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**The Next Meeting: Thursday, June 1, at the Rushston Rd. Field, weather permitting, A.S.A.P. Also - Tuesday, June 20th will be electric fly night at the Midwest Field - see page 8**

**Two New Products From Germany**  
Doug Ward - editor "Watts Current"  
R.D. #1, Box 189  
Irwin, PA 15642

The latest Hobby Lobby catalog (#25) contains many new items mostly from abroad. Among them, is a new motor + gear drive combination which is quite different from the things we have been using.

The motor itself is not new, in fact, you can use either the SPEED 500 (Race) or SPEED 600 (BB) to turn the gearbox. I see no reason why the gearbox couldn't be mounted on an Astro 035, as all the motors mentioned here have the same 3.2 mm output shafts.

The drive's uniqueness lies in the fact that it is totally inline with the motor case; there is no offset from the motor output shaft to prop shaft. This is accomplished by the use of four gears within the drive housing rather than the usual two. The gears are hardened steel and the spur is a press fit on the motor shaft. The whole thing is encased in what appears to be a fiberglass (possibly carbon fiber) case of high quality which can easily be opened for inspection and/or lubrication. The case mounts onto the motor by inserting screws into the regular motor mount holes. The whole unit,

then, mounts in your aircraft by means of threaded holes and screws just as if you were installing the motor alone. One nice touch is the use of retained nuts inside the gearcase which receive the mounting screws from the firewall. If you strip these, they are easily replaced. The reduction is 2.8:1. It's a neat package. The price is \$76.25 or \$86.20, depending on the motor you purchase with the drive.

It is highly recommended that you also use the new Graupner propeller--a 12x10 folder specifically for this application--selling for \$19.40.

"But," you ask, "how do you know all this stuff?" As it turns out, I have been using the SPEED 600 unit in my UHU/JUNIOR for the past several weeks, where it has lived up to its promise, mostly. The maiden flight was witnessed by none other than Bill McAvoy and Roger Coughy, plus numerous park visitors who probably didn't realize that history was being made.

For the first flight. I used a 7-cell battery pack which " was adequate for trial purposes. Since the instructions for the motor allow anywhere from seven to 12 cells, I decided to make a 10-pack out of 800s--that is all the room there is in the UHU fuselage--and try

## Ampeer

**What's  
in this  
issue?**

**New from Europe - Vacuum Forming - Down Wind Turn -  
More on Making Decals - SR Max motors - What Colors do we  
fly? - Black wire rot - May Meeting**

them on the second flight. There was a significant increase in thrust with a slight penalty of additional weight. This setup draws about 19 Amps and tachs at about 5600 with the 12x10 prop. With seven cells, the current is about 13 Amps @5100 rpm. I suspect those numbers might change a bit with more run-in time. It's also nice to know that the gearbox shafts run in a combination of ball and needle bearings for long life.

The catalog description is somewhat inaccurate, so be forewarned. Their claim of an eight-ounce weight for the 600 combo is too light: mine weighs 9.2 ounces. They also register a 15-Amp draw on seven cells, but then point out that their specs were taken from the Aero Comp motor program. I would rather that they give actual measurements instead of theoretical ones. Hobby Lobby also describes the gearbox as planetary, which it is not. But the extra gears mean that the motor rotation does not have to be reversed when the gear drive is attached - everything rotates in the normal counterclockwise fashion. If you think about putting this on an Astro 035, as I mentioned, you don't need to reverse the rotation or change brushes. Slick!

The new prop uses the old familiar Graupner hub parts typically found in the 8-4's that many of us have been using, so all you need, if you have the hub and adaptor, is a set of blades. Too bad they don't have any separate blades as of this writing. It would also be nice if the gear drive were available separately, but it is not at this time.

As far as I am concerned, the design is very good and the unit does what it says it will do. The installation, including the 10-cell pack, added four ounces to the suffering UHU; it was a perfect fit in the narrowly tapered plastic nose of the fuselage. I haven't tested it for duration, but if there are five minutes of running time you could stay in the air all day and send out for lunch!

