The Tailwind

AMA Charter No. 704

MAY | ***DON LEWIS, EDITOR*** | **2017**

President: Lynn Perkes *Vice-President*: Bill Pruner
Treasurer: Lynn Perkes *Secretary*: Don Lewis
Safety Officers: Carl Tackett *Instructors*: Lynn Perkes, Bill Pruner

Next Meeting on Thursday, May 18 – Be There!

Spring Fly-In Saturday, May 20

(see notice on website)

Be sure to check out the website at www.fly-hrcc.org

MEETING MINUTES

The March meeting was called to order at 7:03 by L. Perkes.

Attendees: L. Perkes, B. Pruner, D. Lewis, C. Tackett, S. Chrzanowski

D. Lewis moved to accept the minutes for the January meeting as published in the March Tailwinds. Seconded by C. Tackett; passed unanimously.

Treasurer's Report, shown below, was presented by L. Perkes. D. Lewis moved to accept; C. Tackett seconded; passed unanimously.

Old Business

- Field improvements to be made were reviewed. Plan to make them as soon as possible.
- There was no March meeting for MTRCCA
- Upcoming events were reviewed:
  - May 6 – MTRCCA Fellowship Fly-in
  - May 20 – HRCC Spring Fly-in

New Business

- Mowing schedule – D. Lewis to send out request for volunteers.
- Club mower is at B. Pruner's house
  - Seasonal servicing needed
  - May need tires
  - Trailer has issues
- Training sessions will start on April 20
- The May meeting, and all subsequent meetings through September, will be held at the field, weather permitting.
- L. Perkes to contact T. Anderson about trainer repair.
- D. Lewis to create Spring Fly-In notice and distribute.
- D. Lewis to check on what needs to be done for us to sponsor a drone race held by an AMA chartered club. B. Pruner to get details.

There being no other business, D. Lewis moved that the meeting be adjourned at 7:54; B. Pruner seconded; passed unanimously.

Treasurer's Report

Opening balance	$ 1,708.10
Income	100.00
Expenses	(137.88)
Closing balance	$ 1,670.22

Just NUTS About Model Airplanes

By Fred Fischer

[*Editor's note: This is a re-print of an article run several years ago. The article was written by and the planes were built by a long time member, probably a founding member, who has some of the best scratch building and model design skills I have seen (as well as being one of the most intelligent people I have ever met). All of these planes will fly, and the craftsmanship is unsurpassed. Modelers with these skills were few to start with, and many of these skills are being lost. Maybe this will inspire some of our younger modelers to pick up some of these skills and hone them to the fine edge like Fred has taken pride in doing. These planes were displayed at the Hendersonville Library in the reference room for several months in 2011. I've included pictures of most, if not all, of them.*]

Over the years I have built many different types of models, including radio controlled, control line, free-flight models (both gas and rubber powered), and scale models.

There are a variety of "classes" of free-flight rubber-powered scale models, but my particular favorites belong to what I refer to as the "Nut" group:

Coconut scale,
Walnut scale,
Peanut scale, and
Pistachio scale

The models displayed here are the two smaller sizes, i.e., Peanut and Pistachio, and I'm really "nuts" about these.

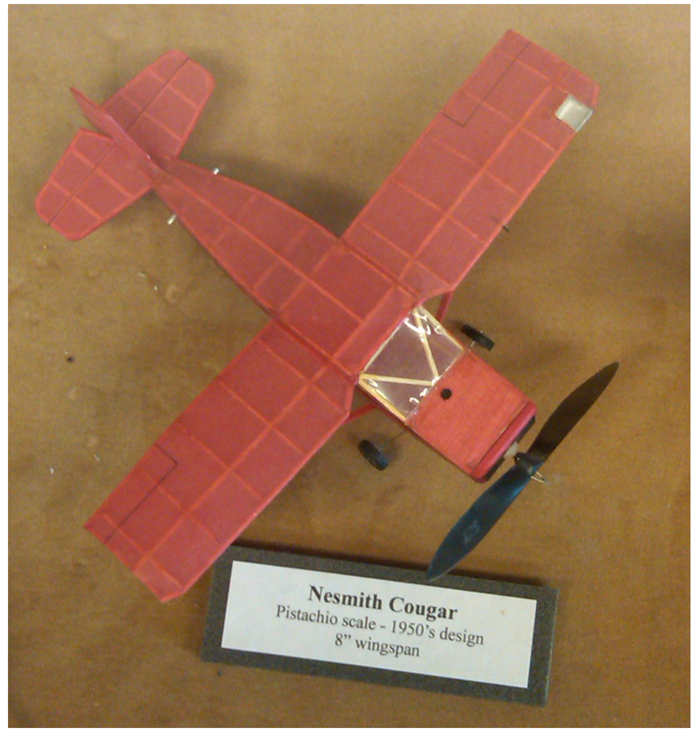
Two of the planes are not yet finished, but the parts are included to give you a better idea of the construction involved. I have flown several of the other planes, some more successfully than others.

I hope you enjoy looking at these planes as much as I enjoyed building them!

