



Air Grangers



NEXT MEETING FEB. 9 2009, AT 7:00 P.M..

If you can't see any opportunities where you are now, don't waste your time criticizing the darkness. . . . Light a candle to find your way out. — *Arlene Feldman. Regional Director FAA.*

A very full meeting is what we had Jan. 12th. There was a lot discussed at the meeting and it lasted until 8:45. The minutes were read and approved and then Glenn introduced Harold Jarman who recently passed his check ride. We also had a visitor, C.W. Murphy. Francis brought up possibly having a Young Eagles day at our next pancake breakfast for the remainder of the Harris Co. High School class. It was agreed to see if was possible by Francis, and Jimmy who would get in with Dan.

Glenn talked about the next pancake breakfast and about his chickens laying eggs with three and four yolks. Francis discussed the Harris Co. Airport, and David brought everybody up to date on the web site. He also shared the progress on his plane. Gardiner also talked about his plane project. His projected finish is March 1st. Bill Roberts talked about his plane as well, and the progress he is making with it.

Don gave a financial report and gave Glenn a check for National dues and insurance. He also shared about

upcoming airshows. Glenn discussed the insurance and brought up the pancake breakfast being the next Saturday and also about some of his food being 'raided' at previous breakfasts. C.W. Murphy paid ahead of time for breakfast and made a donation as well. C.W, thank you; we appreciate it.

Dues were collected for the year and so far dues have been collected from eight people. If you haven't paid your dues yet, please consider taking care of that at the Feb. meeting.

We got back to our meal-before-the-meeting and Francis will provide the main course with Jimmy bring green beans, David bring dessert, Gary bring rolls and drinks, Glenn bringing a side, and Don also bringing a side. Anything else that someone wants to bring will be welcome of course.

A cold day greeted us Jan. 17th for our monthly pancake breakfast. It was very *cold* and we really didn't expect to get much traffic. It was so cold that we ended up doing all the cooking inside. We didn't have anybody fly in but did end up having 8-10 people show up though. Most were members but Larry Black joined us from Auburn. Jim Brocks also. Though everybody stayed inside most of the time, we still had a good morning and it was great to get together for the breakfast and get away from home on a Saturday morning. No pictures were taken at this breakfast so no photos to share this month. Our next breakfast will be Feb. 21st. It should be some nice weather (we hope) and as always, the breakfast is great reason to get out of the house. And if the wife is irritated at what you got her for Valentines Day the Saturday before, you definitely want to come out to the airport instead of staying home.

This newsletter needs your input!

Email your ideas, comments, and suggestions to aaa1350@aaa1350.com.

From David Letterman's "Top 10 Signs You Have a Bad Airline Pilot"

- When you take off he yells, "Weeeeeeeee!"
- Keeps referring to the control tower as "Mommy."
- You overhear him say on the intercom, "Hey Pedro, what's this gizmo do?"

Don't forget to check our bulletin board in the FBO.

The History of Avgas

by David Barrett

Recent regulatory changes by the EPA put the future of lead in avgas in question. What does the future hold?

When looking toward the future, sometimes it helps to know where we've been. The Wright Flyer had a 200 cubic inch engine that developed 12 HP. The compression ratio was 4.4 to 1. After a short period of operation at full power, the output dropped to about 9 HP. The loss was due to overheating of the cylinder heads due to poor design of the water cooling system. Later designs of the engine lowered the compression ratio to 4 to 1 and didn't suffer from the earlier overheating problems. Speculation is that the overheating was due to detonation.

By WW I, refining capabilities had improved, and some of the gasoline being produced was "cracked." The cracking process rearranged the hydrocarbon molecules and produced gas with higher volatility, thus adding to performance and easing cold starts. However, there was great variability in the fuel due to the inconsistency of the raw crude oil being used. Refined Pennsylvania and Oklahoma crudes probably had an octane rating of between 45 and 50, while gasoline refined from crude from the East Indies and Borneo were probably closer to 70 octane due to higher concentrations of benzene and toluene. As a result, British and French aircraft banned the use of US fuel in combat due to overheating undoubtedly caused by detonation.

