Next WingNuts Chapter Meeting: ***Sat. Feb 12, 2022 12:00 PM - Hunter International Air-Field***

Next VMC Club Meeting: ***Tues. Feb 22, 2022 6:00 PM - Hunter International Air-Field***

WINGNUTS PLANE TALK

Chapter 1321 / South Middle Tennessee

Our Chapter Home Page: https://chapters.eaa.org/eaa1321

PRESIDENTS CORNER:

This month's Presidents Corner doesn't have a lot of information to offer other than a few reminders.

The first is of course remember to attend the monthly meeting this Saturday the 12th at noon.

Second is we are still collecting the yearly dues, if you haven't paid yet. The dues are $20.00 per year. I'll include Jim's (chapter treasurer) address to mail in your dues if you can't make the meeting.

Third I would not only like to remind but invite you to the VMC meeting that is held on the fourth Tuesday of each month at 6:00 PM at Hunter Field. It is a discussion group about VFR flying.

And lastly to keep you out of the doghouse remember Valentine's Day is Monday the 14th.

See ya Saturday,

Glen Smith

Jim Tjossem
2577 Douglas Lane
Thomson Station, TN 37179
Make check payable to "EAA Chapter 1321"

FLYING
THE WEEKENDER

When the Sun Sets on 100LL, Will You Be Ready?

Learn what you can do now to prepare for the changeover to unleaded fuel.

By Richard Scarbrough January 27, 2022

FLYING recently reported the Reid-Hillview Airport (KRHV) and San Martin Airport (E16) in California halted sales of 100LL and forced the FBOs on the field to switch to an unleaded alternate, UL94. Although this practice is not common yet—and limited to a few locations—changes are coming to aviation fuel regulations.

Here is what you can do now to prepare you and your aircraft for the eventual sunsetting of 100LL.

As more airfields adopt this policy, it could cause affect flight plans and significantly impact aircraft owners and pilots, especially those operating high-performance models.

Much like Tesla owners who now plan road trips based on the availability of charging stations along the route, flight plans will need an additional layer of forethought to ensure refueling at an airport still distributing 100LL.

The stakes are considerably higher with aircraft, as one does not simply pull over and wait for AAA to arrive with a portable charger when reserves dip dangerously low.

How This Happened

Distinguished by its bluish hue, 100LL is the industry standard for reciprocating aircraft engines. For many years, 100LL-powered aircraft deployed to accomplish missions such as flying medical supplies, inspecting power lines, agricultural work, transportation, and serving as a lifeline to remote populations not connected to a road.

For decades, pilots have had very little to think about when they taxi up to an FBO looking to refuel. The choice was simple: 100LL or jet-A. Now, and moving forward, there will eventually be additional choices. Just as necessity spawns innovation, so does competition flourish in the presence of a vacuum. The eventual tabling of 100LL will leave a tremendous void.

UL94 is a 94 octane unleaded avgas alternate option that meets ASTM D7547 specifications and can be a direct replacement for a 100LL solution for some aircraft owners. Manufactured by Swift Fuels, UL94 has been available since 2015 and is an all-hydrocarbon blend. UL94 is safe, FAA-approved, and **can coexist in fuel tanks with 100LL without issue**

What to Do Now

The first thing you have to consider is compatibility. Some aircraft engines that operated at a lower compression ratio should have no trouble just popping the cap and topping off the tanks with unleaded avgas alternative.

Although 100LL and UL94 can intermix with no issues**, not everyone has the all-clear to start pumping UL94 straight away**. Airframes and powerplant combinations are still type-certificated to run on specific fuels, and to deviate from that will require FAA approval.

How to Use Unleaded Fuel with the FAA's Blessing

Aircraft OEMs are beginning to accept unleaded avgas and are paving the way using standard approval methods. Service bulletin (SB), service letter (SL), and service instructions (SI) documents are the technical publications that OEMs use to transmit information.

Textron Aviation announced in October 2021 the approval of unleaded avgas in some of their most popular Cessna models. Owners and operators can comply with Textron Aviation Service Bulletin SEB-28-04. The SB describes parts and instructions to install fuel placards for very-low lead and unleaded fuels. No hardware modifications are needed to comply.

Aircraft engine OEMs understand the need for unleaded fuel, and they can sense the change in the wind. Lycoming Engines—a Textron company and one of the major engine manufacturers in North America—published a three-part series of articles addressing unleaded fuels. Additionally, Lycoming issued technical publications supporting the alternatives to 100LL.

Lycoming SI No. 1070AB, "Specified Fuels for Spark-Ignited Gasoline Aircraft Engine Models," is a resource for identifying which Lycoming engines are approved to run alternate fuels.

Service Letter No. L270 identifies extended maintenance intervals as benefits of routine exclusive use of approved unleaded fuels identified in the latest revision of Service Instruction No. SI-1070 for Lycoming engine models. **You will also note that this notice states that although approved for the engine, approval for an alternative fuel at the airframe level is also required.**

One way to gain approval for the airframe is through a supplemental type certificate (STC). The FAA maintains a searchable STC database and can identify terms like UL94, unleaded fuel, avgas, etc. One can also download the entirety as a .zip file.

The Players

Swift Fuels is the manufacturer of UL94. They have an STC for their fuel and will gladly sell you a copy. Currently, they are running a special introductory offer for their "FOREVER" Avgas STC Certificate for $100 each. ***Editor Note: See Information concerning Swift Fuels following this article***

Swift is not the only player in unleaded fuel. Another aviation company is also gearing up to meet the rising demand for unleaded fuel. General Aviation Modifications Inc. (GAMI) in Ada, Oklahoma, is on the verge of a breakthrough in unleaded fuel. Once fully rolled out, may answer the lead question once and for all.

Decades in the making, some of the most recognized names in aviation have aided the development of **G100UL high octane unleaded avgas,** including Embry-Riddle Aeronautical University, which contributed to flight testing in the early phases.

G100UL contains no organometallic additives (like TEL, the tetraethyl lead in 100LL). Nor does it have scavenging agents (like the ethylene dibromide required to scavenge the deposits formed by the TEL in 100LL). As a direct result of this, G100UL burns exceedingly clean, with essentially no deposits formed in the combustion chamber. The result is reduced maintenance, better spark plug health, and increased intervals for oil changes.

