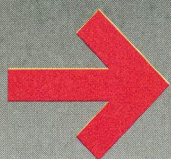


QUIET THUNDER

THUNDER TIGER IS A VERY WELL KNOWN BRAND OF MODEL HELICOPTERS, CHANGING THE FACE OF THIS HOBBY WHEN THEY INTRODUCED THEIR RAPTOR 30 MODEL MANY YEARS AGO. THE LARGER RAPTOR (60 THEN 90) MODELS WERE EXTENSIONS OF THEIR SMALLER SIBLING AND WERE CONSIDERED GOOD FLYING MODELS BY MANY. THE LATEST 90 SIZE THUNDER TIGER MODEL IS THE G4. WE'VE TESTED THE NITRO VERSION ALREADY, BUT HERE OUR US CORRESPONDENT, TIM DIPERI TRIES OUT THE ELECTRIC FLY-BARRED VERSION, KNOWN AS THE E720, TO SEE HOW IT SUITS F3C COMPETITION

ON TEST



I first had an opportunity to see the G4 in person at the 2011 World Championships.

Interestingly enough, the designer of the model and very first F3C world champion, Shigetada Taya, was also at the Worlds as one of the Japanese judges.

I spent many days (as US team manager) with Wayne Mann and his G4. Wayne was flying the only G4 that made the finals at this World Championship. During that time I had an opportunity to see how smooth and well behaved the fly-

barred FAI model was. Additionally, I spent quite a bit of time chatting with many of the judges; including Shigetada Taya.

The Thunder Tiger G4 series of helicopters actually comprises four models; two electric models (one 3D flybarless and one fly-barred designated E720) and two 'wet' nitro-powered models. With the popularity and performance of flight control systems, it's a little surprising that a manufacturer is offering a new product with a fly-barred control package. I'm sure that it's no accident that a former world champion designed a model for (F3C) competition (the FAI rules do

not allow flight control systems to be used at this time).

When I was given the opportunity to try one of these models out, I opted for the electric fly-barred version. I spend most of my hobby time preparing for competition so I thought I'd be better off testing the contest quality and performance of the model.

This model reminds me a bit of the 'high end' contest model that Shigetada Taya introduced years ago called the Imperio. The quality of design and parts are that which we have come to expect from many of the high end Japanese helicopters, but at a fraction of the

cost. This model comes in at the sub-thousand dollar mark as a street price in the USA. While there are some other models in this class that come in a little lower, now I've had the chance to look over the model properly, I believe it's great value.

As I understand it, Shigetada Taya first designed the electric model and then designed the nitro version. I found that very exciting since most electric models on the market today started their design life as liquid fuelled designs. Being a 'purpose built' electric product really ensures that the model's drive train easily handles the significant power from modern electric motors.

Features at a glance...

- Easy & fast conversion between fly-barred or flybarless rotor system
- Hardened 15mm steel main shaft
- Adjustable Bell-Hiller mixing ratio can be set for F3C or 3D (Raptor 90G4 & Raptor E720) 4. Aerodynamic carbon paddle (Raptor 90G4 & Raptor E720)
- Collective pitch range +/-15 degrees (Raptor 90G4 & Raptor E720)
- High-quality, color shifting preprinted FRP canopy
- Lightweight and rugged landing skid for low center of gravity
- Rigid 2mm carbon main frame
- Lightweight, high- quality screws hardware
- All metal servo horns & control arms assembly eliminate the need for upgrades
- Lightweight and vented, high-duty 17mm helical main gear
- Innovative Quick-calibration system
- A easy conversion between nitro and electric powering
- Heavy-duty helical bevel tail gears
- Lightweight, one-piece machined metal tail case
- All metal, high-precision & heavy-duty tail rotor system
- Efficient torque tube drive system for crisp rudder response and 100% power transfer
- Easy-install rudder rod guide
- Lightweight one-piece metal tail boom bracket
- 3D carbon vertical fin and carbon tail boom support
- Optional carbon horizontal fin available (option parts)

BUILDING THE MODEL

The model goes together very nicely and the instructions and marked bags make assembly quite a pleasure. Many of the CNC machined parts are packaged in a foam cut square and covered with a clear plastic cover looking more like a trophy box rather than a container for parts.

The rotor-head was the first thing to build. The head offers a great deal of flexibility for FB ratio's to allow the 3D pilot or the contest pilot to enjoy the model. I chose the contest settings on the ratios.

