NEWS AND VIEWS

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Coming Events

1. Next COPA 26 Meeting is Tuesday March 14, 2023. Details to follow.
2. The Pilot Decision Making (PDM) Workshop is a monthly video-based meeting of pilots to discuss pilot decision making (air and ground). Pilots of all experience levels and ratings are welcome. Meetings are on Zoom, the first Wednesday of each month, at 7 pm. To join, send an email to cykf.pilotworkshop@gmail.com. Next meeting is April 5, 2023.

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Welcome!

Coming Speaker for March 2023!!

Pat Hanna will be our speaker for the March meeting, presenting a variety of his show-stopping aviation photos called "50 Years of Just Plane Fun".

Note: The upcoming meeting will be in-person at 950 Eagle Street N (Eagle Street Christian Fellowship) in Cambridge. The meeting will also be on Zoom (link to be provided). See you all there!

New Unleaded AVGAs is Slowly Coming!

General Aviation Modifications Inc. (GAMI) has officially begun selling supplemental type certificates (STCs) for its G100UL 100-octane unleaded avgas. As previously reported by AVweb, the FAA approved STCs for the use of G100UL in all general aviation piston airplanes in September 2022. GAMI says it is looking to have the fuel available in California by mid-2023 and nationally by 2026.

"GAMI is excited to announce the opening of its online G100UL STC store," the company said. "All gasoline powered airplanes and engines in the FAA's type certificate database are covered by the STCs for G100UL, which is the first and only FAA-certified, totally lead free, high octane avgas."

As with similar fuel STCs, price for the G100UL STC varies based on an aircraft's engine and horsepower. According to GAMI, it comes out to roughly $2 per horsepower, bringing average STC cost for aircraft such as the Cessna 210, Cirrus SR22 and Piper PA-32 to the $600 range. When it comes to the fuel itself, the company says pricing for G100UL will be "slightly higher than 100LL" until production volume reaches several million gallons annually.

Further G100UL STC information is available at G100UL.com.

Brainteaser

By Warren Cresswell

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF – WHERE ARE YOU GOING TO GO?

It's a nice VFR day and you are off on a flight to Goderich for lunch in your single-engine piston aircraft. The winds are from the West at 20 kts but right down the active runway 26. You line up, advance the power and rotate. The aircraft begins a normal climb, and you are quickly past the departure end of Runway 26 and soon climbing through 1750' MSL. At this point the engine quits completely for no apparent reason. You are shocked for a few seconds but then spring into action with some immediate engine out procedures for your aircraft type. You first push the nose down to avoid a stall and assume a pitch that yields best glide speed. As well, you quickly adjust your variable-pitch propeller to full course to lengthen the glide. There is not time for other immediate engine out procedures for you are only about 700 feet above ground. Instead, you need to INSTANTLY choose between two high-risk options – glide ahead (or maybe a bit to one side or another as warranted) for a forced landing **OR** turn back and try to make the field landing on the reciprocal runway - in this case Runway 08. This turnback option is sometimes referred to as "The Impossible Turn." This article focuses on this turnback option.

Look at the Google Earth image of the KW airport (from 5000 ft) on the next page, and study the departure paths for all the runways at CYKF. You will quickly see that good options for landing ahead are available for all runways except Runway 26. Because options for this runway are much more limited, you might be encouraged to attempt the turnback in an effort to make and land upon Runway 08. But is this your wisest choice? As you might guess, it depends on a number of factors.

Region of Waterloo Airport - View from 5000 Ft

Many individuals and organizations have studied this turnback option and a lot of information can be found on the internet and in other sources. In very recent years the EAA in the USA formed the "EAA Turnback Project" which included the use of 36 aircraft that actually flew the maneuver many times. In addition, simulator work was completed using 12 Redbird Simulators, involving100 pilots of all levels of experience. Each pilot flew 5 attempts or profiles to a 3,400-foot runway. On the fifth attempt the pilots were coached by a CFI. The EAA project came up with some interesting findings:

- "Startle factor" ranges from four to as much as 18 seconds – clearly the faster the better.

- For success the pilot needs to be able to execute a 45-degree bank, descending turns, at best glide speed, with good precision. Not surprisingly therefore, pilot proficiency and recent training is **critical** to success.

- The required turnback to re-establish an inbound course to the reciprocal runway is usually at least 270 degrees and could, depending on winds, angle of bank and pilot proficiency, be up to 360 degrees (with a final 90 degree turn to the final approach course). A 180 degree turn only puts the pilot on a course to a line parallel to but offset from the intended runway.

- If the climb-out gradient is less than the best glide speed angle, the runway will not be made. Climb angle must be high enough to keep the plane above the glide angle line.

- The amount of altitude lost in the maneuver is NOT the same for all aircraft types. Some aircraft types have much poorer performance of this maneuver than others.

- Obviously, the altitude above ground when the engine power is lost is a critical factor, but what is that altitude in your airplane? Below what altitude AGL would you not attempt a turnback? How can you calculate that?

- In addition, environmental factors must be considered such as: density altitude; strength and direction of winds, runway length, weather conditions (VFR or IFR) etc.

