

NEW NITRO POWERHOUSE! OS 91HZ-R

RC Heli

THE WORLD'S BEST-SELLING RC HELICOPTER MAGAZINE

TEST YOUR LIMITS!



Align's New **TREX 550E**

DO IT RIGHT!

- Set Up Your Flybarless
- Install Your Receiver
- Think You Know What a Cyclic Ring Is?

TESTED:

- » **ESKY 900**
- » **MODEL AVIONICS LINK MAKER 9000**

ANATOMY:

Li-Po Power



AUGUST 2010 / ISSUE 49



www.RCHELMAG.com

OBJECTS ARE AS THEY APPEAR!

E-flite 120 SR Micro or Mini?

ACTUAL SIZE



A NEW CHAMP IS CROWNED: 2010 FUTABA XFC



mini Titan

BALLISTIC 3D PERFORMANCE



- 4710-R10 Kit Includes:**
- TT V2 Carbon Blades, 325mm
- 4710-R11 Kit Includes:**
- DBL 29/37-10H Motor
 - BLC-40 Speed Control
 - TT V2 Carbon Blades, 325mm



Pre-painted fiberglass fuselage Brushless motor DBL 29/37-10



Brushless speed control BLC-40 Adjustable fly-bar control lever One-piece machined aluminum mast



Carbon fiber main frame TT V2 Carbon fiber rotor blades, 325mm Metal & Carbon fiber tail case

FEATURES:

- Super Rigid Carbonfiber Main Frame (1.5mm)
- Slim & Aerodynamic Pre-Painted Fiberglass Canopy
- CCPM Swash Control for Added Flight Precision
- One-piece Machined Aluminum Mast Block and Servo Mount
- Adjustable Fly-Bar Control Lever
- Metal & Carbon Light Tail Case/Metal Grips
- One-piece High-positioned Battery Tray
- One-piece Low Profile Molded Skid
- Canopy with Integrated Intake For Efficient Thermal Dissipation
- Exclusive Receiver Tray

mini Titan V2

Specifications

Full Length of Fuselage:	25.19"
Full Width of Fuselage:	8.79"
Total Height:	8.2"
Main Rotor Dia.:	28.46"
Tail Rotor Dia.:	6.14"
Gear Ratio:	1:11.5:4.4
Full Equipped Weight:	28.35 oz.



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BL SERIES

BL 9088 BL 9080

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7.4 VOLT RATED
(2 CELL LIPOS)

BL 9088 TAIL Servo 760/560Hz

Speed / Torque

6.0 v : 0.05 / 63.48 oz

7.4 v : 0.04 / 78.53 oz

8.4 v : 0.03 / 91.64 oz

BL 9080 CYCLIC Servo

Speed / Torque

6.0 v : 0.07 / 88.32 oz

7.4 v : 0.06 / 112.35 oz

8.4 v : 0.05 / 132.86 oz

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We miss Brandon already.

Information OVERLOAD

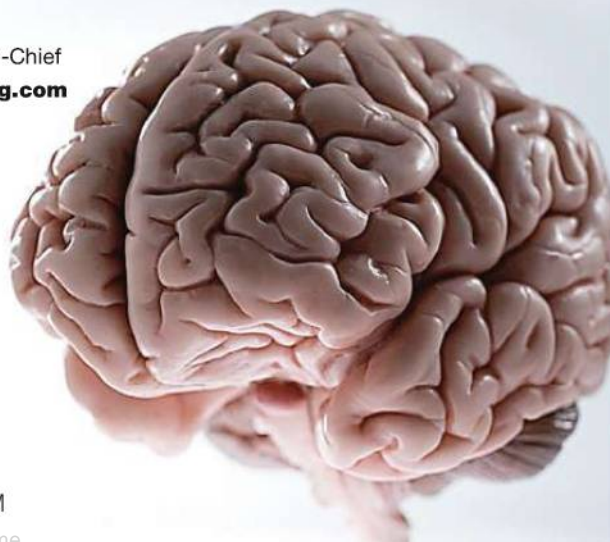
KNOWLEDGE IS POWER! YOU'VE HEARD THAT EXPRESSION. THAT FACT THAT YOU'RE READING A MAGAZINE DEDICATED TO YOUR HOBBY IS PROBABLY AN INDICATOR THAT YOU BELIEVE IN THAT PRINCIPAL. I have a couple hobbies not related to RC and one of the first things I did when I got involved, and continue to this day, is research. I bought/buy magazines, books, DVDs, and do research on-line. The more information you can gather on any subject really the better off you'll be. This principal is true in our recreations, our livelihoods, our politics, our health, the list goes on. Well get ready to become very powerful when it comes to this hobby. The idea of telemetry and data capture in RC helicopters is not new. Eagle Tree Systems has had available data loggers for years now. We've used them, reviewed them, and been quite pleased. However there's some extra work required to get those in your machine that frankly some of us are just too lazy to do. Late last year Hitec RCD announced on-board telemetry systems that would integrate with their flagship Aurora 9 radio (more in News). Those components will soon be available. Spektrum has also gotten into the telemetry game with their new DX8 radio (more on that in News). Both of these systems will allow you the pilot to monitor your machine while in flight. Knowing things like RPM on the fly, engine temperature, fuel-level, etc. will bring a whole new angle on the hobby that will be extremely useful to scale pilots who don't have the benefit of seeing how much fuel is in the tank. Pilots who prefer 3D or pushing things to the limit will be able to see their motor RPM, and essentially head speed, at any point during their flight. No more excuses for running out of fuel, or battery, or running your engine too lean. You'll soon have all the information needed to prevent a number of tragedies literally at your fingertips. Look for more companies and radios to offer telemetry thanks to spread spectrum technology that is already sending data back to the transmitter.

Technology is constantly evolving, as is our ability to use that technology for our needs. I'm very happy to see telemetry becoming more mainstream. Its use will only make our hobby more and more enjoyable.

Fly Safe,

Mike Velez

Publisher/ Editor-in-Chief
mikev@rachelimag.com



Ouch, my brain hurts!

CHATTER BOX

WHAT IS THE BEST \$50 YOU EVER SPENT?



MIKE VELEZ - Publisher/Editor-in-Chief
Cubic Zirconia engagement ring, sssshhhhh! Keep it our secret.



RYAN KEPHART - Associate Editor
Call Of Duty MW2, countless hours of entertainment all for 50 bucks!



JIM INNES - Editor-At-Large
My best purchase in the hobby for \$50 has to be the combination of a good set of hardened hex drivers and a set of JIS screwdrivers.



SHAWN KITCHEN - Editor-At-Large
What happens in Vegas stays in Vegas.



CHUCK BASSANI - Editor-At-Large
Dinner for the first date with my wife!



ART KORAL - Contributor
Call of Duty. For 50 bucks you get all the excitement of battle without having to be there!



AARON SHELL - Contributor
DVD quality (540 lines of resolution) 12-volt micro video cam with free shipping from China ;)

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Radio controlled helicopters are not toys. Their use can cause serious injury or death. Always use caution when operating a radio controlled helicopter. The publishers of this magazine can not be held liable for any injuries or damage incurred performing any operations seen in this publication or related medium.

SCALE

Fly The Excitement!!!



Bell Textron 222
30/50/60



Schweizer 300 50



Long Ranger 30/50



Ecureuil A-Star A5350 50

AIRWOLF

A fantastic high gloss painted AirWolf modeled after the star of the popular 80s television show. The AirWolf is available in kit version with mechanics and in 90% ARF version that is completely pre-painted with mechanics.



Hughes MD500



Hughes 500E 30



BlackHawk 60



Hughes 500E 50/60



Agusta 109 30/50



Robinson R22 50



Bell Jet Ranger 60

Scale Up Your Thrill to Fly!

Experience the real life adrenaline pump of scale helicopter flight. There's nothing closer to actually sitting in the pilots seat when it comes to these hovering birds. Century Helicopter products offers a full line of 30/50/60 Scale ARF and Scale Fuselage Kits. Our kits come in high quality, pre-cut fiberglass that possess a level of detail that will satisfy the most discriminating builder. You can choose between

non-painted or fully hand painted fuel resistant bodies. In addition, many kits come with all mechanics necessary to complete assembly including landing gear where applicable.

So if you are looking for detailed high quality Scale Helicopters, Century Helicopter Products has the Scale model for you.



Bell Textron 47 G

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CENTURY
HELICOPTER PRODUCTS

MULTIPLEX FUNCOPTER

We have all been waiting for the release of the new helicopter from Multiplex, and we are glad to see that it has finally hit the market. This helicopter is based on a proven helicopter that was built for both great flight characteristics and a unique durable, crash-resistant rotorhead. The Funcopter is Multiplex's first helicopter, and you can see that some of the design comes from their popular foam airplanes. The Funcopter has an EPP foam shell that is durable and easy to repair. We have one in the shop and can't wait to put it to the test. Check out next month's issue for a review.

www.multiplexusa.com

Funjet meets Funcopter.



TILT-A-WHIRL

Have you ever had your helicopter on the bench and still didn't have enough room to adjust your pitch range and set it up? How about having to flip the helicopter on its head so you can reach for a screw or something on the underside? Well, with this new helicopter stand, all of this is possible with a flick of the wrist. The Tilt-A-Whirl helicopter stand uses a strong steel base and sturdy head to mount your helicopter. The head can be swiveled around, tilted, and locked into any position. The stand will support a 450 sized helicopter all the way up to a big gasser. Keep an eye out for a full review in the next issue of *RC Heli Magazine*.

www.prontow.com

KDE DIRECT UPGRADES FOR YOUR TREX 550E

SO YOU GOT YOURSELF A BRAND NEW ALIGN TREX 550E AND YOU ALREADY WANT TO UPGRADE IT? You can do exactly that thanks to KDE Direct and their new upgrade line for the 550E. Two new upgrades are available and both sport a shiny CNC machined aluminum surface. You can now add thrust bearings to the main shaft and experience full axial load support for hardcore 3D, all while providing the protection and integrity of the radial bearings. The all-aluminum bearing blocks come with everything you need to upgrade your TREX 550E. The second but not last upgrade you can accomplish is the all-aluminum elevator lever. This lever provides the correct amount of clearances while perfectly aligning the arms to the elevator mechanics and servo. Check them out today.

www.kdedirect.com



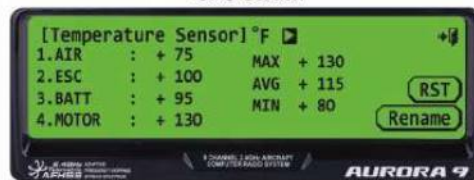
HITEC UNLEASHES TELEMETRY FOR THE AURORA 9



Cockpit Screen



GPS Screen



Temperature Screen



Voltage Screen - Set your own low voltage warning!

Since the release of the Hitec Aurora 9, we have known that Hitec is serious about the use of telemetry for our airborne aircraft. With Hitec's Sensor Station, you can unlock the full potential of the Aurora 9. Several new sensors are available from Hitec to give you the full skinny on your in-flight performance and parameters. The Sensor Station will connect to any Optima 7 or 9 channel receiver. The Station provides multiple sensor inputs, allowing you to connect what you choose to your helicopter. The following are the current sensors available for the Aurora 9:

- Optical RPM Sensor (HTS-ORPM): Provides optical RPM Sensing
- Magnetic RPM Sensor (HTS-MRPM): Provides RPM information using a magnetic sensor
- Temperature Sensor (HTS-TEMP): Measures temperatures from 40° to 392°F
- Fuel Level Sensor (HTS-FUEL): Provides an accurate 5-step reading of your remaining fuel by adding it to the outside of your tank.
- GPS Sensor (HTS-GPS): Displays constant directional information including speed, altitude, latitude, and longitude.

Package deals can be purchased that include everything you need, or individual products can be selected for purchase.

Street Prices:

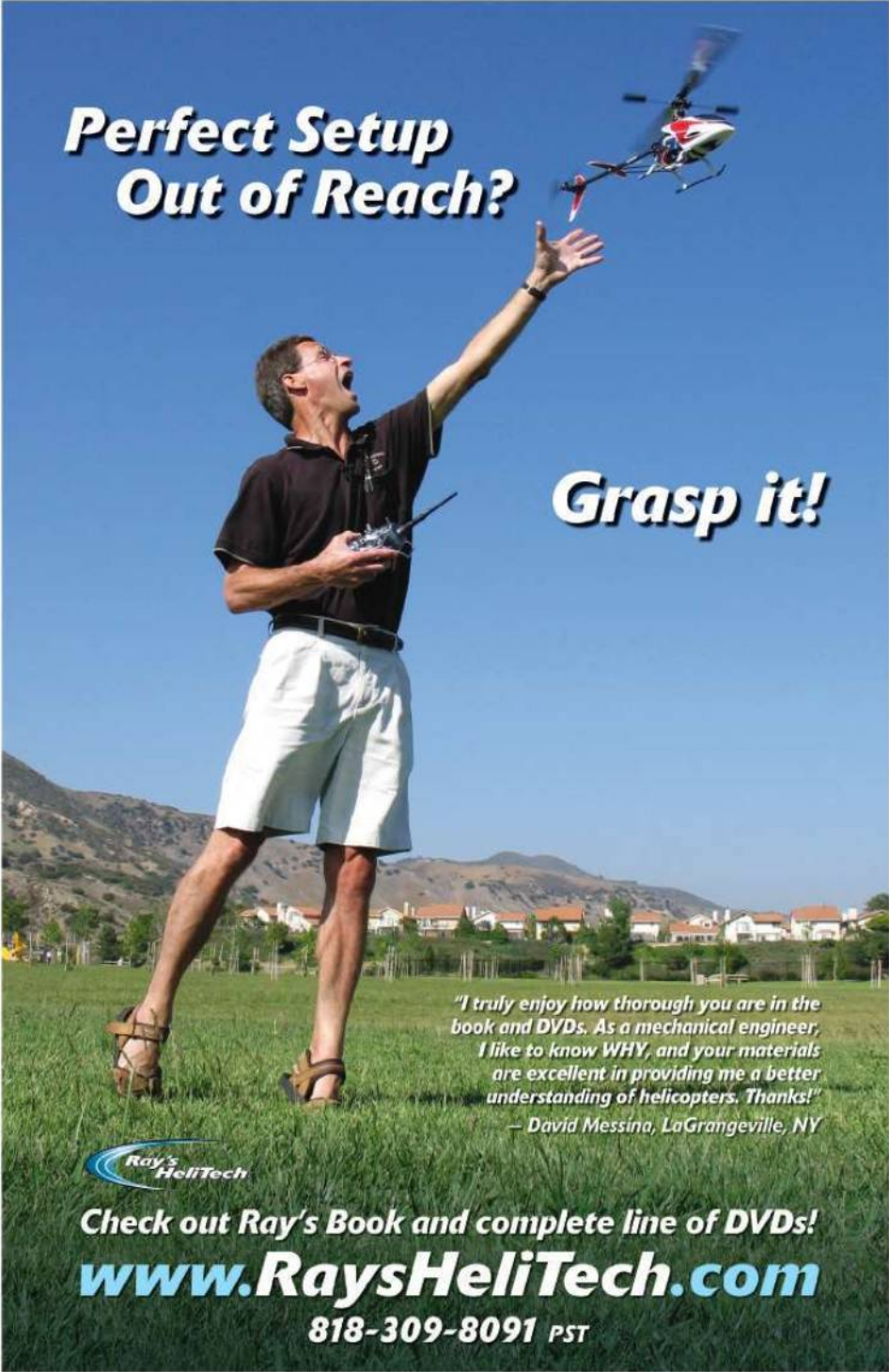
- 55830: Full Telemetry Pack—\$224.99
- 55831: Basic Telemetry Pack w/ Optical sensor—\$69.99
- 55845: Basic Telemetry Pack w/ Magnetic sensor—\$69.99
- 55832: Sensor Station—\$36.99
- 55833: Optical RPM Sensor—\$25.99
- 55842: Magnetic RPM Sensor—\$25.99
- 55834: Temperature Sensor—\$12.99
- 55835: Fuel Level Sensor—\$26.99
- 55836: GPS Sensor—\$119.99

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— David Messina, LaGrangeville, NY



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**DANNY SZABO
NOW FLIES
FOR GAUI**

One new face that you might recognize around the **Gaiu** tent is none other than **Danny Szabo**. This well established 3D pilot was seen at the San Diego Fun Fly ripping on the new **Gaiu X5**. **Danny** has already started to make plans with **Gaiu** and has decided to fly a fireworks routine during the 2010 Gaiu FireFlight at the IRCHA Jamboree.