This rotor-head uses a pinned pivot point at the centre of the feathering shaft. The pivot point actually uses a large bearing in the centre of the head. After chatting with US team member, Wayne Mann, I decided to do away with the pinned pivot and allow the feathering shaft to freely float. Additionally, I used (also chatting with Wayne) some softer head dampers.

The model build is very straight forward using a carbon fibre frame set with a mixture of braces, plates, bearing blocks and plastic blocks

for assembly. The 'monster' hollow 15mm main shaft is actually lighter than most 10mm shafts. The frame is basically assembled on one side completely and, then, the other side of the frame is bolted on. I kept all of the bolts a bit loose and tightened them all when I stood the mechanics on a flat surface and added some Loctite.

RADIO INSTALL

I was chatting with a fellow modeller about this heli. While the basic radio controlled model helicopter has had very little innovation over the past few years, it is nice to find those nuggets of brilliance within this model's design. I found one of these 'nuggets' while installing the radio equipment.

I used all Futaba (BLS) servos as well as a GY-701 gyro for this model. For years, most contest pilots have worked very hard to re-drill servo wheels so that the control ball is exactly in the spot needed. Sometimes some of us use sub-trims to get the servo centred but that presents its own issues. Additionally, if a servo needed replacement, the drilling would begin again.

The G4 series of models uses a servo arm that has unlimited adjustment for fine tuning. Additionally, the frames are fitted with the control arms to aid in a 'quick calibration' (zero pitch) that makes life easier for basic set-up but fine tuning is imperative (as is traditional with most F3C contest model helicopters).

The only thing I varied from the stock kit was adding a rear (tail rotor) servo mount on the tail boom. This makes transportation disassembly simpler and there is no worries of an electric motor spewing oil into the servo.

The other thing I did was to add a horizontal fin. With this model being tested as a fly-barred competition helicopter, this really requires the use of a horizontal tail fin. I had one from another contest model and, with the help of some stand offs, mounted it to the model

POWER SYSTEM

For the power system I chose to use the KDE Direct 495KV motor, a Scorpion Commander 130 amp speed controller and Pulse LiPo batteries.