- In a survey of over 1500 pilots, 95% of pilots said they could make the return to land a success. On actual recorded and monitored test flights only about half of them did. The pilots were generally overly optimistic about their chances for a successful turnback to land. In the flight recordings of 36 airplanes 128 attempts were made and recorded. Only 48% made it back to a 4,000-foot runway. Understand that these pilots were primed for the event and maneuver and yet only about half of them were able to succeed.

- The EAA turnback project involved simulator training and the finding was that training for the turnback procedure had a positive impact on the outcome. Pilots can learn the procedure and should practice it (safely).

The key conclusion is NOT that the “Impossible turn” is indeed impossible. But the maneuver is difficult and does carry some high risks without the right aircraft type and pilot training and practice, including recent practice.

The U.S. NTSB has also studied the “impossible turn” quite carefully. Most recently they looked at real reported* occurrences of loss of power on takeoff from 2013 to 2022 – approximately 425 occurrences. They found that when faced with this situation 30% or about 128 pilots tried to turn back. 30% of these, or about 39 aircraft crashed causing fatalities. This compared with the 70% or just under 300 aircraft that did not turn back. Of those that did not turn back, there were only 9% (27 aircraft) that resulted in fatalities. The incidence of fatalities for those aircraft that did turn back was three times higher. Of those who turned back, 75% were below 600’ AGL. Of these, 56% stalled resulting in 70% fatalities. Of those aircraft that turned back only two made it back to the runway after total loss of power.

(* of course NTSB does not examine cases where a turnaround maneuver results in a successful outcome).

Taken together, quite clearly, when faced with an engine power loss, the turnback maneuver is not impossible but it does carry some high degree of risk and the chances for success are quite low, especially if the pilot is flying the wrong type of aircraft and hasn’t properly trained for the eventuality.

The results of a turnback are highly dependent upon aircraft type, pilot proficiency and the conditions at the time of takeoff. If all three are not properly considered, then success is very unlikely. Furthermore, you are not likely to survive a turnback without planning ahead. Let’s now examine some of these factors.

Aircraft Type:

Aircraft make and model is perhaps one of the most important factors in determining the likelihood of success for the turnback maneuver. Different aircraft types will perform the maneuver better than others from a set altitude above ground. The EAA study found that Experimental Aircraft did better than Certified G.A. aircraft. C-172’s did better than Mooneys and almost all types did better than Bonanzas.

In April 2021 AOPA ran a test which reinforced that different aircraft types have varying capabilities when it came to the turnaround. They took out the variables of pilot proficiency and environmental conditions to focus only on the difference due to the aircraft type.

The pilots, all high-time experienced pilots, verified their stall speeds and minimum turnback altitudes and practiced the turnback maneuver before the test began giving them a large advantage over the average pilot who rarely practices this maneuver.

The test pool consisted of a Piper SuperCub, a Vans RV-4, a Cessna 172N and a Beech Bonanza A36. The allowed startle time was only three seconds – probably less than would be the case for an average pilot facing this situation. Each pilot/aircraft took three tries from power loss at the turnback altitude above ground they had calculated as the minimum for their specific aircraft make and model. For the Piper Cub this was only 500 feet, the others used 1,000 feet. The goal was to execute the turnaround to a 4,000-foot runway.

The results were:

- The Cub made all three attempts; in fact, the third attempt was from only 300 feet and the Cub still made it.
- The RV-4 made it two of three times but fell short of the runway on the third attempt.
- The Cessna 172N comfortably made the runway for all three tries.
- The Beech Bonanza A36 wasn't even close to making it on any of its attempts. AOPA's conclusion was that the turnaround was not a good plan for aircraft types with a high climb speed and glide speed because the higher climb speed took the aircraft farther from the airport and had a bigger turning radius (at the same 45-degree descending bank). Both had the effect of extending the distance required to glide. Examples of these kind of aircraft are the Bonanza, C210, Cirrus etc.

AOPA further concluded that the turnaround is only viable for certain aircraft types, in the right conditions flown by proficient pilots who have trained for the maneuver. When it comes to the turnaround, aircraft type trumps the pilot proficiency and environmental factors. That is why it is so important to learn what your particular aircraft's performance would be in such an engine power loss situation.

The important thing to learn is how much altitude your specific aircraft will lose in this situation. This can be tested safely at altitude. From that safe altitude, pitch up and establish a climb angle at a speed that matches what you would do in a normal takeoff. Now pull the power to idle and note the MSL altitude. Next allow a startle factor of at least 4-5 seconds before doing anything. Then, push the control forward and establish your best glide speed while entering a 45-degree descending turn and continue in the turn for 360-degrees. Finally, level the aircraft, adjust trim and note the new altitude MSL. If you have flown the descending 45-degree bank descending turn at best glide with precision, the difference between this final altitude and the altitude above where you pulled the power is the amount that your aircraft is likely to lose in a real engine failure after takeoff. There is a bit of a buffer built in because the real-world turnback would likely be more like 270 degrees to line up for the final approach course instead of a full 360-degrees.

Experts in this maneuver, such as Brian Schiff, an American Airlines captain and son of Barry Schiff, strongly suggest that you should add at least +50% to the altitude you derived from your 360- degree experiment, to add a reasonable safety margin.

What do you do with this buffer adjusted figure? Add it to the field elevation of your airport of departure and commit to yourself that you will NOT execute a turnback in a real engine failure after takeoff if it occurs at an MSL altitude below this value. Instead, choose another option, such as landing straight ahead or to a side.

