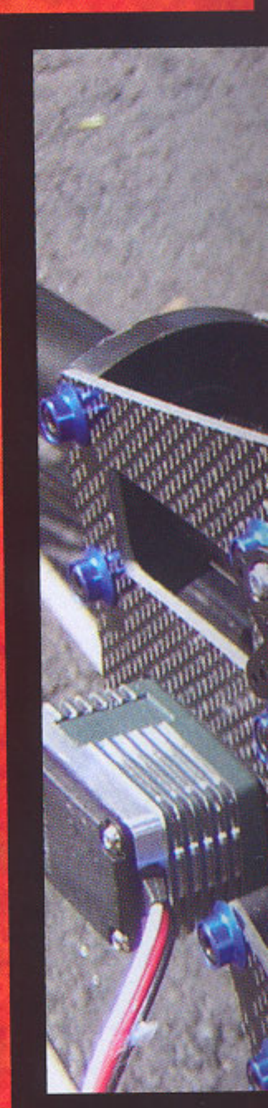
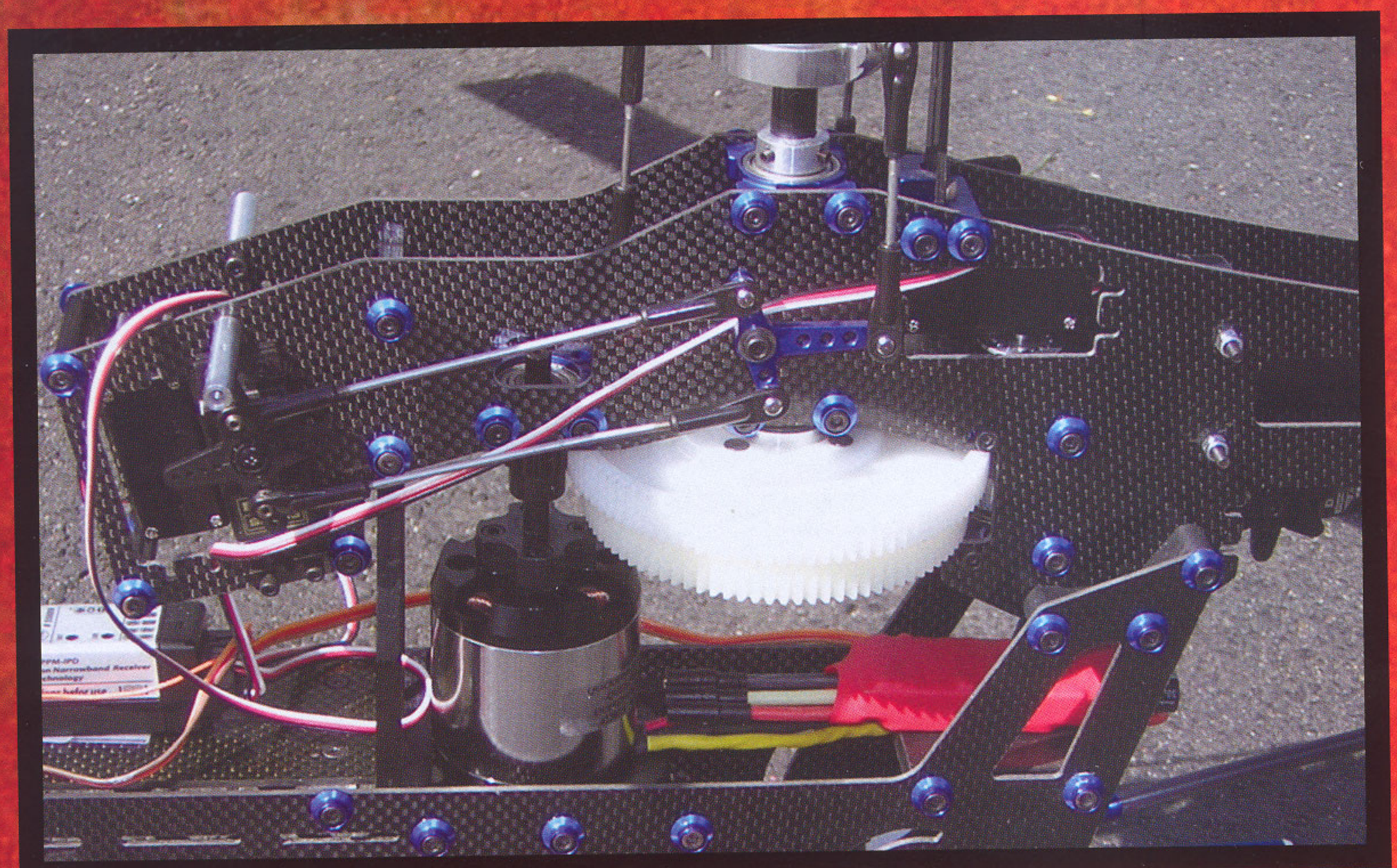
