



Multiplex MiniMag

In recent years, I have seen quite a few Multiplex airplanes at the airfields. I've always been impressed with their quality and design. The MiniMag is a new high-wing electric trainer. It is molded, like their other airplanes, in very durable Elapor® foam. It is the little brother to the 64-in. wingspan Magister and should make a good small-field trainer, or a fun, relaxing sport airplane.

BY: **Don Betz** Photos by: **Mike Hoffmeister**



Kit Box
The ready-to-fly (RTF) version I received includes everything you need to get this airplane in the air except 6AA batteries for the transmitter. Upon inspection, everything arrived in perfect condition. Excellent!

The design is well thought out with features such as servo pockets molded in. Hitec HS-55s or equivalent sub-micro servos will fit perfectly. The wing is one piece with a spar already installed that also acts as a hard-point for the nylon wing-mounting bolt. The rudder, elevator and aileron hinges are molded right in. The “live” hinges need to be “exercised” to break them in before assembly, but they work well and make for a very clean look.

The battery, receiver and electronic speed controller (ESC) are accessed via a hatch in front of the wing and behind the motor. This setup is very convenient. The only problem was that the hatch didn't want to stay closed with the system they had in place. I glued in some rare earth magnets and that did the trick.

Getting it RTF

When they say RTF, they aren't kidding. Just about everything is already done for you. The few tasks that remain include installing the tail feathers, tightening the control rods to the horns, installing the landing gear, and charging the NiMH flight battery with the included peak detection charger.

The Elapor foam is not like other

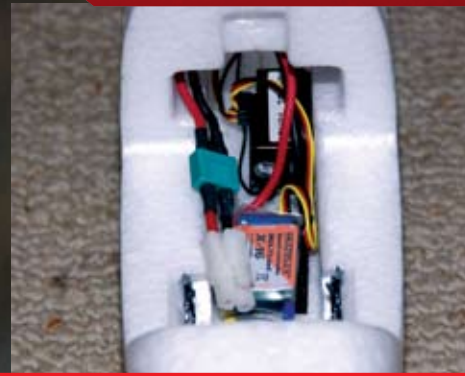
foams and is best secured with medium cyanoacrylate (CA) and “kicker” or activator. The manual is pretty clear about NOT using epoxy or “foam-safe” CA. The tail feathers need to be installed, and the design makes this step easy, but you should still do a trial fit to make sure everything aligns, as it should.

Test fit the tail feathers to ensure everything aligns too. With the tail built and the landing gear installed, all that is left to do is apply the high quality, brightly colored decals. This last step took much longer than completing the airplane but it went smoothly.

With the included 7-cell NiMH battery in place, the airplane balanced perfectly at the recommended center of gravity (CG), which is 2.6 in. from the leading edge of



▲ These are kit parts, all laid out prior to assembly. The motor, ESC, servos and pushrods are already installed.



▲ There is easy access to the battery compartment. Access to the receiver and ESC is also gained through this hatch.



▲ "Exercise" the molded-in live hinges to make the surfaces move freely before the airplane's first flight.



◀ The Multiplex MiniMag comes with colorful graphics and a nice semi-scale look.

the wing. There is a bump molded into the wing at the CG that makes it really easy to check before a flight.

The MiniMag really can be completely ready to fly in an hour or two with the included gear in the RTF package.

The First Flight

My friend Mike and I planned to get together to take some pictures and to complete the maiden flight. The weather was cold and gray but the air was calm. With static picture taking out of the way, we got the MiniMag ready. Since power is modest with the included Permax 400 and Multiplex 5x4-in. propeller, we decided a hand launch would probably be best for the first flight.

I turned on the Zebra 4-channel

transmitter and hooked up the flight battery, and we got ready for the throw. With the throttle all the way up, Mike gave the MiniMag a firm, level toss and it was off. I kept it level to let it gain some airspeed and gently turned back and climbed to get things trimmed out. Trim settings were pretty close right from the start, with only a little bit of up trim needed for level flight. The trim levers are pretty easy to bump and have very little

detents so accidental trim changes could be a problem. Make sure to check them before each flight. I was surprised at how responsive the MiniMag was with just rudder and elevator control considering how little dihedral it has.