G100UL offers tremendous advantages in engine maintenance and higher reliability. GAMI expects to complete the fleet-wide certification around mid-2022 and begin the production and distribution of the G100UL soon. The manufacture and distribution of G100UL will be handled by Avfuel, with a nationwide network of dealers.

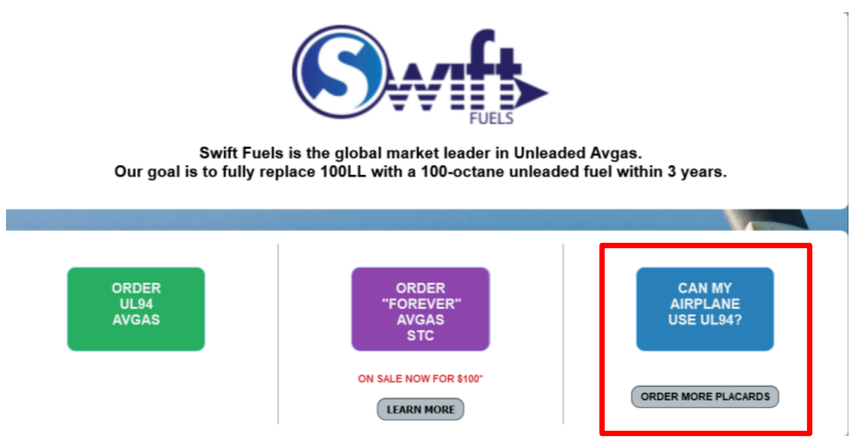
Stay Tuned

Things are far from settled at Reid-Hillview Airport. Nor is the path forward on unleaded fuel crystal clear. There are a lot of unknowns that continue to develop as we dive deeper into this topic. Most will agree that lead is harmful to people, pets, or plants. The question of if it is beneficial for an airplane is also the topic of spirited debate.

Pilots, maintainers, and aircraft owners face some tough decisions when it comes time to transition from 100LL to unleaded avgas alternative. Airframe and powerplant manufacturers face equally daunting choices. The stakes are high. Health, environmental, financial, and other mitigating factors all come into play.

Currently, there is no clear answer, although G100UL looks very promising. The only thing anyone can say with certainty is that it will take a concerted effort by regulators, manufacturers, and aircraft operators to work together to find an amicable solution for all.

Editor Note: The following is from Swift Fuels Website



https://www.swiftfuelsavgas.com/

Lycoming Engines Supported

Lycoming Engines Approved for UL94

Lycoming Engine Models		AVGAS ASTM D910 100LL	AVGAS ASTM 7547 UL94
O-235	-C, -E, -H	•	•
O-235	-K, -L, -N	•	•
O-235	-M, -P	•	•
O-290	-D	•	•
O-320	-A, -B, -C, -D, -E	•	•
IO-320	-A, -B, -D, -E	•	•
AIO-320	-A, -B, -C	•	•
LIO-320	-B	•	•
AEIO-320	-E	•	•
O-360	-A, -B, -C, -D, -F, -G, -J	•	•
HO-360	-C	•	•
IO-360	-B, -E, -L, -M, -N	•	•
LO-360	-A	•	•
HIO-360	-B	•	•
HIO-360	-G	•	•
IVO-360	-A	•	•
LIO-360	-M	•	•
O-435	-A, -C	•	•
GO-435	-C, -C2	•	•
GO-480	-B, -D, -F	•	•
O-540	-A, -B, -E, -F, -G, -H, -J	•	•
IO-540	-C, -D, -N, -T, -V	•	•
IO-540	-W, -AB, -AF	•	•
VO-540	-A, -B	•	•

Lycoming Engines Approved for UL94

Lycoming Engines Requiring 100LL (DO NOT USE UL94)

Lycoming Engine Models		AVGAS ASTM D910 100LL	Lycoming Engine Models		AVGAS ASTM D910 100LL
O-235	-F, -G, -J	•	O-480	-A	•
O-320	-H	•	GO-480	-C, -G	•
IO-320	-C, -F	•	GSO-480	-A, -B	•
LIO-320	-C	•	IGO-480	-A	•
AEIO-320	-D	•	IGSO-480	-A	•
O-360	-E	•	O-540	-L	•
HO-360	-A, -B	•	O-540	-9, -9A	•
IO-360	-A, -C, -D, -F	•	IO-540	-A, -B, -E,- G, -J, -K, -L, -M,	•
IO-360	-J, -K	•	IO-540	-P, -R, -S, -U, -AA, -AC, -AE	•
LO-360	-E	•	VO-540	-C	•
TO-360	-A, -C, -E, -F	•	HIO-540	-A	•
VO-360	-A, -B	•	IGO-540	-A, -B	•
AIO-360	-A, -B	•	IVO-540	-A	•
HIO-360	-A, -C, -D, -E, -F	•	TIO-540	-A, -C, -E, -F, -G, -H, -J, -N,	•
LIO-360	-C	•	TIO-540	-R, -S, -U, -V, -W, -AA, -AB,	•
LTO-360	-A, -E	•	TIO-540	-AE, -AF, -AG -AH, -AJ, -AK	•
TIO-360	-A, -C	•	TVO/TIVO-540	-A	•
AEIO-360	-A	•	AEIO-540	-D	•
AEIO-360	-B, -H	•	AEIO-540	-L	•
LHIO-360	-C, -F	•	IGSO-540	-A, -B	•
IO-390	-A	•	LTIO-540	-F, -J, -N, -R, -U, -V	•
AEIO-390	-A	•	TIO-541	-A, -E	•
VO-435	-A, -6, -23	•	TIGO-541	-D,-E,-G	•
VO-435	-B	•	IO-580	-B	•
TVO-435	-A, -B, -C, -D, -E, -F, -G, -25	•	AEIO-580	-B	•
O-480	-1, -3	•	IO-720	-A,-B,-C,-D	•

Lycoming Engines Requiring 100LL (DO NOT USE UL94)