The concept of detonation was first mentioned in 1906, but actual studies didn't occur until 1915 at the Royal Aircraft Factory in Farnborough, England. These early studies showed that fuel-air mixture and fuel sources had an impact on detonation. It wasn't until 1919 that researchers accurately explained detonation and the causal relationship between compression ratio and the chemical composition of fuel was established. In the process, toluene was discovered to have the best anti-knock properties of available fuels and was used as the basis for a gasoline rating scale.

In 1921, research at the General Motors subsidiary Dayton Engineering Laboratories (Delco) found that among 30,000 additives tested, tetraethyl lead had by far the best anti-knock properties. The downside of lead use was lead oxide deposits on exhaust valves, sparkplugs, and pistons. Later research found that ethylene dibromide worked as a scavenging agent to remove lead, and in 1927 the U.S. Navy was the first to use TEL enhanced fuel to power its Pratt & Whitney Wasp engines. At the same time, the use of heptane and iso-octane as reference fuels in detonation testing was begun. We still use the octane rating to measure the detonation properties of gasoline.

Testing with higher octane fuels took place over the next decade, and by 1935 the USAAC had specifications for two grades of fuel. The first was 65 octane unleaded, and the second was 92 octane using TEL. The U.S. Navy had four grades for fuel ranging from 73 to 87 octane. The Navy was the first to use coloring to identify fuel that contained TEL. Testing of 100 octane fuel began in 1934 and was first specified as an aviation fuel in 1938.

When conducting tests on their supercharged Merlin engine under high-boost, full-rich operations, Rolls-Royce found a great deal of inconsistency in fuels that met all of the 100 octane specifications. This testing ultimately resulted in a two level octane specification with one rating for lean operation and the other for rich operation. The 100/130 grade was the first using both lean and rich octane ratings. In July, 1944, specifications for 115/145 fuel were issued for long-range aircraft such as the Wright R-3350 powered B-29.

The Rolls-Royce Merlin II engine was able to produce 1030 HP at 6.25 lbs of boost using 87

octane fuel. With the higher octane avgas, The Merlin 130 produced 2070 HP at 25 lbs of boost. 30 years earlier, the Liberty L-12 engine with the same displacement and basic configuration produced a maximum of 450 HP using 50 octane fuel. Improved refining capabilities combined with the addition of TEL, allowed for the production of fuel that that allowed engines to perform at extraordinary levels.

Following WW II, the higher octane fuels were used to power commercial aircraft such as Lockheed Constellations, DC-6 & 7s, Convair 240s, 340s and 440s, and Boeing Stratocruisers. Post-war production of avgas reached a peak of 14 million gallons per day in 1957. The decline after that was due to turbine powered aircraft such as the Vickers Viscount turboprop airliner and the Boeing 707 jet. By 1957, the US Air Force had converted to primarily turbine powered aircraft. Only a limited number of piston powered transport and training aircraft remained in their inventory.

The decline in demand for avgas combined with the increased demand for jet fuel caused airfields to convert fuel storage facilities from multiple grades of leaded avgas to jet fuel and limit the grades of avgas they handled. 100/300 avgas was the grade most commonly used. While aircraft that required only 80 octane fuel could use the 100 octane fuel, many experienced severe plug fouling and exhaust valve deterioration due to the high levels of lead in 100/130 fuel. The oil companies reduced the lead content of the 100 octane fuel and created the current 100LL grade used in piston aircraft today. Although it is called low-lead fuel and has lower levels of lead than the previous 100/130 grade fuel, the lead levels are higher than the levels found in leaded mogas.

All during the development of high octane fuels using TEL as an additive, the dangers of lead were apparent. Several of the researchers at Delco died of lead poisoning, and others suffered many serious effects. The belief was that the dangers were limited to the TEL manufacturing process and handling of the fluid. It wasn't until the 1950s that the environmental effects were understood. This ultimately led the EPA to launch an initiative in 1972 to phase out leaded gasoline. Reductions in allowable levels began in 1973 with the total ban of lead for road vehicles occurring in 1996. Throughout these years, the EPA had issued a waiver for the lead contained in avgas.

The need for a waiver to exempt the lead in avgas is due to the unavailability of a suitable substitute for 100 octane fuel. While approximately 70% of piston-powered GA aircraft could use fuel with mogas level octane ratings, those planes only account for about 30% of the overall demand. Most GA airports don't have the facilities to handle more than the two grades (100LL and Jet-A) of fuel. Another problem with mogas in GA aircraft is the presence of ethanol in the fuel. A significant portion of the GA fleet uses sealers, gaskets and o-rings that cannot withstand prolonged exposure to fuels containing more than a minimal amount of alcohol related components. There are also issues related to vapor pressure and water solubility.

