DESIGN & DEVELOPMENT OF THE

R 42

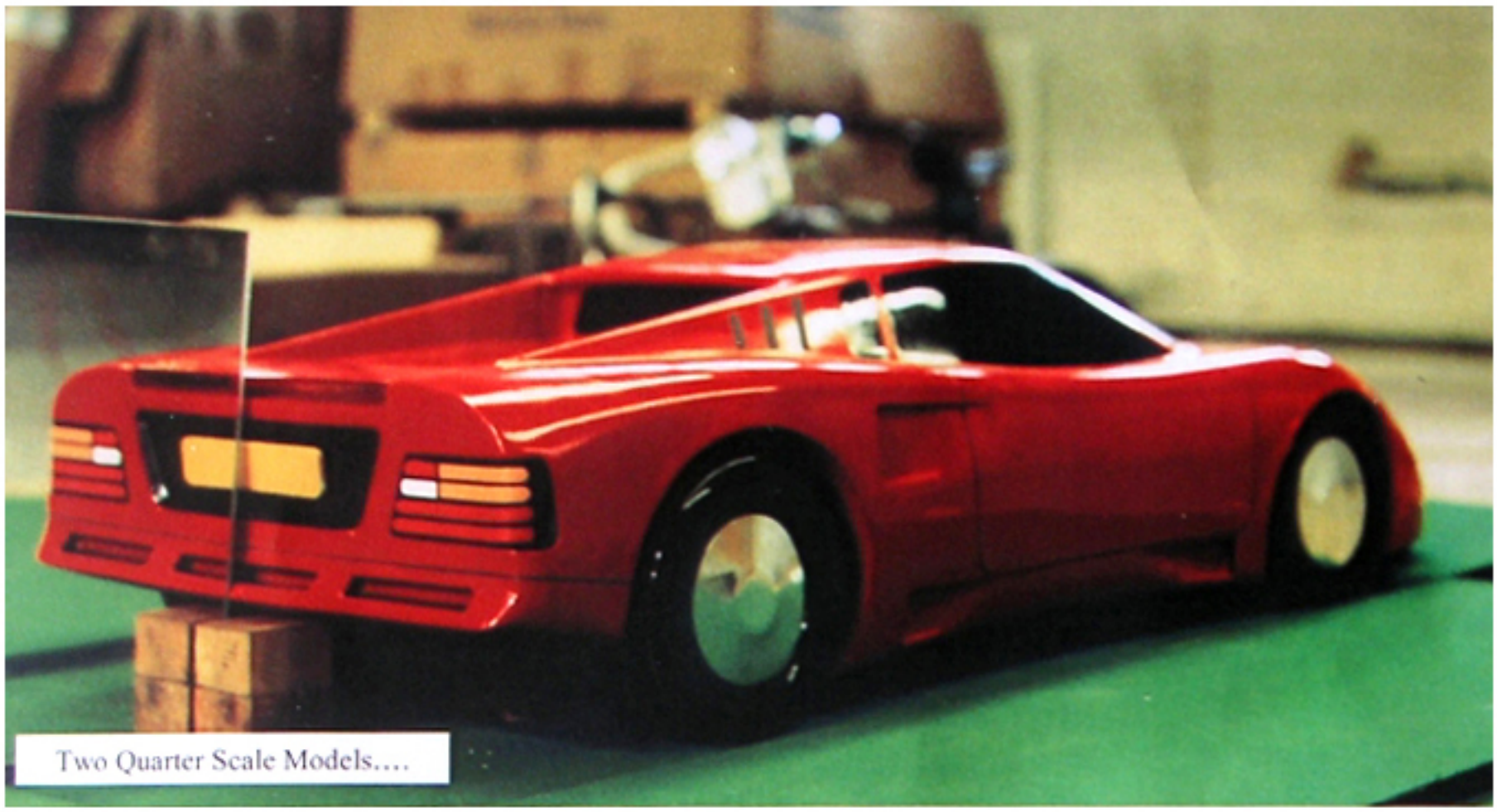
REPRODUCED WITH KIND PERMISSION FROM

THE GTD 40 CLUB

WRITTEN BY ROY SMART AFTER INTERVIEWS
OF RAY CHRISTOPHER.

