the Ampeer

April 1995 Page 1

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Ampeer subscriptions are $10 a year U.S. & Canada and $17 a year world wide.

The Next Meeting: Thursday, Apr. 6, Dublin Community Center on Union Lake Road, just north or the village of Union Lake, 7:30 P.M.

From Louis Dionne

Hello Ken!

Here' some breathtaking news from up north Quebec (mosquito city - well not quite, I worked, when a student in the James Say area, and there! I really saw some mosquitos; the only thing missing was the second engine).

Some time ago, I went to an R/C store to the north of Montreal and bought an issue of the English magazine "*Silent Flight International*". This is basically for Model Gliders & Electric Soarers. But the issue I bought showed a delta in direction toward Sport Electric, as the editorial said "...we think that the elec-tric fraternity have got more in common with gliding enthusiasts than with any other group, so I guess that we will find space for them as long as they need us." In the April/May 94 issue, they had around 20% about Electric:

Davey Systems Vengeance review (electric soarer)

Sport Electrics (column on rich selection of electric subjects)

Graupner's Junior Acro review (electric soarer)

Watts Up (column on competitive electric flight)

Motor Test column

Before I subscribe I hope to see another issue to validate what I saw. I went back to the same R/C store to get the fol-lowing issue... but the store has closed its business the day before.. talk about timing...

The Sport Electric column talked about KRC and showed several photo-graphs of Keith Shaw's airplanes and a few others (the man has a long reach!). The column included comments on a geared 400 SE-5A bipe from a scratch builder and some pretty impressive photos for the Titan Models' line of Speed 400 or Speed 600 scale ships:

Mustangs on Speed 600 and a version on Speed 400

Spitfire on Speed 600

Lightning P-38 on 2 Speed 600

Me109 on Speed 600

More details and prices can be obtained from Titan Models, 21 Strathmore Avenue, Hitchin, Herts. SG5 ISN. Tel: 0860 716307 (day), 0462 431287 (night).

The Watts Up column discussed low cost pylon racing, Electroslot and shows that an inexpensive geared motor on an inexpensive model can provide competition to high cost cobalt motor and sophisti-cated design.

All in all its seems to be a fine magazine.

They also have a Power Scale Soaring

What's in this issue?

column: amazing scale ships flying without any power source from slopes (Boeing 747, A-4, Wellington and Lancaster, etc.) Light!!!

With the new format (and printer), the Ampeer greatly improved in the look. The content is still great. Although the last issue (August 94) was a biiiiiit thin... as you already know. (Hey - gotta have a vacation some time! km) Apparently, what I wrote previously, seemed interesting... if I judge from the issues of January and February 94 where you reprinted some of my blabla.

I finally decided to buy and build the Puddlemaster from a kit. I am up to the point of covering prepar-ations. I bought an Astro 035 and an Astro 217 speed controller for it. I wanted to stick with a 6 cell power source. This speed controller is very, very small and light. Beware to connect the motor cable to the motor side of the controller or you will end up looking pretty silly... as I did.

I did a few test flights with the 217 and the Astro 035. With a Graupner 7-3, my Astro 035 is drawing 27 Amps (static - Thanks to your gismo). The Graupner 7-3 seems to be a very nice propeller; expensive compared to the APC 7-3 but it gives a better performance in the air apparently (I have to do a bit more accurate comparisons). With an APC 7-4, I was drawing some 31 Amps - a bit to much for my taste. I haven't checked the static Amp with an APC 7-3 on my Astro 035. But I am a bit puzzled by those high readings.

The only drawback I have to report on the Astro 217, is the effects of the other servos moving when running at low speed. Well, I guess that in order to have it so small and cheap - I paid 30 $US at Tower Hobbies - they had to cut down somewhere. This is a frame-rate controller driving only 2 MOSFETs (SMPS60N03-1 OL) on an aluminium plate heatsink with apparently a resistance of only 5 milliOhms, so no cooling is needed at up to 30 A. They say it is good for an 0.010 up to an Astro 25. One interesting feature is that only one power cable is there - the Negative power cable (plus the connection to the receiver). Interesting way to save weight and space. The speed controller is provided with a 100 microFarad condo and a diode to be placed at the motor terminals.

