

The Noble purpose



*The creator of the ARV Super 2 and the Farnborough F1 is again on the warpath on behalf of British engineering, as **Pat Malone** reports*

Richard Noble's CV reads like one of those business cards you used to get in joke shops – 'revolutions put down, rockets test-flown, virgins cured', that sort of thing. A serial doer of difficult deeds, he is famous for having held the world land speed record for 14 years before putting together the Thrust SSC project that took the record through the sound barrier, where it remains today. He has mounted four-wheel-drive safaris the length of Africa and sold chemicals and concrete floors, had a shy at lifting the Atlantic Blue Riband and created the ARV Super 2 training aircraft and the Farnborough F1 air taxi. Now he's in the headlines again as the man who says he will build the world's first thousand-mile-an-hour car, and when Richard Noble says he'll do something you won't get long odds at William Hill's against him doing it.

The purpose, he says, is to create an iconic project that will capture the attention of youngsters everywhere and turn them on to the wonderful world of engineering, just like in the old days when Campbell's Bluebird, Concorde, the Harrier and the TSR2 raised the sights of kids of his own generation. Noble himself saw John Cobb's Crusader 1952 jet-powered water speed record challenger on Loch Ness in 1952, an experience which infected him for life. At that time, of course, Britain had two dozen companies making aeroplanes and ten more making engines for them; today we're hanging on to our aviation heritage by our fingertips. Can we recreate an industry we have all but destroyed? Richard Noble thinks it's not too late, if only we can mint the engineers and designers we so desperately need and fix the elitist disconnect of the financiers.

The situation is dire. The government recognises the problem, partly because the Ministry of Defence is obligated to hire British engineers and can't get anywhere near enough

end. Love him or hate him – which many of his acquaintances manage to do at the same time – he is the kind of man around whom high achievers congregate, and by whom they are imposed upon to achieve more. Setbacks that would crush ordinary men are mere irritations to him when he has his sights on a goal. He is the reason Britain holds the land speed record, and he's the reason nobody dismisses the 1000 mph car out of hand.

It's hard to put your finger on what Richard Noble does or how he does it. He's not a trained designer or engineer, yet he understands design and engineering in great depth. He's not a trained driver, yet he drove Thrust 2 to 633 mph. What he does is persevere: with small teams and large projects he has to multitask on a wide scale, and with limited finance there is seldom room for error – life is an endless fight right down to the wire and through to completion. It's very difficult to get behind his mask; innocuous personal questions are batted off with practised ease, and when he's explaining his motivation he clicks into a groove that tells you it's not the first time he's told this story. It's understandable – he's had 30 years of dealing with the press. He's been traduced and misrepresented more than most, and his greatest efforts have been roundly denigrated; after Thrust SSC shattered the sound barrier, the newspapers chuntered on about how pointless it all was. But publicity has been the lifeblood of much of what he has attempted, and he must grit his teeth and answer stupid questions with a smile. His story is told in his own words in his excellent book *Thrust*, but suffice it to say that seeing John Cobb's Crusader lit a fire that no amount of stultifying British pessimism can quench, even though Cobb was killed in an appalling accident a few days later. Noble mounted the Thrust 2 world land speed record attempt with £175 obtained from a scrap merchant for the wreckage of the Thrust 1 car – a gas turbine powered concept racer he built himself, and since then his life has been one long round of raising money from the barely-interested to fund the next challenge.

**Left: Richard Noble drove Thrust 2 to 633mph
Below: whatever happened to...? Noble and the ARV Super 2 stand between the Edgley Optica and Chichester-Miles Leopard at Farnborough '86**



of them. Noble has canvassed manufacturing industry and the utilities and finds that the picture is far worse than the MOD says. "The reservoir of engineering expertise Britain once had is running dry," he says. "Some companies have entire departments dedicated to finding engineers, bringing them in from all over the world. But Britain is beginning to realise that without engineering, technology and manufacturing, we don't have a hope. The City casino is shut, and the country now knows it has to work for a living. Engineering and manufacturing must become the foundation stones of our economy."

