



## EAA Chapter 648

Longmont, Colorado 80503

Our next meeting is on Monday, May 14th, 2018, at 7pm.

The meeting will be held at our usual venue, the Colorado Classic Aircraft office of Carol & Bob Leyner, located on the north side of the Longmont Airport.

Guest Blog: **Selling The Fun, Not the Gewgaws** (something gaudy and useless; trinket; bauble.)

By JASON BAKER

Life as a full-time news editor and marketing dude can get a bit boring. Did you know that company XYZ has developed product A, or expanded service to now include B and manager Joe Little and CEO Frank Big both think it's the most amazing thing since dinosaurs walked on earth? Oh, and don't forget to read *the "About Us"* tab. It's been the same for nine years.

**Yawn!**

Missing the audience and failing to convey a message that departs the norm and veers off the beaten path seems to have become the norm. People like me now make a living telling aviation companies that canned news releases and newsletters as well as Facebook and Twitter hashtags and other social media storms are short-lived vehicles to convey what we do with those we wish to reach.

Pictures are great, videos are great, but they don't make people jump up and drive to their local airport to take flying lessons. Maybe we have to be more human in how we communicate, so that we reach more humans with what we have to offer. Language is powerful and—seriously folks—people on the outside just get blurry vision and then click on something that "gets them."

Even those who exchange ideas, concepts or thoughts among their fellow pilots through forums and discussion groups appear to be a bit tired at times. Discussions have turned stale and repetitive. There's always one person who can one-up the other, either financially or with the number of toys owned. The tone often turns negative towards the very future of what we love and wish to sustain for future generations to come.

Our fraternity feels discriminated against by regulators who don't understand what general aviation is all about, mistreated by the press and media, which often shows its bias and lack of

knowledge, and bugged down by politicians who can't tell an airplane from a hole in the wall. Senator Schumer could have just zipped it, rather than involving himself in the tiresome helicopter debate. Rah, rah.

We live and operate in a complicated and highly technical environment that has mastered unique and tremendous challenges in its past. No question, we have huge challenges in front of us. Over the last two years, my own thinking has changed and these days I wonder if our focus for selling general aviation should be shifting to how we communicate about general aviation. I believe that **how we communicate** has much more impact than **what we communicate**. What is general aviation? First and foremost, it's fun. It's the freedom to discover and explore and experience truly endless beauty.

So here we are, 10-plus years into the LSA and Sport Pilot movement with the heavily relaxed BasicMed process to get people back into the mix and yet our growth appears relatively stagnant. Again, nothing seems to catch on. The old guys don't think it's worth jumping back in and the youngsters are so involved and focused on Facebook, Snapchat, Instagram and staring at their smartphones, that having a conversation at the dinner table isn't possible without functional Wi-Fi. We middle-aged people are no better, mind you. When was the last time you completely unplugged?

My new Bose A20 reads me my messages and emails on demand and I can watch my favorite movie right on my SVT HUD while clipping along at 210 IAS on the new S-TEC AP with the A/C on. Ever since I got that STC'd STOL kit and the 2850 XLs, her Vx and Vy is like ... Can someone from the general populace follow us when we talk about ADS-B, XPDRs, 14 CFR Part 91, certification standards, G1000XLi, EFBs, SBs and ADs? You get the point.

Having gotten nearly all the fancy badges on my own FAA certificate listing, I distinctly recall an examiner who stated that there are two kinds of pilots out there. There are those who chase bigger metal and more technology and those who chase adventure and fun and the flying contraption they use is simply a tool to experience and share just that.

I always enjoyed and embraced the small airplane stuff much more than the information about Boeing's newest wide-body or Branson's plans to shoot people across the globe at warp speed for close to a trillion dollars per seat. I do appreciate the developments in technology and all the crazy gadgets, really, but what I really want is stick-and-rudder, low-and-slow VFR flying fun. Frequently, I hear that general aviation is competing with other, easier-to-learn and finance leisure activities like boats, Jet Skis, ATVs and motorcycles. And even RVs. Just like sport flying, all these things bond families together and provide endless fun. They all convey just that message in their marketing and advertising. Are we really competing? Can you fly a boat, Jet Ski, ATV or depart planet earth and climb above the clouds on a motorcycle without a notarized will? None of our competitors is free of risk, liability or cheap to insure. Each comes with challenges of their own.

