

What did I learn in building the Advanced UPRT course in Pipistrel Academy Lab

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As most Europeans now I am spending my days with my family waiting for the Covid 19 calamity to pass. As this happens, I am sure we will return to a different world. The extent of change will depend on the duration of the crisis and this will directly influence our aviation and especially the training world.

The good thing about my self-imposed isolation is that I have time to reflect and share. With this text I would like to share with you the lessons I learnt and impressions I got in building the first Advanced UPRT course on the Virus SW 121.

The first thing I had to learn was what UPRT is, what its aim is and where does the requirement come from.

UPRT stands for Upset Prevention and Recovery Training. So it is training directed to prevent upsets. Upsets in turn are defined as any large unplanned and unwanted excesses in the desired flight parameters. This is usually interpreted as deviations in aircraft flightpath, angles or airspeed. But it can also be deviations in total energy of the aircraft or in the use of automation. Simply put: upset is a loss of control. The goal of UPRT is to reduce loss-of-control accidents.

My first step was to take a good, long look at the accidents that resulted in the UPRT requirement. There were many, many more than I realised. The two classical and often quoted ones are the Air France A330 crash off the coast of Brazil and the Asiana Airlines short landing of a B777 in San Francisco. But when you start looking at it more seriously, you see that loss of control accidents take a huge proportion of all transport category aircraft accidents. In fact in 2009 it got to such a point that in a span of six months, three separate loss-of-control accidents happened, resulting in a loss of 286 lives.

As a result of this ICAO took the initiative to introduce UPRT. In the EASA world this became law in December 2019.

Preventing loss of control works on several levels.

From the eyes of a pilot in training he or she will confront the UPRT first in commercial training, where it is called Basic UPRT. Then before the first type training it is a standalone course, which is called Advanced UPRT. In the initial type training a significant portion of the training is dedicated to upsets and they are a part of all later type recurrence trainings.

While I was looking at the accidents, I fought hard to resist a simplistic notion along the lines: "Well, younger pilots just cannot fly anymore." I fly with new pilots in Pipistrel Academy Lab every single week and I think exactly the opposite. They can fly. Boy, can they fly! The younger generation of pilots are more educated, better trained and are more talented than we were. So, where is the disconnect? More importantly, what should the Basic and Advanced UPRT focus on?

I decided to tailor the Advanced UPRT course on case studies of accidents. I selected 12 accidents or incidents, all of them from the past 15 years. Careful study of these cases revealed that loss of control does not happen in isolation. In fact, the only case of a pure upset and following loss of control happened to a German Bombardier Challenger when it encountered wake turbulence from an A380 and this resulted in a loss of over 9000 ft. The rest of cases showed that loss of control is a

symptom and not a cause. It does not happen in isolation; rather it happens with a crew under stress making piloting errors.

So this is what I based the Advanced UPRT course on. First I wanted to give students the self-confidence of really and truly departing an aircraft at high angles of attack.

Second I wanted to create an opportunity for the student pilot to experience how an upset develops.

After a few students of Advanced UPRT, I added a third requirement – I wanted to introduce to the students the concept of appropriate use of automation.

Just taking an aircraft up in the air, putting it in an upset and saying to the students: 'recover,' defies the point of the UPRT.

Therefore at the present time our Advanced UPRT course looks like this. Initially the students gain the access to on-line learning course. There they study the 12 accident cases. Each accident case builds into a learning objective. For example, the American Airlines A300 crash teaches about reflex actions and startle effect. FlyDubai 737 crash in Rostov teaches about physiological effects in upsets. The students love this. It is called problem based learning.

Most important lessons and recovery strategies are printed on flash cards which they bring to the course.

On the first day we meet at the airfield to do a two-hour brief. We go over the most important points and we fly the X-ALPHA 200 simulator. With the latest flight dynamics update, the stall/spin characteristics are representative of the real thing. And I am not saying this lightly. Any negative habit transfer from the sim could have very detrimental effect on real flying.

The greatest thing about the sim is that it can abstract. We can take everything away, but the focus on the manoeuvre. There is also no fear factor. It is just the focus on the execution and recovery strategies. Since upsets are dynamic, VR is paramount to this. This is exactly like skiing the downhill at Kitzbuhel in VR, but without the fear of crashing and the physical strain. Of course it is a great learning experience, since the student can focus only on the technique.

When we are walking to the aircraft I am confident that the student pilot will execute the recoveries. Yes, he or she might be startled a bit. But from the sim, they absolutely have the correct picture of what they need to do. They will not be disorientated or confused. In the air they just practice what they learnt earlier in the sim.

