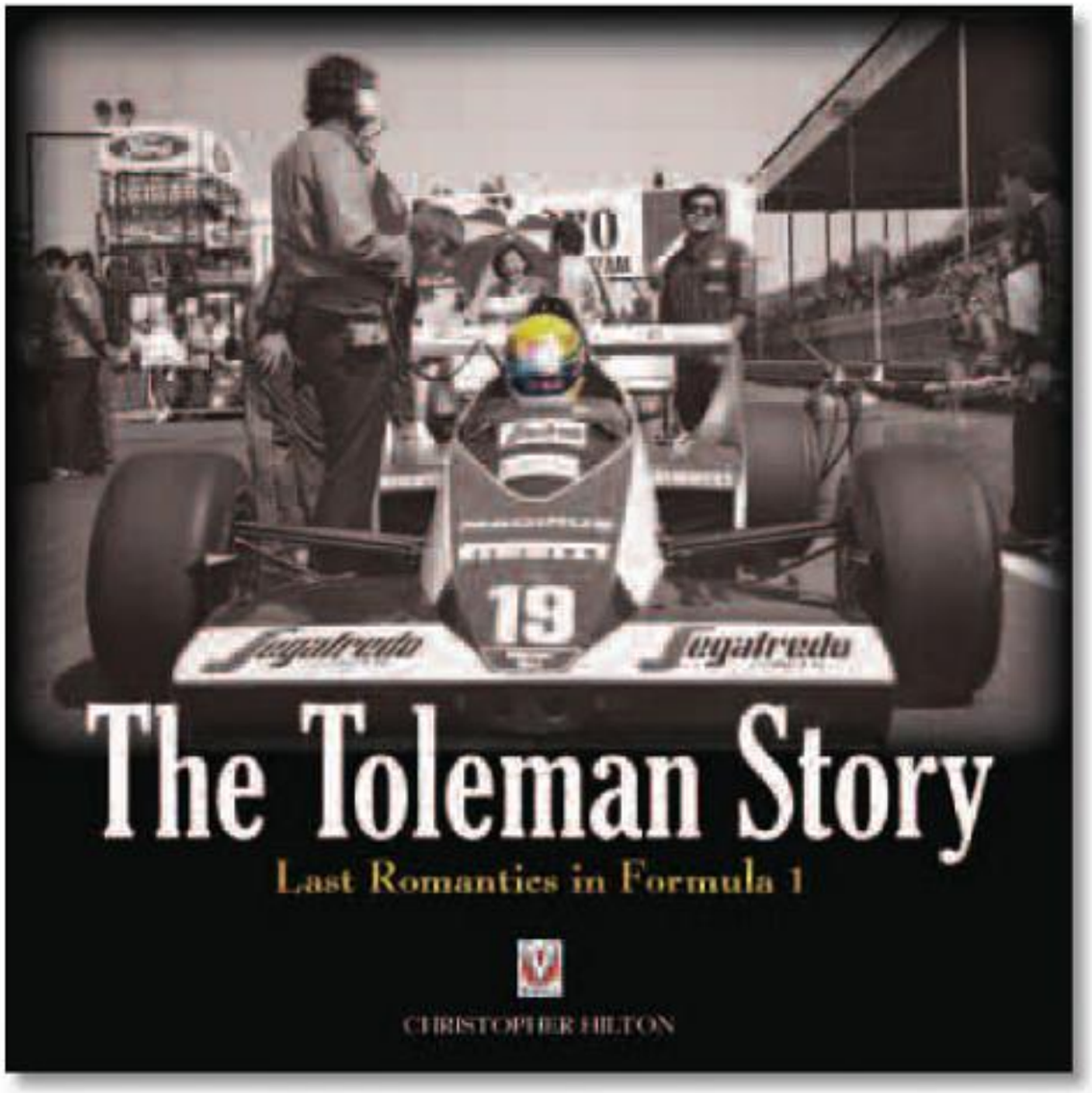

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