the Ampeer

December 1995 Page 1

The Officers:

President:
Ken Myers
1911 Bradshaw Ct.
Walled Lake, MI 48390
phone: (810) 669-8124

Vice-President:
Richard Utkan
240 Cabinet
Milford, MI 48381
phone: (810) 685-1705

Secretary/Treasurer:
Debbie McNeely
4720 Duck Lake Rd.
Milford, MI 48382
phone: (810) 685-1105

Board of Directors:
Keith Clark
2140 E. Highland Rd.
Howell, MI 4848843
phone: (517) 546-2462

Board of Directors:
Jeff Hauser
18200 Rosetta
East Point, MI 48021
phone: (810) 772-2499

Ampeer Editor:
Ken Myers
1911 Bradshaw Ct.
Walled Lake, MI 48390
phone: (810) 669-8124

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

The Next Meeting:
ANNUAL Holiday Get Together Dec. 9, 7 P.M. at the McNeely's - See Map
Everyone who gets this newsletter is welcome!

TriStar Fix

John Maxwell, after reading the Mid-America Fun Flies issue, wrote to say that his Sig TriStar is flying just fine with an Astro Cobalt 05. "I was hooked on the Sig TriStar after reading the construction article in Model Airplane News in September 1995.

The author noted 'wrinkles' when flying electric.

I decided to use 1/20" SIG sheeting instead of the 1/32"in the kit. Viola - I've not seen any 'wrinkles' nor have I 'popped' one in the air, a la Dave Grife.

Using the Astro 05 geared with an 11x7.5 prop and 7 SR 1000 cells gives me flights of 8 minutes."

(*Thanks for the tip John. May all the future TriStars stay together and fly safely because of your tip.km*)

For Sale

Bill Duncan (Ribcracker)
810-478-6844
Futaba Servos: for electric airplanes $5 ea
MRC & Sanyo 6 cell 1400mAh $13 ea

SERMOS CONNECTORS SWEEP THE ELECTRIC NATS!

No this is not a paid ad from John Sermos, head of Sermos R/C Snap Connectors. It is a fact. Check out page 108 of the November issue of Model Airplane News. 100% of the Electric Nats competitors used Sermos connectors. Don't be fooled by imitators - use Sermos connectors. I have only **Sermos** on all of my planes and have never had a connector problem, period.

Holiday Get Together

Saturday, December 9, 7 P.M.
at the McNeely's
4720 Duck Lake Rd.
Milford, MI
phone: (810) 685-1105
or call Ken at (810) 669-8124

What's in this issue?

TriStar Fix - Sermos - Party Time! - FX-35 - Gearing the Goldfire - No Batteries Electric - More on Gearing - Servo Reversing - Turbo 10 & 6:1 gearbox
Ken says: THIS IS A REAL GEAR ISSUE! You do remember GEAR?

Falcon's New Year's Day Fly

The Ann Arbor Falcons have a club fly on New Year's Day, about noon. This is for their club members, but I have a feeling that if you show up, you'd probably be welcomed to join them. To double check on this, you might want to call Jack Laird at (313) 971-3518 or Keith Shaw at (313) 973-6309.

Speed Control Report from:

Chuck Davenport
5460 Chestnut Hill Dr.
Willoughby, Ohio 44094-4346

To:
Martin Euredjian
AI/Robotics
1440 Third St., Suite #4
Riverside, Calif. 92507

Dear Martin,

Just a quick note to let you know three items.

1) When I sent my FX-35 control to you for repair you replaced it, at minimum charge, with a new one. The replacement was somewhat more sophisticated and definitely an improved unit. I realize you were not obligated to do this and you need to hear my loud **THANK YOU**.
2) The new control is great. In spite of the compactness, it offers more features than any unit that I have seen.
3) The information sheet that you include is of considerable value by itself, just for the tips it offers. I have set a standard of fusing every battery pack at the pack itself but the possibility of losing power through the fuse holder has always bothered me. Soldering the fuse in place solves this and your other tips were useful also. Thanks again for your involvement in this hobby.
cc Ken Myers
(*Thank you for sharing this letter with us Chuck. km*)

Gearing the Goldfire

Edward J. Moore 9196
2632 SE. Emmett Rd.
Port St. Lucie FL. 34952-5213

Dear Ken;

Thanks for the idea of making a "Brick" for the receiver and servo's. I am currently rebuilding (it crashed) a Guillow's Aeronca Sport Trainer. I made a plan for the Brick and cut it out of 1/8 Lite ply and mounted it so I can remove it easily. The size of it should also fit my other planes.

The reason for this letter is to ask for more advice (Wisdom).

Can an 05 type motor like the Great Planes Thrustmaster or the Goldfire be wired in reverse so that it can be used with a gear box?. I have a Master Airscrew MA 3550 that the instructions say to wire the negitive lead to the red dot. (*Yes, any motor with fixed brush timing at neutral can be run in reverse for a gear drive. With adjustable timing, the motor can easily be set up for optimum running in reverse for a gear drive.* ***Don't run*** *an advanced forward timing motor with a gear drive without changing the timing to neutral or reverse timing. km*)

Why and when do you use the steel collar that comes with some motors?