We may need to relax on the mundane numbers and abbreviations based on highly technical BS nobody needs or wants to see and focus on what makes sport and general aviation flying unique and priceless. And why anyone not involved or caught by the virus is missing out on a lifestyle and passion that is simply impossible to match. **Please don't let it be an autopilot!** Is there hope for radical change in how we portray sport and general aviation to the public and among our peers? Would doing so change things? Hope springs eternal and we have to start somewhere.

## A Treatise On Oil

Oil—the stuff of life in internal combustion engines—very much leads a double existence in our air-cooled aircraft power plants. It's the obvious working fluid in the lubrication system, while at the same time is a major, if often overlooked, player in the cooling system. It even moonlights occasionally as a substitute hydraulic fluid in controllable-pitch propeller systems.

As a lubricant, oil is mainly responsible for reducing friction among the engine's moving parts, but it also floats away impurities, provides corrosion protection to the engine's otherwise un-plated, un-painted metal, and aids sealing the piston rings to the cylinder.

As a coolant, oil transfers combustion heat from the vulnerable, hellishly hot piston and piston pin to the oil cooler where it is shed to the atmosphere. It's also the main source of cooling for the entire bottom end of the engine, that is, the crankshaft, connecting rods and, most notably, the main, rod, and thrust bearings, plus it is also the main coolant for the valve train where the valve springs are especially needy. In fact, while typical aircraft engines are labeled air-cooled, the only parts mainly air-cooled are the cylinder heads. It would be more proper, if laborious, to say these are air- and oil-cooled engines. The same is similarly true for water-cooled engines, although water's greater density typically handles a greater percentage of the engine's waste heat.



### Oil the Lubricant

For our purposes let's note mineral oil (the traditional stuff) is refined from crude petroleum and synthetic oil is the same stuff more highly refined, or a totally different material synthesized from non-crude-oil beginnings. Synthetic oil is more uniform in its molecular structure and contains much less of the extraneous stuff found in mineral oil (waxes and such) that have nothing to do with lubricating engines. Synthetic oil has several desirable qualities to offset its greater cost, most notably it remains stable—does not break down into gummy residues—at high temperatures. Mineral oil begins breaking down noticeably around 240°F, while synthetic oil often withstands temperatures hundreds of degrees higher. In fact, high oil temperatures are first a threat to mineral oil, but with some synthetics, the first thing to give is the bearing material in the engine.

One downside to synthetic oil as first sold to aviators was its minimal ability to carry extraneous lead from 100LL gasoline in solution. Said to have been an additive issue, sludge formation has purportedly been a problem with 100% synthetics, and synthetic oil is now offered mainly as a 30% synthetic/70% mineral blend to form semi-synthetic oil. It has no issues with sludge formation.

Oil is also categorized by viscosity, which is the liquid's thickness, measured by its resistance to pouring at a given temperature. Viscosity is important as it provides the “body” to cushion against metal-to-metal contact. Around cars, oil viscosity is called “weight,” as in “30 weight” and is established in accordance with standards set by the



Society of Automotive Engineers (SAE). In aviation this property is formally known as “grade,” and the numbers come out roughly double that of SAE weight. So 100 grade corresponds to 50 weight, for example. Naturally, around the airport “weight” is more often heard than “grade” these days.

Oil weight or grade is matched mainly to the oil’s operating temperature range, although internal engine gaps (between the crankshaft journals and their bearings, or between the piston rings and cylinder walls) play a major role as well. Thus, the light duty cycle of automotive engines means relatively low oil temps, plus these tightly-built engines feature small oil clearances so they employ 20 to 30 weight oils at most. Our oil/air-cooled aircraft engines run hard, long, and put generous heat into the oil, so thick, 50 weight is typical, with some legacy radials running 60 weight, thanks to their cavernous oil clearances.