## VACUUM FORMING CANOPIES

by Paul Sampson

from Electric Flight U.K. edited by Dave Durnford  
Winter 1994

Have you ever seen an aircraft that you would really like to model, but cannot find a canopy suitable for it. This has probably been the cause of many modelling projects never getting past the proverbial sketch on the back of an envelope. I have come across this problem many times in the last few years. In fact ever since I started to design my own PSS models.

This problem can be solved without spending all the housekeeping money. Vacuum forming is quite simple. All you need is the household vacuum cleaner (ask the wife first), a few lengths of wood (floor-boards are ideal), a couple of elements from an electric fire, some piano hinge, a switch and a few other odds and ends from around the house.

The illustrations show how my machine was constructed. The size of the unit is entirely up to you.

As you can see it is a simple wooden box divided into two sections, one for the heating element and the other for the vacuum. The base on which you place your plug is a piece of chipboard with holes drilled into it (hard work!). The side of the box which has the heating elements in it must be protected from the heat that will be generated. I used thin aluminium.

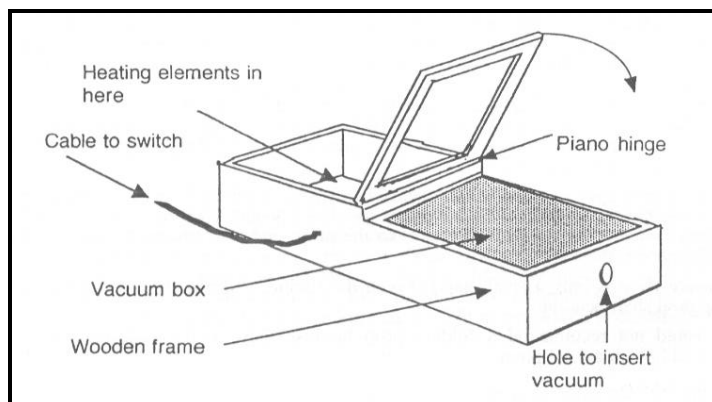
The two elements are positioned inside this side of the box, making sure that they are insulated from the aluminium. I used heat resistant wire to connect up the elements and I would advise you to do the same. The elements should be mounted about 3 inches below the top of the box.

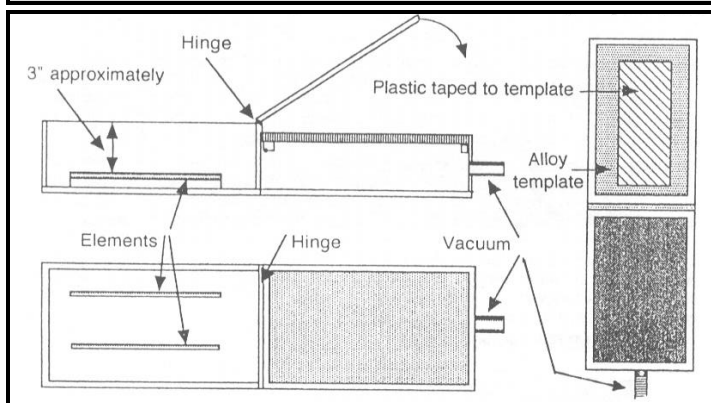
The hinge is positioned so that when the lid is flipped over to the vacuum side it lies flat on top of the drilled bed. A strip of rubber is stuck to the lid on this side to make a seal. The lid is usually bigger than the item you are making so a number of aluminium templates can be made to suit the item being formed.

There are numerous materials that can be used for vacuum forming but the more common ones are ABS, PVC, POLYESTER, LEXAN. The best plan is to decide what you are going to make and then ask the advice of the nearest plastics stockholder who will know- exactly what material will be most suitable for the task.

The next step is to make your original plug. I have tried numerous materials and have found that wood is probably the best medium for the job. Pattern makers use Yellow Pine. This is hard to find and not cheap unless an off-cut can be obtained. The alternatives are normal pine, but some time will have to be spent on getting a perfect finish otherwise the grain will show in the finished article. The same applies to using balsa, so the choice is yours. If you are just copying an existing canopy, a good method is to just fill the article with fine casting plaster and use that as the plug.