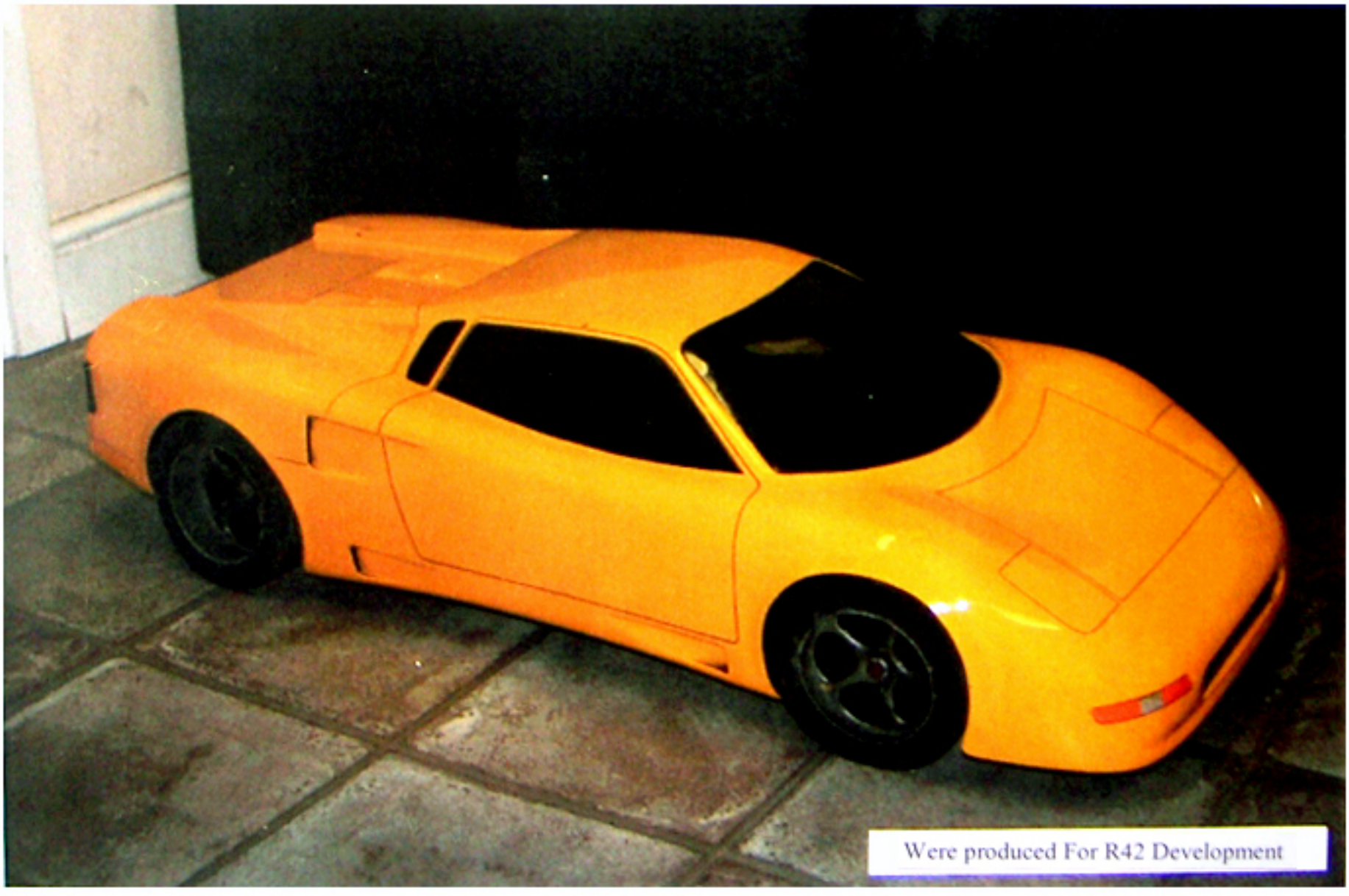
REF www.gtd40club.co.uk

was talked into getting involved and was glad to get out when I had done my bit".
The R42 was a different concept, designed from the outset as a modern sports racer with a 200mph capability, the intention was that it would replace production of the GTD40 which it was clear would



Two Quarter Scale Models....

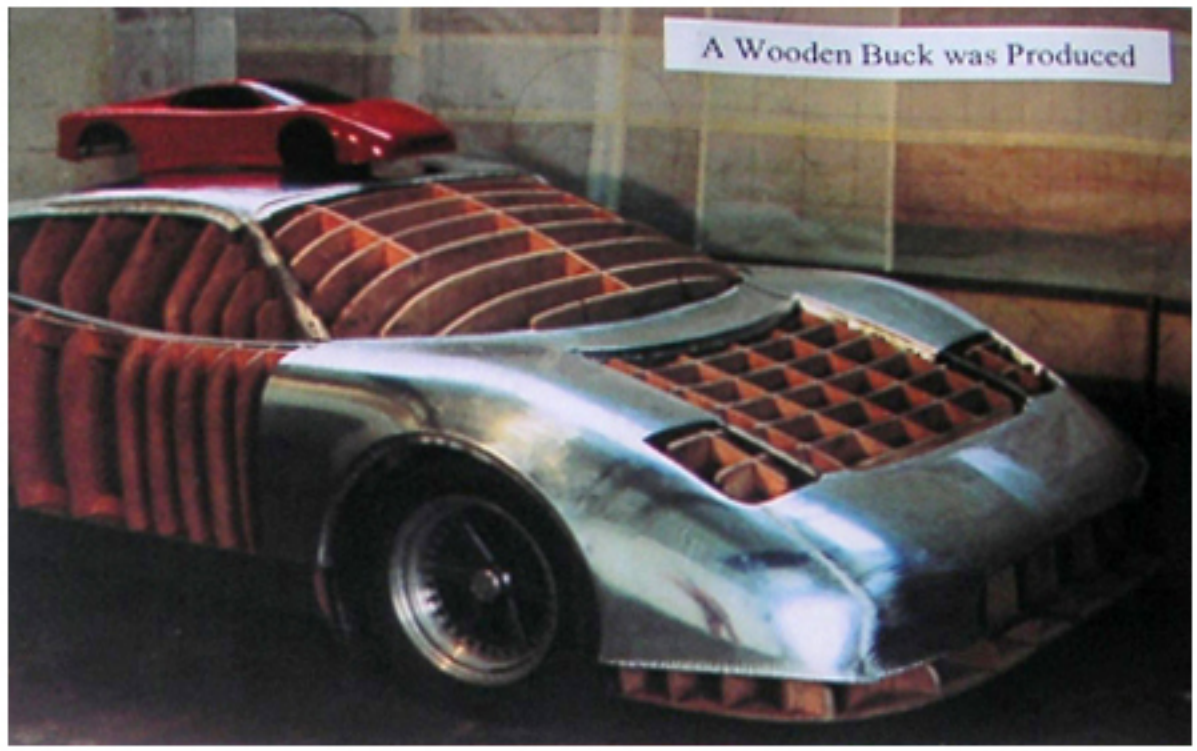
eventually reach market saturation. If the company was to continue to produce quality low volume cars a second string was needed. The R42 was conceived by Ray with input from Len Bailey and Pat Murphy