1. AVRO 504K

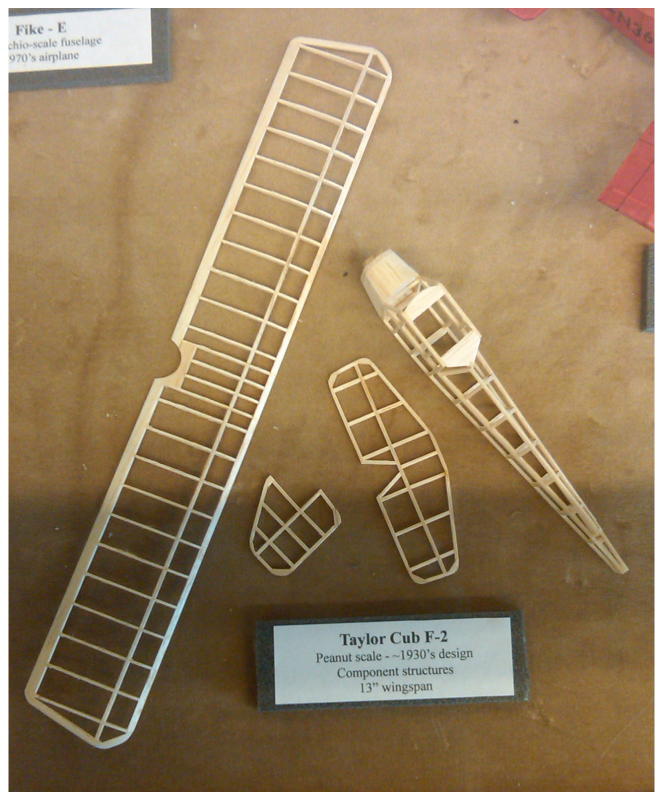
2. Druine Terbulent

3. **Ganagobie**



5. **Nesmith Cougar**

4. **Lacey M-10**



6. **Taylor Cub F-2**

Matching Propeller to Mission

By Don Brooks

My all-time favorite aircraft to fly is a .40-powered semiscale P-51D Mustang. However, landing this model used to be another story entirely; it was too fast on final to make a three-point landing. Every good landing had to be a "wheels" landing with touchdown on the mains. Landed in this manner, the model often flipped over and struck the fin ignominiously on the pavement as it skidded to a stop.

My trips out on the runway to retrieve my upside-down aircraft were a source of shame. I almost decided to go back to my high-wing trainer and forget the Mustang. Then, during one particular flight, the most amazing thing happened: the engine flamed out. I had to shoot a dead-stick landing. It was the best approach and touchdown I had ever flown with the model; I even three-pointed the landing.

With the 10 x 6 propeller I was using and with the engine at idle, the model's airspeed was too high for an easy approach and landing. To reduce the airspeed on final, I switched to a 10 x 5 propeller. What a difference! The P-51 was still a pleasure to fly, and landings no longer ended with a flip and skid on the fin. Sometimes, when not limited by the pilot's skill, the landings were even graceful. Bring out the observers! I was ready to show them a thing or two.

Whether you are flying a hot warbird or a slow-flying Piper Cub, the propeller you select makes a great difference in how a model performs. With the right propeller for the model's mission, each flight is a delight.

"So, what is the model's mission?" you may ask. I judge the model's mission to be adequate performance in each of three phases of flight: takeoff and maneuvering, cruise level flight, and landing.

The takeoff-and-maneuvering phase tends to require a larger-diameter but shallower-pitch propeller for maximum thrust. Wing lift increases in step with the airspeed squared. To generate sufficient lift to maintain level flight with an aircraft having a high wing loading, we must fly at a higher cruise airspeed. So for cruise we may need a more steeply pitched propeller to get the higher speed.

If we increase the propeller pitch, we may also have to decrease the propeller diameter to maintain the engine rpm in the best operating range.

If we don't have flaps on the aircraft, we may be back to needing a lower-pitched propeller for the landing phase.

Since most of us don't have a variable-pitch propeller on our models, we must select a propeller that best matches at least the minimum requirement for each phase of flight. Therefore, selecting the propeller to match the mission requirements will be a compromise. To do this job properly, we need guidelines for making informed judgements.

I'll show you three tools you can use to make objective judgements on adjustments to match the propeller to your model aircraft's mission: graphs for calculating stall and minimum cruise speeds, graphs for calculating pitch speed, and equations and a graph for calculating the static thrust produced by a propeller.

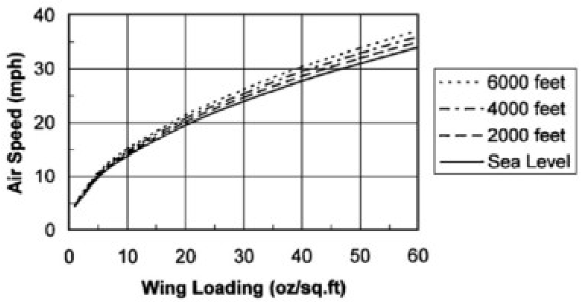
To use these tools, you will need a tachometer. You will also need a way to calculate or measure static thrust. I'll show you how to do that. I'll make the judgements based on two rpm measurements: one at full throttle and one at idle.

Does that sound simple? It is. I wish I had these tools when I was trying to solve the problem with the P-51. I would have been much more confident in the outcome of the propeller change and its effect on the Mustang's flying performance.

Stall and Cruise Airspeeds for Models: An estimated stall speed can be calculated using the equation in the sidebar. The calculation is even easier if one only has to look up a number on a graph, so in Figure 1 I've plotted graphs of model stall speed as a function of wing loading for four elevations: sea level, 2,000 feet, 4,000 feet, and 6,000 feet.

	Sea Level	2000 feet	4000 feet	6000 feet
1	4.4	4.5	4.6	4.8
5	9.8	10	10.3	10.7
10	13.8	14.2	14.6	15.1
20	19.5	20.1	20.7	21.3
30	23.9	24.6	25.3	26.1
40	27.6	28.4	29.3	30.2
50	30.8	31.8	32.7	33.7
60	33.8	34.8	35.8	37

Figure 1: Stall Speed as a Function of Wing Loading and Elevation



In the calculations for these graphs, I assumed a value of 1.3 for the lift coefficient, a temperature of 70 degrees Fahrenheit, and an appropriate barometric pressure for each elevation. A lift coefficient of 1.3 is the approximate value for several common airfoils when operated near the stall condition.

