



UPDRAFT

Newsletter of EAA106
Greater Boston Chapter

We Build
Airplanes!

May 2005
Volume 33 Issue 5

Your new Newsletter Editor:
Jeremiah Brazeau

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**Have something of interest
for the newsletter? Please
send it to Jeremiah at
jdb1090@cs.rit.edu and cc
PABowman@comcast.net**

A throttle and mixture cable
-- available to a good home...

Each 48" long and made by
Tuthill Cablecraft Division...
Contact Angier Ames at:

N4ZQ@comcast.net
978 468-4565

Angier Ames would like to
give a big thanks to Larry
Goff for the initial gift!

MEETING INFORMATION



May Dawn Patrol
Fly-In and Fly-Market
Hampton, NH

May 21st, 11:30am
Meet on deck area

**See page 6 for details &
all Upcoming Events**

Saturday, May 14th, **10:00 AM**
At Bruce Ryan's Lawrence Airport hangar
(Directions on Page 4)

10:00 am: **Coffee, Donuts, & Hangar Flying !**

10:15-10:30 am: **Chapter 106 Business Meeting**

10:30-11:30 am: **PROGRAM: member BRUCE RYAN
shows us his LANCAIR IV-P
a pressurized kit plane!
(Bruce is nearing completion)**



11:30 am-12:30: **COOKOUT at our Hangar**
Drive back to our hangar, fire up the grills,
and enjoy food and more hangar flying.

BOOK Giveaway – The next book giveaway will be in June!

March's book giveaway winner: Mark Hodgson

Have a book or aviation item for a mtg giveaway? Contact Penny. Thanks!

A memo from your President -

Greetings! Thanks go to EAA336 of Southern NH (located in Nashua) who put on a great workshop! This month, on May 14, we will be viewing Bruce Ryan's !-- Penny Bowman

To access gate to EAA106 hangar unescorted, get your AIRPORT BADGE !

Call Christine at: 978-794-5880 to make an appointment

Do you have your OFFICIAL Massachusetts airport ID? If you plan to drive in to the EAA106 hangar (where most of our meetings are during warmer months) and do not yet have one of these, **get yours now!** **Call Christine at: 978-794-5880 to make an appointment** (photo and short application). If you already have an officially issued airport ID at another MA airport, just wear that when attending meetings at the hangar (and tell Penny about this badge).

SPOUSES, too should now get an **AIRPORT ID badge** if they will be at hangar periodically. Just **send Penny PABowman@comcast.net your spouse's name** so that Penny can transmit that information to Christine -- before you make that appointment. Penny will also make a spouse meeting badge if you will provide aircraft & caption info. Thnx!

DIFFERENTIAL COMPRESSION TESTERS

I recently was looking into buying a new compression tester. When I went to the parts catalogue, I saw two different models listed for different bore sizes. What's this, my tester says nothing about bore size?

I have done a lot of checking and called Eastern Technology Corp (ETC), who is a recommended manufacturer of testers by Continental and Lycoming. The official regs as they now stand, require a .040" orifice in the tester if the engine is less than 1000 cubic inches, and .060" if it is greater than that. ETC said that does not make sense because a 1000 cubic inch engine could have many small cylinders, and therefore should be tested with a .040" orifice. What should count is the bore size of the engine, not its total displacement. ETC recommended that a .040" orifice be used for 5" bores or less, and a .060" orifice be used for greater than 5" bores. The FAA saw some merit in that position, and the regs were supposed to be changed in 2002. To my knowledge, that has not happened. ETC has letters from Continental and Lycoming recommending that this policy be followed, but I have not seen that recommendation in any of their literature on the web.

Of course, they could have just picked one orifice size for all engines, and adjusted the acceptable leakage limits to the engine so we would just have to buy one tester to test all light aircraft engines. The difference in area between the two orifices is significant, 225%, so you are going to read a much higher pressure with the .060" testers.

The O-200 and O-235 have bores less than 5". The most common engines used in sport aircraft are the O-320 and O-360, and these both have bores of 5.125".

