The Mooney Flyer

The Official Online Magazine for the Mooney Community

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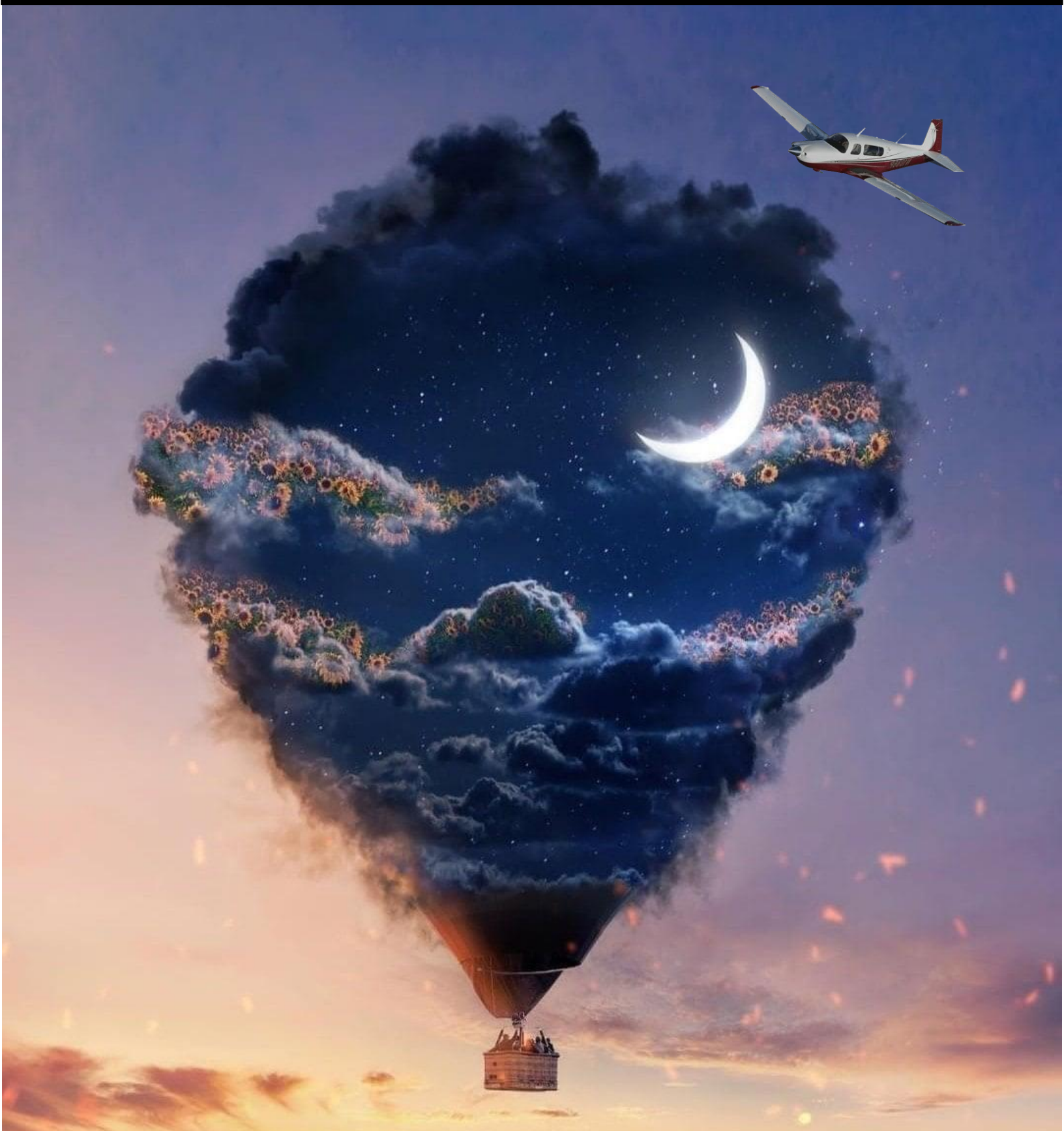

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Departments

Features

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The Mooney Flyer's goal is to educate, inform, and entertain Mooniacs.

From the Editor

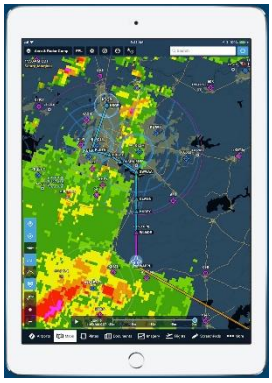
Phil Corman

Decisions That Can be Difficult

Mooneys are both easy and demanding. If you fly them the way they demand to be flown, it's easy. But occasionally, you may face situations that pressure you make the wrong decision. Sometimes a wrong decision can change your life or end it. Here are a few examples:

- **High Density Altitude Departures** – When faced with a high Density Altitude (DA) takeoff, do you check the performance section of the Pilot Operating Handbook (POH) for Takeoff Distance required? Yes, this requires some laborious work wherein you must pick up your POH or Electronic Flight Bag (EFB) and run the data. How many times have you done this on a high DA departure? Remember, you will seldom get "book value" performance, so you should demand more takeoff and climb performance than the graphs suggest. The turbo folks shouldn't be too smug because although they will get full engine performance, their propeller and wings will not produce as much lift.

- **Weight & Balance** – Mooneys are high-performance airplanes with laminar wings. That means that it is even more important to be concerned about your Weight and Balance. Do you compute your Weight and Balance if you are approaching the maximum allowed gross weight? Do you move cargo if you may be exceeding the cargo bay limits? This requires another POH or EFB computation, right? Please be professional when it comes to safety.



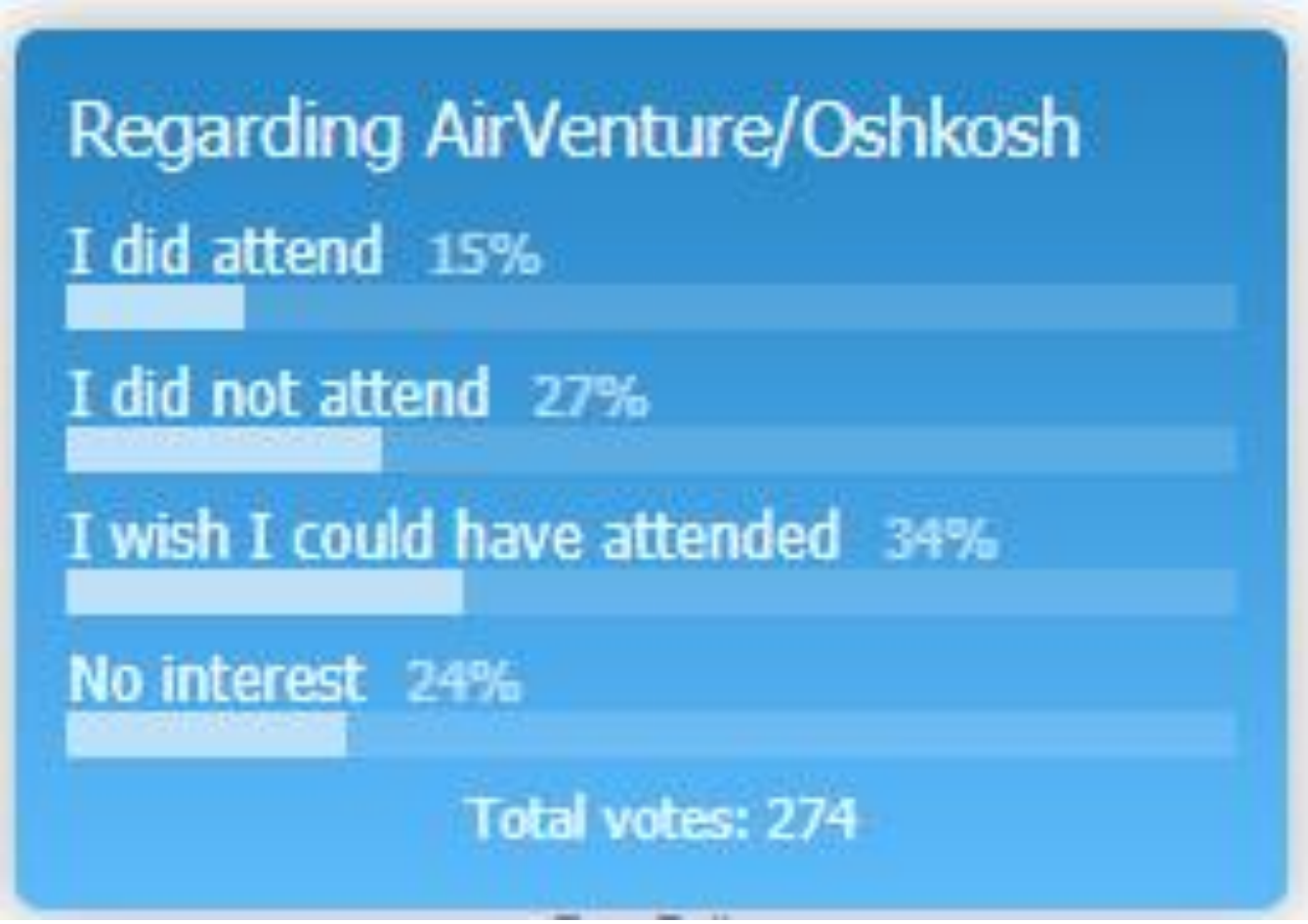
- **Marginal Weather** –Do you depart or wait? Marginal weather can take many forms such as low clouds, obscured mountains, fog, higher winds in the mountains, questionable forecasts enroute, etc. NEVER, NEVER, NEVER feel pressured by your passengers. The decision is the sole responsibility of the PIC. Live to fly another day. Another marginal weather decision can occur enroute when your destination weather turns sour. Consider an alternate, check fuel and land. Turn around if it is unclear.

- **Not Feeling Well** – This is a tough one. Your brain power can be impaired when you are not feeling well. Perhaps it's an allergy, cold or flu; call it off. If a medication is causing side effects, don't fly. Feeling sluggish? Fly another time. Always make the safe decision.

- **In a Rush** – You arrive at the airport late and you want to be airborne soon because of a schedule commitment, weather rolling in, or some other issue. Slow down and ensure that you receive a weather briefing and perform a thorough pre-flight. Skip nothing. It's better to get there late, or the next day than to rush, miss something and not make it at all.