Please examine Figure 1. Airspeed is shown along the vertical axis. Wing loading is shown along the horizontal axis. To use the graph, calculate the wing loading; i.e., model ready-to-fly weight in ounces divided by the wing area in square feet. Locate the value of the wing loading along the horizontal axis. Slide a pencil point upward until you reach your flying-field elevation. Estimate a point for elevations not represented on a graph. Read the stall speed off the y-axis for your field elevation.

I'll use my P-51 as an example. Ready-to-fly, it weighed 88 ounces and the wing area was 490 square inches (3.4 square feet). The calculated wing loading was 26 ounces per square foot. At my flying field elevation of 4,740 feet, the stall speed for my P-51 is 24 mph.

In the Model Airplane News article "Electric Power for Scale Models," Bob Benjamin recommended at least two times the stall speed as a minimum level-flight cruise speed. Applying this criteria to the P-51, the minimum cruise speed should be 48 mph. Keep these two values in mind as we look at the second tool: the pitch speed graph.

Pitch Speed at High and Low Throttle: Figure 2 shows lines of constant pitch speed for various combinations of propeller pitch and propeller rpm. The pitch speed is the maximum level-flight airspeed that would be achieved for a particular propeller rpm if the propeller did not slip in the air and the model had no drag.

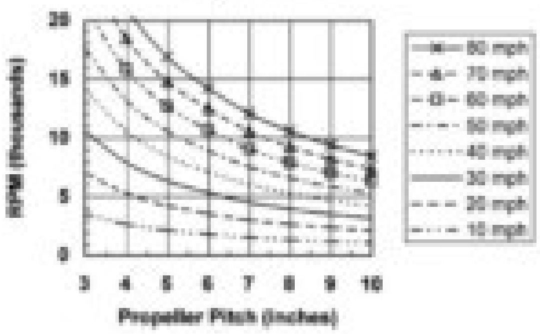
However, we would never expect the model to fly at 100% of the pitch speed; real propellers do slip in air, and real models do have drag. But there is a compensating mechanism. Note that the propeller unloads when in level flight, which would make the in-flight rpm greater than what we measure during a static run-up on the ground. This propeller unloading compensates for some of the effects of slippage and drag.

For our purposes I will assume that the high-throttle pitch speed is the same as the high-throttle airspeed in level flight. The relationship is not exact, but it gives us a useful gauging tool.

Let's continue to use my P-51 with the 10 x 6 propeller to illustrate how this information can be used. With the 10 x 6, the high- and low-throttle rpm values were 11,000 and 3,000 respectively.

	80 mph	70 mph	60 mph	50 mph	40 mph	30 mph	20 mph	10 mph
3	28.16	24.64	21.12	17.6	14.08	10.56	7.04	3.52
4	21.12	18.48	15.84	13.2	10.56	7.92	5.28	2.64
5	16.896	14.784	12.672	10.56	8.448	6.336	4.224	2.112
6	14.24	12.46	10.68	8.8	7.12	5.34	3.56	1.78
7	12.072	10.563	9.054	7.545	6.036	4.527	3.018	1.509
8	10.56	9.24	7.92	6.6	5.28	3.96	2.64	1.32
9	9.384	8.211	7.038	5.865	4.692	3.519	2.346	1.173
10	8.448	7.392	6.336	5.28	4.224	3.168	2.112	1.056

Figure 2: Pitch Speed as a Function of RPM and Propeller Pitch



Looking at Figure 2, find the pitch of 6 and slide a pencil point upward along that line until you reach the rpm value of 11,000. Estimate the high-throttle pitch speed by the relationship of this point to the two closest pitch speed lines. Note that this point is approximately one-third of the way between the 60- and 70-mph lines. I read this pitch speed as 63 mph. This is well above the minimum cruise speed of 48 mph.

At low throttle, the pitch speed of 17 mph is not far below the stall speed of 24 mph. If the model were maintaining level flight at 24 mph, it could be just above the stall speed and fly on and on. This relatively high pitch speed with the engine at idle explains a lot about why my P-51 did not want to settle in during the final approach and landing.

When I changed the propeller pitch to 5 inches, I didn't want to lose takeoff and maneuvering thrust. So instead of changing to a 10 x 5, I selected an 11 x 5. The 11 x 5 loaded the engine more than the 10-inch propeller, so the engine only turned it at 10,200 and 2,500 rpm at full and low throttle respectively.

Looking at the graph for a pitch of 5 inches and rpm values of 10,200 and 2,500, I read pitch speeds of 48 and 12 mph. I'm right at the recommended minimum for cruise speed. But now the combined effect of lower idle rpm and lower pitch have reduced the low-throttle pitch speed to roughly half the stall speed.

With the model on final and flying faster than the stall speed of 24 mph and with the propeller trying to move forward at 12 mph, the propeller acts as a brake to help slow the model. This combination of factors produces an easy, steady descent for landing. I have not only solved the problem, but now I have some numbers that we can tag to the aircraft performance if we want to try a different propeller.

Takeoff and Maneuvering Thrust: Now you might be thinking, "He changed the prop from a 10 x 6 to an 11 x 5. That took care of the high approach speed on final. But what did he do to the takeoff and maneuvering thrust for the model at full power?" One could calculate or measure the static thrust to ensure enough thrust for takeoff and maneuvering.