The MiniMag flies very nicely with good speed, but with the stock power system you need to be gentle with the climbs since the small propeller doesn't offer much "grunt". If you do try to climb too aggressively, the MiniMag will slow and stall. As long as you don't push it too hard the stall is straight ahead and recovery is quick and easy.

After feeling it out for a while, it was time to start thinking about landing. Settling into a nice approach, I found that even power-off glide is smooth and fairly



▲ The way the parts are molded makes installing the tail feathers very simple. This is a model that goes together quick and easy because of prefabrication.



▲ You just guide the pushrod through the barrel and lock down the screw after making sure the elevator is properly centered.



▲ One of the few assembly steps involved in getting the RTF version ready involves snapping the landing gear wire into place and screwing in a retaining bolt.



▲ The wheels are even made out of Elapor foam. They have held up surprisingly well!



▲ Here the airplane is captured just before touchdown after a fun flight. It looks quite scale.

quick. I overshot my first landing attempt so I went around to try again. This time, with a better lower approach, I brought it in with just a touch of throttle for a smooth and easy landing. Success!

Modifications

The plane flies well as supplied, and with the help of an experienced RC pilot would make a fine trainer right out of the box. I'm not looking for that kind of training at this point however, and want to use the MiniMag as a fun and relaxing sport plane. Before the next outing I wanted to make a few minor modifications. Almost everyone in the hobby likes to tinker anyway, so let's see what we can do here.

First, I wanted to add ailerons. I installed the recommended Hitec HS-55 servos and hooked up the ailerons. The servos fit perfectly in the molded pockets; they even have a channel for the wire. All of the hardware, except the servos and Y-harness is supplied with the kit.

I started with the recommended throws but have since increased them a little for better roll rate. Control is naturally more positive and flight performance is more versatile now with the ailerons, although the airplane did fly fine on rudder and elevator only.

We found that the lack of a steerable tail wheel made ground handling quite a challenge. The next change was to add a tail wheel. The kit instructions show a way to do this that proved to be relatively easy.

The next thing we looked at was getting more thrust. The propeller supplied with the kit seemed to be a bit too small and the first flights proved this. I've read on the Internet about several different props people have tried, including a GWS 7035. I happened to have one of those along with an appropriate hub on hand, so we tried it out. Initial tests showed that it seemed to be a good match for the power system.

The Second Outing

Excited to find out how the changes we made would affect the airplane, Mike and I planned to take a long lunch break from work to do some more flight-testing and picture taking. This time we were blessed with a beautiful afternoon with a clear blue sky. After a quick preflight check, I taxied around for a little bit on the new tail wheel; it worked great! Once lined up, I advanced the throttle and started the takeoff roll. The MiniMag was airborne in about 20 to 25 ft. Power was much better with the new GWS 7035 prop. What a difference!

The addition of ailerons opened up the flight possibilities. They add a few more aerobatic options and make it easier to fly in breezy conditions. While no aerobat, it will do an aileron roll if you have enough speed.

With the exception of changing the propeller, these modifications are mentioned in the instructions. While the plane flew fine out of the box, these changes made