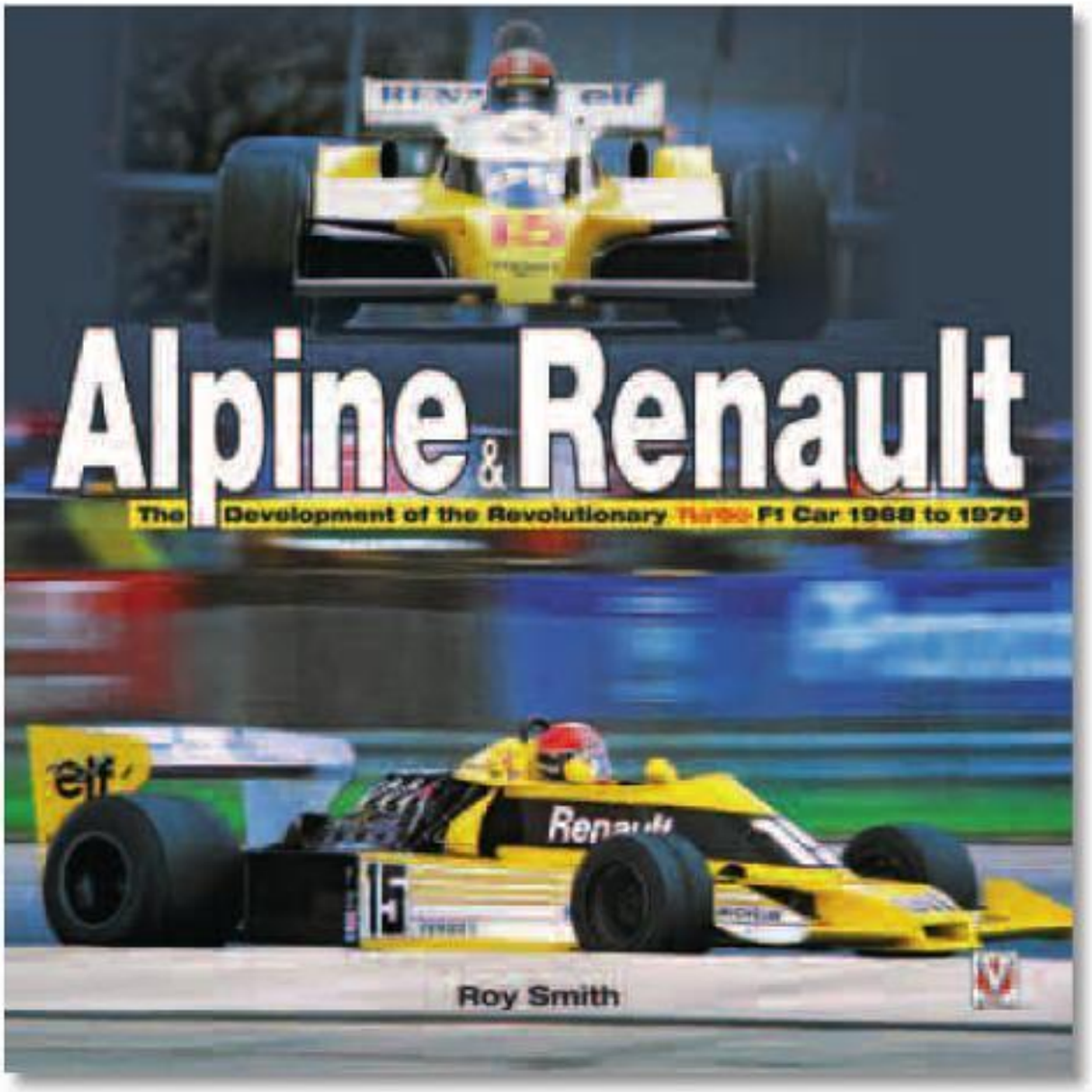

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