



## **PLANE TALK GREENHORN CHAPTER 808 EAA, March 2010**

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**MEETING: SECOND WEDNESDAY EACH MONTH 7:15 PM, FREMONT COUNTY AIRPORT, East of Canon City, CO on Highway 50. ANNEX BUILDING #2.  
BREAKFAST EACH SUNDAY MORNING 9:00 AM SPITFIRE Grill at PUEBLO MEMORIAL AIRPORT TERMINAL BUILDING.**

### **OFFICERS 2009-2010**

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**WEBPAGE ADDRESS: WWW.EAA808.ORG LOOK IT OVER!!!**

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**Dues: \$15.00 a year; due June 1 of each year, \$20.00 if not received by July 1st. Mail to: Leonard Mino, 2013 Hesperus Dr. Pueblo West, CO 81007**

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If you are receiving this newsletter by U.S. Mail and now have an e-mail address available, please let the editor know your new address.

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## **Randy's Shop Notes**

Hello Folks, I just returned from the very entertainment centered Las Vegas with Kathy this last weekend. We went to see Garth Brooks in concert and had a great time. From the ninth floor of the Wendam hotel where we stayed, I had a clear view of at least a dozen high

dollar private jets about a mile away at the airport. I had two thoughts as I watched the jets come and go, Where do all the pilots hang out while the owners gamble? How many are really broke playing in lost wages? I'm not much for the gambling scene, Garth Brooks and his wife, Trisha Yearwood were great.

Anyway, I'm glad to be home and have enjoyed some great flying days as many of you have. Walt reports that the flyout this last Saturday was fun, and he will never challenge a Navy Pilot (Paul) to a spot landing contest again. Paul nailed the first cable on the aircraft carrier while Walt says he landed on the fantail. I am looking forward to many more fly outs and fun contests. I believe that is where grass roots flying belongs and makes our sport so inviting to young and old folks who just want to have a good, relaxed flying experience with friends. We don't need slick ads, super high performance, high dollar airplanes to have a good time.

Oshkosh is coming up fast, and I would encourage all members to try to make it to the mecca of our sport, and the great fun that is our convention. Elsa reports that the Barnstormers restaurant will be open for our meeting next Wednesday night. She will serve a fish fry special with a delicious cobbler for desert. I hope to see you all there.

Jim has been working on his next door neighbor to get her to come speak to us. She has thousands of hours flying with the WACS or the women who flew the brand new warbirds, ferrying them across this country. Her stories should be very interesting. I hope to see you all there, Randy

#### **Minutes From The EAA 808 November '09 Mtg.**

Meeting , Feb. 10,2010, called to order by Randy White ,Pres.

#### **Treasurers Report:**

None

#### **Old Business:**

R. White reported on E.E,A Young Eagles program and varios other programs.

#### **New Business:**

Proposal to have a Chapter fly out to Pueblo or LaJunta.

Grant Schemmel asked for builders tips from various members ,maybe kit mfg. ideas.

Motion to close meeting by R. White ,approved.

Program: R. White showed silent movie about annual EAA Fly In.

## Upcoming Events

Date	Event
03/10/10	<a href="#">EAA 808 Chapter Mtg.</a>
3/16/10-3/18/10	<a href="#">Aviation Industry Expo 2010 Las Vegas, NV,</a> <a href="http://www.AviationIndustryExpo.com">www.AviationIndustryExpo.com</a>
03/20/10	2010 Young Eagle Kick-off Rally - EAA Chapter 72, Peyton, CO, <a href="http://www.eaa.org/calendar/eventdetail.aspx?id=6402">http://www.eaa.org/calendar/eventdetail.aspx?id=6402</a>
4/13/10-4/18/10	Sun 'n Fun Fly-in, Lakeland, FL <a href="http://www.sun-n-fun.org">www.sun-n-fun.org</a>
4/16/10-4/18/10	<a href="#">Doolittle Tokyo Raiders Reunion, Dayton, OH</a> <a href="http://www.nationalmuseum.af.mil">http://www.nationalmuseum.af.mil</a>
04/17/10	<a href="#">Bluebonnet Picnic &amp; Fly-In San Antonio, TX,</a> <a href="http://www.als-cannonfield.com">www.als-cannonfield.com</a>
6/10/10-6/15/10	B-17 Tour Stop, Denver, CO <a href="http://www.b17.org">http://www.b17.org</a>
6/12/10-6/13/10	Vintage Aero Flying Museum Presents The Platte Valley Fly-In & Open House, Hudson, CO <a href="http://www.vafm.org/">http://www.vafm.org/</a>
06/28/10	Frontier Days Airshow w/ USAF Thunderbirds, Cheyenne, WY Contact: MSgt Shawn Hendricks, Phone: 307-772-6392

## Tips 'N Tricks

This month's article comes from the [experimentalaircraft.info](http://www.experimentalaircraft.info) site (<http://www.experimentalaircraft.info/homebuilt-aircraft/aircraft-propeller-2.php>) and talks about propeller aerodynamics which most pilots know the basics of. This article is the first of two parts and provides some more background into the how and why of propellers.