Using the thrust and air-density equations (see the equation sidebar), a modeler could simply calculate the maximum static thrust for the two propellers. For this calculation we need to know the propeller thrust coefficient and the air density.

The thrust coefficients for the Master Airscrew 11 x 5 and 10 x 6 propellers are 0.079 and 0.099 respectively. I obtained these values from Appendix C of my book Prop Talk, Understanding and Optimizing Propeller Performance for Model Electric Aircraft.

To calculate the air density, we need the local barometric pressure and air temperature. The average local barometric pressure for my flying field at 4,740 feet is 25.30 inches of mercury. I assumed an air temperature of 70 degrees Fahrenheit. The air density under these conditions is 1.014 grams per liter. I calculated the thrust of the 10 x 6 propeller at 11,000 rpm and at this air density to be 50.6 ounces. The thrust calculated for the 11 x 5 propeller at 10,200 rpm was 50.8 ounces.

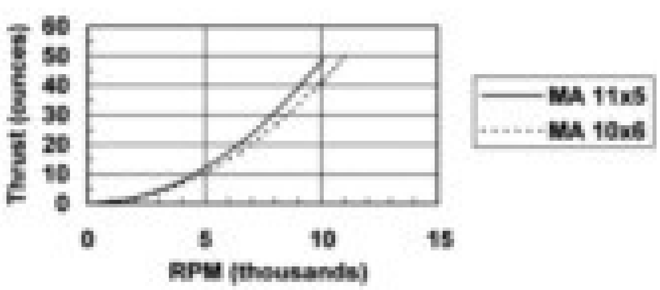
Even though the 11-inch propeller had a lower thrust coefficient and operated at a lower maximum rpm with my K&B .40 engine, it produced equivalent thrust because thrust increases with the fourth power of the propeller diameter.

If math is not your favorite thing, the thrust measurements for this third step could be made directly. A rough measurement could be made using a fishing scale attached to the tail of the aircraft during a run-up with each of the propellers to be compared. More accurate bench measurements could be obtained using an engine test device such as the American Hobby Products Thrust-Finder. This bench test could be done even before you have the aircraft built.

I plotted the thrust curves for the Master Airscrew 11 x 5 and 10 x 6 propellers, ending at the maximum rpm for each with the K&B .40 in Figure 3. These graphs show how the propeller thrust changes with rpm.

	MA 11x5	MA 10x6
0.001	0.001	0.001
2	2	1.7
4	7.8	6.7
6	17.6	15
8	31.2	26.7
10	48.8	41.8
11		50.6
10.2	50.8	

Figure 3: Thrust Graphs for Two Master Airscrew Props at 4740 Feet and Air Temperature 70 Degrees F



If the thrust coefficient, air temperature, and barometric pressure are known, plots such as those in Figure 3 can be made for any propeller for various values of operating rpm using the thrust and air-density equations. Here is some work for your calculator. These graphs may be useful on those days when the engine rpm is lower than previously measured for some reason. You could use the graphs to verify that you still have sufficient takeoff thrust.

So for the Mustang and the change to the 11 x 5 propeller, I've verified the match of the propeller to the model mission. I've reduced the model's approach speed while preserving thrust for takeoff and maneuvering and ensuring sufficient pitch speed for cruising flight. When I made the adjustment a long time ago, it was by trial and error. I've verified my expectations from the long-ago adjustment using graphical estimating tools.

Matching the J-3 Mission: My friend Ken Marler had an engine I wanted to bench-test for possible use in a 1¼4-scale Piper J-3 Cub. The engine was a Fox .74 two-stroke, and Ken's suggested propeller was a Zinger 12 x 5. We set up to test this combination on my new Thrust-Finder.

At high and low throttle, the rpm readings were 10,800 and 4,800 rpm. The Cub was projected to weigh 15 pounds (240 ounces) and would have a wing area of 1,600 square inches (11.1 square feet). The wing loading was calculated at 22 ounces per square foot.

From Figure 1, the stall speed for the J-3 would be 22 mph, and the minimum cruise speed would be 44 mph. From Figure 2, for a propeller pitch of five inches operating at the low- and high-throttle rpm we measured, the pitch speeds would be 23 and 51 mph. The measured full-power thrust was 93 ounces, which more than meets my minimum guideline of one-third the model's weight (80 ounces) for takeoff thrust.

With a stall speed of 22 mph and a low-throttle pitch speed of 23 mph, this model would be worse than the Mustang. It would never land until it was out of fuel. Obviously, we did not have the idle adjusted properly. This engine should easily idle at 3,000 rpm or less. From Figure 2, for a propeller with five-inch pitch and with it spinning 3,000 rpm, the pitch speed would be approximately 15 mph. This compared to a stall speed of 22 mph is barely low enough to land. A 12 x 4 might work better.

Let's see how the numbers work out for the 12 x 4 propeller. At 3,000 and 10,800 rpm, it would give pitch speeds of 12 and 41 mph respectively. The 12 x 4 would work better in the landing pattern but would provide a full-throttle pitch speed less than the minimum cruise speed of 44 mph. At 10,800 rpm and an air density of 1.014 grams per liter, a Zinger 12 x 4 with a thrust coefficient of 0.075 (reference Bob Benjamin's article) would produce 76 ounces of thrust, which is a bit less than we think we need.

Let's hope that the decrease in pitch results in an increase in the high-throttle rpm. If so, this could fix the thrust and cruise-speed problems. We could try this propeller knowing that the takeoff run would probably be a bit longer than with the 12 x 5.

