BEES BREEZE

RC BEES of Santa Cruz County, Inc.

AMA Chapter 144

Newsletter January 2015

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Next Meeting

Thursday, January 15th, 2014, at the EAA building, Aviation Way, Watsonville Airport, 7:30 PM.

Treasurer's Report (December)

Beginning Balance	**$9746.82**
Income	
Apparel Sale	$10.00
Donations/Rebates	$264.00
Fuel Sale	$40.00
Dues	$1474.00
Subtotal	$1788.00
Expenses	
D & G Sanitation (Nov./Dec.)	$129.90
Field Expenses – Misc.	$92.86
Fun-Fly Expenses	$10.00
Office Expenses	$19.60
Subtotal	$252.36
Ending Balance	**$11282.46**

For the entire year, the treasurer's report is as follows:

Treasurer's Report (2014)

Beginning Balance	**$9314.64**
Income	
Apparel Sale	$167.00
Donations/Rebates	$289.00
Dues	$4866.00
Fuel Sale	$250.00
Subtotal	$5572.00
Expenses	
AMA Charter Fee	$270.00
EAA Hangar Rent	$150.00
Bank Fees	$8.00
Awards, Donations, Prizes	$135.00
Meeting Expenses	$5.00
D & G Sanitation	$779.40
Field Expenses - Equipment/Misc.	$269.61
Field Expenses – Mowing/Maintenance	$137.60
Fun-Fly Expenses	$220.15
Office Expenses – Newsletter	$64.56
Office Expenses – Misc.	$200.09
Air Show/Demo.	$125.77
Subtotal	$3604.18
Ending Balance	**$11,282.46**

The meeting was called to order by President Steve Boracca at 7:30 pm. with 21 members present. The minutes of the previous meeting were approved, as was the treasurer's report. No old business was reported.

New Business

Allen Ginzburg reported that we had 9.18" of rain at the field last month.

Dan Morris will send out a questionnaire asking what fun-fly events people would like to see in 2015 at our field. (*Results are reported further into the newsletter).*

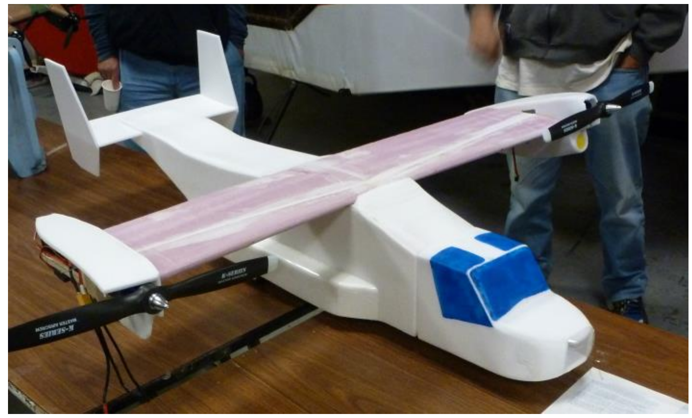
Alan Brown asked about his Aero 101 article, noting that part 2 would follow in the January newsletter if it were of sufficient interest, followed perhaps by a talk on the subject. All politely agreed!

Show and Tell

Benno showed us his latest rocket, this one with an altitude controlled door which allows a parachute to pop out and bring the device safely to land.

Then Mark Christensen displayed a very nicely made Pete 'n' Poke, plan-built – not a kit, powered by an O.S. 46.

Dan Morris's pursuit of composite vertical and horizontal flying has led to his making a fine model of a Bell V-22 Osprey. The propellers are as big as the motors will accommodate, but still a bit smaller than scale. We'll look forward to seeing it fly.



Alan Brown brought along a very nice looking foam ARF Avro Lancaster, a WW II British bomber. No pictures of his model, but here's a photo from Hobby King, which looks just the same, except that Alan's hasn't flown yet. A big reason for this is that the motors won't start! Naturally, being a foam ARF, the ESC's are totally inaccessible, and despite getting help from almost every club member present, the problem could not be solved. *(Alan is currently having a running fight with HobbyKing over what's to be done next).*

Finally, the moment we've all been waiting for all year! Two raffle prizes were awarded. The Pico Stick donated by Dennis Kanemura was won by Bill Moore, and the $150 gift certificate was won by David Tacklind. Here's the lucky winner of the Grand Prize suitably bemused by the entire affair!