- **Flying a Possibly Unairworthy Airplane** – Maybe something is amiss, but you say to yourself, "I'll get it fixed when I get home". However, if it's an airworthy issue, this is not a wise decision. Airworthy issues are not only regulatory issues, but they are also SAFETY ISSUES.

- **Rule of 2** – This decision is incredibly important. Most incidents or accidents are not the result of a single issue. Often it takes two or more issues for these to occur. We have developed a simple rule: If one thing goes south, but may not be essential for safety, we may continue the flight. But the minute a second issue comes up, often unrelated, but still negative to the safety of flight, we land. This is another tough decision, but one that may save you and your Mooney.



Next month's poll: "I Change My Oil Every" **CLICK HERE** to vote.

Letters to the EDITOR

TheMooneyFlyer@gmail.com

Reading "Forced to Land in Waco" in the September issue of The Mooney Flyer sent a shiver up my spine … and the thought, "there but for the grace of god …"

A few years back, our M20J Lycoming's IO360-A3B6 went to the shop for a major overhaul due to cam shaft corrosion at less than 1200 hours since factory overhaul. A problem that most likely predated our ownership of the plane. Of course, we were not very happy to incur this unplanned expense, however it most likely saved us from our own "Waco Moment".

Shortly after delivery of the engine to the overhaul shop, they called to report that the high-pressure governor oil line was worn and close to failing. It had apparently been rubbing against something else under the cowling. Upon inspection of the airframe back at our home field we discovered a matching hidden wear spot on the engine mount that was not easy to see with the engine installed. The mount was sent in for repair and, once completed, it was shipped to the engine shop for a trial mating with the newly overhauled engine. Guess what? The new oil line supplied by Lycoming had the same clearance problem!

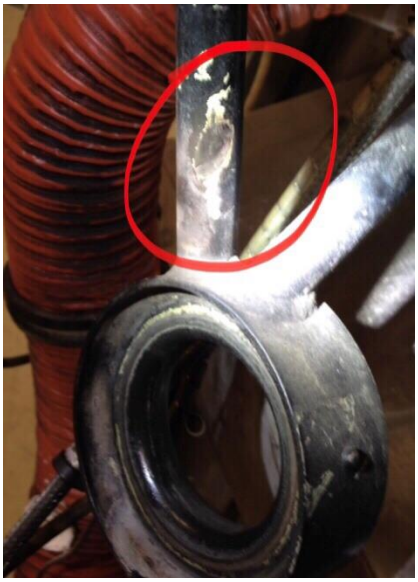
The standard IO360-A3B6 line does not fit on the M20J. After additional research, the unique foot-noted "Mooney" part was identified, installed and clearance was confirmed when mated to the mount.

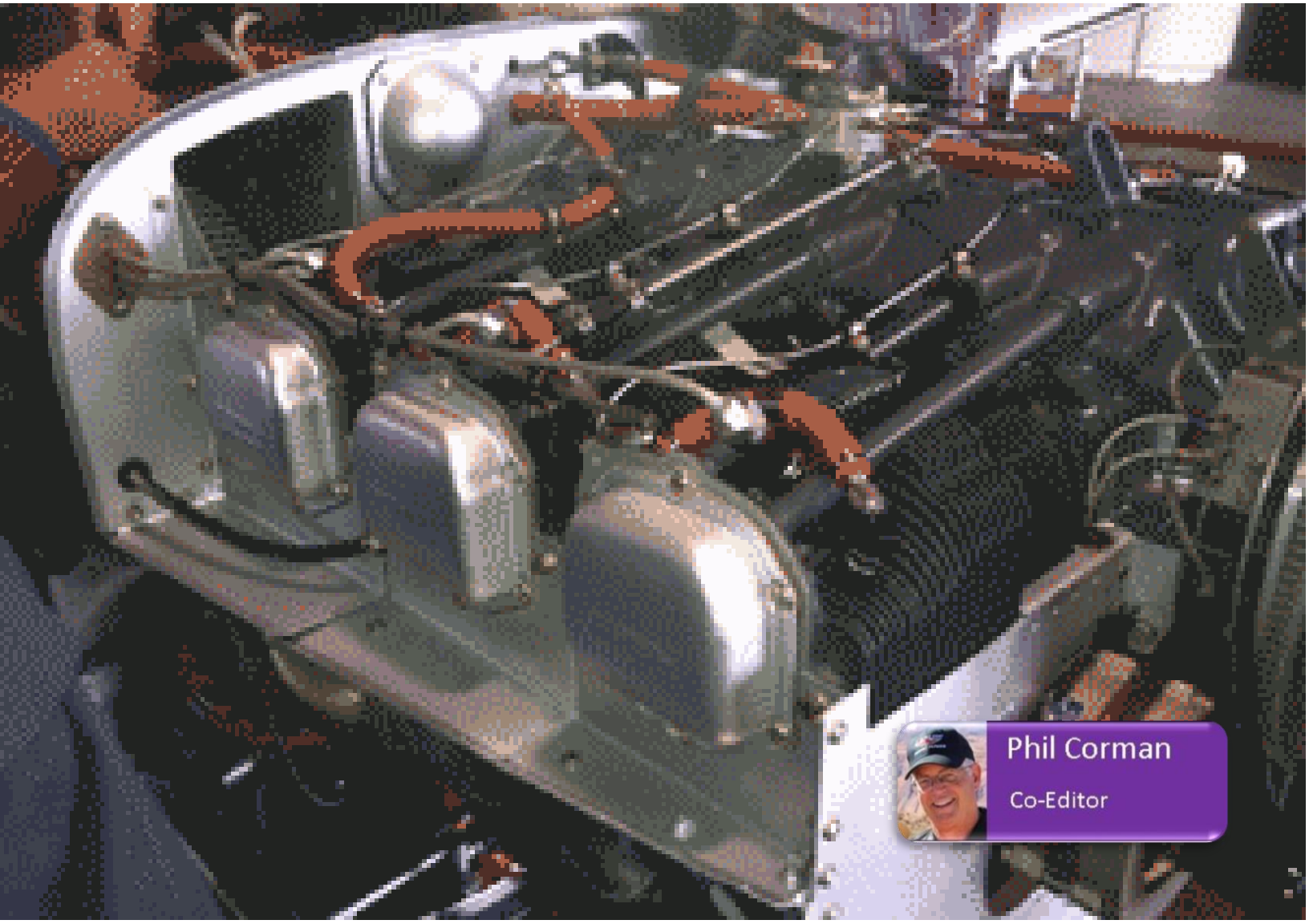
I've attached photos below of both the worn oil line and the corresponding wear spot on the engine mount, but the photos don't fully show the amount of wear. When I later cut the oil line at the point of wear, I found it was almost worn through and would likely have failed within the year.

Lastly, I'll just mention that even thought this engine was a factory rebuild ordered by and delivered to a Mooney Service Center for installation on the M20J, at no time was this incorrect part identified and replaced until our earlier than expected engine overhaul.

Note: We never considered a flexible high-pressure replacement as suggested in the "Forced to Land …" article as I don't see where it is an authorized replacement on our aircraft. Is there an STC or other authorization for such a replacement?

Regards, Bob





Love Your Engine for Pennies on the Dollar

So many things cost many AMUs (**A**irplane **M**onetary **U**nits = $1000). In this article, I want to spend time on several things you can do for your engine that are easy to perform and cost almost nothing. The best part is that in the future, these things might save you many AMUs.

To do some of these techniques, you will need the following:

- EGT/CHT for each cylinder
- Fuel Flow Indicator
- Oil Pressure and Temperature gauge

First: Make Regular Oil and Filter Changes

There are a lot of opinions on when and how often to change your oil. Here's a simple rule of thumb: "Do it more often than you think". Most of us have 8-quart sumps. For smaller bore engines like a 180/200hp, you can probably get a little more mileage on your oil changes than a big bore TCM 550. Both have 8-quart sumps, but the larger 550 has a lot more to lubricate and clean and therefore you might need to have the oil changed more often. Just sayin'. For a large bore

engine, 25 hours may not be “too often”. If you are reticent to change oil at 25 hours, maybe push it to 30 hours. For smaller bore engines, you might go longer, say 30-35 hours.

As they used to say in Star Trek, here’s another Prime Directive. Always change your filter when you change your oil. If the oil is dirty and acidic, so is your filter. It costs virtually nothing for a filter and is one of the easiest and best things you can do.

Second: Don’t Start a Really Cold Engine without Preheating it first

Is it close to freezing? Preheat your engine. You can invest in an engine heater that warms the sump and the cylinders or you can put your Mooney in a warm hangar before starting. You can also preheat with a space heater or lightbulb with a horse blanket over the cowling. Without preheating, the first 20-30 seconds after ignition, the metal upon metal movements are “sandpapering” the inside of your engine. Avoid doing that whenever you are able.

It also goes without saying, regardless of the ambient temperature, do not let your engine rev at a high RPM after starting. Retard your throttle as quickly as you can after ignition. Give your oil pump a chance to get that oil to the top of your engine.

Third: Starting (Hot and Cold)

Cold starts are generally straightforward, unless you have bad mag timing, questionable mags, poor sparkplugs, or clogged injectors/dirty carb.

Hot starts are always tricky and generally vary by engine. A hot start on my IO550 is simple. When I pull the mixture to idle cutoff, I can run the fuel pump forever as the mixture simply recirculates back to the tanks. This way I can cool the vapors from my fuel pump. Then I use my normal cold start technique.

But regardless of your hot or cold start procedure, REMEMEBER THIS! Your starter pulls a lot of current and gets hot very quickly. Do not keep your starter engaged very long. My limit is 10-12 seconds. After a few attempts with no success, give your starter a cooling off period.

Fourth: Taxiing

You're probably asking yourself, "How can I help my engine during taxi?"
It's an easy procedure and it's great for your sparkplugs and valves.
At taxi power, lean your engine until it starts to run rough, then enrichen it until it's smooth. This will keep deposits from building up in your cylinder because of a rich mixture.

You'll need to remember to enrichen the mixture for your runup, but if you don't, no harm. However, your engine may stall as you add power.