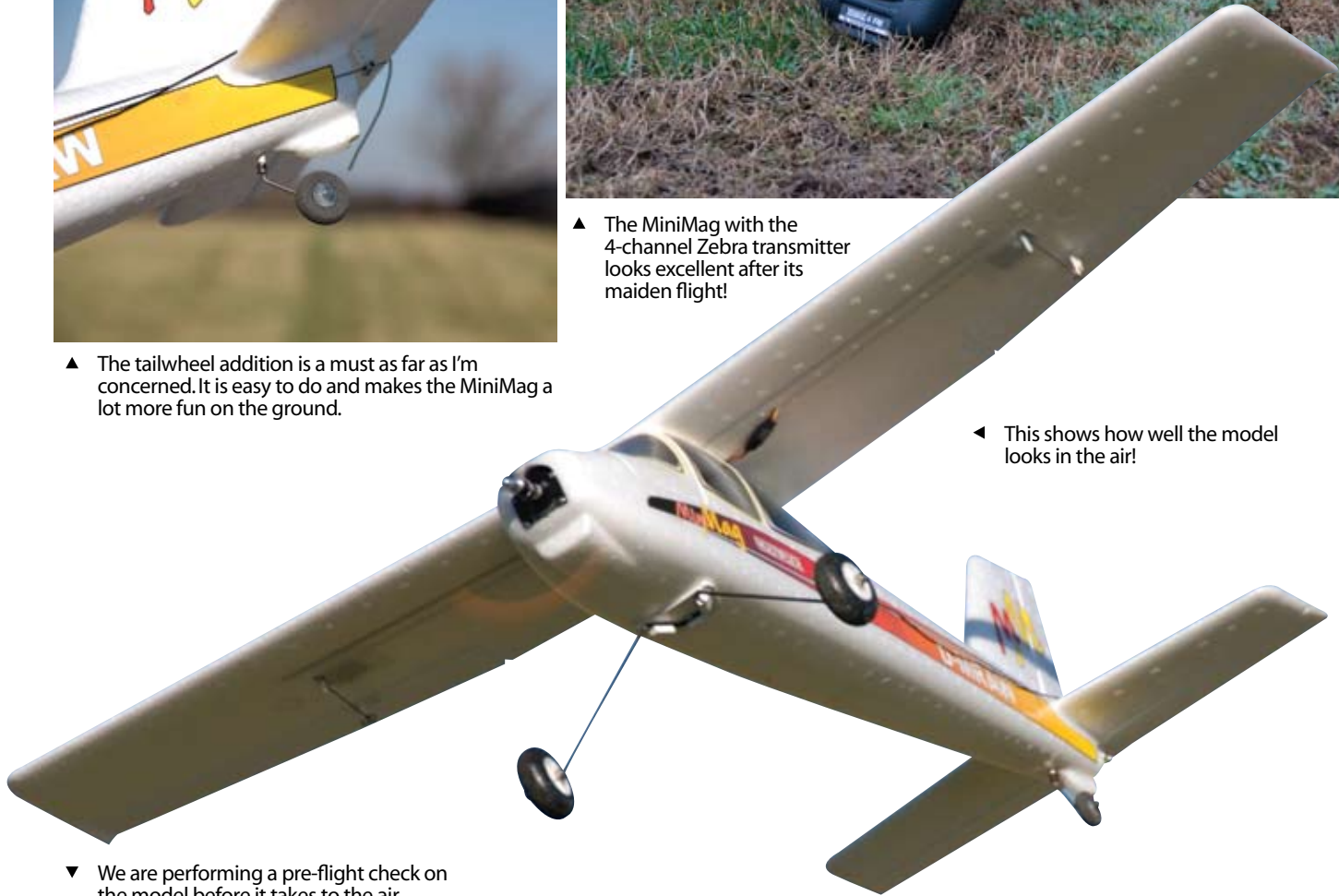
▲ The Hitec HS-55 servos and a Y-harness are needed for the addition aileron control.



▲ The tailwheel addition is a must as far as I'm concerned. It is easy to do and makes the MiniMag a lot more fun on the ground.



▲ The MiniMag with the 4-channel Zebra transmitter looks excellent after its maiden flight!



◀ This shows how well the model looks in the air!

▼ We are performing a pre-flight check on the model before it takes to the air.



POWER SYSTEM TESTING BY: Mike Hoffmeister

With the stock motor and GWS 7035 propeller, the power system produces 67 watts of power, giving the airplane a 0.5 thrust-to-weight ratio, pulling 8.7 amps. With the brushless upgrade (Himax HB-2815 motor, Multiplex 17 amp ESC and APC 7X4E prop), power is up to 108 watts, and the thrust-to-weight ratio is up to a sporty 0.8, pulling 14.8

- amps. As the graphs show, there is
- much more thrust across the throttle
- and rpm range, and the "Thrust vs.
- Throttle" graph really demonstrates
- how the power systems compare. As
- the throttle is advanced beyond 30%,
- the brushless motor's advantage
- grows quickly, and by 80-100%
- throttle, the difference is quite
- substantial.