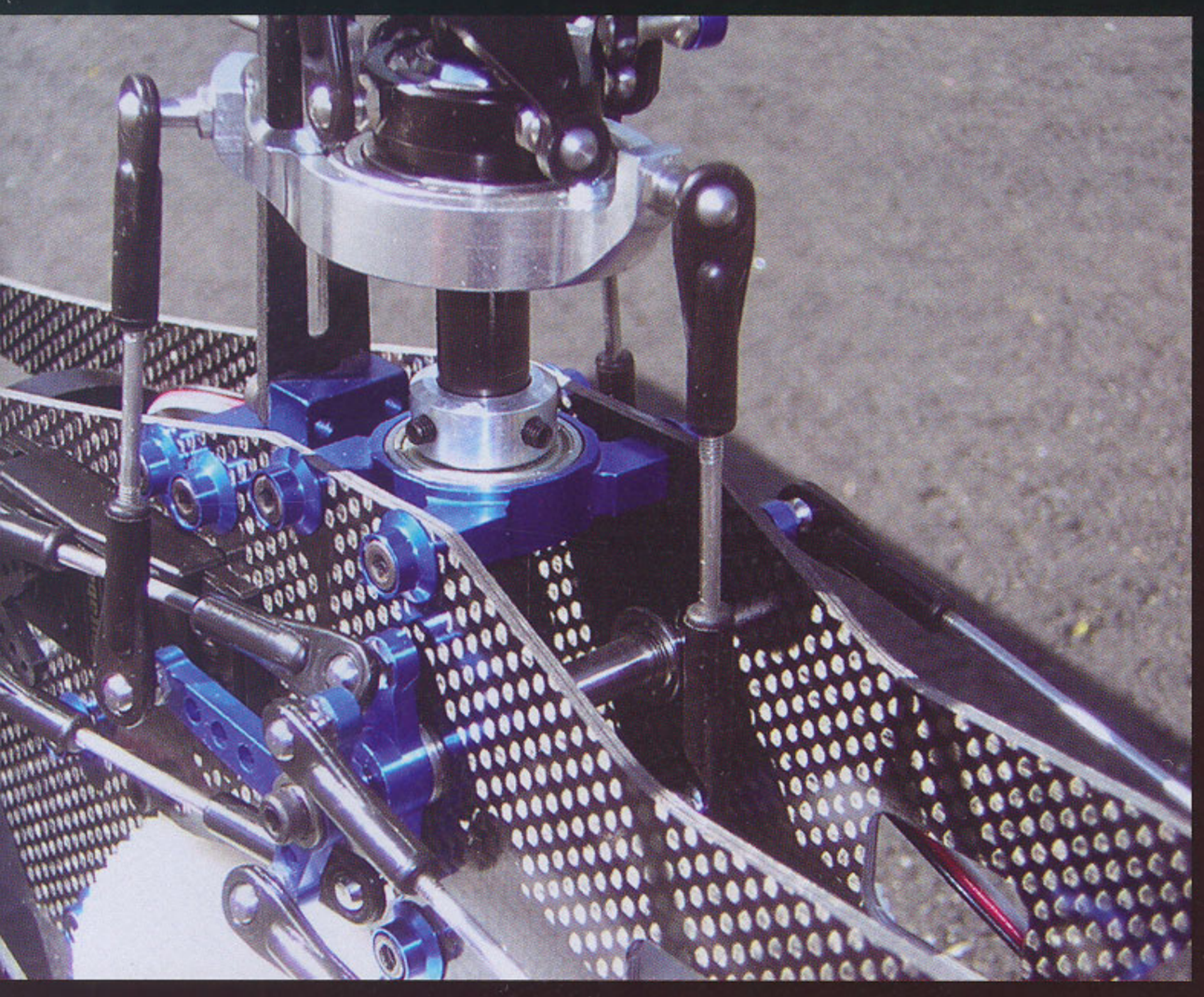
HH - QUICK Outdo 600