(*I believe you are asking about a stator ring. It lowers the RPM and current draw to increase duration - that is according to the Hobby Lobby catalog. I've never used one, since my type of flying is sport and I choose motors so that I can static prop from 20 - 25 amps. km)*

Word From England

The following two articles (Watt No Batteries!!! & Gearboxes, Propeller, and Efficiency) appeared in the Autumn 1995 issue of Electric Flight U.K. This newsletter is edited by Gordon Tarling, 87 Cowley Mill Road, Uxbridge, Middx., Great Britain UB8 2QD CompuServe 100554,2174

Watt No Batteries!!!

by Dave Durnford

Last January, a small 14 inch (356mm) wingspan model caught my eye at the annual 'Model Engineer Expo' held at Olympia. This turned out to be electric and a very different electric at that - a capacitor powered airplane.

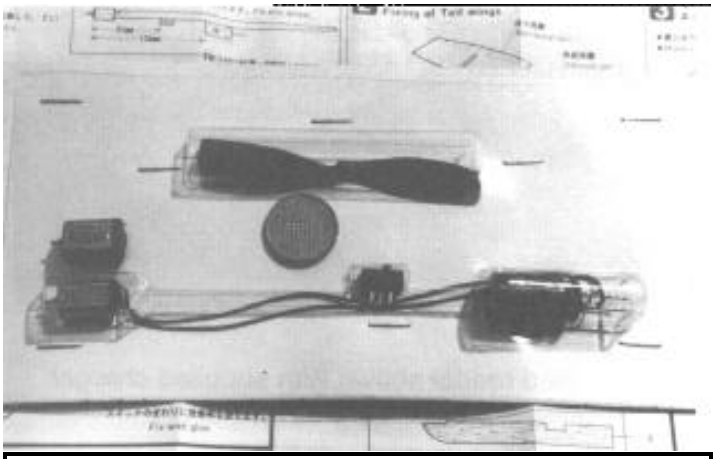
Union Models have ingeniously used the power storage capabilities of an electrolytic capacitor (labelled 'Gold Cap' 2. 5V AND 3.3 FARAD note FARAD not MICRO FARAD as more usually known to us). Two variants of this model are available, stick and tissue traditional structure and one with foam flying surfaces. Spare building time being somewhat short for me at the moment, I chose the very quick to assemble foam version.

Contents of the Kit Box

The photos, I hope, reproduce sufficiently well to show the contents of the box (it retails in the UK for £24.99 (US $38.00). The motor is shown with a 'Kenway' (Mabuchi N20AO) alongside for size comparison, slightly smaller, it bears the designation 'M2V 4813' - a Mabuchi FFM20VA. These types of motors often feature in camera wind-on mechanisms, and if readers know of other sources for both

the motor and this capacitor, please let me know, as the combination has interesting potential for other own-design and indoor projects.

Construction (well, simple assembly really) took about an hour at a very unhurried pace, but a gentle hand is needed on the delicate components (more so if choosing the built up version). I deviated from the kit and assembled the model using an aliphatic white glue rather than the double-sided sticky pads offered in the kit. I hoped this might save a few grams weight. I'm sure a built up version could be built more lightly or further weight reduction made to this version. The box specification quotes 16 grams 0.57 oz., my example came out at 15 grams ready to fly!



Supplied motor, capacitor and prop, with Kenway motor for comparison.

Modus Operandi

Two alkaline (type LR14/MN1400) cells contained in a neat plastic case (requiring assembly) act as the charger. NOTE #1: Re-chargeable cells are NOT to be used - a tiny warning in the multi-lingual instruction sheet informs. With a miniature switch set in the 'OFF' position, the extended leads of the capacitor/condenser are inserted into the two sockets of the charger for a recommended 30 seconds worth of 'charge'. NOTE #2: The capacitor is polarised i.e. it has positive(+) and negative(-) leads. Providing you have assembled the model as per instructions, the configuration/location of the condensor should ensure it is nigh impossible to incorrectly charge or short out this set-up but be aware if you 'play' with the components off the model. The combination has interesting potential for other own-design and indoor projects.

Flying

With the model 'charged' a quick double check that all surfaces are in trim, (having checked for obvious warps and C.G. balance during construction). the tiny switch is turned 'ON' and the motor springs to life. In still air, the model climbs away quite sprightly and average flight times of just under a minute have consistently been obtained. The static motor run is of approx. 40 seconds, the power coming at the start of the run then tapering off as the capacitor gives up its electrons. The plastic (80mm dia) propeller supplied might yield fiirther flight improvements if 'modified' but performs well 'out-of the-box'.

'Condenser Airplane'

Specification (As quoted in instructions):

Length: 356mm 14 in Span: 390mm 15.3 ins
Area: 2.73dm 242.3 sq.ins Weight: 16gm 0.57 oz.
Loading: 5.49 g/dm2 0.013 oz./sq.in.
Prop: 80x44mm 3.14x1.7 ins
Motor: Mabuchi FFM20VA
Capacitor: Electric Double Layer 'Gold Cap 2.5V 3.3F'
Manufacturer: Union Model Co.Ltd Kit No. CP-02:2200

GEARBOXES, PROPELLERS, AND EFFICIENCY

By Bob Smith

I received a detailed and very interesting letter from Dick Comber the other day in which he raised a number of queries about several different aspects of electric flight. There may be other elements of his letter and data in other parts of the magazine but I thought that one aspect of his comments was worth looking at in sufficient detail to make this article. The following is a straight quote from Dick's letter -

"when people say that larger propellers are more efficient than smaller ones, they are frequently being used with a higher ratio gearbox which allows the motor to run faster and more efficiently. So the two effects are confounded and it is difficult to say how much of any increase in efficiency is due to each factor"

Dick goes on to refer to a set of Speed 400 test figures produced by Bruno Schmalzgruber which he believes show that "the increase in efficiency associated with the higher ratio gearboxes is due more to the little motors running at a higher speed than to the propellers being larger".

