

The Gazelle? Isn't that a military helicopter? Well, yes it is, but a number are now on the British register.

Richard Boswell takes a look...

The Aerospatiale Gazelle: The Undiscovered Gem?

The Gazelle has been around for quite some time now. It is over 30 years ago since the first prototype flew, the second in a three type development programme between Aerospatiale and Westland aiming to meet the helicopter needs of the British and French armed services until the turn of the century. First came the utility Puma, followed by the sprightly Gazelle and lastly the fighting Lynx.

All three helicopters were incredibly successful and all remain in active service around the world, so the Gazelle comes from a fine pedigree and is unquestionably a fine helicopter. Speak to any UK military helicopter pilot: if they are under 50 they will have trained on them and they will extol the virtues of this thoroughbred. So the question has to be asked: why aren't the skies full of civilian registered Gazelles?

In many ways the Gazelle has lost out in the civilian market because of its pedigree. It's built with military

operations in mind and is therefore heavily over-engineered to enable it to withstand considerable punishment, either in the battlefield or – even worse – when being flown by your average ham-fisted student pilot who has just been given his first helicopter to play with. Design a machine to cope with that kind of punishment and you know why they didn't come cheap: you could have purchased two JetRangers for the price of one Gazelle when they were first introduced.

Besides, neither Aerospatiale nor Westland were interested in selling you one – they had their hands full trying to run their production lines to meet military orders. And so this elegant little helicopter, which served so well in military insignia, was doomed for a life of obscurity in the civilian world.

It's amazing how hard it is to lose a reputation once it's been acquired. Speak to a fixed wing pilot about the R22 and they will shake their heads, suck their teeth and

make some misinformed comment about them being dangerous – despite the fact that accident statistics do not back these assumptions up. Talk to another pilot who has never flown a JetRanger and they will remark on how twitchy they are in directional control – despite the fact Bell cured the problem years ago. Mention the word Gazelle to most helicopter pilots and they will talk about needing to be a lottery winner to finance the cost of owning and running one.

20 years ago this would have been true, but things have changed. The price of a JetRanger has slowly risen in line with inflation, keeping them

▼ The Gazelle's transmission system was designed in France, so it hovers right skid low. It's easy to get used to, though. Lifting the cowling reveals the easily accessible engine and gearbox.

at the same real value. Remarkably the same thing has not happened with the Gazelle. Perhaps it is because there are so few of them around (and those lucky enough to have acquired one tend to hang on to them) or maybe its reputation as an expensive helicopter to own has worked to keep the re-sale price down, but whatever the reason the cost of buying a used Gazelle has remained virtually unchanged over the last 20 years, bringing their real value down to the point at which today they change hands for the same money as used JetRangers.

Last year I reviewed the JetRanger and I liked it. No, let's be honest. I liked it a lot. Having just flown the Gazelle I have to admit that I like it even more, but let's once again be honest – I learned to fly on Gazelles as a young Navy pilot so it is going to hold a special place in my heart. But even when I try to be dispassionate and totally

objective about the Gazelle I still can't stop myself rating it very highly indeed. Why?

Simple. Not only will it cruise at 135 knots, but it can lift five people in comfort (certainly in the stretched version) and it is a very agile helicopter to fly.

