

Bend Aero Modelers



Flight Report

March 2015



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February Meeting at the Black Bear Diner

Next Meeting



March 25, 2015
6:30pm at Black Bear Diner
Food available
Come early to visit and eat!

FROM THE PRESIDENT



Message from the President



Dear Members & Interested Readers:

We had a very successful (first) club meeting at our new location (The Black Bear Diner) in February. We had a great turnout (25 people) and most of them arrived early to grab a meal and tell lies. Well, actually not lies, but stories about flying. And I thought fisherman were the only ones to tell tall tales! The food was great and the fellowship was even better. I am guessing that we will have another great turnout in March (25th). Be sure to show up early to grab a good seat and some dinner.

I am happy to report that we accomplished three great things during the meeting. First, we established a new membership category (**Super Senior**). All members who are 75 years old or older will qualify as a Super Senior. The dues are the same as our Youth category. You can read more about this category on page 8 of this newsletter. Second, we adopted a new club logo that included the old logo along with our name, AMA affiliation and our Bend, Oregon location. You can check out the new logo on page 8 also. Lastly, we revised our Field Safety Guidelines. With the addition of our safety fence, we felt a revision to our safety guidelines was needed. Detail about these revisions can be found on page 7 and 18 of the newsletter.

We continue to see growth in our membership. From March 1st of 2014 to March 1st of 2015, we have welcomed 22 new folks to our club. Many of these new members are new to the hobby and are having fun learning about our hobby and improving their flying skills. Our club instructors have been busy helping these folks when the weather permits. I believe that we will see even more interest in our club through the remainder of this year. Thanks again for making our new members feel welcomed!

On a “regulatory note,” on February 23rd, the FAA published its proposed regulations for small unmanned aircraft as a notice of proposed rulemaking (NPRM). We are now in the 60 period during which the public can comment on the proposed regulations. **The good news is that the proposed regulations would not apply to model aircraft (when operated within the safety programming of a nationwide community-based organization like the AMA).** AMA has responded to the NPRM and is asking all AMA members to comment to the FAA as well. You can review more details about the NPRM on the AMA website. Here is link that you can use: https://mail.aol.com/webmail-std/en-us/DisplayMessage?ws_popup=true&ws_suite=true

Spring is here! Enjoy some spring flying!

Greg McNutt



Propeller Talk: Equivalent-Blade Propeller

By Waldemar Frank

As we all know, a propeller is a key component of an airplane's propulsion system. Moreover, the propeller type and design affects how efficiently engine power is converted into thrust. Although there are applications where propeller efficiency is critical for the model pilot, it is not always the main reason for model pilots to select a specific propeller configuration.

For example, scale model pilots might prefer a scale-looking propeller with 3 or 4 blades over a more efficient 2-bladed propeller configuration. These scale propellers may not be as efficient, but they provide a scale look. Or your pusher airplane does not provide sufficient ground clearance for a 2-bladed propeller with a larger diameter—instead you might choose a 3-bladed propeller with a smaller diameter to allow adequate ground clearance. In other words, there are good reasons for us to choose propellers with different blade configurations.

The question is: What would be an equivalent propeller blade setup when switching from a 2-bladed propeller to a propeller with 3 or 4 blades and vice versa? This is not a trivial question because there are several design parameters that determine the performance of a propeller and its impact on power consumption, resulting in a large number of possible combinations.

However, one can use some basic assumptions to arrive at a practical choice. For instance, typically we decide on the engine (or electric motor) of an airplane first before we even think about the propeller. Or the airplane we choose comes with engine recommendations that naturally narrow down our options for suitable propellers. In most instances, the engine's user manual suggests 2-bladed propellers with a specific diameter and pitch.

Another way of looking at this: The available power for our airplane has been decided for us when we choose the engine. And this means that our propeller options are limited as well. Although we do have more flexibility with electric motors compared to combustion engines because we can utilize a much broader power range by changing the voltage (cell number) and capacity of the battery, for example. In general though, we are limited by the available power set by the chosen engine (electric motor).

So if we use the available power as criteria and decide that we want to ensure the same flight characteristics of our airplane regardless of how many blades our propeller has, we must use the same propeller types. That is, the **pitch** and the **propeller blade shape** must be the **same** while the diameter and number of blades can be configured accordingly to allow the same flight conditions (e.g., thrust, revolutions, forward speed, etc.).

There is plenty of research material available to learn more about the science behind it. However, this article is meant to provide a practical answer without doing much math. And if you really want to know the math, here it is:

D₁: Original Propeller Diameter

D₂: Adjusted Propeller Diameter

B₁: Number of blades of original propeller

B₂: Number of blades of adjusted propeller

Formula: $D_2 = D_1 \times (B_1/B_2)^{1/4} = D_1 \cdot \sqrt[4]{\frac{B_1}{B_2}}$

¹ Source: <http://www.mh-aerotools.de/airfoils/index.htm>

Example 1: Conversion from 2 to 3 blades (same pitch)

$$D_2 = D_1 \times (2/3)^{1/4} = 0.90 \times D_1$$

To change from a 2-bladed to a 3-bladed propeller, one needs to **reduce** the original diameter by **10%** to ensure the same power consumption and flight conditions.

