EAA Mount Rainier Chapter 326 Newsletter

Thun Field – August 2008 116

Burger Burn

Sunday, August 10th, 1 pm

Smitty's Hangar, Thun Field
Third hangar row south of the CAP building.

There will be no meeting on Tuesday evening, Aug 12th.

The Burger Burn is a pot luck affair with static display of members' aircraft. And maybe a few demo rides. Park your planes along the taxiway opposite Smitty's hangar.

Whatever you brought last year was so good we'll just keep it the same…**just bring more of it.**

A-G (38) bring a main dish

H-P (41) bring a salad

R-Z (22) bring a desert

The Chapter will provide the Burgers & Soft Drinks.

As always, we are inviting EAA Chapters from the surrounding area to join us. We provide ALL the food, so bring your extra large dishes and be a good host.

From the Secretary

Jeff brought the meeting to order at 7:05 pm.

Visitors:

Tony Epperson. Buying almost finished KR-2.
Steve McAllister. Buying property at Kapowsin.

Decision was made to have Burger Burn on Sunday, August 10th.

We got scolded, actually Jeff did, for leaving the CAP building a tad unkempt after our meetings. Pigsty and other untoward descriptors were levied by Inspector General ?Monk. Jeff now has a new pair of white gloves. Be careful.

Young Eagles was a big success. We flew 137 kids. Dave Fritzsche read three thank you letters from kids / parents. Another was addressed to Andy so it was unopened. Wes Rasmussen you are adorable, to some kid at least. Norm said that after tallying income and expenses we flew 137 kids for a total of $14.19. Dave thanked all the volunteers and especially the pilots who made it happen. There was a brief discussion on improvements we could make next year. It seemed amusing that the marquee out on Meridian was still advertising scenic flights for $225 followed by the EAA giving flights for free.

Don't forget the pot luck on Saturday at Arlington after the airshow.

First Flight

Gary McDonald
RV-4
N14443

Gary gottr done and flew on July 13th.

Engine: Superior XP IO-360 180 HP

Gary bought the engine fully assembled by Superior. It has 8.5:1 compression and is approved for 91 octane unleaded auto fuel (without ethanol).

Precision Airmotive Silver Hawk fuel injection.

Prop: Hartzell Blended Airfoil constant speed.

Avionics:

Dynon FlightDEK-D180
Combines Flight Instruments and Engine Monitoring
Icom A200 com radio
Garmin GTX 320A transponder

Electric elevator trim
Electric flaps

Gary picked up a partially completed kit and finished it in three years. Charlie Cotton did the certification. The airplane is hangared at Thun field.

Congratulations Gary!

First Flight

Irvin Luke
Fisher Tiger Moth
N34TM

July 28th was the big day at Eatonville. The build time was advertised as 500 hours, but Irvin said took 2800 to 3000. He had already built an RV-6 in 1990 and was not looking for another big project. He worried most about doing the fabric covering. He even thought about hiring that out. But he did it himself, Polyfiber, and is very happy with the result.

He has five flights as of this writing and is having cooling problems. He has the Jabiru 3300, one of the early models for

which overheating was a common malady. Right now he is reworking the cowl to fix that.

Irvin wanted a low and slow, two place, nostalgic, open cockpit bi-plane and chose the Fisher 80 percent scale replica of the original DeHaviland DH82a Tiger Moth. He has all the original Tiger Moth instruments.

Charlie Cotton did the certification. Can't wait to see it. Congratulations Irvin!

Ethanol

Compared to 100 LL

Less expensive.
Burns cleaner.
Burns cooler.
Higher octane.
Provides more Horsepower and torque.
Immune to carb ice.
Increases TBO.

Dr. Max Shauck made a transatlantic flight in a Velocity on ethanol in 1989. The route included a leg from St. Johns to the Azores, a much longer hop than the more common Greenland, Iceland route. In the winter, no less. He was awarded the Harmon Trophy presented at the White House by Vice President Dan Quayle.

The Vanguard Squadron (now called the E-Squadron due to a different sponsor) is an aerobatic four-ship demonstration team flying RV-3s. They have been flying together since 1993 and have flown over 3000 hours on 100 percent ethanol. They are based in Tea, SD and are sponsored by various agencies promoting ethanol. Their engines are fuel injected and the fuel servos are modified by Airflow Performance to accommodate the higher fuel flow. The only corrosion inhibiting measure was to alodine the fuel tanks and fuel lines. They have a small aux tank with gasoline that they use for starting. Pure ethanol is not as volatile as gasoline and will not start below 60 degrees. Even warmer it can be difficult. One of these RV pilots recently bought 2500 gallons of pure ethanol (denatured…you can't drink it) for $2.54 per gallon. He has been using it for many years and denies any corrosion, vapor lock or water absorption problems.