Example:

Experimental altitude loss from (360-deg.) test = 700 ft. Add +50% buffer = 1050 ft. Field elevation for departure airport: 1054ft. Commit to not attempt a turnback below (1050 ft +1054ft) 2,104 ft MSL .

Brian and his father Barry also believe that another key determinant is that on takeoff the aircraft must pass over the departure end of the runway at a height above ground of at least two-thirds of the altitude loss figure derived from the 360-degree experiment (before the +50% cushion), in order to ensure that the climb gradient of the takeoff will exceed the glide gradient once engine power is lost. It is a **certainty** that if the climb gradient does not exceed the glide gradient then the return to land maneuver will fall short of the reciprocal runway. In our example this would be 2/3 of 700ft = 470 feet. If below the 470 feet AGL the turnaround maneuver should not be attempted.

Some Environmental Considerations:

These are some of the environmental conditions that the pilot must consider for the eventuality of an engine power loss after takeoff:

Terrain Ahead: What is the terrain off the departure end of the runway like? Is it amenable to a landing straight ahead (or slightly off to the side) option or is it hostile?

Some pilots like to climb out at Vx to gain as much altitude as quickly as possible to help provide better options in the event of an engine failure after takeoff. Others prefer a somewhat lower climb gradient to provide better over-the-nose visibility and comfort for those aboard. Whatever is your norm, it is worth considering the nature of the terrain beyond the departure end of the runway and adjust your normal climb gradient accordingly. If the terrain ahead is hostile and a turnback may be the best choice, selecting and executing a climb gradient at or close to Vx would be preferred (except when takeoff headwind is strong, in which case the turnback success is strongly diminished).

So, it would seem that climbing out at a speed closer to Vx and its associated best angle of climb would raise the odds for a successful turnaround, if needed. But this might not be a good idea for all aircraft types. Pilots of aircraft with high climb speeds must also consider the offsetting risk of a stall on climb-out and the remarkably quick pilot response time needed to counter a stall in a nose high attitude. For aircraft like this, a shallower climb speed/angle, somewhere between Vy and Vx may be more appropriate with the accompanying implication that this reduces the chances for a successful turnaround outcome.

Winds:

The turnback maneuver has a better chance of succeeding if the headwind on departure is light and crosswinds are minimal. If instead, the headwinds are strong you have less of a chance to land on the reciprocal runway and a heavy tailwind component could put you off the end or even past the runway altogether. Heavy crosswinds on departure will make the maneuver more difficult for the pilot. In any event, the initial turn, if it is to be made at all, should be made into wind.

Runway Length:

The turnback maneuver has a better chance of succeeding if the reciprocal runway is long. If you departed from a short runway there is less of a chance of success.

Other Airport Layout:

The pilot should consider also the possibility of landing on other runways, taxiways or even on the grassy area of the airport.

Weight:

A lighter load on the aircraft will be more beneficial. The climb rate and distance associated with the amount of time to climb to the minimum safe turnback altitude is less. Also, a lighter load lowers the stall speed and permits more of a margin above that critical speed. Finally, glide distance is increased.

Density Altitude & Humidity:

Hot or high-altitude elevations resulting in high density altitude degrade aircraft performance in the climb, taking longer to achieve the safe turnback altitude and carrying the aircraft further away from the runway. So, a high-density altitude is a negative environmental factor associated with the turnback. High humidity, such as we often experience here in Ontario, can have the same kind of effect to lower aircraft performance.

THE TIME NOT TO BE THINKING ABOUT THESE FOR THE FIRST TIME IS AT THE MOMENT ENGINE-POWER IS LOST!

Instead, a two-step process of evaluating these factors is suggested.

Step 1:

Incorporate them into your overall pre-flight planning for the flight which you do on the ground before even getting into the aircraft. You plan for your route, altitude, required fuel, weather, weight and balance and many other things. Why not include in this overall planning what you will do if you have an engine failure immediately after takeoff from the airport you will be departing from?

Importantly, analyze the topography off the departure end of the runway and work out what your best option might be in the event of a power loss on takeoff. Select off-field areas for various altitudes for both go-forward and turnback paths. In addition to conventional aviation maps, there are many other tools you could consult such as:

- Google Earth overhead view
- CFS (or U.S. Chart Supplement) data
- IFR plates for the plan
- Planned and reciprocal runways, published departure procedures
- Airport diagram etc.

As part of this analysis, consider all the environmental factors listed above. Also consider your aircraft's expected performance and your own proficiency and recency with the types of maneuvers needed to execute a successful turnback. Make this part of your normal regimen, not just for departures from your home airport which you know well, but especially for airports that you must operate from with which you are unfamiliar.

Step 2:

Do a pre-launch self-briefing which you complete before taking the runway for departure. It's important to say it out loud even if you are alone in the cockpit. Vocalizing such briefings causes the pilot to not only think the briefing but also hear it, which reinforces the message and commitment to act accordingly. This should cover key things such as:

- Runway length;
- Wind speed and direction and implications;
- Climb speed and angle/gradient;
- Minimum turnback altitude AGL;
- Best place to go if below that altitude;
- Best place to go if above that altitude;
- Key immediate action steps in event of engine failure (eg. propeller full course, 45-degree descending turn if turnback, best glide speed

Be realistic about what your current proficiency level is - avoid over-optimism as was found in the EAA study.