Example 2: Conversion from 2 to 4 blades (same pitch)

$$D_2 = D_1 \times (2/4)^{1/4} = 0.84 \times D_1$$

To change from a 2-bladed to a 4-bladed propeller, one needs to **reduce** the original diameter by **16%** to ensure the same power consumption and flight conditions.

Example 3: Conversion from 3 to 4 blades (same pitch)

$$D_2 = D_1 \times (3/4)^{1/4} = 0.93 \times D_1$$

To change from a 3-bladed to a 4-bladed propeller, one needs to **reduce** the original diameter by **7%** to ensure the same power consumption and flight conditions.

Example 4: Conversion from 3 to 2 blades (same pitch)

$$D_2 = D_1 \times (3/2)^{1/4} = 1.11 \times D_1$$

To change from a 3-bladed to a 2-bladed propeller, one needs to **increase** the original diameter by **11%** to ensure the same power consumption and flight conditions.

Example 5: Conversion from 4 to 3 blades (same pitch)

$$D_2 = D_1 \times (4/3)^{1/4} = 1.07 \times D_1$$

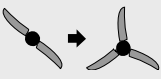
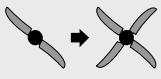
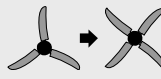
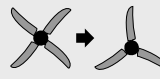
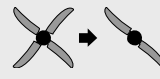
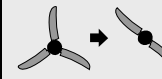
To change from a 4-bladed to a 3-bladed propeller, one needs to **increase** the original diameter by **7%** to ensure the same power consumption and flight conditions.

Following is a summary of calculated percentage changes for different propeller scenarios:

Propeller Scenarios			
IMPORTANT: The below values are only accurate if the propeller pitch and the propeller blade design are the same as that of the original propeller. Using a different propeller pitch and/or different propeller design would change the power requirements.			
To <u>increase</u> the number of blades		To <u>decrease</u> number the of blades	
Scenario	<u>Decrease</u> diameter by	Scenario	<u>Increase</u> diameter by
From 3 to 4 blades	7%	From 4 to 3 blades	7%
From 2 to 3 blades	10%	From 3 to 2 blades	11%
From 2 to 4 blades	16%	From 4 to 2 blades	19%

The following table provides calculated diameters based on the above scenarios. Please note that the listed values are calculations and you may need to select a propeller diameter closest to the suggested value.

For example, if your original propeller has a diameter of 10 inches and 2 blades and you are replacing it with a 4-bladed propeller, the calculated diameter for the 4-bladed propeller would be 8.4 inches (highlighted below by the yellow-shaded values). So you most likely would replace it with an off-the-shelf propeller that has a diameter of 8.5 inches.

Original Diameter (D ₁) [inches]	Increase Number of Blades			Decrease Number of Blades		
	 D ₂	 D ₂	 D ₂	 D ₂	 D ₂	 D ₂
7	6.3	5.9	6.5	7.5	8.3	7.7
8	7.2	6.7	7.4	8.6	9.5	8.9
9	8.1	7.6	8.4	9.7	10.7	10.0
10	9.0	8.4	9.3	10.7	11.9	11.1
11	9.9	9.2	10.2	11.8	13.1	12.2
12	10.8	10.1	11.2	12.9	14.3	13.3
13	11.7	10.9	12.1	14.0	15.5	14.4
14	12.7	11.8	13.0	15.0	16.6	15.5
15	13.6	12.6	14.0	16.1	17.8	16.6
16	14.5	13.5	14.9	17.2	19.0	17.7
17	15.4	14.3	15.8	18.3	20.2	18.8
18	16.3	15.1	16.8	19.3	21.4	19.9
19	17.2	16.0	17.7	20.4	22.6	21.0
20	18.1	16.8	18.6	21.5	23.8	22.1
21	19.0	17.7	19.5	22.6	25.0	23.2
22	19.9	18.5	20.5	23.6	26.2	24.3
23	20.8	19.3	21.4	24.7	27.4	25.5
24	21.7	20.2	22.3	25.8	28.5	26.6
25	22.6	21.0	23.3	26.9	29.7	27.7
26	23.5	21.9	24.2	27.9	30.9	28.8
27	24.4	22.7	25.1	29.0	32.1	29.9
28	25.3	23.5	26.1	30.1	33.3	31.0
29	26.2	24.4	27.0	31.2	34.5	32.1
30	27.1	25.2	27.9	32.2	35.7	33.2

Have fun!

Waldemar

Highlights from the February Meeting

New Meeting Location

Our new meeting location (**The Black Bear Diner**) turned out to be a hit for your members. The food was awesome and we had plenty of room to eat, fellowship, conduct the meeting



and show off some air-planes and equipment (Show and Tell). Approximately 25 people (members and guests) attended the meeting. One of the great benefits of the new location is that we have room to grow. The banquet room can comfortably handle around 50 people, so there is plenty of room for new folks anytime. There is also plenty of room for our “show and tell” exhibits. Additionally, we have enough room to use a video projector and computer for the meeting agendas, videos and other visual displays. If you weren’t able to join us during our February meeting, please plan



on attending our March Meeting on March 25th. Come early and grab some dinner and some brew. Yes, some of Bend’s finest brew can be found at the Black Bear Diner. Many of us begin showing up around 5:30PM, so I hope to see you there!