What have we done? We defined the model mission as adequate flight performance in all three phases of model flight. We examined three tools that use rpm readings for input to help us match the propeller to the model mission.

Figure 1 can be used throughout a wide range of flying-field elevations, and Figure 2 is universally usable, regardless of location or air-density considerations. Preserve them for future reference; you could laminate Figures 1 and 2, and keep them in a handy place. Figure 3 is only good for the specified propellers, air temperature, and air pressure. If you want to use graphs such as these, you must construct your own Figure 3 for your particular propeller(s) and flying location using the thrust and air-density equations.

Have you matched the propeller of your favorite model to its mission? Try it; a successful match makes the flying much more fun. Good flying!

Celebrating Flight

Avro 504

From Wikipedia

The **Avro 504** was a World War I biplane aircraft made by the Avro aircraft company and under licence

by others. Production during the War totalled 8,970 and continued for almost 20 years, making it the most-produced aircraft of any kind that served in World War I, in any military capacity, during that conflict. Over 10,000 would be built from 1913 to the time production ended in 1932.

First flown on 18 September 1913, powered by an 80 hp (60 kW) Gnome Monosoupape engine, the Avro 504 was a development of the earlier Avro 500, designed for training and private flying. It was a two-bay biplane of all-wooden construction, with a square-section fuselage.

Small numbers of early aircraft were purchased both by the Royal Flying Corps (RFC) and the Royal Naval Air Service (RNAS) prior to the start of World War I, and were taken to France when the war started. One of the RFC aircraft was the first British aircraft to be shot down by the Germans, on 22 August 1914. The pilot was 2nd Lt. Vincent Waterfall and his navigator Lt Charles George Gordon Bayly (both of 5 Sqn RFC) The RNAS used four 504s to form a special flight in order to bomb the Zeppelin works at Friedrichshafen on the shores of Lake Constance. Three set out from Belfort in north-eastern France on 21 November 1914, carrying four 20 lb (9 kg) bombs each. While one aircraft was shot down, the raid was successful, with several direct hits on the airship sheds and destroying the hydrogen plant.

Soon obsolete as a front-line aircraft, it came into its own as a trainer, with thousands being built in the

war, with major production types being the 504J and the mass production 504K, which was designed with modified engine bearers to accommodate a range of engines, in order to cope with engine shortages. 8,340 Avro 504s had been produced by the end of 1918.[

In the winter of 1917-18, it was decided to use converted 504Js and 504Ks to equip Home Defence squadrons of the RFC, replacing ageing B.E.2cs, which had poor altitude performance. These aircraft were modified as single-seaters, armed with a Lewis gun above the wing on a Foster mounting, and powered by 100 hp (75 kW) Gnome or 110 hp (80 kW) Le Rhône engines. 274 converted Avro 504Js and Ks were issued to eight home defence squadrons in 1918, with 226 still being used as fighters at the end of World War I.

Following the end of the war, while the type continued in service as the standard trainer of the RAF, large numbers of surplus aircraft were available for sale, both for civil and military use. More than 300 504Ks were placed on the civil register in Britain. Being used for training, pleasure flying and banner towing, civil 504s continued flying in large numbers until well into the 1930s.

The embryonic air service of the Soviet Union just after World War I used both original Avro 504s, and their own *Avrushka* copy of it for primary training as the **U-1** in the early 1920s, usually powered with Russian-made copies of the Gnome Monosoupape rotary engine - this Russian version of the 504 was replaced by what would become the most produced biplane in all of aviation history, the Polikarpov Po-2, first known as the **U-2** in Soviet service in the late 1920s, as the 504's direct replacement.

Although Avro 504s sold to China were training versions, they participated in battles among warlords by acting as bombers with pilot dropping hand grenades and modified mortar shells.

The improved, redesigned and radial engined 504N was produced by Avro in 1925. After evaluation of two prototypes powered by Bristol Lucifer and Armstrong-Siddeley Lynx engines respectively, the Lynx powered aircraft was selected by the RAF to replace the 504K. 592 were built between 1925 and 1932, equipping the RAF's five flying training schools, while also being used as communication aircraft. The 504N was also exported to the militaries of Belgium, Brazil, Chile, Denmark, Greece, Thailand and South Africa, with licensed production taking place in Denmark, Belgium, Canada and Japan.

The 504N was finally replaced in 1933 by the Avro Tutor in RAF service, with small numbers continuing in civilian use until 1940, when seven were impressed into RAF service, where they were used for target- and glider-towing.

The 504 was the first aeroplane to strafe troops on the ground as well as the first to make a bombing raid over Germany. It was also the first Allied aeroplane to be downed by enemy anti-aircraft fire and was Billy Bishop's first army aircraft.

The 504 is easily recognisable because of the single skid between the wheels.

A small number of static display, and airworthy examples of the Avro 504 exist, almost a century after the first one flew, one of the airworthy examples being the Shuttleworth Collection's example -another flyable example exists in a Canadian aviation museum. An Avro 504K can also be found on static display in the Making of the Modern World Gallery at the London Science Museum.

The Old Rhinebeck Aerodrome has had a flyable Avro 504 reproduction aircraft, powered by an original 110 hp Le Rhône rotary engine, flying since 1971, and a newly founded company (Blue Swallow Aircraft) in Virginia is starting to produce reproduction Avro 504 examples.