By stating your plan out loud, you have a better chance of minimizing the time lost to "startle factor" and successfully executing the necessary maneuvers.

Pilot Proficiency, Training and Recent Training

The EAA study cited above clearly indicated that pilot proficiency with the maneuvers associated with the turnback procedure was one of the most important factors affecting success or failure. The EAA data showed that the turnback maneuver was a difficult and dangerous one unless the pilot was flying the right type of aircraft, was himself/herself highly proficient and the environmental factors

were favourable to a turnback. The NTSB data also indicated that a high number of pilots failed to achieve the necessary proficiency, and this resulted in a very small number of aircraft making it safely back to the departure runway and also resulted in a much higher rate of fatalities than for single-engine aircraft that attempted to land straight ahead after a power loss after takeoff.

The good news is that, perhaps unsurprisingly, the EAA study clearly also showed that execution of the turnback maneuver is a trainable skill.

Pilots are encouraged to regularly practice 45-degree turns, including descending turns at best glide speed and just above stall speed, and approaches to off-airport forced landings where the field is determined to be "made on target" before going around. Most instructors would say the 45-degree bank turns and forced landings are two significant weaknesses for many pilots. In order to be successful at a turnback option, practice of these maneuvers is important. Recency of this practice enhances the chance of a success. Add that to a good knowledge of what altitude loss your aircraft can achieve in a turnback, together with good pre-flight planning and pre-launch briefing, and you have set up the best conditions for a successful outcome. Practice makes a proficient pilot. Recent practice only makes that pilot sharper.

Summing Up:

Is the turnback maneuver in the event of an engine failure after takeoff an "impossible turn?" The answer is: not necessarily. But experts agree that the turnback is a risky maneuver and the chances for success are quite low, especially if the pilot is not proficient in the skills needed, and hasn't properly trained, prepared and briefed for the turnback.

Academic Flight (academicflight.com) publishes guidance in a piece titled: "Turnback Maneuver." Here is what they say about the turnback after a full engine failure after takeoff:

"The turnback is a viable last resort option to be used only when **ALL THE FOLLOWING CONDITIONS** are met:

1. There are no suitable emergency landing sites straight ahead or in a reasonably narrow angle of your takeoff path.

2. The pilot has sufficient altitude for the maneuver (this is an individual altitude based on the aircraft make and model, weight, environmental conditions, as well as the pilot's capabilities and proficiency). With insufficient altitude the (turnback) maneuver will fail regardless of how well you fly.

3. The Pilot has been thoroughly trained in the maneuver in the specific make and model of aircraft (do not attempt the maneuver in a real emergency if you have never flown the aircraft before).

4. The pilot is proficient at the maneuver having practiced it reasonably recently (exact recency needs depend on the pilot).

5. The pilot has briefed the maneuver explicitly before takeoff, including the minimum turnaround altitude MSL and turnaround direction based on wind direction."

Clearly, the adage, "Practice makes Perfect" applies.

It is also important for pilots to acknowledge that the **TOP PRIORITY** when faced with engine failure after takeoff is acting to ensure the survivability of the humans on board, not saving the aircraft.

When engine power is lost and can't be restored, go for the safest place that ensures the safety of pilot, passengers and people on the ground.

Then follow Bob Hoover's famous advice: "Fly the airplane as far into the accident as possible." The insurance company will take care of the damage to the aircraft and property on the ground.

Power loss on takeoff is a rare occurrence and most are not due to mechanical issues… but to fuel starvation! So, be diligent about those pre-flight walkarounds, and runup checks too!

Banner Towing Service at KW!

Shan Gnana at FliteLine (KW Airport) provides banner towing and can supply a good addition for advertising for a company or social/personal event. He can also provide special messages (you missed a birthday or anniversary, or need spousal OK to buy a plane….). Shan's contact information is:

Shan Gnana
519-514-0530 (Ext 510)
charters@fliteline.ca

From: Pilot Workshops (Wally Moran) - Problems with Crosswind Landings

"**A common problem I see is poor airspeed control, usually too fast.** Sure it's good to have a little extra airspeed on turbulent days, but too much is as bad as too little. Extra airspeed means you will be hovering over the runway longer waiting for that airspeed to bleed off and that means a longer fight with the wind close to the ground. Often pilots will try to force the airplane on the ground in this situation and that never works. Use the speed your POH recommends.

Another problem is to stop flying after the airplane touches down. Remember to hold that aileron into the wind after touchdown and increase it as the airplane slows down. If you neutralize the ailerons after touchdown, the upwind wing will come up and the airplane will start to weather vane providing a whole new adventure for you and your passengers.

So watch the speed and fly the airplane all the way to the tie down.