Fun-Fly

We mentioned in the last newsletter that there would be a fun-fly on January 18th, the Sunday after our upcoming meeting. Dan Morris has done sterling work in soliciting opinions on what types of competitions we should have this year, noting that the upcoming event would be dedicated to our normal type of skill competition, as already noted.

Here are the rules for the airplanes to be used Firstly, one airplane must be used for all events. The only variation allowed will be in amount of fuel carried or size of battery used. Secondly, several events will require take-off and landing from the runway, so landing gears are mandatory. Thirdly, no artificial aids, such as GPS, assisted stability, etc. Fourthly, no multicopters.

So here's a proposed event list.

1. Spot landing: model takes off from the runway, does one circuit, and lands on the runway as close to a baking soda line as possible. A go-around will be allowed if asked for, but it will be penalized.

2. Triple loop: model takes off from the runway, performs a triple loop and lands on the runway in the same direction. This may be done in one straight line or as part of a circuit, but landing must be completely on the runway. Shortest time wins.

3. Climb and glide: Model takes off from the runway, climbs as high as possible on a fifteen second motor run, and then glides back, landing on the runway. Total flight time wins. In the event that the pilot cannot get back to the field, the motor may be restarted to avoid damage, but flight time will terminate when the motor restarts or the airplane goes out of sight. There will also be a small penalty for not making it back to the runway.

4. Slalom taxi: This involves the airplane staying on the runway throughout a taxi event around cones and returning to the starting point in the shortest time.

5. Mini pattern contest flight. Airplane will take off from the runway, stall turn to go downwind, perform two loops, a Cuban eight, one slow roll, return and land in the same direction as the take-off. Highest score from the judge(s) will win, and will not be subject to discussion!

6. Maximum speed run: This will depend on availability of a hand-held radar gun. One circuit will be allowed

7. Airborne bowling: Plastic bowling pins will be set up in the center of the runway. Contestants will take off upstream of the pins and will complete six circuits, attempting to knock down as many pins as possible.

It is fairly clear that it may not be possible to accommodate all of these competitions in a reasonable time, depending on number of contestants, and some may have to be deleted.

So let's look forward to an enjoyable morning's flying, with a fine lunch cooked by our president.

Down by the River

Gary Gonzales came to the field recently with a fine-looking Embraer Tucano trainer, 62" wing span, sold by Phoenix models of Vietnam. He has also treated himself to a 42" wing-span EFX racer from Durafly, the latter very fast, while the former flies in a very scale-like manner. Can't help liking them both. Good choices, Gary!

Here they both are.

Not to be outdone in the speed department is Stefan Warnke with his NitroPlanes Dago Red which beats the EFX by about 10 m.p.h. according to Marcelo Montoreano's radar gun on his cell phone.

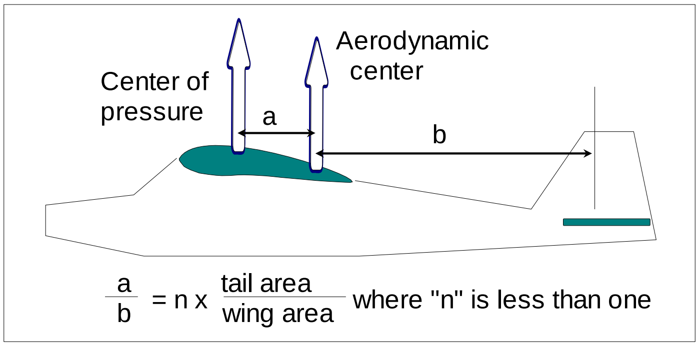
Potential new member Alan Miller came to the field with a Bixler, here being launched by Marcelo.

He was also helped by Allen Ginzburg in flying his E-Flite Apprentice, shown here.

Steve Boracca is having much too good a time with his miniature quadcopter, complete with GPS and infra-red height control. Here it is sitting above the runway while Steve watches but doesn't control.