Having made the plug you then position it in the middle of the alloy template on the vacuum box, flip the lid over to the heater side of the box and cut a piece of





your plastic approximately 20mm larger than the hole in your template and tape down with the tape on the side away from the heat.

Switch on the heaters and you will see the plastic sag slightly a second time, then quickly switch on the vacuum and flip over the lid. You should end up with a perfect replica of the item you require, it sounds easy and it is, but there are times when you will use too much heat and a hole appears in the plastic, and also too little heat and the plastic does not pull down to the base of the plug. Try, try, try again - it will be worth it!

Paul Sampson, Newcastle.

'EF-UK' expresses its thanks to Paul Sampson and the 'PSSA' Magazine for kindly allowing reproduction of the above article to an "electric" audience. Paul Sampson has an interesting range of plans available. Whilst primarily intended for 'Power Slope Soaring (PSS), their balsa/foam construction may well be adapted for electric power. For further details contact:

Paul Sampson. 16 Whinneyfield Road, Walkergate, Newcastle-upon-Tyne, NE6 4HX

### DOWNWIND TURN

#### From the Aero Modelers Airways BBS

The problem with the downwind turn with an RC aircraft is not really with apparent wind speed. It's a matter of visual perception. We get used to turning our planes seeing a certain radius in the turn. When we have good airspeed relative to wind speed everything is OK. However, when we fly slow and make a downwind turn we in fact turn too sharply and caused the stall. The sharpness is relative to the air not the ground. Relative to the ground our turn looks the same as always (except for the stall) but to the air we have really cranked it!

A downwind turn should visually look like the plane is getting "blown" downwind. If you tighten the turn to make it look 'normal' you will likely stall the plane.

To demonstrate take a circle template and a piece of paper. With the paper stationary you can easily draw a circle with a constant radius. Now pull the paper under the circle template while drawing a circle. (The moving paper simulates the wind speed. The circle template is a constant radius turn.) The circle is the track that we try to maintain when the wind is

blowing. The pencil mark on the paper is the radius relative to the wind speed. See any sharp turns? -Yep. Which turn is it? The downwind turn. The pencil mark is the constant wind speed ground track of the airplane. The downwind turn is the loong radius part of the track. When we tighten this part of the turn we stall the plane. - Rick Eckel

### More On Making Decals

from Ralph Moote  
10589 Homestead La.  
Plymouth, MI 48170

I read with interest the article on making decals by Don Bartick. The method I used for years (70s) to copy printed circuit patterns from magazines or my own, also works well on making decals.

I use the cold seal laminating sheets bought from ACO or K-mart at a cost of about \$3 for a pack of four 9x12 inch sheets.

#### How to do it:

1. Copy the article on a copier or use the original.
2. Laminate in cold seal laminate, rub with flat object to adhere well.
3. Under warm running water rub off paper pattern with finger until all paper is removed from back. The cold seal loses its stickiness from the water, but returns after drying.
4. Put decal copy to one side to dry, sticky side up.
5. When dry, adhere to object or to save for later use, put back onto original paper backing (shiny side).

The decal of Beetle Bailey looks great - thanks Ralph!

(A method that I have used successfully to make decals is to spray what I want to make the decal out of with clear polyurethane paint, several coats. Once it has dried well, I rub off the paper, under water. I then coat the "decal" with thinned white glue and put it in place on the model. With color copy reproduction not too expensive, almost anything could be made either of these ways. km)

### CS Flight Systems

It has been quite a while since I last mentioned Charlie and his electric flight supply business. He carries a full stock Electric flight goodies. Charile is a very nice person to deal with. He has his new catalog available for \$6. Folks, this is not a catalog - it's an e-flight reference work. You'll love it! Mail that check off to CS Flight Systems, 31 Perry St., Middleboro, MA 02346 (508-947-2805) If you're looking for something electric, he's probably got it.

**WHAT DO I DO NOW???... (3)**

My plane is disappearing over the horizon!  
The Old Buzzard sez, "Wave Bye-Bye! Or ..."  
PULL 1/2 UP AND WATCH CAREFULLY !!