Continental Engines Supported

Continental Engines Approved for UL94

Continental Engine Models	Cylinders	Fuel Grade	CR
C-85	4	80/87	6.3:1
C-90	4	80/87	7.0:1
C-115	6	80/87	6.3:1
C-125	6	80/87	6.3:1
C-140	6	80/87	6.3:1
C-145	6	80/87	7.0:1
C-175	6	80/87	7.0:1
E165	6	80/87	7.0:1
E185	6	80/87	7.0:1
O-200-AF	4	UL94	7.0:1
O-200-A & B	4	80/87	7.0:1
E225	6	80/87	7.0:1
O-300	6	80/87	7.0:1
IO-346	4	91/98	7.5:1
IO-360-AF	6	UL94	7.5:1
O-470-J, K, L, M, R, S	6	80/87	7.0:1
IO-470-C	6	91/96	8.0:1
IO-470-J & K	6	80/87	7.0:1

Continental Engines Approved for UL94

Continental Engines Requiring 100LL (DO NOT USE UL94)

Continental Engine Models	Cylinders	Fuel Grade	CR
O-200-D, X	4	100/100LL	8.5:1
IO-240-A & B	4	100/100LL	8.5:1
IOF-240-B	4	100/100LL	8.5:1
IO-360-C, CB, D, DB, G, GB, H, HB	6	100/100LL	8.5:1
IO-360-ES, J, JB, K, KB	6	100/100LL	8.5:1
TSIO-360-A, AB, C, CB, D, DB	6	100/100LL	7.5:1
TSIO-360-F, FB, H, HB, JB, LB, MB, SB	6	100/100LL	7.5:1
L/TSIO-360-E, EB, KB, RB	6	100/100LL	7.5:1
O-470-U	6	100/100LL	8.6:1
IO-470-D, E, F, H	6	100/130	8.6:1
IO-470-L & M	6	100/100LL	8.6:1
IO-520-B, BA, BB, C, CB, D, E, M, MB	6	100/100LL	8.5:1
IO-520-F, L	6	100/130	8.5:1
TSIO-520-B, BB, E, EB	6	100/100LL	7.5:1
TSIO-520-C, H, J, JB, N, NB	6	100/130	7.5:1
TSIO-520-(M), P, R, T, U, UB, VB, WB	6	100/100LL	7.5:1
GTSIO-520-D, H	6	100/130	7.5:1
GTSIO-520-L, M	6	100/100LL	7.5:1
IO-550-A, B, C, D, E, F, G, L	6	100/100LL	8.5:1
IO/IOF-550-N, P, R	6	100/100LL	8.5:1
TSIO-550-B, C, E, K, N	6	100/100LL	7.5:1
TSIOL-550-A, B, C, G	6	100/100LL	7.5:1
TSIOF-550-D, J, K	6	100/100LL	7.5:1

Continental Engines Requiring 100LL (DO NOT USE UL94)

Can Search for Eligible Aircraft and Purchase STC on Swift Fuels Website

Identification of UL94: Appearance - Clear like moonshine
"Smells different" Has a dank, musky odor

Besides reducing the effects Lead has on the Environment, there are other Advantages of using Unleaded Fuel to our engines

Benefits

Burns cleaner □ No lead-fouled plugs or engine buildup

Longer interval between oil changes and maintenance

Compatible with fuel system (rubber, valves, pistons, etc)

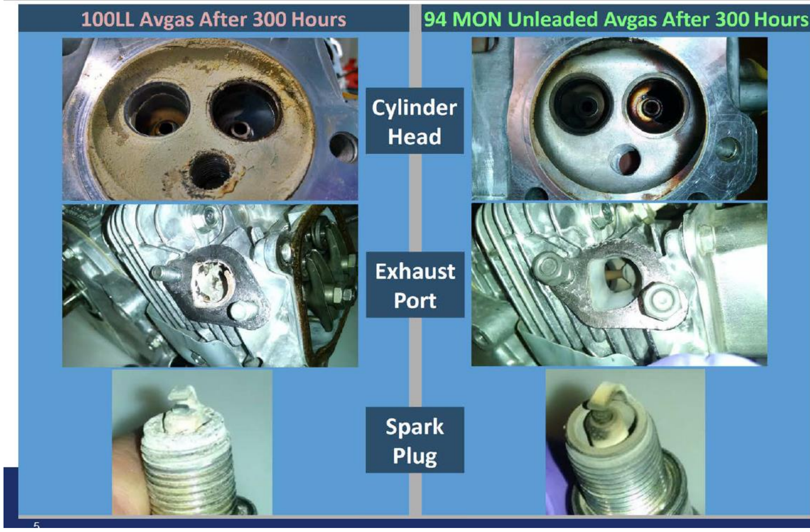
Mixable with 100LL in the aircraft

Easily separates from water

Aviation-grade quality

Doesn't use dangerous or corrosive components to increase octane

Comparison of Engine Components Following 300-Hour Trial



Source: Chris D'Acosta, CEO Swift Fuels

100LL Impact

- ✕ More sludge in oil and engine
- ✕ More fouling of spark plugs
- ✕ Lead acidity corrodes the engine

MON – Motor Octane Number

Maintenance Benefits (Lycoming Service Letter L270)

LYCOMING

SERVICE LETTER

Continued and consistent use of unleaded fuel decreases the risk of lead fouling of spark plugs and contamination of engine oil with leaded combustion byproducts. As a result, engines continuously operated on unleaded fuel could realize the following advantages:

- Extended maintenance intervals for spark plug rotation/replacement
- Extended operating hours between oil changes.

Table 1
Operating Hour Maintenance Intervals

Maintenance Task	Operating Hour Maintenance Interval	
	Leaded Fuel	Unleaded Fuel
On engines with an oil filter, after the initial transition 50-hour change, complete subsequent oil change	50 hours*	100 hours*
Oil filter replacement (after initial transition change)	50 hours	
On engines with an oil pressure screen, after the initial transition changes, complete subsequent oil change	25 hours*	50 hours*
Oil pressure screen /removal/inspection/cleaning (after initial transition changes)	25 hours	

*Or every 4 months, whichever occurs first; also, remove, examine, clean and re-install/safety the oil suction screen. Refer to the latest revision of Service Bulletin No. 480 for guidance on inspection of oil filter and oil pressure screen contents.

Note: Read complete service bulletin for transition inspection instructions!

https://www.lycoming.com/sites/default/files/SL270%20Extended%20Maintenance%20Intervals%20for%20%20Engines%20Operated%20on%20Unleaded%20Fuels_0.pdf

IN THE "WHAT IN THE WORLD" CATEGORY

Have You Heard About This??

