Eagle Screams

Volume III, Issue IV | *Monthly Publication of the Screamin' Eagles* | April 2002

The Screamin' Eagles Giant Scale Model Airplane Club meet on the 2nd Thursday of the month. If you have any questions about club activities or meeting location please contact one of the following members.

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April Meeting:

The April meeting of the Screamin' Eagles will be held at JJ's Top of the Swamp in Madison on April11, 2002. As you know, they have good food at very reasonable prices so plan on grabbing a bite to eat there to show our appreciation for using their place as our fall and winter meeting site.

March Minutes – *By Roy Seals*

Rob opened the meeting with a joke (stick to dashes, Rob. ha-ha)

We discussed the flyer for our upcoming fly-in and Roy agreed to update it and print it at his school. Charlie said that he would check with Mike Bitter about catering the food for the fly-in. We all agreed that a spectator raffle separate from the pilot raffle would be a good idea. We agreed that pilots would get one ticket per flight in order to help promote more flying which is what the spectators like to see. Le Roy will contact Dave Jeardeau to see if he would be interested in running the general raffle. If Dave agrees we will give him his 2002 Screamin' Eagles membership.

It was brought up that there is a fly-in/swap meet in Shawano on Sunday, April 28 at 8:00 a.m. with an auction at 10:00 a.m.

Continued on page 2

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Mike Pirkl - http://maddog-aviation.rcplanet.com/
Le Roy Stuczynski - http://galleryofaviation.com/

Prez Sez – *By Rob Goebel*

Everything is moving forward with our big bird event. Thanks to everyone who has already stepped forward to help out! Let's have a great turn-turn-out at the April meeting to finalize a few things and get geared up for the upcoming flying season. See ya there!

The Screamin' Eagles offer their heartfelt sympathy to fellow Eagle Bill Disch on the recent loss of his loving wife Carol. May God bless you and your family.

Minutes – Continued from page 1

It was mentioned that the Marcs Float Fly will be held July 22 or July 23.

Show & Tell:

Rob brought a model-sport video magazine and told us a little about it. Roy said that he would bring the ones that he has so that anyone in the club who wanted to watch them could.

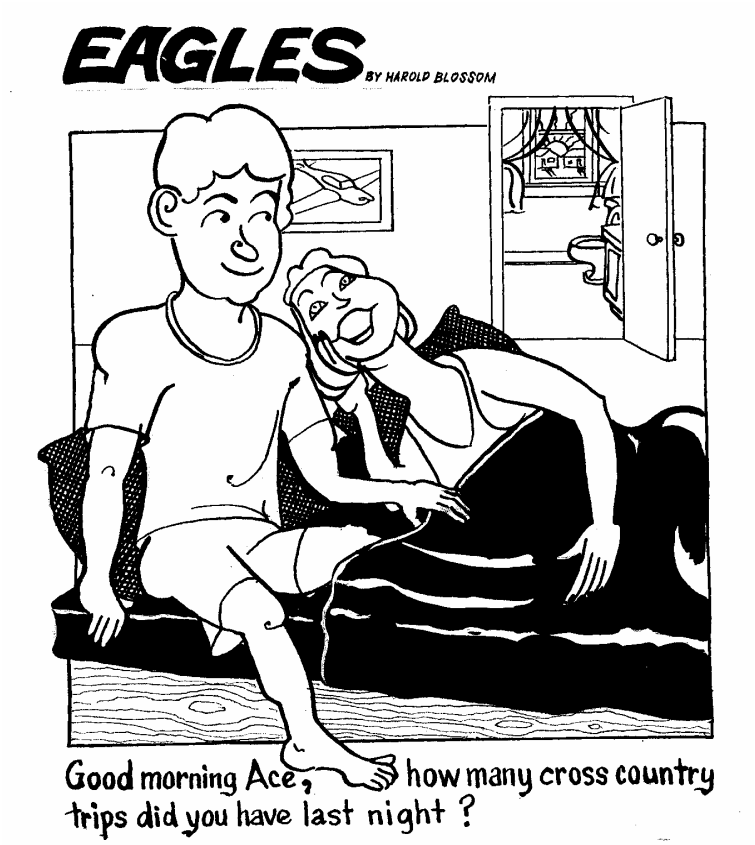
Le Roy mentioned how, at the Chino California WWII fighter restoration facility while building an airport hangar, they found all sorts of airplane part relics that had been covered up.