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NANO HELICOPTER FOR BEGINNERS

NEW



NANO
Length: 174mm
Height: 47mm
Main Rotor Diameter: 210mm
Weight: approximately 60g

E-500 HELICOPTER FOR ENTERTAINMENT

NEW



BIG LAMA
Length: 427mm
Height: 280mm
Main Rotor Diameter: 460mm
Weight: approximately 408g

HONEY BEE CT FLYBARLESS, 3BLADES 3D AEROBATIC

NEW



HONEY BEE CT
Length: 525mm
Height: 185mm
Main Rotor Diameter: 490mm
Weight: approximately 440g

BELT-CPX 3D PRO AEROBATIC HELI

NEW



BELT-CP X
Length: 650mm
Height: 230mm
Main Rotor Diameter: 680mm
Weight: approximately 670g



ESKY STATEMENT

Don't Be Fooled!
It's come to our attention that counterfeit ESKY brand products are being sold by unscrupulous vendors. These fake and shoddy products are not only causing a negative impact on our image of our commitment to quality, but threatening the safety and rights of ESKY consumers and users. To protect the lawful rights and interests of the authorized ESKY distributors and vendors as well as ESKY consumers and users, ESKY Co., Ltd makes the statement as below:
Please locate your local distributors or vendors from ESKY official website www.esky-sz.cn www.twf-sz.com
ESKY confirms that distributors publicized on ESKY official website are authorized distributors of ESKY original products. As for those unauthorized distributors and vendors, ESKY will check their distributor's qualifications within 3 months since the date of issuing of the statement. Only passing our distributors and vendors qualifications then will they be publicized on our official website. Your cooperation of eradicating ESKY fake products will be greatly appreciated.
In order to help consumers to authenticate genuine ESKY products and to take more efforts in fighting against the fake products, ESKY Crop is introducing new laser technology to mark an additional ESKY registered trademark on the surface of spare and accessory parts. All the parts sold after December 23rd, 2009 are laser marked with the additional ESKY registered trademark. For the convenience of all the consumers to authenticate the ESKY products, especially the tiny parts, please browse the Anti-Fake page on our website to check for the exact spots of our trademark on those tiny parts. It may require using magnifying glass to check the laser-marked trademark because those trademarks may be smaller than 1mm. Please find your local distributor from official ESKY website www.esky-sz.cn

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ALIGN HAS GOT IT IN THE BAG

THIS WEEK, WHILE PLAYING ON THE COMPUTER (Facebook, to be exact) I noticed a little something new from Align. Many aftermarket manufacturers have been making bags for Align helicopters over the years, but Align just never seemed to have an interest in this market until now. Currently, Align is working on a bag that will fit the 550E. The bag is made from 1680D nylon fabric with computerized embroidery. The bag will come with three additional deputy bags with the Align logos embroidered on them. Check out Align's website for more info as they become available.

www.alignrcusa.com



en·cy·clo·freak·ia en-sahy-kluh-free-key-uh

-noun

1. the ultimate Internet source for articles on a variety of topics relating to RC helicopters, organized into easy-to-find categories and groups covering all branches of knowledge.
2. the No. 1 place on the Internet for step-by-step how-to videos, videos from heli events, aerial videography and photography.
3. the best resource on the Internet for the beginner to the advanced RC helicopter pilot featuring more knowledge about the sport in one central location than any person could wish for.
4. the ultimate atmosphere for learning about RC helicopters, where members honor the motto, "Fun, Learning, Friendship and Mutual Respect."



Fun, Learning, Friendship and Mutual Respect





A NEW BLADE FOR A NEW BUDGET!

Cermark is starting a new agreement with a relatively new manufacturer of carbon fiber blades. Chameleon has designed an all-black carbon fiber 325mm blade that performs up there with the best of them. Chameleon says the blades will come in a set for about \$29.99, but Cermark thinks otherwise. Cermark is trying to lower the cost of the blades to about \$16 per set, due to the hard times we have all faced. Keep an eye out for these blades, as they will surely be a hit item.

www.cermark.com

POWER ON DEMAND!

The 91HZ-R delivers!

- "On demand" fuel regulator system.
- New 61E-R carb with attached regulator.
- Performs equally well on a full or empty tank.
- Uncompromising design for superior power.
- Ideal for demanding heli pilots.



Turn your existing 91HZ into a 91HZ-R with this easy-to-install conversion set – complete with a pressurized regulator system!

O.S. ENGINE
osengines.com/96d

DISPLACEMENT:
0.91 cu in (14.95 cc)
OUTPUT: 3.4 hp @ 15,000 RPM
PRACTICAL RPM: 2,000-16,000
WEIGHT: 22.1 oz (625 g)

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SPEKTRUM DX8

Over the last few months, pilots around the world have been wondering what this new radio is all about. We first showed you pics back in February from the Toy Fair in Germany. Well Spektrum has just now announced this radio and its features to the public, and we thought you should know about it. The new DX8 is run using Spektrum's new AirWare software. This software was developed from the ground up allowing ease of programming even if you are not an expert. The DX8 uses a click wheel for programming, much like that of the JR 9503, so JR users will feel right at home. Here are some of the features that are included with the DX8.

ACTIVE GYRO AND GOVERNOR TRIM

Fine tune rotor speed and gyro gain while in flight using trim switches that you assign.

ELECTRONIC E-RING

When programming the cyclic and pitch mixing for a helicopter, it is possible for the sum of the two mixing values to exceed the mechanical travel limits of the servos (see the article on just this topic, page 62). This can cause them to be overdriven into a locked position. Electronic E-Ring prevents this by automatically limiting servo travel if the sum of the cyclic and pitch values exceeds servo limits.

BUILT-IN TELEMETRY

The DX8's built-in telemetry feature gives you real-time information about what's happening with your heli in flight. The telemetry data appears on the backlit LCD screen so you can reference it at a glance. You can also have the DX8 alert you with an audio or vibrate alarm whenever any telemetry values exceed limits you setup.

TELEMETRY MEASUREMENTS:

Battery Voltage

The telemetry module is plugged into the receiver and will automatically relay receiver voltage. A separate sensor for tracking main battery voltage in electric helicopters will be included.

Temperature

One temperature sensor is included with the radio and will allow you to monitor engine temperature, motor temp, esc temp, whichever you choose. Separate sensors can be added for more information.

Signal Quality

The telemetry module will keep tabs on the quality of the signal coming to the receiver and send this information back to the DX8, where it is represented on the LCD screen using a familiar "signal bar" scale.

RPM

Pilots can use the RPM telemetry data to check the effectiveness of new mixture settings, new battery packs, or blade/pitch settings. The RPM sensor is sold separately.

SPEKTRUM DATA INTERFACE

Beyond new software and telemetry, the DX8 is also the first Spektrum radio to introduce the Spektrum Data Interface™. The SDI is designed for use with standard SD memory cards and adds a whole new level of flexibility and ease-of-use. With the SDI, you will be able to:

Share Model Setups

Share setups with other DX8 owners at the field or transfer them from your SD card to your PC and attach them to an e-mail.

Save More Models to Memory

The DX8 has enough on-board memory for up to 30 models before you even need to think about using the SDI, but with the SDI, memory for thousands of models could be stored on the SD card or transferred to a PC hard drive for backup.

Stay Up to Date

With the Spektrum Data Interface, you won't have to send your DX8 into a service center to get the latest Spektrum AirWare enhancements. You can download them onto your SD card and upload them to the DX8 yourself.

New Gimbal Mechanics

The DX8 is the first Spektrum radio to feature new gimbal mechanics. The new gimbals feature the precision of dual ball bearings on each axis. They also feature adjustable spring tension and control stick length.

Backlit LCD Screen

A backlit LCD screen allows you to view the large screen at any ambient light conditions.

Global Smart Charging System

An on-board charging system can be powered by any 12V power source with a compatible 4mm barrel connector. This includes 12V DC power supplies, 12 volt batteries or even from the accessory jack in your vehicle for convenient charging at the field. The charger even detects the chemistry of the transmitter batteries you're using (LiPo or NiMH) and automatically adjusts the charge type and cutoff.

Told you telemetry is on its way.

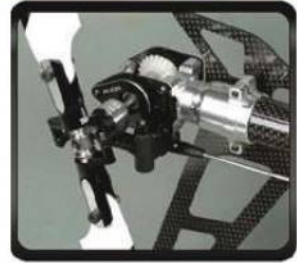


This radio looks very feature packed, we're anxious to get our hand on it. No exact word yet on when it will be available or what the street price will be, but be sure that you'll see it here in *RC Heli*.

www.spektrumrc.com

Nitro T-REX 700

Go Flybarless



Design Features:

- *Simple and light weight design provides awesome flight performance.
- *+14 collective pitch is possible for extreme 3D performance.
- *Heavy duty tail thrust bearings.
- *Clutch, Fan and Bell assembly provide a very smooth operation even at high RPM.
- *Forward mounted tail servo helps to keep exhaust oil from entering servo also improves the CG.
- *Battery tray designed for easy and clean radio gear installation.
- *Fuel Tank Capacity 630c.c.
- *Heavy duty tail with thrust bearings.
- *Torque Tube driven tail for incredible 90 Sized performance.
- *Rigid frame design that can also handle hard crashes without damage.
- *Super engine cooling system very efficient airflow to provide unequalled cooling and hourspower.
- *New main gear with one-way bearing design for high torque.
- *Ready to fly weight(no fuel) is an incredible 4.2Kg.

Specification:

- *Length: 1335mm.
- *Height: 450mm.
- *Main Blade Length: 690mm.
- *Main Rotor Diameter: 1562mm.
- *Tail Rotor Diameter: 281mm.
- *Motor Pinion Gear: 20T.
- *Autorotation Tail Drive Gear: 150T.
- *Drive Gear Ratio: 8.2:1:4.54(E:M:T)
- *Flying Weight: 4.35kg

Accessories:

- *T-REX 700 Nitro 3G Kits Set x 1
- *690D Carbon Blades x 1set
- *RCE-G600 Governor x 1
- *2 IN 1 Voltage regulator combo x 1
- *Flybarless System x 1set
- *DS650 Digital servo x 1
- *DS610 Digital servo x 3

**ASSURANCE**
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LETTERS

RC ON THE FRONTLINE!

My name is Eric Barker and I am a Warrant Officer in the Army. I am currently deployed to Iraq and my job is as a UAV pilot. I own an Align TREX and fly just about every day when I get some spare time. Some of my fellow soldiers also have 450- size helicopters.

The heli I fly is an Align TREX 500 ESP. Everything is stock and I am using the new 500M motor. It has lots of power and is capable of hardcore 3D, although I can only do light 3D for now. With more practice I will get there in due time.

I fly a lot when I am back at home, but since I been out here in Iraq I fly every day when the winds and dust are not too bad. It's a nice way to pass the time!

I started flying about two years ago and have gone through numerous helis with lots of crashes. Eventually, I got a TREX 450 and had that about a month before I stepped up to the 500. This thing is a beast! I am not too bad of a pilot now and people always ask me, "How long did it take you to fly like that?"

When I came to this unit I thought I was going to be the only one that flies RC helicopters but believe it or not, half of my platoon had helicopters or trucks. I helped them all out and gave them tips to fly better and helped them with setting up their birds. To top it all off, a couple soldiers and I constructed an elaborate RC racetrack out here for weekend races. It's official that I am an RC nerd and I do it for a living!

**Very Respectfully,
Eric Barker**

Eric you are the man! Thanks for reading RC Heli, and more importantly, thank you for your service. Keep hitting those sticks! I'm sure the UAV flies a little differently, but more stick time on the TREX can't hurt. Thanks again for all you do!

Mike



UAV pilots rock!

OUR READERS RULE

A few issues ago there was an article about flight logging software. While there were some good choices, there was nothing web-based, and nothing that made use of data files from e-loggers. Your article inspired me to create <http://heliwatt.com>.

Heliwatt is a web-based flight logging site that supports data files from Castle ICE controllers. The data files are processed into flights. Flight data is public and can be searched by heli, motor, or number of cells. Additionally, flight and battery analysis is available. Without a Caste controller, data entry is minimized and all the other benefits and features are available. I thought the RC Heli Staff and its readers would be interested in knowing about Heliwatt.

**Thanks
Matt**



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FURY 55 SPECIFICATIONS

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- Avg. Kit contents Weight: 5.4lbs - 2.45kg (includes painted canopy)
- Avg. Ready-to-Fly Weight: 7.3-7.5lbs - 3.31-3.4kg (less fuel)
- Main Drive Ratio: 8.538:1
- Tail Drive Ratio: 4.61:1
- Bearings: 4-Thrust Bearings, 1-German Heim Ball, 38-Ball Bearings, 2-Torrington One-way Clutch Bearings



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HAVE I GOT A STORY FOR YOU...