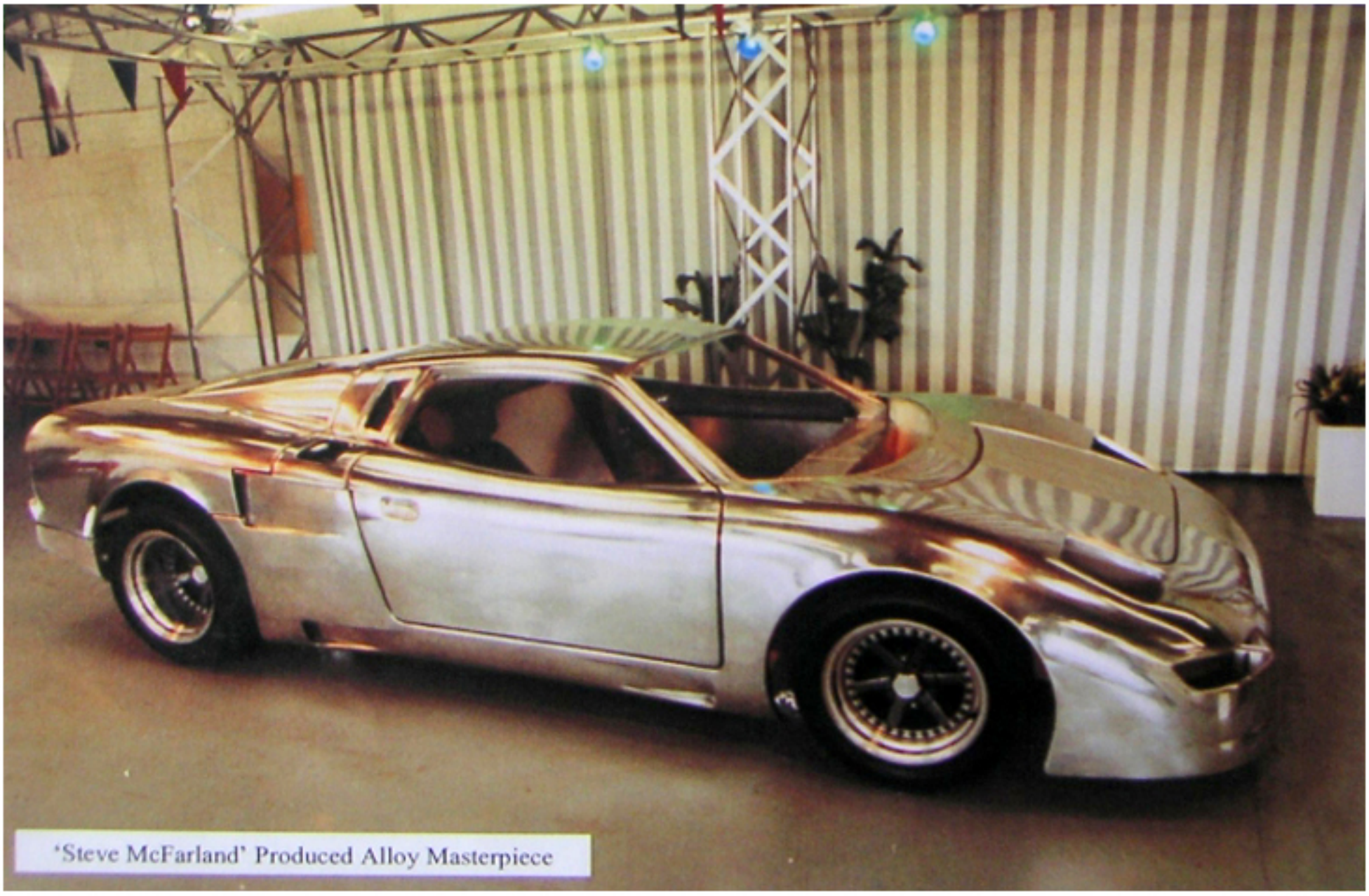
Were produced For R42 Development

and it was Pat who suggested the name R42. R for Ray and the car's height of 42 inches was to be included in the title. The car was laid down from the outset as a sports car capable of more than holding

