

Spinning Extract from On The Buffet

Whilst instrument flying was already casting its cloud, I still enjoyed general handling, including one of its major elements: spinning.

Many people I've spoken to over the years are horrified at the thought of plummeting earthward in a rapidly spinning aircraft. But for reasons that I hope will become clear, despite a tinge of butterflies before every spin, I always found them tremendously exhilarating. And never more so than my first spin sortie on 25th March, which my diary indicates was *Magic fun*.

Starting at about 20,000 feet, Croucho set our JP up as if preparing to enter a stall. But this time, as the speed reduced, he moved the controls in such a way that the aircraft rolled swiftly onto its back and kept rolling until the nose settled about 45 degrees below the horizon. At this angle, we spun downward, completing one turn every few seconds and losing up to 800 feet with every revolution.

It may be a cliché, but the ground really did seem to rush up to meet us. And as the fields and clouds whirled like the spin cycle of a washing machine, my eyes struggled to make sense of what they were seeing.

After several turns, Croucho set about recovering. His actions included pushing the nose forward, at which point the rate of rotation increased until we were looking straight down and spinning like a top. I began to wonder whether the aircraft was ever going to recover. When it did, it was with a jolt that left my head and stomach still spinning, a sensation compounded by g, my vision dimming as Croucho pulled us from the headlong dive.

It was a while before I really knew what was happening, by which time we were in a gentle climb.

The physical sensations in a spin are exciting enough, but there's a cerebral element that gives the experience an added frisson. As you drop like a stone, you're all too aware that only one set of actions will make the aircraft recover. Get these wrong, or enter a spin with insufficient height to carry them out, and your aircraft is going to spin into the ground, with you in it if you don't have enough height to get out and float down on your parachute.

As with stalling, many pioneers found this out the hard way, and aviation history is littered with spinning accidents, many of them fatal. This knowledge can add to the apprehension some people feel before spinning, while extra checks and precautions can also ramp up the tension.

For instance, when preparing to spin, we had to calculate several heights, starting with an entry height that allowed sufficient margin for the planned number of turns and the recovery; then a minimum height to commence the recovery; and finally – something which always focused the mind – a minimum height at which to eject if the aircraft had not recovered.

To minimise the chances of disorientation, there had to be a good horizon at the height we entered the spin and the height, perhaps several thousand feet lower, at which we intended to recover. For the same reason, we weren't meant to spin over a monochrome surface, such as complete cloud cover or a smooth sea, and we needed at least one readily identifiable feature – the sun, a distinctive cloud or a feature on the ground – that we could use to keep track of the number of turns.

Just a bit about the aerodynamics of spinning.

An aircraft in a spin is rotating, nose down, as if around a fireman's pole. In its headlong rush, it's actually pitching, rolling and yawing toward the pole, the inner wing stalled, or more deeply stalled than the outer wing.

Many things, including the method of entry and subsequent handling of the controls can affect the rates of rotation and descent, as can the type of spin, with variations including high rotational and inverted, the latter a type I feel delighted never to have experienced.

To recover, it's important to know the direction of spin, which may not be apparent to the naked eye, especially if the spin is entered from a mishandled manoeuvre. The cast iron indicator once again is an instrument, in this case the turn needle - in the JP, a small gauge to the left of the central artificial horizon.

Once the direction of turn is known, and ignoring the subtle differences between aircraft types, the generic spin recovery is to apply opposite rudder to oppose the yaw; then - counter-intuitively when you're already descending rapidly - push the nose forward to unstall the wings; and, when the spin stops, centralise the controls and ease out of the dive.

Simple. And that, with the necessary variations for the JP is what Croucho set out to teach me on my first dedicated spin sortie.

Of course, the lesson was broken down into digestible chunks, but I'll skip to the end and describe my first practice of a four turn spin.

After working out the various heights, I fly a 360 degree steep turn to check the airspace below us is clear, then roll out pointing at the sun. I close the throttle and maintain straight and level flight as the speed reduces. At 90 knots, I simultaneously push on full left rudder and pull the control column centrally back into my stomach with both hands.

Our JP rolls swiftly left onto its back. The nose drops and tucks under until we're pointing down at a rapidly spinning kaleidoscope of colours, from the greens of fields and woods to the brilliant white of clouds.

The airflow buffets the rudder and elevators, but I hold on, checking that the control column is fully back and central - any aileron could make the spin unstable. As the world rotates below me, I count aloud each time the sun appears.

'One, two, three...'

After the fourth turn, I chant, 'Recovering now, sir,' words that are meant to reassure Croucho that I'm on top of things.

I glance inside at the altimeter. We're above our minimum height to commence recovery, so I take one hand from the control column and close the throttle - or in this case, check it's closed. As I was to find out on a later sortie, if you enter a spin with the throttle open and don't close it, the rate of descent winds up alarmingly.

Another glance inside, this time to find the turn needle and confirm the direction of spin. Unsurprisingly, with me holding on a bootful of left rudder, the needle is to the left, so I push on full right rudder.

I now have to pause for three seconds, which, I can tell you, seems a very long time when you're spinning earthwards at many thousands of feet a minute. Then, slowly and steadily, I push the control column forward. As I do so, the rate of rotation increases alarmingly, but I steel myself to keep pushing.

We're pointing straight down by the time the spin suddenly stops. I centralise the rudders and, bracing against the onset of g, ease out of the dive into a climb attitude. Once there, I open the throttle slowly and check the engine temperatures and pressures.

The whole event has probably lasted little more than ten seconds, during which we've lost thousands of feet – many of them in the recovery. At every stage, I've sung out what I'm doing, again to reassure Croucho. So, after the fourth turn, my spin recovery would have sounded like this:

'Recovering now, sir.