Single weight or grade oil is just what it sounds like, an oil with a specific viscosity at operating temperature (212°F). It is much thicker at cold temperatures. Multi-weight or multi-grade oil, say 15W-50, is a thin 15 weight oil with viscosity improvers added to it. The VI compounds literally coil into tiny balls at low temperature and uncoil into longer strands at high temperature. When balled, the VI compounds don’t impede the oil’s pourability, but when strung out they make the oil thicker.

In our 15W-50 example the oil pours like 15 weight oil at 0°F and 50 weight oil at 212°F. This helps because, like everything else, oil has an operating temperature range. The thick 50 weight oil in aircraft engines is barely a

lubricant at low temperatures—think 45°F or colder cold starts—because it doesn’t flow. The oil can be so difficult to pump through the engine’s smaller passages that it momentarily doesn’t flow at all. Engine preheating is a great answer, but a multi-viscosity oil with greatly improved flow at low temperatures is a big, very convenient help, too.



Cold oil, no matter what type, is a real concern. Besides flowing poorly until it gets a bit of heat into it, thick oil causes meaningful drag on engine internals. This makes life difficult for the starter motor and drags down the battery. It also robs engine power and wastes gasoline overcoming the excess drag. But the worst issue is rapid metal-to-metal engine wear due to no or low oil flow. Short of

preheating, a multi-viscosity oil and warming the engine in the run-up area until movement is seen on the oil temperature instrument are the practical answers.

At the other end of the thermometer, excessive heat is fatal to mineral oil. As temperature ramps up, mineral oil breaks down, cooks, burns, call it what you will, but it permanently turns into a non-lubricating goo. This process is beginning at 225°F, but gets meaningful around 240°F, and when conventional motor oil exceeds 260°F, it’s rapidly becoming something other than motor oil. That’s why overheated mineral oil must be changed. It’s also a big synthetic advantage; hot oil temps are not much worry to it.

Clearly Goldilocks oil temps are the goal: 185°F to 215°F. Given an hour of flight time, this is warm enough to burn off the copious water contamination formed by combustion, but not so hot as to break down the oil.



### Additives

All motor oils are augmented by additives chosen by the oil manufacturer. These differ widely by the oil's intended use, but what you need to know is most additives are sacrificial. They get used up by engine operation, and either more additives must be poured into the crankcase (not unknown in over-the-road trucking or industrial engines, but not done in aviation or automotive applications), or the oil must be replaced.

Typical motor oil additives address high-pressure lubricity (the camshaft-lifter interface is the big player here), but aircraft engines are also heavy on anti-sludge additives to combat the gray goo formed when leaded gasoline, water, and loose engine tolerances get together, along with acid neutralizers.



Then there are the well-known ashless dispersant additives. Ash is a combustion byproduct formed in the combustion chamber when engines burn oil there. The big players in ash formation are detergent additives, so unlike automotive engines with their essentially oil-tight combustion chambers, aircraft oils avoid detergents. Air-cooled aircraft engines burn oil, thanks to their necessarily loose piston, piston ring, and cylinder wall tolerances, so ash-forming detergent additives are an aviation no-no (and why you don't run auto oil in airplane engines). Ashless dispersant additives hold what ash that does form in solution so it can be scrubbed out by the oil filter, or (amazingly) failing an oil filter, until the oil is replaced.



### Controlling Oil Temperature

Lycoming and Continental provide for both too-cold and too-hot oil temperatures. A thermostat, called the vernatherm (on Lycoming engines), is set to open at 185°F. It shuttles cold oil directly through the engine and hot oil through an oil-to-air oil cooler before letting it go through the engine. Thus, oil temperature on these engines is a minimum of 185°F, except from between a cold engine start and when the oil warms to 185°F. That's a big "except," and it's up to the pilot to avoid high engine loads (such as taking off) when the oil is too cold (below 100°F). Few pilots seem to have the discipline to avoid cold-oil engine operation, and low-performance standard category applications and their Experimental equivalents seem to survive such barbarity. But as engine performance goes up, avoiding high-load, cold-oil operation makes a difference in engine

longevity.

Maximum oil temperature is controlled by an oil cooler, and on aircraft, these are inevitably oil-to-air radiators. Water-cooled engines mean oil heat can be shed to the water coolant via an oil-to-water heat exchanger; it's likely the superior strategy, but obviously impractical on air-cooled engines.