MEMBERS' CORNER

Crosswind Landings - Geoff Gartshore

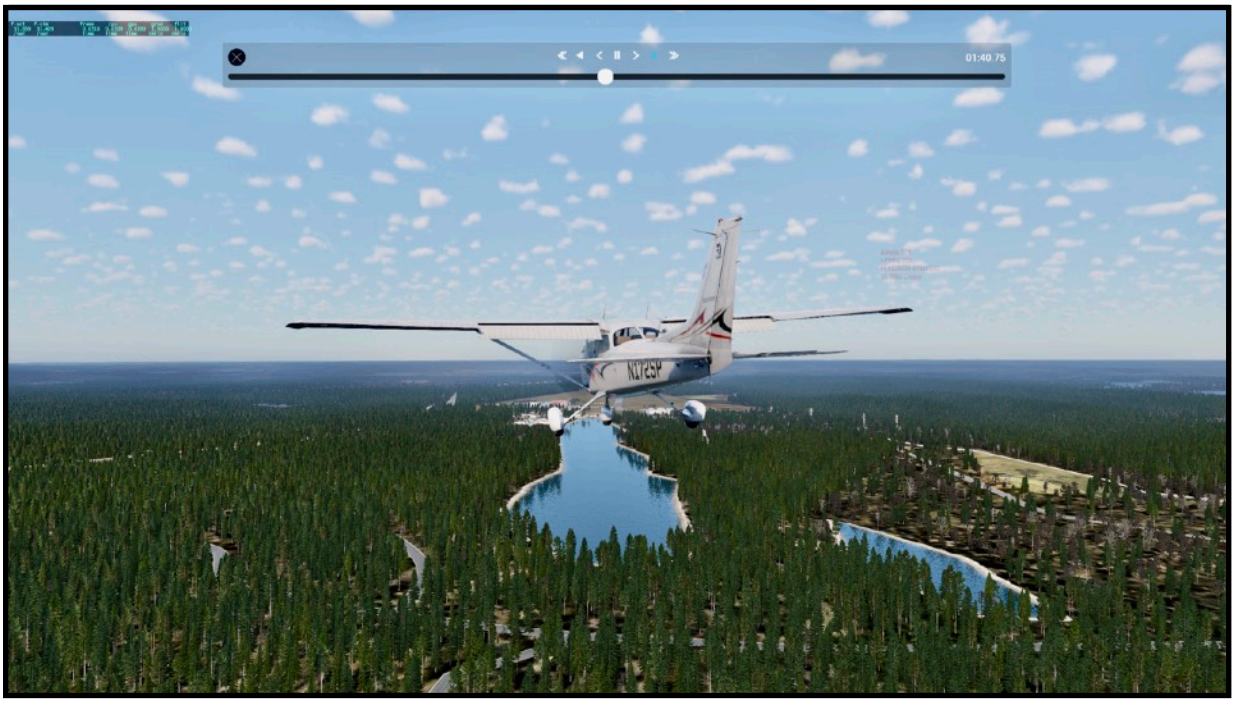
XPlane 12 is my go to computer flight training medium for those days when real-world flying is not available.

Coincidentally, I recently practiced some crosswind landings at Parry Sound (CNK4), using Runway 35, with a very brisk westerly crosswind (from 280 degrees) at about 12 kts, gusting 15 kts. This can be a challenging airport to land at with westerly winds, given there is only a single north-south runway. I have gone around more than once at this airport due to an unstabilized gusty crosswind approach.

I practiced in the Cessna 172, an aircraft I did all my private pilot training in and subsequently flew for at least 5 years after (at least a few hundred hours…).

The approach and landing sequence is shown in the following screenshots during my practice.

