The Tailwind

AMA Charter No. 704

NOVEMBER — DON LEWIS, EDITOR — 2015

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 November 19 – Be There!

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

MEETING MINUTES

L. Perkes opened the meeting at 7:00 PM.

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

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

The September meeting minutes were published in the October Tailwind. C. Tackett moved to accept as published; seconded by D. Lewis; passed unanimously.

Old Business

- Trailer repair status has not changed. C. Tackett reported on Bob's wife's condition. Our prayers are with Bob and his family.

- Fall Air Show preparations were discussed. Menu is $5 meal deal. Hamburgers (or cheeseburgers) and chili (Don & Carl to provide) are $3, hot dogs are $2.50; chips, drinks, and cookies are $1 each. D. Lewis will get food; B. Pruner will bring grill and charcoal; L. Perkes and D. Lewis will bring coolers. L. Perkes will contact T. Anderson about bringing ice. D. Lewis will bring the shelter paperwork.

New Business

- MTRCCA Swap Meet is on Saturday, November 7, at the State Fairgrounds.

D. Lewis moved to adjourn at 7:38; seconded by C. Tackett; passed unanimously.

TREASURER'S REPORT

Opening balance	$764.08
Income	0.00
Expenses	(8.94)
Closing balance	$ 755.14

CELEBRATING FLIGHT

Douglas A-1 Skyraider

The prototype of the Skyraider was first flown on 18 March 1945. Designed as a robust, multi-role attack aircraft for the US Navy, the carrier-based Skyraider was able to carry a wide variety of weapons on its numerous wing hard points. The Skyraider first saw combat in the Korean War, where its long loiter time and heavy load-hauling capability gave it a distinct utility advantage over the jet aircraft of the time.

Various versions were developed over the years; the most numerous types being: ***AD-1*** (Initial production version with 2500hp R-3350 engine); ***AD-2*** (Improved AD-1 with wheel-well covers and increased fuel load, etc.); ***AD-3*** (Redesigned canopy, improved propeller, etc.); ***AD-4*** (2700hp R-3350 engine, further canopy improvements, etc.); ***AD-4W*** (3-seat Early Warning version); ***AD-5*** (4-seat multi-role version. Many variants of the AD-5 were capable of carrying up to 12 passengers in the rear fuselage); ***AD-6*** (Single-seat attack version).

During the 1960s, the AD-x designations were changed to ***A-1D*** through ***A-1J***. The A-1 series was operated with enormous success during the Vietnam War, where it was used in the Ground Attack, Forward Air Control, and Search and Rescue roles. The AD-6 and ***AD-7*** were used by the French Armee de l'Air in Algeria.

Nicknames: *Able Dog; Sandy; Spad; Hobo; Firefly; Zorro; The Big Gun; Old Faithful; Old Miscellaneous; Fat Face* (AD-5 version)*; Guppy* (AD-5W version)*; Q-Bird* (AD-1Q/AD-5Q versions)*; Flying Dumptruck* (A-1E)*; Crazy Water Buffalo* (South Vietnamese nickname).

Specifications (AD-7 / A-1J):

Engine: 2800hp Wright R-3350-26B radial piston engine

Weight: Empty 10,550 lbs., Max Takeoff 25,000 lbs.

Wing Span: 50ft. 9in.

Length: 38ft. 10in.

Height: 15ft. 8.25in.

Performance:

Maximum Speed at 18,000ft: 320mph

Cruising Speed at 6,000ft: 190mph

Ceiling: 25,500ft

Range: 900 miles

Armament:

Four 20mm cannon

8,000lbs of hardpoint-mounted freefall and/or forward-firing weapons

Number Built: 3,180

Number Still Airworthy: Approx. 19

Molding With Carbon Veil

by Jim Varno

It seems as though technology is advancing so quickly that no one can keep up. Sometimes one gets discouraged because just when you get good at one aspect of modeling, the products are no longer available or new techniques are being used. Each change requires new skills that must be learned.

I have found that the old ways of building still work and it is easier to pick and choose which new building skills and materials you can incorporate into your way of building. The key is to keep an open mind and be willing to change to what will make your building easier or better without compromising quality.

One such technique I have learned is using carbon veil and molding to replace carving and hollowing out balsa blocks. Carving out the top block on my Cardinal took several days and a very light, 4-pound balsa block—which is almost impossible to get these days. The new method is as follows:

1. Cut and sand a piece of pink foam to the shape of whatever you want to make (like the top of your new airplane or a wing tip, etc.).