Highlights from the January Meeting—continued

Crash Trophy



Galen Ruud received the **Crash Trophy** for February. There were plenty of folks that qualified for this honor in February including yours truly, but Galen stood tall and took one for the team this time around. His quadcopter crash and ensuing search and rescue seemed to tip the scales in Galen's favor. Congratulations Galen! Thanks for taking the bullet!

Runway Repair Update

Tom Rainwater has received three bids from local paving contractors and is waiting on a fourth bid. We plan to present our findings during the March meeting. We hope to select one of the contractors after the March meeting and have the work completed in mid to late May. Asphalt re-sealing requires warmer weather and May is looking like the month when re-sealing can begin.

Field Safety Guidelines Revision

The EC submitted their proposed Field Safety Guidelines to the members during the meeting. The proposal was discussed in detail and then adopted by a majority of the members present. Due to factors such as the recent installation of our safety fence, we felt it was necessary to clarify and enhance our current guidelines. Our purpose was not to add more safety rules, rather it was to promote fun and safe flying at Popp's Field. Considering the addition of our new safety fence, our growth in membership, and an increase in the number of electric aircraft (including multirotor and FPVs), we felt a revision to our safety guidelines was warranted. A copy of the new guidelines can be found on page 18 of this newsletter. You can also find a copy on our website www.bamrc.com/documents/BAM_field_safety_guidelines.pdf.

Highlights from the January Meeting—continued

NEW BAM Club Logo

A new club logo was proposed, discussed and adopted during the meeting. The EC wanted to enhance our current logo by adding location and affiliation information. We included the popular Bend logo into our new logo. Additionally, we added our name and AMA Chapter number to the logo. As discussed during the meeting, we will begin using the new logo on all club correspondence and apparel right away.



New Member Classification—Super Senior

We have added a new member classification along with a unique membership dues structure for this class. We now have a “**Super Senior**” classification for all members 75 years old and older. The dues for this classification have been set at \$25 (annually) with no initiation fees. All current members who meet this age requirement will receive a refund of \$25 for 2015.

Show and Tell



Andy Niedzwiecke showed off his new Freewing F86 Sabre Jet. This a powerful and fast ducted fan powered aircraft. The plane came in the Jolly Roger paint scheme and features a 4300KV brushless motor. The power unit is a 64mm 12 bladed fan on a 6S 4000 mah 60 C battery. This is a beautiful aircraft and Andy is excited (some might say, nervous) about getting this bird in the air. Good luck Andy!

Highlights from the January Meeting—continued

Show and Tell—continued

Tom Rainwater brought his Great Planes Super Sportster that is being proposed as a simple “out of the box” pylon racing airplane. Tom and **Bruce Burgess** have been exploring some



“electric” alternatives for our future pylon races. The Super Sportster is a lightweight foamie airplane that is a bit slower than our glo fuel Club 40 racers. We are hoping that this new racer will generate more interest in racing in the future. As of this writing, we have about 12 pilots committed to buying this airplane. Let the races begin!

Waldemar Frank showed off his new Graupner PoloronPro charging system. This charging



system is very cool and does just about everything except make coffee. Too many details to mention here, so check out this system at www.towerhobbies.com/products/graupner/gpnp2003.html for all the details. Waldemar also

brought in a couple of his aluminum cases that he re-

cently modified using Kaizen Foam. Waldemar used the foam to make a custom made transmitter box and a battery box. Thanks for sharing guys!



