

36 in. wing, and about 288 sq. inch area. Scott [A DEAFer, ed.] flies his on hot car motors with folding props and gear reducers. He claims to get near vertical climbs. He sent me a motor and Leisure drive, and the little sucker will climb out of sight at a 60 degree angle! However, I can't afford all that hardware, so I put a Sagami with its little APC 7x4 into this 30 oz. plane, (including 7 cell SCR pack), and the results are very pleasing. I of course lost the rate of climb, but my speed is roughly the same, and duration is longer. Keep in mind I fly it full throttle doing constant aerobatics (otherwise it climbs out of sight). Most importantly, the investment is about 1/4th!!!

Please put out the word that from a budget minded fliers view point, this motor simply cannot be beat for seven cell fliers. It is my opinion after several years of experimentation and searching for a good, but inexpensive motor/prop combination, this one can't be beat.

If you are interested in obtaining a motor like this,

### **Sig Wonder**

By Clyde Geist

from Silents Please

Don Mott editor: 516-924-3385

I really thought I had enough planes, but when it comes to evaluating something new like my AMP AIR gear motors, the more diversified the aircraft the better. After developing a single motor gear and mount as a third motor add on accessory to my twin motor box, I decided to try it out as a "stand alone " unit. The dimensions are somewhat larger than most existing gear units, more like a belt drive. Like a belt drive, a motor timed to turn right handed (such as a Speed 600) is properly timed, The difference with mine is that the brushes-face forward for better cooling. Anyhow what I reasoned was that I needed lots of room in the motor area. I heard tell that Rich Uravich was selling his used Sig Wonder and began to reminisce about some that I've seen fly. I have flown two "Psycho Maxes" and owned two "Snappers. I felt the "Wonder" might provide a similar experience.

The first "Wonder" I saw was at LEHI last June, with an Astro 15 in it and the performance was startling. The next one I saw was built and flown by my old friend, the Cobras President, Allen Frank. We were at the Bethpage Polo Field this past summer when Allen put it through it's paces like only he could. With just an OS 20 four stroke for power, it would climb straight up forever. Then another eye opener, Hans Alnach set up a

Sig Wonder with an economy "can" ferrite geared 2.5:1(1 think) on 6 cells. Read this at what? 100 watts? Mild aerobatics and a long flight rewarded Hans for his efforts. By the way, he incorporated original "sled type" landing skids to protect the belly mounted battery pack. This configuration has been used by Hans in many models for years and it works well. Consider the cooling and ease of changing the pack and you will know why. So anyway, I called Rich who reported "scary" performance from a 15 wet. He offered to sell it at an attractive price, sans the Enya.

So, I signed on for yet another "E" conversion. A micro Apollo aileron servo mounts in the wing, the elevator servo mounts in a compartment accessible through a hatch at the rear of the fuselage. The motor mounts outside in its designated motor area. What is left for the batteries? An area so large it could easily swallow an Astro 90 battery pack. I'll save Hans' idea for another model. My 8 SR 1500 cells sure look lonely but they sit right on the C.G. without any special treatment and I can experiment with varied packs without concern for a dangerous shift in C.G.. A 1" x 1.5" hole in the tail exhausts the flow through ventilation quite nicely. Are we sure this model wasn't intended for Electric?

Okay so back to my purpose, the AMP AIR gear unit and mount. It's available in ratios of 2:1, 2.5:1, 3:1 and 3.66 :1, the later being my choice. My experience has been such that 16-18 turn ferrites perform best on 7-8 cells and on higher ratios. I had a spare Trinity Ruby 16T motor on hand and in she went. After lots of testing I chose a 9 x 8 Kyosho prop. The stats are 32A - 250 watts input, 35 oz. static thrust at 5400 RPM which is good for a prop that needs to move at 30 MPH to unload. Timing was advanced 10 degrees, just enough to reduce sparking and not enough to kill efficiency. One other consideration is weight. Devoid of any R/C equipment the airframe weights 16oz, yes 1 lb..! This is easily twice as heavy as any of my other aircraft of an equivalent 340 sq. ins of wing. Okay, one shortcoming, but the all up weight with eight 1500's is 46 oz., not too bad. I'll do my first trim flights with 7 SR 1100 maxes, for an all up 39 oz. before I try it heavier.