Wayne brought his Hanger Nine Cap in order to show off his new pilot that he bought at Schultz Sport & Hobby. It was a Super-Lite painted at HP Pilots. I must say that I was impressed. (Don't fire me, Rob. Just thought I'd cash in on some free advertising.)

Charlie brought some floats made out of styrofoam with a wooden deck. They are light and will not fill up with water if punctured. They're made in Green Bay. He also brought a ZDZ 60 rated at 5.4 horsepower. It has a rear induction carb, will swing a 24-10 prop, and sells for $490. He also brought a Pitts-style muffler in for the ZDZ engine for us to look at.

That wraps up the minutes from our March meeting. Sorry if I missed anything.

Roy



Trez/Ed Sez – *By Le Roy Stuczynski*

Spring has finally arrived and it seems like we have had more winter like weather than we had during winter. The good news is that it won't last long. The poor Robins are pretty confused though. It sure is nice to have longer daylight hours and now that we're back to daylight savings time it's even better. Temperatures will be getting warmer and flying can begin. What I'm leading up to is that we will be able to begin meeting at the LARCC field next month.

A good number of you will be leaving for Toledo for the Weak Signals exposition. I messed up this year by not watching the calendar and I scheduled a Warbirds Squadron 6 meeting at the Gallery of Aviation on April 6. While I will miss Toledo this year, I am looking forward to the Warbirds meeting. I really enjoy sharing the Gallery with friends and get warm and fuzzies inside when I see the mutual enjoyment of those touring the museum. It's just what dad would want.

I'm getting real close to retirement and if there is a State of Wisconsin retirement window, it could be even closer. Let's just say I don't think I will need to take any vacation to go to Toledo next year.

I've been making flagpoles for some time now and I've really got the plan perfected. I'm pretty proud of the product I can offer. I make them from commercial grade galvanized pipe and include a beautiful gold plated eagle mounted on a cast iron truck (pulley assembly). My son just bought a house in St. Cloud and said he wanted one for his home, one for his girlfriend's father, and one for a friend. So I was busy cutting pipe and building 3 flagpoles to take up to St. Cloud on April 12. Unfortunately his friend decided he didn't want the flagpole so I had an extra. Well...what to do?

Last night Rob stopped over at the Gallery to pick up a folder he left there when we met there in January. I told him what I have been doing and jokingly said "you want to buy a flagpole?" To my amazement he said he just happens to be looking for one. He stopped at my house, looked at mine, and the extra I had, and said "sold." I look at that as a compliment of the product. If anyone's interested, I am currently selling the complete flagpole for $100 and will professionally install it for $40, including concrete. Does this sound like a soon to be retired guy looking for a way to make a few extra bucks? I didn't mean to turn this into an advertisement, but we should all have a flagpole. Right?

Well I'm surely going to miss the fun at Toledo this year but I trust those of you going can handle it without me this year. With retirement on the horizon I am looking forward to finally getting into modeling and flying again, building a few flagpoles, playing with the Gallery, boating, a bunch of honey do's, and fun, fun, fun. Geez, how have I had time for work?

See you all at the meeting to hear all the Toledo tall tales.