- a. If the plane dives, it is inverted.  
1/2 ROLL UPRIGHT.
- b. If the plane climbs, it is upright After the plane is upright, DO A 1/2 LOOP THEN A 1/2 ROLL TO UPRIGHT - This maneuver (called an "Immelmann turn," after Max Immelmann, German ace of World War It does two good things:

1. Your airplane gains altitude.
2. Your airplane heads home.

**WHAT Do I Do NOW ??? ... (4)**

My plane is far out and I don't know which way it is heading!  
The Old Buzzard sez, 'Get out your checkbook.'" or...

1. SET TRANSMITTER CONTROLS FOR A SLOW, LEVEL RIGHT TURN.
  - a. If the plane moves LEFT, It is heading TOWARD YOU. Neutralize the controls and wait!!!
  - b. If the plane moves RIGHT, It is heading AWAY FROM YOU. Continue the turn until the plane is heading toward you, then neutralize the controls and wait.

**Ken Welch's Electric Swept-wing Glider**

A while back I asked if anyone knew what Ken's plane was. Keith Shaw called to say that it is proba-bly a Graupner Cumulus.

**The Following is From the SR Tech Notes - Winter 1995**

The new SR Max<sup>7</sup> and SR Max<sup>10</sup> Neodymium, rare earth magnet motors represent a totally new approach to motor design for the Electric Flight modeler. Traditionally, as the cell count for which a particular motor was designed went up, the power output of that motor went up too. In other words, if a company made a seven cell motor and a ten cell motor, the power of the ten cell motor would be significantly higher than that of the seven cell motor.

Unfortunately, higher power also meant higher current consumption which in turn meant shorter motor runs and flying times. If the flying to be done was of the LMR, limited motor run type, which only entails 30 to 45 second motor runs, this extra current consumption wasn't a problem. However, if the modeler was after 8 to 12 minute motor runs and flights, this was the wrong way to design a motor.

The SR Max<sup>7</sup> motor, which is designed to operate on five to seven cells, and the SR Max<sup>10</sup> motor, which is designed to operate on seven to ten cells, both have approximately the same input power even though one is a seven cell motor and the other is a ten cell motor. Both motors have an input power of approximately 330 Watts. Where the new SR motors are different in that

while the SR Max<sup>7</sup> motor is designed to be the strongest, most powerful seven cell motor currently available in both the small-est and lightest package, the SR Max<sup>10</sup> motor is designed to operate on significantly less current while putting out the same or slightly more power than the SR Max<sup>7</sup> motor.



One of the most basic decisions we had to make early on was how to handle the trade off between torque and the ability to spin at high RPMs. You can optimize for one or the other, but not both. What we came up with can best be described this way... If you are rowing a boat you have a choice of two ways to row. You can take short, quick strokes, or you can take long, slow, powerful strokes. If the person rowing is small with short arms, it's probably better to take short fast strokes. On the other hand, if he's a gorilla, he's better off taking long powerful strokes.

The new SR Max motors are gorillas! One of our customers has referred to them as "The four strokes of electric motors!" You can feel the difference immediately when you try to turn the motors over by hand... you almost can't! You don't need a speed control with a brake with the SR Max motors. When you turn them off they stop, period.

Let's take a look at some of the numbers. But, before we do, a word on motor testing techniques. When testing an electric motor there is a long list of variables which can affect the outcome of the tests, particularly if the motor is being tested with an aircraft propeller. For our tests, the same propeller, battery pack, wiring harness, electronic speed control, and charger were used for all of the tests within a particular group, unless the test called for both a seven and ten cell battery pack to be used. All of the tests were completed within a one hour period and the first tests were repeated at the end of the testing sequence to make sure that the results could be duplicated from the beginning to the end of testing. In this way, we could be sure that if you were to duplicate our tests, you might not get exactly the same numbers (due to altitude, temperature, humidity, and barometric pressure) but you should be able to duplicate the relationships between the various motors tested.