In the Hangar

By Greg McNutt

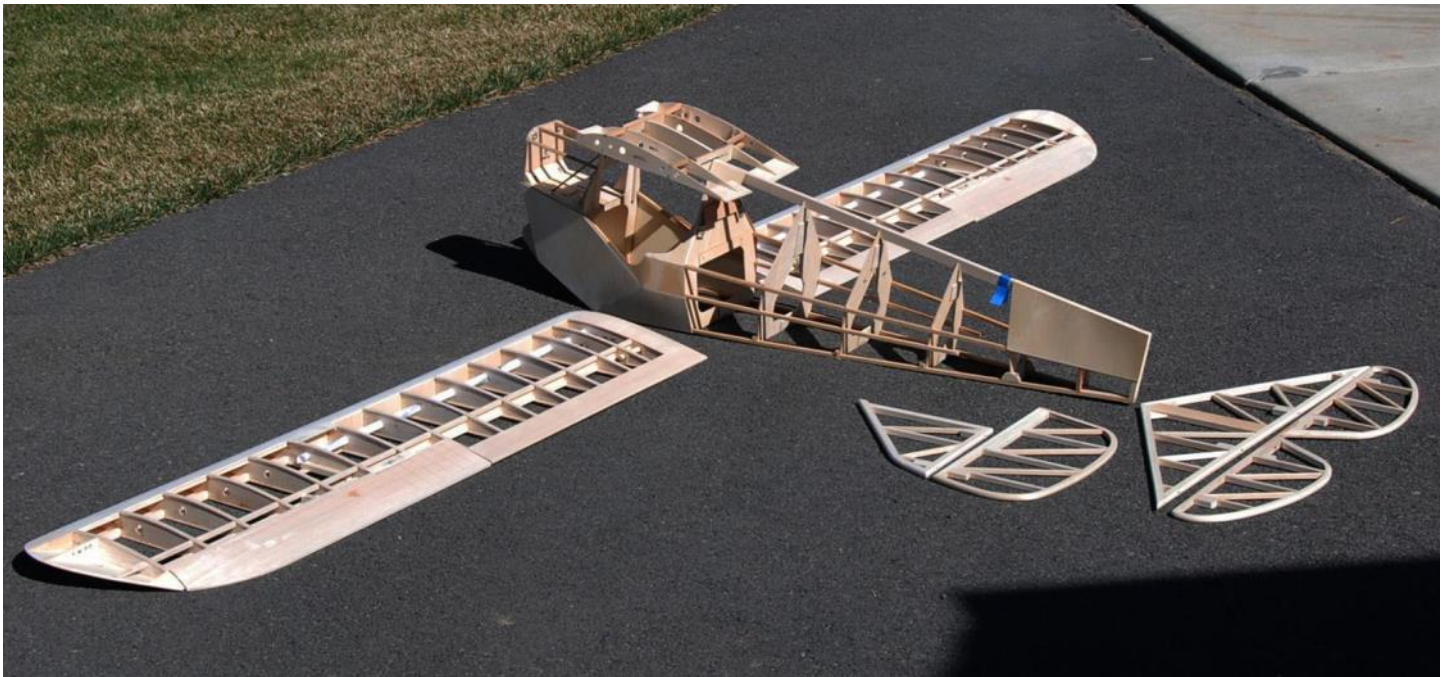
This is part two of our “In The Hangar” spotlight on **Tom Schramm’s Aeronca C-3** build. This is a quarter scale plane project that Tom has been working on since December of last year



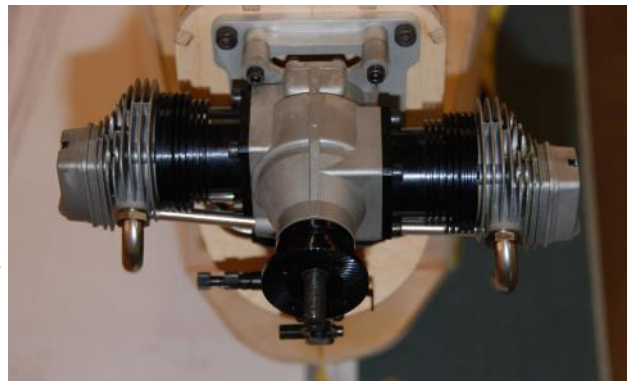
Tom Schramm

(2014). Keep in mind that this is **NOT** a kit build project. Rather, Tom is building the Aeronca C-3 from a **set of plans**. He “kitted” the parts with the help of a 12” compound sliding miter saw, a 10” table saw, 10” disc sander, drill press and a #11 hobby knife. Tom started construction on New Year’s day. The materials that he is using include balsa, birch plywood and spruce, carpenters glue, epoxy and CA.

The covering will be a bright yellow Solartex fabric with green trim. The wingspan on the Aeronca is 9 feet. The Fuselage length is 50 inches. This big plane will