I intend to build and add a small PCB in between the receiver and the Astro 217 to simply regulate the tension and resolve this low speed problem without physically altering the Astro 217. I intend to add the same circuitry I added to the speed controller I had taken from Mitch Poling's book.

Speaking of Mitch... In his July ‘94, he had a very good column, but you read it I am sure. But, let's talk about those charts. They seem to be an important point. It is very easy to get the RPM figures from your airplane and I don't have an elaborate test stand. I can get Amps, Volts and RPM’s without any problems. But thrust is the most important thing with Amps - to my understanding. For a number of motors and a given number of cells, this RPM/Thrust chart tells me how to balance things to get areason-able thrust at a reasonable current - provided I previously measured Amps on those propellers.

I’ve read various minimal comments on the Cermak 05 motor. All I know is:

Less powerful than an Astro 05 but also draw much less expensive
Price of 65 to 70 $US
Shaft of 5/32"
Lighter than an Astro 035
Timing can be adjusted

Is there any more precise and specific data on this thing ? Who sells it, current on various combination of propellers/cells count, or those motor constants.
(Can anyone help Louis with this info? km)

Do you happen to have the motor constants for the Astro 035?(No - not right now. km)

Do you have a CompuServe, Genie account or something like that. I am constantly on Internet and can reach any of those, I guess. I would like to be able to transmit files back and forth to you... My Internet address is:
ldionne@matrox.com
(Maybe by the time you read this - I’ll let you know. km)
Live long and prosper - Louis Dionne
(Thanks for sharing with all of us. km)

News and Ideas from Joe Wagner

135 Waugh Avenue
(P.O. Box 15)
New Wilmington
Pennsylvania 16142

I don't know if any of your gang is into "vintage" electric power -- but if so, I have three out-of-production but new & unused AstroFlight motors I'd he willing to part with. I have two Astro .020 ferrite and one .035 cobalt, plus the Astro battery pack and switch harness which came as part of the ".035 system".

Also new & unused is a Jomar speed controller for the .035.

I'm willing to sell these "antique" electric power items for what I paid for the stuff; and I'll pack and ship (by UPS) free.

AstroFlight's and Jomar 's products have always been first class; and the stuff I'm offering is no exception. I'm only willing to part with it because I just cannot find time to build the airplanes that I bought the motors to fly -- and it doesn't look as if I'll ever get caught up enough here to get back to them.

. . . I have some comments on material in the latest Ampeer; to wit: The "Quick Decal Caper" seems to refer to black linework decals. The same process will produce beautiful full-color decals on Canon color copiers. A special type of reproduction film is needed (different from the B&W stuff) . There's another limitation: you cannot produce a white area in your "Xerographic decal". Anything white in your artwork will come out transparent on the decal. However, you can paint that area on your model white before applying the decal over it.

Most copiers these days (both color and B&W) have

"scaling ability". Thus you can do your "master artwork" just about any size that's convenient to work with; then have it xeroxed to exactly the size you need for your model.

Positioning decals (of any kind) precisely where you want them is easy if you wet the surface of the model with water to which a few drops of liquid dishwashing detergent have been added -- say four drops per cup.

This will let the decal "float" over the wet surface until you have it just right. Then gently squeegee the water out from underneath with your fingers. You don't need to get every molecule of water out; just the major "bubbles". The rest will evaporate in a day or two. DON'T put your model in the sun to dry out the decals fast -- you'll be sorry!

For a protective coating over "Xeroxed decals", use acrylic artists' medium, either gloss or matte as you prefer. It looks like white glue when wet, but becomes transparent as it dries. This stuff is not fuelproof, but works fine for electrics.