--Joel

EAA106 - 12 Missions for 2005

- **Increase quantity of *flyable* homebuilts**
- **Share aircraft building techniques**
- **Recreation**
- **Education**
- **Youth involvement**
- **Aviation Safety**
- **Recruitment**
- **Facilities improvements**
- **Fundraising & Financial Resource Improvement**
- **Communication**
- **Flying**
- **Social**

THANK YOU for making this a GREAT CHAPTER !!!

And now an article from your Vice President on one of the above objectives -

Over the past year, your Executive Board has put together a dozen missions to provide dynamic guidance to your Chapter's activities. We would like each of you to focus your thoughts on what you would like your Chapter to have for objectives and goals in 2006 for each of these missions. Your input to drive the activities of your Chapter is crucial to making this Chapter 106 fulfill your aviation needs. We need you to tell us both the objectives and the numeric goals that you would like to see achieved.

In the March 2005 Newsletter, we talked about our Aviation Safety Mission and providing a First-Flight Team.

This month we are talking about our YOUTH INVOLVEMENT MISSION. Some OBJECTIVES that we have are to promote aviation to youth by sponsoring a Young Eagle Rally, sponsor Young Eagles to the EAA Aviation Academy Summer Camp, and to create relationships with local schools, police/fire departments, unions, etc. GOALS are to hold a Young Eagles Rally on 11 June 2005 teaching participants how aircraft fly and providing an introductory flight, create a list of Chapter 106 members who are EAA members with proper insurance and a desire to fly Young Eagles, promote this to Young Eagle prospects in local school systems and via our website. Financing this will be dependent upon our Chapter's fundraising and financial resource improvements.

Mark Saklad has volunteered to lead a committee to take charge of this Youth Involvement Mission. Many Chapter members will be needed to help out Mark in making Young Eagles Day successful. Please contact Mark to volunteer your enthusiasm and help.

We encourage each of you to volunteer to join a committee to take charge of a Chapter Mission that you especially would like to see fulfilled. Everyone's ideas and energies are appreciated. *Action is rewarding !* Contact me, Alan Cate, VP EAA106

DIRECTIONS to MAY-14-2005 meeting:**This meeting will take place at Bruce Ryan's Lawrence Airport hangar.**

The hangar is an end hangar (facing Eagle East) in the last row behind Eagle East. It is in the last set of hangars abutting Sutton Street. The closest parking is around the main terminal building (Joe's Cafe).

If parking at the main terminal building walk into the Eagle East main entrance and make an immediate right. About another 10' you will make another right to get outside (if you were to go straight you would enter the Eagle East hangar). Bruce's hangar is directly behind the Eagle East hangar and closet to Sutton Street. An EAA member will be at the gate to guide and/or shuttle people as necessary.

A couple of important notes:

- Please bring your own chairs!
- Everyone who has an airport badge (any airport) should be sure to wear it.

Our NEWEST MEMBERS !**Please welcome Roman Harold who joined EAA106 in March!**

Know someone who has an interest in aviation? Bring them along to a chapter meeting and show them our monthly newsletter!

Have a story or information that you would like to see in the newsletter?

Please send it to Jeremiah at jdb1090@cs.rit.edu and cc PABowman@comcast.net

Thinking of building a wood and fabric plane? This workshop may be of interest:

Poly Fiber FABRIC COVERING WORKSHOP

June 11-12, 2005

South Hero Island, Vermont

<http://www.herosaviation.com/HeroAviation/Workshop.htm>

DAWN PATROL - REPORT & NEXT EVENT (come join us!!)

For our new members who might not know what is a "Dawn Patrol"... Just like in WWII when a group of planes would go out on a Dawn Patrol to a selected destination, we select an aviation destination each month for an excuse to fly (or drive if wingless) and meet up for some chow (breakfast or lunch) and "hangar flying"... We usually pick an aviation destination where some event will be happening, such as a fly-in if there is one. If there is no specific aviation event, then we pick an airport restaurant. It's lots of fun...

NEXT DAWN PATROL: MAY 21 11:30 am -- HAMPTON FLY-IN – Come join us !