The EP Outdo 600 from Quick World Wide in Coopersburg, Pennsylvania is a big new electric helicopter designed for high performance 3D flying. The finished weight, including a 10s Li-Po battery is under 9 pounds. The vertical performance is stunning when a good brushless motor and a 10s or 11s Li-Po battery is used. The Outdo was based around the Quick World Wide nitro version Q50 helicopter platform. When it comes to vertical performance, this electric helicopter will out perform a Raptor, or Evo 50, hands down.





This model is powered by Quick World Wide's own Outrunner brushless motor and a 77-O electronic speed controller.



The 120-degree CCPM control system with push-pull for fore/aft cyclic control is shown here.

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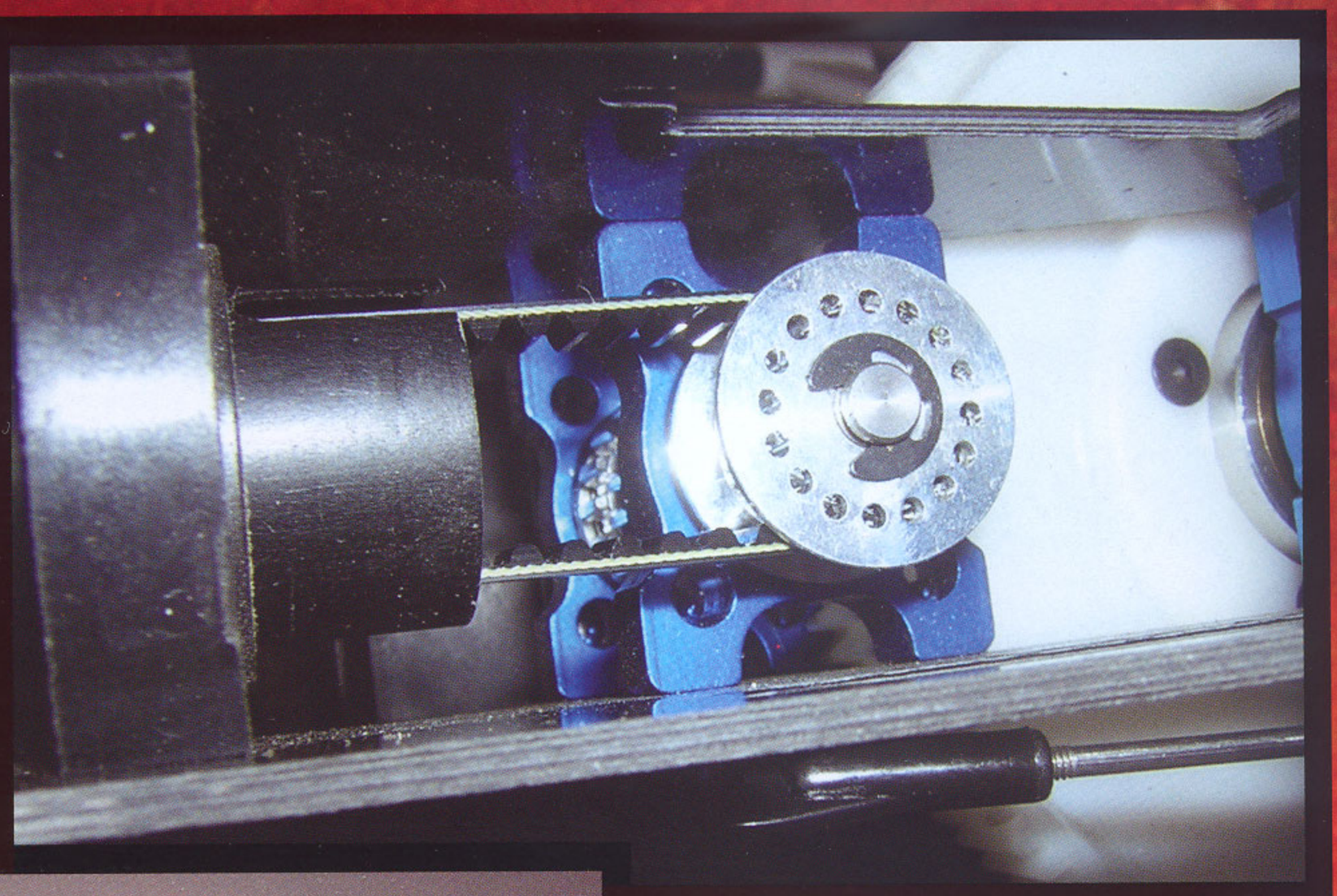
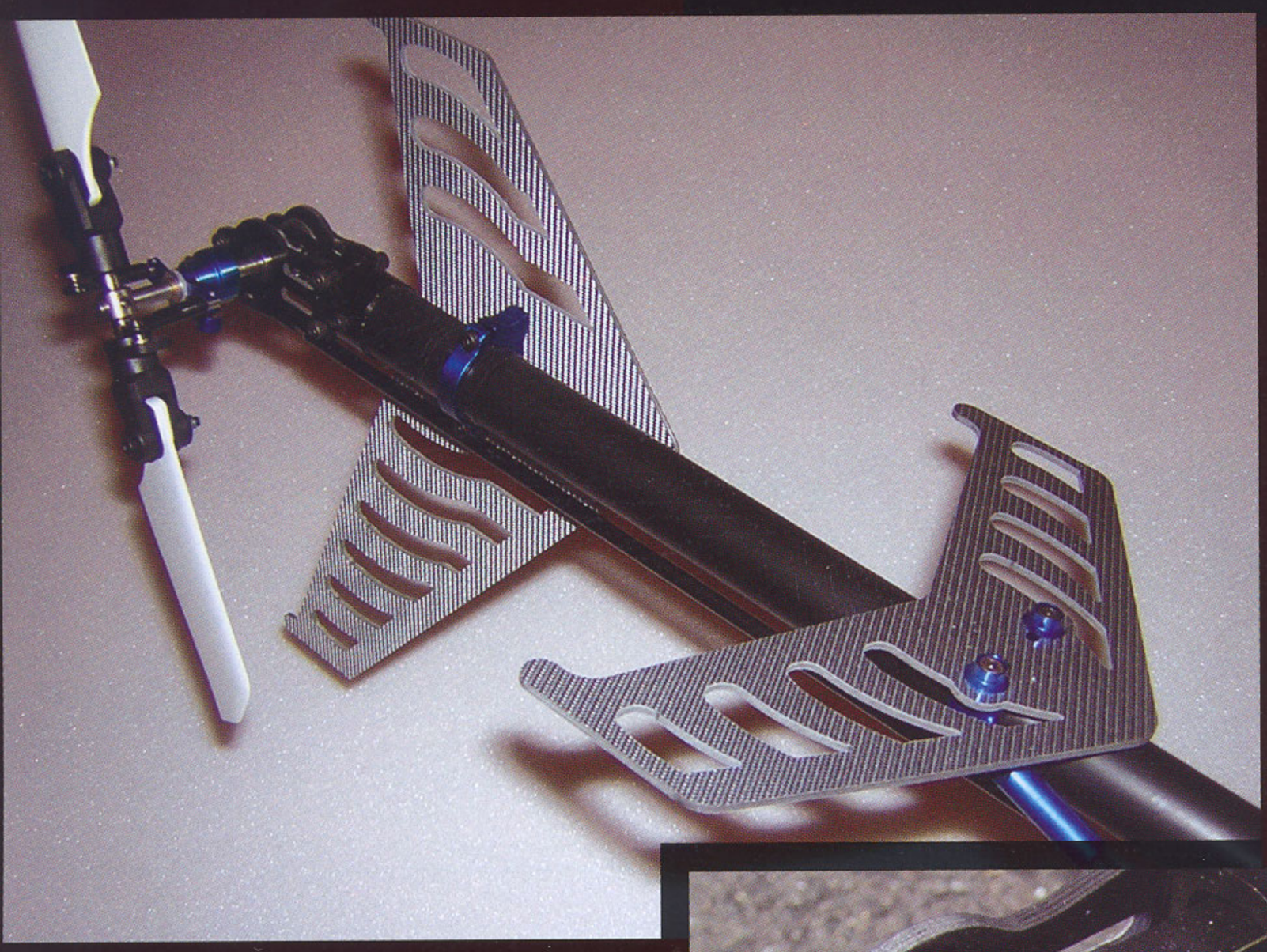
The tail boom length caters to 600 mm to 640 mm length rotor blades. For best performance use 620 or 640 mm carbon blades with a wide chord. We built this model and equipped it with the motor and ESC recommended by Quick, the resulting flight performance blew away most 50 to 90 class nitro helicopters.