The first flight climbed out at such an angle I was shocked it didn't stall. I trimmed the nose level and it picked up speed on the downwind, lots of speed. Geese this thing is hard to see, into a turn she goes or she's gone. Hey is this thing right side up? A quick loop to find out and wow! A 20" loop in a New York nano second, I've got to slow this thing down. I cut power to half and the nose drops 30 degrees and she's coming

down fast. Four clicks of up trim and I have managed to tame the demon somewhat. I flew three more flights using progressively heavier batter packs. The plane doesn't seem to care about the weight.

Originally I planned to test my new SR max <sup>7</sup> motor in the Wonder but my modest ferrite is plenty of power for now. I'll try the SR in a model that needs the extra power. I can offer a basis of performance for those who may be interested.

	Ease of Building	Ease of Flight	Flying Weight	Aerobatics
Psycho Max	3	1	3	3
'Wonder	1	2	1	2
Snapper	2	3	3	1

\*In order of preference 3 is best.

This comparison may prove deceiving. The Psycho Max is most aerobatic but its way too sensitive. The Snapper maybe the least Aerobatic but it is the most stable and pleasant flyer. The Sig Wonder is a fine "Middle of the Road" aerobat. The original design was not intended for electric power. I'm at a loss to understand why.

### Speed Controller Update

by Steve Neu

from Silents Please

Don Mott editor: 516-924-3385

We nearly all have switched from micro switches and relays to "speed controllers" of one type or another to control the motors of our electric powered models. The Hobby Industry advertisements of late are full of new models with associated features and claims. I think it is time again to review what the hobby industry is providing.

Let's start by looking at what a controller is and how it works. A controller works by switching the motor on and off at a high rate, the speed of the motor is changed by adjusting the ratio of on to off while switching. All of the modern speed controllers use special transistors called Field Effect Transistors(FET) these FETs are turned ON and OFF at rates from 40- 10,000 times per second. Current design speed controls fall into 2 types : the first is the frame rate type with a switching rate of 40-60/second, the newer designs are the of a high rate type with a switching rate of 2000-10,000/second. I think that most of you know my feelings about the cheap frame rate controllers by now ( Keep them away from electric planes).

The high rate controllers in general are an improve-

ment over frame rate controllers, but there are features and problems with some of them. The high rate controllers are available with the control functions performed by "analog" circuits and more recently by "digital" methods using simple microprocessors. I have had the opportunity to look at some examples of the new crop of digital controllers and to see how they compare to their analog counter parts. This companson will be discussed in a future article but for now, let me

go over the features that I think are desirable in any model aircraft speed controller:

- 1) Optical isolation
- 2) High rate>2000hz
- 3) Soft start
- 4) Soft brake (if it has a brake)
- 5) No glitch on power up
- 6) Full FET drive voltage (8 volts or more)
- 7) Some sort of shut down on loss of correct drive signal from Rx
- 8) Small size
- 9) Low ON resistance FETs
- 10) No requirement for extra diodes to motor (internal to controller)

These are some of the more important features that I can think of. Let's look at some of the popular controllers that many SEFSD members have in their planes. **Astro Flight #215 & 217.** These controllers lack just about all the desirable features suitable for electric airplanes. Limit their use to demagnetizing old motors. This analog controller is cheap and built to stay that way!

**Astro Flight #210 & 211 Digital Controllers:** These units are a big improvement over the previous 2 units, however they still are missing several of the desirable features. They don't have optical isolation(motor noise can get into radio) and the FET drive is only 4.5 volts so the FETs are not operating at their lowest resistance.

**Airtronics MA3 and Hitec Controllers:** These controllers have the same concerns as the Space Brand 217 and 215 analog units.

**A/i Robotics FX35 and FX 35D:** These controllers have several good features but fall short in the area of low resistance FETs. Both units use a single FET instead of several smaller ones resulting in a resistance is 3-4 times higher than that of other units of the same size. The newer unit is digital.

**Flight Tec Controllers:** Newer units seem to have most of the desirable features, however the wire used on the units is a little small(#14) The newer units are digital.

**Jomar Mini Max:** Unit has many of the same concerns as the Space Brand 210 & 211 digital units.