He then asks two questions:

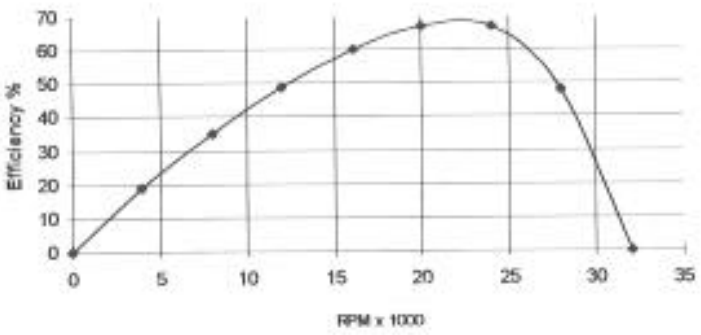
a) as you increase prop size at constant watts do you get more thrust?

b) as you increase the gear ratio with the same propeller does thrust increase with the same watts?

There may not be a perfect answer to the questions Dick has asked but I will try to produce a response which is as straightforward as I can make it. There are two sides to the problem and it is easier in this case if we deal with them separately. Let's start by looking at the theory.

Motor theory

Normal DC motors have an efficiency curve of the following shape-



The point where this curve returns to zero efficiency at high revs is the no-load speed of the motor and since in almost all cases we operate our motors at speeds well below this value it means we are always to the left of the maximum efficiency point. Any increase in motor RPM will therefore give an increase in efficiency, so Dick's point about the gearbox allowing the motor to speed up and producing an increase in efficiency is quite true.

Propeller Theory

If you look at the standard texts for propellers/fans the formula used for determination of propeller thrust is a variation of-

Output power = Thrust x Air velocity

or Input power x motor efficiency = Thrust x Air velocity

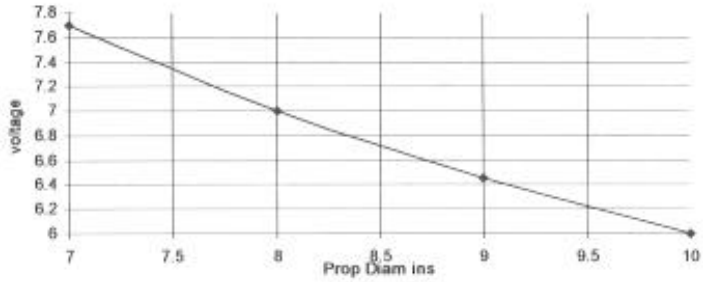
If the input power (watts) and motor speed (hence the efficiency) are constant then the thrust x air velocity must also be constant. Using a gearbox and a greater diameter propeller will move more air but at a lower velocity which means that the thrust must increase to keep the equation balanced.

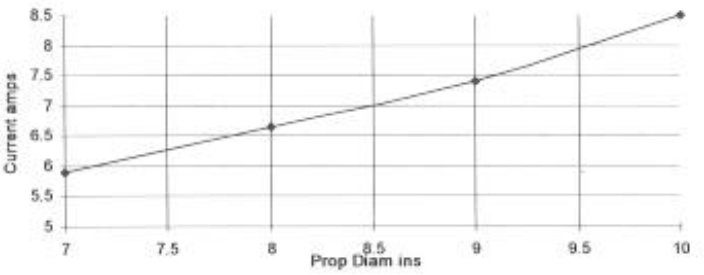
Theory into Practice

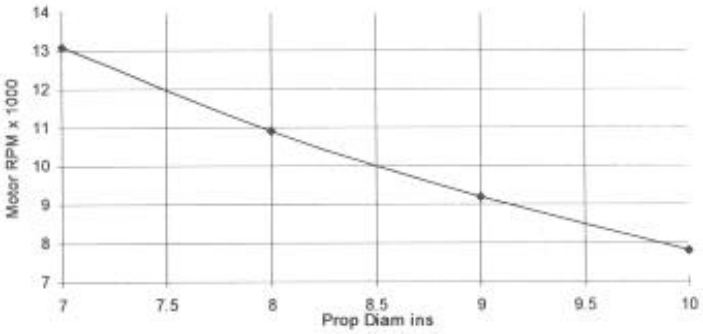
The theory gives us an indication of what might happen, but there are a whole range of factors which the theory might simplify or take insufficient account of. The only real way to verify the situation is to obtain some experimental data which supports the theory. As in all experimental work, the secret is to keep as many of the variables as possible constant so that any changes which occur can be clearly linked to the factors changed in the tests.