Parts are supplied in marked bags



All components are well packed



Rotor-head uses a pinned pivot point



The machining is all top quality



Neat bearings in the rocker arms



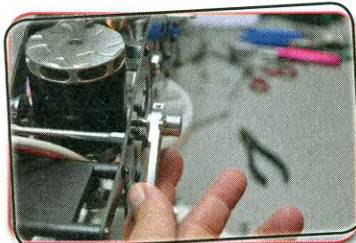
Everything fits together nicely



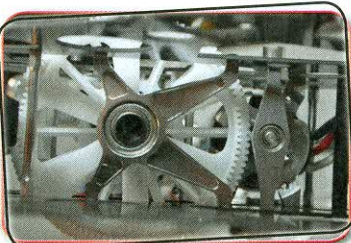
Even the blade grips are works of art



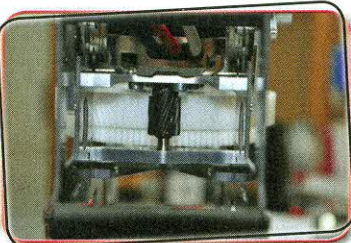
Frames are made from carbon fibre



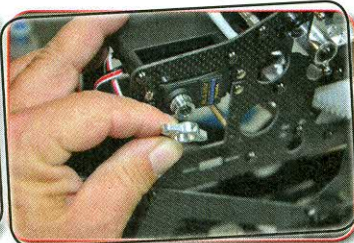
Fitting the control arms



View of the hollow mainshaft



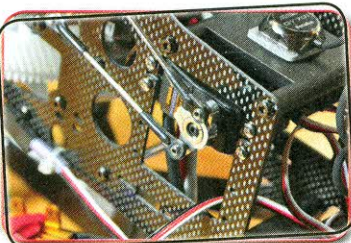
Main gear and spiral pinion gear



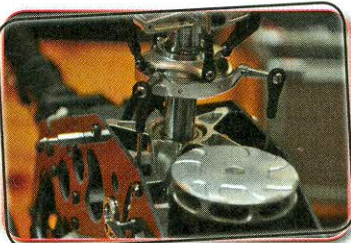
Servo setup is made easier



Close up of the rotor-head details



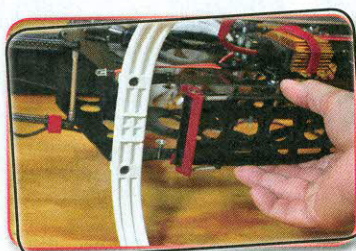
Controls arms are easily adjusted



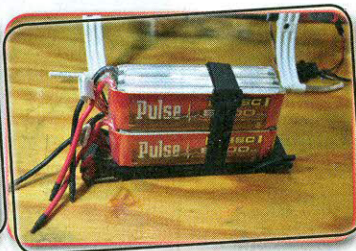
Everything fits with close tolerance



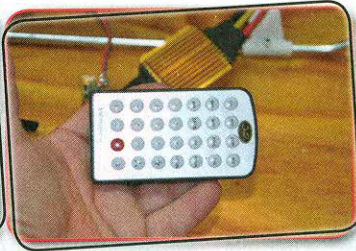
Mainshaft locked in place



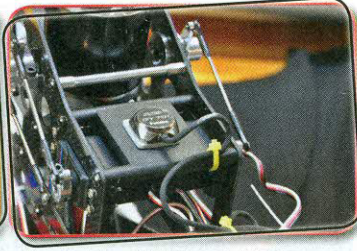
Quick release battery cradle



Batteries are easily removed



Handheld Scorpion ESC programmer



Tiny Futaba GY-701 gyro fitted



The completed rotor-head assembly



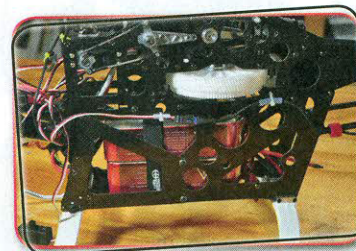
Neat pre-painted Raptor G4 canopy



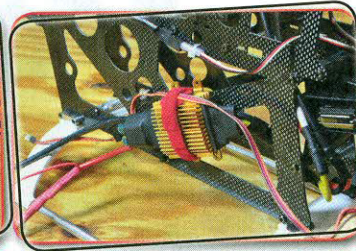
KDE Direct motor offers plenty of power



Very robust main gear



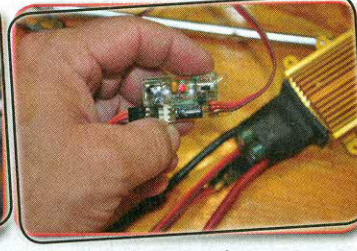
Completed frame with batteries fitted



ESC mounted on the side frames



Close-up of the rotor-head



Scorpion ESC's IR receiver

KDE Direct (www.kdedirect.com) is an American manufacturer of high quality aftermarket parts for popular model helicopters. Recently, KDE Direct has introduced a series of high performance electric motors for most that range from 450 size helicopters to the 700mm (blade length) models.

One of the features I really like on the KDE Direct motors is the

universal mounting pattern. It makes life simple to have options while mounting a motor. In this case, the Thunder Tiger mount plate also has some universal holes as well.

The other thing I really like about this out-runner motor is the incorporated cooling fan. The fan is optimised for high volume of air flow with low current draw. I checked the motor after each flight and found

that the temperature was much cooler to the touch than other motors I use.

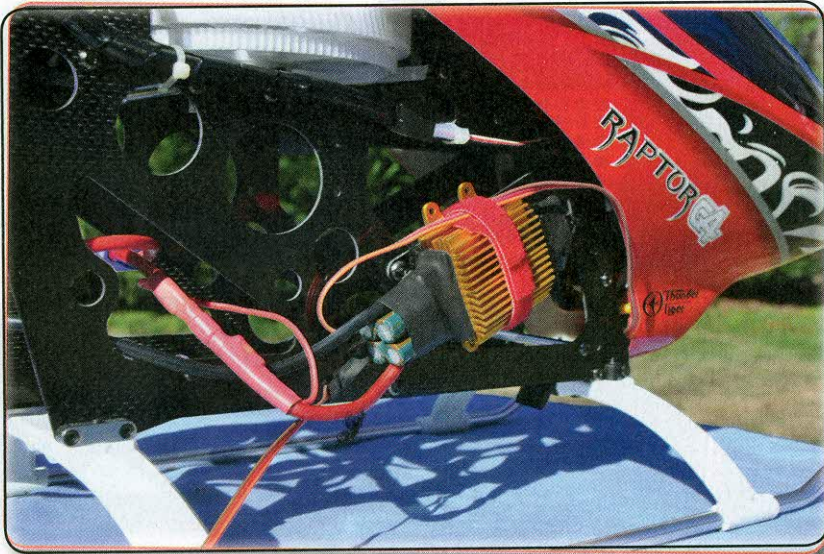
The kit comes with an 11-tooth pinion (slant gear) but for the 495KV motor I needed a 12-tooth gear. The main gear is robust to say the least. This main gear is about twice the thickness of most main gears in this class; almost 25mm thick. Again, the model was designed to use the

very high power output of modern electric motors and the thick, slant gear design does just that. Additionally, the gear train is very smooth and quiet.

