

# British engineering, British technology, British talent

*The fastest man on earth, Andy Green, talks to Pat Malone about flying, driving and going supersonic without leaving the ground*



Andy Green hasn't gone through the sound barrier often enough to be blasé about it, but he is no stranger to the phenomenon. It was part of daily life when he was flying Phantoms out of Wildenrath, planning Mach 1.4 intercepts on targets 70 miles away, and Mach 2 sorties were not unknown when he moved on to the Tornado. He even managed to squeeze a sonic boom out of a Hawk in a power dive, although it was hard work. But he remains the only man ever to have driven faster than sound in a motor car, something he has done not once but five times, for the avoidance of doubt.

But the fastest man on earth is at his happiest leaving it; he will fly anything his finely-honed appreciation of risk tells him he can fairly safely tackle. Aside from the day-job on fast jets (although Wing Commander Green

is currently flying a desk in Whitehall) he dabbles in helicopters, he glides and flies the tug, he takes friends for jollies in a PA28, he skydives – more than 200 jumps – and he flies a Pitts Special at Sibson. He's working on his display authorisation, and he'll get it, too, because when Andy Green sets himself a target he will not rest until it is achieved, and spectacularly well. When he went for a degree, it had to be First Class Honours in mathematics from Oxford. When he did the Cresta Run, he became captain of the RAF team and fastest serviceman ever on the ice. When he learned to sail he quickly became a yachtmaster, and will be an instructor. And there's more. He is personable and effortlessly self-effacing; the ultimate team player, he's always buried in the crowd in the photographs and refers to himself as 'the driver for the team

that holds the land speed record'. He's tall for a fighter pilot, extremely fit – he rowed in an Oxford scratch crew – and sufficiently good-looking to have been offered a lucrative contract modelling menswear. (He turned it down.) He has a beautiful and intelligent wife, and his progress through the ranks of the RAF looks like a textbook career curve. Makes you sick, doesn't it! Even before you take into account the fact that he has the analytical skills, the motor functions, the sheer fathomless moxie to drive a car through the sound barrier, you have to admit he's a man apart.

But there's hope for us ordinary mortals because to hear Andy Green tell it, it doesn't come easy. He was never a 'natural' pilot and came within an ace of washing out because of poor tactical air combat skills. He was one of



**Wing Commander Green with the JCB Dieselmax in which he broke the diesel-powered land speed record**

the worst Cresta Run beginners they'd ever had. What makes him exceptional is not his innate talents, but the mental discipline that applies those talents, the effort of will and the indomitable determination to achieve, properly, correctly, perfectly. Most of us simply don't have the candlepower for the task, but we could all be better pilots if we stretched ourselves intellectually and refused to accept that 'good enough' would do.

There was a vague a whiff of aviation in Andy Green's family history. His father, Tony, got into the RAF for the second half of World War Two, as a second pilot-engineer on Halifaxes. He'd come top of his air engineers' course, but when he was demobbed, like so many wartime pilots he became a labourer, a taxi driver and a chauffeur before joining the Fire Service. He moved around the country as

he climbed the fireman's career pole and Andy was born in Atherstone, Warwickshire. "I was born in a Fire Service home overlooking a fire station, and of course I wanted to be a fireman when I grew up," he says. "But dad was cautious... He was equivocal about my education; my state school pushed me hard to aim for a degree, but dad wondered whether it was necessary. Even after I'd got a First at Oxford I don't think my parents fully grasped how

much bloody hard work had gone into it."

Andy's career path was laid out for him when he went to the town show in Hartlepool, where the RAF was showing a Nimrod simulator. "This was in the late 1970s, Cold War time, and it was all very hands-on and a huge intellectual challenge," he says. "It seemed like something worthwhile, exciting and challenging. The more I looked into it, the more I thought I should be flying an aircraft."

Oddly enough, flying itself wasn't the be-all and end-all. "At my selection they asked what made me think I'd like flying, and I said I didn't know for sure, but I had every confidence that I would. I was not a natural pilot, but had the intellectual discipline to work at it.