If anyone can overcome Britain's inertia and set us off in a new direction, it's Richard Noble. A silver-tongued persuader who has loosened the purse strings of some of the tightest corporations in the country, he has occasionally trampled on the delicate sensibilities of friends, supporters and enemies alike, but most will cut him endless slack because he's a one-off, an ideas man who can drive the wildest projects through to the bitter

ARV Super 2

He learned to fly in order to polish his personal disciplines ahead of the Thrust 2 record attempt, and being Richard Noble, looked at the agricultural Cessna in which he was being trained and thought: 'There has to be a better way...' But we all did that, didn't we. The difference is that Noble not only designed a new aircraft, the ARV Super 2, but put it into the air, certificated it for public transport and got it into production. The ARV had a number of problems that needed to be fixed – the original Hewland engine was a weak point – but what killed it after 30-odd aircraft had been produced was the attitude of institutional investors. At the first whiff of trouble, the money began to dry up, exactly when it was most needed to move the aircraft on.

"Investment has been liberalised since then," says Noble, "but the problems remain. Mike Hewland once said to me, 'Richard, I have a successful gearbox company, but when I need to raise investment money, I'm talking to a man who moves a piece of paper from one pocket to another pocket and takes 15 percent for doing so. If I'm talking about taking risks with capital, how can I compete for the money?' But the investment banks' gravy train has hit the buffers, and we need to ensure that money is available for long-term manufacturing projects that will produce a real return.

"The financial institutions are hopeless when it comes to financing these projects and I'm very critical of them. I find them badly organised, arrogant and disconnected from reality. The ARV went into production on minimal finance, which made the organisation vulnerable – we couldn't take any kind of knocks. We had tremendous problems with the CAA, who were simply so backward! Years later they said to me, 'Richard, we learned so much from your project...' and I thought yeah, it cost us a bloody fortune to teach you.

"But we got the ARV up and flying, and operating costs were about 20 percent lower than traditional trainers. Fuel burn was less, and it was a much nicer aeroplane to fly. As a company you're stuck with overheads like regulatory costs and you have to have a high production rate in order to amortise that. We had 2,000 sales enquiries, 126 people working and the buzz around the factory was fantastic. Every week there was a new aircraft off the line, the quality got better and better we were working our way along the learning curve when we hit problems with the engine. As



with any new project we needed time and money to work through them, but the financial guys could not understand what we were trying to do. We wouldn't get full margin until we got 100 aircraft out of the door, and we got 30-something before we ran out of money."

Ironically, the ARV Super 2 is now being resurrected by a company called Opus in the United States, where the intention is to market it in the Light Sport category. Richard Noble no longer has any connection with the aircraft. "I put a lot into it, but when it's over you just have to let go," he says. "You can't carry baggage around."

In fact Noble's own ARV ended up upside down in a field after it suffered an engine failure. "I was flying from Tatenhill to Popham when the water pump bearing failed," he says. "The pump was belt-driven, so the belt failed. The first indication was the smell, then I had a quick glance at the water temperature gauge and saw the needle moving across the gauge, and I thought, oh hell, this isn't good..."

"I had about 2500 feet under me so I did a 180 and headed back to Tatenhill about 15 miles away. I knew the engine wouldn't last long without cooling, and sure enough it soon started popping and banging so I shut it down and started to glide. I found the ideal field, big, ploughed and recently harrowed, and set up an approach. But as I later discovered, the coolant blow-off valve which maintains pressure in the cooling system had stuck, so the engine had turned into a boiler, built up a head of steam and inflated the radiator, causing much greater drag because the rad was no longer air-porous and it also increased its area, creating a large air brake. All of a sudden L over D was terrible and I had to make a 25 degree approach to maintain flying speed. The difficulty then becomes judging the flare with an aircraft that was making an approach like a Space Shuttle. I got nicely positioned but flared too low and hit hard. The energy went through the structure and broke just about everything but we had a superplastic forward fuselage and I was unhurt. The aircraft passed into the possession of the insurance company and I haven't been near an ARV since."

Farnborough F1

Noble had a Turbo Arrow which he kept at Farnborough and used on business, and the economics of running his own plane led him to his next aviation project, the five-seat Farnborough F1. "Aircraft like the Cirrus SR22 and the Diamond DA40 are being looked on now as air taxi planes, but the concept was new when the F1 was first mooted," he says.

"The privately owned or corporate aircraft model doesn't work. The problem is utilisation – business jets can be flying 500 to 600 hours a year, but they need to be doing 1000 or 1200 to get the cost per mile down to sensible numbers. Jets are the wrong way to go because you haven't got the short-field performance to get into the smaller airfields you need to use, you've got an excessive fuel burn, poor fan efficiency and environmentally it's a disaster. Remember, 100% of the CO₂ produced by every aircraft that has ever flown over 30,000ft is still up there."