Fifth: Runup

I hate those really long runups; runups at higher RPMs with zero airspeed and minimal airflow. For the runup, you don't need to set your RPM to the exact number mentioned in your POH. Just get close. When you check your prop, as soon as you see about a 100 RPM drop, push the lever back and your done. There is no need to check it three times unless it's very cold and your prop had a sluggish drop.

During the mag check, switch to the left and wait about ten seconds, then back to both, then right for ten seconds, then back to both. If you have acceptable drops, you are done. No need to take a long time. It's not good for your engine and it gives you no more info than a ten second check.

If you have no drop in one or both mags, then you have a short and you should address that.

Since we are discussing Mag Checks, if you want to do a "real" mag check, then get the engine up to some significant power setting, (which is hard on the engine, airplane, and prop). Run it up to 2000 RPM, lean the mixture until the RPM rises a bit, then falls on the lean side, and check each mag for 10 seconds or more, while watching the EGT bars on your engine monitor. All EGTs should rise on one mag, and fall back to the starting point on BOTH, and the engine should run smoothly, assuming you have very good fuel distribution.

Before Takeoff – Ensure that you have set the mixture appropriately for your density altitude. If you don't, your engine will be too rich, and you will not be getting optimal power. You'll also foul the inside of your engine.

Sixth: The Climb

Our Mooney engines **were meant** to run at WOT (Wide Open Throttle). One MSC told us that you should only retard the throttle when descending to land. But on the climb, it's great for your engine to leave it WOT.
But here's the thing: You want your fuel flow to be maximum on the climb. If it is not maximum, you should get it set properly so you do not damage your engine.

On normally aspirated engines, from the fully open position, the first observable reduction in Manifold Pressure will also lean the mixture. That's something you don't want to do. It is counter-productive because it can increase the peak internal cylinder pressure, and it moves the peak pressure too close to top dead center. If you do that, you will usually see the CHTs rise.

Seventh: Unleaded AvGas

If you can run UL94, (most smaller bore engines can), consider the switch. Lycoming increases the TBO with UL94. Tests show that your engine is significantly healthier with unleaded avgas. Go do the research. Do NOT take our word for it.

Eighth: Borescope your Engine and Review Engine Monitor Data

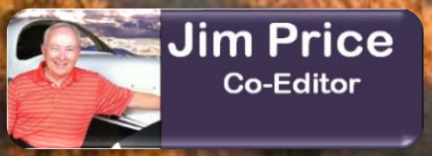
Borescope your cylinders at least annually or more if you fly a lot. Dump the Engine Monitor Data and analyze it. Do this often. It's easy and it can alert you to issues before they become inflight issues. I recently discovered a burned exhaust valve at annual, but had I dumped the engine monitor data a month previously, I would have seen the EGT sine wave, indicating a problem. There is no cost, no wrenches and you can learn a lot about your engine before it acts up.

Summary

These are all tips that cost almost nothing and are good for your engine. The number one thing you can do for your engine is to fly regularly. To make this good for your engine, ensure that you fly at least one hour at cruise. This will burn out any moisture and get everything well lubricated.

"Roger" - a term used by pilots when they can't figure out what else to say.

An Accident that NEVER should have happened



KOB 4

On June 7, 2018, a Mooney M20C was repossessed from the previous owner. It continued to gather dust on the ramp at the Phoenix Goodyear Airport (GYR), in Goodyear, Arizona. On September 27, 2018, almost four months after the repossession, the Mooney was purchased by the mishap pilot.

Personnel at Lux Air, the fixed base operator (FBO) at GYR, reported that in the preceding weeks before the accident, the new owner/pilot had been working on the Mooney, filling it with fuel and installing a new battery. According to Lux Air personnel, he asked to borrow a bucket and an air compressor. From his requests, they assumed that he most likely changed the oil and checked the tire pressures. No FBO personnel or A & Ps helped the new owner with the maintenance.

The Timeline

Sunday evening, November 25, 2018, the night before the accident

The new owner/pilot sent a text message to a friend stating that he planned to be "in the air" tomorrow [November 26th] by 1030 (10:30 am) and at the Colorado Plains Airport, Akron, Colorado (AKO) about 1400 (2:00 pm).

Monday, November 26th, time unknown

The pilot started the engine. After start, while taxiing on the ramp, another pilot noticed that one of the cowling access panels was open. This pilot was able to get the Mooney pilot's attention. The owner/pilot shut down and determined that the panel would not latch normally. So, he returned to the FBO, acquired some blue tape and taped the access panels closed.

Nov 26th, 1500 (3:00 pm) – T.O.

The pilot took off from the Phoenix Goodyear Airport (GYR), Goodyear, Arizona. He was destined for the Colorado Plains Airport (AKO), Akron, Colorado, which is 600 nautical miles northeast of GYR. The pilot did not file a flight plan.

The tower controller asked the pilot if he wanted to **stow the speed brakes before attempting to take off**. He thanked the controller and stowed the speed brakes. Several times after takeoff, the controller tried to tell the pilot that the **landing gear was still down** and that **the transponder was not being received**. Finally, the pilot responded, "I can't hear you, **it's really loud in here**".

1652 (4:52 pm)

Sunset occurred almost two hours later, at 1652. Night visual meteorological conditions prevailed.

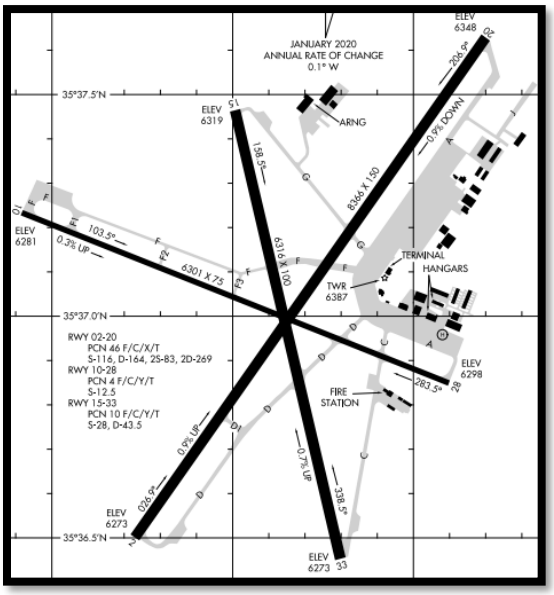
1836 (6:36 pm) – 3 hrs. 36 min. after T.O.

Three and a half hours after takeoff, the pilot **texted a friend indicating that he was over Colorado Springs.** If this was truly his location, the pilot would have been about 107 nm southwest of AKO. **Was he lost?** We will never know.

1914 (7:14 pm) – 4 hrs. 14 min. after T.O.

He texted his friend and asked for the Akron VOR frequency (AKO). She texted him the frequency. Did he fly without the appropriate paper charts or an Electron Flight Bag (a tablet / iPad with a GPS powered pilot app)?

Around 2000 (8:00 pm) – 5 hours after T.O.



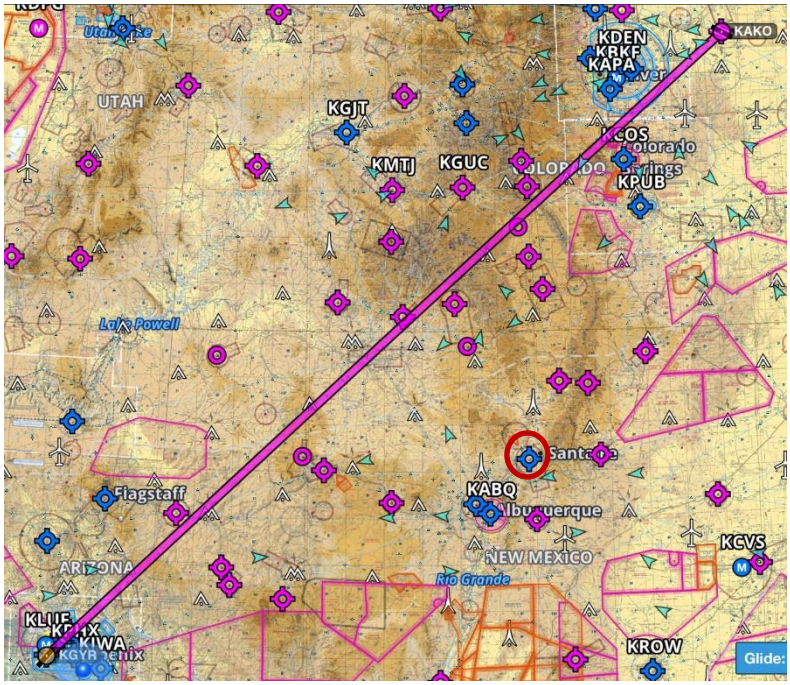
A witness near Santa Fe, New Mexico (SAF) stated that he observed the airplane twice shortly before the accident. Initially, he heard the airplane but did not see it. He was only able to locate it from the ambient lighting surrounding the airport because **there were "no lights whatsoever" on the Mooney**. The airplane appeared to be on an "abbreviated" left downwind for runway 20 at SAF, then turned and crossed over the approach end of the runway before he lost sight of it. About 2 or 3 minutes later, he saw the airplane again on the same approximate flight path with no lighting and then he again lost sight of it. The landing gear and wing flaps appeared to be retracted. The engine sounded as if it was at a "medium" power setting, and he did not suspect any issues with the engine. He did not witness any portion of the accident sequence.

Just before 2000 (8:00 pm) – 5 hours after T.O.

The Mooney crashed in a ravine about 1/3-mile south of the SAF airport and was destroyed by impact forces and a postimpact fire. The pilot was killed.

Lots of Unknowns

SAF is about 305 miles southwest of AKO, the intended destination.



Investigators were not able to determine the flight path taken by the pilot nor were they able to determine the intended route of flight for the original destination of Akron, Colorado (AKO).

Based on the available information, **the reason the pilot was circling the airport and the reason for the airplane's subsequent impact with terrain could not be determined**.

The NTSB determined that it is likely the pilot became lost at some point during the flight and the airplane was probably near its fuel endurance limit at the time of the accident. The pilot may have been trying to orient himself by circling the airport or was attempting to alert the tower controller before setting up for a landing.

The investigation was unable to determine whether a loss of control preceded the impact with terrain or whether the pilot became low on a landing approach.