"I had two letters within a week at the start of 1980, one from the RAF offering me a pilot

cadetship, and the other from Oxford. I was sponsored through university by the RAF and flew Bulldogs twice a week with the Air Squadron. After I graduated I learned more about how to learn in a year at Cranwell and six months at Valley on Hawks. And the emotional engagement with flying grew. I got a PPL at Mona flying a PA28, and it was nice to be able to take friends flying, but I was totally and narrowly focussed on fast jets.

"I wanted to fly the F4, and I worked very hard at it and learned to fly it well – well enough, in fact, to mask my deficiencies in tactical air combat. They probably should never have graduated me from the OCU. Eventually I was found out, and I was sent back to Coningsby for a week-long 'pass or fail' on tactical weapons. I was staring defeat in the face. I thought it was the end of my RAF career – very nerve-racking.

"At Coningsby I had a couple of really good, really understanding instructors. The first day was learning to handle the aircraft on the ragged edge of control, then four days of gradually building up the combat manoeuvres – pure one-v-one handling combat twice a day for a week. I did all the study, talked to the people, I put so much effort into trying to get my head round it, and by the end of it I suddenly got the whole thing. It just clicked. From that day on, one of my strengths was air combat. It was the best thing that could have happened. Without it, I would always have struggled."

Apart from what it tells us about Andy Green, that episode illustrates the major difference between military and civil training – the RAF doesn't give you too many chances. "In the military we're not only looking at a

Aircraft Shelter) doors, which start to open when the hooter goes off, through the gap, throw on the lifejacket, helmet on, run up the steps, jump into the aircraft, plug in the PEC (Personal Equipment Connector) that connects you to the comms and call 'Mike Lima 42, Battle Stations'. And the elapsed time was 15 seconds. To me, it seemed like about a minute. I was the first to check in, and we were airborne before the other squadron."

Of course it was just an exercise... but is everything a competition? Doesn't tackling life on such terms lead to frustration and dissatisfaction? "I accept that I'm a serial over-achiever," Andy says. "I set myself high targets and work hard to attain them. It's very difficult to be satisfied with just being adequate, but I don't live life in a constant state of frustration. I set high standards in specific areas – such as the job I do – and I will always be slightly disappointed because I know I can do better. But I wouldn't want to do everything in life like that."

If you were mapping out a career path towards high office in the RAF the first portion should look like Andy Green's CV. "I spent two years on the ground at Northwood, completely outside of my aviation specialisation, supervising operations in Afghanistan and Iraq, which was just fascinating," he says. "After that job, which went well, I was hoping for a squadron, but there just wasn't a squadron available. What I got was OC Ops at Wittering ('Home of the Harrier'). I had no previous knowledge of the aircraft and was able to do very little Harrier flying. At the time a major upgrade programme was going through and they were changing maintenance systems, which reduced the availability of

aircraft. The Royal Navy was also putting through a lot of extra guys as we moved to the joint course Harrier concept – all of which meant we had half as many aircraft as we needed and twice as many students as we could comfortably cope with. Arriving in the middle of that and saying, 'Can I have some flying please' was not really a fair request. So I got just about enough to keep in touch – about ten hours in all. The day I was going to go solo the weather was rubbish and the opportunity didn't arise again. It was very frustrating, watching other guys go out every day...

"A certain amount of Harrier flying can be mimicked by the helicopter – fixed-power, variable pitch versus fixed pitch, variable power – but there are obvious limits. I went to RAF Shawbury for five hours on Squirrel helicopters, which is the best flying course in the RAF. You don't need to learn the systems, you don't need to know any of the checks, you're not going to go solo. A man goes out to your aircraft, starts it up and says right, ready for you now, sir.