A YouTuber, Trevor Jacob, is accused of Crashing His Plane in Los Padres on Purpose?

Critics Wonder If this Incident Was Staged to Rack Up Views

YouTube personality and former Olympic snowboarder Trevor Jacob has stirred controversy and sparked a Federal Aviation Administration (FAA) investigation after he posted a video in which he parachutes out of a small airplane that allegedly experienced an engine failure over Los Padres National Forest and crashed into a mountainside near New Cuyama.

https://www.independent.com/2022/01/04/did-youtuber-trevor-jacob-crash-his-plane-in-the-los-padres-on-purpose/

The video, which was uploaded on December 23 and has drawn more than 370,000 views, documents Jacob's escape from the stalled plane from multiple camera angles, including a handheld selfie stick. But viewers and aviation experts have grown suspicious of his decision to abandon the aircraft mid-flight, and some have publicly wondered if the entire incident was staged.

https://youtu.be/vbYszLNZxhM

During the first portion of the video, the flight seems to be without any issues, when suddenly Jacob is heard cursing repeatedly and attempting to open the pilot-side door. He does not explain what is happening — the video only shows the nose propeller coming to a stop before Jacob hesitates for a moment, then leaps out, selfie stick in hand. The camera stays perfectly framed on Jacob's face as he falls with the pilot-less plane above him. Cameras attached to the plane's wing and tail capture it slowly losing altitude before plummeting into the mountains.

Sources inside the Lompoc airport said it appeared Jacob never intended to make the full journey to Mammoth. They described the aircraft as in a state of disrepair and in need of major maintenance. Jacob attempted to complete a few fixes on his own, the sources claimed, but seemed to struggle.

Other red flags that suggest Jacob choreographed the event. Jacob implores viewers to always wear a parachute while they fly and credits his for saving his life. His quick decision to exit the plane instead of looking for a place to land. He claimed there was "no safe place," but the footage depicts a large, flat expanse not far in the distance. "From the looks of it, he could've guided that plane 15 or 20 more miles and landed it on more level ground,"

A few days after the crash, sources at the airport say Jacob returned with cuts and bruises and told the story of what had allegedly occurred. Employees informed Jacob that the incident would need to be reported to the FAA, but soon after, Jacob and a friend allegedly chartered a helicopter to remove the wreckage from the forest and transport it to an unknown location.

The FAA said the investigation remains ongoing, and the agency is therefore not able to comment.

Sooo, then-- this GEM appeared in a recent AVWEB Newsletter!!!!

https://www.avweb.com/multimedia/best-of-the-web-pilot-sucked-out-of-airplane/?MailingID=808&utm_source=ActiveCampaign&utm_medium=email&utm_content=5G-Protected+Airports%2C+Paraplegic+Jet+Pilot&utm_campaign=5G-Protected+Airports%2C+Paraplegic+Jet+Pilot-Monday%2C+January+10%2C+2022

About this YouTube video, widely derided as a pilot faking an engine failure so he could bail out of his stricken airplane was in fact caused by a little appreciated hazard of being accidentally sucked out of the airplane when a door comes open.

In this week's Best of the Web video, https://youtu.be/PRwV9rn2794 crack aviation investigator Bryan Turner gets to the bottom of this tragic event and surely hundreds of lives will be saved as a result. As he points out, it can happen in cars, too. Even your house.

Editor Note: Obviously BOTH Videos are over the top! It seems people may have way too much time on their hands !!!!!!

Here are a couple of the comments left on the AVWeb Site

There is no place for ridiculous and charlatan videos like this in your publication. Who approved this for inclusion, a 14 year old intern? I hope there is an FAA investigation of this clown.

This rubbish should never be published, let alone in AvWeb. I thought they had better taste.

Pilot's tip of the week

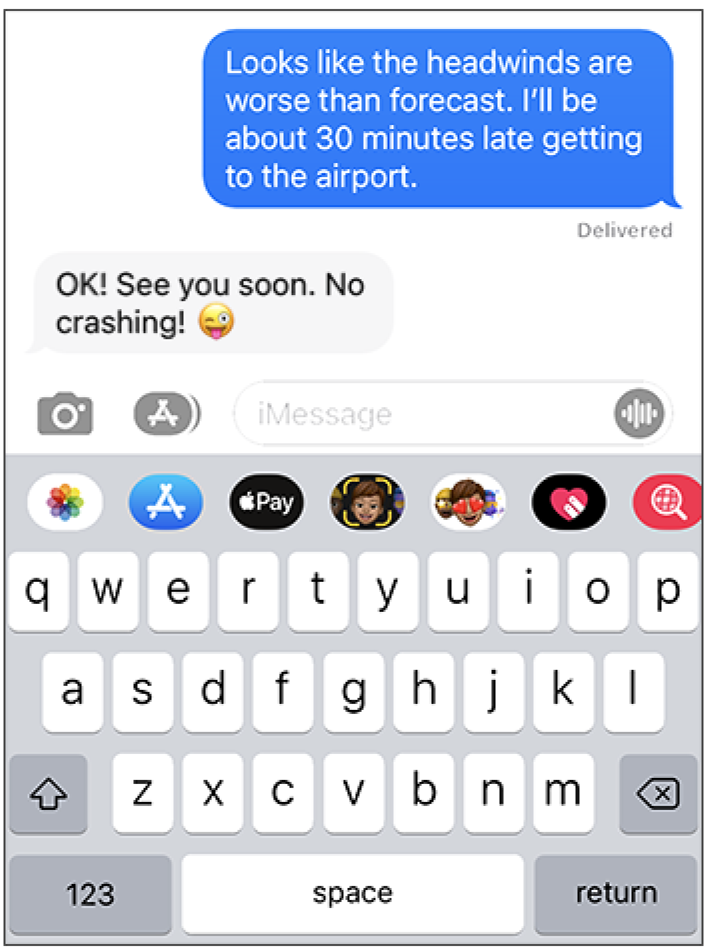
Should Pilots Worry About 5G?

Featuring [Bruce Williams]

Subscriber question:

"I've read about 5G interfering with avionics. Does this mean I can’t use my 5G phone in the air?" — Bobby M.