Information Concerning the M20C

Airplane maintenance records were located with the wreckage. Both the airframe and the engine had accumulated 2,189 hours.

The most recent annual inspection occurred over five years ago, on July 7, 2013.

There was no record that the pilot requested a ferry permit for the flight.

The M20C fuel capacity is 52 gallons. True airspeed is 140 knots. Performance data contained in the airplane owner's manual indicates that **fuel endurance at 75% power is about five hours.**

Information Concerning the Pilot

The 73-year-old pilot had not held a current medical certificate for eight years. His most recent application for a medical certificate, dated May 4, 2010, was denied because he did not provide additional information as requested by the FAA. No subsequent applications were on file. At the time of his medical certificate application, he had a total flight time of 1,200 hours.

The pilot's daughter told a news outlet that her father was a certified flight instructor (CFI). She stated, "He was a very safe pilot. Unless something was very wrong, he never would have crashed an airplane."

Conclusion

As our friend Phil Corman has stated many times, "In aviation, if one negative thing happens, be alert for other negatives. If another negative thing occurs, we are not going!"

This accident was preceded by so many red flags.

The Aircraft and Pilot must be Airworthy

Before undertaking a cross county flight, this Mooney should have undergone an Annual Inspection to determine airworthiness. After the inspection, the Mooney should have been test flown, and if anything was found to not be working properly, the problem should have been resolved.

In addition, the pilot should have been current and "legal"; with a valid FAA medical or BasicMed.

Part II - Oshkosh Rookie – The Show

by Richard Brown

"Welcome to the show!" You hear it multiple times on the radio as you are arriving at Oshkosh. I wonder, do the controllers mumble that in their sleep at night?

After arriving on the "Green Dot", we followed the marshal's directions along the taxiways, crossing runways, and eventually arriving at a parking place. Things happen quickly at AirVenture. When it was our turn to cross Runway 27, the marshal was waving his arms as fast as he could; an incentive to give it more throttle than a regular taxi. A plane crossing the threshold 1,400' off our left wing was a new experience.

We arrived at our "First" parking spot, shut down, and climbed out. "Let me give you your arrival briefing," the marshal said. "You are parked outside the burn line, so you need to get all your stuff out of the plane because you won't be able to come back and forth to it."

"So, then where do we put our tent?" I asked.
He replied, "Oh, you wanted to camp?"

In my mind I said, "Well, that **is** why we were holding up the "**VAC"** (Vintage Aircraft) sign in the windshield for the past 20 minutes while we taxied." But what came out of my mouth was simply, "Yes."

After some back and forth between him and another marshal, he directed us to start up and follow the new guy. Eventually we pulled up at the end of one of the rows of planes and he gave us the signal to shut down, blocking the end of the taxiway for the row. I asked, "Are we pushing back from here?"
"Nope, this is your spot," he replied.
"Where do we pitch our tent?"
"Wherever you want," he said with a smile. "Welcome to the show."
After setting up the tent and unpacking the plane, we proceeded to wander around. It was Sunday afternoon, so Oshkosh had not officially begun. However, there was plenty to see. If you have not been there, it is hard to

describe the sights and sounds. Everywhere you look there is something to see. It is like going to a giant General Aviation "show-n-tell" event with military planes thrown in for good measure.

Be prepared to walk, **a lot**. On Sunday, we walked 10 miles. On Monday, when the trams were running, we cut that down to 7.5 miles. We were parked in the South 40, (more on that later), and from our spot to show center was 1.4 miles. The warbirds were another ½ mile to the north of show center. There are busses and trams, however, be aware that on Sunday, (pre-show), they stop running early, and even during the week, they weren't running as late as the signs suggested they would.

However, there is so much to see that you just take your time and mosey along. There isn't enough time and space to describe all the planes that we saw. Looking down the rows of T-6's, I think it is possible that every airworthy T-6 in the country was parked there at Oshkosh. There was a row of Beech Staggerwings, all beautiful and pristine. There were planes I had to look up because I had never seen them before. Everywhere you looked there was something to see.

Bring a refillable water bottle to make use of the many water stations and stay hydrated. If you didn't bring a way to cook food at your campsite, there are plenty of places to eat, most of which are not very healthy, but they taste pretty good. If you are looking for a healthy place to eat, the only one we found was Subway. Next time, I will bring a small camp stove and buy eggs, bacon, etc., at one of the Red One Markets spread throughout the grounds.

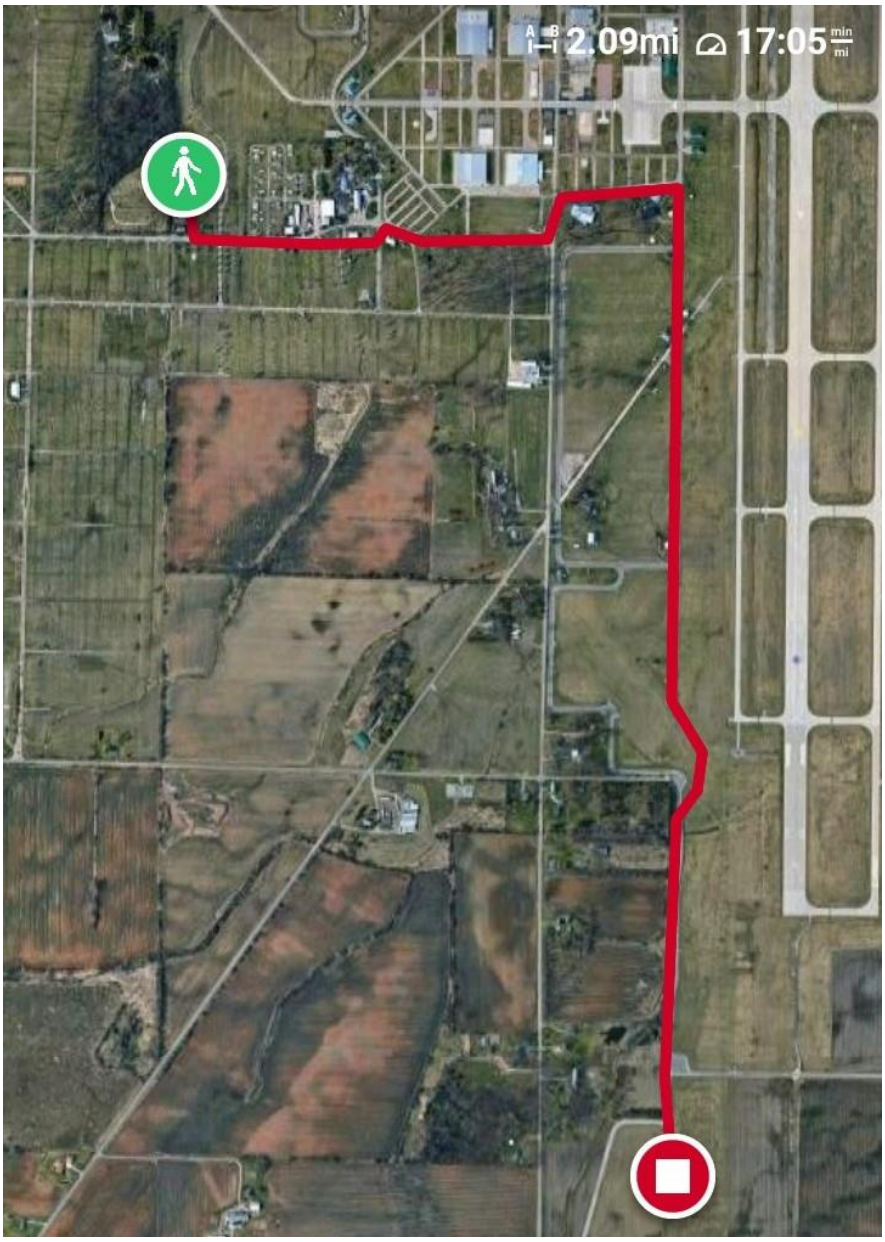
The "Dreaded South 40"

This was my Rookie Year at Oshkosh, and they say that, "You don't know what you don't know." However, I really liked the South 40. The shower trailers are not brick and mortar buildings, but as far as camping goes, they were nice, and the water was as hot as you wanted it to be. I walked past some of the bigger groups that had flown in and parked together, as they were having their get togethers late into the night. I was glad to get to our quiet corner of the grounds and pass out in my tent, listening to nothing but the non-human sounds of the night.
But you might say, "Richard, I heard the South 40 is horrible and you might as well be camped in Fond Du Lac!"

There was a sign that someone had put up saying "Fond Du Lac City Limits" in the South 40. But the reality is that it is roughly the same distance from show center to the south end of the South 40 as it is from show center to the north end of the North 40. The distance comes into play if you are wanting to go to Target or Friar Tuck's. They are just outside the gate of the North 40, but a looonnngggg way from the South 40.

If you decide to go to the Ford Fly-In Theater to watch a movie, be aware that the trams and buses will be done for the night, and you will be walking all the way back. Where we were camped, it was just over a 2-mile walk. However, if you were parked in the North 40 it would have been about the same distance.

Speaking of walking out of your tent after dusk, put on bug repellent. And I'm not talking a quick spray with "OFF!" If you miss a spot, the mosquitos will find it. You don't believe me? Put some of the cream repellent on, you know, the stuff you rub in instead of what comes in an aerosol can. Don't put repellant on a dime size spot on your arm or leg. You will have at least one bite there before the evening is over.



We were a short walk from the Ultralight Runway where they hold the STOL competitions. This is a must-see event during one of the evenings. At some point, I also recommend taking the bus over to the Seaplane Base. It is a beautiful slow-paced environment. If you are lucky, maybe you will get to see the twin Beech on floats that was there this year.

The daily airshows, the official ones, not the constant stream of planes flying overhead, are amazing. Then again, the constant stream of planes is an airshow in and of itself. There was a Ford Trimotor offering flight after flight. There was a B-25 going back and forth overhead as it gave flights that originated from another airport. In the morning, you can set on a chair, right on the flight line, and have an unobstructed view of everything. Bring something for shade while you're sitting out there; an umbrella, light weight sun shelter, anything! I have heard that there are years when the weather was cool, but 2021 was not one of them. The heat and sun during the day was relentless, but it cooled off nicely at night for a comfortable night's sleep.