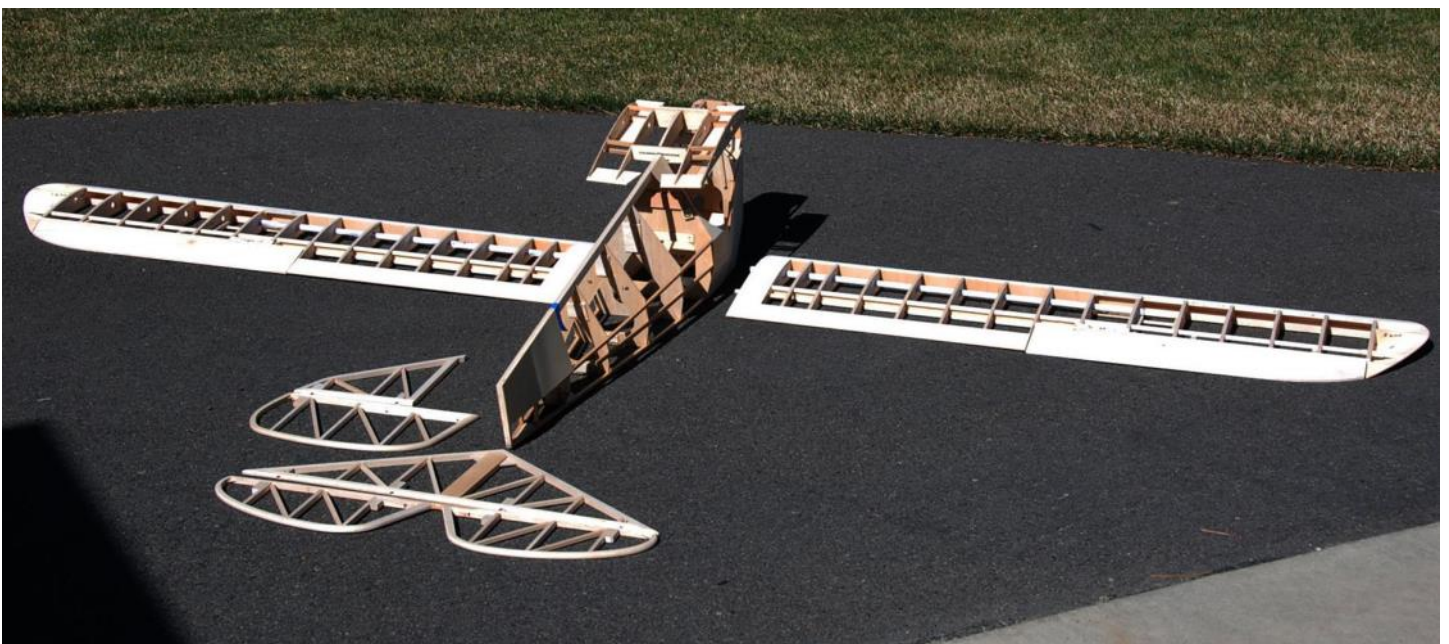
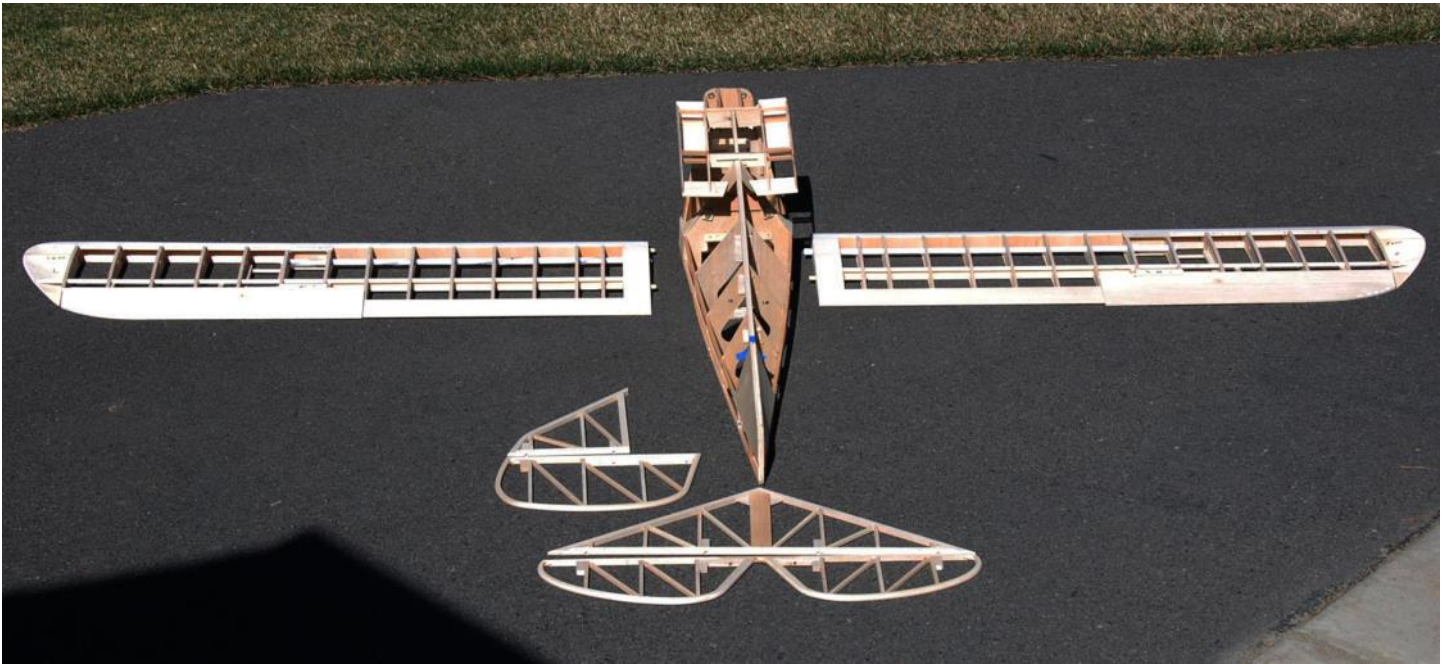


be powered by a **Magnum 1.6 twin four stroke engine**. As you can see, Tom is well on his way to completing this big bird. Tom is really going into detail on the Aeronca. For instance, to make this model look like the real C-3, Tom has done additional work on the ailerons that will result in a ribbed surface. Currently, Tom is installing servos for the rudder



(pull-pull) and the elevator (pushrods). Each aileron will have it’s own servo. Next will come the covering. Tom will be using two 5 meter rolls of Solartex fabric to cover the plane.

