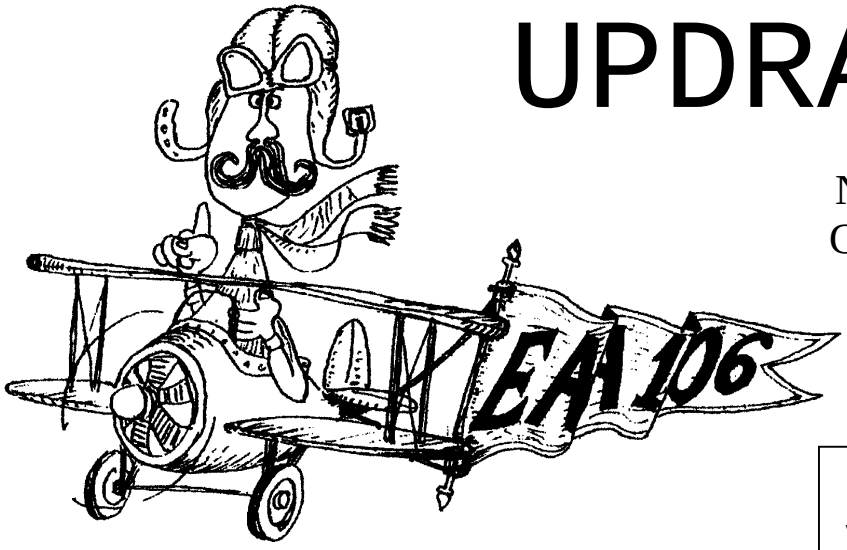

UPDRAFT

Newsletter of EAA106
Greater Boston Chapter

We Build Airplanes

August 2002
Volume 30 Issue 8

President
Roman Rasenas
romanrasenas@rcn.com

Vice President
Rebecca Harvey
n1gzd@tiac.net

Secretary
Alan Cate
alan_cate@msn.com

Treasurer
Joel Ventura
ventura@brandeis.edu

Newsletter Editor
Bill Miller
miller.w.b@att.net

Hanger Manager
Ed Dokus
dokus@attglobal.net

Hanger Comptroller
Joel Ventura
ventura@brandeis.edu

August's meeting—there is none! But we are having a chapter picnic at Hampton Airport

Saturday August 24th

>>>>> 10:00 AM <<<<<

The rain date will be Sunday August 25th

An email will be sent out on Friday August 23rd if the weather looks uncertain. So call someone with email if you don't have it and the weather looks iffy.

Bring Chairs, and bring your own food and drink. We also need a volunteer to bring a gas grill, so notify Joel if you are willing.

The September 7th program will feature **Paul DiNoto** on **Aircraft Painting.** (If you have a part you want painted, let me know and that may be part of Paul's presentation.)
The October 5th meeting is tentatively set to feature **Joe Delello** on his turbocharger derived **Turbojet Engine**. (Hopefully, we will get to see and engine run at our hangar.)

Hello All! Bill is away on vacation, and foolishly left the newsletter in my hands. So I have uncensored access to your brains. Let me start will two contributions I made to the newsletter a couple months ago, which Bill did not have time to include:

Vortex Ring State

For you rotorcraft types, there is an interesting article on the return of the Osprey to flight testing in the 5/30/02 issue of http://www.aero-news.net/. It looks like at least one of the fatal accidents was caused by an Osprey descending too rapidly into its own down wash. This is called "vortex ring state" (VRS). This is a problem for normal helicopters as well, but the twin rotor Osprey is especially susceptible to VRS. The vortexes from the two rotors can interact and differentially affect the two rotors, resulting in an uncontrollable condition. The operating limitations for the Osprey have been rewritten to avoid this state. But this reduces the military utility of the aircraft, because one thing you really want to be able to do is get your troops down on the ground fast to limit your exposure to enemy fire. (Though VRS is usually only a significant problem in vertical descents.) Maybe they should consider scraping the whole project, and look into the Aerocopter. After all, they only have $11 BILLION invested in this project so far.