Speaking of the great weather and sleeping at night, I have read that it runs on a five-day cycle. As you probably know, Oshkosh runs for seven days. Do the math, you will probably see a storm sometime while you are there.

If you are camping, bring a good tent. You may also want to buy better stakes than the little aluminum things that come with most tents. Based on recommendations, I bought a Kelty Gand Mesa 4 Person Tent. It was big enough

for the two of us with two twin air mattresses, but not quite big enough to stand up in. The important thing is that it will stand up to some wind and rain.

Monday, in the middle of the night, I woke up to the sound of rain and a little wind, then I went back to sleep. About 1:30 am, I woke up to more wind and rain and something coming over the loudspeakers that was not clear enough to understand. I got my reading glasses, (darn old eyes), and looked at my phone. There was a text message that read, “OSHALERT: National Weather Service tells us storm in Shawano County that will impact EAA around 1:15 am w/damaging winds 60-70 mph. Please take precautions.”

We were well sheltered by the tree line and our tent was tucked up by the plane, so after going outside to grab the towels off the prop so they wouldn’t be lost, we went back to sleep. About an hour later, at 2:30 am, we woke up to more sounds from the loudspeakers and the text alert on my phone read, “OSHALERT: 7/27/21 – Another round of storms headed for OSH @ around 4:40 am. Heavy rain & 30-45 mph winds expected w/possible lightning. Please take precautions.” Having ridden out the earlier storm we went back to sleep, and I didn’t wake up again until the sun was coming up over the horizon.

We stayed dry, but not all the other tents fared as well. On our way to breakfast, we saw several tents that had either partially or completely collapsed from the storms. If you are going to camp, pay the money for a nice tent. You won’t regret it.

We planned to stay through Wednesday to see the nighttime airshow and begin the trip back on Thursday morning. However, the forecast for Wednesday night called for strong thunderstorms which may produce large hail and strong winds. The Terminal Area Forecast (TAF) Wednesday morning listed thunderstorms in the vicinity at 4:00 pm with thunderstorms at 9:00 pm and from 9:00 pm-12:00 am, heavy thunderstorms with winds 30 knots gusting 45 knots and up to an inch of rain overnight.

The whole point of staying through Wednesday was for the night airshow and it didn’t look like there was any possibility of that happening. So, after breakfast, we packed everything up and headed out. We were part of a steady stream of planes leaving Wednesday morning. It turned out that the afternoon and evening airshows were canceled. They offered shuttle buses to the Museum for a temporary shelter, and by the evening, Oshkosh looked like a ghost town. Fortunately, the storm did not turn out to be as bad as forecast, but I didn’t regret leaving early.

As an Oshkosh Rookie, I was on aviation sensory overload. Wandering through the exhibit halls, up and down the rows of planes, and waking up to the sound of radial engines flying overhead. I was like a kid in the proverbial candy shop. If you want to hear a seminar on a particular aviation subject, you can probably find it. If there is a vintage plane that you wish you could see, you can probably find a pristine version of it somewhere on the grounds. Yes, there was a motorhome that looked like the front half of a DC-3? Do you need a cowling off an old jet engine for a conversation piece in your hangar? There were multiple options to choose from in what was like an aviation graveyard swap meet on crack. Have you ever wanted to see a German A400M Atlas cargo plane? Yes, there was one there that you could walk through. How about a tour of a UPS 747-8F? They had one of those, too. If it is aviation, it is at Oshkosh. I can't wait for next year!

Tune in next month for Part III – Heading Home.

If you're bored and want to kill some time, there is a gallery on my website with all the photos and videos my friend and I took at Oshkosh. See https://intothesky.com/oshkosh-2021/

As always, thanks for reading, and if there are things you would like me to write about (or not write about) drop me an email at richard@intothesky.com.

Wisconsin Aviation Expands Aircraft Interiors Service with the Acquisition of Jaeger Aviation & Its Spatial Interior

Wisconsin Aviation, Inc., announces the expansion of its aircraft interiors department with the acquisition of Jaeger Aviation, based in Willmar, Minnesota.

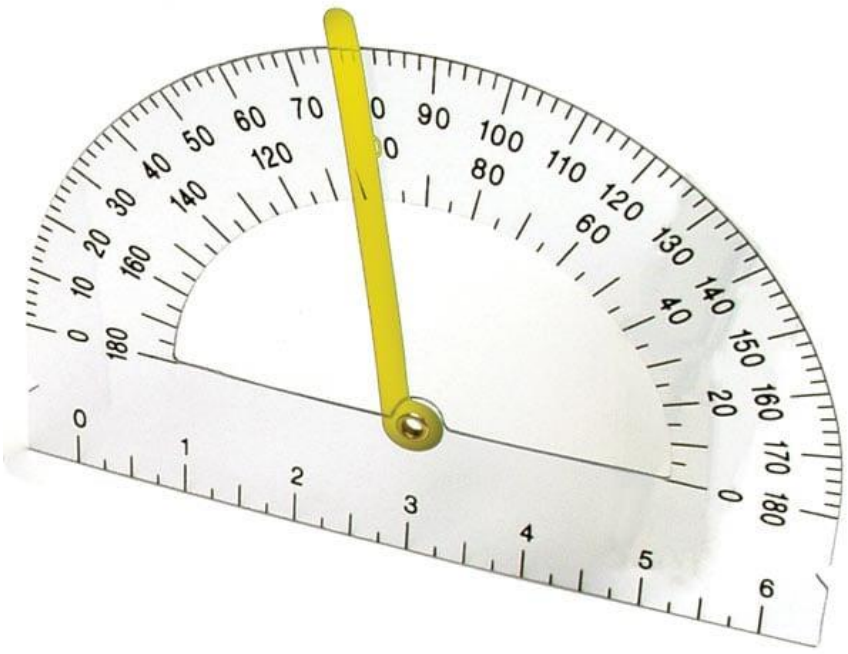
With its roots stemming back to 1945, Jaeger Aviation's sixty-four years of specializing in Mooney Aircraft sales and service made a new interior design for the vintage Mooney a natural. The "Spatial Interior," as this new design was labeled, allows for a simpler and better way to increase cabin space and expedite service while giving the Mooney a look it deserves. The Spatial Interior, now 15 years in the making, is recognized worldwide.

For more details, visit: www.WisconsinAviation.com or www.JaegerAviation.com

Wisconsin Aviation's aircraft interiors department, located in Watertown, Wisconsin (RYV), accommodates all types of general aviation aircraft. Its services include minor repairs to complete customized interior replacements. The Jaeger Aviation products and experience will help continue to grow this department.

Wisconsin Aviation offers a complete line of general aviation services including air charter, aircraft maintenance, avionics repair and installation, flight training and aircraft rental, aircraft management, aircraft brokerage, and fueling services. The corporation has locations in Madison, Watertown, and Juneau, Wisconsin.

For more information about Wisconsin Aviation, send email to Interiors@WisAv.com or call 920-261-4567.



What's Your Angle?

Sixteenth in the series
by Ron Blum

We all talk about many different angles that are relative to airplanes and aerodynamics. However, our conversations are not always talking about the same measurements or angles. In this article we'll discuss many different angles. Some angles are fixed and don't change. Other angles are variable and change all the time. And a few angles are a little bit of both in that they are fixed but they can change a little. Confusing? Let's start with references for these angles and some definitions so we can begin to clarify all these angles and get us all on the same page.

References for most angles are the axes of the airplane. That is, longitudinal (front to back), lateral (wing tip to wing tip) and vertical (up and down, 90^{o} to the other two axes). The longitudinal axis or aircraft level for the M20-M20B, is the door sill. On the M20C-M20K, it's the aft fuselage skin splice joint over the radios. The longitudinal axis on the M20L-M20V is the aft leveling screws.

An angle of incidence is considered to be a fixed, geometric value. On the other hand, an angle of attack (AOA) is highly variable with many inputs changing its value. Angles of attack can change without the angles of incidence changing. But, if the angle of incidence changes, the angle of attack will change the same amount. Yes, I know it's confusing. Let's start with the easiest angles – control surface travels.

Control surface travels are measured from the nominal airfoil shape via contour boards. If using a digital inclinometer, the inclinometer should be "zeroed" when the surface is streamlined (original airfoil shape) and set perpendicular to the hinge line (not streamlined with the airflow). Check the M20 Type Certification Data Sheet (TCDS 2A3) for values for your specific model. The horizontal stabilizer is an example of an angle of incidence that is variable because of pitch trim but also considered fixed for analysis at any point in time. Again, the stabilizer travel and angles are defined in the TCDS.

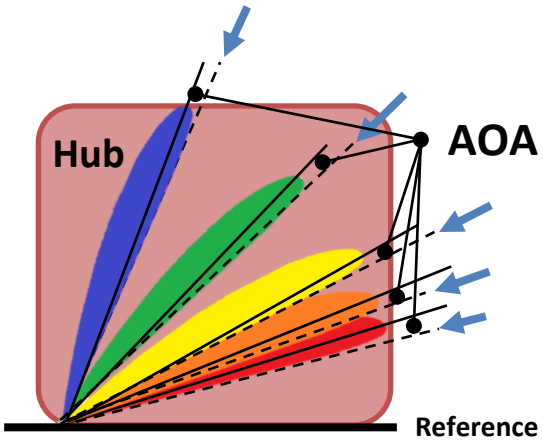


Figure 1

The reference for the propeller is typically the plane made by the aft mounting hub. We'll see in a bit why these angles are not referenced to the airplane axes. Setting a propeller blade horizontal, one can see that the blades are twisted – low angle of incidence at the tip and high angle of incidence at the root (Figure 1). This is done so that the propeller will have a near-constant, local, AOA (L/D max) across the entire span of the propeller at a specific condition, typically climb or cruise true airspeed and applicable RPM. Reference the August 2021 issue of "The Mooney Flyer", (article 14 in this series). Propeller blade incidence angles will all change the same amount with a change in manifold pressure, and propeller blade AOA will change a different amount with each change in engine RPM, manifold pressure, aircraft airspeed or aircraft AOA. Remember P-factor?