General characteristics

- **Crew:** 2

- **Length:** 29 ft 5 in
- **Wingspan:** 36 ft
- **Height:** 10 ft 5 in
- **Wing area:** 330 ft²
- **Empty weight:** 1,231 lb
- **Max takeoff weight:** 1,829 lb
- **Powerplant:** 1× Le Rhône Rotary, 110 hp

Performance

- **Maximum speed:** 90 mph
- **Cruise speed:** 75 mph
- **Range:** 250 mi
- **Service ceiling:** 16,000 ft
- **Rate of climb:** 700 ft/min
- **Wing loading:** 5.54 lb/ft²
- **Power/mass:** 0.06 hp/lb
- **Climb to** 3,500 ft (1,065 m) in 5 min

Editorial

Ambassadors

We all need to be ambassadors for our hobby/sport in order to keep both our club and our hobby healthy and growing. I have seen most everyone in the club doing a great job of this when an inadvertent spectator, on a walk or ride through the park, stops what they were doing, and sits down on the bleachers and watches the flying. The club members present all take the time to welcome the spectator, ask them is they have any questions, and spend some quality time discussing model aircraft with them. This is a fantastic practice that helps keep our hobby and field privileges alive.

There is another ambassadorship that we could improve on, though. Our relationships with other clubs could be stronger. I know that we would like to have great turnouts at our fund-raising events, and these turnouts come primarily from members of other clubs in the area. In order to get this to happen, we have to reciprocate by attending their meets. Even if you don't plan on flying, it really helps the club if you will show up at other clubs' meets and just get something from the concession stand, or even just get some face time there talking to others, especially from the host club.

There are a couple of events being held by local clubs coming up in the next couple of months. It would really go a long way if we had a few members attend them as ambassadors for our club. We might even learn something, too!

That's my opinion – it oughta' be yours! ☺

Letters To The Editor

Need to get something off your chest? Want to solve all of the club/s problems? Write a letter! I welcome anyone (member or not) to submit an opinion in writing so long as it is civil in its expression (I reserve the right to make that determination). You can email your letters to the editor to me at Don_Lewis@comcast.net, or just give them to me at a club meeting.

Novice Nuances

Thread-Lock All Bolts

With the exception of engine screws, all of the bolts that screw into nuts, blind nuts and threaded metal pieces benefit from thread-lock. It reinforces the grip and provides a measure of insurance that the screws won't vibrate loose. This simple step can save you quite a bit of grief later.

Why Didn't I Think of That?

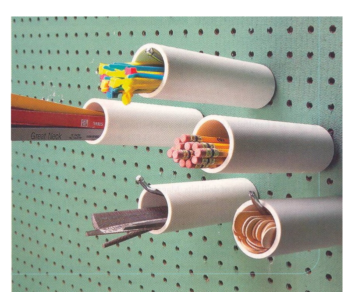
Paint Detail

By Unknown

Make a little pile of fine pencil dust, then smudge this onto your model with a finger or a soft, dry artist's brush. This makes very realistic exhaust and gun soot marks. Seal with a spray of flat clear coat.

Pegboard Cubbyholes

By Raymond Hudon



Here is a tool storage technique for all of those slender tools and shop accessories. Cut short lengths of PVC pipe (1-1/2 and 2 inch diameter pipes work well for most items) and slide them over pegboard hooks. The load them up with files, hacksaw blades, zip ties, pencils, stir sticks, etc.

Propeller Safety

By Unknown

Respect and alertness are mandatory if you want to keep all your fingers. If you continually ignore safety, you or someone close to you will be injured eventually. By adopting good safety practices we can minimize risk and enjoy our wonderful sport for many years.

The most destructive type of propeller injury, aside from being struck by a flying aircraft, is when the engine is operating at or near full throttle. At full speed, a .40-size, two-stroke engine with an 11 x 6 propeller can generate as much power as a 10-inch table saw. Just as a table saw demands your respect and attention, so does an aircraft propeller.

Before you mount your propeller or even start your engine, you should take a moment to review some basic pre-flight recommendations for propeller safety.

General Propeller/Rotor Blade Inspection and Preparation:

1. Look over for obvious nicks or gouges.
2. Flex it gently back and forth along its length and look for cracks.
3. If you find any damage, other than some minor scuffs at the tip, discard/destroy immediately.
4. Wood propellers cause less damage than composite propellers.
5. Remove the sharp edges from composite propellers using fine sandpaper. Just take off the edge. Do not alter airfoil.
6. Always use a balanced propeller. Vibration is the enemy.
7. Make sure the propeller arc is visible by painting the tips a contrasting color.

Ground Safety:

1. Always have someone hold the airplane while starting.
2. Use some form of eye protection, like safety glasses.
3. After starting, move around behind the propeller to remove the glow plug igniter and to make other engine adjustments.
4. Never ever reach over a spinning propeller.
5. Be conscious of the propeller arc. Do not let spectators stand in line with, or in front of, the spinning propeller and don't you stand there any longer than necessary.
6. If starting by hand, use a thick glove or chicken stick.
7. Use an approved spinner or propeller hub.
8. Before starting, be sure the propeller is on tight. If the engine came with backup safety nuts, use them.
9. Have a first aid kit stocked and available.

It's easy to forget these safety items when at the field and some say it's just too much trouble. But safety is everyone's responsibility!

Origin of Common Expressions

Ladies wore corsets, which would lace up in the front. A proper and dignified woman, as in "straight laced," wore a tightly tied lace.

History of Flight

Alexander Graham Bell

From Century-of-Flight.net

The Scottish-born inventor of the telephone, Alexander Graham Bell, who had grown rich from his 1876 invention, had been present for some of the failed tests of Langley's Aerodrome. Bell was interested not just because he was a friend of Langley's, but because he had dabbled with the question of flight and had experimented with kites made of many pyramid-like cells (sometimes as many as three thousand). He called these "tetrahedral kites," and their aerodynamics were similar to the box kite.