Upcoming Aviation Events:

OUR MAY DAWN PATROL -- May 21st Hampton Fly-In and Fly-Market. A great place to sell or buy some aircraft parts, aviation books, and more. And LOTS of planes and EAA friends from many New England chapters. Want to grab a bargain at the fly-market, then arrive early! An EAA chapter sells food outside and the restaurant has food inside and out. **EAA016 Dawn Patrol: At 11:30am, pick up some food and meet on the deck area to eat together.**

Every 3rd Saturday May-October: Cranland Fly-In Breakfast, Hanson, MA -- see <http://www.eaa279.org>

June 3-5 -- Corsairs Over CT, Sikorsky Memorial Apt, Stratford, CT --- At least eight F4U, FG-1, and F2G Corsairs have been confirmed for the three-day event which is located across the street from the now-vacant Vought-Sikorsky factory, where thousands of Corsairs rolled off assembly lines in WWII - see <http://www.aflyer.com/corsairs.html> or <http://www.veteranssalute.org/>

❖ **June 18/19 - The Collings Foundation OPEN HOUSE - 8:30 - 4:30.** Donation for admission will be \$7 for adults and \$5 for children under 12. Aircraft & vehicle collection on display. Radio control aircraft rally. Minicars & military vehicle display. This is *not* a fly-in event and at no time are any aircraft other than Collings Foundation aircraft allowed to land at the private landing area. However, (not firmed up), there might be shuttle service from 6B6, Minuteman Airfield, for pilots. There may be a small donation requested for the shuttle. There may also be creating a package for Sunday that may include brunch at Nancys Airfield Cafe at 6B6 and admission to the event... but this has not be firmed up yet. Directions at: <http://www.collingsfoundation.org/directions/>

SAT JUNE 25: Our own event ! - - We are hosting an RV & CANARD FLY-IN at our hangar !

SIX SEMINARS! A hands-on workshop! And LOTS of beautiful planes !!

July 6-9: Fly-In, Greenland, NH. Sanderson Field. For more information call William Wheat (603) 868-2341

AUG-SEPT (date not finalized): Our own event: - - We're hosting the EAA B-17 again !!

July 25-31: 2005 EAA Oshkosh Fly-in EAA AirVenture Oshkosh 2005. For more information on EAA and its programs, call 1-800-JOIN-EAA (1-800-564-6322) or www.eaa.org . EAA AirVenture info also at www.airventure.org

❖ **August 20-21: Airshow and Aviation Display, Skyhaven Airport, Rochester, NH.** 2nd Annual Airshow, Skyhaven Airport. Mike Goulian. For more information call (603) 332-0005

❖ **September 23-25: DWC Aviation Heritage Festival, Nashua, NH.** Daniel Webster College's Aviation Heritage Festival Daniel. Nashua Airport. For more information call Webster College 603-577-6627 chase@dwc.edu

❖ **These are likely to be our DAWN PATROL destinations that month. Not definite yet, but watch for news.**

ALTERNATOR REGULATORS and OVER VOLTAGE PROTECTION

There are two main kinds of alternator voltage regulators, switching and linear regulators. Switching regulators are cheap, reliable, and low in power consumption. They cost the manufactures between \$1 to \$3 each to make in large quantities. Because they consume little power, they run cooler, which contributes to their reliability. They regulate the alternator output by rapidly (100 to 2000 Hz) switching the field current in the alternator on and off. The alternator output is regulated by how much of the time the field current is on. Their big disadvantage is they make a lot of electrical noise because of this square wave switching. This is especially a problem in fiberglass airplanes because they don't have all that natural metal shielding around found in aluminum airplanes. However, even in metal airplanes this can be a problem for several different kinds of avionics. This noise can be picked up by antennas, or transmitted through power lines and takes filtering or special shielding to remove. The design of modern avionics goes a long way to reducing its susceptibility to this noise.

Linear regulators use a transistor or other device to act as a variable resistance in the field current path to regulate the alternator output. There is no high speed switching and the field current is relatively constant, greatly reducing the electrical noise generated. However, when you pass current through a resistance, that generates heat which must be dissipated. This may be one reason linear regulators are not mounted inside alternators.