In addition, the engine is typically canted ~2^o nose down and ~2^o nose right, (referenced to the aircraft axes), to align thrust and offset torque in cruise, respectively. As a result, the engine cowling is not truly symmetrical. The correction may all be accounted for in the nose bowl portion. However, the spinner is not level with the airplane, nor is the engine mount symmetrical. Often the aft face of the propeller hub will be located on aircraft centerline.

While we're discussing complicated geometry, let's look at the wing. It is typical to have ~2^o angle of incidence. The wing angle of incidence is set so that the fuselage creates the lowest drag in cruise. Wing angle of incidence is measured between the longitudinal axis of the airplane and the imaginary airfoil chord at the centerline of the airplane. But, because the wing is twisted ~3^o (washout), the wing tip may be at a minus 1^o angle of incidence. To uncomplicate the matter, this is why we use the longitudinal axis as the reference chord for aircraft AOA. There are an infinite number of chords!

To increase speed, the twist was decreased or eliminated between the M20G and M20J. I can't imagine that there is no twist (washout) in the J and on, but …

Wing and horizontal stabilizer sweep are measured from the lateral axis of the airplane. The leading edges are perpendicular to the longitudinal axis. But, for aerodynamicists, we care about the 25% chord line, which is forward swept. The horizontal tail and wing are both forward swept with the tail forward sweep being greater. Both are destabilizing in yaw, and hence the need for a rudder-aileron interconnect. Some aircraft even have variable wing sweep (Figure 2).

Figure 2

The vertical stabilizer on some airplanes has an angle of incidence to offset torque. This can also be accomplished through a non-symmetrical airfoil on the vertical stabilizer. The M20 vertical stabilizer is forward swept, but the sweep angle is somewhat variable, in that it changes with pitch trim, (horizontal stabilizer/empennage movement).

You've all heard me preach about local AOA, and here is a great place to show why it is important. Ahead of the wing, there is upwash. In other words, before air hits the airfoil, the pressure field around the airfoil is causing airflow to have an upward component. There is also downwash after the airfoil, (more lift, more downwash). Flaps greatly increase this downwash. So, even though the aircraft AOA is increasing, the local AOA of the stabilizer (negative) might also be getting larger due to the wing/flap downwash.

Hopefully, now we will all be approaching our aerodynamic issues from a similar angle!

I really want to know your comments, questions and concerns about this article. I appreciate suggestions on where to take these articles and/or answer any questions you may have. Please email me at solutions@blueontop.com. Until next time keep the blue on top.

Blue on Top

Ron Blum is an aeronautical/astronautical engineer with a 35+ year career managing general aviation Flight Test and Aerodynamics departments from shore to shore and border to border. He was Chief Engineer of the Mooney M-10 in Chino, CA. He founded Blue on Top LLC, providing engineering and management consulting, Flight Analyst DER services and keynote speaking.

MARGINAL VFR - THE SO WHAT FACTOR

by Ray Reher

Can I land at an uncontrolled airport in "Marginal VFR Conditions"? Of course. Well maybe… kind of. No, not always. Marginal VFR operations, although common, can be complex.

Scenario: You plan a flight to Winslow, AZ (KINW) – A sleepy, uncontrolled airport out in the desert. You have done proper preparation and became "familiar with all available information concerning that flight" (IAW 14 CFR 91.103). The forecast is for solid VFR, good visibility, and clear to the moon. Before leaving, or during flight, you check the METAR, or your ADS-B/FIS-B or the ASOS/AWOS and see (KINW 311156Z AUTO 31008KT 2 ½ SM FU CLR 26/03 A3012). The surprise visibility at KINW is due to the smoke caused by a forest fire several miles northwest. This is a common occurrence in the western states, as the folks in California can attest to this summer.

So, it's a little smokey or hazy. Can I land there VFR? Book answer: NOPE.

Can I land a few miles down the highway at Holbrook, AZ (P14) with the same visibility? YEP.

Can I land with the same vis at Page, AZ (KPGA)? Another Yes.

So, what's the difference?

Something easily overlooked on the sectional for VFR operations, is Class E airspace and its minimum visibility of 3 SM. Class E is CONTROLLED AIRSPACE whether you're in contact with Air Traffic Control (ATC) or not. Class E begins above 1200 AGL unless otherwise depicted.

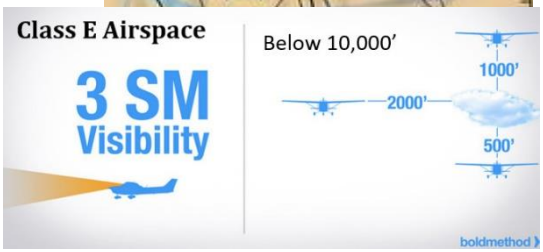
Class G is 1200 AGL and below.

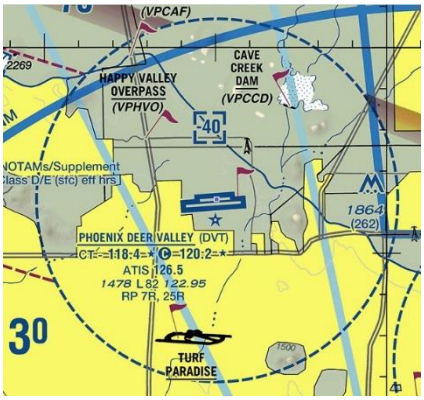
The big difference is that the minimum visibility for Day VFR Class G airspace is only 1 SM (3 SM at night). Pilots routing around mountainous terrain, VFR with 1 SM vis, should in most cases be placed on suicide watch. But it happens.

"Unless otherwise depicted", the thick fuzzy magenta shading around both KINW and KPGA (Transition Area) on the sectional chart indicates **Class E** airspace with a floor of 700 AGL. These transition areas appear around airports with Instrument Approach Procedures and are meant to protect those aircraft on an instrument approach, in lower visibilities and ceilings. This lessens the need for defensive air combat maneuvers while dodging VFR arrivals.

The dashed magenta inner circle around KINW depicts **Class E** airspace **to the surface**.

There is no magenta border around P14. It's all Class G from 1200 AGL to the dirt. You may land there with 2 ½ SM, remaining clear of clouds. But be aware because when approaching the area above 1,200 AGL, you are in Class E, and even if in Class G above 1,200 AGL (see exceptions below), requirements are the standard 500 ft below, 1,000 ft above, and 2,000 ft horizontal cloud clearance. So, this is where it gets complicated.





Of course, solid and dashed BLUE circles around airports, are a different story, with Air Traffic Control in charge (when operating).

CONCLUSION

With a report of 2 ½ SM vis, I may land at P14, remaining clear of clouds, and at or below 1,200 AGL. I may land at KPGA, remaining at or below 700 AGL and clear of clouds. But be careful what you fly over, considering Part 91 minimum altitudes. With reported 2 ½ SM vis, I CANNOT land under VFR at KINW.

So, to summarize and clarify distinctions between Class G and Class E Airspace

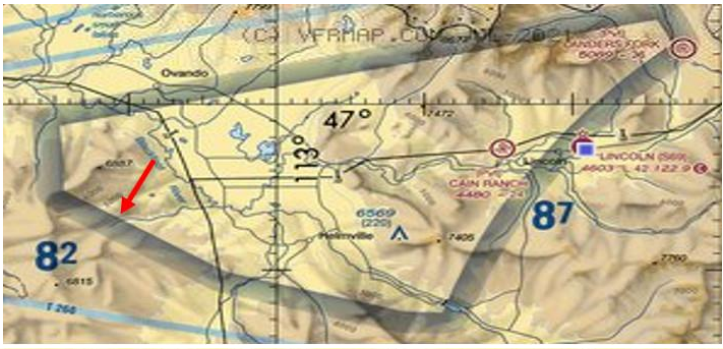
CLASS G airspace is any airspace not designated Class A, B, C, D or E. It IS THE ONLY UNCONTROLLED AIRSPACE. Within class G, ATC has no authority or responsibility. It begins at the surface and extends up to the floor of Class E.

CLASS E airspace begins above 1,200 AGL, with 4 exceptions:

1. The transition area (above 700 AGL) – for example at KPGA.

2. Beginning at the surface, (dashed magenta lines) – as seen at KINW.

3. Beginning at 14,500 MSL and above, inside the sharp edge of the thick fuzzy blue border.



4. Inside the blue zippered line, where it will vary and be specifically designated in MSL (Generally mountainous terrain).

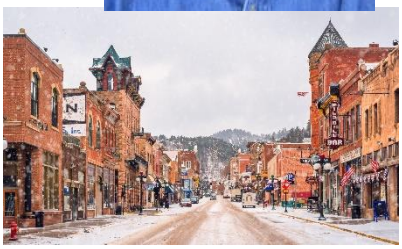
This is obviously “Back to Basics” and “Stay Out of Trouble” stuff. Some may say, “Tell me something I don’t already know.” However, during Flight Reviews, I’ve discovered that for many pilots, there is a lot of confusion on Class E versus Class G airspace rules.

When 14 CFR 91.155 was written, it didn’t exactly explain the “**So What Factors**” buried in the numbers. This is an attempt to do just that.

Mooney and My 50-Year, High School Reunion

by Jerry Proctor, CFII

One might wonder what a 50-year High School Reunion has to do with an airplane. Well, in 1971, I, along with 60 classmates, graduated from Deadwood High School, in Deadwood, South Dakota.



I must admit, that when I found my class was holding this event, I had significant reservations about going. The key question was, why? Why would I want to see people I had known, but departed from half a century ago? I remember when I learned that my dad went to his reunion in Baker, Montana, I had the same question. However, my best buddy and Deadwood next-door neighbor was organizing it, and I felt I needed to go.

Yes, I flew my M20TN from Southeast Arizona to the Spearfish, South Dakota airport, just outside Deadwood. I wish I could say it was a beautiful flight, but due to the tragic California fires, we hardly saw a thing during the whole flight. We were IFR (due to smoke) and we had no other options than to fly instrument approaches. Of my 30 classmates who attended the reunion, about six were my close friends.

I retired after serving 40 years in the military. My Mooney represented a great deal. It meant that I was a pilot – actually, a pilot of 46 years. I served as an Army Aviator, having flown helicopters and reconnaissance fixed wing aircraft all over the world.

Several of my classmates knew about Mooney's outstanding reputation and that helped dispelled the image of me flying a 30-year-old C-172. Given that the Mooney is the apex of general aviation airplanes, it demonstrated a lot about how fortunate I have been since my high school graduation.