The 5 Evils of Propellers by George Hicks

For Starters

IMAC is different from other model aerobatic disciplines because the basic configuration of the airplane is more-or-less predefined. We are permitted to deviate from scale by utilizing the 10% rule, which allows us to do some fine-tuning of the airplane for our specific model aerobatic needs. In the end our ultimate goal is to produce an airplane that requires the least amount of pilot input to perform the task at hand while still maintaining a close resemblance its full-scale counterpart. The demands on the airplane's ability certainly increase as you move up in the class hierarchy. An airplane that is setup to perform the Sportsman sequence well might not be competitive in the advanced class without modification. The additional power requirements are only a small part of the problem since the airplane must now be setup to perform as well inverted as it does upright. The requirements on power and proper setup become even more important in the Unlimited class since your airplane must be able to perform every conceivable FAI catalogue maneuver. For many, having your airplane perfectly setup for the sequence isn't enough because the same airplane is expected to be capable of performing all the latest 3D techno-wizardry that has become so popular. When all is said and done you really want to "have your cake and eat it too"…nothing wrong with that, but what do you do when you have a trimming problem that looks too complicated to be solved easily? This is where a solid, fundamental understanding of how the airplane works becomes indispensable. This understanding will allow you to break things down into manageable parts so you can eventually arrive at a logical solution. Some of the problem stems from the way we approach the setup and trimming process in general. The standard method is what I call the "cookbook" approach where we mindlessly follow the orders dictated by some trim chart with little or no thought. Surprisingly, this will get you pretty far but it does little to enhance your problem solving ability when something happens that isn't covered by the method. Furthermore, the material limits you in that you only make adjustments that are provided in the chart itself. This kind of thinking and approach can be detrimental. We should all try and think out of the "box" and learn to conceptualize the airplane in different ways. The trimming and setup process becomes much more useful when you truly understand why you need to make certain modifications and more importantly how these modifications will affect other characteristics of the airplane.

I'm going to do my best to refrain from very specific technical jargon and long equations because I feel that many times they cause more confusion than understanding. On the other hand I feel that a thorough explanation that covers all the major facets of the problem is necessary otherwise you cheapen the quality of the information. My goal is to explain concepts that appear difficult at first, because of the way they are often presented, but in fact are nothing more than simple ideas once you break them down into their basic components. Much of the information you will already know but the idea is to make it all fit together such that you can visualize how the airplane works as a whole. For the newcomer, the learning curve can be very steep and at first glance seem quite overwhelming but remember that nothing is ever as complicated as it looks. I can remember all the questions I had when I started flying aerobatics. Back then information wasn't as easy to find and the answers I did find didn't always prove true. These days the novice should consider himself/herself lucky because all the necessary information is virtually at their fingertips. This availability of information can literally shave years off the time it takes to learn the "art" of precision aerobatic flying.

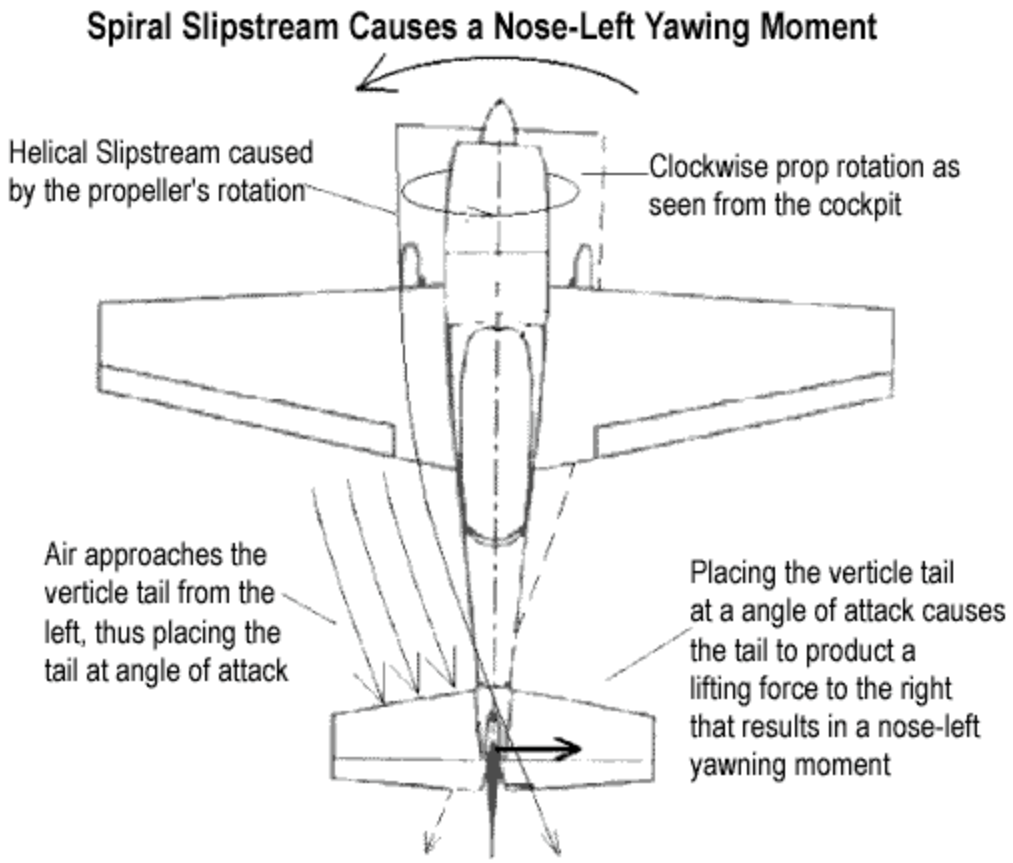
If the flying is the "art", then the design, setup, and trimming process is the "science" and this is what I intend to cover over the next few articles. I figured that we would start by talking about how propellers affect the airplanes we fly. Last time I checked every IMAC pilot I know had a propeller on his or her airplane so this topic is pretty universal. And now for the good stuff…Remember when you built your first trainer and you noticed that the plans called for a couple of degrees of right thrust and an equal amount of down thrust? I do… My first question was why do I need to offset my engine? Zero-zero seems like the logical answer to me. After pondering the situation I had totally confused myself by trying to invent some theory to make sense of the situation. What's left to do but ask the local experts? The club gurus immediately started talking in some other language and I heard words like spiraling airstreams and uneven disc–loading and then I heard about the evils of engine torque. After my lesson I was certain that if I bolted the engine on with no right or down thrust my airplane would undoubtedly crash.