On Reinforcing Wing Panels, I've found that Model Magic isn't good to use under iron-on film or fabric, even the low-temperature materials. Model Magic is thermoplastic, and softens a LOT when you iron anything over it.

I used Model Magic to fill in several "clamp dents" on a model that I later covered with Oracover. The filled-in spots looked worse after the covering was done than they did before I filled them -- even though I'd sanded the filled spots so painstakingly they were invisible on the wood before I applied the covering.

Model Magic is also VERY badly affected by dope. On the surface it looks OK, but underneath it turns to roquefort cheese -- as you discover when you try sanding out something like a wing fillet made with Model Magic.

There is a fix for the dope problem: before painting, mop a good wet coat of thin cyanoacrylate over the Model Magic. That seems to provide a dope-proof barrier...

Thanks for your input Joe . . . km

From R.C. "Dick" Miller

I've been busy with the geared version of my motor which is now being extended to stimulate the interest of gumbanders. With a 25:1 reduction, we're swinging an 18" prop at about 1200RPM to put Wakefields into lift. I'll find out how interested the FAC boys are this week at Geneseo, NY.

But I digress. I had written Keith Walker about errors in his plane locator when it was first published:

1) the 2N3904, Q1, is an NPN transistor; both the symbol and text are wrong (unless he's really using a PNP).
2) the servo "IN" and "+" lead locations are reversed on the parts layout for the PCB
3) I can find no listing for the "3580" IC.

Got no response from him. You may want to check it out.

MICRO & MINI ELECTRIC STUFF 6/28/94
from Dick Miller

MMl: Have I got a motor for you!! Operates on ONE to 4 cells!
It's so new, it's not included in the MMR stuff. Weighs 1.25oz. Uses 110mAh and larger cells. This little beauty develops 0.74oz of thrust with 1 cell and 4.70oz with 4! Is this thing great or what? That means it'll fly anything from about 100 sq.in. to 640 sq.in.! (Well, theoretically, anyway). Motor and info, $5 PP

MMlP: Prop combo. MMl and 2-5"x2" props, diagrams, care and feeding info. $7 PP.

MMlCP: Care Package. Such a deal! MM1, 2-5" props, a plug and jack, 2' of wire, 1-each NRSl and NRS2 switches, diagrams, Radio truly; the hardware (K&S tubing #127 and #152, DuBro push rShack info and a new 110mAh Sanyo cell to get you going! $15 PP.

GEARS! WE GOT GEARS! (Don't you just love proper English?) This 4.8:1 reduction permits the MM-l to swing an 8X6 prop! For FF, R/C and FF Retrevial systems up to a pound! (Well, 12oz for pure R/C). The motor and gears are avaiable from yours truly; the hardware (K%S tubing #127 and #152, DuBro push rod #144, nuts and washers) totals about $3 from your local hobby shop.

MGG: Gears, hardware parts list, instructions and data. $2 PP

MGK: Motor, gears, pre-cut hardware and instructions data. $15 PP

MGl: The whole enchilada! Assembled unit including motor, 7" prop and data. $30 PP (An outrageous, rip-off price, but I'd really rather be flying!)

MMR: A complete guide that answers the questions "What motor will fly what plane and for how long?" Characteristics of 19 popular motors from Kenways to 020s! $2 with an SASE; $3, otherwise.

NRSl: A SPDT slide switch that weighs in at 0.8 grams and handles up to 15 Amps at l0V with a 75mV drop. It measures 7/32"x3/4". Mounts via two 5/64" holes on 19/32" centers. $2 PP; 4 for $5 PP

NRS2: A tiny, 0.4 gram SPST slide switch that can switch up to 6A at 6V with a 50mV drop. It's 3/16"x3/8", has "ON-OFF" printing. Mount with C/A glue. Pricey but nicey. $2.50 PP, 3 for $5 PP.