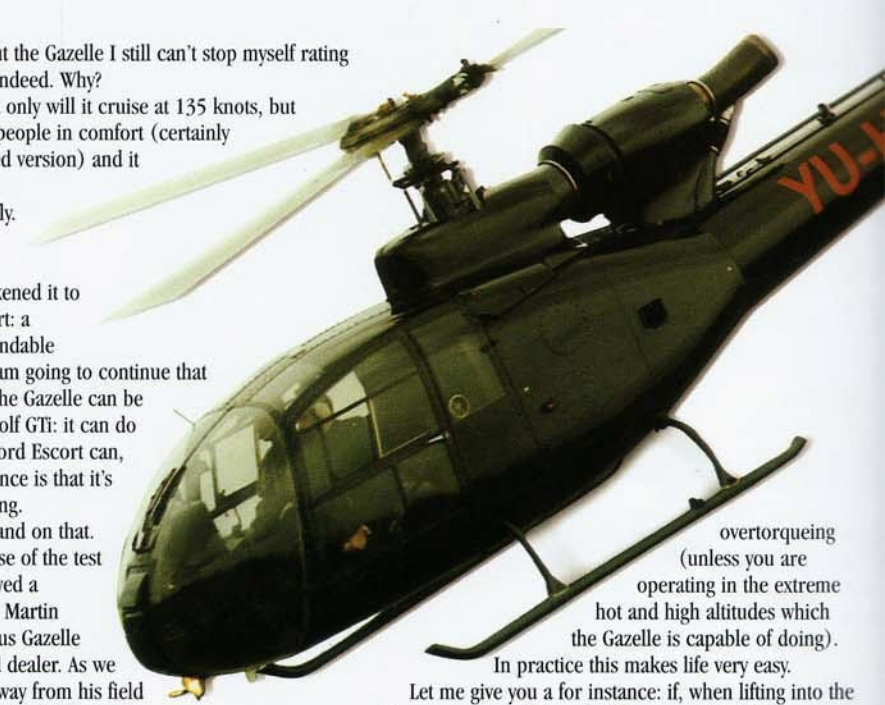
When reviewing the JetRanger I likened it to the Ford Escort: a steadfast dependable machine. If I am going to continue that analogy then the Gazelle can be likened to a Golf GTi: it can do everything a Ford Escort can, but the difference is that it's twice as exciting.

Let me expand on that. For the purpose of the test flight I borrowed a machine from Martin Wood, a serious Gazelle enthusiast and dealer. As we transitioned away from his field en route to Duxford for some general handling I glanced down at the ASI and noticed that we were already doing 100kt; not only that, but we were climbing at 1,000fpm and still accelerating. After levelling at 2,000 feet I left the collective at the Intermediate Pitch Stop (IPS) and let the speed build. Sure enough, in no time at all we had an IAS of 135kt and the ride was still as smooth as it had been at 100kt. In order to reduce the pilot workload there are two 'gates' on the collective. The first is called the IPS: the pilot can raise the collective to this gate without fear of

overtorquing (unless you are operating in the extreme hot and high altitudes which the Gazelle is capable of doing). In practice this makes life very easy.

Let me give you a for instance: if, when lifting into the hover, you haven't departed the ground by the time you have reached the IPS then you know that you are going to be strapped for power (very unlikely); alternatively when transitioning away, pull to IPS and accelerate to the best rate of climb speed and up you go. Rates of climb of around 1,500 feet per minute are normal for two pax on an 'average' day. At the top of climb simply keep the collective where it is, lower the nose to keep the helicopter level and the next thing you know the ground is slipping under the perspex nose at over two miles a minute. With three hours of gas available in the tank, including a 15 minute reserve, you have a machine with a 400nm range that will get you there in less than three hours, so this a serious go places machine.

If you pull through the IPS gate the collective continues to move until you reach the Maximum Pitch Stop (MPS). This allows you to pull 100% torque, but only for five minutes: a little red flashing light on the gauge reminds you that you do not want to keep the collective buried under your armpit for too long. Even with a full load you shouldn't ever need to pull through to the MPS if the aircraft is handled correctly, but it is nice to know that the extra power is there should you need it. The collective can be pulled through the MPS, but this segment is only used for engine off landings when you need that extra pitch on the rotor blades: the collective is spring loaded to return it to the MPS.



The Gazelle looks good on its own, but even better in a herd...

