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Ampeer subscriptions are \$10 a year US & Canada and \$17 a year world wide.	The Next Meeting: Date: Thursday, Feb. 3, 2000 Time: 7:30 Place: Ken Myers's House – see above	

What's In This Issue:

TwinStar & Foamie Rating – New E-flier – Corrections – E-history – N.E. Elec. Tech Fair – Batteries---Watts UP? - Power Systems for Electric Aircraft – Part 2 – January EFO Meeting

TwinStar and Blue Foamie Ratings

From: George Scrimshaw
bifrost@juno.com

TwinStar: Highly recommended. **** (4 Stars)

A nice, easily assembled foam twin motor flyer with two S400s (supplied) and props (Gunther--they look like toys but their ability is nothing short of remarkable). Built stock, but with the Multiplex duo ESC to run both motors. With a 7 cell pack it flies well and is mildly aerobatic; with an 8 cell pack it comes alive. Easily hand launched, very durable (on one launch by a club member, he launched straight UP--it got up about 15 feet and, of course, came straight down. Damage was a slightly dented nose and a broken half stabilizer, which was easily repaired. Easy to fly, even in somewhat windy conditions --8-10 knot winds. Easy to land.

Blue Foamie (Pat Mattes): Highly recommended. FUN!!! **** (4 stars).

Inexpensive. Simple boxy fuselage and flat bottom wing. Unusual assembly--wing is taped together, motor (s400) is squeezed

into a trough in the fuselage and taped in place. Behind it are the ESC, battery, receiver and two servos on top of the rear fuselage with rudder and elevator of sheet balsa. All hinging is with strapping tape. Everything works better than you would imagine. A great flying machine! I used a Gunther prop--the small white press-on type--and am constantly amazed at how well it works!



EPP Focke Wulf

The photo of the S&B EPP Focke Wulf that was mentioned in the January 2000 issue. See that issue for details and availability at Markys Hobby Shop.

Ampeer

A Happy New E-flier

From: Armand Francoeur email: afran@ix.netcom.com

Hi Ken,

I have several flights on the Sig LT40 using the Astro Flight 40G that you recommended. I am using 20 Panasonic 3000mAh cells and getting 15-20 min flights. You are right -- no one believes it is not an internal combustion powered aircraft!!

I am sold on electrics and in the process of selling my fleet of glow planes. Long live EP!

Thanks for the help, Armand

Glad I could be of help, and I'm very pleased that you are so satisfied. KM

Corrections and Additions to Part 1 of "Power Systems for Electric Aircraft"

Ignore the motor data at the end of Part 1. New information appears in this issue. After checking with Keith, DO NOT even think about running the Astro Flight brushless 020 with 10 cells and using the BEC.

The Astro Flight 215D/217 data should not have been lumped together in the R/C components table. I weighed the 215D with power wires and radio connector, as supplied. It is 0.6 ounces. I reweighed the Astro Flight 217D with power wires and radio receiver connector, as supplied. It weighed 1 ounce. Anderson Power Poles/Sermos connectors weigh 0.1 ounce per pair. Please add that data to your table.

All tables are subject to updates and can be viewed and printed from the EFO website at <http://members.aol.com/KMyersEFO>.

If you do not have WWW access, please send me a SASE, and I will send you the most recent table updates. All tables will be updated as time permits and information changes.

**Indoor R/C Fun Fly
May 19-20, 2000 at the
Southwestern
Aeromodeling
Conference**

**Arlington Texas Convention Center
1200 Ballpark Way
AMA Members Only!
Balloon Bust, Carrier Landing, Limbo,
Aerobatics, & More
Contact: Bob Wilder
817.498.6316
Come be a part of this fast-growing
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A Celebration of Electric Flight

SILENT ELECTRIC FLYERS of SAN DIEGO

announces the third annual

MID WINTER ELECTRICS

February 11, 12, 13, 2000

Flying events included: Old Timer Pylon Racing, Sp400 F5B Racing, Sp400 Pylon Racing, Dragonfly Pylon Racing, LMR Glider Toss, Scale Flight and Exhibition

Friday, February 11, 2000 evening there will be an Electric Flight Symposium at the San Diego AeroSpace Museum.

Saturday, February 12, 2000 evening a Mexican Feast a get-together at Marina Village, less than a mile from the flying site.

And don't forget:

Dealer Booths, Event Tee-shirts for \$12, Great Raffle

Come fly with us and visit LEGGOLAND, just 45 minutes north on Interstate-5. Don't forget the San Diego Zoo and the Wild Animal Park, the AeroSpace Museum, and the world famous beaches along with Mission Bay Park. Our flight site is within walking distance of Sea World Park.