The EP Outdo 600 was designed and built around the Quick World Wide nitro version Q50 helicopter platform. The upper frame assembly, main rotor and tail rotor system are from the Q50 family. The lower frame was redesigned to provide a protective box for flight batteries. There are two versions of the EP Outdo 600: a Sport kit that has G-10 fiberglass side frames and plastic blade grips, and a Pro version, which features carbon frames and a metal main rotor head. The Sport kit is $549.00 and the Pro kit is $649.00. We built the Pro version.

Unlike a nitro helicopter, where nitro engine dimensions, crankshaft length and thread have all been standardized, our electrics have yet to establish a universal standard. Most 50-class nitro kits will fit typical OS 50, Thunder 50H or Webra 55H engines. All these engines develop peak horsepower at similar rpm, around 15,500. However, this standardization does not exist for electric helicopters because most electric

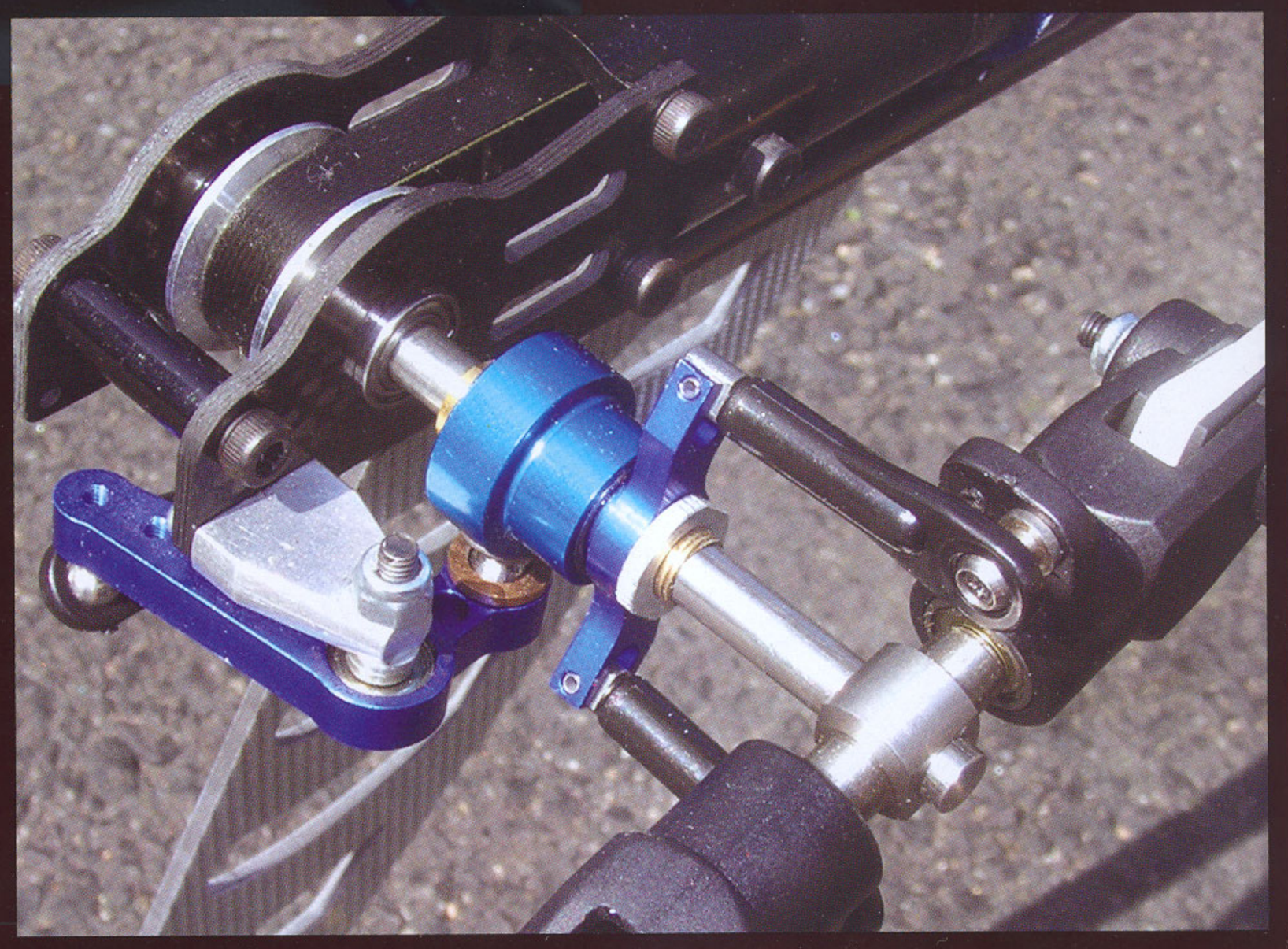
OutDo 600 EP





Above: The belt drive metal pulley used for the tail rotor system.

Left: The 3D style light-weight carbon tail fin set & tailrotor.



Right: The Outdo's nice ball bearing supported tail rotor pitch control mechanism. Note carbon sideplates for the T/R transmission.

motors are designed for RC airplanes and mounting dimensions are not as much an issue. The choices in electric have grown exponentially with offerings from Europe, Asia and the US.