I will let you be the judge of the results……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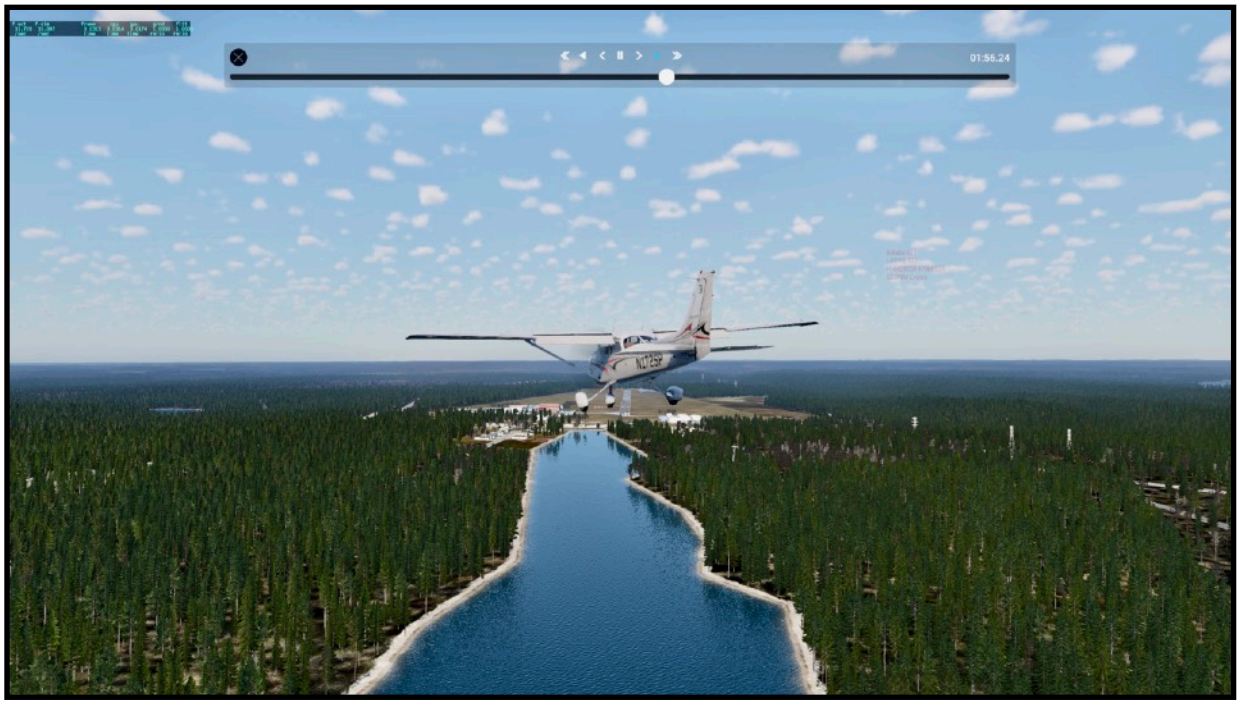
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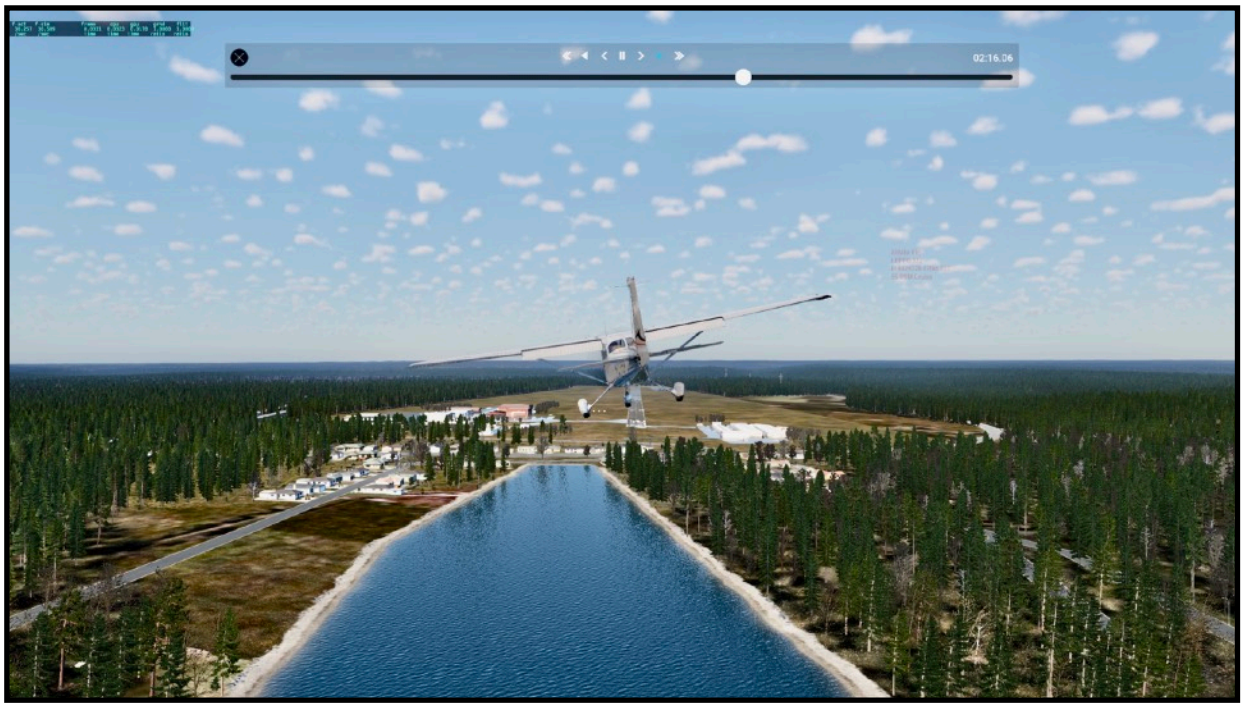