For the first test, let's take a look at the Aero-Naut 8x5 folding prop with direct drive motors:

	RPM	Amps
Competitor	11,900	41.4
SR Max <sup>7</sup>	13,000	45.5
SR Max <sup>10</sup>	13,500	33.2

As you can see, both SR Max motors are significantly more powerful than the competitor's seven cell motor. The SR Max<sup>7</sup> motor turns 1,100 RPM higher while only drawing 4.1 amps more current. However, the SR Max<sup>10</sup> motor, running on a ten cell pack, turns 1,600 RPM higher while drawing 8.2 amps less than the competitor's seven cell motor!

What this all means is that if you need the most powerful seven cell motor for LMR flying, choose the SR Max<sup>7</sup> motor. However, if you're sport flying and simply want the longest possible flight times, choose the SR Max<sup>10</sup> motor and use a ten cell pack.

Let's take a look at the motors physically. Both the SR Max<sup>7</sup> and SR Max<sup>10</sup> motors are the same size and weight. They are both 1.38" in diameter and 2.18" in length with no external brush housings on either motor. The SR Max<sup>7</sup> and SR Max<sup>10</sup> both weigh 6.75 ounces in the direct drive versions and 8.3 ounces with a Master Airscrew gearbox in the ratios of 2.5:1, 3:1, and 3.5:1. Both motors have 1/8" shafts with machined flats.

All of this means that both motors are about the same diameter as the competition and they're about .5" shorter. The SR Max<sup>7</sup> and SR Max<sup>10</sup> motors weigh about 1 ounce less than the competition's seven cell motor and the SR Max<sup>10</sup> motor weighs 1.75 ounces less than the competition's ten cell motors.

Naturally, both SR Max motors have adjustable timing, replaceable brushes, and the timing can be set without removing the gearbox. Both motors have double ball bearing shafts and the front of both motors is flush with no raised boss around the front bearing to interfere with mounting the motor. The armatures are hand wound and are machine trued and balanced. No putty is used to balance the armatures. SR Max motors come completely wired with Sermos connectors and our custom designed SR

12 gauge super flexible wire with strain reliefs. As with all SR products, custom details are no problem. If you need a special connector, wiring or motor



modification, just let us know. As always, we'll be glad to help.

If you're wondering what the performance looks like with a geardrive and larger prop, we won't disappoint you. For the first tests, we chose a combination that wouldn't tax the motors too much so that you could get an idea of the performance you could expect in a seven cell, sport application. We used an Aero-Naut 10x7 folding prop. The competition is a 5 Turn, seven cell, geardrive motor and the SR Max<sup>7</sup> motor has a Master Airscrew 3:1

gearbox installed. Here are the numbers:

	RPM	Amps
Competitor	7,600	32.3
SR Max <sup>7</sup>	7,200	21.5

OK, they got us by 400 RPM, but they had to use 50% more current to do it!

What happens if you use a little more prop? In this case we used an 11x9, Master Airscrew wood prop with fixed blades. We tested the same geared competitor's motor and our SR Max<sup>7</sup> motor with a Master Airscrew 3:1 gearbox installed, but we also tested our SR Max<sup>10</sup> with the same gearbox and a ten cell pack. Here are those numbers:

	RPM	Amps
Competitor	5,800	50.1
SR Max <sup>7</sup>	5,700	34.1
SR Max <sup>10</sup>	6,000	24.2

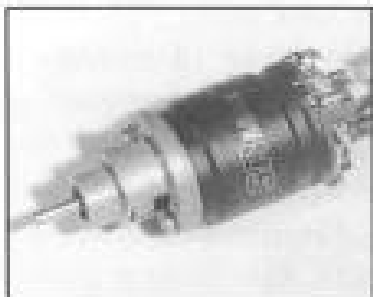
As you can see, the competition turned 100 RPM more than our SR Max<sup>7</sup> motor but they drew 16 amps or almost 50% more current to do it. However, our SR Max<sup>10</sup> motor out turned them by 300 RPM and drew less than half the amps! That means you would get over twice the flying time from the same size cells. In all fairness, remember you would be using a ten cell pack rather than a seven cell pack, but you would get twice the flying time!

Some of you would probably like to use an Aero-Naut 14x8.5 folding prop on your larger sailplanes and old timers. Here are those numbers:

	RPM	Amps
Competitor	5,400	50
SR Max <sup>7</sup>	5,400	35.8

As you can see, we're swinging the same prop at the same speed but the competitive geardrive motor is drawing 14.2 amps more to do it!