Visit our web site at <http://sefds.org> for details or contact, Don Wemple, at DonK126@aol.com or call (619) 469-5566.

Electric History

From: Dale Wilde

Email: Wildenm@cs.com

Hi Ken,

I thought you might be interested in this bit of history. I was looking through some of my old model magazines and found this ad for electric flight. It's from Air Trails, 1960 Annual. It looks just like some of the schoolyard stuff sold today at more than an order of magnitude in cost.

Dale

I trimmed part of the page. The supplier was Associated Hobby Mfrs., Inc., Dept. AT 60, 1240 Gilbert Rd., Meadowbrook, PA. I believe that it is same AHM that may still be around. If anyone else has other ads or any knowledge about our e-past, please share that information with us all. This kind of information will go well with the "That Was Then - This is Now" series of articles to be presented here in the Ampeer. KM.

N.E. ELECTRIC TECH FAIR

Via Silents Please, Dec. 1999

Editor: Frank Dellamura email: fdellamura@aol.com

Tom Hunt updated the news regarding the proposed Northeast Electric Aircraft Technology Fair event (replacing the KRC event [as a major east coast event KM]).

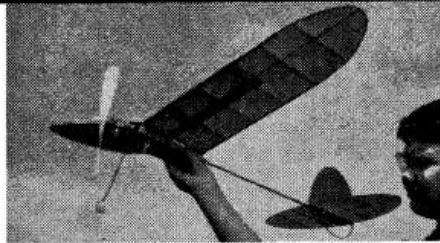
Tom reported that initial responses from the KRC club leader was not to share their data base with the new organizers, but the club (later) voted to provide the data.

Gordy Cells

From: Gordy Stahl GordySoar@aol.com

I have plenty of Gordy Cells right now, just for your information :-)

Gordy Stahl
9303 LeBeau Ct
Louisville Ky 40299
502-491- 5001

VALUES PLUS QUALITY! TVBFL* from am**TK-1 ELECTRIC MOTOR PLANE KIT**

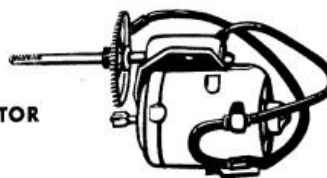
Kit contains full size plans, carved leading edges, finished prop, formed landing gear, fully shaped and sanded fuselage, perfection cut ribs, fuses, timer bands, Japanese tissue (natch).

\$2.98 Complete**SHORT SUNDERLAND III**
19" W.S. by AIRFIX—World-Famous
Maker of Plastic Model Airplane Kits
in 1/72 CONSTANT SCALE

The latest in the fabulous AIRFIX line! Short Sunderland, famous R.A.F. sub hunter-killer. Famed for guarding convoys and rescue operations. Complete with rotating turrets, elevating machine guns, rotating props, sliding bomb carrier and bombs, moving ailerons, decals, and full instructions to make the most detailed and elaborate model you'd ever want! A tremendous model!

\$2.98

**AP-35
BATTERY
POWERED
ELEC. MOTOR
\$2.49**



The **FIRST NEW** innovation in model airplane power since the gasoline engine

No muss, no fuss, no fuel to spill. Always instant starting. Kit contains motor, motor mount, mounting screws, battery case, battery case holder, fuses, timer bands, gears, nylon spinner, brass mounting nuts and bolts.

**THE SPECTACULAR
PROPER PROP**10x6 and 9x6 **ONLY 49c ea.**

PRACTICALLY INDESTRUCTIBLE. Terrific in performance . . . sensational in price! Acclaimed by top U.S. stunt flyers. Made of finest Nylon.

Joe Becker, organizer of the War bird Meet, found a suitable area that might be available for event in Goshen, New York. The owner of a resort in Goshen expressed interest.

Tom reported that Bill Steincamp (Allentown airport manager) is confident that the airport authority will either control the airport or receive the property from the town. A site decision may be made before the WRAM Show in February.

And from a Personal Note from Bob Aberle

On a positive note Tom Hunt and I, along with the help of Joe Beshar have located a wonderful flying site in central New York State to be used as a replacement for the traditional KRC Show. It will be held the same time next year, like Sept. 22, 23 & 24, 2000. The place is a campground called Peaceful Valley at Do wnsville, NY, Exit 90 off RT-17. It is about 60 miles south of Binghamton, NY. The field is about equal in size to Allentown and about three times as big as the old Buc-Le field in Quakertown. Best of all it is a campground with bathrooms and showers on both ends of the field. The grass area has no rocks at all and will be cut like a golf fairway. We are keeping our fingers crossed. Boy if you could only sneak out of school for a few days!