For Dick's first question I needed to run direct and geared tests choosing different diameter propellers of the same make and pitch but which allowed the motor to run at the same RPM in both cases. This should keep voltage and current (and hence watts) the same and would also mean that the motor efficiency would be constant. I would not be able to take account of the mechanical losses in the gearbox, but if the larger propeller produced an increased thrust then this must mean that the larger propeller was sufficiently more efficient than the smaller one to overcome the mechanical losses and still increase the thrust.

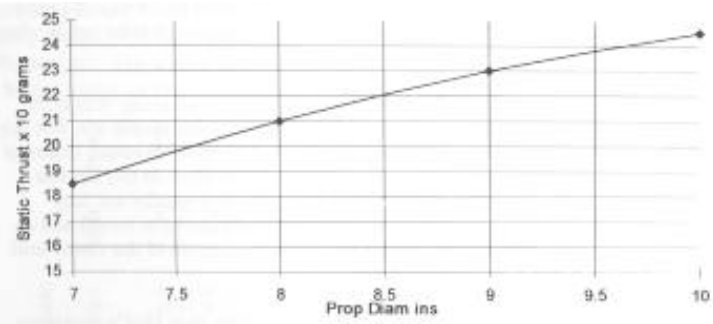
The tests were carried out on a Graupoer Speed 400 7 volt using APC propellers. Tbe direct drive test was based on the APC 7" x 4" and the power adjusted to give 6 volts across the brushes (equivalent to 6 cells). Under these conditions, the motor was pulling 8.7 amps, turning at 7700 rpm, and producing 175 grams of static thrust. The motor was then fitted with a 1.7:1 introgear gearbox (the all metal model imported by Importeknik) and retested with a range of APC props from 7" x 4" to 10" x 4". In each case the power settings were maintained at the level of the direct drive test (equivalent to 6 cells) and the motor speed calculated from the gear ratio and the prop RPM. These results were plotted to give the following graphs:







(continued on the next page)



Whilst these graphs are interesting in their own right and obviously show the trends which could be extrapolated in either direction, they do not give a simple answer to the original question. To get this answer we have to compare the results for two tests directly and these are the direct drive results for the 7" x 4" and the geared results for the 10" x 4". If we put these in a table we get a simple comparison.

Prop	Drive	Motor RPM	Volts	Amps	Static Thrust Grams
7" x 4"	Direct	7700	6	8.7	175
10" x 4"	Geared 1.7:1	7700	6	8.7	245

Given that all of the other major variables in this test were constant, then the conclusion must be drawn that the increase in static thrust is solely the result of the increased diameter of the prop. The relationship in this particular case is that a 43% increase in diameter has led to a 40% increase in thrust but I doubt that this ratio could be applied in general.

The situation with regard to dynamic conditions in flight becomes even more complex since the effective pitch of the prop, after allowance for the airspeed of the model, is dependent upon the prop RPM (not the motor RPM) and the reduction resulting from the gearbox has a disproportionate effect upon the in-flight behavior.

With regard to Dick's second question I think we can extract an answer without carrying out any further testing. If we consider that for constant power input (same volts and amps) the motor must be running at the same RPM then any increase in the gear ratio will result in a lower propeller RPM. This would only be possible if the propeller was of increased diameter (again assuming the same pitch) to produce the required loading. If we accept that the test results I have already given prove the general point that if everything else is constant then any increase in propeller diameter produces an increase in static thrust then the principle must also apply in this case and the increased ratio will also increase the thrust. As a purely hypothetical example we might replace the 1.7:1 ratio box with a 3:1 ratio box and find that fitting a 12" x 4" prop would draw 8.7amps at 6 volts and produce 280 grams of static thrust.

These conclusions might lead one to wonder why we are not all using very high ratio gearboxes and enormous propellers. The fact is that some people are, but only when flying very slow models such as solar powered or extreme duration (sunrise/sunset) type models. Not much of this type of flying takes place in the UK but there is a fair bit in Europe. The point is that the static test results are only equivalent to very slow airspeeds (to zero airspeed if we want to he exact) and as soon as we are dealing with normal model airspeeds then much of the theoretical increase in thrust is lost due to other factors.

This is quite a difficult area to "get a handle on" but I hope that Dick's questions, and my theory and testing will have helped to give readers a better feel for these matters.

The tables of performance measurements by Bruno Schmalzgruber wbich were mentioned by Bob Smith at the beginning of the previous article were kindly submitted by Dick Comber and are are hereby reproduced for information. The motor is standard Speed 400 7.2V and the Voltage is taken to be the same as the cell count. (Tables on next page)

FUTABA s133 Servo REVERSAL

by Gerhard Spielmann
from Silents Please
November 1995
edited by Fred H. Dippel
2 David Ct., Glen Cove, NY 11542

(*Please note that this article is for your information. You could ruin your servo and will void your warranty if you try this. KM)*

You may ask "why an article on servo reversal, just flip the dip switch on the transmitter." Yes, that's true, but you may come across an installation problem that leaves you no other choice. My problem was that the configuration of the wings and flaps was such that I had to install a flap servo in each wing panel, with the servos being a mirror image installation of each other. The two servos are connected by means of a "Y" harness, which is o.k. for ailerons, but flaps have to have the same rotation. A mirror image installation would cause one SERVO to rotate clockwise while the other would rotate counter-clockwise. So much for the reason, let's get down to the "how to do it," i.e., reverse the rotation on one servo.