2. After the part is finished to size, reduce it in size by 1/16 inch on the top and sides (or 1/8 inch if using 1/8-inch balsa).

3. Soak your balsa sheet in ammonia for a few hours until fully soaked in ammonia. Use light, A-grain balsa.

4. Place the wet balsa over the foam form and wrap from one end to the other with an Ace bandage. Set aside to dry overnight at least.

5. Unwrap the Ace bandage and you will have a molded balsa shell. Now place the shell back on the mold and repair any imperfections in the balsa.

6. To give the strength to the shell, lay a piece of wax paper on your bench a little larger than the inside of your molded balsa, and place the carbon veil on the wax paper.

7. Cover the veil with a thin film of slow-curing finishing resin and squeegee the excess resin off with a flat piece of plastic or old credit card.

8. Place a piece of wax paper over the veil, and from the center out, use the plastic card to remove almost all the resin working it out to the sides. You can't take off too much, because you only need enough to stick the veil to the balsa.

9. Next, remove the top piece of wax paper from the carbon veil. Place the veil on the foam with the bottom piece of wax paper down on the foam, and place the balsa shell over the veil. Again wrap the shell, veil, and foam together with the Ace bandage. (I also place wax paper between the balsa and the Ace bandage to keep any resin off the bandage.)

10. When the resin has hardened, remove the wrap and balsa shell from the foam. The veil now will be attached to the inside of the balsa and the unit will be extremely strong and light, ready to glue in place.

This method may seem complicated but it is actually faster, stronger, and easier than carving out a block.

Editorial

It's Not Just Building Season Anymore

In years past, here in Middle Tennessee, when cold weather started to roll in we all went into building mode. Only the most stout of heart and most determined ventured out in cold weather to fly.

Times have changed! No longer will you have to work with a balky glow engine, trying to get it warmed up and started, and living with flameouts and dead sticks. I know what I am going to suggest is sacrilege to a lot of you, but electric flight overcomes most to the reasons not to fly in the winter.

You can keep batteries warm in you coat pocket and they will perform well. If you still want to build that next year's gas or glow model, you can select from a wide variety of electric ARF's or RTF's so you don't have to sacrifice building time.

You can sharpen or keep sharp your flying skills this winter with electrics. As a matter of fact, we will be having our Numb Thumbs Fly-In to bring in the new year early in January. We'll send out a notice of which Saturday via email with the December Tailwind. The club will furnish refreshments and shelter, and there will not be any landing fees. I would like to invite anyone interested to come out and fly with us.

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

Letters To The Editor

I will welcome any member 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

- Remember, unless you are "dead stick", you do not have to land. If it's not right, go around. It's much easier, and safer, to do it over rather than try to salvage a bad approach.
- If you get nervous for any reason, climb out and do some horizontal figure eights over the field. When you calm down, try again. Don't' push yourself to try again too soon. Take your time.
- Do not fly too far away as it is easy to get disorientated. This is especially true when the sun is low on the horizon and the aircraft becomes a silhouette..

Why Didn't I Think of That?

A Tip from Gabby Heard

If you have engines that have been stored and have stuck with congealed Castor oil, just warm them up a little with your heat gun. They usually come right loose! Flush them with a little fuel, then use after-run oil.

Rib Maker

Cut two ribs from 1/16-inch steel. Drill two holes along the center line, one near the leading edge, one near the trailing edge, for 1/4-inch bolts to pass through. Make sure both steel ribs are identical.

Use a steel rib as a template to draw ribs onto balsa sheet. Leave room around each rib. Cut each rib "block" out of the sheeting, and drill the holes in each.

Assemble all ribs on the correct length bolts, and sandwich all between the steel ribs. Using nuts, tighten the assembly down, making sure it's straight.

Now, using a belt sander (a disk sander will work too), remove the extra wood around the ribs down to when the steel begins touching the sander. Cut out the spar notches with a hand saw, and clean them out with a file.
This will make all the ribs for a wing at once, and they'll all be identical, resulting in a straight, uniform wing. It can also be used for a tapered wing (with all the ribs of different size), and bulkheads and formers can be made using this method too.

New Product!

