



# CHAPTER 613

## June 2009

(Chapter 613 web site)

[www.eaa-chapter613.org](http://www.eaa-chapter613.org)

News and Views: Bruce Richardson

Almost Summer?

### Loss of an EAA Chapter Member

By Marge Butterfield

A longtime member of our Chapter passed away on May 13<sup>th</sup>. **Art Robinson**, of South Hero, was an active member in the early formative years of EAA Chapter 613. He and **Sam Lennox** (we unfortunately lost Sam last year) were famous, among other things, for their selling of hot dogs at fly-ins in Shelburne and Allenholm and raising a lot of money doing it. Art help organize many Chapter activities. We send our condolences to Art's family.

In better news, I hear that **George Coy**, although still in Rehab at Fanny Allen, expects to be released June 11th. He is able to get around with the use of a walker and is learning how to do so. I know many members have been concerned about George, and thanks to Marge Butterfield, George received flowers on behalf of the Chapter.

Last month, I told you about a planned hike to search for a 1957 crash site... as Paul Harvey would say, "Here's the rest of the story":

**THE NEEDLE IN THE HAY STACK** - On Saturday a group of 7 intrepid hikers scaled the Green Mountains in Chittenden in search of the site of the 1957 crash of an Army L-20 ( Beaver) in which 4 officers died. Brian Lindner's file of information, clues, opinions and thoughts had 'narrowed' the area to a swath of the ridge about 1/2 mile wide and 4 miles long. There was also the uncertainty that any wreckage might remain after 50 years. Lady Luck prevailed and about 1/2 hour after we started sweeping along the east flank of the ridge Brian and I stumbled into 2 pieces of the radial engine. Further search located some cabin pieces and a gear leg. Bingo! Brian has been in touch with the family of the L-20's pilot (his son is a retired navy Admiral I think) and they will visit soon to memorialize their lost father. So, in addition to being a treasure hunt we helped provide some closure for a family. Good day!!



front row (left to right): Mary Thode, Dr Mark Logan, Peter Fisk, Brian Lindner;  
back row (l-r): Chris Cote, Roger Thode, Jack Himmelsbach

## President's Column: Tom Edwards

I'm Still Alive!

Some of you might have been wondering where I vanished to these past few weeks. I apologize but personal circumstances have made me pretty much unavailable.

Saturday, June 6th with a rain date on Sunday 9-4 will be our Young Eagles Day at the Franklin County Airport. I have been pushing the schools and hit the newspaper with info on this great day! Marge has taken charge so call her if you are available to help out. We need pilots, paper filler-outers, chefs and all sorts of jobs. Tent set-up is at 8:00. Let's hope the skies have dumped all the rain on us this past week!

There will be another YE flight for a summer camp on Wednesday July 29 @ 10:00 with a rain date the next day. There will be around 20 kids coming up from a community camp at the Fairfield Library. I'll need another pilot or two to help fly the kids and introduce them to aviation.

I'll see you all on Saturday and catch up with everyone. My phone hasn't been ringing off the hook so I hope everything has been under control

## Flight Advisor Corner: Hobie Tomlinson

Extending Cylinder Life

For the June newsletter, we will return to our series on "*The Care and Feeding of Aviation Piston Engines*" with **Part V**, "*Extending Cylinder Life*." Modern piston, air-cooled aircraft engines use a cylinder assembly design consisting of a cast aluminum alloy head which is shrunk-fit on a steel barrel. Improper engine operation will drastically affect the service life of these components and radically increase the maintenance costs!

Our discussion on "Extending Cylinder Life," will consider the following areas:

- **Air-Cooled Engine Evolution**
- **Modern Cylinder Construction**
- **Engine Baffle Condition**
- **Ground Operations**
- **Leaning Technique**
- **Thermal Shock**
- **Engine Component Cooling**

**Air-Cooled Engine Evolution** began with early aircraft engines using "velocity cooling." Velocity cooling is where the engine is not enclosed by a cowling, therefore leaving the cylinders exposed to the airstream. This type of cooling was prevalent prior to WWII and can be seen on many of the aircraft of that era. The big problem with velocity cooling is that it does not provide uniform air flow around the entire cylinder assembly. A cylinder assembly "exposed" to the airstream develops a turbulent airflow directly behind the cylinder which prevents not only airflow contact but also cooling on the rear side of the cylinder. Even though this pre-WWII type of cooling system caused "hot spots" on the aft side of the cylinders, it was adequate for the low compression engines of the time. These engines typically had compression ratios around 5 to 1 with a maximum RPM of about 2000.