Bruce:



"This is really a two-part question. FAA is concerned that 5G signals may interfere with radar altimeters. Unless you have a radar altimeter in the panel, fly approaches to CAT II or CAT III minimums, or own an airplane with emergency autoland, interference from 5G towers shouldn't be an issue.

Using a 5G phone in flight still may be a problem. FAA doesn't explicitly forbid using a cell phone during flight. Instead, FAA addresses the use of all portable electronic devices in AC 91.21D. If you operate under Part 91, the advisory circular essentially says that, as PIC, you should conduct tests—while VFR—to confirm that everything plays well together in the aircraft that you fly. If you upgrade to a 5G device, it's prudent to repeat those tests.

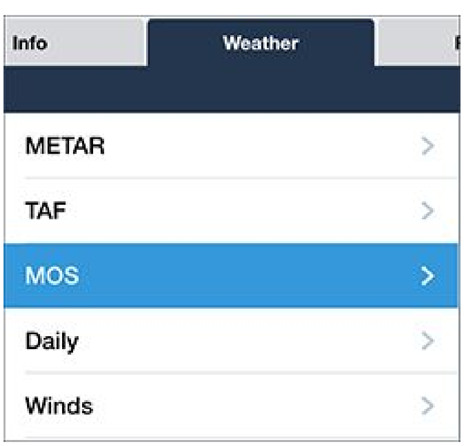
The AC also cites and endorses long-standing FCC regulations that prohibit making calls while airborne, unless the phone is connected through an approved system installed in the aircraft. FCC's primary concern seems to be interference with the cellular network on the *ground*, which isn't designed to handle fast-moving signals that boing from tower to tower like pinballs.

Recent experience using modern personal electronic devices, especially EFBs, indicates that they don't interfere with contemporary avionics. Instead, the issues with making a phone call while flying seem to be establishing and maintaining a reliable connection to the cell towers below.

Pilots have debated the FCC rules for a long time. However, your primary concern about airborne cell phones probably shouldn't be conflicting radio signals or hearing only every third word of a conversation. Using a cell phone to send a text or to take photos and video can cause much more serious interference—by distracting you from your primary task: Flying the airplane."

Also from "Pilot's Workshop"

What's a MOS Forecast?



"I see 'MOS' in my list of weather sources after METAR and TAF. What is that and how does it work?" — Dave C.

KWST MOS	52m ago
0500Z TOMORROW	
●	IFR
Wind	160° at 3 - 12 kts
Visibility	2 sm
Clouds (AGL)	Broken 700'
Weather	Rain
Temperature	2°C (35°F)
Dewpoint	-1° to 2°C (31° to 35°F)
Expires	0900Z Tomorrow

Scott:

"MOS stands for Model Output Statistics. Forecast models such as the Global Forecast System (GFS) don't automatically produce a point forecast for a specific town or airport, so MOS takes the 'raw' model forecast and applies a statistical method that produces an objective, site-specific forecast for a town or airport. MOS forecasts are completely automated, therefore, no human forecaster reviews or amends them.

MOS takes into account historical observations at forecast points such as airports. MOS downscales the model data into weather elements important to aviation. This includes, but is not limited to, cloud coverage, ceiling height, prevailing visibility, wind speed and direction, precipitation type, and the probability of precipitation or thunderstorms.

For example, we know that pressure drives wind. If the GFS model produces a certain pressure pattern over an airport, based on that specific forecast pressure pattern by the parent model, MOS is able to determine that the wind speed and direction will most likely be 290 degrees at 12 knots. That allows MOS to provide a very accurate forecast given that it incorporates the local environment for that airport.

That said, *many MOS elements such as ceiling height and surface visibility are categorical*.

So you might read a MOS forecast of 700-foot overcast and 2 miles visibility, but that really means a forecast with a ceiling category of 500 to less than 1000 feet and a visibility category of 1 to less than 3 miles. In other words, both ceiling height and visibility are in the IFR category."

The Aviation Consumer®

Here is a follow- up to the Insurance Article that was in last month's Newsletter

Doing the research for this article, we spoke with aircraft owners and insurance brokers. We came away concerned for the financial well-being of owners because we heard owners repeat some aviation insurance myths that should have died long ago and because some have signed agreements that—in certain circumstances—can negate the insurance they spent good money to buy.

• **Myth 1:** If I buy insurance I'm turning myself into a target. "Those plaintiff attorneys are always looking for someone to sue. If I've got insurance, they'll come after me instead of going after the real cause."

The "logic" apparently evolved from the experience of aircraft and engine manufacturers who are often named in lawsuits because they usually have good insurance and the plaintiffs hope that the manufacturer will cough up some money.

The hard reality is that at least 80 percent of aircraft accidents are caused by something the pilot did wrong.

Someone who owns an aircraft probably has assets worth pursuing. Rather than turn the owner into a target, insurance is designed to protect those assets.

Besides, there has to be an accident before there is a lawsuit. The aircraft owner can't be a target until he's crunched his airplane. Then, the insurance performs its design function to let the owner sleep at night knowing her family assets are safe.

• **Myth 2:** I can point the finger at a manufacturer because it did something that made me have an accident.

This popped up in conjunction with a discussion of Garmin's new three-dimensional visual approach guidance (pictured). The owner told us, correctly, that Garmin's guidance uses a three-degree glideslope universally. However, the visual descent for his home airport requires a four-degree descent to clear obstructions. He said that if he hits the ground, it's Garmin's fault.

That may sound good if you say it fast, but manufacturers aren't stupid. In the visual approach example, Garmin spent a lot of time making it clear to users in its manual that the descent guidance is just that, guidance. The pilot is responsible for obstruction clearance.

We've spent time a lot of time watching aircraft manufacturers check, double-check and cross-check data, performance, handling and operating instructions. Following an accident, the odds are that the makers got things right and the pilot slipped up.

• **Pitfall 1:** Not buying enough insurance coverage. The most popular aircraft liability policies include "sublimits" that limit the coverage for each passenger to $100,000.

The owner may think that he's bought a $1 million policy—only to find that there is really only $100,000 available to settle the injuries to the single passenger.

In our opinion, if the owner has any assets, buying a policy with "sublimits" rather than "smooth" limits (the full amount of the policy is available even if just one passenger is injured) is a mistake. If you have a sublimit policy and are sued for a badly injured passenger, your insurance company will probably put up the full $100,000 right away and walk away from the case. Once the insurer puts up its limits, it no longer has to provide you with an attorney. You're on your own.