Aer 101: More about tails

In my last article, I noted that the position of the aerodynamic center, which determines the stability margin of the aircraft in pitch, is given by the ratio of tail area to wing area relative to the distance between the 25% chord points of the wing and the tail multiplied by a factor smaller than one, as shown below.

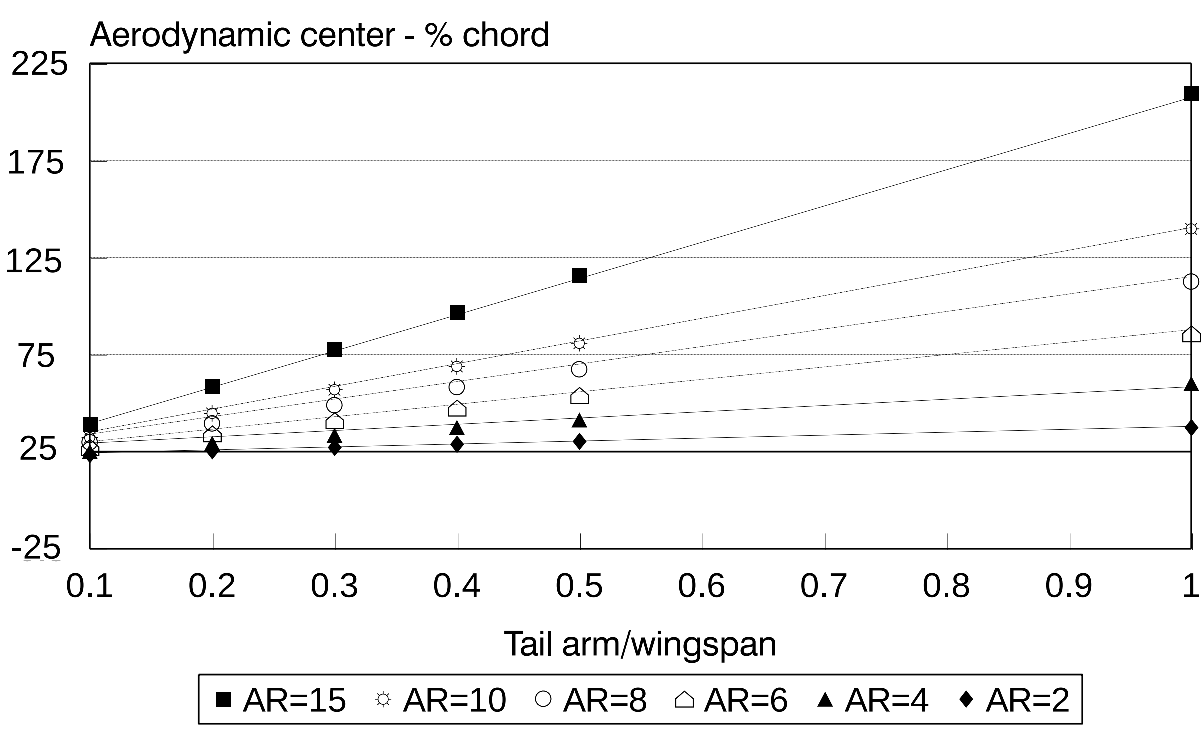


Now we'll look at the effects of distance between the wing and tail, and the wing aspect ratio. I've made some calculations to give the dimension 'a' in the figure, relative to tail arm, 'a+b', for different aspect ratios. The results are shown in the chart below.

In the figure, the vertical coordinate is the position of the aerodynamic center as a percentage of the wing chord, noting that the 25% chord point is typically where the center of wing lift acts. As a reminder, the aerodynamic center is where the incremental lift acts on an airplane if we change its angle of attack. For simplicity, I've neglected any lift from the fuselage, which if anything tends to be destabilizing, so the results shown may be optimistic. The horizontal coordinate is the tail moment arm, again measured from the 25% chord point, divided by the wingspan. I've also, to reduce the total number of variables, made some simplifying assumptions. Firstly, the ratio of tail area to wing area has been set at 1/6. That's a reasonable number. If the value were doubled to 1/3, the aerodynamic center increments would all change by not quite a factor of two, but fairly close. Secondly, I've assumed that the tail aspect ratio is in all cases 2/3 of the wing aspect ratio. Again this is reasonable, and the answer won't vary too much if this isn't the case. If the tail aspect ratio is less than 2/3 of the wing aspect ratio, then the numbers shown would give an optimistic result. I'm now going to go into a somewhat detailed explanation of why it looks the way it does.