In 1998 the FAA allowed commercial single-engine IFR flying, opening the way for aircraft such as the Cessna Caravan to make a living. Noble says: "The P&W PT6 had an uncommanded shutdown rate of just one in 250,000 hours, and given the enormous cost savings that looked feasible. However if you have 1000 aircraft doing 1000 hours a year,



Austin Brown

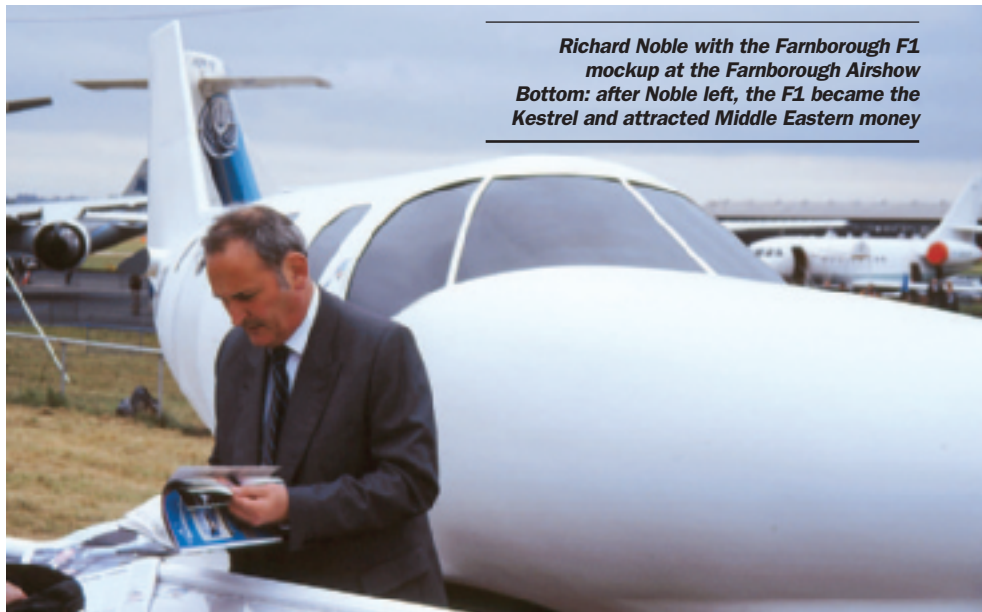
that's four accidents a year. The problem with SE IFR aircraft is that if the engine fails people are going to get hurt. You may be at 20 or 30,000 feet, you may have 30 minutes on the way down, but the odds are against you. Nonetheless we thought it acceptable.

"The Caravan is a very sensible aircraft but a speed of 160 kt is just too slow – you can't get the annual productivity and your depreciation and fixed costs per mile is too high. Speed is vital to increase your revenue and reduce per-hour costs, so we looked for 320 knots and 1500 nm range.

"The problem was to finance it. I went round the City and failed everywhere. We put up a website and people sent us emails saying

Above: the ARV Super 2 is being resurrected under the name of Opus in the United States

they wanted to invest. We didn't send out a prospectus or solicit investments, but people approached us anyway, and the system seemed to supply continuous funds with minimal hassle. Eventually we had 400 shareholders and 40 people working, but just as it became clear that the plane was going to work the internet investments suddenly and inexplicably dried up. One single chap arrived shortly after and put up quite a lot of money. He and I didn't seem to have the same objectives and when the shareholders handed



**Richard Noble with the Farnborough F1 mockup at the Farnborough Airshow
Bottom: after Noble left, the F1 became the Kestrel and attracted Middle Eastern money**





Bloodhound SSC will have rocket and jet engines to help cope with acceleration issues on the way to 1000 mph

the rights to him at an EGM, it was time to shake hands and move on.

"After that experience I came to the realisation that SE IFR was never going to work. We were working on the basis of one uncommanded shutdown per quarter million flying hours, but we should have been looking at the *commanded* shutdowns too. No pilot shuts down an engine unless there is a real problem, and a quick search of UK commanded shutdown data, when added to uncommanded shutdowns, results in risk figures which are far too high for passenger transportation.