its own on the race circuit and equally at home on the road as a high performance prestige motor car. The first stage was to draw the car in quarter scale and then produce a quarter scale model to get the styling right. The model was then set up on a high platform about the height you would see the car when on the road. *"this is so important"* says Ray *"then everybody got involved. Graham changed the rear wheel arch by adding a small flare and the improvement that this small modification made was unbelievable. It still surprises me"* says Ray *"how small changes improve or spoil a prototype"*. After a few weeks of tweeking the models (there were five in all), it was time to bite the bullet and produce a full size version, one of the pre production models is now in the possession of Dave Parker.


A Wooden Buck was Produced

The design of a low volume car is to some extent dictated by the availability of suitable production light clusters. To provide dedicated light mouldings in the small quantities required would clearly involve a disproportionate increase in overall production costs. In order to increase the access and comfort in the cabin it was decided that the fuel tanks would be sited to the rear of the cabin behind the drivers/passengers seats and these were made rectangular in shape. This move radically increased the space available in the cabin but did compromise to some extent access to the engine.


'Steve McFarland' Produced Alloy Masterpiece

The general feeling of the development team was that the car had to have a genuine 200mph capability. At the time this posed a problem unless you used a racing style engine with a capability of some 600HP. Ray says *"To this end Graham and I were sent to the USA to come up with a suitable package. We visited a number of road/race engine builders including Jack Roush (the guy that manufactures most of Fords race engines). Jack and his son Dennis have some set- up. The test capability is housed in a huge facility with twenty Dynos and test houses, each with its own engine building workshop. In one of the test houses was this new Ford engine that Dennis called a 4.5 Quad, up until that time no one outside had ever seen one. Dennis confirmed that they had got 600hp out of it on test before it let go - that's when we knew what engine we wanted for the new car. But wanting and getting are as the sage said two different things, this was now a whole new ball game. Ford had stated that no one was getting this engine it was new and still under development. All I can say is that they had not met Graham.*


R42 Launch at Motor Show


A few words from *'Tiff'*

So off we went to Ford's headquarters in Dearborne to see John Hassie the head of Ford Engine Development. To cut a long story sideways, Graham worked his charm and we ended up with five Quad units and all the help they could give to develop the electronics".

Once back in England the team was able to settle on a suitable gearbox – the Audi Getrag 6-speed being the unit of choice and this paved the way to commissioning what was going to be the key component to be produced in house- the body design.

Based on the final evolution of the quarter scale models it was now time to take the step from which there could be no return and accordingly a wooden buck was commissioned upon which the 14g aluminium body in its final form would be fabricated. The aluminium body was constructed by Steve McFarland and as will be seen from the photos a fine job he made of it. The Aluminium body was then used as a mould to construct fibre glass moulds for production cars.


Viewed by Steve Saleen and Press / TV

From the outset great interest was taken in the project by Steve Saleen, he wanted to buy out the project and take it to America for production.

Have you ever noticed how similar the current Saleen is to the R42?

Since the car was designed to achieve 200mph it was necessary to investigate the aerodynamics and this phase of the work was carried out at the MIRA wind tunnel by John Bridges. Considerable work was also carried out by Peter Gethin at Goodwood circuit where the aero related problems

were addressed and where the car was often seen running with wool tufts attached. A lot of work was also done getting the car through the convoluted European regulations until finally the project was bought out by a consortium led by Olaf Hilderbrand whose intention was to move production to larger premises. He made Ray and Graham *"an offer they could not refuse"*, the car was subsequently renamed the Spectre and that was the end of Ray's involvement in the project. A total of 24 units had been built at the Belina factory and two were retained by Ray for his own use.

During the latter stages of the development of the R42 Ray had become more and more frustrated at the slow progress. Finally Graham told him to go away and build a car. Ray did and that car was the GTD mini. Ray took a cut down GT40 chassis and mounted a mini woody shooting brake body on it. The woody parts were discarded and a Ford 302 engine complete with Renault gearbox was mounted in the rear. The result was an over powered short wheelbase car which was great fun to drive. You always had the feeling that with the slightest encouragement the rear would overtake the front. I drove it in the wet on the Isle of Man hill climbs and above all else it kept you focused. Ray tried to get

The Mad Mad Mini!

the car approved by the RAC for competitions but because the woody parts had been discarded they classed it as a commercial vehicle and no argument would convince them that it was built from a woody.