The following items may be available from your local hobby shop at lower costs than I can charge without giving away the shop:

12301-03: Kyosho square tipped 5X2 prop with spinner. Snug on shaft with short pieces of thread placed in its hole; trim excess Fits all 5/64" shafts (DM-20, Radio Shack, etc.). The best prop around for a bunch of mini motors. 2 for $3 PP.

SP-003: This 7", 0.loz SIG prop has been drilled out for the MGl shaft and may not cause it to bend when you crash (but let's not talk about our problems). 3 for $5 PP

Sonic-Tronics #160 motor mount: For all motors (except Kenways, Micro 4s and Mini 6s). Weighs 0.3oz. $7, PP

110 mAh Sanyo Cell: 1/4 oz.; no tabs. 3 req'd for "1/2A Sanyo" event. 3 for $6, PP

Electrical designs come with complete instructions and

are assembled with the ease of the old "Heathkits." They use Radio Shack parts exclusively and require soldering which you may find stressful. Learning to solder isn't going to kill you. True, it'll smart a lot if you grab the wrong end of the iron, but it gets easy if you first practice on scrap material.
"El Cheapo": A simple pocket-size charger for 50-150mAh, 1 to 3 cell battery packs. Parts cost less than $10!! Wiring diagram for plane included. Included with the MMl or via an SASE!
TC-LVI PLANS: A flight pack charger that really works well! Actually reduces the charging time by providing a constant current current for the entire charging period, regardless of the number of cells (up to a maximum of 4). Charging current is adjustable from 0.5 to 1 Amp with automatic shut-off variable from 30 to 300 seconds. The LVI circuit (Low Voltage Indicator) shows you when it's time to recharge your 6-pack. The charger mounts on a standard 6-cell flat pack, has visual indications of charge. Parts cost about $24. Complete assembly instructions, parts list, schematic, layouts, trouble-shooting, operating procedures, cables and, at no extra cost, Theory of Operation! Comes in a plain brown envelope or boxed. $6 PP.
12V-PC: 500 mA to 2A PORTABLE "PEAK" CHARGER with LVI circuitry (this one won't fit in your pocket). For 50mAh to 450mAh packs of 2 to 7 cells. Requires a 12V storage battery of your choice. Also requires a Digital Multimeter (no, you cannot use an analog) and a small metal or wooden field box of your choice. Uses $28 of parts. Appeared in the 10/93 and 11/93 issues of "The Ampeer" and issue #37 of "Electric Flight U.K." (England). $6 PP

Notes: Because of the relatively low cost of the items offered, all sales are final.

User must determine suitability of items for intended use and assume all risk and responsibilities thereof.
All correspondence via SASE.
Dick Miller
193 Huntzinger Road
Wernersville, PA 19565

The March Meeting

The March meeting covered several topics including building on glass, static motor thrust for what?, Ken's new Bipe-E (see photo elsewhere this issue, the Astro Flight Motor book, some info on the new SR Max^{7} and Max^{10} motors and the Kress/ModelAir-Tech Beech D-18 being built by Ernie LaBelle. Ken also had several magazines up for grabs that he had recently archived. Mike brought up the idea that we should have more than one "flying" meeting per month in the summer, and I plan to make this happen.

At the April meeting - revelent motor testing. What matters.

GETTING THE MOST OUT OF FERRITE MOTORS

By Keith Walker

From the E.M.F.of S.O. Newsletter - sorry lost the date!

The motors we are going to discuss here are the ones usually referred to as "can" motors. Generally, these have ferrite magnets, and are described as 075, 05 or smaller. There are several major differences in construction, but all have fairly similar characteristics. They do have some limitations and short-comings, but most of them can be used to fly model planes quite successfully.