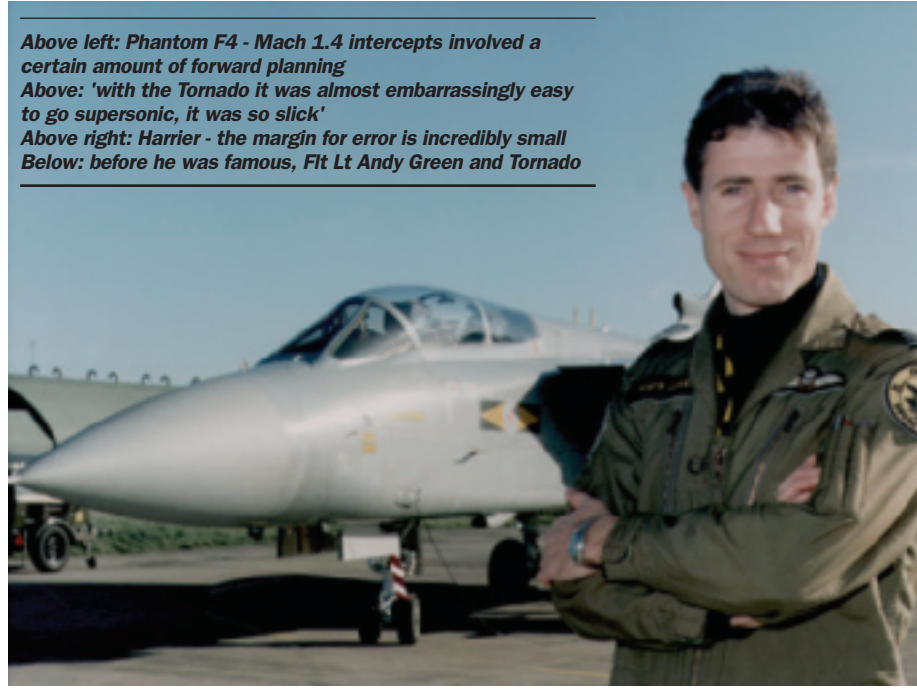
"Harrier pilots do work incredibly hard. I hate to say that for the record, because Harrier pilots are the first people to tell you how great they are. But it's true, we send our best guys to Harrier. It's a low level fast jet, so that's quite a challenge right there. In lots of phases of flight, transition and hover in particular, it's more difficult than some other bits of flying fast jets. You can get yourself into a world of hurt very quickly, and the margin for error is incredibly small. Move the wrong lever and it takes about one second for the aircraft to get to a place where you cannot recover it, and about another second before it's too late to eject. It happens that quickly."



standard, but we're looking for you to be able to achieve a rate of learning. Your ultimate goal is to be productive, effective and safe on a projected curve that takes you out to being a deputy flight commander on a squadron in five years time, for instance. You need to get there within a certain time or you ain't gonna have the potential to go on."

Andy's first tour was in Germany, on the F4 based at Wildenrath. "The primary task was Quick Reaction Alert," he says. "It was five-minute alert, day and night 24 hours at a time. You'd sit dressed in boots and anti-G trousers and the aircraft would be fully cocked in the shelter – all you'd do was battery on, engines on. At night you slept in a building next to the hardened shelter. On one occasion the hooter went off at 5am. I woke up, went straight off the end of the bed – it's astonishing how quickly your brain works when it's got that adrenaline – through the door, through the next door with my thoughts on the chap who missed the door handle and bashed his head, looked outside the door... is there a chap with a stop-watch and a clipboard, in which case it's an exercise? No, this could be for real. Keep running, get to the HAS (Hardened

**Above left: Phantom F4 - Mach 1.4 intercepts involved a certain amount of forward planning**  
**Above: 'with the Tornado it was almost embarrassingly easy to go supersonic, it was so slick'**  
**Above right: Harrier - the margin for error is incredibly small**  
**Below: before he was famous, Fit Lt Andy Green and Tornado**



As OC Ops at Wittering he wrote the flying orders for the Harrier and reinvigorated the gliding club. "We had high performance 15-metre LS8s, terrific aircraft to fly. I qualified to do the tug on a Chipmunk, and at the same time I was going to Sibson to fly the Pitts and to do my skydiving." Eventually Andy became Acting Station Commander at Wittering, and from there he moved to Whitehall, working within the Air Staff on issues as diverse as policy regulation and aircrew medical standards. "It broadens one's understanding," he says. "When I was acting station commander at Wittering it was often difficult to work out who I should be dealing with, and whether I was getting good advice. I felt I needed to understand more of how this process works, and having seen it at first hand I'm better equipped to understand what's expected of us and what the requirements are."