MY NAME IS RODRIGO SILVA MENA, I LIVE IN EL SALVADOR, CENTRAL AMERICA. I started with my RC addiction since I was a little boy, my father taught to me everything related with RC helicopters, airplanes, cars and boats. I remember my dad purchasing RC stuff secretly from my mother because she thinks that hobbies are for kids and not for big people. I think that every guy has a little kid inside.

I started building RC cars at the age of 8. I remember that my passion was so great at that time because instead of me taking the books to school, everything that I took was my RC car on my back pack to go to a friends house after class. I remember doing so many crazy things like building some big jumps, attaching RC airplane wings on it to make the car fly.

By this time I was interested in airplanes and by Christmas I asked Santa Claus to bring me a an RC gasoline airplane. When I opened my presents I realize that Santa brought me the airplane but it was not a gas airplane, it was an electric one. We went to the flying field and I crashed it breaking the wing on the first flight.

When I became older we went to Miami with the whole family and my parents gave money to me and my brothers to purchase clothing. I looked at the yellow pages for RC hobby shops because I wanted to go there, I didn't care about buying clothing. I found a store named Orange Blossom. That store was huge. I stayed with my dad at the store while

my mother went with my other brothers to purchase clothing. I was crazy running in the store, there where so many airplanes that I couldn't decide which airplane to take home. Finally I purchased my first nitro airplane. I was really happy; I spent my money in something that I really liked.

When I came back to El Salvador I started building my airplane and when it was ready I went to the flying field again. It took me six hours for me to be by myself taking off and landing the airplane.

After some time I started gaining interest in RC helicopters. One day me and my friend that used to run the RC cars started building an electric helicopter. We took a plastic toolbox and installed an electric motor on the top. To give the power it had some big wires going to a separate battery. This project didn't look like a helicopter. It didn't have even a tail rotor. The toolbox was so heavy that it didn't lift off the ground, so my friend and me decided to drill some holes all around the toolbox for it to be lighter. After this we tried again and by this time it was moving a little but we couldn't make it take off. We went again and remove the bottom of the toolbox and left just the top of it where the motor was attached. We tried again and this time it took off the ground but it was spinning so crazy because by that time we didn't knew that the tail rotor worked for helicopters not to spin. The project was a total failure.

Some time after we purchased some



Align TREX 450s where we learned to fly RC helicopters. Since then I am flying RC helicopters. I am right now 27 years old. I decide to marry the love of my life so I took her to see me fly my helicopter and I asked her, "Do you see with me in the future doing this same thing?" She told me yes. By this time, the wedding ring was attached to the helicopter skid. I landed went on my knee and asked her "Do you want to marry me?" She answered yes, and we married on January 23rd of 2010.

I sold my TREX 600 Nitro Pro because I came with my wife to study for my masters here in Santiago Chile, but it was too hard for me to stop doing what I have been doing my whole life.

Right now I have a Align TREX 700 nitro and I am doing what I love the most—flying RC helis. Thanks RC Heli Magazine for reading my story, I love your magazine!!

Rodrigo Silva Mena
El Salvador

Great story Rodrigo, take it easy on landing helicopters on your knee. That could get scary. Congratulations and good luck on the marriage!
Mike

Haha nice Rodrigo, I almost have the same story. RKepphart

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FREQUENTLY ASKED QUESTIONS

Q: I have a GV-1 coming and already have the back plate sensor installed from the Revmax that won't read above 1700 RPM. Reading around the Net, it appears that there is an adapter cable for \$12 which allows the GV-1 to work with the back plate sensor. From what I can find, though, all it does is swap the plus and minus connections for the sensor where it plugs into the GV-1. I can make my own if that is the case. Can anybody verify this?

-kcgraves



A: Adapting the Spektrum backplate sensor to the GV-1 is not simply a matter of swapping the leads. There is also a signal level difference that needs to be addressed. The cable sold specifically for that application takes care of that. -cbflys

WHAT IS A NOBAR?

-CPFLYER

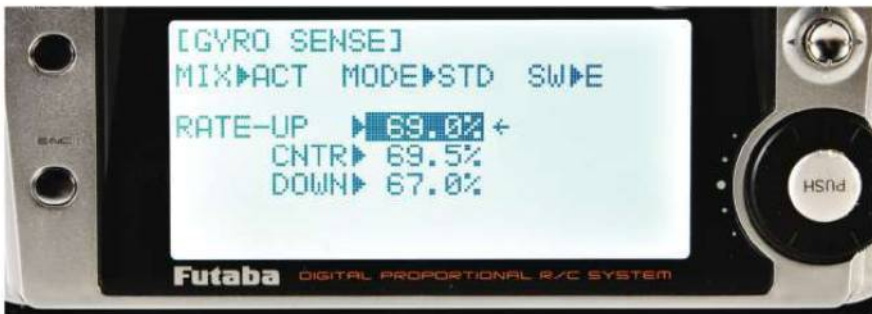
A: A NOBAR helicopter is another term for a flybarless heli. The "BAR" stands for a flybar, and I am guessing you can figure out what the beginning means. -RKephart

Q: Hey guys. I have a T-Rex 600 SNP. My radio is a Futaba 10Chp, the gyro is a GY 770 3D with the 8900 JR servo. I followed all the setup procedures in the manual for the gyro. I have my endpoints set at 140 (max for Futaba radio) and the gyro is on the "high" output selection. I have my dual rates set to get my desired piro rate and still the max gain I can get from it is about 38%. The chart says that below 50% it is not in heading lock mode, but my gyro actually is in heading hold mode. It seems to work okay, but I was wondering if anyone else has a problem with this because the chart included in the manual says I should be getting about 60-70% gain. Any help or suggestions would be great.

Thanks. -Novarossi

A: The 50% is assuming a 0-100 scale. When using endpoints, you are going from -100 to +100, so zero is 50%. Does that make sense? So, think of it this way, with +38% in the +/- 100 scale, you are at 76% on a 0-100 scale. -schluterdude

Are you using the gyro menu or just end points on the 10C? If you're using the end points, then Schluterdude is correct. I use the gyro menu on my 10C and it will show AVCS mode and Normal (non-heading hold) mode. I have mine set to anywhere between 20% and 35% AVCS on my gyros depending on the heli size. For rate mode I run the same percentages, but it says normal in the menu. -kcgraves



Q: Issue 48: Anyone notice a little problem on page 32? -SabreFlyr

A: Yes, I see a big problem with page 32. The intro on that article is wrong. My bad, you just can't catch everything before we send it to print. I will get you next time Inspector Gadget! -RKephart



We occasionally make mistakes in the magazine to see if you're paying attention.

RELY ON THUNDER POWER RC

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Offering the highest capacities and maximum value for backyard bashers and weekend racers, G4 Sport Race 25C series batteries are the best choice for maximum run-time while also being a potent threat on the race track in 'spec' and 'stock' racing classes. They also last up to 4-times longer than other brand batteries and can be charged at rates up to 4C* for fast charge times of 15 minutes or less. Available in capacities from 2700 to 8000mAh and configurations from 2S 3.7V to 4S 14.8V.



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QUICK TIPS

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CHEAP LINK MAKER

We received this tip from Frank Robinson. Do you have an old tail boom with a plastic tail boom servo mount? If you do, you can make your own link maker by simply adding a few spare ball links to the servo mounts and securing the mounts to the boom at the right distance to make your links. Then simply tighten the links until they snap onto the servo mounts. This will make all of your links equal and give you the perfect mechanical setup.



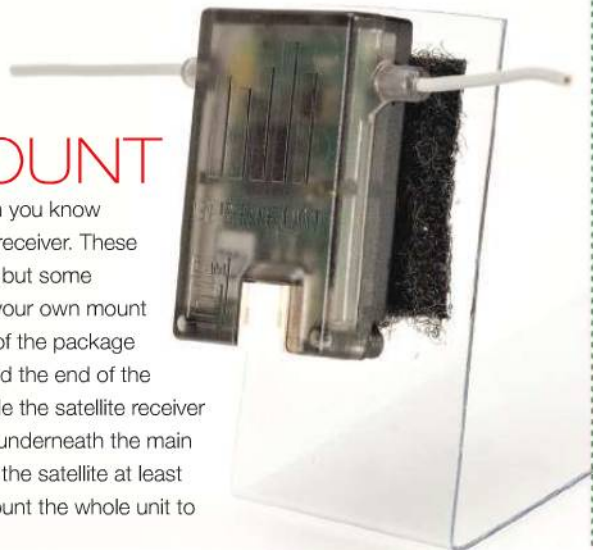
MIXTURE NEEDLE EXTENSION

Adjusting your nitro engine can sometimes be difficult depending on the model of helicopter. If your needle sits to far in and is a pain to adjust, then this quick tip is just for you. Most nitro carburetors have needles in which you can add a screw to the end of the needle. This will allow you to adjust the needle using a hex driver.



SPEKTRUM SATELLITE RECEIVER MOUNT

Do you own a Spektrum radio? If you do then you know that the full range receivers require a satellite receiver. These receivers can be mounted virtually anywhere, but some helicopters just don't have the room. Create your own mount by taking an old plastic package. Cut a strip of the package about an inch wide and four inches long. Bend the end of the strip either 90 or 120 degrees. This will provide the satellite receiver a solid mounting point. Then mount the strip underneath the main receiver using double-sided foam tape. Keep the satellite at least a few inches away from the main receiver. Mount the whole unit to your helicopter and you're finished.



It is always better to replace your blades over buying a ton of new parts and a trip to the hospital.

UNBALANCED BLADES CAN WREAK HAVOC

Last month in the FAQ section of the magazine a pilot wanted to know if they can still fly their helicopter even with a chip missing out of the blade. Depending on the damage to the blade, just a chip off the trailing edge can be flown again. The problem that arises is an imbalanced rotor head, which can lead to other problems. When using an old blade, make sure that you balance them. An out-of-balance rotor head can cause screws to come loose or even pull the blades right out of the spindle. We wouldn't fly the blade shown in this photo!



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Giuseppe Robertone

GIUSEPPE ROBERTONE

Danny Szabo

DANNY SZABO

Length: 1180 mm Height: 420 mm
Main Blade length: 600/620 mm
Main Rotor Diameter: 1335 mm
Motor Pignon Gear: 11T

Autorotation Tail Drive Gear: 41T
Flying weight: 2,920 Kg (no fuel)
Fuel Tank Capacity: 490 cc
Main Frame: Carbon Fiber 2 mm



Model Avionics **LINK MAKER 9000**

Tim "The Tool Man" Taylor's link maker

WORDS: Ryan Kephart

MODEL AVIONICS KNOWN FOR THEIR GREAT TACHOMETER AND OTHER PRODUCTS, and now they have created one of the most valuable tools on the market. Have you ever finished building the links on your helicopter and found that your fingers are just about as sore as your brain after carefully measuring every link to make sure that it's just right? Now you can kiss those worries and pains away with the Link Maker 9000 from Model Avionics.



FEATURES

The Link Maker 9000 sounds like a tool that you would have seen on the popular TV show Home Improvement, but Binford doesn't make a tool for precise and quick ball link construction. The Link Maker 9000 features a solid aluminum base that is blue anodized with measurements etched down the length of the tool. A modified servo is mounted to one end using an adjustable aluminum mount that can slide down the channel in the middle of the base. An electric switch is mounted at the other end inside a clear plastic tube with a spring and link holder. This section is also movable and allows you to set the desired length of the linkage. This solid tool weighs close to a pound and looks as if quality was their number one goal.

HOW IT WORKS

With every new link, the Link Maker 9000 must be calibrated for zero. Depending on your model, the manual will call out the measurements for either the end of the ball link or the center-to-center measurement. For this example we will use a TREX, which calls out for the inside measurements of the plastic ball link.

- 1:** Set zero on the tool by placing a plastic ball link in each end of the tool.
- 2:** Slide the driver so that the end of the plastic link lines up with the zero on the base plate. Then lock down the driver using the thumb screw.
- 3:** Next, place a ball link into the other end and slide the unit until the end of the link touches the other. Then keep sliding the spring unit in until the contact point of the links are lined up with the edge of the clear tube.
- 4:** Adjust the thumb screw at the end of the spring unit until the light on the driver turns off, then you will want to slowly back it off until the light just turns on. This concludes the calibration stage.

Now that the Link Maker 9000 is calibrated for a particular ball link, making your linkage rods will never be difficult again. All that you have to do now is move the spring unit to the calibrated measurement, place the link inside the tool, and press a button. The Link Maker 9000 will drive the servo and tighten the link with ease and stop at the right point to make the link the perfect length. Making multiple links the same length is a breeze.

CONCLUSION

A 4.8-volt, 6.0-volt, or 2-cell LiPo battery pack can power the unit. I have yet to

+ THE GOOD

- Sturdy, well made construction
- Accurate
- Powerful

- THE BAD

- Pins come out of the battery connector
- Unit can fry if a battery is plugged in backwards

CONNECT

MANUFACTURER:	Model Avionics
WEBSITE:	www.modelavionics.com
PART NUMBER:	LINKMAKER
STREET PRICE:	\$99.99

find a link that this tool cannot handle; even some of the tightest ball links on the market are within this tool's capability. The unit is well made and should last a lifetime if taken care of. The only possible "weak link" (pardon the pun) is the battery connector. The pins come out, but can easily be put back in with your finger. The unit can be plugged in backwards, so be careful when plugging in your battery or the unit will fry. I tried this tool out on several different helicopters and it has yet to fail me. **RCH**

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Size puts them in a class by themselves, but so does performance. Both helis fly like much larger models, because they're *equipped* like them. They offer the only torque tube-driven tail *and* heading-hold gyro in the sub-micro class. And a 2.4GHz radio with dual rates, so you can move up to the fixed-pitch FP — or the collective-pitch CP — with ease.

Want more than a coaxial can offer? Then go to the head of the class: Novus 125s.



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Heli-Max™

O.S. Engines 91HZ-R

Time to Regulate

WORDS: Ryan Kephart

O.S. Engines have been around for years. Some of my earliest memories of RC were running these fabulous motors in trainer airplanes. Since I have been in this hobby over 20 years, I have always remembered O.S. as a manufacturer of some of the best running engines. On every box, O.S. states they have “unequalled quality precision & performance”. To test this we will take a look at the new O.S. 91HZ-R helicopter engine.



Made in Japan.