I think we have all struggled with trying to figure out whether or not our aerobatic models actually benefit from an offset thrust line. There are many schools of thought and opinions on the matter. You'll find this in every technical aerobatic topic and it's often comical at how heated the discussions can become among the enthusiast. In the end the right answer is the one that makes the airplane perform and handle the way you want it too…period. I've found that every situation is slightly different and it's up to the competitor to make the final judgement. Unfortunately, many pilots don't know how they want the airplane to handle. Don't fret…this is how we all start in the beginning. Most importantly, don't try to force yourself to see things that aren't really there. Eventually your skills will progress to the point where you will start to notice how small modifications can really help your precision flying. Remember that learning is the fun part of all this…it's what life's all about.

The things the aerobatic competitor needs to know about power effects can be counted on one hand so get your fingers ready because when we're finished you'll have memorized the five major effects propellers have on your airplane.

Spiral Slipstream

The propeller's main purpose is to create thrust in a direction parallel to the propeller's axis of rotation. This thrust force is directly related to how much the propeller accelerates the air that's within its reach. We have all stood behind a running propeller and felt the wind that it creates but rarely are we able to see or feel the rotating motion of the slipstream behind the prop. This swirling of the air in the propeller's wake is one of the things that can affect our airplane's handling qualities especially at low airspeeds and high power settings. So what does this "spiraling slipstream" really do to the airplane? One of the most visible effects is the tendency of the airplane to yaw nose-left when the engine is at full throttle and the airspeed is near zero. This can happen on takeoff, at the top of a Hammerhead, when you get too slow on a vertical upline and especially when your doing 3D maneuvers. Have you ever held a 40-size airplane vertical while setting the high-speed needle valve? Try it some time and see if you can feel the yawing moment created by the prop's slipstream when you pulse the throttle. If you don't have right thrust in the setup it will tend to yaw the airplane's nose to the left …but why? If you take a look at your airplane you'll notice that for the most part it's a symmetrical animal when viewed from the front or the top but when you look at it from the side you see that this symmetry disappears. We immediately notice that the vertical tail doesn't have a mirror image like the wing and horizontal tail. Try to mentally visualize the spiral slipstream that develops behind a clockwise (as seen from the cockpit) rotating propeller and follow its helical path until the propeller wake reaches the vertical tail. The streamlines in the slipstream will be shaped like the coils of a spring. The faster you fly the more the spring will appear to be stretched and the smaller the angle of attack of the vertical tail. If you look at the approaching wake from the vertical tail's point of view you will see the air approaching from the left. All of the vertical tails that I'm familiar with have symmetrical airfoils and must at some angle of attack to produce a force.