First, note that when the aerodynamic center position is greater than 100%, it is behind the trailing edge of the wing. This happens fairly readily for a high aspect ratio airplane, especially one with a long moment arm. Free flight competition models often fall into this category and are often balanced fairly close to the trailing edge in order to get the most effectiveness out of the tail. Note that as we reduce the aspect ratio, the aerodynamic center (a.c.) moves forward, perhaps more quickly than we would have expected. There are two reasons for this. One is to do with the way I've presented the data. As the a.c. is shown as a percentage of wing chord, obviously for a given area, as the aspect ratio goes down, the wing chord goes up. The other reason is however quite real, and has nothing to do with presentation.

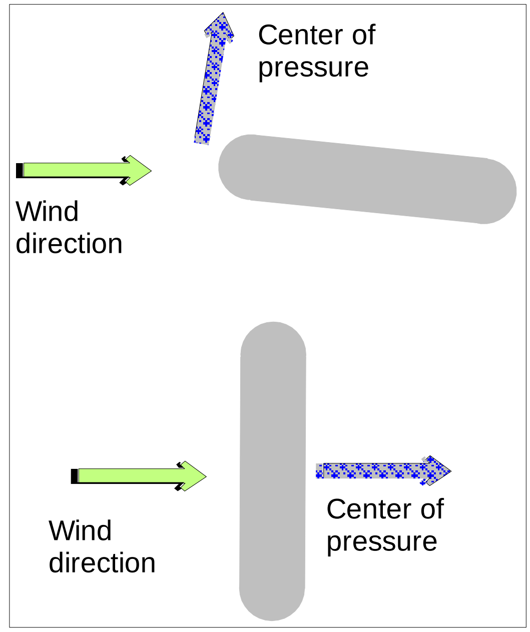
This is that as we reduce the aspect ratio, the downwash angle from the wing increases, and so the tail effectiveness gets less. Also, the closer the tail is to the wing, the greater is the downwash angle. Thus at low aspect ratios, and with moderate tail arms, there is a very severe reduction in tail effectiveness, more so than you would predict from a simple multiplication of tail area and moment arm. In fact, at an aspect ratio of two and a tail arm of only 0.1 (almost an impossible configuration - pretty much a flying wing) the downwash angle exceeds the increase in angle of attack, and the aerodynamic center finishes up ahead of the 25%



point. No coincidence that the 1930's Pou de Ciel, or Flying Flea, which was a very short-coupled low aspect ratio airplane, killed an awful lot of amateur pilots. I made one of these as a model just to see if it was as sensitive to c.g. position as predicted. The result was more or less as expected. As long as the c.g. was in a fairly forward position, the plane flew stably. But it couldn't handle much c.g. range. So the final answers really show no big surprises; high aspect ratio airplanes with long tail moment arms are really neat flyers. But low aspect ratio airplanes with short moment arms are probably much more sensitive than a simple 'tail area' times 'moment arm' would predict.

Now let's throw in another issue - fuselage lift. Fuselages are very unstable devices. At low angles of attack, they will generate positive lift near the nose and negative lift near the tail giving a center of pressure ahead of the nose, but when they get broadside to the wind, the center of pressure acts closer to the center of area of the body. Think balloon on a stick, which waves between +/- 20^{o}.

The Gee Bee racers have very fat bodies, and thus generate a lot of lift far forward. This is why models of these aircraft have to have the c.g. well forward



of the 25% position, typically 20 to 22% to be successful. It also explains why these racers killed a few people in the thirties, when extra fuel would be put in tanks behind the wing to get longer range.

Similar problems arise with nacelles on multi-engined aircraft. So watch your c.g. position!