"In order to overcome that problem we started to develop the ACE, a family of aircraft with a counter-rotating prop system driven by two independent and rotor-dedicated engines, providing centreline thrust with the security of two engines. Propulsion coefficient goes up from 0.8 or 0.85 to about 0.9, which makes a huge difference – the Mach number goes up, the productivity goes up, the fixed cost rate/mile goes down and suddenly you have something that's streets ahead of single-engined IFR. Its hugely efficient. Early aircraft with counter-rotating props like the Fairey Gannet suffered from high noise levels, but prop design has come a long way and you can reduce the noise to acceptable levels. Governments wanted to take part in the programme, but once again we had to give up because we were banging our heads against a brick wall in the financial world. My partner Barrie Baxter asked, 'Are we going to spend the rest of our lives being turned down by people who will never understand the potential?'

Bloodhound SSC

The 1,000 mph car project goes under the name of Bloodhound, a tribute to the great aerodynamicist Ron Ayers who did so much to make Thrust SSC a success. Ayers designed the aerodynamics on the successful Bristol Bloodhound 2 SAM missile, the UK's frontline defence missile for 30 years. A quiet and unassuming genius, he typifies the kind of talent that tends to coalesce around Richard Noble – true heroes like Glynne Bowsher, John Ackroyd, Jeremy Bliss and Andy Green. (As with Thrust SSC, Andy Green will drive Bloodhound.) They are all pre-eminent in their fields, and quite often they're just hanging around, under-occupied and under-appreciated, waiting for someone like Noble to

create a massive new challenge so they can stretch themselves.

Bloodhound SSC will be created in full public view, with nothing held back. Unlike Formula One teams, who have to work in secrecy to maintain their competitive edge, a speed record team can afford to be open – the car is pioneering, the new technology is of uncertain value and the land speed record rules have minimal design restriction – meaning that every challenger is substantially different. Thus one team's technology is unlikely to be of value to a competitor. Every step forward will be made public on the Bloodhound website, and the idea is to share the project with hundreds of schools so the students can study the project live and can be interactively involved.

During the Thrust SSC project the website proved to be the focus of the 'Mach 1 Club', the army of 5,000 supporters who helped bankroll the attempt. The financial establishment had, as usual, run a mile when asked for sponsorship money, but by the time the successful run was made in 1997 the Thrust SSC website was doing a conservative 11 million pages a day and had millions of unique users all over the world. Analysis of what those

Below: Richard Noble with Andy Green, who will drive Bloodhound SSC



users were coming in for showed that they wanted technology, and more technology. Noble says: "They didn't want it dumbed down, either – we found this great hunger for technology, so we gave it to them. And they in turn came up with some really good ideas. The Russians would say, why don't you try this, and this, and the children would come in with really profound and basic questions that made you think, hell, did we get that right?"

"This is what education should be all about. Suppose you wanted to learn to fly and you had no money and all you could do was look at aeroplanes and read books on aviation law and so forth – you'd give up very quickly. Or if you wanted to play guitar and you hadn't got access to one, and you can only study the theory of music. You would only be able to develop as fast as the teacher could give you lessons. This is what the schoolkids are being asked to do. They're learning maths from dry texts, physics by rote, there are no living examples for them to understand and fully study, it's all abstract information. It was Science Minister Lord Drayson who said we needed an iconic project to grip their imagination, and then we realised we could put all the technology on the web so all the schools can follow it. This is unique – the defence industry, Formula 1, Nascar or NASA can't do it because of military and IPR secrecy issues. And just as we expected, even though its early days, there is huge interest from the teachers."

Noble quotes figures which show the number of science and technology graduates in the United States increased by a factor of ten during the Mercury-Apollo space programme, then fell back after it ended. "Bloodhound won't put a man on the moon, but it will provide that iconic attraction that will hopefully cause children and students to say, that's what I want to be part of, I want to be an engineer..."

"This is exactly the right time to do it because we have a bloody great crisis in finance, where people have woken up to the fact that we can no longer live by shuffling other people's money and creaming off a cut. The British have always been world leaders in technology and engineering – we had 28 aeroplane companies at one time – but it's been under-funded, under-appreciated and under-valued. That is no longer the case, and there's no reason why, if we get this right, we cannot once again get into the aviation manufacturing industry in a meaningful way. There's a huge new opportunity developing out there." ■