[Figure 1] shows two streamlines being shed off the propeller and the angle of attack seen at the vertical tail due to the path of the propeller's wake. This local angle of attack causes the vertical tail to produce a side force behind the center of gravity, which results in a nose left yawing moment. Notice what would happen if the vertical tail stuck out the underside of the airplane instead of the top (dotted streamline). The force would then be in the opposite direction and tend to cause the nose to yaw to the right. This same nose right yawing moment would happen if your propeller spun in the opposite direction (clockwise) like it does on the full-scale Sukhoi. I would dare to say that the spiral slipstream is by far the most visible propeller effect that we deal with while flying aerobatics. The spiral slipstream is also the ONLY reason we need to put right thrust in our engines. This effect is pretty much the same whether the airplane is flying upright, inverted or on its side. It always tends to make the nose yaw to the left and to compensate for this we offset or angle the engine's centerline. This solution to offset the engine is not a perfect one but the side effects are small. We typically choose to alter the angle of the engine rather than slide the engine over to one side because the moment arm we can generate is much greater that way. When we angle the engine we create some amount of side force that typically makes the pilot use less right rudder than left in knife edge. What if your design had a symmetrical vertical tail assembly (same amount of vertical tail above the CG as below)? With this arrangement you could eliminate the need for right thrust altogether. While playing around in the wind tunnel with various propeller-powered models, I've been able to add sub-rudders and underbody fins that removed the spiral slipstream effect. Too bad we don't see any symmetrical vertical tails on full-scale aerobats…I suppose that could make takeoff and landing a real hassle.

Torque

A common misconception is that torque causes the nose of the aircraft to yaw to the left. This is nothing more than a myth. Torque only causes the airplane to roll…period! This becomes quite evident during a torque "roll". The torque effect on an airplane is most prevalent at

low airspeeds when the engine is operating at the RPM that supplies maximum torque to the propeller. Next time you're perusing through your favorite model magazine and come across an engine review check out that horsepower/torque vs. RPM chart that you always skip over. Notice the RPM where the engine's torque is at its maximum and compare it to the RPM for maximum horsepower. This maximum torque RPM is almost always less than the RPM for maximum horsepower. This is why you can back off from full throttle and get the airplane to start rolling to the left during a hover. From the pilot's point of view it may appear that torque causes the nose to yaw to the left because to counter the left rolling moment from the engine's torque one would have to apply some right aileron. In theory this right aileron application could cause the down going (left) aileron to produce more drag thus making the nose yaw to the left. It's been my experience that the yawing moments due to small aileron deflections are miniscule and the nose left moment we typically see is mainly a result of the spiral slipstream. The torque of the engine is small in comparison to the aileron's ability to produce a rolling moment and this is why you almost never see the need for right aileron trim to counter the engine's torque effect during normal flight.

Gyroscopic Precession

This is typically quite small on our models because the mass moment of inertia of our propellers is low. The moment of inertia is a fancy way to account for the difficulty associated with starting and stopping the rotation of an object. Imagine spinning a barbell with 100-lb weights on either end and you'll get a pretty good picture of what I mean by "moment of inertia". The moment of inertia isn't the only factor that contributes to gyroscopic precession. You must also have the propeller spinning at a high RPM and the pitch or yaw rate must be rather large. If you're pitching the model up (toward the canopy) gyroscopic precession will generate a nose right yawing moment and conversely a nose down pitch rate causes the airplane to yaw to the left. (You can also develop a pitching moment due to yaw rate) Why does this happen? If you've ever played with a toy gyroscope you're probably very familiar with the counterintuitive forces the can be generated while moving a spinning object. The physics explanation says that any spinning object will react 90 degrees out of phase from an applied force. What does this mean to us? Not a whole lot unless the pitch or yaw rates get to be extremely high. Our aerobatic models typically don't sustain very high angular rates for long periods of time except during freestyle maneuvers. While flying the sequence the effect is pretty much negligible. If you ever pitch up violently at full power and the nose of the aircraft wanders to the right you can probably blame it on gyroscopic precession. I did a quick estimation of how much rudder deflection would be required to counter the gyroscopic precession on a Hanger 9 Cap 232 swinging an APC 16x8 at 9,000 RPM maneuvering with a 40 degrees per second pitch rate. I calculated that the rudder would only have to generate 10 in-oz of yawing moment (less than the torque of a sub-micro servo) to counter the gyroscopic precession. This 10 in-oz of yawing moment equates to approximately 0.3 degrees of rudder deflection …that's not much!