FEATURES

This engine features a two-year engine guarantee for parts and workmanship. Along with this guarantee, the O.S. 91HZ-R features a new fuel regulating system. The fuel tank is pressurized using crankcase pressure and then fuel is sent into a regulator where the delivery pressure is stabilized before the fuel enters the carburetor. The 91HZ-R uses the 61E-R carburetor, which has twin needles for adjusting idling/hovering and high speed mixture independently.



INSTALLATION

We opted to use the TREX 700 for this review, as we have flown the TREX 700 over the last six months with the O.S. 91HZ. This older engine provided tons of power, but mixture settings, at times, tended to fluctuate during flight.

The motor installed perfectly in the TREX 700. The regulated version has the same physical dimensions as the standard engine except for near the carburetor. The engine installation procedures are exactly the same except for the fuel line routing.



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- » The design of flybarless balance characterizes low power loss and great efficiency improvement.
- » Three-axle gyro control makes the Flybarless balance system automatically amend the flight status and provide favorable safety for the beginners.



- » Main Rotor Diameter: 440 mm
- » Tail Rotor Diameter: 121 mm
- » Overall Length: 432 mm
- » All-up Weight: 268g (Battery included)
- » Battery: 7.4V 1000mAh Li-Po
- » ESC: WK-WST-20A-1
- » Brushless Motor: WK-WST-21-003
- » Receiver: RX-2437V
- » Transmitter: WK-2403



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We decided to use the same muffler, so we capped off the pressure line with a small piece of fuel tubing and an aluminum dot. Instead of using muffler pressure, the tank gets its pressure from the new back plate on the engine. A fuel line is placed on the nipple and a check valve is used to keep the pressure from flowing back into the engine. I installed a "T" on the line after the check valve so I could easily relieve the pressure and vent the tank during fueling. The rest of the fuel line was routed the same as the original O.S. 91HZ.

TESTING

BREAK-IN: I have used 30% Byron Rotor Rage fuel in the previous engine and wanted to keep it the same so I can tell the difference in power and the consistency of the tune. The manual calls out for the mixture needles to be set with the high needle at 2.5 turns and the mid at one turn. I wanted to start rich, so I set the high at three turns, and the mid to 1.5. This ensured a rich setting to allow the engine to remain cool while I went through the adjustment process.

I filled the tank and proceeded to start the engine. The 91HZ-R started easily and quickly built up pressure in the main fuel tank. The idle was very consistent. I decided to see how the engine would transition to mid range with the mixture setting rich by bringing

it into a hover. The engine hesitated a little but ultimately stabilized and ran well. I put about a gallon through the engine during break-in and then started to lean out for performance.

PERFORMANCE TUNED: I tuned the motor to the factory recommended settings and noticed that the engine still had room for improvement. I slowly adjusted the needles and test flew the helicopter until the engine was producing maximum power. The O.S. 91HZ-R had more power than I expected. The climb rate and raw power pulled through anything I could throw at it. I can almost say that this new engine is un-boggable. The engine ran smooth and had no tuning fluctuation for the entire flight. Where the non-regulated version of the engine would lean out towards the bottom of the tank, the new HZ-R did not. The engine produced enough power to sustain unlimited Tic-Tocks, full collective Hurricanes, and full collective punch-outs. The new O.S. 91HZ-R is a great performer and has many advantages over the unregulated version.

CONCLUSION

The O.S. 91HZ-R has the power and reliability to make any helicopter pilot smile. If you already have the non-regulated version of this motor and you want to upgrade, you'll be happy to

know that there is a conversion kit that exchanges the back plate and carburetor for a fraction of the cost of a new motor. O.S. Engines have a winning combination and I look forward to seeing future products from O.S. **TRH**



+ THE GOOD

- Great performance
- Consistent operation
- Minimum weight gain

- THE BAD

- None that we could find

CONNECT

MANUFACTURER:	O.S. Engines
WEBSITE:	www.osengines.com
PART NUMBER:	OSMG1973
STREET PRICE:	\$450.00

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Charge: 0.05 - 20A
Discharge: 0.05 - 20A
Charge/Discharge Cycle
Internal Resistance
PC Connection: USB
Memory Settings: 10
Log Memory: 16 Mbit
Drive: brushed DC motor

NiMH CHARGE Mem
2.0A CURRENT

Batt Type



Stop

Dec



Status

Inc



Start



Enter



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Designed for 700 class electric helicopters and Glow to Electric Conversion of .90 size nitro models running on 10 to 12 Li-Po cells. This higher Kv model of the HK-5020 motor will provide more "punch" for your 3D flying in the larger size 700 class helicopters.

MSRP \$199.99



Trex 700E Motor Mount

Designed for the new Trex 700E Helicopter, this motor mount will fit your Scorpion HK-4035 series motor, and hold it firmly in place with 4 mounting screws. Four large machined holes provide unrestricted airflow through the motor for maximum cooling.

MSRP \$10.00



HK-5025-440

Designed primarily for the Mikado Logo 600SE helicopter, this motor also works great in 700 class machines and .90 size Glow Conversions. Pumping out 4200 watts of continuous power on 12 Li-Po cells, this motor will provide all the power you can use for extreme 3D flights.

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HK-4025-550

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LIPO BATTERIES

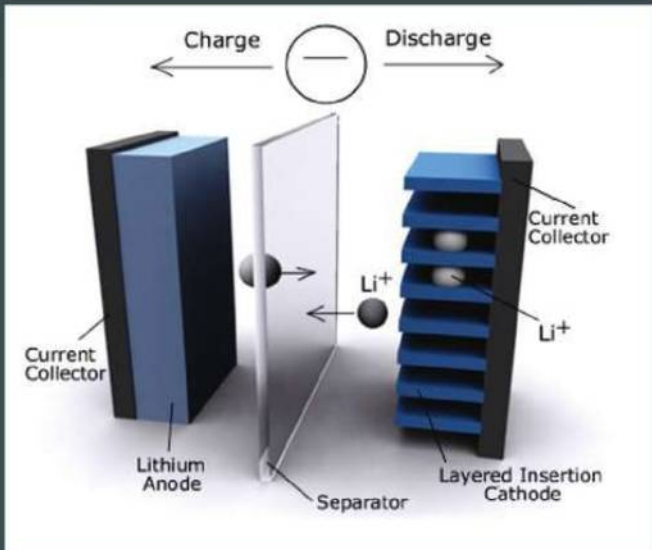
Or you can call them Lithium Polymer

WORDS: Mike Velez

LITHIUM ION POLYMER, OR LIPO FOR SHORT, IS THE TYPE OF CELL MOST COMMONLY USED IN ELECTRIC HELICOPTERS. In fact, their development and reduced cost has been a major factor in electric helicopters, and the hobby in general, becoming more and more popular in the last five years. Before LiPos, pilots were relegated to using much heavier Nickel Metal Hydride (NiMH) cells. These older cells weighed considerably more and simply wouldn't allow some of the aerobatic flight achievable today thanks to electric helicopters' amazing power to weight ratio.

WHAT ARE LI-PO CELLS?

LiPo cells are a rechargeable battery technology that has evolved from lithium-ion batteries. LiPo cells have become more and more popular, not only in the RC hobbies but in a number of consumer electronics. They have many advantages over other technologies,



including easier manufacturing processes that allow cells to be made in an infinite number of sizes and capacities. Despite the recent popularity the technology actually dates back to the late 1970s. The modern LiPo battery is made up of a lithium salt electrolyte that's held in a solid polymer composite encased in a soft foil pouch, just as you see here with this brand spanking new Thunder Power 3250mAh 6-Cell 6S 22.2V Pro Power 45C pack. The lack of a traditional metal canister is one of the reasons why LiPos are lighter than traditional canister cells. This helps with the LiPo's energy density. Pound for pound, or gram for gram, LiPo cells have an energy density that's approximately three times better than that of Nickel-cadmium (NiCad) or NiMH cells. The voltage of an individual LiPo cell can range from 2.7V (fully discharged) to 4.2V (fully charged). The LiPo cells common in RC helicopters, and all of RC for that matter, are rated at their nominal voltage, which is 3.7V. Unlike NiMH and NiCad cells that have size classifications such as C, Sub-C, A, ZZ, and so on, there is no specific recognized standard for LiPo dimensions and capacities; instead, they vary by the individual cell manufacturer. The only one constant is the voltage.

HOW THEY WORK



Lithium batteries work by moving lithium ions between the anode and

the cathode of the battery. The anode, the source of the ions and electrons, is the elemental lithium (or a lithium-containing compound). The cathode, the receptor of the ions and electrons, is the material capable of accepting lithium ions onto its structure.

When the battery is discharged, lithium ions flow from the anode to the cathode, accompanied by electrons. This flow of electrons creates an electrical current and can be used to power our helicopters and other devices. Supplying an external electrical current, which drives the lithium ions back to the anode, can charge the battery. This charging process "resets" the anode and cathode so that the battery can once again power your helicopter.

As batteries are continually developed, the technology is improved. Energy density increases thanks to new, more potent chemical structures in the cell's ingredients, improved cathode and anode designs, and better manufacturing processes.

WHAT DO THE NUMBERS MEAN?

6S2P, 30C, 3S4P—it sounds like a password to your computer, but it's actually just a sample of some of the numbers and terminology you might come across when it comes to LiPo batteries. Here's an example of a common battery pack, its alpha-numeric rating, and what each number means.

6S1P • Here, we're looking at a 6S1P 45C. This is a hell of a battery pack, capable of delivering a lot of juice! It's six cells put together in a series, which gives us a new cell (comprised of six individual cells) that has a total voltage of 22.2V and a capacity of 3250mAh. Each of the individual cells has the same 3250mAh capacity. When batteries are wired in series, the capacity does not change, only the voltage. Now, if this were a 6S2P, then we'd have this 1P battery mated with a matching battery and wired in parallel. This would keep the voltage the same and double the capacity, to 6500mAh.

45C • When shopping for a battery pack, this is the designation associated with the battery's ability to discharge or charge at a particular rate. This is called the "C-rating." The C rating is a measure of the current flow during charging and discharging. The C rating is a multiple of the pack's capacity. So, in this example, the 3250mAh 6S1P 45C pack, the C Rate is the continuous current. If you see two ratings, the first is the continuous and the second is the burst rate. With our 3250mAh pack, 1C would mean 3.25 amps, which is derived by dividing 3250 by 1000 (since we're converting milliamps to amps). A 2C rate would thus mean 6.5 Amps, and so on. The 45 indicates that this battery is capable of supplying 146.25 Amps continuously. The fine print on the battery indicates a charge rate max of 6C. This means it can be charged at a max rate of 19.5. This is a very important number. Always check the Charge C-Rate before you plug any battery into a charger. **TBL**

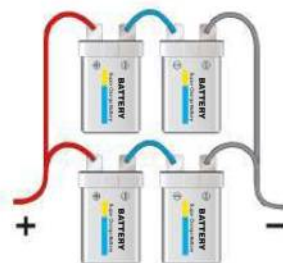
CELLS IN SERIES



CELLS IN PARALLEL



CELLS IN SERIES AND PARALLEL



BUYING AND CHARGING ADVICE

- Stick to a reputable brand. This is very important. LiPo batteries contain a lot of energy and have the capacity to do some major damage, should they explode or combust. Brands that you recognize as being of higher quality typically are produced and cared for correctly before they get to you. Also, a reputable brand gives you someone to fall back on, should you experience any problems or defects.
- Charging is the most dangerous time in any LiPo pack's duty cycle. The following are safety pointers that you should ALWAYS adhere to when charging any LiPo battery pack.
- The most common LiPo charging mishaps are due to an incorrect charge voltage or amperage. Even if you have a charger that's self-sensing and doesn't require you to enter in the voltage or cell count, take note of the charge voltage, do the math, and make sure that it's equal to the battery's voltage or is within 10%.
- Never leave a charging battery unattended, and make sure that it's charging in an isolated area away from any flammable materials. This also means out of your helicopter and not on a wooded workbench.
- Only charge packs one at a time. You might find stories online of people charging their packs in series. DO NOT DO THIS!
- Don't charge in ambient temperatures below 32° F or above 110° F.
- Allow packs to cool to room temperature between use and charging.
- Never, never, never allow the lead wires of your battery pack to touch and short the battery. Should you ever need to cut the leads, cut them one at a time.
- If you notice your battery pack beginning to swell, immediately disconnect it from the charger and place it in a safe area away from any flammable materials in case the battery should combust.
- To be on the safe side, keep a Haylon fire extinguisher or bucket of sand close by, just in case you should need to put out a fire. Whatever you do, do not try to extinguish a flaming LiPo pack with water, as that will only make matters worse.
- For some added safety, you can pick up a "LiPo Sack" or other containment device. Basically it's a fire-safe pouch into which you place your battery pack while charging.



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T-Rex 600 Limited is available three ways, as a Kit with no electronics; a Combo with gyro, servos, governor and regulator; and as a 3G Flybarless Combo. All versions of the 600 Limited require .50 size engine and muffler.

Align T-Rex 700E
Flybar Kit
\$899⁹⁹



T-Rex 700E
Flybarless Combo **\$1,249⁹⁹**

Flybar kit includes 700E helicopter with flybar head, 700M brushless motor and 105mm carbon tail blades. Flybarless combo includes 700E helicopter with 3G flybarless system, 700M brushless motor, DS650 digital servo, 3-DS610 digital servos, 690D carbon main blades, and 105mm carbon tail blades.



Align T-Rex 550E
Flybarless Combo **\$998⁹⁹**

T-Rex 550E 3G Flybarless Combo includes 550F Kit with flybarless head, 3G control unit, 600M motor, digital servos, ESC, and carbon blades.



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Raptor 50
Super Combo
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Raptor 50 Super Combo includes a 2.4 GHz radio system, exclusive sport edition Redline 53HX engine, Redline muffler, heading lock gyro, digital servos, and blades. To top it all off, the Super Combo comes 95% assembled



Thunder Tiger
Raptor 50
Super Combo
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Combo includes 2.4 GHz radio system, PRO-39H engine, muffler, heading lock gyro, digital servos, and blades. The Raptor 30 Super Combo also come 95% assembled.

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JR 11X
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Transmitter
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Link Maker 9000
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Align GP780
Head Lock
Gyro
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GP780 Gyro/
DS650 Servo
\$236⁹⁹

Hitec Aurora 9
2.4GHz
Transmitter



w/ Optima 7
Receiver
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w/ Optima 9
Receiver
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Spartan RC
Quark Gyro
w/Clear Case



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Blade mSR
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Hirobo SDX
w/Painted Canopy
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Look who got a new hairdo! Hirobo's SDX now looks as good as it performs with the addition of a new customer painted fiberglass canopy included in each kit

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Blade mCX2
RTF **\$119⁹⁹**
BNF **\$89⁹⁹**



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CALIPERS

The Super Ruler!