The status of lead in aviation fuel is about to face a new challenge. On October 17, 2008, the EPA issued new regulations reducing the allowable level of lead in the air from 1.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to 0.15 $\mu\text{g}/\text{m}^3$, a tenfold decrease. While the greatest source of lead air emissions comes from stationary sources like lead smelters, general aviation is the one major mobile source, constituting at least 13% all lead air emissions. The new regulations will undoubtedly force smelters to reduce emissions, in turn raising the percentage of lead emissions due to aviation. These new standards will exert tremendous pressure on the aviation industry, oil companies, and other parties to redouble efforts to find a substitute for lead additives in fuel.

Next month we'll take a look at the future of avgas.

Many thanks to David Barrett for this well written and researched article

Winter Flying

Free on-line training available

“Inflight Icing”

<http://www.faasafety.gov>

Aviation Learning Center

“Weather Wise: Precipitation and Icing”

http://www.aopa.org/asf/online_courses/

Interactive Safety Courses

GA pilots Guide to Preflight Weather planning, Weather Self-Briefings, and Weather Decision Making

http://www.faa.gov/safety/programs_initiatives/pilot_safety/

Gary Brossett

FAA**STeam** Lead Representative

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The EVEREL propeller, after several years of intensive study and experiment, has been successfully demonstrated in flight on numerous occasions, under all conditions. It is of the automatic variable pitch type, statically and dynamically balanced—manufactured to standards of precision worthy of the watchmaker's craft.

This, the newest innovation in propeller design, offers to aircraft manufacturers advantages too important to overlook. And to pilots and operators—improvements in safety, economy and performance of almost incredible proportions.

The EVEREL Single Blade Propeller is approved by the Bureau of Air Commerce for power plants of 40 h. p. Others will be available shortly. These propellers will definitely provide: Faster take-off and climb, higher cruising and top speeds, better cooling—Less vibration, greater fuel economy, increased safety. Lower engine temperatures. Reduced bending moment on blades. Elimination of gyroscopic action. Perfect blade traction. Furthermore, it will pull extra power from the engine—which can be done by no other blade rigidly fastened to a shaft.

EVEREL PROPELLER CORP.
 1008 Munsey Bldg., Baltimore, Maryland

Interesting idea. Everybody should rush out and buy one and stop wasting all their money on these obsolete multi-bladed propellers.

One our members, David Barrett, was featured in the Spring 2008 edition of the LaGrange College "Columns" magazine. David is a business professor at the college and his interest in aviation and his plane project was the subject of an article. The article is presented below for you to read.

The men and women who make up the ranks of the LaGrange College faculty are an eclectic bunch, a motley mix of backgrounds, hometowns, mores and political stripes bound together by one common characteristic: a passion for teaching.

But what of their other passions-the pursuits of a more personal nature? What do these scholars think about, brood over and invest their time and money into once the final paper is graded? On the following pages, we'll take a look at the flip sides of three LaGrange professors who engage in interesting sidelines that fall outside the periphery of their academic lives.

A dream taking wing

In his off time, when he's done with his academic responsibilities, you'll likely find Dr. David Barrett back home in his woodworking shop. He's building something in there, something unusual... it's bigger than a breadbox, smaller than a battleship and has nothing to do with wood.

It is light, sleek, strong and fast, and has a nose, tail, rudder and wings.

It is an airplane.

So, what compels a man to build a flying machine in his own backyard? For Dr. Barrett, it's a combination of economics and a desire to overcome a challenge.

"If you want to go out and buy a new aircraft-a Cessna or a Piper-you're talking about spending close to a quarter of a million dollars," says the Associate Professor of Business. "But you can build an airplane yourself that actually has better performance for much less money.

"Also, there's the mechanical engineer (his undergraduate major) in me that loves the challenge. I love building things.

I love the mechanical part of it. So part of it is the expense, but part of it is the knowledge that you can do it yourself."

The plane that Dr. Barrett is building is no ultralight or glorified glider. It will be a high-performance aircraft capable of aerobatics and speeds of up to 200 mph.