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Low vibration levels in the turn make the Gazelle a dream to fly



A little fighter

It's difficult to find the right adjective to define exactly how the Gazelle looks on the ground. It's not a pretty helicopter – with its fighting services background it would be an insult to call it 'pretty' – but without a doubt it's aesthetically pleasing to the eye. You just know that something which looks this good is going to be pretty damn exciting to fly, and she doesn't disappoint. Rolling into a sustained 60 degree turn at 120kt with only the merest hint of yaw pedal to keep it in balance it was more akin to flying a fighter than a helicopter. Remarkably, even rolling quickly into the turns brings only only a slight increase in the vibration levels.

Keeping the collective at the IPS and pulling back on the cyclic the helicopter entered a zoom climb which registered a whopping 2,500fpm rate of climb on the VSI; once again you have to be extremely harsh with the controls to induce a noticeable increase in the vibration levels and you have to be extremely violent indeed to induce any jackstall. With its fully articulated head the Gazelle can be bunted over to level off or start a rapid descent, although this type of manoeuvre is best left to the display pilots. But once again its nice to know that the aircraft will sustain negative G should you ever encounter severe turbulence.

The fenestron

The Gazelle has received some criticism in the past concerning the 'fenestron' at the rear, which it sports in place of a conventional tail rotor. The advantages of such a system are many, but the main one as far as the civilian pilot is concerned is that this arrangement is far more efficient. In addition, the large fin is actually an aerofoil section which produces lift during forward flight to offset the torque effect of the main rotor, and this minimises the use of the yaw pedals in forward flight. The down side of the arrangement is that the fenestron has been known to 'stall' on rare occasions, an aerodynamic effect in which the airfoil breaks away from the fenestron blades and renders them useless, effectively mimicking the effects of a tail rotor failure. Very unpleasant for the pilot and passengers alike.

Exactly what causes the fenestron to stall is still a bit of a mystery. It is much talked about by the powers that be in the helicopter wing of the armed services, but it is



The fenestron: an unusual design and a source of both criticism and praise

known that if you keep the wind within limits (especially from the right) and keep all spot turns nice and gentle then you will not have a problem. This is one of the reasons that the Gazelle is considered to be a big cat rather than a kitten: being a capable machine it does need to be treated with a healthy degree of respect. It's a big boy's toy.

The aircraft is cleared for sideways and backwards flight up to 30kt, and there is no problem with directional control during any of these manoeuvres. Being a turbine powered helicopter with a fair amount of inertia in the blades the avoid curve is tiny and not something that you need worry about for the majority of the time. If you are moving up from a Robbo onto the Gazelle then the first thing that you will notice is just how stable the helicopter is in the hover. The civilian variants do not have the Stability Augmentation System (SAS) which is standard fit in the military machines but quite frankly you wonder why they needed it: the Gazelle sits solidly with a big helicopter feel about it.

But I have always maintained that a real test of a helicopter's flying characteristics is how it performs in autorotation, and it should come as no surprise that the

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Comfort's not at a premium, but it's more than adequate

Gazelle did not disappoint. The Nr (rotor rpm – but we are talking turbines now, guys) remained extremely stable, even during manoeuvres. The glide can be easily stretched by increasing the airspeed before flaring it off as you get nearer the ground – using this technique the helicopter will go a long, long way.

Greasing onto the grass

To demonstrate the last bit of the autorotation we carried out a couple of 'engine offs' onto the grass. If you are currently taking your PPL on a Robinson then you will be green with envy at how easy this machine is

to grease onto the grass with minimum effort. The Nr almost takes care of itself and even on the relatively light wind day on which we carried out the flight test there was ample time for a civilised flare, a check and level followed by loads of rotor rpm to carry out the smoothest of run-ons. The skids are attached to the fuselage by a flexible joint arrangement which allows them to take a reasonable amount of punishment without transmitting it up through the fuselage. It also makes a conventional landing on rough or sloping ground a lot easier.

Being a helicopter, aerobatics are not permitted. This means no angle of bank greater than 90 degrees, but it does mean that you can legally partake in a few wingovers if you so desire, and the Gazelle remains a delight to fly whilst exploring the more distant ends of the flight envelope.