The sight of a large complex structure flying in the wind was certainly impressive and gave Bell the idea that the tetrahedral kite could be used as the basis for a heavier-than-air craft. At the insistence of his wife, Mabel, and with her financial support. Bell assembled a small group and formed the Aerial Experiment Association (AEA) in the summer of 1907.

The group met first at the Bell summer home at Baddeck, Nova Scotia, and in 1908 moved to Hammondsport to he near Curtiss' shop and Keuka Lake. The group—known as "Bell's Boys"—consisted of two Canadian engineers, John A.D. McCurdy and Frederick W. "Casey" Baldwin (not related to Curtiss' balloonist friend); a U.S. Army officer, Lieutenant Thomas Selfridge, assigned by the War Department at Bell's request; and Glenn Curtiss, who at that time had nearly no involvement in aviation outside of providing engines for Thomas Baldwin's dirigibles.

Curtiss quickly became the driving force of the AEA, being designated director of experiments and given the largest stipend of the group. The strategy of the AEA was reminiscent of Chanute's approach a decade earlier—each of the members would design an aircraft that would be outfitted with a Curtiss engine and tested, in the hope that five different approaches would yield the best possible airplane.

The group started with one of Bell's kites, the Cygnet I, tested on December 6, 1907, and piloted by Selfridge. It was clear that this design was not going to yield a controllable aircraft. Bell, now sixty, accepted this disappointment and, to his credit, continued his support of the AEA. The next aircraft tested was a Selfridge design called the Red Wing (because of its bright red wing fabric)—it was piloted by Baldwin and flown over frozen Keuka Lake on March 12, 1908, before a huddled audience.

The aircraft flew some 320 feet (97.5m) at an altitude of about twenty feet (6m) for approximately twenty seconds, and then crashed onto its wing. Baldwin was unhurt and the AEA was able to claim its first success. The public reports of the Red Wing's success were particularly galling to the Wrights since Selfridge had written to them asking specific questions about design, giving the brothers the impression that he was inquiring as an official of the U.S. Army.

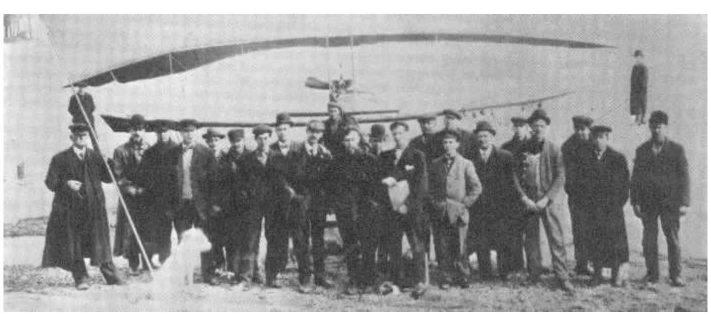
The AEA next experimented with a design of Baldwin's dubbed the White Wing. This aircraft used triangular wing-tip ailerons at the ends of both wings to control the aircraft, and performed excellently when flown on May 18 by Selfridge, and then by Curtiss. Selfridge's report to the Associated Press made it clear that the AEA airplane had the ability to land and take off immediately on its wheeled undercarriage, dispensing with the Wrights' derrick catapulting method and landing skids. The group believed that their problems with the Wright brothers' patents were finally over with this, the first successful use of ailerons in the United States.

Unfortunately, on May 20, with an inexperienced McCurdy piloting the White Wing, the plane crashed. The AEA now turned to its crowning achievement: the Curtiss-designed June Bug, which incorporated all that was learned from the previous two efforts. The airplane was controlled in flight by the wing-tip ailerons and had a wheeled undercarriage (and raised skids in case a hard landing crushed the wheels). Most important, it used a wing design that had been inadvertent in the earlier Red Wing and White Wing but which was discovered to boost stability and control.

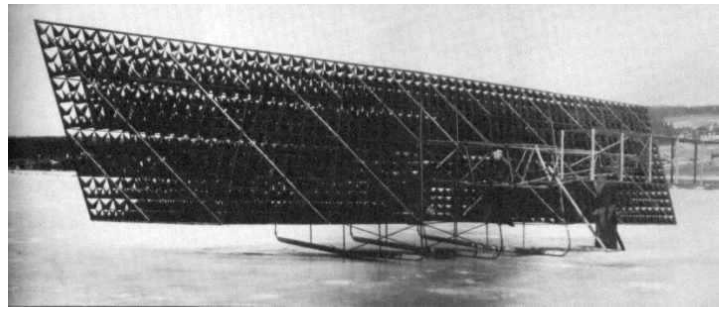
The earlier aircraft had been built with their lower wings curved upward to prevent them from bumping on the ice and slowing down the plane. (Recall that at Kitty Hawk Wilbur had to run alongside the Flyer to keep the wingtip from dragging in the sand.) The only way this could be accomplished with wings so light was to curve the upper wing downward. The result was a double-wing configuration that made the plane look like a narrow eye when viewed head-on. When wings are slanted upward from the horizontal plane, that is known as "dihedral"; this configuration keeps the aircraft locked when it banks into a turn and prevents it from slipping sideways.

Wings slanted down-ward are called "anhedral"; this gives an aircraft more vertical control. The combination of dihedral and anhedral wing design gave the aileroned June Bug control that rivalled the Wright Flyer. The aerodynamics of this configuration were not well understood in 1909, certainly not by the courts that heard the Wright patent suit. A better understanding might have vindicated the AEA design as an alternative means of airplane control, putting an end to the litigation that hurt the Wrights. Less than a month after the crash of the White Wing, the June Bug was ready. Curtiss entered it in a competition sponsored by the magazine Scientific American which offered a trophy and a twenty-five-hundred-dollar cash award for the first public flight over a 0.6-mile (1km) straight course.