**WWII** brought the need for high horsepower aviation engines. As compression ratios and rpm increased, so increased the amount of heat which needed to be dissipated. (The heat energy transferred to the cylinders which needs to be dissipated is approximately 1/3 of the energy produced by the fuel. This is roughly equal to the horsepower driving the propeller.) Velocity cooling was no longer satisfactory for these engines, so pressure cooling systems were developed.

**Pressure Cooling Systems** use an engine cowling to convert “free stream” air velocity to increased air pressure. This increased air pressure is then directed around the individual cylinders by baffles. Today’s engine baffles are the result of much study. Special “wrap around” baffles guide cooling air completely around the cylinder head and barrel assemblies. Other baffles channel cooling air into the oil radiator as well as the cooling ducts for other engine accessories. Rubber seals on the cowling edge of the baffles provide an air tight seal between the baffles and the cowling. (Oddly, because the air pressure inside a cowling is highest at the back of the cowling, it is the front cylinders which run the hottest.) Pressure cooling is vastly superior to velocity cooling in addition to providing uniform cylinder cooling.

**Modern Cylinder Construction** consists of a cast aluminum alloy head which is “shrunk-fit” on a steel barrel. Over the years, the metallurgy of both the cylinder heads and barrels were improved to meet the demands of higher horsepower and longer TBO (**T**ime **B**etween **O**verhaul). Early steel cylinder barrels were made from aircraft quality steel forgings and were only heat treated. The demand for higher horsepower led to the use of higher compression ratios and turbocharging, which in turn produced higher operating temperatures. To preserve (and improve) existing TBOs for these engines it became necessary to start using nitrided (case hardened) cylinder bores.

**Cylinder Deterioration’s** biggest contributors are the operational loads imposed during the combustion process and the resulting operating temperatures. The number of thermal cycles (engine starts) is also a major factor. Lastly, *corrosion of the cylinder head and rusting of the cylinder barrel (very low or non-use without proper engine care) can rapidly destroy the durability of a cylinder!*

**Steel Cylinder Barrels** are not affected much by the typical range of operating temperatures. However, unusually long periods of operation near maximum engine temperatures can compromise the cast aluminum cylinder heads. High temperatures are the biggest enemy of your cylinder assemblies, as the cast aluminum cylinder heads can incur cracking under prolonged high temperature operation. *The absolute best thing which can be done to improve cylinder durability is to minimize operation at maximum temperatures!*

**Turbocharger Systems** make available more horsepower at high altitude, thus increasing airspeed. The downside of these systems is the age old problem of heat. Because a turbocharger works the hardest at high altitudes (where air density is less) heat dissipation becomes an increasingly problematic issue as we climb. The high altitudes produce increased compressor output temperatures, cylinder head temperatures, engine exhaust temperatures, and temperatures inside the cowling. *Not only is it very important to keep the turbo system properly inspected and maintained but also it is necessary to strictly adhere to the proper power setting and mixture leaning procedures for these engines!*

**Engine Baffle Condition** is critical in obtaining good cylinder life. Modern engine baffling is the result of considerable study and is designed to guide the cooling air completely around engine cylinder heads and barrels (using wrap around baffles). Pressure cooling cowlings are designed to produce a pressure difference between 4 to 6 inches of water between the high pressure and low pressure areas of the cowling. This pressure difference is about the same as that produced by the typical instrument vacuum system. *When deteriorated baffles let this air escape between the high and low pressure areas of the cowling without providing the desired cooling effect, premature cylinder replacement is sure to quickly follow!*

**Baffle Condition Inspection** should occur every time the engine cowling is removed for maintenance. This should include the following items:

1. Check baffles for condition, correct position and proper contact with cowl.
2. Repair/replace worn or distorted baffles.
3. Check/adjust inter-cylinder baffles to insure a tight fit
4. Seal holes/cracks (which waste cooling airflow) with a non-corrosive silicone adhesive/sealant. Check with aircraft OEM (**O**riginal **E**quipment **M**anufacturer) for application instructions.
5. Check integrity of all ducting - cooling and heater ducts. Repair/replace as necessary.