At this point I have to mention that the course is agnostic to the aircraft type. We are not teaching anything about the Virus SW 121. They get a four page handout that is also available at pipistrel-online.com about the Virus SW 121 and they have access to the relevant version of the POH. But they do not have to operate the Virus. They just have to fly it.

Any they love it. They also hate it at the same time. They hate it because they realise what a great hour building machine this is. The speed, the automation, the complexity. What shitty luck that this is the last piston aircraft they will fly. Like being shown a cake, when you are full on potatoes.

In the first two sorties we go out to 6000 ft and depart the aircraft. First of all we start with stalls. Power-off, power-on, stalls in turns, stalls with cross-controls. They realise that a wing-drop is not a start of a spin. They can recover from dynamic roll. They take away that a low-drag aircraft like the Virus must be recovered quickly from a nose-low upset, because it accelerates like crazy. Just like a

jet. They practice nose high recoveries. We go establish 40 degree or more pitch up, trading kinetic energy and recovering on the PFD, since everything in front is just blue sky.

We decelerate below V_A and try to go to limit load in a steep turn. The aircraft just buffets at 2.5 G with full aft stick and I am whispering into the intercom: "Do you understand V_A now?"

Did I mention they love it? They do. It clicks. The confidence builds. They realise they can do this. They realise they can depart and recover this aircraft. That it holds no surprises for them. And for the first time, through the Virus SW, they see how a jet behaves.

In the second sortie we do spins. We start off with a two turn spin. Then we play and explore. They start feeling when an incipient spin becomes a stable one. They try different recoveries when it is still incipient. They get into a rolling spiral and I call out: Nose low recovery. They arrest the roll and recover and I smile, since I just taught them a lesson how a timely callout can save their day.

In sorties one and two we depart and return from the practice area using automation. First, Automation level 2, with them following the Flight Director. Then Automation level 3, with the Autopilot. I am encouraging them to use it as much as possible. For most, it is the first experience of an AP coupled to the PFD. They are clumsy. They select wrong modes or time them inappropriately. "See what you have to look out for in your type training? Learn every AP mode and know exactly what it does. It will give you a huge advantage over others."

And then the third sortie. It is a reserve sortie. So if someone does not attain the learning objectives in the first two, then we go and repeat what is necessary. But most do.

I call it the synthetic sortie. It is very simple. I pick a small airfield and enter a user waypoint on the G3X 5 miles out and abeam at 7000 ft above the elevation of the airfield. Then the student pilot must accelerate to 135 kt IAS keeping the power at 15 inches using full automation and bring the aircraft down to final 2 nm out at 1000 ft and 90 knots. It is a high-energy visual approach. It is a jet approach.

You must see the upsets that we get into doing that. We are energy high, energy low. We select the wrong mode on the AP and the aircraft pitches up wildly. There are a million ways how can that go wrong. They come back and understand how upsets happen.

I always had a feeling that the Virus SW is designed for this task. Advanced UPRT, sure. But also much more. It cruises at 2 NM per minute, it climbs at 1000 fpm, it is best between 5000 and 7000 ft, is complex and full of automation. The aircraft is just made to train future commercial pilots.

Who? Me? Lie?

We'll consider other Advanced UPRT courses. High-end courses are flown in an Extra 300. Lower end courses either in a Cessna 150 Acrobat or a Slingsby T-67. If the student pilot is training on an Extra 300, he or she is missing the automation and information picture. You cannot synthesize a set up upset in an Extra. Also the high rates and low control forces and not representative of jet aircraft.

Training on a C150 is pretend training. Can you go nose high at least 30 degrees and see the rapid fall off of the airspeed? Can you start a rolling recovery from a nose high attitude and you are uncertain how much you rolled, since you see only blue sky? Do you feel good in spinning a 40 year old airframe?

What I learned in building the Advanced UPRT is the depth of the training capability the Virus SW 121 has. I learned about the context of UPRT and the managing of automation levels. Advanced UPRT pushed my concepts and the concepts of Pipistrel Academy Lab further.

This will have a big impact on the way we teach during the following months. I am happy and look forward to share this knowledge within the framework of Pipistrel Academy and the Pipistrel family. The distributors and the instructors are the key ingredient that will exploit the full potential of these great machines to the fullest. Pipistrel Academy Lab is here and flying, learning and developing daily to help you do that.

We have a dynamite aircraft on our hands and the kids, these great, honest, modern kids – they love it.

Sašo Knez