It's a bit of a cliché, but the worst part about the flight was when it came to a end. That doesn't mean that the helicopter is difficult to start up or shut down: in fact it is simplicity itself. To get the engine going simple turn the fuel pump on for 20 seconds then move the start switch to run. The engine will then start to turn over, so to get it going move the same switch to ignition and hold it. After the fires are going, confirmed by an increase in the T4 gauge, let go of the switch and the rest takes care of itself. To engage the rotors, move the throttle (it's on the overhead panel) out of the 'ground idle' gate and slowly advance it to the 'flight' gate. As the engine rpm increases the clutch automatically engages and the rotors begin to rotate. To shut down simply move the throttle back to idle and move the start switch to 'off'. The hardest part is using the rotor brake (a large handle on the overhead panel) to stop one of the blades in the fully forward position – and even that's not difficult!

No, the end of the flight is difficult purely and simply because the Gazelle leaves you wanting more. It was



The instrument is easy to read and doesn't obstruct the superb view

AEROSPATIALE GAZELLE

Dimensions	
Rotor diameter	34.5ft (10.5m)
Length rotors turning	39.3ft (11.97m)
Fuselage length	31.2ft (9.53m)
Maximum height	10.2ft (3.15m)

Performance	
VNE (sea level)	168kt (310kph)
Max continuous speed	135kt (250kph)
Max range (with overload tank)	400nm (740km)
Best rate of climb	1,675fpm

Weight and Loading	
Max take-off weight	1,800kg
Empty weight	1,050kg
Full fuel (540 litres)	430kg
Payload with max fuel	320kg

Price
With small numbers of these machines on the UK register they are seldom seen in the 'for sale' columns. However, good condition second hand models can be seen changing hands for around the £200,000 to £250,000 mark which is good value

Contact
Martin Woods (Tel: (01920) 821524), self appointed Gazelle dealer and maintenance facility. Martin generally has two or three machines on offer at any one time and will be delighted to talk to you

summed up nicely by Martin as he spoke of when he bought his first Gazelle, "I kept my Robinson for the shorter trips when I thought it would be cheaper to run, but from the moment I bought the Gazelle I never found another reason to fly the Robbo again!". I can fully appreciate those sentiments but let's get to the important bit: how big a hole will one of these burn in your pocket? Obviously being a turbine helicopter it's going to be a big one, but maybe not as large as you may have imagined or heard on the grapevine.

The undiscovered gem

Martin tells us that good condition mid-life machines generally sell for somewhere between £200,000 and £250,000 – very comparable to the JetRanger. But that's only half the story. What are the running costs like? Military airframes are lifed at 9,000 hours with the gearbox at 2,450 hours and the engine at 1,750. Martin uses his machine relatively frequently as a private owner

and estimates that the maintenance costs come out at around £95/hour. This does not sound particular high but the 50 hour check seldom costs more than £400 and even the annuals rarely cost more than £2,000. If you presently own a turbine helicopter and reckon that these figures seem quite low, then you are correct. They are. The Gazelle was built with battlefield support maintenance in mind so all of the main transmission components are readily accessible both to inspect and replace. The 50 hour inspection amounts to little more than a detailed visual inspection by a qualified engineer.

These figures are meaningless if you purchase a Gazelle which has only a few hours remaining before major component changes, so you have to choose your machine carefully. She will burn around 30 gallons an hour in the cruise but remember jet fuel is considerably cheaper than Avgas so the cost for fuel comes out at a paltry £20/hour. This is even more impressive when you bear in mind that you can cover a lot of miles in an hour; in addition not only are they relatively cheap to insure (3.5% of hull value) but they do not tend to devalue very much either. Suddenly the Gazelle becomes a much more attractive proposition than the preposterously expensive machines they were twenty years ago. This transition has gone by relatively unnoticed and somehow, in the civilian world at least, the Gazelle has remained the undiscovered gem. ♦