MOTOR TEST STAND



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01

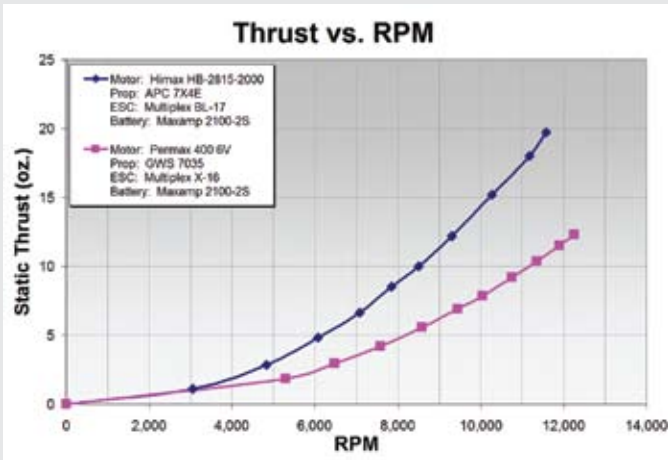
Power system testing rig is built around the Medusa Power Analyzer Pro system. Lots of good information can be gathered here!

02

This graph primarily shows the difference in propeller characteristics, but also shows the big gain in thrust with the brushless system.

03

With this graph you can see that the Himax HB-2815 really starts showing its advantage above 1/4 throttle.



02



03



The model comes with great graphics and a nice semi-scale look. I like it!



Comin' at ya! The model is very scale like in the air and looks good coming straight at you.



Climbs can be much more aggressive with the Himax HB2815-2000 brushless motor installed.

▼ With its nice colorful graphics, the MiniMag sure looks good in the air.



⊗ the MiniMag much more fun. Just like the improvement in the weather, the upgrades made the MiniMag shine.

Late Extra!

Almost too late to make it into this review, the brushless motor upgrade that I had been looking forward to finally arrived. Multiplex USA recommended a Himax HB2815-2000 with a Multiplex BL-17 brushless ESC. Coupled with an APC 7x4 Slow Flyer propeller and a 7.4-volt, 2S 2100-mAh LiPo battery, this new power system should really liven the MiniMag even more.

The conversion couldn't have been easier. The motor mount design makes changing motors a snap and everything fits great. With the heavier motor and lighter battery, making it balance on the CG was easy with a quick slide of the battery.

This time on a cold, snowy, gray day, I got another chance to fly the airplane. Now the take-off roll can be as short as 10 ft. Performance has made another jump and now the MiniMag is really fun to fly. Steep climbs and loops from level flight are no problem. The extra speed makes the aileron rolls a little smoother as well. Yet another worthwhile upgrade!

Conclusions

The MiniMag is reasonably priced, extremely durable and can truly be in the air in less than 2 hours. The tail wheel and propeller upgrades cost only a few extra dollars but add greatly to ground and flight performance. The brushless upgrade and aileron servos cost a bit more, but for sport flyers these upgrades take the plane to a whole new level of fun. **QF**

Specifications

Aircraft Type	Electric high wing trainer		Specs w GWS 7035:
Pilot Skill	Beginner to Intermediate	RPM	12,250
Wingspan	39.75 in.	Current Draw	8.7 amps
Length	32.25 in.	Watts	67
Wing Area	345 sq in.	Radio	Zebra 4-channel FM (supplied)
Airfoil	Flat Bottom	Instruction Manual	Good with nice diagrams
Weight, RTF	25 oz w/aileron		Brushless Upgrade:
Wing Loading	10.4 oz/sq ft	Batteries	2S 2100-mAh LiPo
Control Functions	Rudder, elevator, throttle with optional ailerons	Motor	HB2815-2000
Construction	Molded Elapor® Foam	Speed Controller	Multiplex BL-17 (brushless)
Radio Channels	Four	Propeller	APC 7x4 SF
Batteries	Two	RPM	11,575
Motor	Speed-400 (supplied)	Current Draw	14.8 amps
Speed Controller	Multiplex X-16 brushed ESC (supplied)	Watts	108
Battery	7-cell NiMH (supplied) or 2S 2100-mAh LiPo		
Gearbox	Direct Drive		
Propeller	Multiplex 5x4 (supplied); GWS 7035		
RPM	14,375		
Current Draw	8.1 amps		
Watts	62		

References

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*Suggested Retail Price: RTF \$195;
 Receiver ready (RR) \$120; Kit \$65*