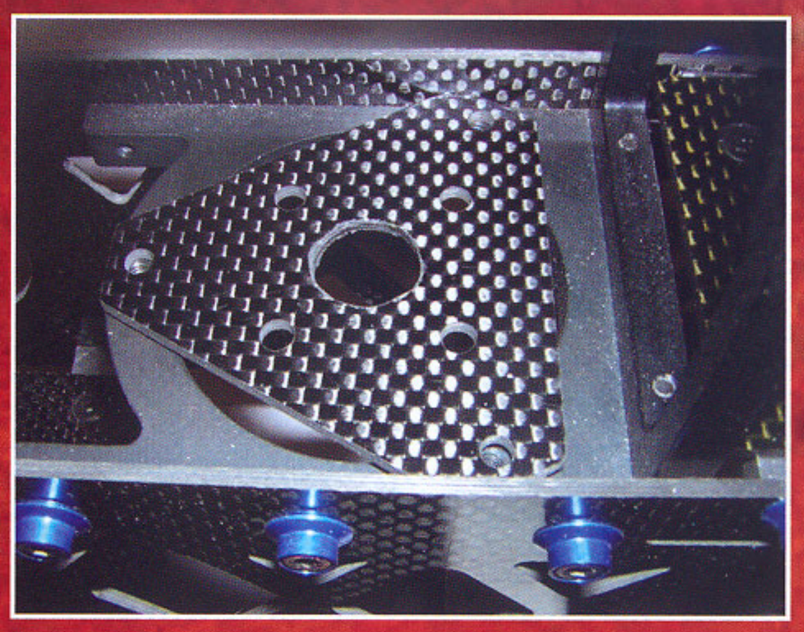
Different brushless motors that may have similar outer dimensions may have internal windings and kv ratings (rpm per volt) that are vastly different. Peak horsepower occurs at different rpm for different motor designs. The pilot must experiment with different gear ratios to match up the motor and helicopter. This can become a scientific project in itself. To prevent this hair-pulling experience, it is advisable to use the electric motor, pinion, and ESC recommended by the electric helicopter manufacturer.

We used the Quick World Wide 4130/16 Outrunner brushless motor recommended for the Outdo. This motor has a kv rating of 410 rpm per volt. The 10s Li-Po battery we have chosen produces a nominal voltage of 3.7 volts per cell, and 10s means 10 cells in series, which yields 37 volts for the whole battery setup. 410 rpm per volt times 37 volts, in theory, produces 15,170 rpm under no load. This is similar to the peak rpm for a 50 to 90-class nitro fuel engine. Three different motor pinions are included in the Outdo kit, 13, 14 and 15-tooth. We found the 14-tooth as a good choice in providing excellent balance between adequate rotor speed and powerful torque. The performance of this helicopter with a 10s battery and the 4030 motor matches high performance 60 to 90-class nitro helicopters. Based on how well this motor pulls our 8.5-pound Outdo helicopter through the air, we estimate that it produces at least two horsepower, and is an excellent match for this helicopter.

Luckily, a 4130/16 motor was used, because when using an Outrunner motor on the Outdo, the motor must be mounted upside down and a special adapter/shaft extension is required to be mounted to the motor casing. On the Outrunner, it is the motor casing that spins and not the motor shaft. The advantage of Outrunner motors is they provide higher torque.

The adapter/shaft extension fits the 4130/16 motor perfectly. The 14-tooth pinion is then slipped over this extension shaft. When other brands or sizes of motors are used, there is a good chance the adapter/shaft extension will not fit or match the mounting holes on the motor casing. This 4130/16 motor at $109.99 is very inexpensive for a powerful brushless motor. Comparable brushless motors can easily cost 50% more. The specifications for this 4130/16 motor says it is designed for 10 to 11 cell Li-Po battery operation and the maximum continuous current is 40 amps. This powerful motor weighs 14 ounces, which is not much more than most 50-size nitro engines.

The motor attaches to the Outdo frame with a carbon mounting plate and four 4 mm bolts. The carbon plate then bolts to the Outdo aluminum frame spacer with three 4 mm bolts. The system aligned flawlessly with the bearing block for the motor pinion. We chose to mount the ESC (electronic speed control) on a tray behind the motor. This tray was originally intended for mounting the gyro. However, we chose to mount the gyro on the front and locate the ESC in the rear. The goal is to keep the ESC far away from the radio receiver to help prevent glitches. The motor and ESC are the two biggest generators of electric noise that can interfere with radio operation. The receiver we have selected is a Multiplex FM receiver with frequency synthesizing and IPD features. IPD is a proprietary intelligent digital signal-processing algorithm, developed by Multiplex to make the receiver immune to noise. Electric helicopters usually have more RF noise issues than nitro engine models, thereby it is important to use the best FM or PCM receiver available.