Seagull Models T-34 Mentor

By Geoff Barber on RCUniverse.com

The Beechcraft T-34 is a two-place trainer, designed to replace the aging North American T-6. While looking like the Beechcraft Bonanza, the T-34 has a narrower fuselage that is much stronger. A large bubble canopy replaced the aluminum roof and windows, creating a wide-open field of view.

Powered by a flat, six-cylinder engine, the T-34 was able to perform on as little as one-third the horsepower as the T-6. This, alone, made the T-34 a more economical aircraft.

Seagull Models, distributed by SIG manufacturing in the US, has recently introduced their own version of this prop-driven military trainer. Standing out in yellow and green UltraCote covering, the 'Miss Kitty' T-34 will be sure to catch eyes at any field - and I know because mine has gotten plenty of attention! Whether it's sitting on the ground or flying high, 'Miss Kitty' gets lots of looks!

So, grab your favorite beverage of choice, sit back in your comfy chair, and check out my review of this great looking military trainer.

Price: $330.99 (Price at Review Publishing Date)
Stock Number: SEA240Y
Wingspan: 74.8" (1900mm)
Wing Area: 848.5 in² (54.7 dm²)
Weight: 11-12 lbs. (5-5.5 kg)
Length: 56.3" (1430mm)

My 'Miss Kitty' arrived as a pre-production sample, so there were no graphics on the box. Rest assured that by the time you're reading this, the plane will be in stock at SIG Mfg. - complete with a full-color box label! The yellow and green UltraCote stand out well, and the covering was as smooth as glass out of the box! A very LARGE top hatch will allow plenty of access for electronics installation and battery changes.

I really like that Seagull produced a clean looking model with all the decals pre-applied. The T-34 comes with fixed gear in the box, but can be upgraded to the new Seagull electric retracts - these will be available through SIG Mfg. and SIGPlanes.com soon! E-flite's 60-120 electric retracts are also a good 'drop-in' fit as well.

Also included are parts for gas/glow engines and electric conversion. My T-34 will be set up electric.

I really like Seagull's fiberglass control horns. They don't flex at all, and are easy to install!

I finished assembling the T-34 just a couple of days prior to leaving for WATTS over Owatonna. If you've never been to this event, I highly recommend it! WATTS is an all-electric event that has become the Midwest's largest electric fly-in. WATTS 2015 saw approximately 150 registered pilots over the three days, with many more spectators! There are on-site vendors and a great concession area, and even camping and room for RVs!

Friday brought with it some early morning storms and high winds, so the T-34 maiden flight was delayed until Saturday morning. Joe Vermillion, Mike Gretz, and I arrived at the SMMAC (Southern Minnesota Model Aircraft Club) field at the break of dawn to start getting 'Miss Kitty' ready to fly.

The T-34 was taxied out onto the runway, and it was immediately apparent that the nose wheel had plenty of authority for turning the plane. One final check of the control surfaces, and the throttle stick was pushed forward!

The RimFire 1.20 motor and Hitec 80 Amp ESC proved to be a great combination for the T-34. There was PLENTY of power on tap to get 'Miss Kitty' off the ground in a hurry! With a flip of the switch, the Seagull electric retracts responded accordingly, pulling the gear up. I was already in awe of how nice this plane looked in the air! A couple of circuits around the field had the trims adjusted - four clicks of right aileron and eight clicks of down elevator had the T-34 flying 'hands off' at half throttle.

It was now time to see what this aircraft can do. We pushed the throttle to full for some high speed passes, and we were not disappointed! The T-34 moves very nicely across the sky at scale speeds! A few 'show passes' were done for the camera at this point, and she sure looked good in the lens.

Slowing the plane down required a little more finesse on the sticks. When we slowed 'Miss Kitty' down, she got a 'little tippy' - in other words, she wanted to tip stall. Dropping the flaps definitely helped cure this issue, and looked really cool too!

The gear was then dropped as well to make a few 'dirty' passes for the camera. Again, she looked really nice in the lens!

With the throttle pushed forward again and the flaps and gear up, we tried out some basic aerobatics. Once again, the T-34 didn't disappoint us! Loops could be made as large as we wanted, but the rolls felt a little sluggish. We added more control throw for the next flight, and she reacted much better.