"I look forward to just being able to go up on a nice afternoon and drill a few holes in the sky and occasionally do an aileron roll or loop or something like that and also to being able to use it to travel to visit family and friends."

But before Dr. Barrett can escape the tethers of gravity, he has much work to do: about 1,600 hours worth. That's how long it's estimated to take to assemble the parts of the RV-7, which are produced by Van's Aircraft in Aurora, Ore. Once he's fin-

ished, he will have personally fastened more than 15,000 rivets.

"I've had to learn riveting," he says. "I may have to learn how to paint. Painting an aircraft is pretty expensive, and so I may practice with a spray gun and paint it myself." He smiles, then adds, "When your ideas and dreams go beyond your budget, you have to learn to find ways to be frugal and cut costs."

Dr. Barrett's decision to follow in the footsteps of Orville and Wilbur did not come to him overnight. He first developed a strong interest in aviation years ago when he worked in the business world where some of his clients were companies like Lockheed and Boeing. As his curiosity grew, he began attending events sponsored by the Experimental Aircraft Association when he was visiting his parents in Wisconsin.

"And finally, I said, 'I am going to do this.' So we have a local EAA chapter here that meets at the LaGrange Callaway Airport once a month, and I started going to those meetings and talking to the folks there and decided to get my pilot's license," Dr. Barrett says. About a year ago, he earned his wings.

Now it's just a matter of carving out a few hundred hours to finish the project-which, for a busy professor, is sort of like eating an elephant one small bite at a time.

In addition to all the elbow grease he'll expend, Dr. Barrett says that he probably will have sunk more than \$30,000 into the effort when the final numbers are crunched: a mere bag of shells in exchange for a dream. But he also says he's looking forward to the challenge, and he's particularly looking forward to soaring through the sky in an aircraft he built himself.

"When you get up in the air, just being able to look out and see things down on the ground-it gives you a sense of freedom, gives you a sense of being able to escape what's going on down there. And I won't say it's quiet because a small private plane can be a little noisy, but it's peaceful up there flying around the clouds. It's just sort of an exhilarating feeling to get up there."



Dr. Barrett keeps his flying skills sharp by renting planes like this Diamond Star while he builds his own plane at home

Don Neuberg and Jimmy Robinson have recently had articles published in the Southeastern edition of Autopilot magazine. Their articles were about the Dobbins AFB open house airshow, the Great Airshow in Peachtree City, and Dane Patterson, an RV owner. Look for a copy at the local airport and see how our members' writing skills are being featured.

What have you been up to? Have you been anywhere? Been involved in an aviation event or seen anything interesting? This newsletter needs to feature items for and about our members. Send in your articles, news, happenings, and photos to the EAA 1350 address. Don't get left out.

On the Menu for the Meeting

We will be having our usual food-before-the-meeting at 6:30 for our Feb. 9th meeting. It should be good.

The meeting will be at 7:00 but if you would like something to eat, be there at 6:30. The main dish will be brought by one of our members and other members will be bringing everything else. If anyone else wants to bring anything extra, that would be welcome. Whatever you do, don't miss out on the meeting or the meal.

The February meal will be supplied by Francis with sides and other items being brought by the members. If anybody else wants to bring anything, feel free to bring it. Be thinking about what we will have or the March meeting. Who is going to volunteer to bring the food on March 8th?

Coming Up!

Know of any events coming up? Don't just tell someone, email it to eea1350@eea1350.com

2-9-09	EAA 1350 chapter meeting	7:00—8:30	LaGrange Airport, LaGrange, GA
2-21-09	EAA 1350 pancake breakfast	7:30—10:30	LaGrange Airport, LaGrange, GA
3-07-09	MidCoast Regional Airport Fly-in	8:00-10:00	Wright Army Airfield, Hinesville, GA
3-14-09	Salute to Heroes Fly-in	10:00—5:00	Auburn Airport, Auburn, AL
3-21,22-09	Thunder in the Valley airshow	9:00—5:00	Columbus Airport, Columbus, GA

Our Members:

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Don't forget, we have a chapter online bulletin board at Yahoo Groups. If you have anything to share,

NEXT MEETING WILL BE FEB 9, 2009 AT 7:00 P.M.



**TREAT SOMEONE TO
DINNER AND INVITE
THEM TO THE MEETING!**