Physically, they vary in several ways. The most significant of these is the way the brushes are mounted. We push the motors fairly hard, so the soft carbon brushes wear away quite rapidly. There is not much point in buying a motor that does not have easily replaceable brushes, unless the motor is cheap enough to be thrown awaywhen the brushes wear down. Most of the motors that do not have replaceable brushes were not designed for heavy duty work. They have fairly hard brushes. This increases their life, but makes them unsuitable for the high currents we need to use, because they have higher resistance, and do not make very good contact with the commu-tator, causing arcing and radio interference.

Some motors do not have any means of adjusting the position of the brushes relative to the magnetic field. For the best efficiency, the brushes are moved to advance the timing of the commutator which connects the power to the armature. Generally it is no problem if the timing is fixed, as long as it is set for the direction of rotation you need. It does mean that you can not change your mind at a later date and either add or remove a gearbox without changing the motor too.

The bearings on the shafts of these motors are either metal sleeves or ball bearings. Either will work well with a little maintenance, but ball bearings are a little more efficient, especially at higher speeds.

The mechanical power or torque output of a motor is directly proportional to the number of turns of wire on the armature and the current passing through them. The speed of the motor is proportion-al to the current, but inversely proportional to the number of turns. This causes a bit of a compromise because there is a very limited space for the windings on the armatures of these small motors. This means that the more turns of wire, the thinner the wire has to be, and the less current can be pushed through it.

Most of the energy losses in these motors is heat, caused by the armature current and the resistance of the windings. To make them really efficient, the number of turns can be reduced, and the current increased, but these both cause the speed to increase for a given power out. To run really efficiently, they would have to run at such high speeds, that we would have to use ridiculously small and inefficient propellers. The resultant compromise in the windings limits the amount of current that can be safely used without over heating the motor. This is how the power rating of the motors is established. Usually for an 05 size motor, the power limit is about 100 watts. If you push them much more than this, they will get hot enough to de-magnetize the ferrite magnets. Then they only make good paper weights.

There are a couple of ways of getting around this limitation. The first is by using stronger magnets. The stronger magnetic field has the effect of lowering the speed

for a given number of ampere turns. This means that a motor with sumarium cobalt magnets, which are about three times stronger than ferrite magnets, can be made with less turns, and can therefore be run much more efficiently at higher currents because of the lower winding resistance losses. There is an added bonus, too. Sumarium cobalt magnets will retain their magnetic properties at much higher temperatures than ferrite, so the motors can run much hotter, increasing their power limitations.

The only snag to using sumarium cobalt magnets is that they are expensive, so you will pay four or five times more for a motor using them. Neodymium magnets are even stronger than sumarium cobalt, and are much cheaper to make, but can not be run at quite such high temperatures. Unfortunately, the manufac-turers have not reflected this in their prices to us. They are generally the same price or more than motors using sumarium cobalt magnets.

The other way of getting around the power limita-tions of inexpensive ferrite motors is to use a higher voltage than usual. This results in higher speed and a smaller prop, but if a gear box is used, a larger, more efficient prop can be used. The prop size must be selected to keep the current to about the same as when running on the original specified voltage. If the gear ratio is relatively high, the propeller can be big enough to be very effective, and even look right on a scale model. The gain is from the fact that although the current is the same, the voltage is higher. This results in higher power output at the same motor efficiency. This, by the way, is how such wild claims can be substantiated by the company that markets the "war emergency surplus" motors. There is nothing realty special about the motors. They are just re-specified to run at higher voltages and higher speeds, with a high ratio gearbox. It really does work!