I set the timer on my Hitec Flash 7 conservatively for the first flight. At six minutes, the timer alarmed, telling us to land. The flaps and gear were dropped, and the T-34 brought out over the grass to land. We found that the nylon mat runway was a little too bumpy for landing, so she was brought down in the grass. Now, with the flaps and gear down, the plane slowed in a hurry - she dropped in quickly, but softly. Landing in the grass proved to be the right move, as she touched down with a short roll out!

Seven minutes (six on the timer plus landing and taxiing back to the pits) proved to be right on the money. I tested the battery after removing the hatch and it was down to 30% left - just the way I like my LiPos after a flight!

All in all, we were very pleased with the flight performance of the T-34. It flew very well, as long as we respected the minimum speed without flaps. She flew very well for a maiden, and went back up later in the day! Everyone at WATTS seemed to stop and watch when the T-34 went up!

For the complete review, visit rcuniverse.com

Pioneers of Flight

Sir George Cayley - Making Aviation Practical

From Century-of-Flight.net

Sir George Cayley, born in 1773, is sometimes called the of Father of Aviation. A pioneer in his field, he is credited with the first major

breakthrough in heavier-than-air flight. Cayley literally has two great spurts of aeronautical creativity, separated by years during which he did little with the subject. He was the first to identify the four aerodynamic forces of flight weight, lift, drag, and thrust and their relationship. He was also the first to build a successful human-carrying glider. Cayley described many of the concepts and elements of the modern airplane and was the first to understand and explain in engineering terms the concepts of lift and thrust. Before him, researchers thought that the propulsion system should generate both lift and forward motion at the same time, as birds were able to do. So they constructed their flying machines with flapping wings (called ornithopters) to resemble the motion of birds. Cayley realized that the propulsion system should generate thrust but that the wings should be shaped so as to create lift. Finally, Cayley was the first investigator to apply the research methods and tools of science and engineering to the solution of the problems of flight.

In his experiments, Cayley would first test his ideas with small models and then gradually progress to full-scale demonstrations. He also kept meticulous records of his observations. One of his first experiments as a young man was to build a small helicopter model. This toy was rooted deep in European history. The earliest ancestors of the device date to the 14th century. Cayley was inspired by a version developed in 1784 by the Frenchmen Launoy and Bienvenu. It had two rotors consisting of feathers stuck in corks and was driven by a string from a bow. The design demonstrated an understanding of how a propeller worked. It also addressed Cayley's interest in finding a means of powering an aircraft. He attempted to use an engine fuelled by gunpowder but it was unreliable. His inability to find a means of propulsion caused him to revert temporarily to Leonardo da Vinci's concept of using flapping wings as a means of propulsion. This resulted in his 1843 convertiplane model called the Aerial Carriage. Cayley reverted to ornithoptering propulsion and vertical flight ideas on several occasions in his career.

In 1799, Cayley designed a configuration that was basically in the form of a modern airplane with a fuselage and wings. Etched on a silver disk this design bears a close relationship to the modern flying machines of more than a century later. On one side of the disc he showed the forces that govern flight. On the reverse side, he engraved an aircraft that illustrated how those forces operated. It had a fixed main wing, a fuselage, a cruciform tail unit with surfaces for vertical and horizontal control, a cockpit for the pilot, and a rudimentary means of propulsion that consisted of revolving vanes, a precursor to the propeller. Thus, one hundred years before the Wright brothers flew their glider, Cayley had established the basic principles and configuration of the modern airplane, complete with fixed wings, fuselage, and a tail unit with elevators and rudder, and had constructed a series of models to demonstrate his ideas.

Experiments that he began to carry out in 1804 allowed him to learn more about aerodynamics and wing structures using a whirling arm device. He observed that birds soared long distances by simply twisting their arched wing surfaces and deduced that fixed-wing machines would fly if the wings were cambered. This was the first scientific testing of airfoils the part of the aircraft that is designed to produce lift.

After these experiments, he constructed what is considered to be the first real airplane in history. This glider, which was basically a kite on top of pole, was about 5 feet (1.5 meters) long, with a fixed wing set at an angle of incidence of 6 degrees and a cruciform tail that was attached to the fuselage by universal joints. Movable ballast controlled the centre of gravity. After this model successfully flew, Cayley designed a larger model glider with rigid wings.

By 1808, Cayley had constructed a glider with a wing area of almost 300 square feet (28 square meters). By the middle of 1809, Cayley had investigated the improved lifting capacities of cambered wings, the movement of the centre of pressure, longitudinal stability, and the concept of streamlining. He demonstrated the use of inclined, rigid wings to provide lift and roll stability, and the use of a rudder steering control. He even came to realize that an area of low pressure is formed above the wing. By 1809, he had advanced from model gliders to the building and successful flying of a

glider with a total wing area of approximately 172 square feet (18.5 square meters).