One of the R42 chassis Ray retained formed the basis of the R42 currently run by Dave Parker. This car is fitted with a Motec injected 350ci Chevy engine, driving a Renault UN1 gearbox with the Derek Bell modifications plus ATB Diff and this car is regularly seen competing in the club hill climbs and sprints where it regularly outperforms the other 40s.

In the mid 90s a car was commissioned by Tony Marsh the then hill climb champion and ex F1 driver. It was designed to take a twin

Dave Parker's Chevy R42

A 'Younger' Ray from his Wrestling Days

GTD - The Penultimate chapter

by Roy Smart

Shortly after the circulation of the last magazine, I received a call from Ray Christopher. He took up the suggestion that I made that he perhaps should consider building a hearse. At the time on my information it was about the only vehicle he had not attempted, coupled with the fact that it would in the course of time perform a useful function. Ray pointed out that he had in fact already built a hearse complete with coffin and indeed contents. It was arranged so that at a signal from the driver the contents of the casket would assume a sitting position. Can you imagine the effect this would have on an elderly driver following the hearse and showing the customary respect? Can you also imagine the effect if this were to happen in the current atmosphere of excessive personal litigation? The ambulance chasing lawyers would have a field day. As an aside, Marge mentioned that at the time that the hearse was parked outside the house, she and Ray had very few visitors!

During the ensuing discussion Ray suggested that to close the series on GTD he thought it would be interesting if he gave us an insight into the design and marketing of a sports car in the pre CAD world. What follows is a run down of the process in the words of Ray, looking at the problems from his perspective.

Ray believes that the R42 is a better example of what is required to produce a low volume sports car than the GTD40, which was a natural progression from the cars he had produced in the past. Also the R42 was a more recent project and as such the memories are still reasonably fresh. Ray *"I will try to give you some idea of the trials, the problems and of course the pleasures of producing a car from scratch. If however I get some of the events out of sync, or put a different slant on some aspects of the build, compared to others that were there at the time this is because , whatever else, the buck stops here."*

"In order to produce a car from scratch there are a number of stages which one goes through. A typical build would consist of a minimum at least seven stages. Quite what would be the order of their relative importance would depend on the circumstances prevailing at the time and not least your personal commitments and self belief and of course the abilities and commitment of your team. From my own experience with the R42, I would list the stages as, conception, dressing, packaging, finance, prototype, testing, pre-production, manufacture/production and marketing.


Qtr Scale Model...

In the real world, Finance with

a capital 'F' would be the first consideration but if you put this at the top of your list, you would be unlikely ever to start and certainly unlikely to proceed far down the rocky path to production. To be honest, anyone who contemplates building a high performance production car is either, not quite right in the head, or has an inside track on the access to funding. He will need lots of the latter. Anyone even thinking about just what is involved would not get past number 1 - Conception.


... of R42

Aircraft and high performance low volume cars have much in common and not only at the construction phase. Both are difficult to get off the ground (no pun intended) and are regarded as high risk investments by the financial houses, therefore it probably boils down to in house finance.