Many of you would like to use a gearbox which doesn't have the large offset between the center line of the motor and the prop shaft. You've also told us that you don't use a prop as large as the Aero-Naut 14x8.5. So, we also

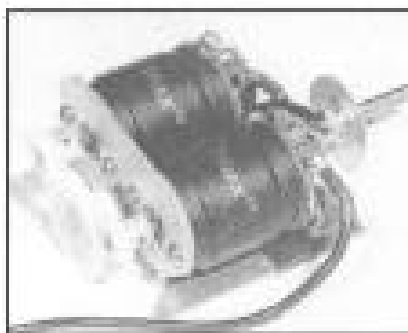


provide the SR Max motors with the Hobby Lobby, Titanium, 2:1 gearbox installed. Here, the 12x7 Aero-Naut folding prop is the prop of choice. Here are the numbers:

	RPM	Amps
Competitor	7,200	36
Max <sup>7</sup>	7,450	38

We're 250 RPM and 2 amps higher, but we're also 1.6 ounces lighter!

This brings us to those of you who would like to fly .40 to .60 size, or even 1/4 Scale "wet" type aircraft. You can't do it with the SR Max<sup>7</sup> or SR Max<sup>10</sup> motors individually, but you can if you use twin motors in the Amp-Air Twin gearbox and a 14 or 20 cell battery pack!



The Amp-Air Twin gearbox allows you to use two motors to swing a single prop. It comes in many gear ratios but the most popular are 2.1:1, 2.5:1, 3:1, and 3.66:1. With twin SR Max<sup>7</sup> and SR Max<sup>10</sup> motors we've been able to easily fly up to 750 square inch, 7 pound Sport and Trainer aircraft such as the Eagle 2, Tiger 2, Aero-Star and even the Dynaflyte Fun Scale .40 Corsair. Not only do we fly them but we get 10 to 12 minute powered flights! No gliding, or soaring, just plain, old, powered flight!

The prop to use in these applications seems to be the

Master Airscrew 14x10 wood prop with fixed blades.

	RPM	Amps
Competitor	6,500	37.2
SR Max <sup>10</sup> , Twin	5,800	22.5

As you can see from the numbers, the SR Max<sup>10</sup>, twin motor system wasn't breathing very hard at all and we really could have gone to a 2.5:1 gear ratio. However, we've found that 5,800 RPM is plenty of power for these aircraft and we love a 22.5 amp maximum current draw. Most of the flying is done at partial throttle so you really don't even need 5,800 RPM vrry much. Even so, at full throttle, the competitive motor is drawing 65% more current!

To see how far we could take this concept, we set up a system designed for really large aircraft such as the SIG 1/4 Scale Cub and the Hobby Lobby Senior Telemaster. To do so, we wanted to swing either a Zinger 16x8 or 16x10 prop. We used an Amp-Air 3:1 gearbox. The competitor's motor is a "40" size geared motor. Here are the 16x8 numbers:

	RPM	Amps
Competitor	6,200	45.3
SR Max <sup>10</sup> , Twin	5,500	25.8

As you can see, we don't have quite the power, 700 less RPM, but we're drawing almost half the current! That means we'll get almost twice the flight time and either motor is putting out more power than you'd need so you'd be flying at partial throttle in either case. Here are the 16x10 numbers:

	RPM	Amps
Competitor	5,500	52.5
SR Max <sup>10</sup> , Twin	5,200	37.5

As you can see, once again it's no contest. The Twin SR Max<sup>10</sup> system puts out almost the same RPM, only 300 less, while the competitive motor draws 40% more current.

For more information or to order a motor Call SR Batteries at 516-286-0079 or write us at Box 287, Bellport, NY 11713. Our FAX number is 516-286-0901 and you can reach us on CompuServe at 74167,751.