Still on the drawing board is the exhaust system. With the goal of keeping it as close to scale as possible, Tom will be fabricating the exhaust from stainless steel tubing and will get the help of our club TIG welding expert, **Tom Rainwater**. No completion date has been set yet. Stay tuned for an update on Tom's build in April's newsletter!



The Pima Air and Space Museum: More Planes than You Can Almost Look At



Jon Putnam

I know this seems like an odd topic for a Bend model airplane club newsletter, but like me, many of you may travel south for the winter for a few days. If your travels take you to Tucson, the Pima Air and Space Museum is well worth the visit... which is why I have been twice.

It is one of the world's largest non-government museums (think NASA's museums in Washington DC, the USAF Museum in Dayton and the Navy Museum in Pensacola for government entities). It has nearly 300 aircraft spread out over 80 acres. Bring sun cream and a hat if you visit as many of it's restored and non-restored planes are outside in the sun. There are also several large hangars with 1930's through modern jet era planes. If that is not enough aircraft to see, than you can also tour the "Graveyard of Planes" at the nearby Davis-Monthan Air Force Base. Buses leave the museum on a regular basis. If you visit, go early before the day heats up.

Hanger 1 features a little of everything, from a Wright Brothers Flyer reproduction to the latest jets. As a model builder what

interested me most were the 1930's aircraft



like this Waco ZKS-6, a 4-seat biplane that is described as the Learjet of the 1930's



A lovely red Piper J4-A Cub Coupe is in the same hall... Along with those who like faster aircraft, a Grumman F14A Tomcat... which instantly evokes Tom Cruise and Top Gun. It's hard to believe that as big a plane as an F14 can land on a carrier.



Next door to “Top Gun” are several amphibians, including one of my all time favorites, this yellow Grumman Widgeon, the “Petulant Porpoise.”



Next to it is an absolutely huge Martin Mari-ner seaplane which makes you ponder how anything this big got off the water.



Walking to the next hanger you bump into a really nice Bronco that Model Airplane News sells plans for.



Open the door of Hanger 2 and you are face-to-face with “Sentimental Journey,” a B-29. “Huge” especially staring up into the bomb bay hardly does justice to this plane.



In the same hanger is a more petite example of the warplane genre, a Battle of Britain Hawker Hurricane ...



A Feisler Storch ... known for many things including rescuing Mussolini from a mountain top prison, hangs overhead.

A B-24 Liberator that in handling ability is probably the antithesis of the Storch...





sits on the concrete under the Storch. Nearby is "Bad Angel" a hot Mustang...



plus a rarer Nakajima Oscar used heavily by the Japanese in China ...



A nice Bell Aircobra ... a plane with its odd centrally mounted engine is also in the hall



...And an often modeled Ryan PT-22 flies overhead.



There is also this interesting Grumman Wildcat. Tom Rainwater made BAM members aware that Great Lakes paddle wheelers were converted to WWII training carriers. This Wildcat is one of the planes that missed a landing and was rescued decades later from water. It's really in great condition considering how long it has been underwater.



The next hanger is a one plane display and shrine to the 20th Bomb Group. A B17 G named "I'll Be Around" is the front and center display and is as pretty a B-17 as you will find anywhere.



There must be 200-300 aircraft outside including this nice Sikorsky amphibian....



... and a hot looking Grumman Tigercat (too late for WWII) that looks like it's going fast sitting on the dirt. I think you will agree this is a great looking plane.



The last hanger devoted to Air and Space was low on my interest list so I toured it very briefly. That left ample time to take in the very extensive and mainly post-WWII collection outside.

If you want to model something hard try this Fairey Gannet with counter-rotating props.



The Gannet is not alone in the world of the unusual. This B-36 designed to bomb Europe from the USA if the UK fell is. Its hard for me to believe people actually build models of these.



A Douglas Skyraider nearby may not be as big as the B-36 but in its own way it is very impressive giving you the impression it carries almost as much armament.



For those of you flying T-28s, there is one of those as well.



This B-58 was designed to deliver the Atomic bomb at supersonic speeds. Again, it looks like it's going fast sitting still.



And last are two jet fighters that looked like a study in svelte and rotund. This Northrop F-58 has a very slim waistline...



Unlike this more porky Douglas Skynight fighter.



At Pima, there is a lot of planes and something sure to please anyone. If your travels take you to Tucson don't miss it. More information at <http://www.pimaair.org/>

Learn To Fly R/C Model Airplanes Class at COCC

By Greg McNutt

Waldemar Frank and I will be conducting another “Learn to Fly” class in **April (13-18)** at COCC via their *Community Learning* program. If you would like to attend the class or know someone who might benefit from this class, please register by calling (541) 383-

7270. You can also go to: <https://selfservice.cocc.edu:8002/flexibleregistration/index.jsp?frc=CLMAIN&q=27609> for more details.