The entire competition had been the brainchild of the magazine's publisher, Charles A. Munn, who felt bad about how his magazine had treated the early reports about the Wright brothers and who was making virtually a gift of the prize and the money to the Wrights. All they had to do was step forward and claim it. The Wrights steadfastly refused (even declining the written pleas of Munn), claiming that their plane did not meet the qualification of taking off unassisted. Wilbur was off to France to demonstrate their Model A, and Orville was too busy preparing for the trials at Fort Myer, Virginia, to make the necessary modifications. But the truth was that the Wrights were not so easily placated and would probably have turned Munn down anyway. This left the field open for the AEA, and on July 4 Curtiss flew his craft over the prescribed course at Stony Brook Farm, Hammondsport, and claimed the prize much to the embarrassment of Munn.



Glenn Curtiss and the AEA team are seen here on the morning of March 12, 1908, at the first flight of the June Bug.



Graham Bell's Cygnet II was a tetrahedral kite (the craft had to be towed to become airborne), one of many constructed and tested.

The event was widely covered in the press and bolstered the impression that the AEA was a worthy rival of the Wrights. The AEA tested one more plane, John McCurdy's Silver Dart, which, on February 23, 1909, became the first plane to fly in Canada. When Bell disbanded the AEA in March 1909, he pointed to the death of Selfridge in the Fort Myer accident (described next) and the loss of Curtiss, who went off to market his aircraft, as the reasons.

More than likely, Bell had continuing doubts about what the outcome of a patent fight with the Wrights would be and he wanted no part of being on the losing side. (The fact is, he did have his lawyers inspect the June Bug for possible patents and received a discouraging report.) And Bell may have gradually lost interest once it was clear his tetrahedral kites were not to be a part of aviation's future. In the summer of 1908, Orville Wright was preparing to test his airplane for the Army and a great deal hung in the balance.

The successes of the AEA that spring and summer had cast some doubt as to whether the Wrights were the best airplane manufacturers available, especially when it was reported that the AEA was preparing to sell their planes at one-fifth the Wrights' price. Orville's consternation must have strained even his stolid character when he discovered that the military observer who was to evaluate the plane and actually go up as a passenger was none other than Thomas Selfridge, who had come to the trials in the company of Curtiss himself.

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Sometimes You Just Have to Laugh…

A preacher woke up one Sunday to find it was a fantastic spring day. The sun was warm, and the birds were singing. He decided that instead of going to church, he was going golfing. So he called in sick and headed out to the course.

He was playing very well and having a great time. Then he came to a dreaded par-4 hole. He hit the ball in a decent drive that started to fall well-short of the green.

Something amazing happened, however. A wind came up and blew the ball forward. The ball sailed over water traps and bounced around sand traps.

Finally the ball made it to the green. It rolled past the hole and then gently back around. For a second it teetered on the edge of the hole. Then it fell right in.

The preacher was stunned. He made a hole-in-one on a par-4! He started jumping up and down in excitement.

Up in heaven, an angel was watching this. The angel turned to God and said, "I don't get it. He skips church to go golfing, and you gave him an amazing hole in one."

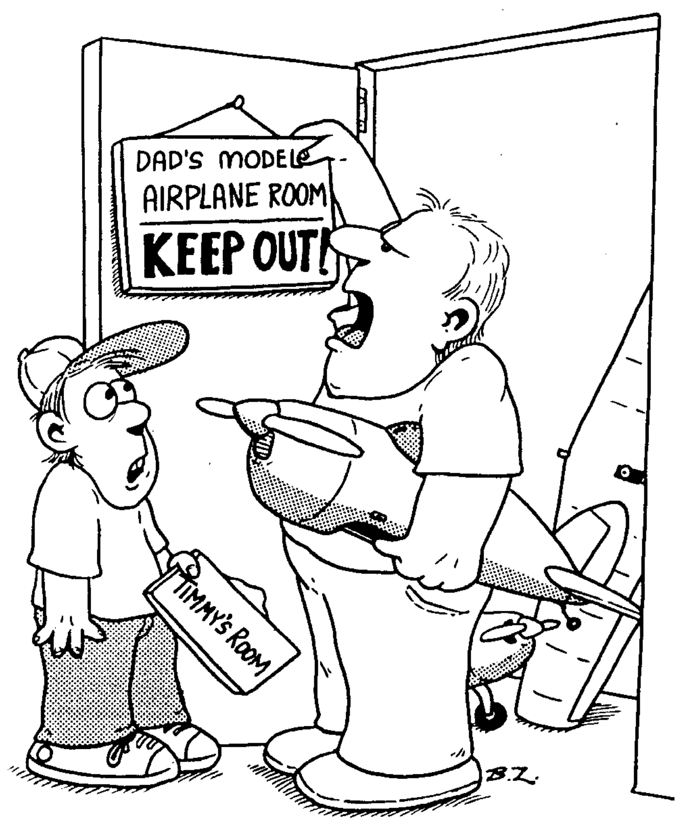
God replied to the angel with a smile, "Who's he going to tell?"

You Might Be An R/C Modeler If…

By Bill Atkins, Byron, GA.

- ... You can't wait for grass cutting season to get here.
- ...You crash your plane and go to the golf course to vent your frustration.

The Lighter Side of R/C



"Tell you what, son... just to be fair about this, I'll help you move your stuff out to the garage."