**Please note this info-ad was run unpaid, as an informational piece for you. I hope that you find it useful and check out this product and I'll soon have a test report - km**

**What Colors Do We Fly?**

by Terry Cusock

from the AMA National Newsletter

We know that contrast is the key to producing a visible paint scheme, but what paint schemes are easy to see and show aircraft orientation? Well, before I offer suggestions, let me tell you what I have learned. (The following observations are not based upon scientific process.)

Originally, the goal of this article was to increase my ability to see aircraft orientation from great distances. What I learned was that the paint scheme is irrelevant. Yes, all this talk about color and contrast did not improve my ability to see and control my aircraft from great distances. (If I wanted better orientation, I would have to change the size of the model or fly closer to the ground.) Against the sunlit sky, color did little to increase visibility. On the ground, or line-of-sight near-parallel to the ground, colors and patterns made a direct impact on visibility and orientation. So color research determined on the ground had no relation to what was visible in the sky. When the aircraft flies between you and the source of light, the aircraft becomes a mere silhouette in as few as 250 feet (depending on the size of the model). Obviously then, a paint scheme should be organized to orient the aircraft

during its three most critical phases of flight: takeoff, landing and low maneuvers. Now for another surprise. The most visually-effective design tested is "invasion stripe(s)". (The same stripes that were used in Europe during WWII to identify allies.) Invasion stripes are a pair of large wide stripes running with the cord of the wing or vertically on the fuselage (see figure 1). The stripes wrap completely around the surface covering both the top and bottom with no breaks. Sunburst, diagonal stripes, and smaller forms of stripes help little in increasing visibility or orientation. Large areas of contrast, such as the entire bottom of the aircraft or 50% or more of a wing panel proved effective but (believe it or not) did not offer the banking orientation that the invasion stripes did. Invasion stripes seem to form a 3-D effect in the air (see figure 2). The 3-D effect is created by the shape of the leading edge and the contrasting area between the stripes. You really have to see it to believe how something so simple can be so effective. It is quite easy to determine the bank of the wing or turning of the aircraft by the apparent shape of the invasion stripes.

Knowing what paint design works and how it works, I proceeded to work on some designs that would appeal to our sense of "art" and still provide orientation. To be effective, the design must use cord-lines, or lines perpendicular to the length of a wing or fuselage. Lengthwise lines are only effective when used to break up cord or split the top and bottom colors of the aircraft. One of my favorite designs is used by Burlington Air Express (see figure 3). The design splits the different sides of the aircraft with variable contrast. This offers great visual orientation and the impression of movement even when the aircraft is sitting still. Another eye catching design is the Patriot (see figure 4). Splashing red, white and blue in the proper patterns offers some great contrast. Notice that all of these designs break up the leading edge of the wing, providing better visibility head on. I wish these figures were in color, but even in black and white, the contrast is apparent. Figures 5 and 6 show more ideas to help stir up your own creativity.

from The Frequency Flag  
 Bob Thompson Editor  
 165 N. Clyde Ave.  
 Longwood, FL 32750

**New Ni-cad Battery Technology  
 from Watts Current, Feb. 1995  
 Doug Ward - Lonely Newsletter Editor**

There was a two-paragraph article by Dick Sarpolus in the January, 1995, issue of Flying Models. According to him, there is a new type of Ni-cad which has been developed for military and commercial aircraft. It is called the FNC, or fibrous Nickel Cadmium battery and it has been in development for about ten years. It is already in use on the McDonnell Douglas MD-90 and the Boeing 777.

What's it all mean? It has been reported to have a much longer life, higher reliability, and resistance to extreme environments and applications. Sarpolus goes on to say that



FIGURE 1



FIGURE 2. NOTE CHANGE OF AREA AND SHAPE.



"BURLINGTON AIR EXPRESS"  
 FIGURE 3



"PATRIOT"  
 FIGURE 4



"TRI-COLOR"  
 FIGURE 5



"BIG GRAPHICS"  
 FIGURE 6

the US Army has installed them in 40 of their *Apache* helicopters and to date, they have been in use for over 6,300 hours with no failures or removals. These helicopters previously had to have their batteries replaced after only 35 flight hours before removal for maintenance.

Along the same line of thought, there has been an ugly rumor about the availability of commonly used Sanyo 1700's and 1400's. The original information came to me from Bill McAvoy, and I decided to check further into it.