I chose to try out a Scorpion speed controller. Scorpion is a very well known brand of electric motors and speed controllers. Up until recently, Scorpion did not manufacture a ESC for the 700 class model.



The E720 follows the style of previous Raptor models and looks great



The speed controller mounted directly to the frames and exposed for good flow of cooling air



Standard carbon fibre fly-bar paddles are supplied



Horizontal tail fin fitted especially for F3C contest flying



Tail servo is neatly wired up



The finished alloy rotor-head is free from any slop



Tail servo mount added to the tail boom



The E720 is a very well made and thought out design

The Scorpion Commander 130A controller is designed for 12S (50 volts) power. Since this was my first experience with a Scorpion ESC, I had a few questions so I contacted Innov8tive Design which provides great phone service for me (www.innov8tivedesigns.com).

The ESC uses a unique programming receiver and (hand held) programmer. The IR receiver is connected in series from the throttle to the ESC. There is a switch on the IR receiver that allows the user to go from the 'run' mode to the 'program' mode. The IR receiver can be left connected at all times if wanted (or it can be removed and the ESC can be connected directly to the throttle channel).

I really like the hand-held unit to program the ESC. In the past, I have had to keep a note book computer with me just to adjust some other ESC products.

I simply went through the different parameters needed to program the ESC and powered up the model. The Commander 130 has a governor feature that holds head

speed consistent. Since this model has been built for F3C competition, I used a two-speed head set-up; one for hovering (approx 1,500rpm) and one for aerobatics (approx 1,975rpm) by setting flat line throttle settings on the transmitter in the governor mode.

Finally, I powered up the entire system using Pulse batteries (www.pulsebattery.com). I chose two 6S 5000mAh (45C). Pulse batteries have been using premium cells to manufacture high quality packs. I've found the packs to perform very well compared to similar size packs from other manufacturers. Some well known 3D champions are flying these packs; more information can be found on their website.

One of the additional 'nuggets' is the innovative battery tray the electric model comes with. It is one of the cleanest quick packages I have seen to date. I can literally pull a full set (two x 6S 5000mAh) of batteries out of the model in 10 seconds! I picked up a second tray so I can have two power packages ready to go in seconds.

TEST FLIGHT

I began hovering the model at different orientations with respect to the wind. The motor, ESC and drive train all seemed to be happy and extremely quiet. I found the model is very well behaved in the wind and the rotor-head does its job quite well. I normally use FunTec competition paddles but I wanted to try the stock (carbon fibre) paddles out and found them to be good. As I get more time on the model, I'll probably test it out with a set of FunTec paddles too.

It was time to take the model out for some full power and speed flights and F3C aerobatics. I think I picked the windiest day I could get that month but I really wanted to get out and see what it could do.

I am pleased with the model in all attitudes of flight. The helicopter tracks straight and true and I have not added a single program mix at this time. I also found the rolls to be very axial (something contest pilots really like!).

I think that, as long as F3C pilots are required to use fly-barred

helicopters, rotor-head design is critical. The E720 has some great features and quality for competition models at an affordable price. Additionally, this helicopter really is an 'out of the box' contest helicopter; something that is difficult to find in the sub thousand dollar range of helicopters. ←

Tim DiPeri

Tech Spec...

Thunder Tiger Raptor G4 E720

Product type:90 size electric 3D helicopter
 Length:1367mm
 Width:221mm
 Height:462mm
 Main rotor dia:690-720mm
 Tail rotor dia:105mm/280mm as standard
 Gear ratio:1:9.25:4.67 (standard)
 Full equipped weight:3,650g
 RRP:£749.99 (fly-bar), £699.99 (FBL)

Available from:All good model shops
 Manufacturer:Thunder Tiger
 Web:www.thundertiger.com
 UK distributor:Amerang
 Tel:01903 765496
 Web:www.amerang.co.uk



'the E720 helicopter really is an 'out of the box' contest helicopter...'