Batteries---Watts UP?

by Carl Schwab

via Silents Please, Silent Electric Flyers of Long Island
newsletter, Sept. 1999

INTRODUCTION

E-powered flight is entering exciting times. New (not really new, but enjoying exposure) battery technologies promise much better performance.

Where we are now?

What we have now are Nicad, NiMH (nickel metal hydride), Li-ion (lithium ion), Li-M (lithium metal), shortly Li-Polymer and eventually others. We are all familiar with Nicad technology, which now has been around with, first the sintered and later the porous anode, for approximately 45 years. The technology is VERY mature and, to date, is still king of the hill for extreme discharge rates. Unfortunately the hobby group is about the only one interest dimensions

1. Nickel-based technologies produce cells that average about 1.2 volts per cell, while being discharged. This has made the idea of measuring capacity in mAh (milliamp hours) useful.

Lithium Cells

2. When you go to Lithium, it's a different story. MAh is misleading and confusing. So, the Li battery people use watt-hours or whr for short. I suspect you will see RC suppliers turning to this terminology as the lithium -based battery use increases.

Example: Comparing a AA Ni cell rated at 800 mAh to a AA Li cell rated at 800 mAh, shows that they are nowhere near equal in the whr department. In the first case $1.2 \times .8 = .96 \text{ whr}$ while in the second case it is $3.0 \times .8 = 2.4 \text{ whr}$. Clearly the Li cell has about 2.5 times the Watt-Hour capacity of the Ni cell (*Due to the higher voltage of the Li cell. GMM.*)

Li-ion is more expensive than NiMH, BUT has a better performance in the number of "charge-discharge cycles without capacity loss" than any of the nickel technologies. Also, better shelf life (charged), and no memory effect (only Cd cells have that). The ability to take many charge-discharge cycles without reduced capacity is a major advantage of Li-ion: That's why it's popular in the computer and PCS markets. It's also attracting considerable attention in the full size E-car market.

In the battery business you see the terms "whrs per liter" (whr/l), and "whrs per kilo gram" (whr/kg) used to assess the potential of various battery technologies.

When you compare the whr/kg for any Li cell to any Ni cell the Li cell wins, because Li is lighter than Ni.

(When I went to buy some Li cells, I was told that the manufacturers are holding back on retail sales. When I went on the Internet, I found out why: Lithium is poison and has bad interactions with many heart medicines. GMM)

Nickel-Metal Hydride cells

We have skipped over NiMH, which should not be taken so lightly. The rechargeable battery market is dominated by hand-tools, computers and personal devices such as cell phones and camcorders. LAST, but not least, are full size E-cars. Notice that E-power hobbies aren't even mentioned.

The hand-tool, computer and PCS (personal communication services) look for best battery performance based upon 1 hour use per charge. E-flight is interested in 6 to 12 minutes. So, let's introduce a term that seems familiar "C".

3. "C" refers to cell capacity BUT it also refers to the constant discharge current that will take a NiMH cell down to 1.0 VDC in 1 hour. (*I was able to buy a NiMH pack and get the English translation Engineering Manual. GMM*)

Let's say we want an 8 minute motor run and we know that our motor/propeller draws 8 amps from six NiCds. We can estimate the "C" rating needed for 6 LiMH cells by calculating $8\text{amps} \times 8/60 \text{ hrs} = 8000\text{ma} \times .133\text{hr} = 1067 \text{ mAh}$. Discharge rate will be $8000/1067 = 7.5\text{C}$. From the charts: Capacity diminishes about 5% per multiple of C, to 3C. We're already off the chart, but we can approximate that we need six LiMH cells rated about $7.5 \times 5\% = 38\%$ higher. $1067 \times 1.38 = 1472 \text{ mAh}$ to run 8 min. at 8 amps. Pick the next larger cell, "C" = 1500 mAh.

(High discharge currents reduce cell capacity by losing energy to heating the cell. (whr stored - whr heat = whr avail)).

Hand-tools, computers, camcorders and PCS are nominally C applications. For us to extend that to 5C and 10C is, literally, a stretch, BUT Nicads have accommodated us. NiMH is trying to accommodate us, and will get it done, in spades (eventually). NiMH has intrinsic advantage over Nicad in the whr/l and whr/kg categories AND

is toxin free (no cadmium). NiMH cells have been around a while and will become more plentiful, eventually replacing Nicad in the hand tool market (I think).