Similarly to exhaust systems, the remotely-mounted Lycoming oil cooler lives in the gray boundary between the engine maker's and the airframe manufacturer's responsibilities, and therefore many applications leave much to be desired. As Experimental aircraft builders, we are responsible for everything, and dealing with the many variables in constructing an efficient oil cooling system is a major creative area for us.



Rotax engines are supplied and typically run without a thermostat (vernatherm). But the popular Rotax four-strokes are also dry sumped. Dry sumping means there is a larger oil supply, so the oil spends relatively more time outside of the engine in a tank and therefore naturally sheds more heat than a conventional wet sump Continental or Lycoming. Rotax's are also water-cooled, meaning less cylinder head heat ends up in the oil in the first place. Continentals mount their coolers directly to the engine. They also use the more heat-transfer efficient, more physically durable bar-and-plate style cooler construction. Integrating the engine to the airframe is therefore simplified; an adequate inlet and cowl flaps are typically sufficient.

## Oil Analysis

Critically examining drain oil gives an excellent window into what's going on inside the engine. Specialized labs offer such services; they use spectroscopy and other advanced methods to accurately detail in minute quantities what's in the oil, and thus the engine. Excessive amounts of steel could foretell cam and lifter failure for example. High aluminum counts might be piston or piston plug wear, iron is likely from piston rings, tin is normally from bearings, and so on. The oil's composition is also easily tracked, so additive depletion or contaminations are easily spotted.

Oil analysis is a powerful tool, especially when used regularly so changes can be quickly and accurately identified. Of course, it's also an added expense, so most private operators use it occasionally or when problems are suspected. At the least it's another tool to be aware of, at best it's a regular part of a thorough engine operation program that gives peace of mind, looks good at resale, and just might catch impending disaster.

### Sidebar: **Why So Much?**

Filling the typical airplane engine during an oil change feels like topping off a super tanker—why do they hold so much oil anyway?

There are several reasons. Firstly, the more oil available, the fewer trips through the engine any given amount of oil makes per unit of time. So, more oil means less contamination, less rapid oil

heating, and maybe a touch less total oil temperature. But mainly our good old, loose-tolerance, air-cooled aircraft engines draw oil past the piston rings and burn it in the combustion chamber, sometimes dramatically.

When the regulations were written decades ago, massive oil consumption was fairly normal because cylinder sealing wasn't as good as today. Thus, typical 6-cylinders are allowed nearly a quart of oil an hour(!) consumption, so a seven-hour leg with long-range fuel tanks means it's possible to consume five quarts during such a trip.

In the modern world, oil consumption should be more like a quart every 10 hours, and you'll also find putting 12 quarts in a 540 Lycoming or eight quarts in a 360 results in one quart blown out the engine breather and down the aircraft's belly in about an hour. This is why the old hands always run a quart lower than the placarded maximum.

This article appeared in a 2016 edition of Kitplanes.



On Wednesday evening, April 4<sup>th</sup>, Willi and I accepted Mike Gugeler's invitation to the Antiquer's monthly meeting.



The Antique Airplane group was having their monthly meeting at the Vintage Aero Flying Museum at Platte Valley Airport. They were cooking up some



Fokker D-VII

hamburgers/hot dogs/chips/beans and showing the Fokker D-VII, the SPAD XIII (which recently had its first flight), and the progress they are making building a British RAF SE-5A. These planes plus a Sopwith Camel are scheduled to be at Dayton, Ohio



SPAD XIII

this fall for the Dawn Patrol Rendezvous at the Air Force



Museum. We took a tour of the museum and WWI airplane factory.

Mike was explaining that many parts for the airplanes needed to be improvised in the most unusual manner!