**Manufactures Report** that investigation into cylinder life issues have implicated incorrect or improperly fitting baffles as a major cause of premature cylinder removals. In many instances critical baffles have been poorly maintained and were deteriorated by age. In other instances engine replacements have been made without repair/replacement of faulty engine baffles and seals. *Failure of the engine cooling baffles to perform efficiently will lead to rapid and significant deterioration of the engine cylinder assemblies as well as other engine components!*

**Ground Operation** of air cooled aviation piston engines is where a high level of abuse exists. Even though the rules for ground run-ups have not changed since the days of velocity cooled engines, these rules seem to be regularly ignored by both aircraft pilots and aviation mechanics. This probably happens because the pressures of daily routines make it easy to become careless in this seemingly minor part of the operations. *Even though this doesn't appear to cause any harm to the engine, it is the biggest precursor to future troubles!*

**Excessive ground Run-Up** (especially at high power) can cause damage to a pressure cooled engine. The worst thing with this type of engine abuse is that the damage is cumulative and seldom shows itself right away. Instead it usually goes undetected until it shows up “way down the road” in the form of broken piston rings, scored pistons, scored cylinders, and a premature engine “top” – or even full – overhaul. Because of the long delay between cause and effect, pilots and mechanics seldom “connect the dots” to equate this engine damage with its rightful cause. Instead they usually give the engine an undeservingly bad reputation.

**Rules for Ground Running** an air cooled aviation piston engine are as follows:

1. Always run-up facing into the wind – it really helps
2. Avoid prolonged/unnecessary run-ups
3. Avoid high power run-ups unless absolutely necessary
  - o Maintenance checks
  - o Minimize time as much as possible
4. When high power run-up is required
  - o Idle engine at 600/800 rpm for a few minutes prior to shutdown
  - o This removes excess heat created by the high power run-up
5. Some modern turbocharged engines are also “ground boosted”
  - o Turbo produces more than atmospheric pressure on the ground
  - o Engine will quickly overheat during a high power run-up
  - o Keep high power run-ups to minimum time
6. Remember the turbocharger is located inside the cowling
  - o Turbine is “red hot” during high power operation
  - o In flight this heat is dissipated overboard
  - o On the ground it stays inside the cowling
  - o Cool down at 600/800 RPM for ample time prior to shutdown
7. Do not run-up without the induction air filter installed or with the carburetor heat on
  - o Both allow unfiltered air to enter the engine
  - o Dirt contamination of the engine results
8. Do not run-up in coarse pitch (low rpm) except for momentary propeller pitch check
9. Do not start (or run) an engine on a multiengine aircraft with the propeller feathered
  - o Use auxiliary unfeathering system if engine so equipped
  - o If no Aux system installed, unfeather with propeller blade beams
10. Always fully open all cowl flaps and other cooling devices
  - o Even in cold weather
  - o Use full rich mixture
11. Never – **but Never** - attempt to “burn out” a magneto drop with a ground run-up
  - o Succeeds at the expense of the engine’s mechanical health
  - o Saves time in the short term, but costs big \$\$\$ in the long term
12. Never make a high power run-up with the cowling removed
  - o The most important but most ignored rule
  - o High power run causes uneven cylinder heating and cylinder distortion
  - o Cylinder distortion rapidly damages pistons, rings, and cylinder walls
  - o Idle run to adjust idle mixture is ok – otherwise a cooling scoop is required

**Leaning Technique** is very important because the life of engine cylinder assemblies is highly dependent on correct operating temperatures. This is a function of installation design, proper maintenance and pilot control of mixture and cowl flaps. Because any excess fuel in the engine cylinders cannot burn once all the oxygen in the cylinders is used, it evaporates. This evaporation of excess fuel is a powerful way of controlling combustion temperatures, and hence cylinder, piston and piston ring temperature. Due to this fact and the fact that engine power on the rich side of peak is very stable during changes in fuel flow, engine fuel systems are specifically designed to introduce excess fuel for cylinder

cooling when operating at very high power settings. (Hence the high fuel burn during takeoff and initial climb). High power operations (over 75% of rated takeoff power) and all operations at slow airspeeds should always be conducted with full Rich mixture settings to supplement the air cooling of the engine cylinders. Also a richer mixture should be considered whenever environmental or operating conditions are producing high engine cylinder head and/or oil temperatures.