## Propeller Aerodynamics, I

A propeller is an airfoil and like a wing it will generate an aerodynamic force much the same way. It has a leading and trailing edge, camber and a chord line. The cambered side is called blade back and the flatter side the blade face. The angle which the chord makes to the plane of rotation is the blade angle. The propeller is rotated by the engine and this creates thrust and moves the aircraft forward.

Previous pages discussed the type of propellers and their controls, in this section we will try to describe some of the aerodynamic principles.

## Propeller Aerodynamics

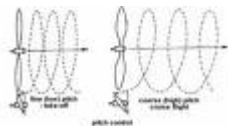
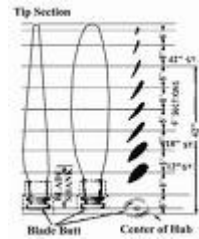
As the propeller moves through the air the static pressure is reduced ahead of each blade and at the same time at the blade face the flow is retarded resulting in an increase of static pressure. The changes in pressure around the rotating blades causes air to be drawn into the propeller disc and this results in a rearward movement of a column of air. The result being a forward thrust pulling the

aircraft. All of this in accordance with Newton's Third Law.

The amount of thrust generated by a propeller depends on the mass of the air and its acceleration toward the rear.

## Blade twist and pitch

The need for a changing blade angle from the hub to the tips stems from the fact that angular speed varies also and is greatest at the tips. Combined with any forward speed the propeller may have, the relative airflow is also different from the hub to the tips. To keep thrust equal along the blade, they have a built in twist. The design is such that the blade is thick at the hub with a large blade angle and thin at the tip with a low blade angle.



During rotation and forward movement the propeller describes a rotational path, called a helix. If the propeller would move forward without giving thrust the distance of one revolution is called experimental mean pitch (angle between plane of rotation and the zero thrust angle of attack). The actual advance is the difference between experimental mean pitch and slip. Slip is the angle between

the zero thrust and the actual angle of attack.

If the propeller rotates in a solid medium it would advance according to its pitch (angle between plane of rotation and the blade face, chord line,) also called geometric pitch.

## Propeller performance

If this was an ideal world the propeller would convert all power to thrust. But as this is not the case, losses occur in the slipstream, aerodynamic drag. Under normal conditions the propeller is able to convert 85% of the brake horse power from the engine into thrust. Thus propeller efficiency is the ratio between thrust horsepower and brake horsepower.

Remember that  $\text{Power} = \text{Force} \times \text{Distance} / \text{Time}$  (rate of doing work), we can equate propeller efficiency as  $\text{Thrust} \times \text{TAS} / \text{Brake Horse Power}$ .

It follows that propeller efficiency is zero (0) under two conditions: when there is no forward speed (TAS) or when there is no thrust generated. With the aircraft at standstill (beginning of takeoff roll or taxi) the propeller has zero efficiency until it reaches its optimum forward speed for the propeller where maximum thrust is generated (max efficiency), increasing forward speed beyond that point will decrease efficiency (propeller with fixed blade angle). You could say that there is a relation between RPM and airspeed for fixed pitch propellers.

It is obvious that a controllable propeller has a wider range of airspeeds where efficiency is at its maximum, until the governor reaches a position where the blades can no longer be adjusted, which is at the full fine and coarse pitch stops.

## Blade forces

During rotation the blades generate lift and drag. But with propellers we talk about thrust (lift) and propeller torque (drag). Another one: with a wing, drag must be overcome to provide lift but with a propeller it is propeller torque that must be overcome by engine torque. Increasing power with the throttle increases engine torque, resulting in a higher RPM until propeller torque is equal to engine

torque and RPM stabilizes.

If you would place an aircraft with a fixed pitch propeller into a shallow dive, as forward speed increases the relative airflow changes and the angle of attack is reduced. Resulting in a reduced thrust and propeller torque and as engine torque remained the same (there was no change in throttle setting) engine/propeller RPM will increase.

### **Blade effectiveness**

A propeller blade is the most effective between station 60% and 90% with a peak at 75%. It is this point (station) where blade angle is usually reported.

### **Asymmetric blade effect**

This is most noticeable during high angles of attack of the airplane, take off rotation, tail wheel aircraft on take-off run. The cause is that the propeller disc (normally at a right angle with the airflow) is tilted backwards and the relative airflow between the upgoing and downgoing blades are different. The downgoing blades have a larger angle of attack (the distance travelled seems greater due to the forward movement of the aircraft) and produce more thrust, pulling the aircraft with a higher force than the upgoing blades. With an engine rotating clockwise (as seen from the cockpit) the aircraft wants to turn to the left.

### **Twin engine aircraft**

On twin engine propeller driven aircraft and with both propellers rotating in the same direction the arm (or distance) of the downward going blades towards the center of gravity are not the same. The engine where the distance is the smallest is called the critical engine. If that one fails the other engine will yaw the aircraft with more force (thrust x arm) than if the critical engine had failed.