Soon after, Cayley published a paper, On Aerial Navigation (1809-1810), which appeared in Nicholson's Journal of Natural Philosophy, Chemistry and the Arts. In this paper, he laid out the basis for the study of aerodynamics. However, this work was not known and acknowledged for some years.

After having built several models (with an interruption to explore the possibility of an Aerial Carriage of 1843), Cayley concentrated on experiments with full-size gliders. He built his first full-size glider in 1849 and initially carried out trials with ballast. Later that year, the ten-year-old son of one his servants became the first person in history to fly when he made a short flight in a Cayley glider.

Four years later, in 1853 and fifty years before the first powered flight was made at Kitty Hawk, North Carolina, Cayley built a triplane glider (a glider with three horizontal wing structures) that carried his coachman 900 feet (275 meters) across Brompton Dale in the north of England before crashing. It was the first recorded flight by an adult in an aircraft.

Throughout his long career, Cayley recognized and searched for solutions to the basic problems of flight. These included the ratio of lift to wing area, determination of the centre of wing pressure, the importance of streamlined shapes, the recognition that a tail assembly was essential to stability and control, the concept of a braced biplane structure for strength, the concept of a wheeled undercarriage, and the need for a lightweight source of power. Cayley correctly predicted that sustained flight would not occur until a lightweight engine was developed to provide adequate thrust and lift, an event that did not take place until the flight of Orville and Wilbur Wright in 1903.

Sir George Caylev was interested in the design of parachutes and discussed the subject at length in his landmark paper. “On Aerial Navigation,” published in I 809—1 8 10. CayIey was particularly interested in England’s first parachute jump, which was made in 1802 by Andres Jacques Garnerin. Garnerin used an umbrella-shaped parachute, and swayed violently during his descent. Cayley theorized that a cone-shaped parachute would he more stable. A reader of Cayley’s paper who had also witnessed Gernerin’s jump, artist Robert Cocking, decided he would attempt a jump using Cavley’s design.

It was not until 1817 that Cocking had an opportunity to make his jump. He convinced the owners of a balloon, the Royal Nassau, that a parachute jump was just the sort of publicity they needed; it did not seem to bother them that Cocking had no experience whatever in parachuting or that he was sixty-one years old at the time. Cocking built a parachute in a funnel shape and attached a basket underneath in which he could ride. The balloon lifted the chute-and-basket combination, with Cocking in the basket, to an altitude of five thousand feet (1 .5km) and released it.

As soon as it was released, it was obvious that Cocking had neglected to take one thing into account: the weight of the parachute. The entire apparatus weighed 250 pounds (113.5kg). roughly ten times the weight of the modern parachute. The apparatus raced downward too quickly to suit the onlookers who had assembled below, and then the parachute came apart. Cocking was killed in the crash, and a great deal of attention was given to determining what went wrong, with the possibility that Cayley’s design was to blame casting a shadow on his entire work. It soon became clear (from tests made with dead weights) that the fault did not lie in Cayley’s design (although he, in fact, did omit to discuss the weight requirements of the parachute), but was due to a combination of the weight and the flimsy stitching that held the strips of the parachute together.

Safety Tips

Lithium Safety and Instructions

From Radical RC

1. NEVER allow any lithium type cell of any kind to be charged unattended.

Remove the pack from the model/device and charge it in a fireproof container such as a baking dish placed on a fireproof surface such as the ground or cement, well away from flammables.

Fires from Improperly charged and failed Lithium packs are well documented. It is possible that you may do everything correctly and still be subjected to a cell failure which could result in a fire. It is possible you may make an error in charging or may charge an out of balance pack unaware. It is possible your charger will fail you. Leave nothing to chance when handling lithium cells of ANY type.

2. ONLY use proven lithium Ion and Lithium Ion Polymer chargers to charge these cells.

If you elect to use your Super Nova, your Super Turbo or any other non-lithium charger on a lithium pack you are going to ruin your pack. It is possible you'll cause and explosion or bursting of the cell housing, it is possible you'll also start a fire. Buy a charger with a good reputation that is designed for your application. Lithium warnings are REAL.