It is important to maintain these motors regularly. If this is neglected, the performance will deteriorate quite rapidly. The brushes are soft, and wear down quickly. This causes most of the loss in performance. The particles of carbon will lodge in the rear bearing. In a sleeve bearing, friction will build up causing wear on the shaft and the bearing. Eventually the bearing will seize, and the motor will be useless. In a ball bearing, the particles will lodge in the races, causing wear and pitting on the balls and the races. Both of these conditions can be avoided by regularly flushing away the carbon particles with a solvent which will not damage the plastic parts of the motor. I use old ashioned lighter fluid. The squirt action of the can will clean a motor without taking it apart. Make sure that you lubricate the bearings after-wards, because the solvent will dry them out. Use a very thin oil. This will penetrate the pores of a sintered sleeve bearing, and will be retained for some time. Thicker oil or grease just sits on the surface, and is quickly lost. Thin oil will also penetrate the seal of a ball bearing and lubricate it. Thick oil and grease will get thicker with time, and clog the bearing. Be careful not to use too much oil, or it will get onto the brushes and commutator. This will form an insulating layer on the them, which will make the motor run very badly. The only thing you can do then is to start cleaning the motor all over again.

You must regularly check the condition of the brushes as they wear down. Make sure that the brush springs are not near or resting on the bottom of the brush holders, because then there is no pressure to hold the brushes against the commutator. Replace the brushes with a new set if this happens. Replacement brushes are generally available from the hobby stores that sell R/C cars. Don't spend a lot of money on them. All of them work okay for us. Make sure at the same time, that there is still plenty of springiness left in the brush springs, and that the brushes are free to move in the holders. If there is any binding at all, there will be loss of power and a lot of sparking. If you are using a gearbox, lubricate the gear teeth regularly with molybdenum grease, even if they are plastic or composition. This will considerably extend the life of the gear teeth.

Don't buy very expensive car motors with ferrite magnets. Their performance is only marginally better (if at all) than the cheaper ones. If you want to spend that kind of money, you may as well buy a cobalt motor and know that you are getting your money's worth. Don't ignore the larger ferrite motors, either. There are some real bargains out there.

AERIAL PHOTOGRAPHY

By Derek Radford

from the E.M.F. of S.O. newsletter - date lost

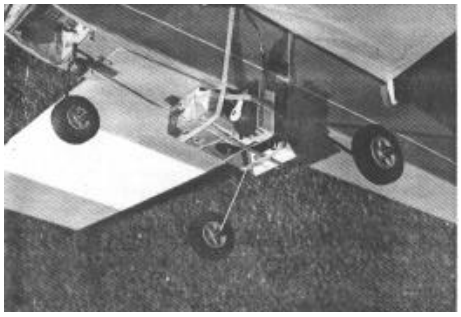
Have you ever wondered what your flying site looks like from your aircraft's perspective? Or like me have you just wanted to try something different? Shortly after moving out here to Vancouver, I found some electric flyers and a great site to fly from. Since I only had one airworthy plane, my PT-Electric, I found a need to do something different with it. That's when I decided to turn it into a part-time camera platform. The unit is simple to build requiring only a dis-posable camera, a servo, a few rubber bands and some foam. Your camera ship should have some extra power available and preferably landing gear.

The camera unit I used for my first flights was a Fuji Quicksnap, which is loaded with 400 Speed film. I'm sure the Kodak equivalent would work just as well. Don't bother with the flash version, as the range is limited to a few feet and just adds extra weight. Also stay away from the panorama version. The negative frame is the standard 35mm width but the camera only exposes a narrow centre band. The major drawback to the disposable camera is that you can only take one picture per flight. During my exper-imental flights I managed 3 medium altitude shots for each battery.

Attach a servo to the top of the camera using tape and/or rubber bands in such a way that the servo arm will trip the shutter when activated. I used the gear retract channel, although any unused channel will do. Very little pressure is needed to trip the shutter, so any size servo will work. I used a standard size as I had extra. The unit pictured weighed about 5 oz. With the next camera, I removed the cardboard cover and reduced the unit weight to 4 oz. Using a micro servo would bring the weight down even more.

Eliminating the cover also eliminated the buzzing noise it made in the prop wash. You should cover some of the open areas on the exposed camera body with packing tape to keep dirt out.