WORDS: Ryan Kephart

HAVE YOU EVER WONDERED HOW TO GET YOUR FLYBAR LENGTHS EQUAL ON EACH SIDE OF THE HEAD? Or have you ever tried to determine the size of that faulty bearing so you could replace it? A ruler is one way of doing this, but it's just not accurate enough to get the well-balanced machine you're looking for. Calipers are what you need to get the job done right with precision accuracy!

WHY YOU NEED IT

Whether you have a turbine, gas, nitro, or electric helicopter, balance plays an important role. This is where calipers come in handy. You can get the flybar to have equal lengths on both sides by ten thousandths of an inch. Digital calipers can also offer a metric conversion, accurate to 1/100 of a millimeter. Additionally, this multi-task tool is useful to measure the inside diameter, outside diameter, and depth of a bearing.

■ **INTERNAL JAWS:** Used to measure the inside dimensions of an object

■ **EXTERNAL JAWS:** Used to measure the outside dimensions of an object.

■ **THUMB WHEEL:** Used to slide the display assembly up and down the body

■ **DISPLAY:** Dial and digital are the two most common types. Digital calipers offer both metric and standard measurements by pushing a button.

Claws, spreaders, and depth gauges... Sounds scary to me!

■ LOCKING SCREW:

Used to secure the sliding assembly from moving, and maintaining a measurement



■ DEPTH GAGE:

Used to measure depth. For example, you can use this type of measurement for the overhang of each landing skid.



EXAMPLE OF MEASURING A FLYBAR

Butt the external jaw against the flybar control arm. Slide the assembly until the step on the backside of the internal jaw touches the end of the flybar. Read the measurement and repeat the process


on the other side. Take the difference of the two measurements and divide by two. Now you can use your calipers to make the flybar lengths equal on both sides of the head.



SHOPPING FOR A PAIR OF CALIPERS

You can find a pair of calipers at any local hardware store from about \$25 to \$80. If you're a person who likes the best of the best, check out some machinist supply websites. The high-end units range from \$85 to \$250, depending on the size you are looking for. For the most part, all you need is an 8-inch caliper for any big-size heli, or a 6-inch pair for micro helis.

CONCLUSION

This tool does it all when it comes to measuring. Nothing can compare to this extremely accurate measuring device. I don't know how many times I have picked up my pair of calipers just to make sure I have the right bolt when I am building a heli. This made countless builds faster and smoother every time. I favor the digital pair over the analog, just for the simple fact that many of the helicopters on the market use the metric system. Outside of our hobby, calipers are also great for numerous projects that require pinpoint accuracy. 

HOW TO USE IT

Calipers are easy to use and can be the best ruler you could ever buy. There are several different ways that you can measure with this tool.



OUTSIDE MEASUREMENT: Slide the jaw and use minimal pressure to get an accurate reading. If you use too much pressure, you can squeeze the object you are measuring and get a false reading.



INSIDE MEASUREMENT: Use the opposite side of the jaw to measure the inside of a bearing or the length between the flybar control arms and the flybar paddle.

LENGTH

MEASUREMENTS: The depth gauge can be used by sliding out the jaw and butting the end against the object you are measuring.



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GYRO V-BAR 600

SPECIFICATION:

MEMS Gyro Sensors in three axes
Digital signal processor
Operating voltage: 4-10 Volts, current < 80mA
Temperature range: -10°C to +50°C
Servo compatibility: 1520uS/333Hz,
1520uS/250Hz, 1520uS/167Hz and
760uS/333Hz digital servos,
1520uS/7.1Hz Analog servo
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Weight: 15g

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- Height: 310mm
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- Tail drive gear: 31T
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- Flying weight: Approx 1700g
- Weight (without power system): 1370g



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HK 600 CT

- Length: 1200mm(47.25 in)
- Height: 368/405mm(15.25 in/16 in)
- Main Blade Length: 600mm
- Weight(w/o main blade): 1340g
- Tail Rotor: 240mm(9.45 in)
- Motor Drive Gear: 10T(11T optional)
- Main Drive Gear: 170T
- Autorotation Tail Drive Gear: 180T
- Tail Drive Gear: 40T
- Drive Gear Ratio: 1:17.0:4.5/1:15.45:4.5
- Main Rotor Diameter: 1350mm(53.15 in)
- Flying Weight: Approx 3000g(6.6 lbs).



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RECEIVER INSTALLATION

Get It Right

WORDS: Chuck Bassani

YOUR BRAND NEW HELI BUILD IS NEARING COMPLETION AND YOU'RE READY TO INSTALL THE RADIO SYSTEM. You've even gone the extra mile to get the control linkages just right—90 degree angles at neutral, no binding, yadda, yadda, yadda. But the quest for the perfect setup doesn't stop with the moving parts. You need to pay just as much attention to your receiver installation.

BUT FIRST, JUST 'A LITTLE' 2.4 GHZ SIGNAL INFO

2.4 GHz is an overloaded term which tends to include a lot of technologies. These include system features such as Spread Spectrum, digital modulation schemes (FASST, DSM2, etc.), binding techniques, and other items. All are important, but for the sake of this discussion I'm talking specifically about the frequency band of the RF carrier signal; in this case that's 2.4×10^9 (or 2,400,000,000) cycles / second. Why is this important? Frequencies in this band have a wavelength somewhere in the neighborhood of 5 inches, which means that the receiving antenna (which is typically a $\frac{1}{4}$ wave length design) will end up being about 1.2 inches in length.

A 2.4 GHz receiver antenna is pretty short, and as such we need to put some thought into a proper installation.



POTENTIAL PROBLEMS WITH SIGNAL RECEPTION

1 Ideally, the only signal our receiver's antenna will 'see' is the one coming directly off the transmitter's antenna. This is known as the 'direct' signal. But there's also a possibility of what's called a 'reflected' (or 'multi-path') signal making its way to the antenna as well. A multi-path signal is created when the direct signal bounces off a conductive surface (such as carbon fiber frame parts, the engine, muffler, etc.), and it is precisely 180 degrees out of phase with the direct signal. When these two signals combine at the antenna, they essentially cancel each other out. The result is a severely degraded signal.



Good



Another reception issue has to do with 'signal propagation'. The relative strength of the signal entering the receiver will be a function of its distance and orientation to that of the transmitter's antenna and its associated radiation pattern.

Suffice it to say, there may be times when the transmitter and receiver antennae are at the worst possible orientation to each other, thus yielding the weakest possible signal strength.

Bad



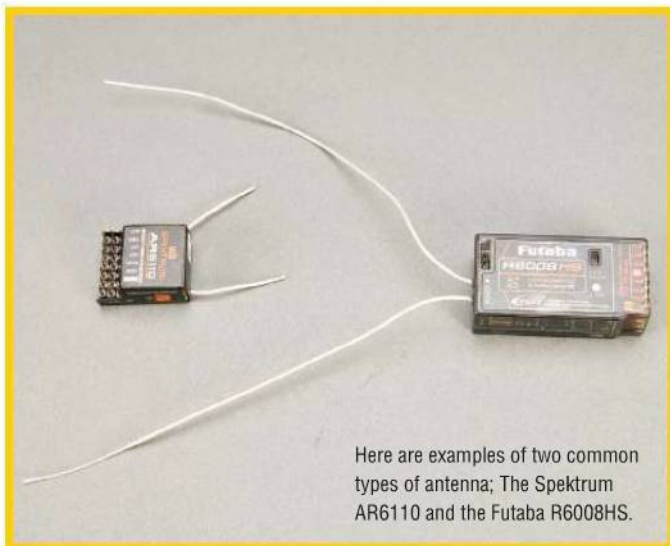
Angle your antenna to gain the best possible signal.

I hope your receiver install doesn't look like the opening picture.

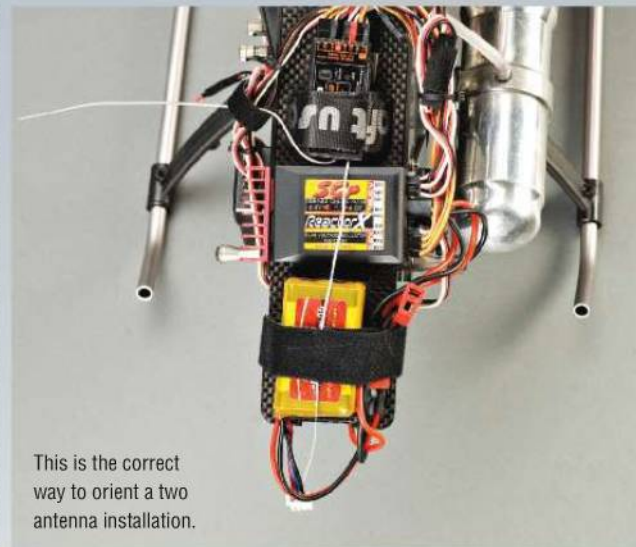
» ANTENNA PLACEMENT

2. Having an antenna length of only 1.2 inches doesn't leave much to expose to the RF environment. It's easily 'shadowed' (or blocked). It's for this reason alone that antenna placement is crucial. We need to do everything we can to give the antenna a fighting chance to 'see' the transmitter's signal.

2.4 GHz receivers generally employ one of two types of antenna. The first type is a 'Monopole' or 'Dipole' antenna that is directly attached to the receiver's circuit board. It will look like one or two short wires sticking out of the receiver case. The second type is a 'Monopole' antenna that you'll find at the far end of a coax cable. This will look like a long wire with the last inch or so of shielding removed. The exposed center conductor of the coax cable is what functions as antenna. In either case, the antenna must be positioned for maximum reception.



Here are examples of two common types of antenna; The Spektrum AR6110 and the Futaba R6008HS.



This is the correct way to orient a two antenna installation.

If your receiver has only one antenna, it's important to position it such to avoid it from being shielded by conductive surfaces. There isn't much you can do other than positioning it so its span is perpendicular to the direct signal for the majority of your flying orientations. Contrary to most installations I've observed, the best position would be with the antenna pointing directly fore or aft. This places the span perpendicular to the direct signal when the heli is flying across the field—the most prevalent orientation when one has advanced past tail-in hovering.

Many receivers employ two antennae. In this case, you want to orient them 90 degrees to each other. By doing this, should one antenna ends up in a bad orientation with respect to the direct signal (such as pointing directly at the transmitter), by virtue of the 90 degree difference the other antenna will be in a much better orientation; in this example, directly perpendicular to the direct signal.



Are 'more' receivers really better than one?

WHAT ABOUT THOSE 'MULTIPLE' RECEIVER SYSTEMS?

3. Many Spektrum and JR receivers employ a main receiver and one or more "satellite" receivers. They refer to this as "MultiLink" technology. The idea behind this is that by utilizing more than one receiver, you can very effectively reduce the possibility of shadowing and fades from reflected signals. The ability to place a receiver (and its associated antenna) on two or more sides your heli will almost ensure that at least one of them is always exposed to the RF environment. It's not so much the multiple receivers that are giving you this benefit as it is the additional antennae that come along with it.

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TECH TIP

BAG IT

If you're flying a nitro or gas heli, there WILL be fuel residue. We can prevent that residue from getting inside the receiver simply by wrapping it in a plastic sandwich bag. For vibration damping, you can add a wrap of foam. What I will further do is to use hook & loop strips to attach the foam-wrapped receiver to the mounting surface. This locks it in place and keeps it from sliding. Finally, use nylon tie-wraps or rubber bands to keep the receiver securely attached. Don't over-tighten or you'll lose the vibration damping effect of the foam. For electric helis, just eliminate the plastic bag.

Sometimes over doing it can save you some money in the long run.



The plastic bag ensures that no fuel will be getting into this receiver. The foam wrapping will very effectively reduce vibration from getting to it as well.

MOUNTING AND PROTECTING THE RECEIVER

4. Proper receiver mounting is often overlooked. It's so easy to just slap a receiver on your model with some double-sided adhesive foam or with a nylon wire tie. The problem is that electronics are very prone to vibration induced failure. For you nitro and gas guys, fuel residue can also cause trouble if it gets inside.

Some will argue that electric helis don't vibrate as much as their internal combustion counterparts, and that mounting a receiver directly to the frame with little or no protection is a perfectly acceptable thing to do. The fact is, electric helis do run quite a bit smoother than a nitro or gas machine, but they are NOT vibration free. Why take a chance when it's really easy to do it right?



DON'T FORGET ABOUT THE WIRES

5. Power supply leads, servo leads, governor/limiter and gyro gain leads, sensors, and other electronics all end up at the receiver.

We generally bundle these wires together. However, doing this creates quite a massive chunk that is quite susceptible to being tossed around in flight by G-forces.

You shouldn't use nylon wire-ties to bundle these wires, as they tend to cut into the insulation and eventually the wire. A better solution is to use hook & loop bands. Secure the bundle to the frame, leaving play in the wires between where they attach to the frame and the receiver. This ensures that any slight movement doesn't pull the connectors out of the receiver.



This is the best way to protect the wires from damage and to prevent them from pulling out of the receiver.

CONCLUSION

Spending an extra five minutes on your receiver installation can save you from an unexpected surprise down the line. Remember—position for maximum reception and protect from fuel and vibration. You NEED to do both. **TRE**

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REGULAR GUY


REGULAR GUY INTERVIEW:

DAN WEIGAND

WELCOME TO THE RC HELI MAGAZINE "REGULAR GUY" INTERVIEW. EACH MONTH WE'LL CONDUCT A SHORT INTERVIEW WITH AN UNKNOWN, NON-SPONSORED PILOT WHO IS ONE OF THE "GOOD GUYS" AT THEIR LOCAL FIELD.

We hope to shed some light on the lifeblood of this hobby: those pilots who day-in and day-out train and help new pilots succeed, and who do so without fanfare or payment. We are looking for the unsung heroes in the hobby, if you know of such a person we could interview in your area, please email me at rchelijim@gmail.com.

PILOT INTRO

 Our pilot this month is Dan Weigand. Dan's name was submitted by none other than RC Heli Mag's own Chuck Bassani. Chuck and Dan fly together often and Chuck felt that Dan represents the essence of what this hobby is all about. In learning more about Dan and the type of guy he is, it became easy for me to call him one of the "Good Guys". Read on to learn more about him.

RCH: SO, TELL US A LITTLE BIT ABOUT YOURSELF. WHAT DO YOU DO? WHERE DO YOU LIVE?

DAN: I work in Manhattan and I'm the Vice President of Logistics at one of the largest contract office furniture dealers in the country. I'm responsible for large union carpenter and teamster crews along with a fleet of trucks and some warehouses. I live in Freeport on Long Island. I was born and raised in New York City.

