

by Cliff Becker

# Multiplex Twin Star II

## Brushed vs. brushless motor systems

**T**he Multiplex Twin Star II is a stable and docile electric twin suitable for a new pilot entering electrics. It also has enough aerobatic capability to please the experienced flier. We tested it with stock Multiplex Permax 400 and Permax 480 brushed motors, and then with Permax BL-480 brushless powerplants. Performance grew from conservative to slightly improved duration to ballistic.

The kit comes complete with two Permax 400 brushed motors and all necessary hardware. You will just need to add a 4-channel radio system and speed controller before flying. I have flown both the original design PICO Twin Star and this latest version. They both fly well, but the new version offers some unique advances. The new version is composed of Elapor, a proprietary CA-friendly foam that is very durable.

### ASSEMBLY

There are very few glue joints when assembling the Twin Star. The parts fit together with no sanding and no painting is required. The

color is incorporated into the Elapor foam during manufacture, so if the material is scratched, you'll get no discoloration marks. The manual is clear and easy to follow. I easily completed assembly in three short evenings. The decals supplied by the manufacturer give the Twin its character. Overall, everything fit together well. A novice would have no trouble completing the assembly process and be very pleased with the outcome.

### TIPS FOR SUCCESS

There are a few areas that need close attention during assembly. Be sure to rough up all plastic control horns for better adhesion when Zapping them to the foam with ZAP CA. Also make sure the hinges are pressed securely in their proper locations when gluing. Finally, I use ZAP Thread Locker on all metal-to-metal screw connections. It takes no extra time, and ensures you won't have parts vibrating off the model after a few dozen flights.

To charge the batteries, I used the Multiplex Multi-Charger LN-



## MOTOR SYSTEM COMPARISON

I assembled three wings for this project and measured full throttle power with an Astro Flight Whattmeter. Each wing setup resulted in an all-up weight of within a fraction of an ounce of 53 ounces. Power consumption was quite similar for each setup, but the performance grew markedly—a clear case of increased efficiency.

### STOCK

#### MOTOR

Permax 400 brushed  
6V direct drive

#### BATTERY

8-cell 1800mAh  
NiMH

#### ESC

(1) Speed Pico 40A  
400 round

#### PROPELLER

Gunther 5x4.3

#### TOP RPM

12,230

#### FULL THROTTLE POWER

22.4 amps  
212 watts  
4 W/oz.  
64 W/lb.

#### DURATION

8 min.

#### PERFORMANCE

Conservative



#### NOTES

The kit's stock power setup has two direct-drive Permax 400 6-volt motors wired in parallel turning Gunther 5x4.3 propellers. I used a Pico 40-amp speed controller and an 8-cell 1800mAh NiMH battery.

### HOP-UP

#### MOTOR

480 Permax brushed  
7.2V direct drive

#### BATTERY

Multiplex 2S2P  
3000mAh Li-Poly

#### ESC

(2) speed RGUR Pico

#### PROPELLER

5x4.3 Gunther

#### TOP RPM

13,860

#### FULL THROTTLE POWER

18.2 amps  
148.5 watts  
2.8 W/oz.  
44.8 W/lb.

#### DURATION

12 min.

#### PERFORMANCE

Modest improvement



#### NOTES

The first hop-up wing setup has two Permax 480 7.2-volt motors with a Pico 400 round speed controller soldered to each motor. These assemblies were wired in parallel to the battery. The speed controllers can be connected by using a Y-connector to the throttle channel (what I used) or by using two channels and mixing. I used two Multiplex 2S 1500mAh Li-Poly batteries in a 2S2P configuration, which gave me 3000mAh. I used the stock Gunther 5x4.3 props.

### HIGH PERFORMANCE

#### MOTOR

Permax BL-480D brushless  
7.4—11.1V direct drive

#### BATTERY

Kokam 2S 3200mAh  
Li-Poly

#### ESC

(2) Multicont BL-27s

#### PROPELLER

APC 5x5 speed 400 props

#### TOP RPM

16,800

#### FULL THROTTLE POWER

19.4 amps  
152 watts  
2.9 W/oz.  
46 W/lb.

#### DURATION

20 min.

#### PERFORMANCE

Ballistic



#### NOTES

The high-performance setup used two Permax BL-480D brushless motors, two Speed Multicont BL-27 controllers and a Kokam 2S 3200mAh Li-Poly battery. The motors are wired in parallel and the speed controllers can be set up as previously explained in the hop-up wing. I used APC 5x5 speed 400 props.

## SPECS

**PLANE:** Twin Star II

**MANUFACTURER:** Multiplex

**DISTRIBUTOR:** Multiplex USA

**TYPE:** Twin powerplant

**FOR:** Average to expert flier

**WINGSPAN:** 56 in.

**WING AREA:** 4.7 sq. in.

**FLYING WEIGHT:** 53 oz.

**WING LOADING:** 11.5 oz./sq. ft.

**LENGTH:** 43 in.



An antenna tube is glued into a groove on the underside of the fuselage.

**RADIO:** 4 channels required; flown with a Hitec Optic 6 transmitter, Hitec Electron receiver, four Multiplex Tiny S micro servos

**MINIMAL FLYING AREA:** Club or large ball field

**PRICE:** \$89.99

#### COMPONENTS NEEDED TO COMPLETE:

4-channel radio system, speed control, ZAP CA glue

## SUMMARY

Multiplex has designed a very stable and responsive twin that flies nicely, is extremely tough and, if you suffer a hard landing, is easy to repair. With brushless motors, the Twin Star II exhibits strong vertical performance and extended duration, and can perform in windy conditions that would ground many aircraft.