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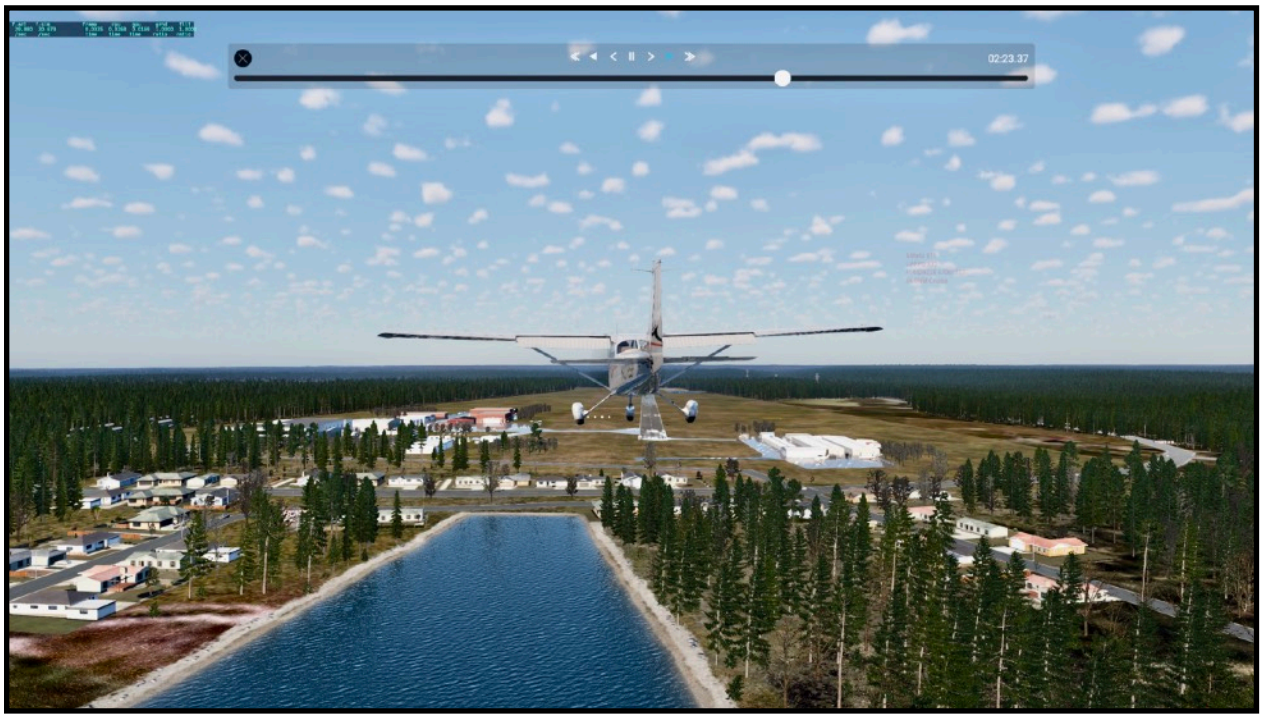
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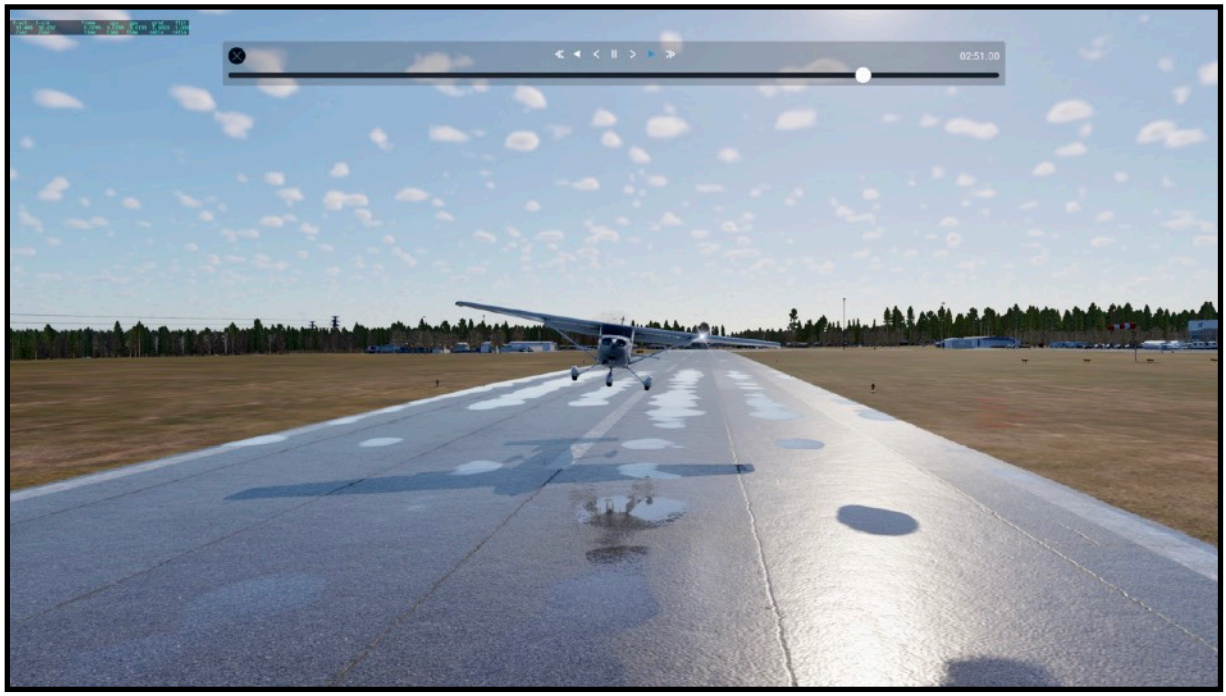