The web site below has extensive information on rotorcraft in general and on VRS. It includes some movies of computer generated simulations of normal down wash and VRS. You will need a high speed internet connection to look at all those movies in a reasonable amount of time.

http://www.enae.umd.edu/AGRC/aero.html

Another Canard Related Canard Accident

In the last few months there have been three canard related canard accidents that I know of. Last month the elevator of a VariEze fluttered in flight, tearing the entire canard surface off the airplane. Without the canard for pitch stability, the airplane pitched straight down and dove into the ground killing both occupants. The elevator of this airplane had not been properly balanced in spite of the emphasis that is placed on the importance of elevator balance both in the VariEze plans, in all the canard publications and mail lists. It is hard for me to understand how a builder could make a mistake like that.

In another accident, a VariEze pilot-builder forgot to replace the two bolts that mount the canard to the airframe. On his takeoff roll, when he applied up elevator, the canard took off, leaving the rest of the airplane behind. There was no serious damage to the airplane, or the pilot (except to his ego). This failure should have been caught in the preflight, when the security of the canard is checked. (At Oshkosh this year, I heard of a similar LongEze incident in which, on attempted rotation, the canard shot 100 feet into the air.)

A much more disturbing accident occurred last week. Steve Drybread had just completed a Berkut (considered by many, including Dick Rutan, to be an improved LongEze type design). He was in the initial stages of flight testing, when his canard separated from the aircraft in flight, killing him and destroying the aircraft. In the plans built Eze's and Berkut, the fuselage decks forward and aft of the canard are glassed to the top of the fuselage. Steve modified this design, so that these covers were attached to the canard, and were held in place by eight cover screws. This gave him better access to the front of the aircraft and back of the instrument panel when the canard was removed. On the fatal flight, the cover screws were in place, but the two 5/16" bolts designed to carry the flight loads were not. The cover screws would have made the canard appear to be securely attached during the preflight

inspection. This accident was more disturbing to me because Steve was a very experienced pilot-builder, and I know if this kind of accident could happen to him, it could happen to me.

This additional information about the accident later appear on the canard aviators mail list:
There was a major distraction that may have led to the accident. The day before, or the day of, the accident (not sure which), the canard was off. A friend came to see Steve. The friend wanted to sit in the cockpit. Friend got in. Steve kept the bolts in the seat of the cockpit when the canard was off. Phone rang, Steve answered it. Guest got out of the cockpit. Plane fell on its tail. Propeller broke. Steve had to swap propellers to run the test flight....

I have seen a number of tricks pilots use to make sure critical parts are replaced before they fly. One was to put critical parts in a box as they are removed. You don't fly until that box is empty. But you have to remember to check the box. Another guy put the critical parts in a bag attached to the ignition key. You don't fly until the bag is empty. Finally, others put the parts on the pilot's seat. Distraction can be deadly, especially emotional induced distractions.

In the military, a written record must be kept of the present flying status of the aircraft. Complete written records must be kept of everything removed from an airplane. I do some writing when I work on my airplane, but now I think I should do much more. See the web site below for the kinds of forms and procedures followed in the military. There is also and interesting story there on how following these procedures probably saved a guy and his airplane.

http://www.remotearrow.com/ez/maint/index.htm

PS: When I was checking over my LongEze after I first bought it, I found the lock nuts on the canard mounting bolts were not installed, and the nut on the left wing attach bolt was only screwed on a few turns and had never been torqued. I removed it with my bare hand. According to the logs, the airplane flew for more than three years in that condition.

Spark Plug Heat Ranges and Measuring CHT
The letter below is reprinted with permission from the Canard-Aviators forum. However, I thought that the content would be of general interest. It was in response to a number of contributions which indicated that the heat range of a plug could be increased by putting additional sealing washers under the plug before installation, and other contributions which noted that Lycoming does not approve of using copper ring gasket thermocouples under spark plugs to measure cylinder head temperature (CHT). They only approve of bayonet type thermocouples. (At a Lycoming forum I attended this year, the Lycoming representative said that the gasket type thermocouples were useless and misleading.)