Above: The 4130/16 brushless Outrunner motor from Quick World is recommended because the shaft extension is necessary and designed to fit this motor.

Above Right: The motor is attached to a carbon plate, and then the plate bolts to an aluminum frame spacer.

Right: Two Thunder Power Prolite Gen II 5s 4000 mAh Li-Po batteries connected in series with a homemade Y-connector. The batteries are 13 inches long.

The gyro we have used is a prototype micro heading hold gyro. We have made an extra effort to keep the weight of this helicopter light. Light equates to highest performance for electric helicopters. Instead of using a 6000mAh Li-Po battery, a 4000mAh Li-Po battery was used. The sacrifice is shorter flight time, but the flight performance is stunning. Originally, a 1000mah NiCd battery was used to power the receiver, servos and gyro, but was later replaced by a 3 amp, 6-volt switching voltage regulator from www.medusaproducst.com. The Medusa Research switching BEC weighs 0.5 ounces. The all up weight for our Outdo is only 8.5 pounds. This is why our Outdo electric model has an excellent vertical climb rate.

Choosing an ESC is not as critical as choosing a motor. The driving factors for selecting a suitable ESC are: continuous and peak current rating, ability to handle the number of Li-Po cells used, and whether the ESC can match the pole count and timing of the motor. The Jeti 77-O is recommended by Quick World Wide for the Outdo, combined with their 4130/16 motor. Jeti is a company from the Czech Republic that has been making ESC's, battery chargers, and brushless motors for many years and has developed an excellent reputation. The 77-O ESC is rated at 77 amps continuous max and it is used by Ion-X pilot to control Hacker motors. The Ion-X is a 10+ pound helicopter, so the $169 77-O is sufficient for the Outdo.

The Outdo helicopter assembles rapidly. There is no cooling fan shroud or clutch assembly. The carbon box frame design is rugged and offers excellent protection for the battery. Two Thunder Power 5s 4000mAh Li-Po batteries fit in the battery compartment as if they were designed for each other. The batteries we ordered are off-the-shelf items from www.thunderpowerbatteries.com. The two 5s batteries are connected in series to form a 10s battery pack. Each cell provides approximately 3.7 volts, so the 10s provides 37 volts total.

Each 5s battery is one foot long but it is entirely enclosed in the Outdo carbon battery compartment. This is a nice design. On the Mikado Logo, the long

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During testing, the Outdo was flown spirited, as we would fly our 50 or 90 nitro-powered models. The standard 3D routines such as Rainbows, Funnels, Piros Flips, Rippers, Tick-Tock, Tail Slides and others were laid down on the Outdo and it handled them as if it had a powerful nitro engine hiding inside. The only abnormal thing is no engine noise. For pilots who are used to flying high performance nitro models, flying the Outdo will give them the same feel. There is no delay in collective and collective pumping does not stall the rotor (if the proper motor pinion is used). This is why it is so important to use the factory recommended brushless motor when buying any electric helicopter, especially the bigger electric models.

The Outdo's size is approximately that of an Evo 50 or Raptor 50 nitro helicopter. However, the vertical climb rate of the Outdo, on a freshly charged set of batteries, will outdo the Evo 50 and Raptor 50. During the six minutes of 3D flying, the flight performance does not gradually drop. The rotor speed was steady for the entire 6 minutes: that is impressive. This is the benefit of modern Li-Po batteries; they have a flat discharge curve, they can maintain a constant voltage for at least 80% of the discharge and suddenly the voltage falls off steadily and the rotor speed drops. That is the time to land, immediately, otherwise the longevity of the battery will be curtailed.

The initial investment of a large electric helicopter is higher than nitro helicopters. However, in the long run, the cost of operation is about the same. The Outdo lives up to its name and it smokes most nitro birds.

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