E-Cars

The full size E-car market has some similarities to E-power flight. Car makers are interested in FAST charge-discharge AND repeated charge-discharge cycles.

The braking system of an E-car is called "regenerative," meaning that the momentum of the car spins the motor as a generator, to recharge the battery (at very high currents).

Acceleration is provided by battery power, again requiring high currents. E-car engineers are not interested in 500 cycle life. They want literally thousands of charge-discharge cycles. They are looking for 35,000 mile battery life.

E-car manufacturers are investing heavily in Lithium technology and have had some success with Nickel Metal Hydrides, which makes me believe that, for our purposes, NiMH will eventually displace Nicad.

It is an EXCITING time! *Carl Schwab*

Power Systems for Electric Aircraft – Part 2

By Ken Myers – January 2000

In **Part 1**, it was shown that the main determinant for the required power system is based on the finished airframe weight. The "**Completed Empty Airframe Weight**" table indicates what the other parts of the aircraft should weigh to reach a target weight equal to three times the battery weight.

Tables take up a lot of space, but are a good quick reference when no calculator is at hand. Here is the math to use to create an individual case for the completed airplane.

airframe weight * 0.95 = battery weight

aircraft weight = battery weight times three

motor weight¹ = battery weight times 0.5

R/C component weight² = aircraft weight – airframe weight – battery weight – motor weight

1. Motor weight – as motors get physically larger and heavier, or more efficient, the motor weight can be less than the multiplier of 0.5. The weight savings can be used to carry a heavier airframe or heavier R/C components.

2. R/C component weight – with a battery weight of 25 ounces or greater there is excess R/C component weight that can be used to increase the number of functions with items like flaps and retracts or the acceptable airframe

weight can be increased.

How Does This All Come Together?

Using the new ElectricCub II as a typical example: Advertised finished weight using a 7-cell pack is 3.25 (52 oz.) to 3.5 lbs. (56 oz.). Estimated finished airframe weight = 56 – 14 oz. battery – 9 oz. geared 05 – 11 oz. radio = 22 oz. finished airframe weight. (It would be nice if the manufacturer gave this instead of finished aircraft weight for all types of models.)

Using the "**Completed Empty Airframe Weight**" table yields:

Battery Wt.	Total Wt.	Motor Wt.	R/C wt.
21.2 oz	63.7 oz.	10.6 oz.	9.6 oz.

Using the math yields:

Battery Wt.	Total Wt.	Motor Wt.	R/C wt.
20.9 oz	62.7 oz.	10.45 oz.	9.4 oz.

Determining Whether the Model is Worth Attempting?

Use the "**Completed Empty Airframe Weight**" to determine the expected finished weight of the model. For the example of the ElectricCub II, with a 22 oz. completed airframe weight, that would be about 63 ounces.

With an expected finished weight of about 63 ounces, the wing loading would be 471.5 sq.in. / 144 (the number of inches in a square foot) = 3.27 sq.ft. and 63 oz. / 3.27 sq.ft. = 19.27 oz./sq.ft. This is at the high end of Keith Shaw's recommended range for this type of aircraft.

Figure the Battery Cell Count

From the information given in **Part 1**:

21 oz. / .7 = 30 500AR/600AE

21 oz. / 1 = 21 700AR/800AR

21 oz. / 1.5 = 14 1000SCR/1250SCR

21 oz. / 2 = 10.5 1400SCR – RC2000

Use the Table of Motors to Select the Motor

(table found at the end of this issue)

In **Part 1** there were some motor examples given as a guide for some of the smaller aircraft. The "**Motor Table**" provides more examples of typical motors.

When selecting a motor, it must meet three criteria. The first is the number of cells. The second is the maximum weight of the motor. The third is the minimum prop diameter for the airframe weight.

The number and types of cells are noted above. Checking the "**Completed Empty Airframe Weight**" table and using a 22 oz. completed airframe weight shows a minimum prop diameter of 9 inches and a maximum motor weight of 9.6 ounces, including any gearbox.

The power system choices for the aircraft can now be considered, in this case, the ElectricCub II.

The table printed in this issue does not show any battery packs with over 20 cells. Beginners to electric flight are unlikely to choose a system larger than 20 cells to start with. More motors and cell combinations will be added to the table as time permits. The “**Motor Table**” will be updated on the EFO site, and available to *Ampeer* hardcopy subscribers via a SASE, when it becomes available.