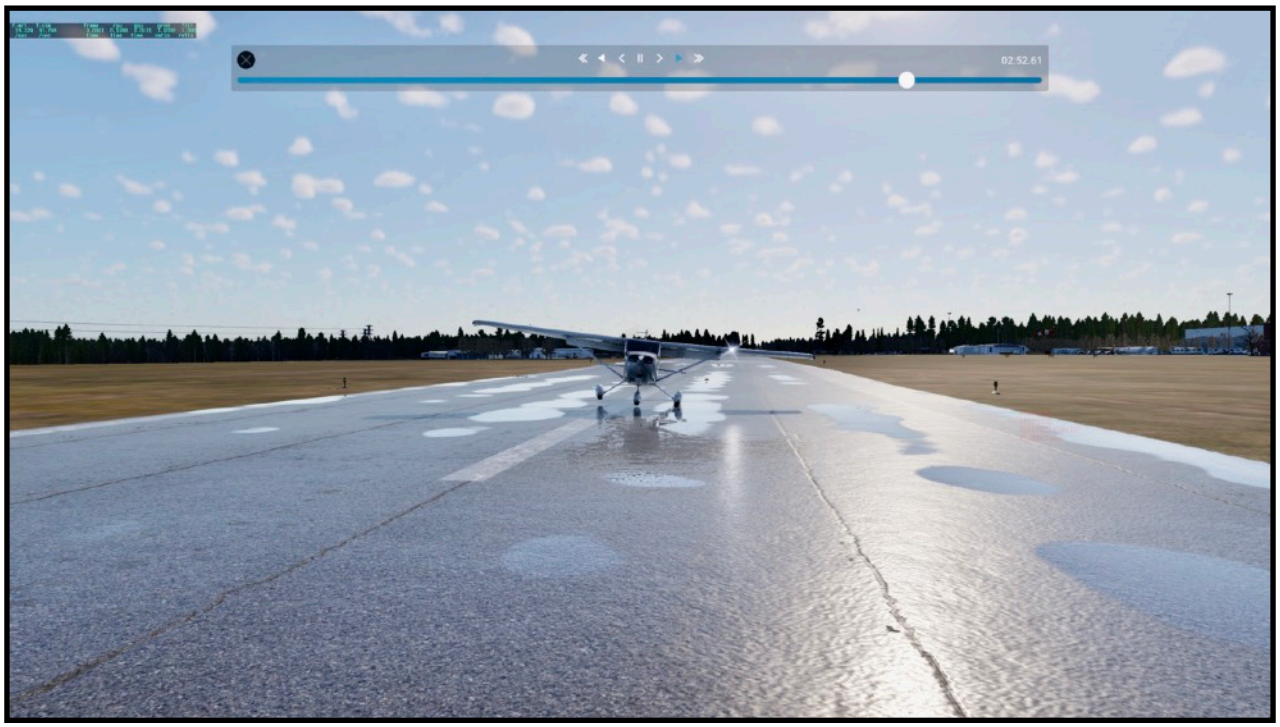
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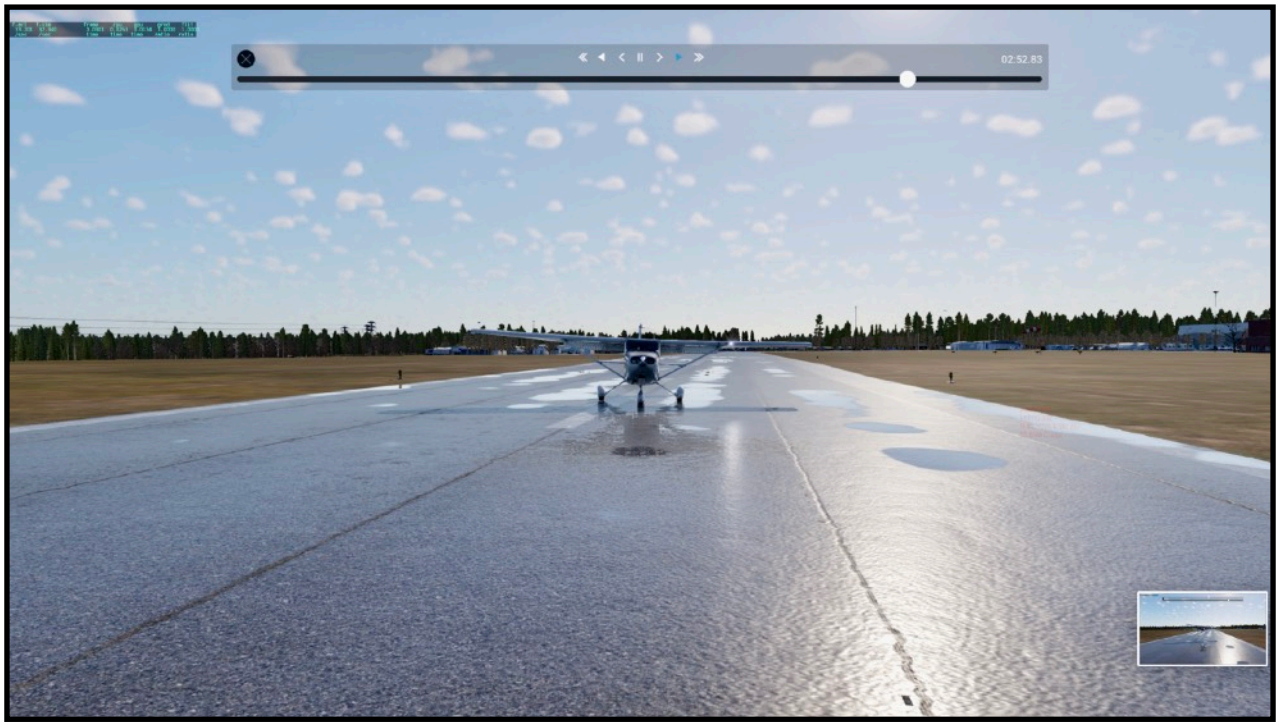
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(See you next Issue! - Spoiler - Hella Comat’s first flight into Oshkosh!)