• **Pitfall 2**: Signing an agreement that negates your insurance coverage. All of the aircraft liability policies we've read exclude coverage if the aircraft owner assumes any liability under a contract or agreement or if the owner has assumed (accepted) liability. It also prohibits the owner from doing anything to interfere with the insurance company's right to subrogate (pursue for reimbursement of the money it paid you) against the real wrongdoer in an accident.

We have seen some FBOs require that an aircraft owner sign an agreement not to sue the FBO for its services before the FBO provides those services, most commonly fueling and de-icing. If the owner signs and then has an accident caused by the FBO's services, the owner's insurance company can refuse to pay the owner for damage to the airplane because the owner interfered with the insurer's right to subrogate against the FBO.

Whether the agreement signed with the FBO is valid or not depends on state law, but do you want to have to litigate that issue to get your insurance to pay? FBOs carry insurance—so we think it's unethical for an FBO to require that an owner sign away rights in return for routine service.

Pitfall 3: Signing an agreement that obligates the owner to pay to defend a manufacturer or service provider against a lawsuit.

Thus far we've only run across this with an extended warranty offered by Avidyne on its avionics. The aircraft owner agrees not only to not sue Avidyne if she crashes, but also agrees to defend Avidyne if someone else—for example, a passenger—sues Avidyne. Her insurance will not help her, she's got to pay to defend Avidyne.

Got a spare million bucks lying around? We think that self-insuring for the wrong reasons is a mistake, just as we think underinsuring and signing away rights is something owners shouldn't do.

boldmethod

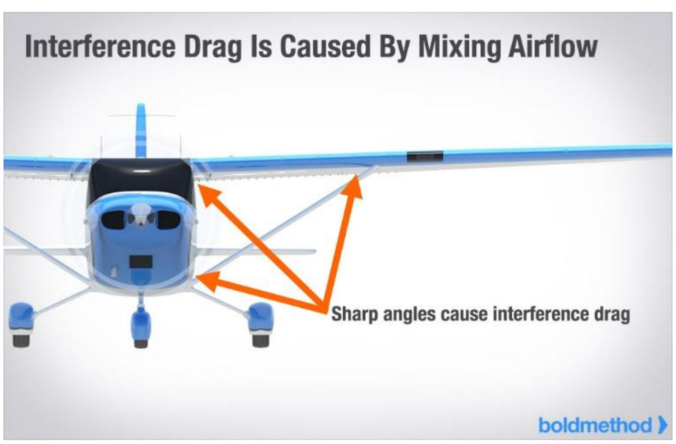
How Interference Drag Affects Your Plane's Performance

By Boldmethod 01/08/2022

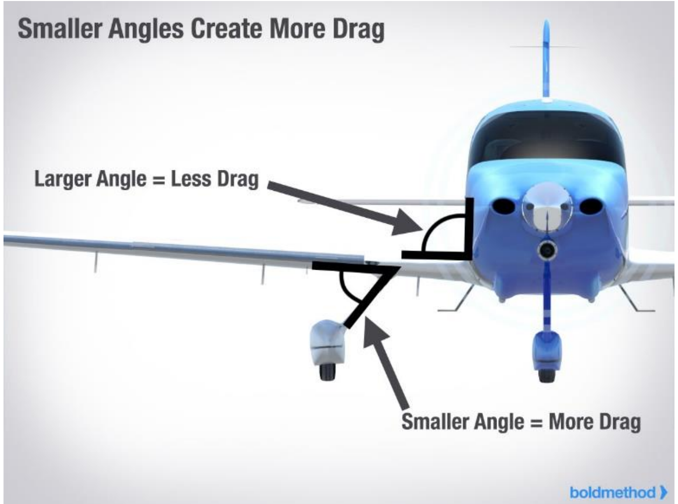
Your plane creates interference drag every time you fly. But what exactly is it? Here's what you should know...

Mixing Airflow

Interference Drag is generated by the mixing of airflow streams between airframe components, such as the wing and the fuselage, or the landing gear strut and the fuselage.



As air flows around different aircraft components and mixes, it needs to speed up in order to pass through the restricted area. As the air speeds up, it requires extra energy. At the same time, it creates turbulence, resulting in an increase in drag. **The more acute (sharp) the angle, the greater the interference drag that's generated**.



Where You'll Find Interference Drag

You can typically find interference drag anywhere you find a sharp angle on your plane.

For example, look at where the fuselage and wing meet. Interference drag forms behind the trailing edge of the wing adjacent to the fuselage. **Airflow over top and underneath the wing mixes with airflow around the fuselage, creating interference drag.** If the wing was flying without an attached fuselage, there wouldn't be interference drag at this location.

To reduce the drag, designers use fairings to ease the airflow transition between aircraft components, like what you see in the picture below.

But interference drag isn't just limited to where the wings and fuselage meet. A Cessna 172 wing strut, for example, has fairings around the base and top of the strut, where the strut meets the fuselage and wing. Without fairings, these connections form noticeably acute angles, significantly increasing interference drag.

Retracting The Gear

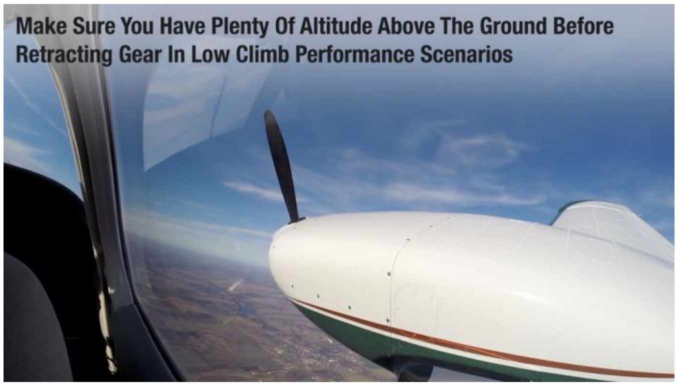
If you've flown airplanes with retractable gear, you should know that as you retract the gear, you significantly increase interference drag. *You might be thinking, "Wait a second, I thought retracting the gear should decrease drag, not increase it?"* Don't worry, you're not totally off.