To anyone reading this article, know that you are a significant notch above your average guy on the street. You are a pilot, and likely a pilot with additional ratings. When you start your Mooney, your pilot friends say to non-pilots, "Yeah, that's a Mooney, and they are FAST!" In addition, you are reading this great on-line magazine. You are more than a pilot, more than a Mooney pilot, but you are a pilot that seeks to constantly learn and refresh your knowledge. Well done!

Attending my 50-year reunion was significantly rewarding. As I talked to my close circle of friends – about six guys and gals – I was nearly stunned to find that the connection we had so many decades ago, was still there, and just as strong! It was as if that 50-year gap did not exist and we had picked up right where we had left off, as very good and great friends. What a pleasant feeling. At least for this group of 68-year-olds, we realized that the friends we grew up with, are indeed friends for life. They are not just friends and neighbors, or people you have worked with around the world, but guys and gals that really know you. As my next-door neighbor buddy said, "We have known each other since we were in diapers". It doesn't get stronger than that.

Yes, our Mooney took my wife and I to South Dakota in style, and very fast. This made a silent but powerful statement. It also represented who I am. Your Mooney also represents who you are! Lucky and Good – not just one or the other.

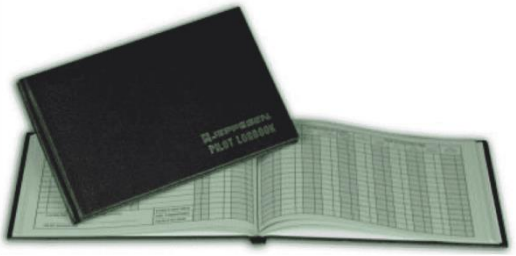
So, in this article, did you learn more about a Mooney? Probably not. However, I hope you learned more about who you are. That you are a successful person, a pilot and not just an average pilot. I congratulate you.

Yes, when it is your time, go to that reunion.
Fly safe and Proud!
Jerry Proctor, CFII

1) Tonight, you are planning to update your night currency. How many takeoffs and landings will you need to have flown withing the past 90 days?

a) Three if you plan to carry passengers.
b) None, if do not plan to carry passengers.
c) Two if you plan to carry passengers.
d) A and b

Answer is d. Both a and b are correct.



2) You want to become night current. Between what time periods do you need to log 3 takeoffs and landings?

a) Between Evening Civil Twilight and Morning Civil Twilight.
b) After Sunset and before Sunrise.
c) Between 1 hour after sunset, ending 1 hour before sunrise.

Answer is c. Between 1 hour after sunset, ending at 1 hour before sunrise.

3) What kind of landings do you need to perform for night currency?

a) Landings must be performed to a full stop.
b) Touch and go landings will work.

Answer is a. Landings must be performed to a full stop.

4) When do you need to turn on your aircraft position lights?

a) Between one hour after sunset until one hour before sunrise.
b) You don't need to turn on your position lights, just the rotating beacon or strobe lights.
c) Turn the position lights on at sunset and leave them on until sunrise.

Answer is c. Turn them on at sunset and leave them on until sunrise.

5) When can you log night time?

a) **After sunset and before sunrise.**
b) **After Evening Civil Twilight through Morning Civil Twilight.**

Answer is b. After Evening Civil Twilight through Morning Civil Twilight.

6) Where can you find the local times for Sunrise, Sunset, Morning Civil Twilight and Evening Civil Twilight?

a) **CNN**
b) **The Weather Channel**
c) **AirNav.com**
d) **Fox and Friends**

Answer is c. Airnav.com has all those times. Open https://www.airnav.com/ and select the location (airport). In the right column, Sunrise, Sunset, Morning Civil Twilight and Evening Civil Twilight will be listed for that day.

Sunrise and sunset

Times for 02-Sep-2021

	Local (UTC-7)	Zulu (UTC)
Morning civil twilight	05:38	12:38
Sunrise	06:03	13:03
Sunset	18:51	01:51
Evening civil twilight	19:16	02:16

7) When flying VFR at night, how much reserve fuel do you need to have after you reach your destination?

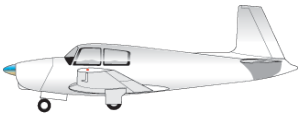
a) **30 minutes**
b) **1 hour**
c) **45 minutes**

Answer is c. You need to carry enough fuel to reach your first point of intended landing, and then an additional 45 minutes at normal cruising speed.

There is a big inventory of serviceable airframe parts, including wings for M20C, E, F, G, J, K & R models, empennage assemblies, fuselages, rebuilt controls, rudders, elevators, ailerons, flaps, cowls, engine mounts, landing gear and small parts.

Paul Loewen is offering them online, or by phone. The website is www.LoewensMooneySalvage.com, and he can be contacted in Lakeport, California at **707 263-0462** or by cell at **707 272-8638.** Email is PaulLoewen98@gmail.com. The used inventory is also still available through LASAR Parts at 707. 263-0581

Mooney Maintenance



Search Mooney's new website for Service Bulletins (SBs) and Service Instructions applicable to your Mooney

Click here

Download and search LASAR's Airworthiness Directive (AD) Log – all models

Click here

LASAR
Fanatically Mooney. Exceptionally Fast.

Ask the Top Gun

Tom Rouch

Founder of Top Gun Aviation, Stockton, California

Send your questions for Tom to TheMooneyFlyer@gmail.com

Question: Dear Tom, I love your feature section every month. It is very useful to me.

I had a "shutter" three times while flying my C. I was in a descent to the airport for landing. All engine indications were normal. Each shutter lasted for about 1 second. What do you think caused it? Water? Something else? I had the carb heat pulled.

Answer: This will really be a "shot in the dark" answer since I have no idea the cause. However, I will venture a possibility.

The only real clue is that you had carb heat. I am guessing that you made no other changes to the plane, so I will zero in on the carb heat. I must assume that carb heat was on because conditions warranted it. Maybe some ice formed in the intake and broke loose a couple of times, causing the engine to "miss" and then shudder.

Another possibility would be a failing sparkplug due to oily buildup or high resistance. You can check this by looking at a dump of your engine monitor or by removing the sparkplugs, cleaning them, checking the resistance, and gapping them.

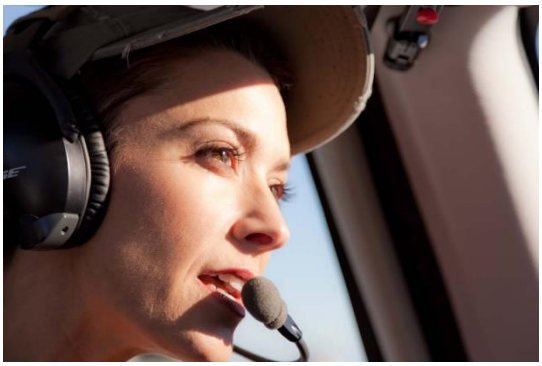
I do enjoy oddball questions. It gives me a reason to really use my "thinker". I am lucky to have someone read and appreciate what I think.

When everything else is going against you, remember an aircraft still takes off into the wind.

Pilots could start seeing improvements in the NOTAM system as early as this fall

AOPA recently surveyed 30,000 members about improving NOTAMs, and 77 percent of respondents said making NOTAMs easier to understand was important while 46 percent said addressing the number of NOTAMs was important.

The improvements pilots will start to see include graphical airport construction diagrams and a decrease in the number of permanent NOTAMs as the changes are incorporated into charts. In addition, the notam system will become more resistant to outages as it is moved into the cloud.
These are just the first tangible improvements pilots will notice. The upcoming transition from the domestic to the International Civil Aviation Organization (ICAO) notam format, is expected to be complete by the end of 2024. The transition “will allow for more robust sorting and make it easier for pilots to find relevant NOTAMs.



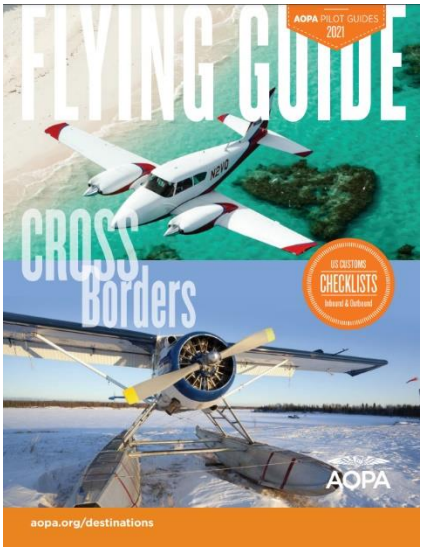
Take a Quiz to see if you sound like a Pro when talking to ATC

Click Here for the Quiz

Environmental Groups Renew Fight to Ban 100LL

Spurred by a new study of lead levels in children living near a California airport, a coalition of environmental groups has renewed the effort to get the Environmental Protection Agency to issue an “endangerment finding” on the use of leaded gasoline in light aircraft. That initial step is crucial in getting a ban on leaded aviation fuel. Friends of the Earth, which launched a similar petition in the past, is joined by Alaska Community Action on Toxics, Center for Environmental Health, Montgomery-Gibbs Environmental Coalition, Oregon Aviation Watch and Santa Clara County in the action. CLICK HERE TO READ MORE