Since s133 servos are expensive, I decided to call Futaba for directions, I didn't want to fry the servos by just reversing the motor leads. Futaba said "reverse the red and black wires to the motor, and reverse the white and brown wires between the P.C. board and the potentiometer." The red and black motor wires were easy; the white and

Gearbox ratio 1.5:1 (Graupner)

Propeller cm.	in-	V	Amps	Watts	Thrust g
20 x12	7.9 x4.7	6	6.1	37	150
20 x 12	7.9 x4.7	7	7.3	51	190
20 x 12	7.9 x4.7	6	9.0	72	240
20 x 12	7.9 x4.7	9	10.4	94	270
23x10	9.1x3.9	6	6.6	40	146
23x10	9.1x3.9	7	6.2	57	200
23x10	9.1x3.9	6	9.2	74	240
23x10	9.1x3.9	9	10.9	96	260
23x15	9.1x5.9	6	7.1	43	146
23x15	9.1x5.9	7	6.6	60	200
23x15	9.1x5.9	6	10.2	62	250
23x15	9.1x5.9	9	12.2	110	270
25x10	9.6x3.9	6	7.1	43	166
25x10	9.6x3.9	7	6.6	62	230
25x10	9.6x3.9	6	10.2	62	260
25x10	9.6x3.9	9	11.4	103	300
25x16	9.6x7.1	6	6.1	49	146
25x16	9.6x7.1	7	9.5	67	176
25x16	9.6x7.1	6	11.2	90	220
25x16	9.6x7.1	9	12.5	113	250
30x10	11.6x3.9	6	9.9	59	166
30x10	11.6x3.9	7	12.0	64	226

Gearbox ratio 2:1 (Hummel)

Propeller cm.	in.	V	Amps	Watts	Thrust g
20x15	7.9x5.9	6	6.6	54	210
20x15	7.9x5.9	9	7.9	71	245
20x15	7.9x5.9	10	9.3	93	290
20x15	7.9x5.9	11	10.2	112	345
23x15	9.1x5.9	6	6.0	64	250
23x15	9.1x5.9	9	9.0	61	300
23x15	9.1x5.9	10	10.7	107	365
23x15	9.1x5.9	11	12.0	132	435
25x15	9.6 x5.9	6	6.2	66	255
25x15	9.6 x5.9	9	9.5	86	320
25x15	9.6 x5.9	10	11.0	110	390
25x15	9.6 x5.9	11	12.5	136	460
26x15	11.0x5.9	6	9.0	72	290
26x15	11.0x5.9	9	10.7	96	340
26x15	11.0x5.9	10	11.6	118	390
26x15	11.0x5.9	11	13.7	151	460
30x15	11.6x5.9	6	9.4	75	275
30x15	11.6 x5.9	9	10.6	95	320
30x15	11.6x5.9	10	12.5	125	390
30x15	11.6x5.9	11	14.7	162	460

(more on data on next page)

brown wires looked easy also, I cut them midway and soldered the whites to the browns. (Big mistake). The servo did reverse direction, but, the motion was erratic. I called Futaba again and spoke to another technician, explaining what I did. He asked "Did you also switch the resistors?" - "Resistors?, what resistors?" - "The ones that are beneath the heat shrink tubing at the potentiometer lugs!."

I opened the SERVO once more and gently lifted the P.C. board as far as I could without disturbing any components and their connections.

After carefully slitting the heat shrink tubing and peeling it away, the resistors came into view; they are diminutive, and if you weren't informed of their presence you would never know of their existence under the heat shrink tubing. Tweezers and a 18-20 watt pencil type soldering iron were used to reverse their connections to the potentiometer. Small strips of vinyl electrical tape replaced the original heat shrink tubing, the servo was reassembled and worked perfectly. (Those pretty colored bands on resistors are not there for decoration, this case proves that a subtle difference in resistor values can make a big performance difference.)

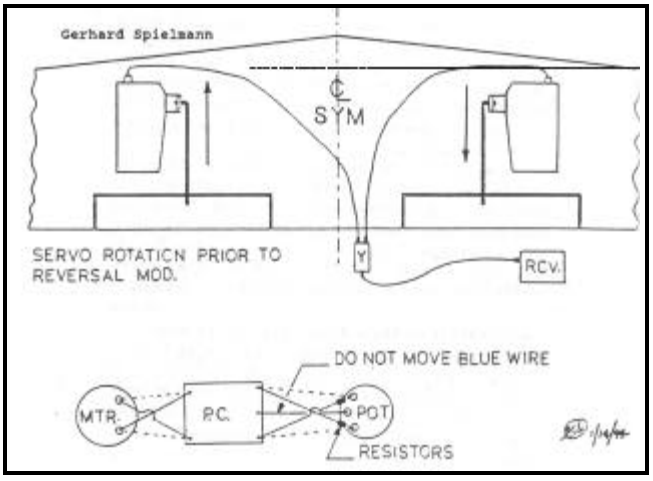
A few words of caution: (1) After removing the four screws, gently remove the top cover without disturbing the gear train, (2) Draw a sketch of the gear layout before you remove them. (3) Remove the gears in sequence and lay them aside in the same sequence, (they are small, delicate, and some look alike). (4) The motor has a small rectangular rubber covering the motor terminals, carefully slice it off with an X-acto blade and save for re-assembly, glue it back on after switching motor leads. (5) Do not use a high wattage soldering gun. (6) Use a "third hand", small vise, or whatever - you will need your own two hands to perform the required "micro-surgery." (7) Use care when desoldering and resoldering, especially the resistors, their leads are very short.