As the landing gear retract into the fuselage, you're creating a progressively acute angle between the fuselage and landing gear strut. And since tight, acute angles cause more interference drag than wide angles, you'll be momentarily increasing drag as your gear retracts. The moment just before the gear move into the fuselage is where the most interference drag is created.

It's something to keep in mind when you're flying out of hot, high-density altitude airports.

If you're just above the ground and beginning your climb, you'll reduce your climb performance in the process of bringing the gear up. On hot days, wait a few extra seconds and climb up to a higher altitude before bringing up the gear.

Fortunately, the performance loss will only last as long as it takes for the gear to fully retract.



As the angle between airframe components shrinks, interference drag increases. That's why you see fairings placed around most airplanes where the sharp angles meet.

And remember that interference drag is just one of three major forms of parasite drag. The other two? Form drag and skin friction drag.

From the Archives of

Editor Note: This has been a very indepth, lengthy discussion broken into installments. Here is the link to the full article

https://www.avweb.com/features_old/pelicans-perch-18mixture-magic/

Pelican's Perch #18: Mixture Magic

This is the 4th Installment of an article discussing Engine Fuel/Air Mixture

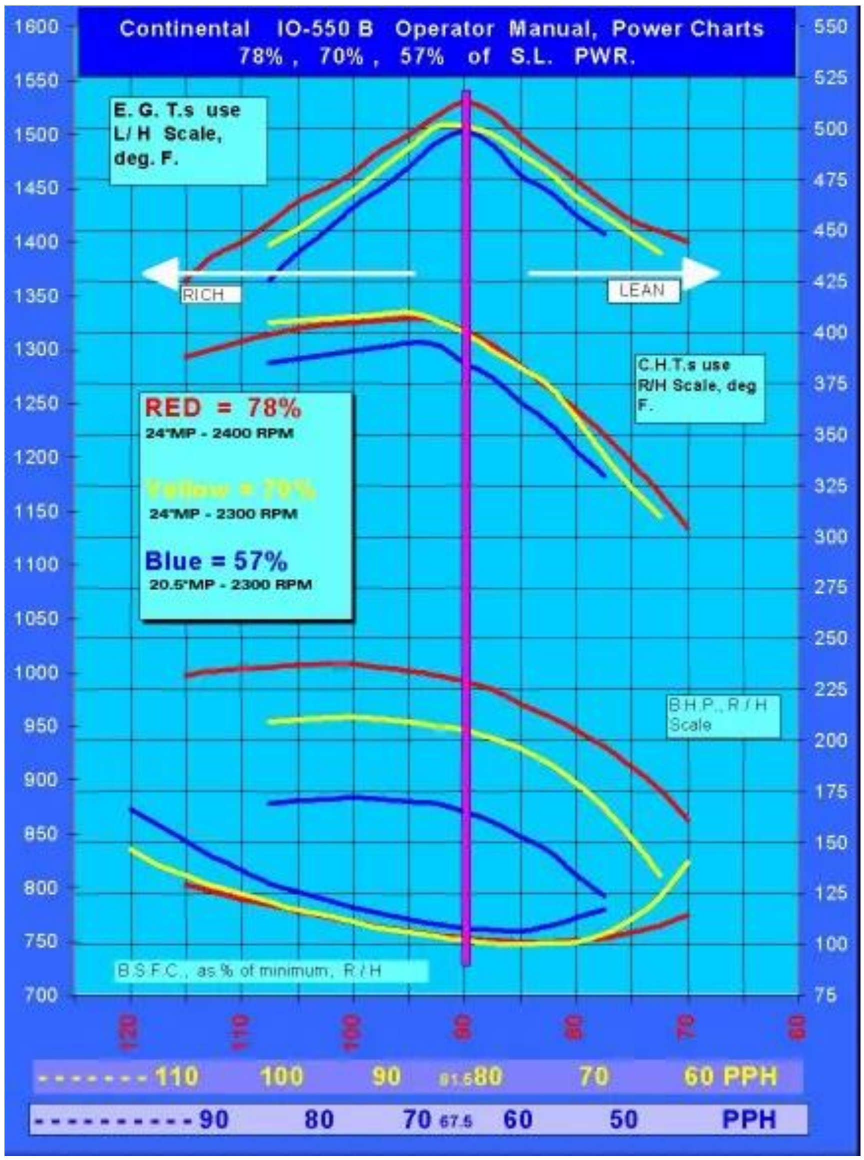
If we change the Manifold Pressure or RPM, what happens to the relationships between Fuel Mixture, EGT, CHT, and their affects fuel efficiency? Read on to discover the answer.

Let's say you have carefully set the engine up at **real** 65% of rated power, using the required MP/RPM, with the mixture leaned to Best Power.

What would happen to the above relationship if we increased the MP and/or RPM, keeping the mixture constant at Best Power? More power to the shaft, right? Think about what this might do to the power chart.

Since the power moves up, all the curves must move up. Since the peak EGT will occur at a higher fuel flow, it must move to the right, and all the other traces will move right, too, to preserve the interrelationships.

Here’s what that looks like:



Heads up, crucial concept coming!

So, next let’s add to our above scenario:

We have leveled off and very carefully trimmed the aircraft up for straight and level flight. We have set Both Engines, set at equal MP, RPM, and mixture settings for 65% power for both engines. **Resulting in them both producing exactly the same power!**

Now, Assume that we

> Increase MP, which increases power output to something substantially above 65% power. ***Editor Note: The article doesn’t say but I think for their illustration to work the Throttle Levers must be matched***
>
> Lean the mixture a bit, until the actual power drops to exactly 65% power again?

This real picture shows the indications after the throttle is increased, and the mixture decreased

The left MP is 3″ higher than the right

The left fuel flow is 3.2 GPH **lower than the right**!