14-cell Combinations For the ElectriCub

Using the “**Motor Table**” it can be seen that the Astro Flight 05 7T (\$138 w/gearbox), Astro Flight 1 \$138 w/gearbox, and MaxCim MaxN32-13D \$217 w/gearbox meet all of the criteria.

10-cell Combinations

When the math was worked for the number of batteries, it came to 10.5. Because of the type of aircraft the ElectriCub is, 10 cells were chosen. Had it been a higher performance plane, 11 cells would have been chosen.

The following meet the criteria: Graupner Speed 500 Race 7.2v #1789 \$35 w/gearbox, Astro Flight 035 7T \$138 w/gearbox, Master Airscrew 05 \$35 w/gearbox, Graupner Speed 600 BB SP 7.2V #6311 \$46.50 w/gearbox, Kyosho Magnetic Mayhem (reverse) \$38.5 w/gearbox, Aveox 1406/2Y \$184 w/gearbox, Astro Flight 05 7T \$138 w/gearbox, MaxCim MaxN32-13 \$217 w/gearbox, and Great Plane Goldfire \$68 w/gearbox.

Final Considerations for the Power System

All of the motor, gearbox, prop combinations selected draw approximately 25 amps. Because the 14-cell choices would have to use 1000SCR/1250SCR batteries, the 10-cell packs would be a better choice since they can be RC2000s, which will yield a much longer flight time.

Remember that the prop dimensions are a “guide.” The goal is to try and get the anticipated amp draw by adjusting the prop pitch while staying within the recommended prop diameter for the battery/motor/gearbox combination.

Which motor?

The Kyosho Magnetic Mayhem reverse with the Master Airscrew gearbox with the 2.5:1 reduction ratio would be the first choice based on price and performance. It is already reversed timed and therefore does not require retiming of the motor for reversed rotation or using a reversed pitch (pusher) prop. Selection of reversed pitch props is limited.

What R/C components?

22 oz. completed airframe weight plus 8.4 ounces for

the motor and gearbox plus about 22 ounces the battery pack of Sanyo RC2000 with wire and connectors equals 52.4 ounces. With a target weight of about 63 ounces, that leaves 10.6 ounces for the R/C components. A standard radio receiver with three standard servos, 600mAh receiver pack and Astro Flight 217D would work. I would recommend spending a little more for a glider version of the Hitec Flash 4, which comes with the 555 receiver, two HS-81 servos, and 270mah receiver pack. With the purchase of another HS-81, you’d have a very adequate “small” 4-channel system to use in smaller planes at a future date. That would bring the total weight of the R/C components to about 5.5 ounces, reducing the planes total weight to about 58 ounces and a wing loading of 17.7 ounces. That is well within Keith’s recommended range for this type of model.

Support Equipment & Other Tips

As noted earlier, two of the beginner’s first purchases should be a voltmeter and Astro Flight Super Whatt Meter. A good charger is essential! Don’t settle for anything less than an Astro Flight, Robbe or Shultz. Good connectors are required. Sermos, Anderson Power Poles, Astro Flight and the “bullet-type” sold by Aveox are essential in not wasting the power that you’ve tried so hard to achieve. Select true aircraft electronic speed controls. Don’t try to use a “car” controller. You can be “frugal,” but don’t be cheap!

Wrapping It Up

By following the recommendations in the tables and this series of articles, a successful electrically powered aircraft can be easily achieved by anyone following the guidelines. Is it the only way to do it? No. Planes can fly pretty well with less power than is recommended by the use of the tables, but the tables simplify the selection process and will work very well with the types of aircraft defined at the beginning of this series.

Be sure to read the electric columns, reviews of electric products and planes and the electric construction articles in the R/C magazines. Visit the electric flight sites on the World Wide Web and keep following the *Ampeer* to see what really works.