**Thermal Shock** to the engine should be avoided. This occurs both when an engine is operated at high power before it has adequately warmed up and when the power is rapidly reduced to idle from cruise flight. Because the aluminum pistons heat (expand) faster and cool (contract) slower than the steel cylinder barrels, thermal shock momentarily reduces the clearances below an acceptable level. This loss of clearance causes highly accelerated wear and associated damage to the cylinder assemblies. Always adjust power (especially in turbocharged engines) in increments, giving the engine time to thermal stabilize. In addition proper warm up and cool down periods are recommended at the start and end of flights.

**Engine Components** such as magnetos, alternator, starter, fuel pump, etc. are cooled by ram airflow from air scoops located on and within the cowling. This ram air is piped directly to the accessory by flexible hoses. It is important to ensure these hoses are properly routed, secured, and maintained. Loss of cooling airflow to these accessories will both shorten their life and promote their failure.

That completes our discussion of extending cylinder life. The thought for this month is "**When you get it right mighty beasts float up into the sky. When you get it wrong people die.**" ~ *Roger Bacon, c.1284*. So until next month, be sure to **Think Right to FliRite!**

### Fairchild PT-22 with Velocity Cooled Engine ~ Simsbury, Ct.



## Young Eagles: Donald Taylor

There is only one pilot reporting Young Eagle flights for 2009:

George Coy - 1



Pilots who flew 10 or more for 2008:

Pilot ID	Count	Name
13810	35	John Butterfield
42977	14	Thomas Edwards
43441	12	Kurt Gruending
17423	10	Don Nowakowski
33276	22	Michael Pecue
7159	28	Donald Taylor
29411	<u>26</u>	Ron York

Total: 147

The credits are now worth \$5.00 instead of \$1.00. We have \$735.00 to send a youth to the Air Academy in Oshkosh.

Young Eagle fly-ins for 2009:

International Young Eagles Day - Franklin County Airport (FSO), Highgate, VT.

Saturday June 6th, 9:00am - 4:00pm (rain date: Sunday June 7th)

See flyer on page 9 - feel free to duplicate, post it to get the word out.

We need **HELP** for International Young Eagles Day at Franklin County Airport - if you can help, please let us know: Donald Taylor 868-3809 or Marge Butterfield 878-6337.

Edward F Knapp State Airport (MPV), Berlin, VT.

Wednesday June 10th (rain date: Thursday June 11th)

Shelburne Day - Shelburne Airport (VT8), Shelburne, VT.

Saturday September 19th, 9:00am - 4:00pm

Newport State Airport (EFK), Newport, VT.

Saturday August 1st and Sunday August 2nd, 9:00am - 4:00pm

Adirondack Regional Airport (SLK), Saranac Lake, NY - No show this year.

## UPCOMING EVENTS

### \*\*\*\* **Young Eagle Rally at FSO – June 6<sup>th</sup>** \*\*\*\*

By Marge Butterfield

Our first Young Eagle Rally of the season is just around the corner. The rally begins at 9:00, so if members could arrive around 8:00 to help set up, that would be great. The pilot briefing will be at 8:30. If you have any questions, call either **Donald Taylor** at 868-3809 or **Marge Butterfield** at 878-6337. Look forward to seeing you there!

### Young Eagle Rally – MPV!!!

Mike Pecue has arranged the fourth annual Young Eagle Rally to be held at MPV on **Wednesday, June 10<sup>th</sup>**. There will be approximately 100 8<sup>th</sup> graders from the Barre Town Middle and Elementary School anxiously awaiting their Young Eagle ride. These kids have to “earn their wings” in order to participate in the rally. Their flight will come at the end of a six-week unit on the physics and history of flight. They must earn an 80% or better on their flight unit test that covers all of the physics studied during the flight unit and they must maintain a 90% or better work completion for the 4<sup>th</sup> quarter. Needless to say, the kids that qualify are really looking forward to their Young Eagle ride! In the past Mike Pecue held some of these classes for the kids at the school. This year, due to the fact he is getting married (congratulations Mike and Kathy!), Ron York will be filling in for Mike. Ron has helped out in all the past YE rallies at MPV. Soooooo.....**We need some pilots!!** If anyone can help out with the paperwork, that would be great too. Please contact Marge Butterfield at 878-6337 if you're free on June 10<sup>th</sup> to help out at this Young Eagle Rally. Thanks!