P-Factor

This is a tough subject to talk about with authority because much of the published data on the subject is inconclusive. In theory, "propeller factor", as it is commonly referred to in the States, can be explained with relative ease. In the real world, however, it's hard to separate its effect from the others. The theory states that when the propeller disc is at angle of attack, one side of the disc is loaded more than the other side because the down going blade is at a higher angle of attack than the retreating blade. This uneven disc loading produces a nose-left yawing moment when the disc is at a positive angle of attack and a nose right yawing moment when the disc is at a negative angle of attack (for a clockwise rotating propeller as seen from the cockpit). Since the direction of the yawing moment changes from upright to inverted flight we should not correct for this effect with right thrust. In theory you could pitch at such a rate and angle of attack that the P-factor and the gyroscopic precession could exactly cancel each other… perfect world!

Propeller Normal Force

This is basically a force in the plane of the propeller disc. This force results from the fact that the propeller changes the direction of the air entering the disc area. Since this force is a dependent on the angle of attack of the propeller disc it becomes a player in the stability of the airplane. In a tractor configuration this force is destabilizing in pitch (the opposite is true in the pusher configuration), which typically results in you having to put the center of gravity a little further forward than theory might suggest. This force is typically small because the inflow angles seen by the prop during normal flight are usually small. If you see large variations in longitudinal stability at various trim speeds you may have a prop normal force problem. I have only seen problems with prop normal force on military drones where the prop disc was right next to the trailing or leading edge of the wing (this puts the propeller disc in an area of large upwash or downwash). These planes were very sensitive to this effect because they were flying wings (tailless). Our airplanes have relatively large tail volumes, which translate into a much wider allowable CG range. Prop normal force is something you'll probably never have to worry about.

Now you can count the major propeller effects on one hand! From the discussion above it appears that right thrust is only needed to counter the spiral slipstream. All other effects are reversed when you're inverted. We've talked a lot about right thrust …Next time we'll talk a little about up and down thrust and why you might need it. We'll also discuss what we mean by forces and moments and how we can use them to better understand our airplanes.

Till next time…keep your hand out of the prop.

Third Annual Tailgate Swap and Fun Fly

LARCC
LODI AREA RADIO CONTROL CLUB

At the Lodi Area Radio Control Club's Quarry Field

Sunday May 26, 2002

Swap Meet Starts at 9:00 AM

Flying to start at approximately 12 noon

(FOR INSURANCE PURPOSES, AMA MEMBERSHIP IS REQUIRED TO FLY)

Admission:

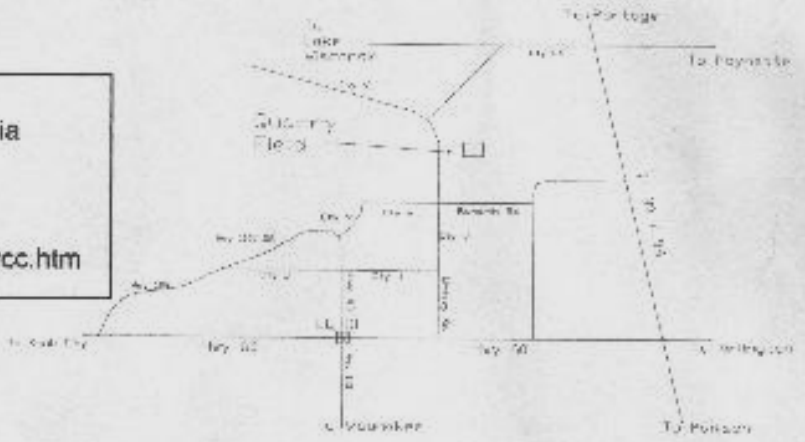
- **Vendors/Sellers/Pilots: $5 per vehicle**
- **Buyers/Spectators: $3 per vehicle**

Bring your own tables, tents, or sell out of your vehicle.