Name:	Wt.	# cells	Ratio	Prop(s)	Amps	Mtr. Eff	Price
Graupner Speed 500 Race 7.2v #1789	5.8	6	1:1	7x5	25	64%	\$18
Astro Flight 035 7T	6.5	6	1:1	7x4	25.5	75%	\$94
Graupner Speed 400 6v	2.6	7	1:1	5.5x4.5	11	60%	\$8.50
Graupner Speed 400 7.2v	2.6	7	1:1	7x4	10.5	50%	\$8.50
Graupner Speed 480 Race 7.2 #6330	3.7	7	1:1	5x4	15	65%	\$21
Kyosho AP-29	5.45	7	2.57:1	8x6	16	69%	\$62 w/gearbox
Graupner Speed 500 Race 7.2v #1789	5.8	7	1:1	7x4	27.5	65%	\$18
Master Airscrew 05	6.9	7	1:1	7x5	25	63%	\$35 w/gearbox
Graupner Speed 600 BB SP 7.2V #6311	6.9	7	1:1	7x3.5	26.5	65%	\$30
Kyosho Magnetic Mayhem	6.9	7	1:1	7x5	25.5	64%	\$22
Aveox 1406/2Y	6.9	7	1:1	6x3	25	84%	\$149
Aveox 1406/3Y	6.9	7	1:1	8x4	25	82%	\$149
Aveox 1406/4Y	6.9	7	1:1	9x7	24.5	76%	\$149
Astro Flight 05 7T	7.5	7	1:1	7x6	25.5	76%	\$107
Astro Flight 035 7T	8	7	2:1	9x7	24.5	78%	\$144 w/gearbox
Graupner Speed 400 6v	2.6	8	1:1	5.5x4, 6x3	12	62%	\$8.50
Graupner Speed 400 7.2v	2.6	8	1:1	6x5	10.7	55%	\$8.50
Graupner Speed 480 Race 7.2 #6330	5.45	8	2.57:1	9x5	15.5	67%	\$61 w/gearbox
Aveox 1406/4Y	6.9	8	1:1	9x5	25	78%	\$149
Graupner Speed 500 Race 7.2v #1789	7.3	8	2:1	9x6	24.5	72%	\$68 w/gearbox
Astro Flight 15 10T	7.5	8	1:1	9x6	26	72%	\$107
Astro Flight 035 7T	8	8	2:1	9x5	24.5	79%	\$144 w/gearbox
Graupner Speed 600 BB SP 7.2V #6311	8.4	8	2:1	9x6	25	70%	\$80 w/gearbox
Kyosho Magnetic Mayhem (reverse)	8.4	8	2:1	10x6	25	69%	\$72 w/gearbox
Aveox 1406/2Y	8.4	8	2.38:1	9x6	25	86%	\$184 w/gearbox
Master Airscrew 05	8.8	8	2:1	10x6	24.5	67%	\$85 w/gearbox
Astro Flight 05 7T	9	8	1:1	7x4	25	78%	\$107
Graupner Speed 400 7.2v	2.6	9	1:1	6x4	11.4	57%	\$8.50
Graupner Speed 400 6v	3.5	9	1.72:1	7x4	11	68%	\$30.50 w/gearbox
Graupner Speed 480 Race 7.2 #6330	5.45	9	2.57:1	8x6	15.5	70%	\$61 w/gearbox
Aveox 1406/4Y	6.9	9	1:1	8x6	25	80%	\$149
Graupner Speed 500 Race 7.2v #1789	7.3	9	2:1	9x5	26	73%	\$68 w/gearbox
Astro Flight 15 10T	7.5	9	1:1	8x6	25	75%	\$107
Astro Flight 035 7T	8	9	2.38:1	9X7	25.5	80%	\$138 w/gearbox
Graupner Speed 600 BB SP 7.2V #6311	8.4	9	2:1	9x5	27	71%	\$80 w/gearbox