3. NEVER combine different brands or ratings of cells in packs.

If you put two different capacity or brands of cells together in a pack, the weaker or lower capacity cell will become fully charged (when charging as a multi cell pack) prior to the larger or stronger cell(s). The cut-off voltage will still not be reached because one cell is not full, the weaker cell will be overcharged while the charger trys to force the pack up to full voltage. This will result in a failure and destruction of the pack and possible fire.

4. BE CERTAIN that your cut off voltage is 4.2 volts per cell when charging. 1 cell cutoff is 4.2 volts, 2 cell cutoff is 8.4v, 3 cell cutoff is 12.6v, etc.

If the cutoff voltage is above 4.2V per cell then your charger will damage your cells and will be much more likely to cause a fire.

5. BALANCE AND BREAK IN: Every pack needs a break-in / balancing charge to insure that all cells are of equal voltage in the pack. A single cell charger is required to do this. If you don't own a charger with single cell capability you need to obtain one.

6. All multi-cell series wired packs shipped from Radical RC complete with wire include a center tap. Center tap(s) are provided at each + to - cell union to allow you to access them individually for balance charging. It is EXTREMELY important all cells in a multi cell pack be in an equal state of charge. We recommended that you check the individual cell voltage regularly with a quality digital volt meter to verify all cells are of equal voltage. This helps prevent cells from being charged above 4.2 volts. For example, a 2-cell pack will be charged to a full voltage of 8.4 volts (4.2volts per cell). If one cell in the pack starts at 3 volts and one at 3.5, the ending voltage will still be 8.4 volts when the charger stops charging. However, one cell will be 4.7 volts and the weaker one will be 3.7 volts. It is likely that the 4.7 volt cell in the pack will fail, this could lead to fire, injury or death. Use this tap frequently to check that all cells in your multi cell pack are at the same voltage. Once the pack is out of balance by .05 volts or more you should charge the cells individually again to rebalance the pack. Use the same charger on exactly the same settings for each cell. Allow the pack to rest for at least 10 minutes after finishing the last cell. Check the voltage of each cell again to verify they are within .05 volts of each other prior to using the pack. An out of balance pack will eventually catch fire. Skip this important safety procedure at your own peril.

7. DO NOT discharge Lithium type cells below 3 volts per cell. Under 3 volts chemical reactions start that ruin the cell's capability to store a future charge.

Sometimes You Just Have to Laugh…

Ed was in trouble. He forgot his wedding anniversary. His wife was REALLY angry.

She told him, 'Tomorrow morning I expect to find a gift in the driveway that goes from 0 to 200 in less then 6 seconds AND IT BETTER BE THERE!!'

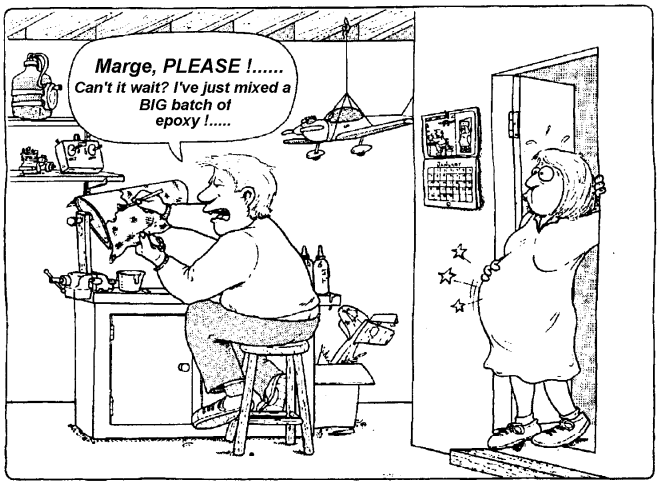
The next morning Ed got up early and left for work. When his wife woke up she looked out the window and sure enough there was a box gift-wrapped in the middle of the driveway. Confused, the wife put on her robe and ran out to the driveway, and brought the box back in the house.

She opened it and found a brand new bathroom scale.

Ed has been missing since Friday.

Please pray for him.

The Lighter Side of R/C



You Might Be An R/C Modeler If...

By Bill Atkins, Byron, GA

- ... You buy the "wife and kids" a new Pentium computer for Christmas so you can practice with the Dave Brown flight simulator.

- ...You have watched TOP GUN and IRON EAGLES more than ten times.