AOPA updates Cross-Borders Flying Guide

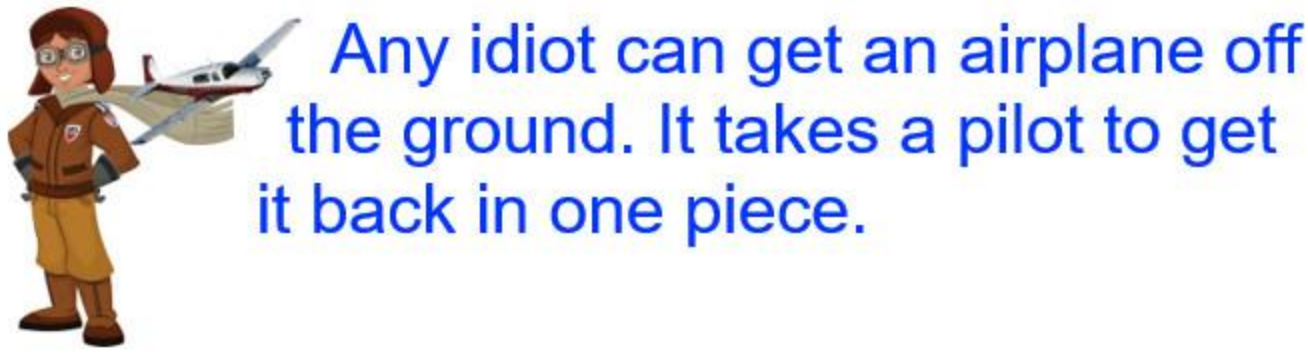


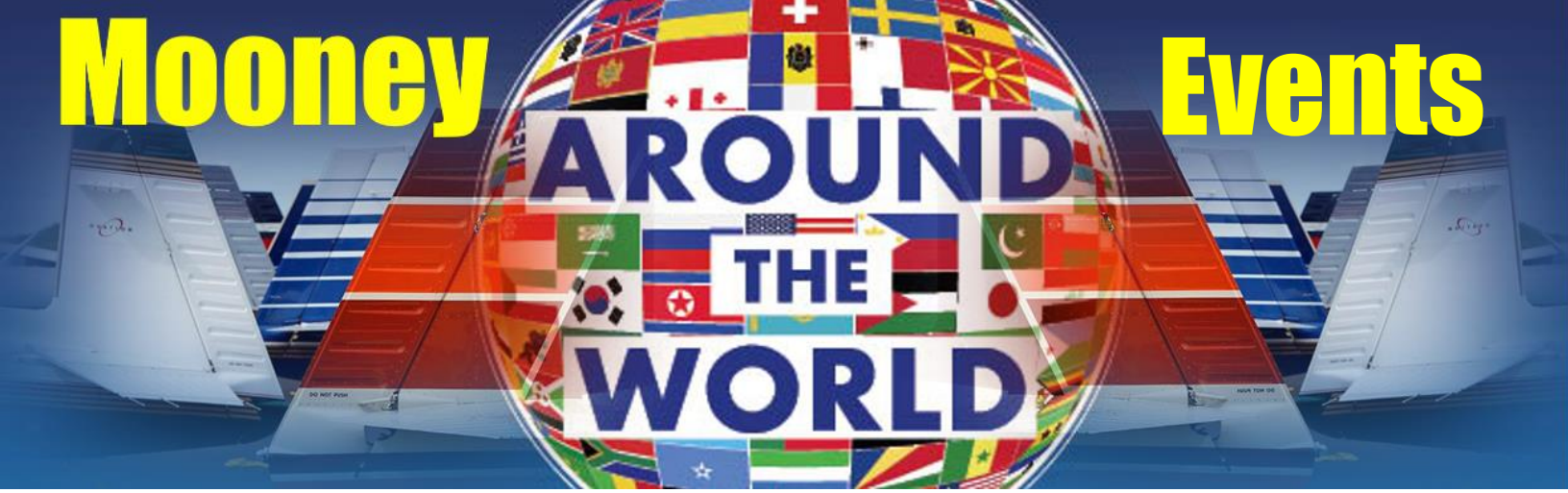
You can learn about cross-border operations, including preparing for your flight and departing and arriving in the United States, in AOPA's Cross-Borders Flying Guide. This includes a helpful checklist, US Customs and Border Protection topics and procedures, and FAQs. Download the guide.

House Amendment Fixes Flight Training Rules

Congress appears poised to short-circuit the FAA's plans for an elaborate rewrite of its commercial aviation definition that has resulted in frustrating paperwork exercises for some CFIs. The House has passed a bipartisan amendment to the National Defense Authorization Act that states in plain language that an instructor conducting training "shall not be deemed to be operating an aircraft carrying persons or property for compensation or hire," according to an AOPA report on the amendment.

A legal opinion that resulted from the prosecution of a Florida company for allegedly offering flight instruction in a warbird prompted the agency to require that all instruction in experimental aircraft require the instructor to have a Letter of Deviation Authority and that those teaching in limited or primary category a written exemption. FAA Administrator Steve Dickson told the annual "Meet the Administrator" session at AirVenture 2021 that he was frustrated by the action, too, but that the legal niceties had to be observed. He estimated it would take four years to rewrite that section of the regs and said the agency had done what it could to make getting the required paperwork quick and easy. But AOPA said in its report that the paperwork addresses a practically nonexistent issue and a precedent that has allowed homebuilders and owners of non-standard category aircraft to learn to fly in their own planes for more than 60 years. The FAA said it took the action to "prevent operators from broadly offering their aircraft for joyrides and other similar experiences under the guise of 'flight training.'" Rep. Sam Graves, R-Mo., and Rep. Kai Kahele, D-Hawaii, co-sponsored the amendment. "This important amendment will clear up the confusion associated with flight instruction for general aviation pilots, and I look forward to working with the Senate to ensure it is signed into law," Kahele said in a statement. Graves said he and Kahele will keep tabs on the amendment to make sure it survives the rest of the legislative process and makes it into the final authorization act.





Florida Mooney Lunch Group	*Contact Dave at daveanruth@aol.com or (352) 343-3196, before coming to the restaurant, to have an accurate count. Events begin at 11:30* October 9: Flagler (FIN) November 13: Sebring (SEF) December 11: Winter Haven (GIF)
Mooney Caravan	
MooneySafety.com	Oct 15-17: Wichita, KS **Sign Up at** https://www.mooneysafety.com/ppp-registration/
MOONEYSUMMIT	CLICK HERE for details
Australian Mooney Pilots Association	October 8-11, 2021: Spring Fly-in, Merimbula, NSW. **CLICK HERE** for the AMPA website's *Event Page*. March 17-21, 2022: Mount Gambier Fly-In
EMPOA	November 26-27: Xmas Event CLICK HERE for details
Other Mooney Events	

TMF PRODUCT REVIEW

BendixKing AeroCruze 100 for Mooney Aircraft

The STC for installation of the AeroCruze 100 Digital Autopilot in Mooney Series aircraft is nearing completion. This approval will cover Mooney M20B, M20C, M20D, M20E, M20F, M20J, M20K, M20L, M20M, M20R, M20S, M20TN, M20U and M20V aircraft.

Gulf Coast Avionics is now accepting pre-orders for these systems. [Click this link to get your system reserved today!]

Parts for Sale

This Cowling was removed from a M20E and replaced with a M20J (201) cowling. The cowling is located at Fullerton Airport (KFUL) and is in excellent condition. Offers accepted.

Contact: Bernard Lee – leebern@msn.com (562-865-2547)

P/N 310309-501
P/N 310309-502

These fairings are new and priced @ $280.00 each or $525.00 for both. Priced elsewhere @ $362.69 each.

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Bushing P/N 914007-003 - 2- Bushings in the original package @ $35.00 each. Priced elsewhere @ $45.00 each.

Bushing P/N 914007-005
1-Bushing in the original package @ $59.00
1-Bushing loose @ $50.00
Priced elsewhere @ $69.00 each

Contact: Bernard Lee – leebern@msn.com (562-865-2547)

Access Covers P/N 3000-901 (2-available) - 1-without nuts attached.
Make offer. Contact: Bernard Lee – leebern@msn.com (562-865-2547)

1/3 SHARE FOR SALE

Two partners are offering the final 1/3 co-ownership share in this excellent, incredibly unique and well-equipped aircraft. Over $50,000 spent over the last two years, upgrading and sorting it out. The share price is $45,000. TTAF is about 3160, engine SMOH About 1320 (Mattituck Red/Gold). We have Calculated that 1/3 of the fixed expenses will be around $5,250 per year. Reserves TBD. Photos and all records can be provided. The plane is hangered at KCCR Concord, CA.

- Garmin GNS 430 WAAS
- King KX 155 N/C/LOC/GS
- Castleberry electric back AI
- King KFC 150 FD/AP alt hold, climb/descend, simulated GPSS
- King KCS 55A HIS
- Garmin GTX 330 ES TXP with traffic, ADS-B out
- Newly Overhauled KX 256 AI ($1,730)
- King KN 64 DME
- New Garmin GMA 345 Audio Panel
- New JPI 830 with *all* options
- ADS-B in including traffic, weather, Sirius XM, etc. via a new certified Garmin GDL 52R hard wired to a panel mounted Garmin Aera 660. A new yoke mounted Aera 760 will be hard wired to provide IFR charts and Additional features. More Bluetooth connections for portables and iPad available from the GDL 52R
- Newly Overhauled BFG WX 1000+ Stormscope, display and processor ($1,890)
- 28-volt electrical system
- Astrotech LC-2 clock
- Electric trim with CWS
- Yoke mounted AP disconnect and ident.
- Electric Back-up vacuum
- New STC'd gear and stall audio alarm ($1,100)
- Built-in CO2 detector
- Speed brakes completely overhauled January 2020 ($2,800)
- Four place intercom
- 2900 GW STC
- Two built-in David Clark 20-10X ANR headset jacks with headsets
- CYA 100 AOA with custom housing, (not yet wired) ($1,690)
- Useful load 992 lbs.
- Air/Oil Separator
- Reiff Preheater, 2 sides
- Removable back seats
- Articulating seats
- Inflatable lumbar support
- Indirect interior lighting
- Kool scoop
- Wing mounted fuel gauges
- Two place Sky Ox oxygen tank with custom rack
- Sidewinder electric power tug
- B-Cool ice cooler with remote switch
- Annual completed February 2020 by Top Gun Stockton MSC.
- Tan leather interior redone 2012, good condition, front sheepskins coming soon
- Custom black front floor mats, custom cover, cowl plugs
- Original paint. Pleasing colors. Looks very good at 8'.
- The plane starts right up hot or cold, good compressions, does not use much oil, good oil analysis, runs very smoothly, flies great.
- Recent avionics fan, fuel pump, starter, battery, airstop tubes on mains
- New shock discs 2 1/2 years
- No back clutch spring was installed 2 1/2 years ago

Give me a call anytime at 510 377 0129 or email bradinc@astound.net. Thanks! Steve


Rusty Pilot or Old Pro
INSTRUMENT PROFICIENCY CHECK
Study Guide
J D Price, CFII, MEI, ATP
FLIGHT REVIEW
Study Guide
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Prepare online
FREE
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