RAF SE-5A



**Open House April 21, 2018**  
 Doors Open 10:30      100th Anniversary      Doors Close 4:00pm  
**Who Shot the Red Baron Down?**

**Open House Schedule**

- 11:30 Lunch
- 12:30 Talk
- 3:30 Doors Close

Call 303.688.8044 with questions

**Hot Dog, Chips and a Drink \$6.00**  
 Fund Raiser lunch benefiting The Vintage Aero Flying Museum Home of The LaFayette Foundation.501c3

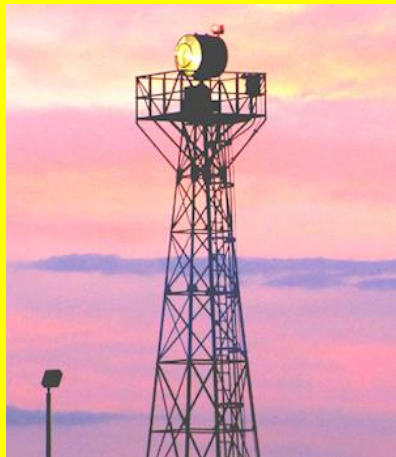
Special talk commemorating the 100th anniversary of the day the Red Baron was shot down. Come hear historian, Andy Parks, explain the theory of how and who shot Baron Manfred von Richthofen April 21st, 1918

**Of course, by the time you read this you either enjoyed the presentation or you missed it!**

Vintage Aero Flying Museum  
 Platte Valley AirPark (18V)  
 7507 CR39, Ft. Lupton, CO 80621 follow signs to hangar

## Aviation question:

"Sometimes at my home airport, the airport beacon is on during the day when the weather is bad. At other airports, it is not. Why is that?" – Curious Pilot



"There is no regulatory requirement for the daylight operation of airport beacons.

At some locations with operating control towers, ATC personnel can turn the beacon on or off when the controls are located in the tower. At some other airports, the airport beacon is turned on by a photoelectric cell or time clock and ATC personnel cannot control them.

In Class B, C, D and E surface areas, operation of the airport beacon during the hours of daylight often indicates that the ground visibility is less than 3 miles and/or the ceiling is less than 1,000 feet. A specific ATC clearance is required for landing,

takeoff and flight in the traffic pattern. This is known as a Special VFR clearance.

You should not rely solely on the operation of the airport beacon to indicate if weather conditions are IFR or VFR. It is always the pilot's responsibility to comply with the correct flight rules for the existing weather conditions."

"Good answer. I asked one of our tower guys about that once. He told me that the only thing it means when the light is on is that the bulb isn't burned out."

## Are you a little rusty with your takeoff check list?

If so, click on this link for a refresher: <https://www.youtube.com/watch?v=lhs1Rlcf8k>

## The "electrification" of GA



Four Pipistrel Alpha Electro aircraft are now being tested in California's San Joaquin Valley, with the goal of validating electric propulsion in the flight training environment. Officials celebrated their arrival April 17 with a ceremony at Fresno Chandler Executive Airport.

If you have about 5 minutes, check out this link from "Aero Friedrichshafen 2018" in Germany:

<https://youtu.be/Gx2hKFc0up8>

## A Message from the President

Once again, we want to remind people of the upcoming "Airport Days" at the Boulder and Longmont airports in June and a host of fly-in's around the front range and neighboring



states which afford an opportunity to enjoy any number of aviation-related activities. There's a need for volunteers at these events and also this affords a good opportunity to introduce young people to aviation activities

Dick Socash

President, EAA Chapter 648

### May Question:

The sky east of the Continental Divide often shows bands of clouds running parallel to the Divide. What is the cause of this banding?

### May Answer:

The bands of clouds running parallel to the divide are not static masses of condensed moisture. Air flowing from west to east crossing the divide forms a series of vertical downstream waves similar to the patterns displayed when fast moving water flows over a rock in the stream. As the air rises and enters a cooling zone, the moisture condenses forming the west edge of the wave. At the east edge, the air is once again entering into a warming zone where it re-evaporates. What one sees from the ground is actually a flow of air condensing and evaporating which depending on air velocity and temperature variations, can form multiple bands until the wave pattern dissipates.



### June Question:

The SR-71 Blackbird was originally designated as the RS-71 Blackbird. What gave it the new designation, SR-71?



### April Program

We had an off-site visit to TinkerMill, the largest makerspace / hackerspace in Colorado and the surrounding Rocky Mountain region. It's a place where like-minded people interested in art, technology, science and business can

collaborate on creative projects, share tools, learn, teach, make things, prototype new ideas, products and services, start ventures, meet new people and share knowledge."