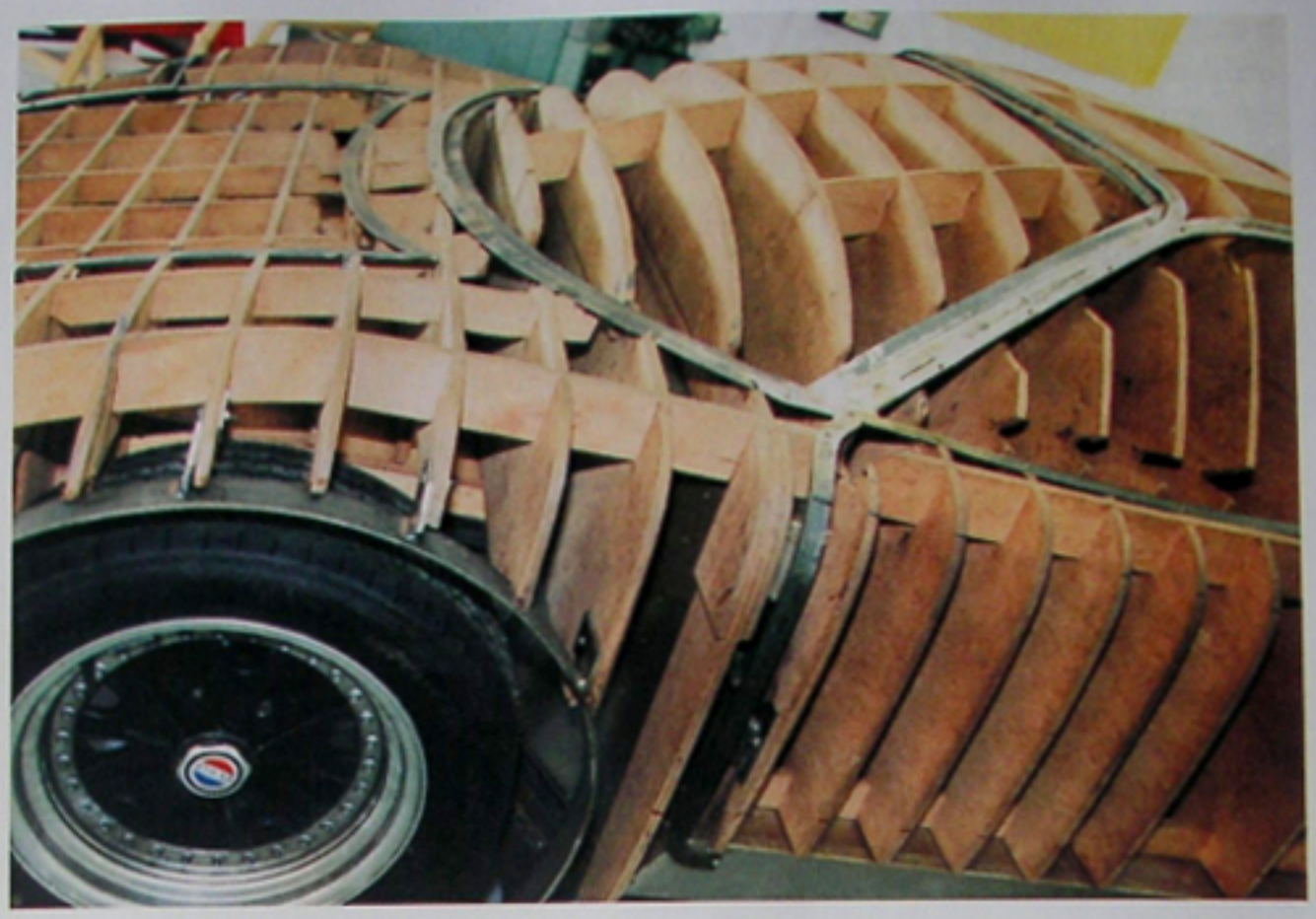
Conception

The R42 had to look good, be capable of over 200 mph and above all be build-able. Lots of cars produced are nearly impossible to build as the designer has no concept of engineering or suspension geometry. Pat Murphy the GT40 production manager of FAV came upon this problem often, because the program to build the 40 was set by Ford executives on high in the Detroit Boardroom. They had no conception of how a low volume car could be produced, so they just threw money and personnel at the problem, lots of individuals with different skills and expertise, but no-one with the skill to put it all together. Eric Broadly was by this time out of the picture, having got fed up with Ford politics and consequently half of the knowledge had gone with him. Roy Lunn thought he could make it work but his only claim to fame was the sloping window on the rear of the Anglia (and what an abortion that was!). Pat told me that Len Bailey, who ran the drawing office, would draw up the chassis parts and one group would then assemble the chassis. Another group would make the suspension and when that was offered up to the chassis it was not even near to what was required. Their answer to the problem was the Ex Aston Martin production manager, Tony Tocock. Between him and Pat, conformity developed and a build program was then able to be put together.


Full Size Wooden former Buck

A story Pat told me summed up what was happening in the early days. FAV sent out a guy to get some wheel bearings for the prototype cars. He came back with a van load, when asked why he had bought so many, he answered that he got a better discount if he bought a thousand. Pat

says that when FAV closed down most of that van load went into the skip. All one can say is, out of the early chaos they built a great car.