To the wider public, the defining moment in Andy Green's career was when he was picked to drive Richard Noble's Thrust SSC car, with the objective of breaking the sound barrier. For the full fascinating story of the part he played in that great endeavour, get on to Amazon and buy Noble's book *Thrust*. Suffice it to say that Andy Green played a pivotal role in the design and development of the car, established protocols for driving and steering that other mortals might not have had the brains or the bravery to try, and after its ultimate success took far less credit than was his due. Driving Thrust SSC, says Andy, was a job for a pilot.

"I read about the car in the *Sunday Times* in the officers' mess at RAF Leeming," he says. "The story said Richard Noble wasn't going to drive the car himself and was looking for a

need to understand jet engines, supersonic airflow, and have a pilot's discipline.

"The second thought was a completely unexpected emotional jump – 'I should do that job.' I cannot explain why that happened, but I was convinced that I had the right skills to help develop and to drive that car. The next day I got in touch with Richard."

Andy did not know there was to be a selection process, and that he was one of two dozen applicants. They all turned up at Farnborough on day one and found that many of them knew each other. "One was the guy who came second to me on the Hawk course," says Andy. "Another was one of my old instructors." Aviation psychologist Roger Green had devised a series of tests, having first suggested administering a simple sanity test and accepting the ones who failed. The process was difficult and often uncomfortable, and whittled the group down to sixteen, then eight, then five. "They thought they would get a bunch of nutters, most of whom would have a death wish," Andy says. "In fact, when they

looked at their data they found that they had the brightest, most intelligent, most stable group that they'd ever had in 25 years of testing."

Nobody knew what to expect in selection. Andy tried to prepare by buying a model helicopter and learning to fly it, and by teaching himself to juggle. The last 16 in the race were all pilots. The last eight comprised a Navy helicopter pilot and seven fast jet men. The last five were two serving and three ex-RAF fast jet pilots. The last man standing was Andy Green – someone Richard Noble was later to say was 'the best man in the world for the job'.

At first, Andy and Richard Noble treated each other with a wary stand-offishness.

"Richard is one of that breed of magnificently eccentric Englishmen without whom the world would be a much poorer place," says Andy. "He's as mad as a box of frogs. Initially we were in the slightly awkward relationship of being the two key players in an organisation that only ever had one.



**Above: 'We had high performance 15-metre LS8s, terrific aircraft to fly'**  
**Above right: Andy Green was directly involved in fund-raising for the Thrust SSC project**  
**Right: Wing Commander Green was solely responsible for the placement of instruments in Thrust SSC**

driver. In five minutes on a Sunday afternoon I came to the conclusion that it wasn't a racing driver's skill they needed, it was a fighter pilot's skill. You're not looking at applying rubber to corners at the absolute limit, wheel to wheel with the next chap, you're not taking into the arena a car that's the finished article – it's much more of a test pilot's job. The car's a prototype, the likes of which has never existed before. You'll be the first and probably the only person to drive it, and the aim is to develop the engineering and the technology safely to the point where it will do two passes across a measured mile within one hour, above the speed of sound. Intuitively I thought that the driver of a 600 kg – including him – Formula One car wasn't going to be the ideal guy to climb into a twin-jet 10-tonne vehicle. You'd



**Andy Green with Thrust SSC and the compressor which provided his breathing air**



Traditionally the chap who organised a speed record attempt then gets in the car and drives. This was different – one guy had all the experience, and the one who hadn't was going to do all the driving. We were very formal and polite in our relationship and relaxed slowly. We couldn't risk a falling out."