Our class in January was well attended and many of the students are now members of BAM. Waldemar is the primary instructor and did a fantastic

Learn to Fly Remote Control Model Planes

Get an overview of flight safety and R/C technology as well as hands-on flight instruction. This class is for interested enthusiasts and newcomers to recreational R/C model aviation. It will help you understand the difference between recreational vs. commercial applications, organized vs. unorganized flying, airplane types, governing regulations and required equipment. Learn what it takes to get started and enjoy introductory flight training. Saturday's class will take place at the Pine Nursery airfield. *Instructor: Frank Waldemar*



Monday, April 13 & Wednesday, April 15 6:00 - 8:00 pm
Chandler Lab Room 207 (1027 NW Trenton Avenue, Bend)
Saturday, April 18 9:00 am - noon
Pine Nursery Airfield, Bend
\$79 CRN 27609

CLICK HERE to Register or call us at 541-383-7270



Community Learning
(541) 383-7270
<http://www.cocc.edu/continuinged/>

In advance of college events, persons needing accommodation or transportation because of a physical or mobility disability, contact ADA Coordinator Joe Viola, 541-383-7775. For accommodation because of other disability such as hearing impairment, contact Annie Jenkins, 541-383-7743.

job preparing for, and teaching the class. If you are new to the hobby or know someone who is, this an excellent class to improve your understanding of the dynamics of flight and of course, flying radio controlled aircraft.





Bend Aero Modelers



Bend, Oregon | AMA District XI | AMA Charter 2311

Field Safety Guidelines

A. GENERAL

1. All pilots shall be current members of AMA. Proof of current AMA membership is required prior to flying at BAM.
2. Visiting AMA pilots and new members of BAM shall receive a safety orientation by one of BAM's Safety Committee members prior to their first flight.
3. Pilots shall ensure flight operations in accordance with AMA's Safety Code and these Field Safety Guidelines at all times.
4. Pilots shall ensure proper operation of their aircraft and associated equipment prior to use.
5. Pilots shall show courtesy towards others and apply common sense when flying at BAM.
6. Pilots are encouraged to verbally enforce safe flying practices as appropriate.
7. All guests, spectators, children, and pets shall be supervised by a BAM member at all times while inside the flying field and are encouraged to remain behind the pit tables.
8. When working on running or armed airplanes in the pit area, pilots shall always secure/restrain the aircraft from moving on the ground or rolling off a work bench/pit table.
9. R/C cars and other surface vehicles are prohibited anywhere inside the flying field.
10. Smoking is prohibited anywhere inside the flying field and shall be carried out in a safe and respectful manner in the parking lot.
11. The consumption of alcoholic beverages before or during flight is prohibited.

B. PRE-FLIGHT OPERATION

1. Pilots that use AM/FM radio equipment (50 MHz, 53 MHz, and 72 MHz) shall attach the appropriate frequency pin visibly to their transmitter's antenna whenever it is in use.
2. Pilots shall place their AMA card on the respective channel pin on the frequency board.
3. Pilots shall restrain their aircraft during the start-up (combustion engines) or arming process (electric motors).
4. Pilots shall use one of the designated run-up stands for the start-up and arming process as appropriate for the type and size of aircraft.

5. For larger or electric-powered aircraft, pilots may use the taxiway instead to start up or arm their aircraft while keeping it restrained with the help of another pilot, helper, or tethered to the ground or safety fence.
6. For extended engine tuning and troubleshooting procedures (e.g., more than usually needed to start the engine), pilots shall use one of the run-up stands designated (marked) for tune-ups, break-in and troubleshooting.
7. Pilots shall never leave their aircraft unattended while the aircraft is running or armed even if it is secured and restrained.

C. FLIGHT OPERATION

1. Pilots shall only taxi aircraft on the taxiways and runway. No taxiing is permitted in the pit area.
2. While flying, pilots must remain behind the safety fence and never block the taxiways.
3. Pilots shall verbally communicate their intentions during takeoffs, landings, and emergencies.
4. Pilots shall always fly their aircraft north of the centerline of the runway and remain within the approved fly zones (see fly zone map for details).
5. Only pilots or a supervised helper are permitted beyond the safety fence (e.g., to retrieve an aircraft).
6. Landing aircraft have the right of way. Dead-stick landings shall be called as such and given immediate right of way.
7. Pilots shall announce low passes, touch-and-gos, and hovering directly near or above the runway.
8. Pilots shall not take off from or land on the taxiways. This applies to all aircraft types, including rotary-wing and micro aircraft.
9. No more than five (5) aircraft shall be in the air at one time. This includes rotary-wing and micro aircraft.
10. Pilots shall call all maiden flights prior to flight. All other aircraft shall be grounded until the maiden flight has been completed.
11. All hand launches shall be called to alert other pilots. Hand launches shall be performed either from the runway or the area between the runway edge and the safety fence.