Designing

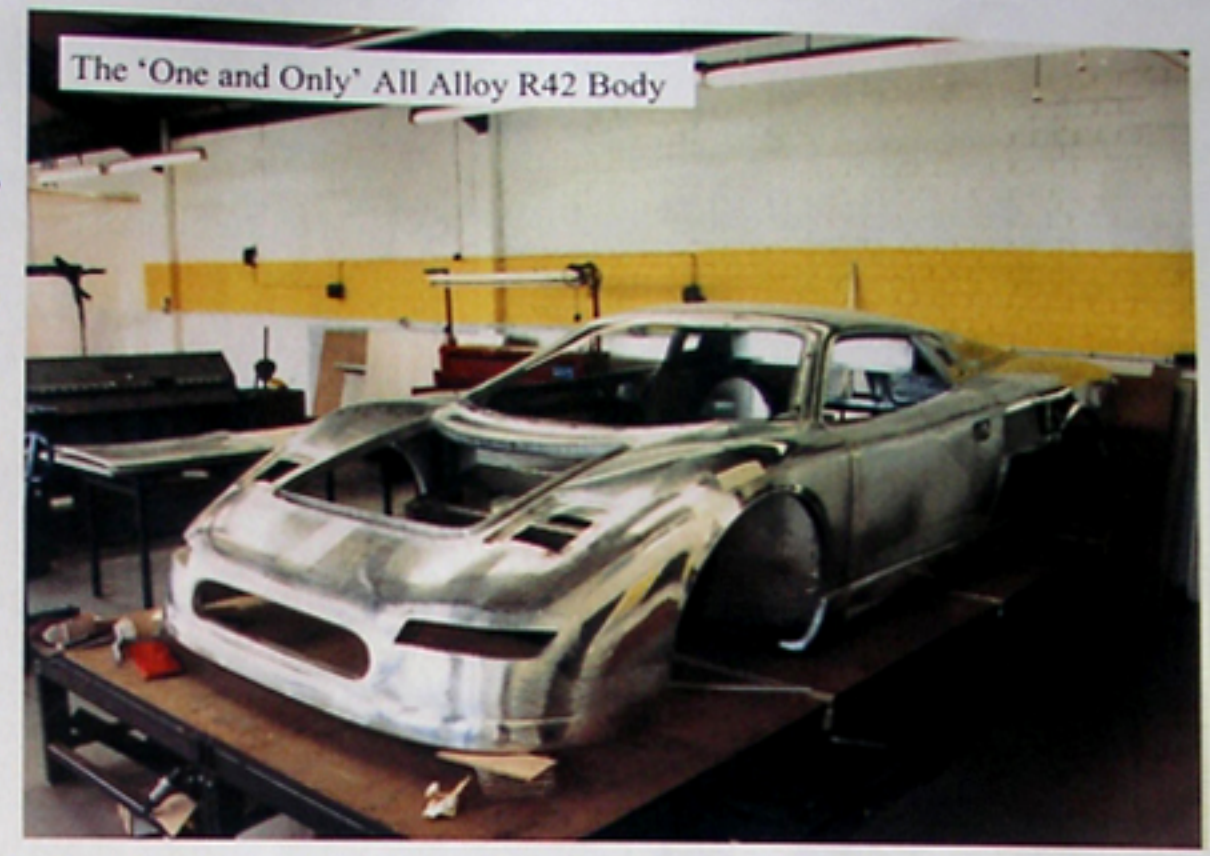
One of the things I stop doing when I start a new design, is to stop reading car magazines, if I don't the car turns out to be a miss-match of the cars I saw in the magazines. The next step is to do lots of sketches of the shape of the car, the suspension details, the cockpit layout, its size and shape. I will fill a sketch pad on just one car and this pays dividends later on when you use some of the ideas and junk others. Following this phase the next job is to draw everything out in ¼ scale. Len Bailey once told me that if it looks good in ¼ scale it will look ten times better in full size. You now draw everything, including body, chassis, wheels, suspension, hubs, seats, plus of course engine and gearbox. Following this, the next process is to mock up a ¼ scale model. At GTD the whole crew would get involved. It sounds obvious but believe me this is where you find out that parts do not fit or will not work. If you do this before you start manufacture it will save the project a lot of money and you a lot of sleepless nights.

Once you have completed this task of swapping around the parts and when you think all the parts are going to fit in the way you want them to, you can design the chassis. It's no good using an engine and gearbox that is too tall for your car or one that sticks out at the back by two feet. The seats that you have selected may be too large or there may not be enough leg room, it is at this stage that your requirements are finalised and the parts that you need to obtain from manufacturers parts bins is finalised.

As mentioned earlier, as soon as you move into prototyping you will need buckets full of money and if you are not blessed with a very rich dad, you will have to deal with the finance houses. It is important the project has sufficient funding to get it into production. Many projects fail at this point, one has to spend a great deal of ones own money before the money monkeys will get involved, if they ever do. Then you will need to sell your soul to get sufficient funds to get you into production. In the early days of the finance stage it's a chicken and egg situation, you need a car ready for production but you need the money to get you there. All I can say is that Graham and I did a lot of head scratching and had many sleep-ness nights before we got to production of the R42.

Prototype

This is the stage I just love as this is where I come into my own. Building a one off car while a team of guys record what is being put together. On the R42 we employed a team of eight students and engineers to record the process. At this stage the production manual starts and the conformity is written including the parts listing, covering everything from the major components to the nuts and bolts. On average some three thousand parts go into the car and all have to be listed, the parts numbered and priced.


The 'One and Only' All Alloy R42 Body

At GTD we had an agreement with the local university design department to take each year students on secondment for a year. Like all students some were good and a few not so good. Over the years some passed through our hands that went on to greater things and are now working for the likes of X-Trac, Williams, Lola and Mclaren.

At this stage Pat Murphy kept all the balls in the air, he came out of retirement to run this program for us. We built the cars in prototype, one for testing and parts assessment, one for driving, engine testing and suspension setup and one for destruction, plus four chassis in various stages of completion for seat belt anchorage testing, parts fit and finish and torque testing".

Recent events with Roaring Forties have confirmed what Ray says, namely that it is one thing to produce a few prototypes but quite another to go into series production with a car like the GT40. The 40 is quite a difficult car to build, for instance the door fit is critical and if the door does not fit correctly initially then it becomes a major job to correct any discrepancies. While this would be possible on a single car, so series production items like this must be eliminated at the outset


Don't ask how much the polishing cost!!

The Final Chapter Of The GTD Story in Ray's Own Words or as Ray Christopher calls it "The Dead Sea Scrolls"

Testing.