Name:	Wt.	# cells	Ratio	Prop(s)	Amps	Mtr. Eff	Price
Kyosho Magnetic Mayhem (reverse)	8.4	9	2:1	9x7	26	71%	\$72 w/gearbox
Aveox 1406/2Y	8.4	9	2.38:1	9x5	26	85%	\$184 w/gearbox
Master Airscrew 05	8.8	9	2:1	9x7	25	69%	\$85 w/gearbox
MaxCim MaxN32-13D	9	9	2.5:1	10x6	25	85%	\$217 w/gearbox
GP Goldfire	9.3	9	2:1	10x5	26	70%	\$68 w/gearbox
Graupner Speed 400 7.2v	2.6	10	1:1	5.5x4	11.4	61%	\$8.50
Graupner Speed 400 6v	3.5	10	2:1	7x5	11	70%	\$30.50 w/gearbox
Graupner Speed 500 Race 7.2v #1789	7.3	10	2.5:1	9x7	25.5	76%	\$35 w/gearbox
Astro Flight 035 7T	8	10	2.82	10X6	25.5	81%	\$138 w/gearbox
Master Airscrew 05	8.4	10	2.5:1	10x7	24.5	71%	\$35 w/gearbox
Graupner Speed 600 BB SP 7.2V #6311	8.4	10	2.5:1	9x6	25	75%	\$46.50 w/gearbox
Kyosho Magnetic Mayhem (reverse)	8.4	10	2.5:1	10x6	25	74%	\$38.5 w/gearbox
Aveox 1406/2Y	8.4	10	2.82:1	9x6	25	85%	\$184 w/gearbox
Astro Flight 05 7T	9	10	2.38:1	10x8	25.5	80%	\$138 w/gearbox
MaxCim MaxN32-13D	9	10	2.5:1	10x5	25	85%	\$217 w/gearbox
GP Goldfire	9.3	10	2:1	9x6	26	73%	\$68 w/gearbox
Graupner Speed 400 7.2v	3.5	11	1.72:1	7x5	11	65%	\$30.50 w/gearbox
Astro Flight 035 7T	8	11	2.82	10X5	26	82%	\$138 w/gearbox
Master Airscrew 05	8.4	11	2.5:1	10x5	25	73%	\$35 w/gearbox
Kyosho Magnetic Mayhem (reverse)	8.4	11	2.5:1	10x5	26	75%	\$38.5 w/gearbox
Aveox 1406/2Y	8.8	11	2.82:1	9x5	25.5	86%	\$184 w/gearbox
Astro Flight 05 7T	9	11	2.38:1	10x6	24.5	81%	\$138 w/gearbox
MaxCim MaxN32-13D	9	11	2.5:1	9x6	25	86%	\$217 w/gearbox
GP Goldfire	9.3	11	2.5:1	10x6	27	74%	\$35 w/gearbox
Graupner Speed 400 7.2v	3.5	12	1.72:1	7x4	11	67%	\$30.50 w/gearbox
Astro Flight 035 7T	8	12	3.69:1	11X6	25.5	83%	\$150 w/gearbox
Master Airscrew 05	8.4	12	2.5:1	9x6	25	74%	\$35 w/gearbox
Aveox 1406/2Y	8.8	12	2.82:1	9x5	28	87%	\$184 w/gearbox
Astro Flight 05 7T	9	12	2.38:1	10x5	25	82%	\$138 w/gearbox
MaxCim MaxN32-13D	9	12	3:1	10x6	26	86%	\$217 w/gearbox
GP Goldfire	9.3	12	2.82:1	10x6	26	77%	\$53 w/gearbox
Astro Flight 25	11.8	12	1:1	10x5	25	75%	\$113
Graupner Speed 400 7.2v	3.5	13	2:1	7x5	11	70%	\$30.50 w/gearbox
Astro Flight 05 7T	9	13	2.82:1	10x7	25	83%	\$138 w/gearbox
Astro Flight 15 10T	9	13	2.38:1	11x9	24	81%	\$138 w/gearbox

Name:	Wt.	# cells	Ratio	Prop(s)	Amps	Mtr. Eff	Price
MaxCim MaxN32-13D	9	13	3:1	10x5	26	87%	\$217 w/gearbox
Astro Flight 25	13.3	13	1.63:1	12x9	25.5	76%	\$144 w/gearbox
Astro Flight 05 7T	9	14	2.82:1	10x6	25	84%	\$138 w/gearbox
Astro Flight 15 10T	9	14	2.38:1	11x8	25	81%	\$138 w/gearbox
MaxCim MaxN32-13D	9	14	3.33:1	10x6	26	87%	\$217 w/gearbox
Astro Flight 25	13.3	14	1.63:1	12x8	26.5	77%	\$144 w/gearbox
Astro Flight 15 10T	9	15	2.38:1	11x7	26	82%	\$138 w/gearbox
MaxCim MaxN32-13D	9	15	4:1	11x6	26	87%	\$217 w/gearbox
Astro Flight 25	13.3	15	1.63:1	12x7	27	78%	\$144 w/gearbox
Astro Flight 40	14.5	15	1:1	11x7	26	74%	\$126.00
Astro Flight 15 10T	9	16	2.82:1	12x7	27	83%	\$138 w/gearbox
MaxCim MaxN32-13D	9	16	4:1	11x6	28	88%	\$217 w/gearbox
Astro Flight 25	13.3	16	1.63:1	12x6	27	79%	\$144 w/gearbox
Astro Flight 40	14.5	16	1:1	11x6	26.5	75%	\$126.00
Astro Flight 15 10T	9	17	2.82:1	12x6	25	83%	\$138 w/gearbox
MaxCim MaxN32-13D	9	17	4:1	11x6	30	88%	\$217 w/gearbox
Astro Flight 40	16	17	1.63	13x10	25	78%	\$157 w/gearbox
Astro Flight 40	16	18	1.63:1	13x9	25	78%	\$157 w/gearbox
Astro Flight 40	16	19	1.63:1	13x8	25.5	78%	\$157 w/gearbox
Astro Flight 40	16	20	1.63:1	13x7	25	79%	\$157 w/gearbox