Almost all automotive regulators are switching regulators, as are most aircraft regulators (since most aircraft alternators and regulators are automotive derivatives). Just about the only place you will find linear regulators are in aircraft applications to reduced the noise problem, but I have seen them in some motorcycles (which is odd, because who cares how much electrical noise they make).

The regulator can be built into the alternator, which is simpler, but there are a lot of good reasons to mount it in a remote location (eg more benign environment, output more closely suited to batterie's temperature, and the alternator can be turned off if there is a problem). If the regulator is internal, it will almost definitely be a switching regulator.

The most common problem with a regulator is that it will slowly drift out of calibration, but this will be slow to kill the battery and take a while to be noticed. (That's why you should have a voltmeter on your panel.) The failure modes which really get our attention are when the regulator completely fails either on or off. If it fails on, the full field current will be supplied to the alternator which will greatly increase its output voltage, which will push more current through the field, which will increase the output voltage even more, which—well you get the idea. This is a positive feedback situation and, if you have a large capacity alternator, this will soon raise the bus voltage to very expensive levels that can take out all unprotected avionics, electric flight instruments, electronic fuel injection, and electronic ignition. This is the real killer failure mode.

A regulator that fails off is comparatively benign. The field current will go to zero, as will the alternator output, and you just fly on battery power alone until you can land for repairs.

I have heard that external regulators are more likely to fail open (off) and internal regulators are more likely to fail on, but I have not seen any data to support that. Perhaps this is more a difference between switching and linear regulators. In my own experience, I have had an external switching regulator drift out of calibration, another fail open in a car, and two external linear regulators on motorcycles fail open (both caused by shorts in the field windings).

Now here comes my main point, so wake up if I put you to sleep. The most dangerous failure mode of the alternator regulator is to fail on and produce dangerously high bus voltages. But this can be avoided by having over voltage protection. There are two main types; the over voltage relay and the over voltage crow bar. The over voltage relay is placed in the field circuit. If the voltage exceeds a certain level for a certain period of time, the relay latches open reducing the alternator output to zero. You then rely on your battery for electrical power until you can land. The crow bar works analogously, except when the circuitry detects the over voltage condition it uses a special semiconductor (an SCR) to place a dead short across the field windings. This will open the alternator circuit breaker, and you again are reduced to dependence on your battery for all electrical power. (From my readings, the crow bars have more advantages than the relays). Of course the relay or crow bar could fail, and take a perfectly functioning alternator off line. But this is much less likely to happen than a regulator failure.

If you have no over voltage protection and the regulator fails on while flying VFR, it will be expensive. If it occurs while you are flying IFR, it could be deadly. (It could also be deadly if you are VFR with dual electronic ignition.) Many certified light aircraft do not have over voltage protection. There are not that many failures, and to put them into certified aircraft involves a lot of testing and money. So here is an area where we can be safer than the certified. I have seen schematics and building instructions for over voltage protection on the web, probably by Bob Nuckolls, and they are commercially available). Depending on the level of protection you want, and how fancy you get, it will cost \$10 to \$50 to build your own. Commercial units will probably be three or four times that.

For a dollar or two you could build an over voltage warning indicator (B & C sells them for \$75). This would turn on a warning light when bus voltage got too high, and then you could turn off the alternator. But in many cases you would not be able to react fast enough to save your electronic equipment, and this light would just be an early indication that a very expensive event just took place. One could also easily install a back up regulator that you could switch to if the primary one failed, but this would probably only make sense for someone who flew a lot of hard IFR.

And speaking of Bob Nuckolls, most of the above and much more is in his excellent book "The AeroElectric Connection" available for about \$30 at www.aeroelectric.com. As I have said before, the responsible home builder should read this book, or an equivalent.

--Joel

Thinking of building plane?

The Glastar group has two shares for sale due to relocation of the members.

Contact the project manager at: dokus@att.net

Want to own an experimental aircraft?

Variviggen N106VV is for sale.

Contact dokus@att.net for particulars.