Academy of Model Aeronautics National Model Aircraft Safety Code

Effective January 1, 2014

- A. **GENERAL:** A model aircraft is a non-human-carrying aircraft capable of sustained flight in the atmosphere. It may not exceed limitations of this code and is intended exclusively for sport, recreation, education and/or competition. All model flights must be conducted in accordance with this safety code and any additional rules specific to the flying site.
1. Model aircraft will not be flown:
 - (a) In a careless or reckless manner.
 - (b) At a location where model aircraft activities are prohibited.
 2. Model aircraft pilots will:
 - (a) Yield the right of way to all human-carrying aircraft.
 - (b) See and avoid all aircraft and a spotter must be used when appropriate. (AMA Document #540-D.)
 - (c) Not fly higher than approximately 400 feet above ground level within three (3) miles of an airport without notifying the airport operator.
 - (d) Not interfere with operations and traffic patterns at any airport, heliport or seaplane base except where there is a mixed use agreement.
 - (e) Not exceed a takeoff weight, including fuel, of 55 pounds unless in compliance with the AMA Large Model Airplane program. (AMA Document 520-A.)
 - (f) Ensure the aircraft is identified with the name and address or AMA number of the owner on the inside or affixed to the outside of the model aircraft. (This does not apply to model aircraft flown indoors.)
 - (g) Not operate aircraft with metal-blade propellers or with gaseous boosts except for helicopters operated under the provisions of AMA Document #555.
 - (h) Not operate model aircraft while under the influence of alcohol or while using any drug that could adversely affect the pilot's ability to safely control the model.
 - (i) Not operate model aircraft carrying pyrotechnic devices that explode or burn, or any device which propels a projectile or drops any object that creates a hazard to persons or property.
Exceptions:
 - Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight.
 - Rocket motors (using solid propellant) up to a G-series size may be used provided they remain attached to the model during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code but may not be launched from model aircraft.
 - Officially designated AMA Air Show Teams (AST) are authorized to use devices and practices as defined within the Team AMA Program Document. (AMA Document #718.)
 - (j) Not operate a turbine-powered aircraft, unless in compliance with the AMA turbine regulations. (AMA Document #510-A.)
 3. Model aircraft will not be flown in AMA sanctioned events, air shows or model demonstrations unless:
 - (a) The aircraft, control system and pilot skills have successfully demonstrated all maneuvers intended or anticipated prior to the specific event.
 - (b) An inexperienced pilot is assisted by an experienced pilot.
 4. When and where required by rule, helmets must be properly worn and fastened. They must be OSHA, DOT, ANSI, SNELL or NOCSAE approved or comply with comparable standards.
- B. **RADIO CONTROL (RC)**
1. All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others.
 2. A successful radio equipment ground-range check in accordance with manufacturer's recommendations will be completed before the first flight of a new or repaired model aircraft.
 3. At all flying sites a safety line(s) must be established in front of which all flying takes place. (AMA Document #706.)
 - (a) Only personnel associated with flying the model aircraft are allowed at or in front of the safety line.
 - (b) At air shows or demonstrations, a straight safety line must be established.
 - (c) An area away from the safety line must be maintained for spectators.
 - (d) Intentional flying behind the safety line is prohibited.
 4. RC model aircraft must use the radio-control frequencies currently allowed by the Federal Communications Commission (FCC). Only individuals properly licensed by the FCC are authorized to operate equipment on Amateur Band frequencies.
 5. RC model aircraft will not knowingly operate within three (3) miles of any pre-existing flying site without a frequency-management agreement. (AMA Documents #922 and #923.)
 6. With the exception of events flown under official AMA Competition Regulations, excluding takeoff and landing, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and the pilot's helper(s) located at the flightline.
 7. Under no circumstances may a pilot or other person touch an outdoor model aircraft in flight while it is still under power, except to divert it from striking an individual.
 8. RC night flying requires a lighting system providing the pilot with a clear view of the model's attitude and orientation at all times. Hand-held illumination systems are inadequate for night flying operations.
 9. The pilot of an RC model aircraft shall:
 - (a) Maintain control during the entire flight, maintaining visual contact without enhancement other than by corrective lenses prescribed for the pilot.
 - (b) Fly using the assistance of a camera or First-Person View (FPV) only in accordance with the procedures outlined in AMA Document #550.
 - (c) Fly using the assistance of autopilot or stabilization system only in accordance with the procedures outlined in AMA Document #560.
- C. **FREE FLIGHT**
1. Must be at least 100 feet downwind of spectators and automobile parking when the model aircraft is launched.
 2. Launch area must be clear of all individuals except mechanics, officials, and other fliers.
 3. An effective device will be used to extinguish any fuse on the model aircraft after the fuse has completed its function.
- D. **CONTROL LINE**
1. The complete control system (including the safety thong where applicable) must have an inspection and pull test prior to flying.
 2. The pull test will be in accordance with the current Competition Regulations for the applicable model aircraft category.
 3. Model aircraft not fitting a specific category shall use those pull-test requirements as indicated for Control Line Precision Aerobatics.
 4. The flying area must be clear of all utility wires or poles and a model aircraft will not be flown closer than 50 feet to any above-ground electric utility lines.
 5. The flying area must be clear of all nonessential participants and spectators before the engine is started.