Gearbox Representatives:	Price:
2:1 Hobby Lobby VEE001	\$50.00
2.5 Master Airscrew 2.5:1 (2.47:1 actual)	\$16.50
2.38 Astro Flight w/13-tooth pinion	\$35.00
2.82 Astro Flight w/11-tooth pinion	\$35.00
1.72:1 Maxx BB for S400	\$22.00
2:1 Maxx BB for S400	\$22.00
3.69:1 AF Superbox w/13-tooth pinion	\$45.00
2.57:1 Modelair-Tech H-100 belt-drive	\$40.00
MaxCim ratios available w/ motor	

The January EFO Meeting

The meeting was held at Ken's house. There were many members and guests, and before the meeting was over several new members. Welcome Rick, Bob, and Wally.

Ken had his new SR Batteries X-250 laid out for all to inspect. There were many positive comments on the quality of the kit, and everyone was very surprised to see the high quality accessories included in the kit. It will save a lot of wasted trips to the hobby shop to get what was forgotten. Hopefully there will be more next month on this very nice kit, as Ken gets into the building.

Election of officers proceeded in the usual way, with the current officers retaining their positions. Thanks for the vote of confidence.

It was decided not to pursue the use of the Rushton Rd. field this year, as we could not sub-let it from Midwest R/C Society, since they did not renew their option. We will be holding summer meetings at various fields in the area. Watch carefully for dates and times, as they will vary throughout the spring, summer and fall months. We also wish to continue to have a close association with MISS (Michigan International Soaring Society).

The year 2000 dues are due. Please send them to Ken.

Upcoming Events:

February 11, 12, 13: A Celebration of Electric Flight – Visit our web site a sefds.org for details or contact, Don Wemple, at DonK126@aol.com or call (619) 469-5566.

May 6 & 7: Triad Electric Weekend (North Carolina)
Day 1, Winston Salem R/C field - CD Randy Covington, 336.983.9126 for info
Day 2, Riverside Aero Modelers Field - CD Colin McKinley, 336.928.5890 for info

May 6 & 7: 10th running of the Celebration of Silent Flight will take place in the Camas/Washougal, Washington area. That's about 15 miles east of Vancouver, WA. A couple of for-fun events and there are no trophies, except for the commemorative marble bricks we give out to all entrants. The emphasis is on flying. Contact: Dennis Weatherly email: jdwxly@gte.net, Wilsonville, Oregon USA

May 13: Donnelsville, OH Azarr (more details to follow)

May 19-20: Indoor R/C Fun Fly 2000 at the Southwestern Aeromodeling Conference, Arlington Texas Convention

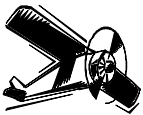
Center, 1200 Ballpark Way AMA Members Only! Balloon Bust, Carrier Landing, Limbo, Aerobatics, & More
Contact: Bob Wilder 817.498.6316

May 27 & 28: CASA "Spring Sizzle" E-FunFly the site is in Rockville, MD, just outside the Washington beltway (Maps at http://www.cp-inc-us.com/casa/flysites/casa_flysite_gude.htm) Site will be open 9:00AM each day and Saturday night flying is being looked at!

June 10 & 11: Wisconsin Rapids, WI Third Annual Electric Fun Fly, Rich Ida 715.325.5309 or email Inspector@tznet.com or Chuck Benner 715.424.5179 or email cjbenner@tznet.com

July 8 & 9 (tentative) Mid-Am

Aug. 3-6 IEFF & Aug. 6-12: (F5) **International Electric Flight Festival (IEFF) and the F5 World Championships**
The Silent Electric Flyers of San Diego and SANYO Energy (USA) will host these events San Diego, California. The IEFF (Aug. 3-6), which is open to all pilots, precedes the F5 World Championships (Aug 6-12). Ron Scharck, Director (858) 454-4900 email: Scharck@aol.com



The Ampeer/Ken Myers
1911 Bradshaw Ct.
Walled Lake, MI 48390
<http://members.aol.com/KMyersEFO>

The Next Meeting:
Date: Thursday, February 3, 2000
Time: 7:30 Place: Ken Myers's House
Bring Planes for Show and Tell