Attaching the camera to any high wing aircraft is very easy. I was able to securely mount it by wrap-ping 2 #64 rubber bands around the fuse and camera before I attached the wing. The camera is held snugly, especially if a piece of foam is placed between it and the fuse. I have experimented with 2 positions, under the fuselage pointing straight down and under the wing pointing horizontally. The under-fuse position is desirable because the camera can be placed directly under the balance point, however, the under-wing position produces better pictures. They resemble, very closely, the view out the window of a plane, especially if part of the wing is visible in the shot. Both positions produce the same amount of drag, but you may have to add some rudder trim when the camera is underone wing. Don't forget to clean the lens between flights. I recommend that prior to taking the picture, you throttle back or turn the motor off. This will eliminate the prop wash and vibration acting on the camera (as electric flyers, we should have little or no vibration anyway!). Slower airspeed will also reduce vibration, so near stall speed is recommended. The amount of bank you put the plane in will determine the framing, so experimentation will yield results that are most pleasing to you. With careful planning and steady formation flying, air to air photographs can be taken. You don't have to fly too close together to obtain acceptable results.



Most of all, have fun with it. It may seem that 24 frames can take a long time to finish but the results will be well worth all the work.

ELECTRIC MOTOR HANDBOOK, by Robert J. Boucher, AstroFlight, Inc. Available from AstroFlight, Inc.13311 Beach Ave Marina Del Rey, CA 90202 And from SR Batteries - Reviewed by **George M. Myers**, 11/1/94, Published in the Jan. 1995 issue of *Silents Please*, edited by Don Mott

Subtitled "The Complete Handbook of High Performance D.C. Motors," I believe that SEFLI should adopt this as the official SEFLI handbook, or use it as the section of our handbook that describes electric motors. I bought my copy at KRC in September and have been learning from it ever since.

Ten chapters and two appendices cover "Understanding Motors," "Measuring Motor Constants," "Timing motors for Sparkless Commutation," "Pro-pellers," "Speed Controls," "Ni-cad Batteries," plus specifications and graphs for the various AstroFlight Cobalt motors for 1994.

It's worth nothing to the person who doesn't read it. The rest of us should read it from front to back, slowly. No matter how much you think that you know, I guarantee that you will find enlightenment.

If you want to design an airplane, this book will help you to select a motor and to treat it properly. The Airplane design effort wants more help. I recommend the USR&D program for DOS computers named AERO*COMP for preliminary estimates. Detailed design will require a spreadsheet for Weight and Balance calculations and additional help for Stress Analysis, plus instruction in Materials and Construction Techniques. Naturally, that points directly to my book, "Computers in the Hobby," which isn't finished, yet.

VCT or Visual Count Tack

from Flightline - Aug. '94

Now, when it comes to tachometers there are many models to choose from, some are digital, some have dials, and all have batteries. They all work well, but at times they do break down. Here's a solution to this break-down problem. Learn the technique of the Visual Count Tack (VCT). This method has many advantages over the other devices, it is cheaper and more trustworthy. In the many years of using this method, I have never had a reading that was incorrect, and found that Stan Miller's tack, many times, to be incorrect. Here are some tips that will make this process easier.

1) Paint only one blade tip, painting two will cause problems if your math is poor (if two are painted you will have to divide by two, or what is even harder is that you will have to count only every other one)

2) Clean your glasses, and lower the bill on your hat

3) Pay close attention to what you're doing (don't use your finger to aid in counting, it's too slow, and you may stick it into the prop)

4) Don't let anyone disturb you

5) Practice, practice, practice

6) Count for one minute, but if you are good at math, you could count for only 15 seconds and multiply by 4

Instructions

1) Focus your eyes on the area that the propeller is spinning.

2) Visually look for the one tip that is spinning.

3) Increase the RPM slowly, doing this too fast will cause you to lose count.

4) Keep your face as far away as possible from the propeller, too close can cause you to go cross-eyed, or worse, you could lose your nose.

5) Start counting, after one minute your number is the actual RPM that your motor is turning.