For us as experimental airplane builders, repairers, and upgraders, Tinkermill has a metalworking/machine shop with industrial mills, lathes, grinders, and sheet metal shears and brakes; a 3D



printer shop; a large CNC laser cutter; a wood



shop with a CNC router; a blacksmith shop, and a welding area. There are a number of skilled artisans who conduct skill classes and are available to work 1 on 1 with members on specific projects. Tinkermill is at 1840 Delaware Pl Unit A, Longmont CO 80501. We met at our usual



meeting place at 7:00 and then went to Tinkermill at 7:15. This was an interesting and enjoyable visit and something to keep in mind when special needs arise in building or in general hobby-work interests. Thanks Rick for a great program.

Care to go to their website? Left click here <http://www.tinkermill.org/>

## May Program

Steve Strollo will be presenting a program on “Aviation Oil.” Don’t let the title fool you. There is a lot to know about the “how, what, when, and if” for using the correct oil in an airplane engine and this program affords a chance to hear from an expert. I talked with several people who have heard Steve’s presentation and their comments were very positive and enthusiastic.

## Chapter 648 Fly-In:

HOPEFULLY A MONTHLY OR BI-MONTHLY EVENT

Chapter 43 will be holding a picnic on May 2nd at the Erie Airport. All are invited to attend and meet members from Chapter 43. Our own member, Phil Brown is currently the President of Chapter 43 and we hope to have cooperative events in the future. We thought it might be a good idea to have our Bi-Monthly fly-in be the trip to Erie airport for this picnic. Details will be presented at the meeting.

## From the Chapter 43 website:

On Saturday, May 12th, EAA Chapter 43 is holding its annual picnic. This year, Chapter 43 would like to invite any and all aircraft owners and aviation enthusiasts at Erie Municipal to join our festivities. All EAA Chapter 43 members, local unaffiliated EAA members, and all Erie based aviation enthusiasts are welcome to participate in a hangar open house that morning through lunch. We would love for all of you to open your hangars from 9:00 - 11:30am that morning so that attendees can walk about the airport and see airplanes and other special attractions hiding in those hangars of yours.

At 11:30 all are welcome to mosey over to Myles and Nila Lee's hangar for our pot luck cookout and scholarship presentations. We’ll be adding links in this space to an open hangar map, general directions, and parking suggestions by late April.

To assist us in food planning and open house attractions, please be kind enough to fill out the brief questionnaire/reservation by clicking HERE:

<https://docs.google.com/forms/d/e/1FAIpQLSfT6nvGt2okT6pQEGLb2WwHyuDrPKoKAYrTNPHJXLmHOloQRQ/viewform>

All guests for the cookout are requested to bring a side dish or dessert (we will be providing hamburgers, hot dogs, brats and drinks).

We are very much looking forward to meeting new faces and visiting with old friends.

I received the following email providing a bit of sad news to many of us:

Dear Richard,

Hello, I am a C150 pilot based in Boulder. N7766E. My old flying partner, Joel Kiester, just died at 87 years old. He was a longtime EAA Member at the Longmont Chapter. We are having a memorial service on Sunday, May 13th at 2 PM at Journey's Aviation in Boulder. If any of the EAA Chapter remembers him, we hope they join us.

Lexie Armitage

Home on the Range Real Estate LLC

[www.nederlandproperty.com](http://www.nederlandproperty.com)

c.303-517-9658 o.303-258-7839

To members, friends and aspiring authors. Get published!

DON'T FORGET!!! We need to get submissions from the members to include in future newsletters. I'm starting to run out of ideas and lies!! Let's hear from you!! Need "Plane of the Month", trip reports, technical tips, hangar tales, "beautiful planes" and aviation slanted "fish stories

Send in Your Newsletter Items to Editor Haiko at [heritmail@aol.com](mailto:heritmail@aol.com)

A FINAL NOTE As the weather gets better, I've been thinking about the idea of getting a group together to make a Saturday early afternoon visit to Bill Truax in Parker. We'll talk more about this at the meeting.

Bill Truax

Crown Crest of Parker

Room 313

9398 Crown Crest Road

Parker, Colorado 80138

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