News like this is not easy to come by, but I asked Kirk Massey what he knew about the situation, and he said that the production of those sizes is likely going to be somewhat limited, as Sanyo is planning to produce cells specifically for camcorders in greater numbers than it does at present.

So we all know what that means: reduced availability and higher prices. Kirk tells me that Sanyo has just increased its prices by 6%, but that he will, through his connections (no pun), be able to maintain his stock. I'm certain he will keep us posted.

### NICAD Black Lead Rot

Anyone who uses NICAD batteries can experience this problem. Sooner or later, the wire connected to the negative end of the cell becomes corroded by a black substance that seems to eat away the copper wires. Because it always occurs at the negative connection, and because manufacturers all use the same colour coding for negative, black, the black wire is blamed.

A popular theory is that the black pigmentation in the wire causes the rot. If this was true, manufacturers would have sorted the problem years ago. Even if they haven't, why are we not experiencing the rot on all pieces of black wire? No, the wire covering is not to blame.

If you examine an affected piece of wire, you will find that the rot extends along its complete length, unless it has only just started. The rot affects the copper wire and seems to lift off the tinning and the solder.

If you look at the chemistry of a NICAD cell, you will find that the internal negative electrode is cadmium, and the electrolyte is potassium hydroxide. On old batteries you will find white crystals of potassium carbonate around the cell nylon insulator, (this separates the positive and negative connectors). The nylon insulator is slightly porous to the electrolyte, and over a period of time some seeps through and is attracted to the negative end of the cell. Please note that under no circumstances does Cadmium seep through the insulator. If it did NICADS would have been withdrawn from use many moons ago.

The electrolyte is electro chemically attracted to the negative end of the cell, and hence the copper on the black lead. Not being a chemist, I am not able to tell you exactly what reaction takes place between the potassium and the copper. I believe that a reducing action takes place, with the copper wire being converted into a black substance which we know as the black lead rot. Anyway, the resulting substance does not conduct electricity very well. Perhaps the chemists

out there amongst you can supply the exact details.

There are ways to stop the rot. I have successfully sealed solder connections with clear silicon rubber. This will last for quite a long time, but eventually the silicon to metal seal is breached. A fellow club member only uses NICADS in a battery holder. He removes the cells at the end of each flying session and discards any cell that shows signs of seepage. The result is that he has no wire rot. (*Using a battery box for Nicads is not generally recommended. km*)

The conclusion is that you should not use cells that seep and **carry out at least an annual wiring check**. If you find any trace of black rot you must replace the complete lead. Note that it not unusual for the rot to cross a connector.

*A note from Ken:* I am sorry that I lost where this article came from, but thought it valuable. I have experienced this "disease" several times with both radio and electric power systems. It is real and it is dangerous! Beware!

### The May Meeting

The May meeting was a real surprise in many ways. We had a great turnout, considering the weather was cool with overcast skies and drizzle. We were also told that the Rushton Rd. Field was no longer a "club" flying field. While we were flying, the owner said that we could, she was on the phone with Howard Kendall, president of Midwest R/C. I saw Howard the following weekend and he has reassured me that the rent has been taken care of and that the "tractor parts dispute" is being taken care of, therefore we do have a field to fly at. **Our next meeting will be at the Rushton Rd. field on Thursday, June 1.**

On Tuesday, June 20th, we are going to have a demonstration/flying night at the Midwest R/C field, located on 5 Mile Rd. This will be a time for us to fly and share our "electric elation" with interested members of Midwest R/C. The field is absolutely great! It is located on the north side of 5 Mile, just west of Ridge Road. It is easily seen from 5 Mile, since it is just off the road. For you freeway riders, if you are going west on M-14, get off at Beck Rd. and go north to 5 Mile, turn left and it is just a couple of minutes down the road.

Final plans for the July meet will be discussed at the June meeting, hope to see you all there.

#### June 15, 1919

Capt. John Alcock and Lt. Arthur Brown completed the first non-stop flight across the Atlantic in a Vickers Vimy bomber.

#### June 18, 1928

Amelia Earhart becomes the first woman to cross the Atlantic