### \*\* *Butterfields – Music on the Green* \*\*

John and Marge Butterfield and drummer, Steve Fox will be performing music at Maple Tree Place (on the green across from the Majestic Movie Theatre) at Taft Corners in Williston on Thursday, June 18<sup>th</sup> from 6:00 – 8:00. Come and enjoy the music!

### Calendar of Events

June 6	International Young Eagles Day, Franklin County Airport (FSO), Highgate, VT, 9:00am - 4:00pm, Rain date: Sunday June 7th
June 10	Young Eagle Event @ MPV, <b>PILOTS NEEDED</b> , Rain Date: Thursday 11 June
June 20	Taildragger's Rendezvous, Southern Vermont Regional Airport (RUT), Rutland, VT
July 27-August 2	AirVenture 2009, Wittman Regional Airport (OSH), Oshkosh, WI

**Green Mountain Flyers (EAA Chapter 968)  
Annual Taildragger's Rendezvous  
Rutland Southern Vermont Regional Airport**

Saturday, June 20th: 8AM to 12Noon. Blueberry pancake breakfast w/eggs, sausage and genuine Vermont maple syrup.

**Special this year there will be two seminars** (to held rain or shine on **June 20**).

- 11AM Gene Benson, "A Better Safer Approach and Landing", is Wings Program qualified
- 1PM Dave Pepple, 'Light Sport Aircraft' - "Everything You Need To Know"
- All morning: Jim Leavitt from FAAST will be available for informal briefings on the Wings program.

We hope to have several LSA on display, including examples of old and new LSA aircraft.

The public is invited starting at 11am.

At around noon, the CAP cadets may have the grilles going for burgers and dogs.

If it should be lousy weather we will postpone the fly-in part **but all other events will take place as scheduled.**

Rain date for Fly-in and breakfast **only** is June 21. If weather looks lousy please check the Green Mountain Flyers web site (<http://greenmountainflyers.org>) after 12 noon on June 19

**OFFICERS/COMMITTEE MEMBERS**

<b>President</b>	<b>Phone</b>	<b>Address</b>	<b>e-mail</b>
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<b>Assistant Tech Counselor</b>			
John Butterfield	878-6337	721 North Williston Rd, Williston VT 05495	airbear9fj@verizon.net
<b>Chapter Web Site</b>			
Dick Bayer	796-4432	20B South Main St., Alburg VT 05440	webmaster@grnmtsolutions.com

# Kids Fly Free



## International Young Eagles Day

Franklin County Airport, Highgate, VT (FSO)  
( I-89 Exit 21, East on Rte. 78, 1 mile, Airport across from John Deere Dealer )

Saturday – June 6 - 9 AM till 5 PM

Rain Date: Sunday – June 7 - 9 AM till 5 PM

Free plane rides for kids between ages 8-17.

A parent or guardian must attend.

- A tour of the airport and airplanes.
- There will be a barbecue at noon.
- An Air guard helicopter will be on display.
- A display of radio controlled model airplanes.
- **Scouts may qualify for their aviation merit badge.**
  - Merit badge counselor on staff.

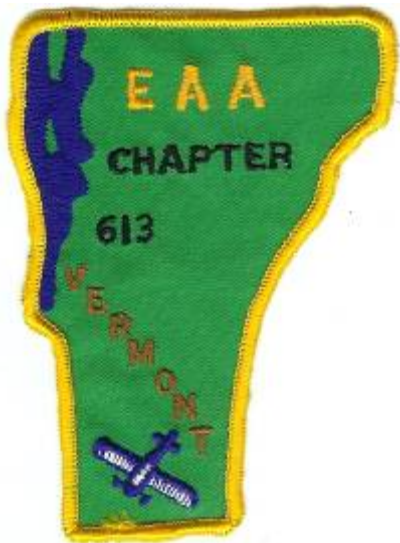
Sponsored By:  
EAA Young Eagles Program  
Chapter 613



For more information contact: Donald Taylor 868-3809 or  
Franklin County Airport 868-2822

EAA CHAPTER 613  
Bruce Richardson  
975 Crosstown Rd  
Berlin, VT 05602

**FIRST CLASS MAIL**



June 2009