RCH: HOW DID YOU GET STARTED INTO RC HELIS?

DAN: My first helicopter was a Schluter Super HeliBaby. I was building and flying planes from the time I was 12, starting with control line models and then RC. My father loved helicopters, so when the HeliBaby came out I got one. It never really flew for me, but instead of giving up I purchased a Schluter Superior when they came out. That bird flew great and that was when I learned how to fly helicopters. It was 1984 and by then I was 30 years old.

RCH: WHAT ARE SOME OF THE MANEUVERS YOU ARE CURRENTLY WORKING ON? WHAT ARE YOUR FAVORITES?

DAN: I am still trying to master inverted flight. My rolls, loops, and flips are looking really good, but most of the time recently I have been working on my scale flying. It's harder than I thought it would be.

RCH: WHAT ARE YOUR TOP TIDBITS OF ADVICE FOR NEW PILOTS?

DAN: I have worked with a lot of new pilots, and once they master hovering tail-in and sideways I get them doing figure eights because I think they are easy if you never need to turn into yourself. It also gets them hooked for life because they are really flying around after only a few practice flights. Once they master the figure eights I tell them to work on nose-in hovering before trying any tricks.



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RCH: WHY DO YOU FLY HELIS NOW AND WHAT ARE YOUR FUTURE PLANS WITH THE HOBBY?

DAN: What I love about flying a helicopter is how you become totally absorbed in the flight. Everything else goes out of your mind until after you land. It's a release from everything in your life for the duration of the flight and you feel great when you land. I would have trouble remembering my daughter's name if you asked me while I was flying. It's better therapy than any therapist could provide.

Last winter, I started building my first 50-size scale helicopter. It came out great



and was a ball to fly. Now I'm working on my second one. In the future, I'd love to build one that I could compete with. That's the long term goal.

RCH: THANKS FOR TAKING THE TIME TO TALK WITH US DAN, AND THANKS FOR YOUR DEDICATION TO THIS HOBBY!

CONCLUSION

Dan started in this hobby during a time when many of the luxuries we take for granted now (like heading-hold gyros and computer radios) were not in existence. It's great to hear stories from guys who have been around as this hobby has grown. Another great thing to learn from this interview is that you can find long-term enjoyment in this hobby without going the "smackdown 3D" route. Like Dan, I too enjoy the graceful precision flying found in aerobatics and scale models.

See you at the field! *TBH*



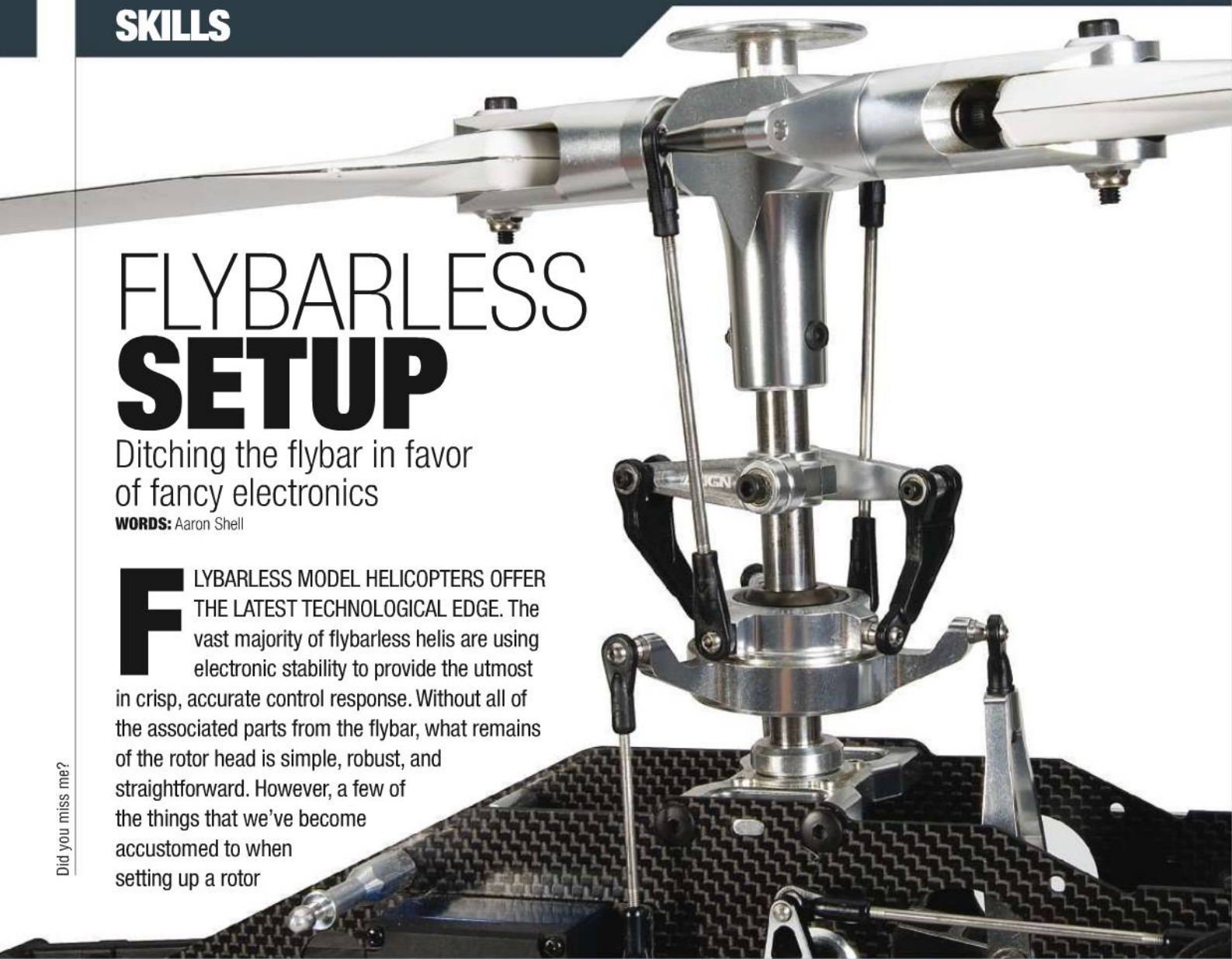
FLYBARLESS SETUP

Ditching the flybar in favor of fancy electronics

WORDS: Aaron Shell

FLYBARLESS MODEL HELICOPTERS OFFER THE LATEST TECHNOLOGICAL EDGE. The vast majority of flybarless helis are using electronic stability to provide the utmost in crisp, accurate control response. Without all of the associated parts from the flybar, what remains of the rotor head is simple, robust, and straightforward. However, a few of the things that we've become accustomed to when setting up a rotor

Did you miss me?



THINGS TO CONSIDER WHEN YOU DITCH THE FLYBAR

Not only does the flybar provide stability augmentation, but the Bell/Hiller arms can greatly affect the blade's available travel. In addition, the Hiller portion of the flybar system acts as a sort of power steering and boosts cyclic control inputs. Without the flybar, the control linkages go directly from the swashplate to the blade grip, and the advantages of using flybar are all void.



CONVERSIONS AND **FACTORY FLYBARLESS HEADS**

There are two ways to approach the flybarless rotor head; you could convert a rotor head with a flybar on it, or you can buy a rotor head specifically designed for flybarless operation. While there are kits on the market that make excellent use of stock parts, it's a little more complicated than simply getting rid of all the flybar related parts and hooking up a pushrod straight to the blade grip. Whichever you decide to go with, it helps to keep these points in mind.



MAKEUP OF A **FLYBARLESS ROTOR-HEAD**

BLADE GRIPS: Unlike flybar heads, it's important to have the input for the ball link lined up with the center of the head-block for "zero delta." It's also common to have the input spaced further out from the main shaft than most flybar blade grips to reduce total blade deflection.

HEAD BLOCK: While a stock flybarred head block can be used, it may look ungainly or out of proportion. Factory flybarless heads may or may not sit closer to the frame and offer a tight, compact, and finished look to the rotor head without big gaps and unused screw holes. It's likely that factory designed flybarless heads will fare better in a crash as well, for the same reasons as the aesthetics.

MAIN SHAFT: While some flybarless helis use the same length of main shaft as their padded brothers, others are getting shorter in an effort to drop the rotor disk as close as possible to the center of gravity. Despite the obvious fears of boom strikes, experimental setups with ridiculously short main shafts are popping up all over the world.

RECEIVER POWER: With all of these demands for powerful servos comes more demands from the receiver's power supply. In addition to worrying about the voltage your receiver sees, you also need to provide sufficient voltage under load to the flybarless unit, or it's possible that it can "brown-out" just like other electronics. On top of it all is the fact the swash servos are all now acting on a gyro, so while they may not see as much use as a tail servo, they are drawing power all the time as they follow the gyro's commands.

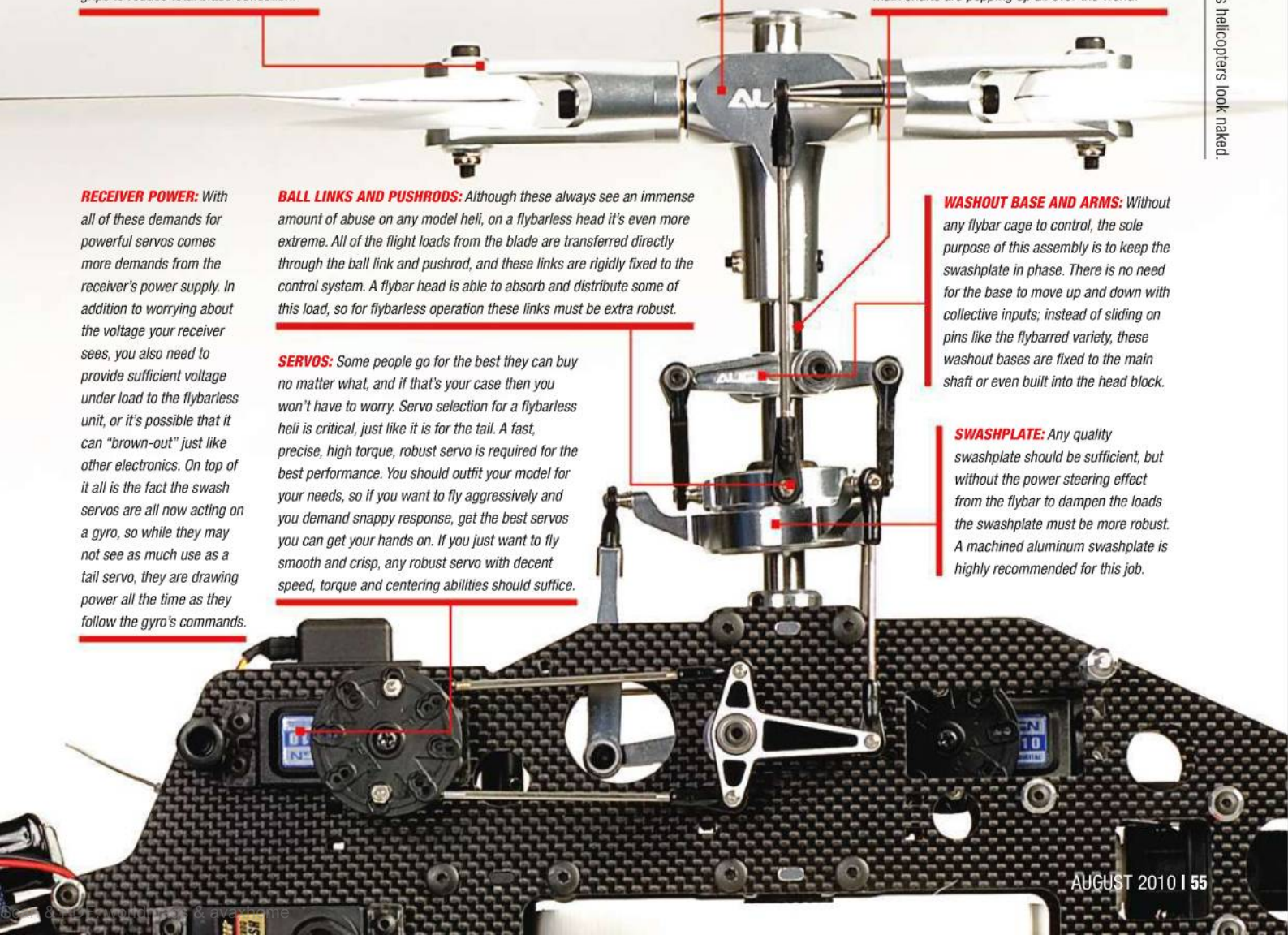
BALL LINKS AND PUSHRODS: Although these always see an immense amount of abuse on any model heli, on a flybarless head it's even more extreme. All of the flight loads from the blade are transferred directly through the ball link and pushrod, and these links are rigidly fixed to the control system. A flybar head is able to absorb and distribute some of this load, so for flybarless operation these links must be extra robust.

SERVOS: Some people go for the best they can buy no matter what, and if that's your case then you won't have to worry. Servo selection for a flybarless heli is critical, just like it is for the tail. A fast, precise, high torque, robust servo is required for the best performance. You should outfit your model for your needs, so if you want to fly aggressively and you demand snappy response, get the best servos you can get your hands on. If you just want to fly smooth and crisp, any robust servo with decent speed, torque and centering abilities should suffice.

WASHOUT BASE AND ARMS: Without any flybar cage to control, the sole purpose of this assembly is to keep the swashplate in phase. There is no need for the base to move up and down with collective inputs; instead of sliding on pins like the flybarred variety, these washout bases are fixed to the main shaft or even built into the head block.

SWASHPLATE: Any quality swashplate should be sufficient, but without the power steering effect from the flybar to dampen the loads the swashplate must be more robust. A machined aluminum swashplate is highly recommended for this job.

Flybarless helicopters look naked.



PUMP UP THE VOLUME!

If you have a helicopter designed by the factory for flybarless operation, follow the manual's suggestions for your setup. If you are doing a conversion, keep in mind that most of your settings are going to change. Despite sophisticated electronic stability systems, establishing proper function relies heavily on the mechanical setup. In the flybar head, the cyclic pitch inputs are translated through the Bell/Hiller mixers, which reduces the travel but all the collective pitch movements are translated directly to the blade. When we convert a flybar-equipped head to flybarless, we end up with an imbalance between the travel required for cyclic and the travel required for collective. Moving the inputs further out on the blade grip is the most common answer to this issue. Depending on the design of the blade grip, a longer ball link may suffice, but most often a blade grip extension is required. Another way to limit the cyclic travel to the blade grip is to use shorter ball links on the inside, or longer ball links on the outside of the swash.