The stated objective, breaking the sound barrier, made the team an object of scorn in some quarters. It couldn't be done, they said. But Andy had gone supersonic many times. "I managed to get the Hawk to Mach 1 on one occasion, which was a fairly laborious process. You take it up to whatever its service ceiling is on the day, about 48,000 feet, then dive it down until it becomes airspeed limited, and you've cracked it. In the F4 we regularly used to practice supersonic high flight profiles that would involve manoeuvring at about Mach 1.4, doing intercepts starting 70 miles apart because you'd use up the ground fairly quickly. With the Tornado it was almost embarrassingly easy to go supersonic, it was so slick. On a delivery flight from Marham to Leeming with a clean aeroplane I managed to get it up to its operating limit of 50,000 feet and Mach 2, and had all sorts of problems getting rid of the height and speed before getting down again.

**Wing Commander Green steps down from Thrust SSC after a test run on the Black Rock desert  
Bottom: breaking land speed records calls for a test pilot's skills, including intense concentration**



"The rules for supersonic flight are that you have to be ten miles offshore heading away, or 30 miles heading towards the land. But even at 35 miles you will throw a sonic boom, the pressure wave will reach the ground. It's normally reported to the police as an explosion. The police call up air traffic agencies – I've been 38 miles offshore completing a supersonic exercise, turned away, and five minutes later we were asked if we'd gone supersonic."

But in a car? "In terms of the design of the cockpit and of exactly how to control the car, I brought a fundamentally different approach to anyone who'd ever done this before. The majority of the other drivers did very little except put the foot down and look out the window, and gathering test data was a matter of sending the driver away and debriefing the car. I had 20 years of flying fast jets. It's a very data-rich environment, there are a lot of cockpit instruments, and a lot of stuff that I can influence in the cockpit.

"Rosco McGlashan (one of the serious starters in the race for the land speed record) had a full instrument suite in his car, but he said to me: 'It's a complete waste of time – I've never ever had the capacity to look at them. I point it down the line, I put my foot on the floor and the guys tell me what happened afterwards. I've no idea how fast I'm going, I've no idea what the engine's doing. Don't have time.' But as a fighter pilot I'm used to sucking up ten times that amount of information and time-sharing it. I've been taught by the best and spent 20 years practising."

Noble's book confirms how astounded the team were when Andy showed he could drive the car at insane speeds, making sometimes





**Below: Andy Green and his wife Emma, an eye specialist at Moorfields Hospital  
Right: Wing Commander Green at the controls of a Robinson R44**



massive and counter-intuitive steering corrections, read the dials, seeming to notice every monitored parameter simultaneously, and talk at the same time. It's an important book for the insights it gives us into how wrong-headed we are about genuine achievement. The reason Noble did not drive was because he had a full-time job raising money to keep the project afloat. The record attempt teetered constantly on the brink of failure for want of cash, and Noble, with his double-mortgaged home and his long-shredded overdraft limit, went about passing the hat among companies who didn't want to know. Yet the whole enterprise – the years of selfless effort by some of our most talented engineers in conceiving the goal, obtaining the jet engines, designing, building, testing the car, taking it halfway round the world, busting the sound barrier and bringing the land speed record back to Britain – cost less than half what the BBC pays Jonathan Ross in a year. This hopelessly cockeyed prioritising is starkly illuminated in the story of Thrust SSC. After they'd broken the record, one City finance house offered Noble an extraordinary sum of money to have their logo retrospectively applied to the vertical stabiliser; to his eternal



credit, Noble told them to stuff it.

Will we ever wise up enough to create the celebrity engineer? Andy Green's purpose in driving Thrust SSC was, he says, "to demonstrate in every sense of the word, great British engineering and technology. People slag off British engineering and say, oh, it died years ago. It really didn't. We still are the best in the world. For a small amateur team to build a Mach 1 jet car in a garage, ship it 5,000 miles and run it under conditions most people consider impossible was a brilliant achievement that showcases British engineering capability, and it was wonderful to play a part in it. A hundred million people saw it that day on TV, and the whole nation felt prouder for it.

"We need a change in educational emphasis for our people. Science, technology and maths don't make for good league tables, and potential graduate engineers are sidetracked into the arts. There's a crying need to inspire a new generation of engineers, and Thrust SSC helped to do that. I've met a number of young engineers who said, 'When I was 13 I saw that, and I decided to become an engineer.' That's the real goal, and the reward." ■