Gentlemen,
Just some basic information regarding spark plugs. There seems to be some mystery with Copper gasket thermocouple installation under the spark plug base seal.

Let me start by explaining the basics regarding spark plugs. Once the spark plug mechanical design is understood the rest will make sense. Some of you may know this already. The reason for the length or reach of the plug (Threaded area) is based off the design of the cylinder head and the head material. The deeper the reach the more contact area the plug has with the cylinder head base material. This is used for thermal transfer and plug security, nothing more, nothing less. The softer the head material (aluminum) the deeper the reach for more thread contact. Heat transfer is also a major concern, the more contact area the plug has with the head, the better the thermal transfer of spark plug heat to the

Cylinder head material. The spark plug will always reflect the hottest section of the cylinder head combustion chamber area, excluding the exhaust port.

Now lets talk about heat ranges. I'll use 1 through 10 as the example (All plug manufactures support heat ranges with different combinations of numbers). The higher the number (-10) the more heat the plug will transfer. The control agent used to dissipate heat from the spark plug electrode is controlled by the ceramic material that insulated the electrode from the threaded metal base. Plugs that have higher numbers in the 3rd and 4th positions of the part numbers have less ceramic shielding around the electrode. This allows better thermal transfer from the spark plug to the cylinder head, the plug easily transfers the heat. The opposite applies to lower number plugs (-1). They have a long, thick insulated ceramic shielding around the electrode that doesn't allow the spark plug to transfer the heat to the Cylinder head, hence, they call it a hotter plug. The reality is, the spark plug doesn't spark hotter or colder, it simply holds or dissipated more built up heat to the cylinder head to maintain an optimal temperature for ignition.

During engine cylinder design, the spark plug electrode is positioned as closed to the center of the combustion chamber as mechanically possible to provide an even / balanced ignition across the entire piston face. Aircraft engines are a bit different due to the ignition and dual plug designed heads. However, even aircraft engines place the plugs as symmetrical as possible to provide balanced detonation across the top of the piston face, provided timing on both ignition sources are in-sink. Placing a copper gasket (plug type thermocouple) under your spark plug is as close to actual cylinder head temperature as you can get without being internal to the combustion chamber. The spark plug is the main thermal conductor for cylinder head heat.

The reason older race car mechanics and even some new mechanics placed washers under spark plugs was to orient (index) the electrodes in each cylinder identically, it had nothing to due with the plugs heat range. Although it could effect thermal transfer slightly. The original philosophy was: By indexing all the electrodes in the same position in each cylinder, you would have even/balanced combustion in all cylinders. This concept is only valid in fuel injected cylinders where the pressurized fuel is sprayed across the face of the spark plug. It has been proven to have zero effect on throttle body injected or carburated induction systems. It does seem to have some psychological advantage (like the rabbits foot). (I have seen more recent data that shows spark plug electrode orientation in the combustion chamber can have significant effects on engine performance when electronic ignition is used with very lean mixtures. More on that next month. –Joel)_

My point regarding this information: Using copper ring gasket thermocouples under your spark plugs will provide very dependable CHT information. However, on up-draft cooled engines (most pushers). the cooper ring gaskets must be located on the top of the engine to be accurate. The reason they can not be on the bottom is, copper dissipates heat very fast. It's a great thermal conductor. If they are located on the bottom of the engine your incoming air from the lower cowl will draw the heat from them and give you a false (cooler) reading of your actual CHT's.

Sorry if this post was long. I always feel better explaining the concept and design of an issue rather than just saying something I heard from someone else with no understanding or concept of what I am talking about or telling the group.

Phil Camarda
Long EZ N6PC
www.kitaircraftparts.com (Phil is an electrical engineer for Daimler-Chrysler.)

"Boston Globe Attacks Homebuilt Aircraft"
Most of you have read or heard about the recent death of Tim Crawford when he crashed into the ocean just south of Martha's Vineyard last Saturday. Tim was on a data collection flight in a highly modified LongEze. He built and modified the airplane to collect atmospheric data for NOAA, the Navy, and NASA. He routinely flew these flights at an altitude of 32 feet (that is no typo). A sneeze at that altitude could be deadly. He did this for 10 years without even an incident. Several of us saw Tim and his beautiful airplane at Oshkosh this year, on display in the NASA pavilion.