To the fortunate fliers that have a programmable computerized transmitter that could negate the above efforts, I say "Great, but look at the lessons learned, servo modification experience gained, and dollars saved."

(See illustration on the next page)

Gearbox ratio 2.5:1 (Hummel)

Propeller cm.	in.	V	Amps	Watts	Thrust g
20x15	7.9x5.9	6	5.2	42	193
20x15	7.9x5.9	9	6.0	54	240
20x15	7.9x5.9	10	7.0	70	295
20x15	7.9x5.9	11	7.5	63	325
23x15	9.1x5.9	6	6.5	52	260
23x15	9.1x5.9	9	7.4	67	315
23x15	9.1x5.9	10	6.4	64	350
23x15	9.1x5.9	11	9.4	103	410
25x15	9.6x5.9	6	7.1	57	290
25x15	9.6x5.9	9	6.2	74	345
25x15	9.6x5.9	10	9.3	93	365
25x15	9.6x5.9	11	10.5	116	465
26x15	11.0x5.9	6	7.9	63	290
26x15	11.0 x5.9	9	9.1	62	345
26x15	11.0 x5.9	10	10.4	104	395
26x15	11.0 x5.9	11	11.7	129	490
30x15	11.6x5.9	6	6.4	67	290
30x15	11.6x5.9	9	9.7	87	340
30x15	11.6x5.9	10	11.1	111	405
30x15	11.6x5.9	no figures			



WAR EMERGENCY POWER TURBO 10 & 6:1 GEARBOX

Kirk Massey
from DEAF Notes November 1995
edited by Frank Korman
9354 Forest Hills, Dallas, TX 75218

This time I'm going to review the Model Electronics (MEC) WAR Emergency Power Turbo 10 Plus motor and 6:1 Super Box. To be perfectly honest with you, I was, like most people, skeptical of claims that this motor performed better than a cobalt. I started out in electrics with a can motor, and wasn't going back to that kind of sluggish power if I could help it. My first impression of the Super Box was not good. It looked like something built from an Erector set. It appeared bulky and flimsy. Certainly not able to withstand my kind of abuse. Having never seen the MEC powered planes fly, these impressions formed the basis for my negative opinions.

My interest was first aroused at the 1994 KRC meet where one of my customer's first saw one fly. He said, "The performance was real good, great vertical, but short flight times." Then another customer who regularly burned up motors bought one and said that it performed better than his Astro, and flew longer. Then Bob Benjamin called me, and said the same thing. I asked him how long these motors last. He had just started testing them. Months later he called and said that they where holding up fine, and still performing well. I mentioned to him that I would like to test one myself. Bob said he would talk to MEC and see if they would send a demo for me to try. Well, the next week a package arrived with a motor and gearbox. Great, now what would I put it in?

Because my hobby has turned into a business I have no

Gearbox ratio 3:1 (Hummel)

Propeller cm.	in.	V	Amps	Watts	Thrust g
23x15	9.1x5.9	6	4.3	34	193
23x15	9.1x5.9	9	5.3	46	246
23x15	9.1x5.9	10	6.0	60	295
23x15	9.1x5.9	11	6.9	76	345
25x15	9.6x 5.9	6	5.1	41	240
25x15	9.6 x5.9	9	5.6	52	260
25x15	9.6 x5.9	10	6.9	69	340
25x15	9.6x 5.9	11	7.3	80	370
26x15	11.0x5.9	6	6.2	50	295
26x15	11.0x5.9	9	7.3	66	345
26x15	11.0x5.9	10	6.1	81	405
26x15	11.0x5.9	11	9.6	106	460
30x15	11.6x5.9	6	6.6	54	310
30x15	11.6x5.9	9	7.7	69	355
30x15	11.6x5.9	10	9.2	92	430
30x15	11.6x5.9	11	10.6	117	520

building time anymore. So I thought, "What plane can I convert to install this combo in?" I called MEC and spoke to Pete Peterson the owner, and asked what would be the best type of plane for this combo? Much to my surprise he said just about anything from a glider to a 40 size plane like the SIG Four Star 40, or even a small plane like the Kyosho Zero or Mustang.

Well time slipped by, and KRC 95 was on me before I knew it. I normally don't get to watch much flying. However, this year I did get to see several planes fly. Two impressed me and both had can motors. For a "Die Hard Astro Lover" like myself that was humbling. The first plane was David Dantonio's (Turbo's) Electro Jet Twin that had two Trinity Onyx 14 turn, double wind motors and Leisure 3.8:1 long gearboxes turning Grish Tornado 9X7 props on 20 cells. His flight times with this setup were 7 to 9 minutes of high speed passes and sport flying. Turbo's twin has approximately 535 sq. in. of wing area and weighs 5.75 lbs. The only area where performance seemed sluggish was when he hand launched the plane. It staggered along for 75 feet or so before getting on step, and then performed its high speed routine. The props turn at 8,400 rpm with a 26 amp draw.