Like any servo installation, the goal is to achieve the maximum required travel with

the full travel volume available from the servo. With CCPM mixing this becomes a bit more tricky, but it still boils down to the basics. If you have your ball link mounted too far out on the servo horn, you will have too much travel. Since the conversion from flybarless requires a reduction in available travel, it's critical to pay attention to this step. With too much travel, modelers often reduce the travel settings in the radio or flybarless electronics. Reducing the travel electronically reduces the servo's resolution and reduces the available torque. In the end, a setup with electronically reduced travels will require a lower gain setting and will prevent the



electronic stability system from being utilized to its full potential. The goal with all of these changes is to achieve the full range of collective pitch with the same amount of travel it takes to achieve the full range of cyclic pitch, and have all that matched to the full range of servo travel.



Magnetize my mike while I kick my juice!

PHASING

With its sole purpose being to keep the swashplate spinning "in phase" with the rest of the head, the washout base and arms sometimes get overlooked. Fix the washout base so that the arms are parallel to each other, or in the middle of their travel when you are at zero degrees pitch. It's important that these units are securely fixed to the main shaft, and the phasing should be adjusted so that the outputs off the swashplate only move in the intended axis. If you have the phasing slightly off, you will get some unintended cross control. If you are sure that the phasing is correct and the model has a tendency to respond off axis (slight roll with elevator input, or vice versa), the phasing can be adjusted in tiny increments to account for it.

Put caption here explaining what's going on in this photo.



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You think Ryan looks angry in this pic, just wait.

LIKE A **TAIL GYRO**

Electronic stability on the rotor head has many parallels to your tail gyro. Similar to the tail, you'll need fast servos with good centering abilities or the gyro will be chasing the servo. Also similar to the tail gyro is the setup. You should work to achieve proper setup first mechanically, and only use minimal centering and endpoint adjustments in the electronics. You may need to match your travel and trim settings in your radio to the flybarless electronics during setup, but once set, leave them alone. Before trimming your model with your radio in flight, consider how it affects a tail gyro. Just like your tail gyro, any trim adjustments should be made at the linkages, and the trims on your radio should be left alone. Any trim set here will be read as an input by the gyro, causing drifting or other issues. Even in flight there are parallels; just like a heading hold gyro will point the way, a flybarless head will stay stationary when left alone, and move precisely when commanded. With a tail its easy to leave the stick alone and let the gyro do its job, but with the head its a little different. It takes a bit of getting used to, but you have to lead your helicopter and let the electronics do their job for minor corrections. If you try to correct for every little movement, you will end up fighting the gyros and you'll over-control the model.

PUTTING IT ALL **TOGETHER**

First, a good setup must be achieved mechanically, as mentioned above. Next is getting your flybarless electronics configured properly. Consult your manual or search online for support. People from all over the world who have mastered these systems are probably your best resource to help you perfect your setup and work out issues, and there are several great forums online where you can tap into this network. Once you have everything set up on the bench and you are confident that the gyros are responding as you expect, its time to put it in the air! If done correctly you should be able to fly the model to sort out any changes that need to be made before you wring it out. If the model acts strangely on the ground or crashes on takeoff, go back to the bench to double check everything. It's possible that you are simply not used to flybarless and over-corrected. Flybarless helis are complicated enough they should be avoided until you have some experience with flying and setup. If you're comfortable with setting up a tail gyro and you can fly reliably, you should be able to make the leap to flybarless without too much trouble! *TBI*





Castle engineers Jonathan Feldkamp (left), and Richard Hofer (right) with Tim Jones, testing a Castle Vertigo Motor prototype.

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450	Align 450	Align BL 430SP	Phoenix Ice Lite 50	3	13t	3D
		Scorpion HK 221-8	Phoenix Ice Lite 50	3	13t, 14t	3D, Extreme 3D
	Rave 450	Next D (Scorpion) 221-6	Phoenix Ice Lite 50	3	11t	3D
		Scorpion 221-10	Phoenix Ice Lite 50	4	13t	Extreme 3D
500	Trex 500	Align BL 500L	Phoenix Ice 75 or 100	5, 6	12t, 13t (6s), 14t (5s)	Sport, 3D
		Scorpion HK 3026-1500	Phoenix Ice 75 or 100	5, 6	14t, 15t (5s), 13t, 14t (6s)	Sport, 3D
550	Mikado 500	Scorpion 4025-890	Phoenix Ice 100	8	14t, 15t, 16t, 17t	Sport to Extreme 3D
		Scorpion 4025-1100	Phoenix Ice 100	8	16t, 17t, 18t	Sport to Extreme 3D
600	Trex 600	Align BL650L	Phoenix Ice 100	8	14t, 15t, 16t, 17t	3D
		Neu 1515H/2.5D-1650Kv	Phoenix Ice 100	6	12t, 13t	3D, Extreme 3D
700	Trex 700	Align 700M-510Kv	Phoenix Ice HV 80 or 120	12	12t	3D
		Neu 1915H/1.5Y-450Kv	Phoenix Ice HV 80 or 120, PH-HV110	12	18t, 19t, 20t	3D

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RC Heli

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CYCLIC RINGS

What do they do?

WORDS: Chuck Bassani

As a rule, when setting up a swashplate's cyclic movement we need to make absolutely sure that the maximum tilt angle doesn't exceed that which can potentially cause interference or binding of the control linkages. Sounds easy, right? Unfortunately, it isn't as easy as you might think.

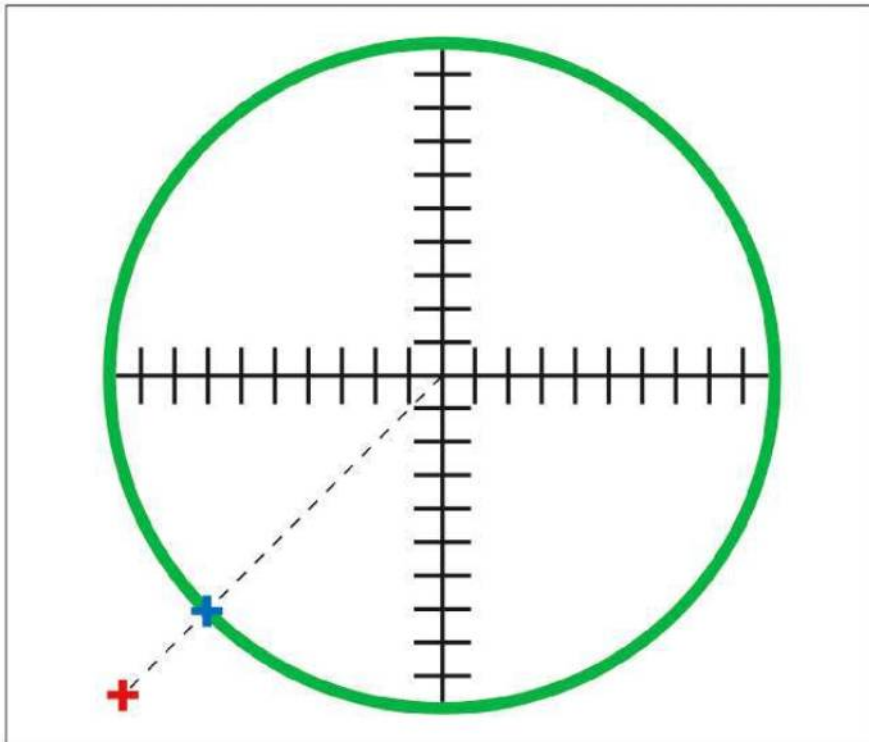


Cyclic Rings go good with a burger and a Coke.

THE PROBLEM

As we know, the swashplate is free to tilt in any direction along its circumference. The swashplate's cyclic movement is driven by two transmitter controls: aileron (left/right tilt) and elevator (fore/aft tilt). Physically, these are linear controls that are configured along an x-axis (for aileron) and a y-axis (for elevator). Combining aileron and elevator inputs result in a tilt somewhere between those two axes.

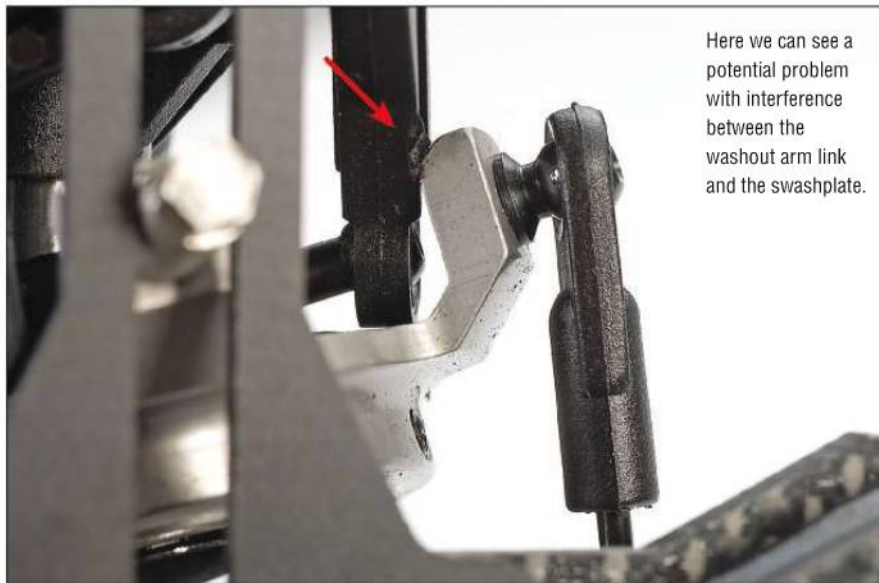
When each axis is operated singularly, we generally don't experience any problems (so long as we did the preliminary travel limit adjustment for a maximum deflection without interference.) However, when we combine the controls (such as when moving the cyclic control stick towards a corner), the swash tilt angle could actually exceed the maximum angle set due to the combined relative components of both axes. This problem exists whether your helicopter uses mechanical cyclic / collective pitch mixing (mCCPM) or electronic (eCCPM) mixing.



This inset illustrates a circle whose circumference rests on the 100% axis limits. The red marker depicts where the control stick would be given combined 100% left and 100% aft cyclic inputs. The blue marker depicts the position that cyclic input should be limited to such that we don't exceed the maximum tilt angle.

The effect of overdriving cyclic can be seen in the photo to the right. Inexperienced builders may not recognize this problem, and even those who do will often correct for it improperly. The most common method I've seen people use in their effort to avoid this problem is to limit aileron and elevator travel such that there is no interference when the sticks are moved to the extreme corners. The problem with this solution is that cyclic deflection is reduced during pure aileron and elevator inputs.

Experienced pilots often avoid this problem by training themselves to instinctively not to combine extreme aileron/elevator cyclic inputs. However, there is a way to avoid the problem altogether. It's called a 'Cyclic Ring.'



Here we can see a potential problem with interference between the washout arm link and the swashplate.

Cyclic rings are nice but diamond rings are forever.

WHAT EXACTLY IS A CYCLIC RING?

Simply put, a cyclic ring is a tool used to prevent the swashplate from being overdriven when combined aileron and elevator cyclic inputs occur. There are two types of cyclic rings, mechanical and electronic.

MECHANICAL CYCLIC RING

A mechanical cyclic ring is a physical device. An actual ring is inserted into the cyclic gimbal on the transmitter.

With this ring in place, the control stick's movement is limited to a maximum distance from neutral in any direction. It allows full stick deflection when pure aileron and elevator inputs are given. When aileron and elevator inputs are combined, the ring limits the maximum deflection on both axes.



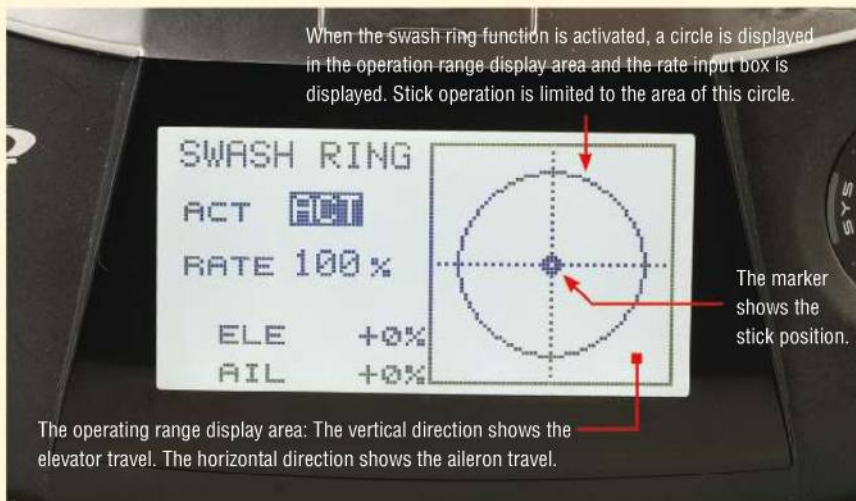
Mechanical cyclic rings will physically prevent the pilot from moving the cyclic stick into the trouble areas.

ELECTRONIC CYCLIC RING

An electronic cyclic ring accomplishes control limiting by virtue of algorithms that calculate the deflection of the appropriate servo(s) based on aileron / elevator stick positions, essentially mimicking what a mechanical cyclic ring does.

This feature used to only be found in high-end helicopter transmitters. Recently, it's beginning to show up in many of the newer sport class systems. Alternatively, there are stand-alone eCCPM swash mixers and digital flybar control units that also incorporate this feature.

A typical electronic cyclic ring function will display a circle around neutral. The circle depicts a virtual maximum distance the control stick is allowed to move from neutral. A marker shows the current stick position. When the marker moves outside the circle, the function begins to limit travel. Some implementations of this feature provide an adjustment to change radius of the circle; thus giving you some fine tuning capability.



When the swash ring function is activated, a circle is displayed in the operation range display area and the rate input box is displayed. Stick operation is limited to the area of this circle.

The marker shows the stick position.

The operating range display area: The vertical direction shows the elevator travel. The horizontal direction shows the aileron travel.