FOOD AND SODA WILL BE AVAILABLE AT THE FIELD

For more information contact:
Mark Johnson at (608) 742-0117 or via email at: mcjohnson@jvlnet.com

Check out our website at:
http:www.mailbag.com/users/niets/larcc.htm



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THE SHAWANO R/C FLYING CLUB'S

15TH ANNUAL

AUCTION/SWAP MEET/FLY IN

SUNDAY, APRIL 28, 2002

SHAWANO COMMUNITY HALL

115 E. DIVISION STREET

DOORS OPEN:	8:00 A.M.
SWAP SHOP:	8:30 A.M.
AUCTION:	10:00 A.M.

1/2 HOUR SESSIONS AND 1/2 HOUR BREAKS FOR SWAP SHOP & MODEL VIDEOS

DOOR PRIZE DRAWING: 12:00 P.M.

TABLES & CHAIRS AVAILABLE - NO CHARGE

FOOD & BEVERAGES AVAILABLE ON SITE

ADMISSION: $4.00 16 & UNDER - FREE

STATIC MODEL DISPLAY & AWARDS (FOR BEST OF SHOW - 3RD PLACE)

CLUB FLYING FIELD OPEN 1:00 - 4:00 P.M. NO LANDING FEE

DIRECTIONS:
FROM HWY. 29 BYPASS, TAKE HWY. 22 NORTH TO DOWNTOWN, TURN RIGHT AT THE LIGHT ON E. DIVISION STREET, THEN LEFT INTO THE PARKING LOT.

ALL TYPES OF AIRCRAFT WELCOME
AMA MEMBERSHIP REQUIRED
FREQUENCY CONTROL OBSERVED
FOR INFORMATION, PLEASE CALL:
LARRY SPERBERG, 715-526-5477
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Pilot Performance

One day a sweet young lady was conducting a study in to human sexual behaviour. She sat down to think and came to the conclusion that the best place to find participants for the survey would be the airport, as there was a wide range of different people going through.

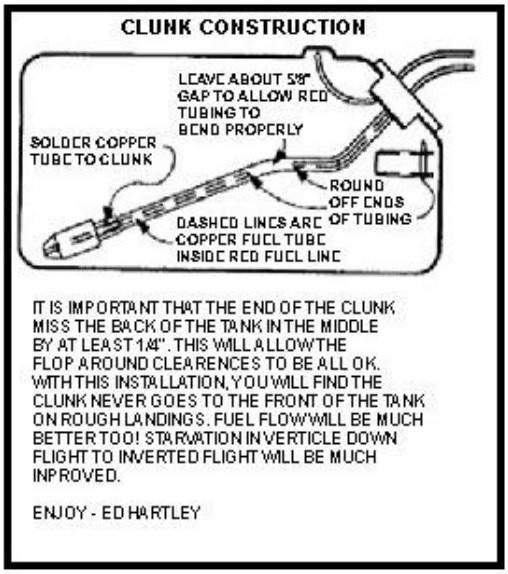
After about three hours of questioning passengers, she sees a pilot walking to his gate .Having heard of the reputation of pilots she stops him "Excuse me, Captain" she says, "I am doing a survey on human sexuality... I was wondering if you could answer a few questions...."

The pilot agrees, and the young lady starts questioning him. After three or four questions, she asks him "and when was the last time you had sex?". Straight away the Captain replies "1959". The girl was shocked... she looks at the captain and asks "1959 isn't that a long time ago?".

"Oh" the pilot replies "I guess so .. but it's only 2015 now..."

FUEL TANK SETUP

Ever have a problem with the clunk after a hard landing? This may solve your problem! First solder a piece of tubing to the clunk. Slide a piece of neoprene tubing over the metal tubing. Leave a small amount of space between the movable clunk and the tube leaving the tank. And you are all set! (see below)



Chemical Compatibility Chart

Several months ago I said I would print a chemical compability chart to help you prevent finishing disasters. The below chart basically tells what substances you can put over or under each other without experiencing bubbling, non curing, other adverse reactions, etc. *Le Roy*