Dave has since switched to MEC WEP Turbo 10 motors, and now is turning 9,200 rpm at 30 amps. Flight times are a bit shorter, but all the sluggishness is gone (shorter flight times are partly due to the higher power). His plane was so impressive that several manufacturers approached him about kitting the design.

The other plane that caught my attention was the MEC Zero. This little foam plane with a WEP Turbo Plus motor, 10 cells, the 6:1 super box, and a 13X7 Sonic-Tronics folding prop was launched and proceeded to go vertical for 300 feet no sweat! Then it performed high-powered maneuvers and aerobatics for a total flight time of 4 minutes and 15 seconds.

The vertical performance was better than any electric I had ever seen. However, the flight times were not up to the 5 or 6 minutes I had read about (probably because I saw very little, if any, partial throttle flying).

After returning from KRC 95 I had seen an Aero Craft Apache in one of the magazines that had the Turbo 10 Plus motor in it with 9 cells. That gave me the idea to install it in an Apache that one of my employees was building for the DEAF Fly-In in Dallas. However, things did not work out, and we were not able to complete the Apache for Dallas in time.

While at the DEAF meet, Scott Hartman was gracious enough to allow me to fly his P-51 Mustang powered by a Turbo 10 Plus motor with 10 cells (I'm not sure of the cell capacity). Flight performance of this bigger plane was still very good, and flight times were 4 to 5 minutes. This prompted me to install the Turbo 10 Plus in my 36 in. Sterling Corsair replacing an Astro 15. This increased the weight to about 3 pounds using 10, 1700 cells, and the Sonic-Tronics 12X7 prop with the 167 hub. This brought the wing loading to almost 29 oz per square ft. About as close to flying an electric brick as I think you can get away with!

Anyway, I tried it, and the results were spectacular to say the least. On the first flight when I hit the throttle the plane pulled wildly out of my hand as it was launched. It looked as though it was climbing a set of invisible stairs in response to an over sensitive elevator setting.

However, I got a little more familiar with the plane, and was able to calm down some and start enjoying the brute power of this nicad bomb. Much to my surprise, after what seemed to be an eternity, (3 to 4 minutes), I yelled for those on the field to clear the runway. When I came by I hit full power to see if the power was pooped. It shot back up several hundred feet and kept going. So I flew around for several more minutes doing loops and rolls before setting up to land.

This was something I was not looking forward to. Trying to land this bomb without stalling, and with no landing gear might bring a sad end to what was otherwise an excellent experiment in watts over wing area. To my surprise the landing went without a hitch. I made my final turn, reduced power, and skidded to a stop. Still shaking I walked over to pick up the plane. Wow! What a flight! Much to my chagrin the day was getting late, and I was not able to get in another flight before dark.

The next day, after reducing the elevator travel some, and recharging, I flew it two more times. The first flight was 6 min. and 29 sec., and the second flight was over 7 minutes (probably due to the new battery and motor breaking in). The final word on this system is that it works! I'm very pleased and recommend it highly. The only drawback that I see is that there is more maintenance. MEC recommends changing the brushes every 30 flights if you're running at higher power levels. This is a minor inconvenience when you consider the enjoyment this kind of performance gives.

It draws 40 amps static with a Sonic-Tronics 13X7 prop so you can't hold it wide open for long periods of time. I use a 12X7 prop to reduce amp draw a little. The best prop for those who don't want a folder is the 12X10 Master Airscrew Electric wood model according to MEC. One other thing that I did not like was the gear whine on the ground amplified by the Corsair's hollow fuselage. I chose to use 3/32" thin ply for the firewall instead of the 1/8" recommended. I also bored holes in the firewall, thus weakening it and adding to the resonance of the fuse.

This is a plus in the air as you can actually hear the motor, and the sound helps the realism of the Corsair in flight. I hope to make a four-blade prop soon that will make it just right.

There are good instructions with the system, and a drilling diagram that shows the mounting layout. I just copied this and placed it in the center of the firewall. The motor bolted right up with no test fitting, or shiming. One thing Pete Peterson recommends to help prevent bending the 3/16" output shaft is to shorten it when possible if you're not running a folding prop. I honestly believe that this system would work to power a P-38, allow using large props, take off on grass runways, and even use retracts (any takers?).

Just so you don't think there's magic working let me explain. First, this is a low resistance motor with larger brushes and commutator which are designed to run at high rpm's. The armature also appears to have a fan built onto the back of the laminates to help keep it below the melting point. This adds up to much better efficiency because of the higher rpm's.

The 6:1 gearbox allows use of a larger prop which is much more efficient than a little 7 or 8 inch job normally used. Somehow this combo unloads in the air and just shows how much Pete has maximized the performance of this system. It's people like Pete that make Electrics happen in the US. Many thanks from us all.

All this performance improvement with geared motors made me wonder what an Astro 035 with a higher gear ratio would do. So off I went. I took a new 035 and installed the Leisure 3.8:1 radial gearbox. On seven 1700's using Sonic-Tronics folding props the results were: 15.3 amp draw with 11X7; 18A with a 12X7; and 22 amps on a l3X7. I then tried it on ten 1700's with the 13X7 folder which drew 32 amps.