The left EGT is only 10°F higher than the right

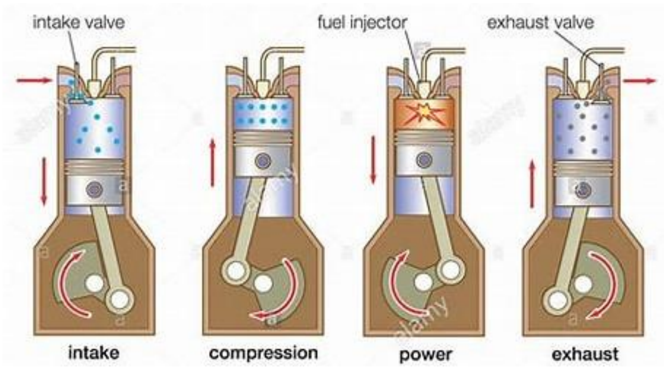
The left CHT (as shown by the missing bars on the Graphic Engine Monitor display) is 1 to 3 bars lower than the right

Ponder this: The left Engine has **cooler** CHTs, using **less** fuel, producing the **same** power. Sounds like magic, doesn’t it?

So, How can an engine operating at a higher Manifold Pressure have cooler CHT, use less fuel, and still produce the same amount of power?

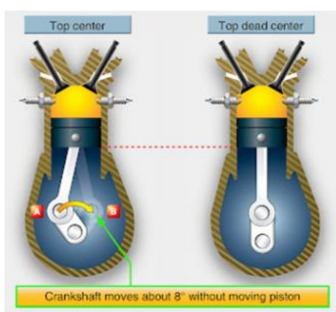
For the answer, we must look at an engine's design, combustion cycle, and its operation.

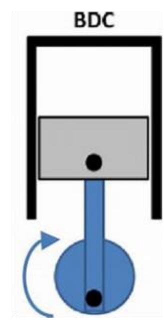
Here is a review of the combustion cycle



As a piston travels up in the cylinder it reaches "Top Center" about 8 degrees before reaching "Top Dead Center." The piston then travels down in the cylinder to "Bottom Dead Center."

"Top Center" "Top Dead Center" "Bottom Dead Center"





An engine does "useful work" when it produces power by igniting the proper fuel/air mixture at the proper time. Therefore, our discussion will center on the "Power Stroke."

After the Fuel/Air Mixture is drawn into the cylinder it is compressed as the piston comes up on the compression stroke. The point that the fuel/air mixture is ignited is essential to get the greatest amount of power from the engine.

Intuitively, you would think it a simple matter, just light it off when the piston hits TDC (Top Dead Center).

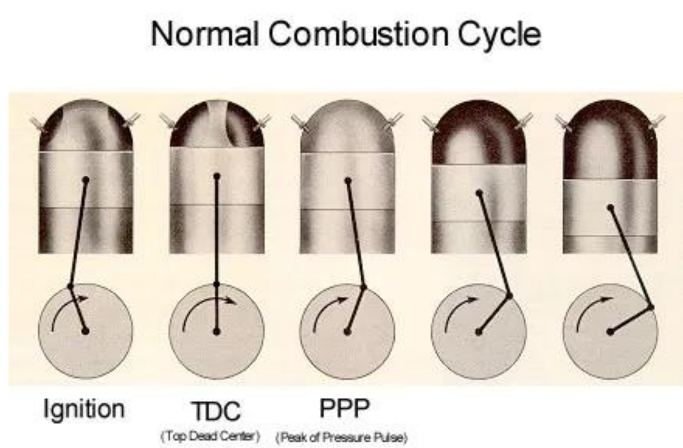
But it is important to understand that fuel/air mixture doesn't just "explode" in the cylinder. It takes quite a bit of time to light that fire. Once ignited the flame burns at a set speed, so it takes time for the flame to expand sufficiently to apply enough pressure to the top of the piston **(Peak of Pressure Pulse)** do anything useful.

Because of this, the question becomes; when is the right time to light the fire. The answer depends on all three engine parameters – mixture, RPM and MP. The best time to "light the fire" also changes with RPM and mixture.

At a high RPM, it takes a short amount of time for the piston to rise and fall. *(the flame has less time to expand)* At a slower RPM, it takes longer. *(the flame has more time to expand)*

At maximum power, experience has shown that discharging the spark at 20° to 25° **before** top dead center (TDC) is about right. That much "lead time" gives the fuel/air charge time enough to develop a good fire, and the pressure will start to build just as the piston reaches the top-of-stroke. From that point, the fire gets really serious, and **the pressure builds rapidly, just as the piston starts falling away**.

Again, through experience and actual measurement, it is clear that about 16° to 18° **after** TDC is the best place for that pressure peak to occur, in order to extract the maximum amount of useful work, as shown by the following picture from the Pratt & Whitney book:



As you can see in the first picture

When ignition occurs the crankshaft knuckle is reaching the top of its arc, which also puts the piston very close to the top of its stroke.

At first glance, igniting the charge at 22° before TDC seems like it would be counterproductive, since the piston is still coming up. However, as discussed above, it takes some time for the fire to get going, and by the time that happens, the piston is already pretty much topped out, so the building pressure cannot really produce the "negative power" you might have expected at this point.

The second picture shows perfect TDC.

No matter what the pressure in the combustion chamber is doing, there is no "mechanical advantage", no leverage, as the piston is just pushing straight down on the connecting rod, which is pushing straight down on the crankshaft throw.

Combustion chamber pressure at this point produces no useful work at all

The third picture shows

The approximate position of the piston at the peak pressure point (PPP).

If the pressure peaked a little sooner the piston would be at the top of its travel, with less mechanical advantage on the crankshaft, and engine stresses would get very, very high.

At about 16° after TDC, some decent mechanical advantage is just beginning to take place, and that allows time for the rest of the combustion event to "push" the piston down.

If the peak of the pressure pulse occurs much later than 16°, the initial peak would have a greater mechanical advantage, but then much of the energy in the later stages of the combustion event would be lost.

On balance, a PPP at 16° after TDC turns out to be about the best you can do. Another compromise.

Now that we have refreshed our knowledge of an engines Combustion Cycle. We will further discuss the effects of Mixture, RPM, and Manifold Pressure on an engines operation in next month's Newsletter!!!

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Interesting and useful websites on the Internet:

NOTE: You may have to copy and paste the address into your browser if the link doesn't work

I have added a few that I use.

If anyone knows of other interesting websites let me know and I will add them to the list

Our Chapter Home Page:
https://chapters.eaa.org/eaa1321

Why We Fly
www.whywefly.org

EAA: Home Page
http://www.eaa.org/eaa

FAA Safety Team FAAST
https://www.faasafety.gov/

FAA Safety Briefing
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Regular links To Check out:
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