Monday, the Boston Globe had an article on the accident, and took the opportunity to say a few unkind things about homebuilt aircraft in general, and the LongEze in particular. Today's issue (Wednesday, 8/7/02) of http://www.aero-news.net/news/index.cfm has a story about the Boston Globe article. It points out all the errors the author made, but what I also found interesting is it summarizes the causes of the 11 fatal LongEze accidents and the causes of the 22 non-fatal LongEze accidents that have been reported. As you would expect, almost all are pilot error.

If you are interested, go to the above web site, click on Top News, and go to the article entitled Boston Globe Attacks Homebuilt Aircraft. There is also a link to the original Globe article if you missed it. (Note: if you go to that web site after 8/8/02, you will have to go to the 8/7/02 issue before that article will appear.)

The PRELIMINARY results from the medical examiner indicate Tim suffered a stroke before the accident.

Sport Aviation Magazines Available on CD
All the Sport Aviation Magazines from the first issue in 1953 through 2001 are now available in a 28 CD set from EAA. The cost of the set is $150. It includes every article, every picture, every letter to the editor, and every advertisement. It can be searched by author, title, subject matter, or a combination of these criteria. I bought a set of the CDs for the chapter library while I was at Oshkosh, and it will be available to members as soon as I can make a backup copy of it.

New members may not feel this is a very big deal, but Sport Aviation had a very different orientation in the early days. It was very technically and "How to" oriented, and the old issues are a treasure of techniques and useful hints for homebuilders. It will be very useful to have all these resources readily available again. Many EAA members are disappointed in the direction Sport Aviation Magazine, and EAA in general, has taken more recently with an emphasis on high end aircraft, warbirds, and the Airventure Flyin rather than on building airplanes.

We seem to have had an emphasis on canards this month. If some of you can make some contributions to the newsletter, maybe we can get back to those old fashion kind of airplanes next month.

PRESIDENT	Roman Rasenas	10 Belnap Road	Hyde Park MA	02136	(617) 364-5120
VICE PRESIDENT	Rebecca Harvey	7 Duston Lane	Acton MA	01720	(978) 287-5457
TREASURER	Joel Ventura	11 Yardley Road	Andover MA	01810	(978) 475-6875
SECRETARY	Alan Cate	21 Neillian Street	Bedford MA	01730	(781) 275-5212
Newsletter Editor	Bill Miller	7 Prentiss Lane	Belmont MA	02478	(617) 489-3443
Newsletter Publisher	Louis Edmonds	104 Rideout Road	Hollis NH	03049	(603) 465-2752
Hanger Manager	Edward Dokus	7 Fairmount Street	Winchester MA	01890	(781) 729-5393
Hanger Comptroller	Joel Ventura	11 Yardley Road	Andover MA	01810	(978) 475-6875

EAA 106 Hanger (978) 683-8751

This **Newsletter** is for **communication** and **enlightenment**, but should **not** be relied upon as absolutely correct in content.

EAA Chapter 106 of Greater Boston
c/o William Miller, Editor
7 Prentiss Lane
Belmont, MA 02478-2020

DIRECTIONS TO EAA Chapter 106 Hangar at Lawrence Airport, North Andover, MA

Take Route 28 North from Route 128/95 and turn right onto Route 125 North. Follow this down a short section of Route 114 then right toward Haverhill. Route 125 blends into Route 133, Osgood Street, which you follow past the turnoff to the airport terminal area, then in about two miles after passing a nursery the road widens for a left turn lane toward a large incinerator plant chimney. Turn left there onto Holt Road and turn right when it tees onto Clark Street. Next left is our road, access to the North ramps, via a combination locked gate which will be left open. The EAA 106 hangar is straight ahead, first on the right. Park in front. **BRING CHAIRS**

Easy way: Fly into Lawrence Airport and ask the tower for taxi instructions to the EAA 106 Hanger. This route avoids traffic congestion on the roads.