With the 12X10, or 13X8 Master Airscrew wood prop it drew only 25 amps. Then I took the older 5-turn non-elliptical version of the Astro FAI 035 and ran the same test. With seven 1700's and the 11X7 folder it drew 30 amps; 34 amps with the 12X7; and 36 amps with the 13X7.

Judging by these figures I think that this motor, or the new elliptical field FAI 035, coupled with the MEC 6:1 gear drive might give similar performance to the "MEP" Turbo 10 Plus. I will let you know if get the time to test this.

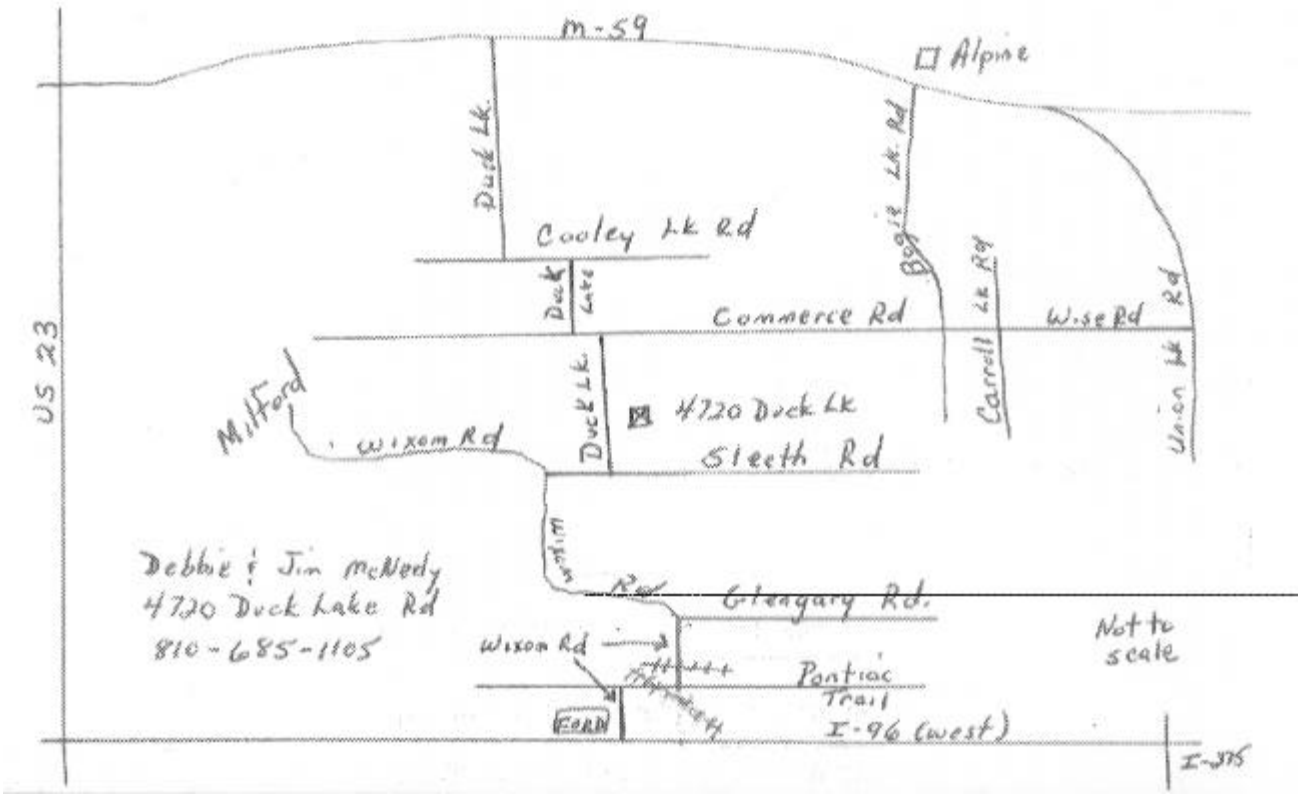
(*I too have been working on the computer with high rev/high gear ratio motor/gearbox combos and it looks very good for both power and efficiency. We aren't using our motors at their most efficient operational point. I believe we can pick up some new "time" without sacrificing performance if "we" continue to follow up on this area. KM*)

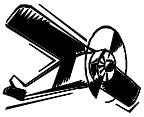
Editorial Disclaimer

I never thought that it would be necessary to start off the following with a disclaimer, but our society, the U.S. and the World, has become so my group is offended by your group, that I must warn you that I will be mentioning Christmas on this half of the page - **READ NO FARTHER IF THIS OFFENDS YOU - SORRY, I CAN'T HIDE THE GRAPHICS, SO PLEASE BE CAREFUL NOT TO LOOK AT THE GRAPHICS ON THIS PAGE, IF THEY TOO OFFEND YOU.**

For those of you still reading, the EFO members wish you a joyous holiday season. We hope that you will enjoy Christmas, and the other holidays that fall at this time of year, with your family and friends. We hope that you share as much of yourself with others around you, as you do with this great hobby. We hope that you and your loved ones continue in good health. From all of us, to all of you, a very Merry Christmas and a Happy New Year!

And for those of you who have wondered - yes, there really is a Ken Myers, and yes he really does fly, or at least poses with a transmitter.





The Ampeer
Ken Myers
1911 Bradshaw Ct.
Walled Lake, MI 48390

Next Meeting:
Sat. Dec. 9 - 7PM (see details)