Once you have a Prototype well on the way, one has to address the problem of testing. The only way to do this is to set up a test program. To say that life gets busier from now on would be an understatement. For the next few weeks or months there are not enough hours in the day. The Company is now employing more staff and spending at a faster rate than ever before, fire fighting becomes the norm, rather than the sorting of the occasional problem and then the consultant rears his ugly head.

We were lucky on the testing front, Graham had established a good relationship with Manchester University and its head of testing George Reed, between them a program of testing was set up to validate the chassis and seat belt mounting integrity etc etc. I arrived on the test day not knowing what to expect. In the test house was one of our chassis clamped down onto a flat steel platform adorned by wires and steel cables and what I can only describe as ships anchor chains going into a large hydraulic ram. High speed cameras had been set up all round the test site. We were escorted to a "safe" area to watch the test and the cameras were started. The strain was taken up on the chains amid much groaning and creaking. Seeing the expression on my face the test staff pointed out that the noise came from their equipment and not our chassis. Then the chap in charge said "Is everybody ready"? Then there was a loud bang and it was all over in less than a second. I said "what on earth happened what have we just seen"? They took me to a monitor and ran the sequence in slow motion. In that short time the chassis bent like a banana and left the platform. All I could say was "has it failed"? The reply was "no, bloody hell that was a good one". They asked me if I would like to see it again, but I declined their kind offer.

Pre-Production Launch

Later I used this chassis in my first GTD 40 Race car, so whoever has that chassis now can be assured that it was an exceptionally good one.

Andy Bennet took on the Type Approval program and that was a real pain in the backside. Not Andy, Type Approval, he stuck with it for two years and came out of it still sane despite me going on about costs all the time and asking "are you sure we have to do all this work and testing just to get type approval" every week.

We did a lot of testing at MIRA and as part of the deal they used the car and program as publicity for the company. The high speed testing was done mainly at
Goodwood and Bruntingthorpe and this involved Peter Gethin, Jonathan Palmer and Derek Bell doing things with the car that mere mortals like me could only dream about.

Preproduction

At this stage you have a car but you still have no idea if its going to sell. Those around you say its good, but there is only one way to be sure - you have to launch it at the Motor Show. This we did and Tiff Needell did the presentation and the press turned up in droves. When the car was unveiled there were lots of gasps, shouts, and cheers with a good measure of hand clapping. I turned round to Graham and grinned and we both started to breathe again. What made the day was people, from the big manufacturers coming up to us with genuine admiration on what we had achieved, people like Walter Hayes the head of Aston Martin. The boss of Ford came over to congratulate us as did the bosses of Renault and GMC to talk to us and offer congratulations. Even Roy's mate Jeremy Clarkson said "I like that, I didn't think you would pull it off - It's great congratulations". At this point Graham and I proceeded to get well and truly pissed. We all went out to dinner to celebrate and listen to Steve Saleen tell some great motor racing stories.

All too soon reality comes back to haunt you, now you have to start making cars back at the factory. We had a good team of guys to build the cars, the 40 had given us a good grounding on how to produce a quality car on time. Soon the guys were producing their own tooling and jigs to make their jobs easier and quicker and the product consistant. On the preproduction cars one tries out new ways to manufacture parts, some are successful some are not. All the cars are shaken down to find rattles and vibrations and generally get ready for production. Usually the cars that are produced at the pre production stage are used for promotion and given to the motoring journalists for publicity. This is not always a good thing to do. How often do you hear a journalist say this or that did not work. What they don't tell you is that they may be the third or forth hack that has tried to burn the tyres off the car and thrash it within an inch of its life.

We had one well known Hack take a car on a four day trip for "evaluation". On his first day he let his mate have a drive in the car. From what I heard the guy could not drive a flock of sheep. This clown floored it at the first opportunity and lost control, he hit one or two cars and then proceeded to take off the nearsideof the car by scraping it along a wall for 50 yads. Now the journalist has a problem, the mate is not insured and he has to file copy on the car in three days. He phoned us with a cock and bull story that the brakes had failed and could we make sure the car was insured for two drivers. We duly informed him that he was the only driver and that the agreement signed was for his magazine to insure the car, and that we would not have a further car for another week or so. I was told later that the total bill for the damage was £90,000 pounds and this had to be met by the Magazine. The journalist never worked for another magazine and I have not seen him on TV since. The moral of this story is, if your mate is a complete tosser, do not let him drive a car you are responsible for.

The Final Product

All in, most of the cars came back in one piece and with the wheels pointing the same direction, and we did get some good publicity.

Production

Production is really number crunching, making sure that the systems work and at this stage business takes over, and the fun goes out of the job. We produced about 25 cars before handing over to a team of investors who moved the factory lock stock and barrel to another site, and Graham and I sailed off into the sunset. If we had our time again I am sure we would do the same thing, and maybe make a bit more money out of it. It's hard to describe the buzz of producing your own car. The fun and laughter involved, the people that you meet and the satisfaction of sitting back and saying "We did that".