## PROJECT MULTIPLEX PICO TWIN STAR II

2010. This is a 12V-powered automatic fast charger for 1-4 Li-Ion/Li-Poly cells or 1-10 NiCd/NiMH cells, so it covered the bases.

### LATEST TWIN STAR IMPROVEMENTS

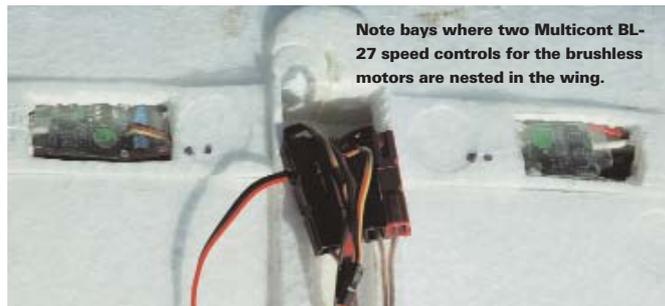
The latest version incorporates several innovations that help the construction go very smoothly and create a sleeker aircraft. The control rods for the rudder and elevator are now secured in grooves on the outside of the fuselage for strong, flex-free linkages. There is also an antenna tube incorporated into the base of the fuselage. The wing alignment is now molded and keyed into the fuselage, ensuring correct wing alignment with no guesswork.

A tube joiner allows the two-piece wing to be separated for transport.

The motors now attach to motor mounts that are secured to the foam nacelles. The cabin area no longer uses rubber bands. The aft part



The Permax BL-480D brushless motor secured in one of the nacelles.



Note says where two Multicont BL-27 speed controls for the brushless motors are nested in the wing.



Main wing hold-down bolts are shown extended prior to mounting the wing.

slides into a notch into the fuselage and the front part clips into place. The nose of the fuselage has been elongated four inches, creating a sleeker-looking model and allowing more room forward for locating

Li-Poly batteries and balancing the plane. These are all great improvements over the old design.

### HORSING AROUND

I really enjoy flying this plane. I bring it to the field every time I fly, and I like to horse around with all sorts of stunt flying. One afternoon I was skimming inverted over the field about six inches from the ground and got buffeted by unstable air. My reflexes kicked in, instead of my brain, and I pulled back on the stick. Need I say anything further? The wing blew off, the fuse cracked in half and half the stab was ripped off. It looked like a tangled mess. Believe it or not, after applying some ZAP, and by the time the Lithium battery was recharged, the plane was ready to fly.

The Elapor foam is very durable, can take a beating, can be broken up, repaired and fly as if it just came out of the box. Incidentally, the December 2005 issue of Fly RC has an outstanding article by Tom Hunt on the Permax BL-480D and BL-480G brushless motors.

### CONCLUSION

Multiplex has put together a very durable, stable aircraft. Any average flier can have a ball with this twin. I liked the high-performance

## AIRBORNE

Let me reflect for a moment to set the stage for the flight of the Pico Twin. During WWII the P51 was developed in the U.S. and sent to England to support the war effort. Performance was average—not outstanding, so the Brits installed their own powerplant and the P51 evolved into the super fighter legend we know today. This is the same scenario with the Twin Star II. It has a good airframe design and the standard powerplant is quite adequate for flying.

The afternoon of the first flight was a blustery day of 15-20 mph gusts. You know how it is, you're at the field and you're there to fly. Conditions are not great, but you've been waiting all week to get a plane in the air. So I did. The Twin Star was launched into the brisk wind and penetrated very well with all three wing setups. With the stock wing, I had to use a lot of rudder when turning into the wind. With all three wing setups, and the plane properly balanced, I could "hover" the plane right into the wind.

The glide path is also very predictable and you don't lose a lot of altitude until you push the nose down. With the Speed 480 hop-up, the speed increased when penetrating into the wind and, because of the greater capacity of the Li-Poly batteries, the duration of flight time was longer.

The 480 motors and Li-Poly battery modestly increased the flight performance and offered extra minutes of flight time. With the brushless system, the plane jumped out of my hand and climbed at a very steep angle into the wind. Fantastic performance! At two-thirds throttle the plane cut through the air effortlessly. The brushless power system gave the longest flight duration and the most precise maneuvers. There was plenty of power to spare. With the first flights in these windy conditions, I was quite impressed with the plane's performance.

Several days later when the air was calm, I evaluated the stall characteristics and tracking of loops and rolls. When the twin stalls, the nose drops, the wings stay level, the plane picks up speed, the nose picks up and the plane levels off. This can be done all the way to the ground. Loops, rolls, split S's are all very crisp. The plane responds to these maneuvers effortlessly with all three wing setups. The brushless setup maximized the range of maneuvers.

I've flown this plane for several months now, and I've let my fellow club members fly the Twin Star II. Many of them have been impressed by its stability in a variety of air conditions.



setup the best. Obviously, it costs more but over the long run, with the proper battery setup, you can easily get 20 minutes of flight time with plenty of thrust. I am able to keep up with any typical 40-size glow plane, and I keep the Twin Star II in the back of my car. At a moment's notice, I can launch it and have a satisfying, relaxing flight. 🌟

### Links

**APC Propellers**, distributed by Landing Products, [www.apcprop.com](http://www.apcprop.com), (530) 661-0399

**Astro Flight Inc.**, [www.astroflight.com](http://www.astroflight.com), (310) 821-6242

**Multiplex**, [www.multiplexusa.com](http://www.multiplexusa.com), (858) 748-6948

**ZAP** is manufactured by Pacer Technology, [www.zapglue.com](http://www.zapglue.com)

For more information, please see our source guide on pg. 177.