'Height sufficient.

'Throttle closed.

'Needle left.

'Full right rudder.

'One, and two, and three.'

'Control column centrally forward, until...spin stops.

'Centralise the rudder and eeeaaasse out of the dive... to the climb attitude.

'Smoothly open the throttle.

'T's and P's,' shorthand for engine temperatures and pressures.

It was a speech which had to – and did – become second nature – whichever aircraft you flew. Out of interest, the Bulldog recovery is very similar, but the control column has to be pushed forward as soon as opposite rudder has been applied.

There was one final step.

Just as I'd been taught to minimise height loss in a stall by recovering as soon as I spotted the earliest sign – often the buffet – why on earth should I wait until I was in a fully developed spin before initiating recovery? So Croucho taught me to spot the wing drop - known as autorotation - that is the precursor to a spin, and to centralise the controls immediately, preventing the spin developing and minimising height loss. It is known as an incipient recovery.

From this point on, there was no reason to end up in a spin because I could recognise the signs and recover before it happened. But of course I still had to demonstrate that I could recover if I failed to catch the incipient stage, so there were still plenty of full spins.

The fact that I enjoyed spinning didn't mean my execution was always flawless. In a recent email, Croucho reminded me of a spin I've obviously chosen to forget. He says I moved the control column forward *before* I'd applied full opposite rudder. This put us high-rotational, the rates of both spin and descent increasing markedly.

Croucho had taken control and sorted things out, but by the time we recovered we were much lower than we should have been. Unsurprisingly, he says we were both pretty shaken, and our post-spin conversation was brief.

He says that I croaked, 'I think I'm going to be sick!' to which his reply was, 'I think I need a change of flying suit!'

On another occasion, I remember pushing the control column forward a little too fast and too far, so that we found ourselves hanging upside down in our straps waiting for the spin to stop. It was a very uncomfortable experience, one that Croucho made all too plain he didn't want to repeat.

To show that not all the near-death experiences were my fault though, I seem to remember Croucho demonstrating a spin from manoeuvre and forgetting to close the throttle. This also led to a very high rate of descent, and another recovery much lower than planned. I did the same in a Bulldog ten years later, by which time I realised how much composure instructors required.

To be able to talk calmly about the characteristics of a spin, then teach how to maintain and recover from it, all the while descending as if in a runaway lift, requires a certain sang-froid, if not downright courage. Even some experienced and gifted front-line pilots struggle to teach spinning, as I learnt at first hand when I began teaching them to become instructors.

And as Croucho had discovered, even if you pass the instructor course, nothing really prepares you for the reality of sitting next to a student seemingly intent on killing you. Over the course of my several thousand spins, I certainly had some frighteners, including students letting go of the controls in a panic, or, more alarmingly, holding them in such a vice-like grip that I had to wrestle them free before I could recover.

An added complication for pilots who fly several types of aircraft is that each type has a subtly different spin recovery. The dangers of this were outlined in an anonymous article in the RAF's flight safety magazine, *Air Clues*. Although I know the name of the author, who regularly flew in the Hawk, the JP or the Bulldog, I'll maintain his anonymity.

Flying solo one day, he entered a spin, maintained it for four turns and prepared to recover. To his horror, and despite the obvious differences in their cockpits, he couldn't for the life of him remember which type he was in. And the harder he looked for clues, the further his befuddled brain seemed from solving the puzzle. Eventually, knowing he had to do something, he flew the recovery for the type in which the correct drill was most critical – the Bulldog.

He had an agonising wait to see whether he'd made the right choice, but his logic was sound.

Some believed the Bulldog so capricious that it would occasionally fail to recover from a spin even when you did fly the correct recovery. Several were lost to spinning accidents over the years, one a few months before I arrived on the staff of the University of London Air Squadron at RAF Abingdon in 1985. Sadly, in that instance, the instructor died, having parted company with his parachute when abandoning the aircraft.

Whether he was ultimately the victim of a rogue spin, I don't know. Personally, I always believed my Bulldog would recover if I carried out the drill correctly. On the other hand, I also knew it wouldn't if I didn't.

Luckily, on the day of his dilemma, the author of the *Air Clues* article *was* flying a Bulldog, and it recovered. If he'd flown the JP or Hawk recoveries, the aircraft would have crashed, although hopefully he'd have taken to his parachute before that happened.

The lesson to be taken from his article was that if you fly multiple types, make sure you remind yourself which you're flying *before* you enter a spin.

Given the potential for catastrophe, why on earth does the RAF teach its pilots to spin in the first place?

Well, the first reason is practical. Because military pilots tend to operate towards the edge of the flight envelope, there's always a chance they'll end up in a spin, especially if they make a hash of something. In training, the most likely scenario is a mishandled aerobatic manoeuvre, but fast jets especially can end up spinning from a range of seemingly innocuous manoeuvres. And if it happens, the pilot needs to be able to deal with the situation.

This is why I had to prove I could recognise and recover from a range of incipient and full spins before I could fly aerobatics solo.

The second reason is to do with character. A military pilot has to be prepared to fly his or her aircraft into situations which others might consider dangerous, foolhardy even. And one of the best ways to see if a student has what it takes to do this is to ask them to fly a manoeuvre that

will lead to the loss of their aircraft – if not themselves – if they don't complete a precise set of actions promptly.

If the student can do it, it's not only a great boost to their confidence, but also a sign that they may have what it takes to become a military pilot. If they can't, military aviation is not for them.

As I said, I always enjoyed spinning. It takes all sorts.