Some years ago, The South Dakota Corn Utilization Council provided funding to South Dakota State University (SDSU) to develop a fuel based on ethanol that could serve as a viable replacement for 100LL aviation gasoline. They called the fuel **AGE 85**, Aviation Grade Ethanol that is 85 percent ethanol. SDSU started testing the fuel on a Cessna 180 and followed with a Mooney 201, Grumman AG Cat, and Piper Seneca. As a result of their tests, the FAA granted STC's to certify C-180's and C-182's on this fuel.

AGE 85 contains, approximately 15 percent pentane isomerate to bring the vapor pressure up to a useable range for cold weather starting.

As a corrosion inhibitor, they add less than one percent biodesiel. They claim it works…no corrosion in a three year test.

Here's the problem: At 81,000 Btu/gallon, AGE85 has 28% less energy than 100LL (112,000 Btu/gallon), but because of higher thermal efficiency, only about 12 to 15% higher fuel flow rates were observed for equal power settings on AGE85 and 100LL. Aircraft engines have to be modified to handle a 20% increase in fuel flow. Maybe you can fly a little faster due to increased power but you can only go 80% as far.

Another problem: Where can you buy it? Nowhere.

Well then how about E85. This is unleaded auto fuel blended with 85% ethanol. There are over 1400 gas stations in the United States where you can fill up on E85. But only six, open to the public, in Washington State. The closest filling station is Airport Depot in Chehalis. Their E85 is $3.19 and unleaded regular is $4.09 today (Aug 5th). They say flex fuel vehicles are heavy users.

Flexible fuel vehicles (FFVs) are designed to run on gasoline or a blend of up to 85% ethanol (E85). Except for a few engine and fuel system modifications, they are identical to gasoline-only models. FFVs have been produced since the 1980s, and dozens of models are currently available. Since FFVs look just like gasoline-only models, you may have an FFV and not even know it. To determine if your vehicle is an FFV, check the inside of your car's fuel filler door for an identification sticker or consult your owner's manual. They say FFVs experience no loss in performance when operating on E85. However, since a gallon of ethanol contains less energy than a gallon of gasoline, FFVs typically get about 20-30% fewer miles per gallon when fueled with E85. Hmmm…at that price difference, 22% cheaper, it doesn't sound so attractive.

For experimental aircraft, corrosion protection and fuel system modification to accommodate higher fuel flows would be in order. Then, when switching back to 100LL, the mixture control would be the flex fuel knob.

Increasing the percentage of ethanol increases the octane. This allows higher compression ratios and more efficient combustion, an option for homebuilders. This would regain some losses due to reduced energy content of ethanol.

Now what about E10? Washington State has mandated that, beginning in December 2008, at least two percent of total gasoline sold in Washington be denatured ethanol. That can be increased to 10 percent by a rule from the director of agriculture. This does not prohibit the production or sale of 85 percent ethanol fuel for flex-fuel vehicles. McChord and Fort Lewis use E85 in their fleet vehicles. Pumps in Washington State offering ethanol blends must have a label stating the percentage of ethanol. The typical blend is 10 percent, E10.

EAA members in Montana and Missouri were successful in getting their states to exempt premium grade gasoline from their ethanol blending requirements to support all types of recreational activities. Their legislation made it very clear that premium grade gasoline shall be ethanol free when delivered to all customers. Not here in Washington unfortunately. However our law does say "Nothing in this section is intended to limit the use of high octane gasoline not blended with ethanol for use in aircraft." But no incentives to make it available either.

In type certified aircraft, using autogas requires an STC. These are easily obtainable for a lot of aircraft, from EAA or Petersen Aviation. EAA STCs only cover engines that were certificated to 80/87 grade or lower gasoline. However, STCs issued for some higher compression engines require the use of 91 octane at a minimum. Ethanol-blended gasoline is not authorized under the terms of the EAA or Petersen Aviation STC's. Of course, in Experimentals you can use anything, pure ethanol if you wish, without STCs.

Problems with ethanol: (According to EAA) Actual engine runs and in-flight testing studies by EAA, Cessna, and the FAA have shown that using 10% or 15% ethanol-blended gasoline is harmful to aircraft fuel systems. *(note they didn't say 85%…not sure if that was intentional or otherwise)*

Entire fuel systems are harmed as ethanol is a collector of water and other fuel contaminates – which, in turn, forms an acid that affects all types of components, attacking rubber and composite components, fuel hoses, fuel pumps, and fuel filters.

Ethanol-blended gasoline causes three primary concerns:

1. Adversely affects volatility of the fuel, leading to vapor lock;
2. Ethanol is not compatible with rubber seals and other aircraft fuel system components; and
3. Ethanol tends to develop "phase separation" as the aircraft climbs, the resulting water (that was held by the ethanol) could overwhelm fuel filters/sediment bowls.