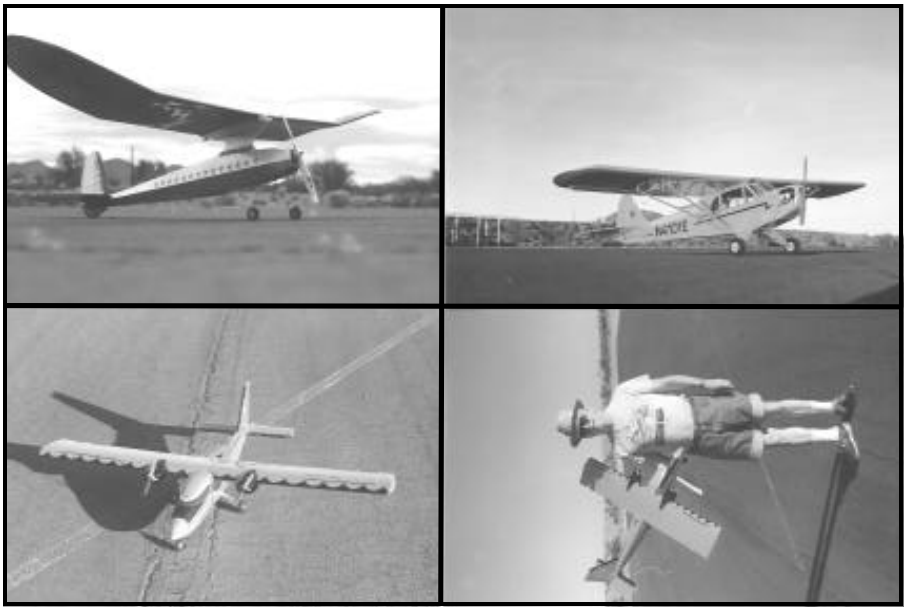
Now isn't that simple! There have been times that I have found this to be helpful at the field. No one can come up to you and read your tack while you are checking your RPM. Only you know, and if anyone asks, you just feed them some bull! (What month is this? gotcha!)

Steve Gurley's Airforce
1104 E. Campus Dr.
Tempe, AZ 85282-3913

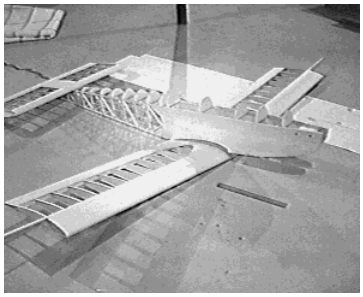
Steve writes: Here are some snapshots of some of my "airforce". The cub is a Goldberg Anniversary Cub with a Cobalt 25 swinging a 12 X 8 prop and powered by 22 SCRC 1700 Mall cells. It will fly for about 7 minutes with much of the flight being at half throttle. It will easily take off at half throttle. The Playboy is my AULD airplane and is powered by an Astro 05 geared. The Twin is Graupner's Partanavia P-68 and is powered by 2 Speed 400 6 volt motors and 7 1700 or 1400 Mall cell packs. It is a little shaky on take off because of no steering, but once airborne it will do most of the IMAC sportsman aerobatics. I added ailerons because I didn't like the rudder only concept. The other one is a converted Aerostar 20, powered with a Cobalt 15 geared motor driven by 12 SCRC cells. It will fly for over 10 minutes as long as I don't push it to full throttle all the time. It's swinging an 11 X 7.5 Zinger prop. I really enjoy the Ampeer!! Keep up the good work.

Thanks for the kind words. Steve and his planes appear on the next page. He CD'd Arizona Model Aviators' electric fly in December. If you get to the southwest, you'd probably want to look him up.

Sorry the picture of the Aerostar 20 in flight was a bit small.



Ken's Bipe-E under construction in the Skunk Works. The dark black line on the floor is a 12" ruler. Top wing not shown in the photo. More to come.



Don't Forget Toledo April 7, 8, 9!!!