A note on vapor pressure / vapor lock:

In a closed container, a liquid will evaporate until the pressure above the liquid is high enough that evaporation stops, or more accurately, that the exchange of molecules between the liquid and gas is in equilibrium. That particular gas pressure is the vapor pressure. For comparison purposes, we use RVP (Reid Vapor Pressure) where the pressure is measured at 100 deg F. The more volatile the liquid, the higher the vapor pressure. Here are a few examples:

Auto Fuel…depending on the region
summer 7.0 to 9.0 psi
winter up to 11.5 psi
100LL 5.5 to 7.0 psi.
AGE 85 6.5 to 8 psi.
E85 same as auto fuel
100% ethanol 2.3 psi

Surprisingly, a 10% ethanol blend actually increases vapor pressure of auto fuel by about one psi. But higher blends like 85% reduce the RVP. Different formulations (additives) are used to bring the RVP to EPA imposed limits.

Vapor lock occurs when the fuel turns from liquid to gas in the delivery system. Higher temps (engine compartment) and / or reduced pressure (sucking side of fuel pump) can cause cavitation at the pump and stop fuel flow. The more volatile the fuel, the more prone it is to boiling and cavitation. Again, the higher the volatility, the higher the vapor pressure, and the increased susceptibility to vapor lock. If somehow you manage to be flying a winter blend in the summer, watch out.

Rotax Engines:

Autofuel is preferred. Officially, Rotax has approved the use of fuel with up to 5 percent alcohol content. Other than a slight increase in the exhaust gas temperatures (EGT), the engines seem to work fine operating on blends with up to 10 percent ethanol.

Avgas is approved too but lead is a problem: the heavy deposits left on the spark plugs, piston rings, oil passages, and cylinder heads. The Rotax liquid cooled head runs too cold. The head never gets hot enough to allow the lead to "purge" itself of the deposits and they build up over time. In comparison, an air cooled head has massive heating and cooling cycles that keep lead contamination more under control.

So for you folks using auto fuel, be aware that ethanol free fuel is going to be harder to find. By law, the pumps are supposed to be labeled. If in doubt, the test for alcohol in the fuel is fairly simple. Take a thin glass jar, mark it one inch from the bottom of the jar with tape or indelible ink, and fill the jar with water up to that mark. Fill the jar to the top with a sample of the fuel to be tested. There is a clear separation between the water and the fuel. Put the lid on the jar and shake. Let it settle for about a minute and check. If the ''water'' line is now above the first mark, the fuel has alcohol in it.

Octane ratings: you can't compare gas station pump ratings with 100LL. They are lower by 4 to 5 points if using the same method of comparison.

Calendar

August 15-17, McMinnville Annual fly-In. (MMV)
August 15-17, Van's Homecoming. Independence State (7S5)
August 17, Return to Thun: Car and airplane display.
September 10-14, Reno Air Races (RNO)

ANYBODY can buy one, it takes creativity to make one. You'll carry it around in your toolbox till you get tired of it. Like so many other things you'll never need it when you have it. You'll finally put it in the shop with the other goodies like it. Then someday you'll need it again, but won't be able to find it. You might even make another one similar to it. After a few years you'll run across it again - but you won't remember what it's for, but you'll save it, knowing it must be important. Finally whoever cleans out your shop after you are gone will toss it out, not knowing what, or why you made it.

Lately I've been trying to clean up my shop - I have lots of those "lifesavers" - specialty one time devices to "reach, spread, hold, slide, shoehorn, clamp, etc." - I hate to toss them out, but have no idea what they were for. But I'm keeping them anyway - just in case!

Such is life.
RRich at Off-Road.com

end

Chapter 326 Staff

President	**Jeffrey Liebman**	**253-531-6123**	
Vice President	**Robert Barra**	**253-988-2676**	
Secretary	**Andy Karmy**	**253-333-6695**	
Treasurer	**Norman Pauk**	**253-630-6396**	
Newsletter Editor	**John Brick**	**253-846-2617**	**jebrick@comcast.net**
Photographer	**Drew Karmy**	**253-333-6695**	
Webmaster	**Andy Karmy**	**253-333-6695**	

Young Eagles Coordinator	**David Fritzsche**	**253-848-1699**
Technical Counselor	**Harold Smith**	**253-752-5480**
Technical Counselor	**Charlie Cotton**	**360-893-6719**
Chapter Flight Advisor	**Terry O'Brien**	**206-244-3619**
Chapter Flight Advisor	**Jim Triggs**	**360-438-1482**
Chapter Flight Advisor	**Marv Scott**	**253-691-5496**
Program Coordinator	**John Brick**	**253-846-2617**
Biographer	**Vacant**	
Property Custodian	**Vacant**	

Chapter 326 Website http://www.eaa326.org

EAA Mount Rainier Chapter 326
C/O John Brick
8304 242nd St. E.
Graham, WA 98338