ALL YOU NEED TO KNOW



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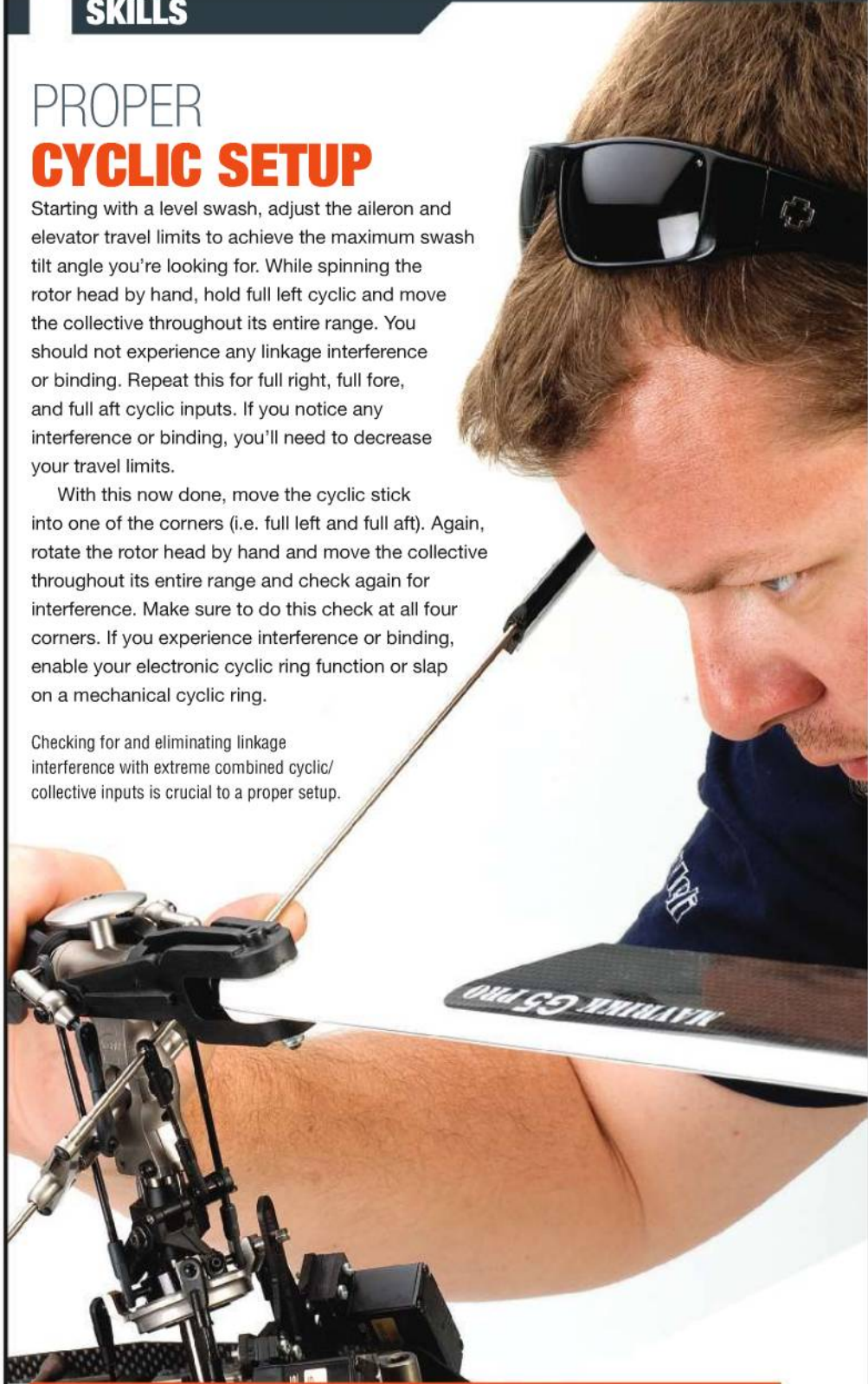
SKILLS

PROPER CYCLIC SETUP

Starting with a level swash, adjust the aileron and elevator travel limits to achieve the maximum swash tilt angle you're looking for. While spinning the rotor head by hand, hold full left cyclic and move the collective throughout its entire range. You should not experience any linkage interference or binding. Repeat this for full right, full fore, and full aft cyclic inputs. If you notice any interference or binding, you'll need to decrease your travel limits.

With this now done, move the cyclic stick into one of the corners (i.e. full left and full aft). Again, rotate the rotor head by hand and move the collective throughout its entire range and check again for interference. Make sure to do this check at all four corners. If you experience interference or binding, enable your electronic cyclic ring function or slap on a mechanical cyclic ring.

Checking for and eliminating linkage interference with extreme combined cyclic/collective inputs is crucial to a proper setup.



CONCLUSION

Many times, the consequence of linkage interference or binding in flight is an involuntary rebuild. Interference or binding can cause linkages to bend and ball links to pop off. Checking for this during your build and setup is crucial to a properly set up heli. When it comes to eliminating interference and binding from extreme cyclic inputs, a cyclic ring is the right tool for the job.

Happy Flying ...

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S032

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Specification:

Product Size: 305mm x 72mm x 150mm

Flight Time: Approx. 12 min

ON/OFF Switch: YES

Control Range: 100m

Charging Time: Approx 60 min

Battery: 3.7v 500mah

Battery for Transmitter: 4 x AA (not included)

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Ready-To-Fly 2.4Ghz 4 Channel
Electric Remote Control Co-Axial Helicopter

Specification:

Main Rotor Diameter: 450mm (17.7 in)

Length: 450 mm (17.7 in)

Height: 250 mm (10 in)

Flying Weight: 350g (12.5 oz)

Driven system: 2x 370 carbon brushed motor

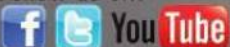
Servo: 2x 9g servos

Battery: 7.4v 1000mAh Li-polymer

Control system: 2.4Ghz RC Transmitter

Radio Control Range: 2500 ft (762m)

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E-Flite BLADE 120 SR

Jumbo Size Your mSR

WORDS: Ryan Kephart | PHOTOS: Jason Boulanger



See E-flite makes helicopters in between sizes 100.

YOU'VE BEEN FLYING A SMALL COAXIAL HELICOPTER AROUND YOUR HOUSE AND YOU'RE READY TO MOVE ON TO THE NEXT STEP. The only thing stopping you is the funds and the fear of flying a larger helicopter. E-flite and their Blade series of helicopters have helped countless beginners enter the world of RC helicopter flight through coaxial design. Many beginner pilots found that the mSR is great for indoor fun, but just a little too small to take outside. The opposite goes for the SR; it's a great helicopter to learn outdoors but a bit too large to take inside. This is where the brand new 120 SR comes in. It's small enough to fly it indoors, yet large enough to handle a slight breeze outside.

» AT A GLANCE

SIZE:	120
POWER:	Electric
TYPE:	Pod & Boom
BUILD TYPE:	Ready To Fly [RTF]
TAIL DRIVE:	Motor

FEATURES

The Blade 120 SR features a 5-in-1 control unit much like that of the smaller mSR. The 120 SR also features a similar rotor head to the mSR, which allows the helicopter to be extremely stable yet still give good flight performance. The ready-to-fly kit includes everything you need to get into the air, even the transmitter batteries. The Blade 120 SR can also be purchased in a “Bind-and-Fly” (BNF) version which allows you to use your own DSM 2 radio.

NOTE: The kit we tested was the final pre-production prototype. The production version may vary slightly.

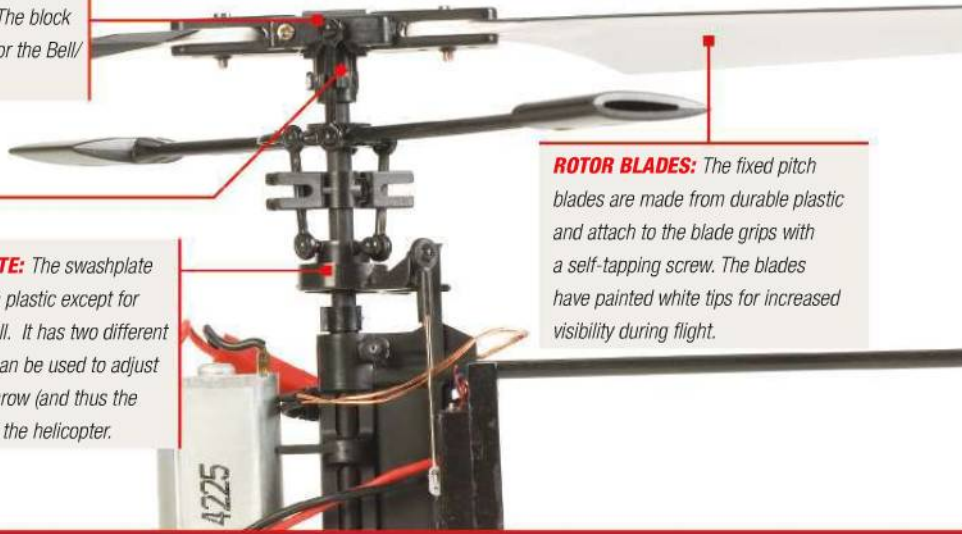
» ROTOR HEAD

HEADBLOCK: The headblock is molded from plastic and is attached to the carbon fiber main shaft with a single Phillips screw. The block contains O-rings for damping and has molded guide pins for the Bell/Hiller links.

CONTROL: E-flite continued the use of their Bell/Hiller head design that lets pilots enjoy the extra speed and response of a single rotor helicopter, but still have the stable feel of a coaxial.

SWASHPLATE: The swashplate is made from plastic except for the swivel ball. It has two different setting that can be used to adjust the control throw (and thus the sensitivity) of the helicopter.

ROTOR BLADES: The fixed pitch blades are made from durable plastic and attach to the blade grips with a self-tapping screw. The blades have painted white tips for increased visibility during flight.



» MAIN FRAME

DESIGN: The frames are a one-piece design with molded bearing blocks for the main shaft. The frames have a molded anti-rotation bracket, tail boom mount, landing gear mounts, and canopy standoff holes (for use with the included carbon rods).

LANDING GEAR: The plastic landing gear is a one-piece design that uses four screws to attach to the frame. The gear is sturdy and looks like it can withstand countless hard landings.

COMPONENT LAYOUT: The servos, speed control, gyro, and mixer are all bundled into one unit that is located just below and behind the main shaft. The battery is slid into place under the canopy and can easily be removed for fast battery swaps. The brushed motor sits in front of the main shaft and is secured to the plastic frame. Two wires are fed through the tail boom and attach to the tail rotor drive motor.

CANOPY: The canopy is made from thin plastic much like the mSR. The canopy is pre painted and has a tinted windscreen. The canopy mounts to the frames with two carbon rods and four rubber grommets.



» DRIVE TRAIN

MOTOR MOUNT: The motor mount is integrated into the frame and secures the brushed motor.

PINION: A brass pinion is pressed onto the motor and is secured by a friction fit.

MAIN GEAR: The main gear is keyed to the main shaft and has a single screw that keeps it in place. The gear is replaceable and is easily removed with a Phillips screwdriver.

TAIL DRIVE: Two wires run through the boom and attach to a direct drive tail rotor drive motor.



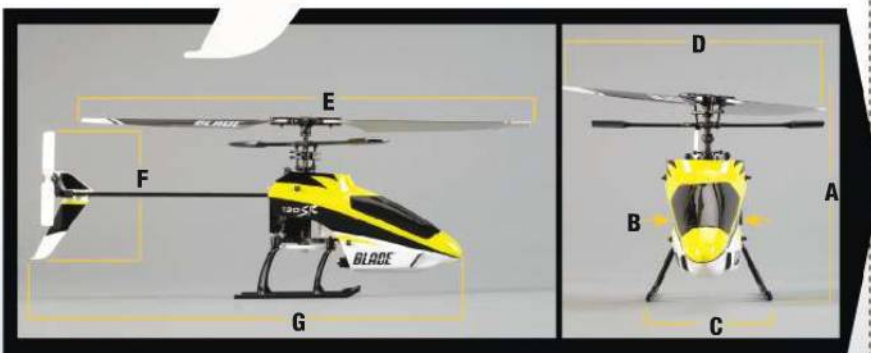
» TAIL & BOOM

TAIL ROTOR SYSTEM:

The tail motor drives a small, white, fixed pitch tail rotor that is press fit to the motor shaft. The motor is controlled by the 5-in-1 unit, which also has a gyro and mixing function to keep the tail stationary.

BOOM: The carbon fiber boom is attached to the main frames with a friction fit. The boom is lightweight and does not need to be supported. A plastic vertical stabilizer is clipped to the tail boom and offers some protection from tail rotor strikes.

TAIL CASE: The tail case is molded from plastic and attaches to the tail boom with a friction fit. The tail case has been molded to receive the brushed tail motor. The tail motor mount also has a cage around the motor can that keeps the tail straight and secure.



PROTECH ZOOM 450IC

MODEL SPECIFICATIONS

CLASS:	Blade 120 SR
BUILD:	RTF
BLADE SIZE:	146mm
LEVEL:	Beginner

FRAME

MATERIAL:	Plastic
TYPE:	One Piece
SERVO TO SWASH LINKAGE:	Direct
SERVO SIZE:	Integrated

ROTOR HEAD

GRIPS:	Plastic
HEAD BLOCK:	Plastic
LINKS:	Ball
SWASH:	Plastic
CONTROL:	Fixed Pitch

TAIL

DRIVE SYSTEM:	Brushed Motor Direct
AUTO DRIVEN:	N/A
TAIL PITCH SLIDER:	N/A
TAIL BLADE GRIPS:	N/A
TAIL CASE:	Plastic
BOOM STRUT MATERIAL:	N/A

GEARING

MAIN ROTOR TO PINION RATIO:	1:7.5
MAIN ROTOR TO TAIL RATIO:	1:1

WEIGHT

WITHOUT BATTERY:	0 lbs., 3.2 oz. (91g)
FULLY LOADED: (Includes battery)	0 lbs., 3.75 oz. (106g)

DIMENSIONS

HEIGHT (A):	5.25 in. (133mm)
CANOPY WIDTH (B):	2 in. (50mm)
LANDING GEAR (C):	3 in. (76mm)
PADDLE TO PADDLE DIA. (D):	5.875 in. (149mm)
MAIN ROTOR (E):	13 in. (330mm)
TAIL ROTOR (F):	2.75 in. (70mm)
LENGTH (G):	12.25 in. (311mm)

Fewer the parts, less to replace after a crash.

TESTING

We tested the Blade 120 SR using the supplied gear and also tried both settings on the swashplate to see how much more aggressively the helicopter would fly. The aggressive settings made the helicopter respond more quickly and it seemed to fly faster overall. For this section, we wanted to base the ratings off the docile settings because this helicopter is geared for the beginner transitioning into a single main rotor helicopter.

That is Ryan's saltwater aquarium in the background.

HOVERING •

Like the mSR, the 120 SR hovers like a dream. This helicopter was designed to be a trainer and that is exactly how it feels in a hover. The controls are docile and a fair amount of input can be added without the helicopter feeling overly responsive. The helicopter doesn't drift much at all in a hover and is very manageable even for a first time pilot.

Rating: 5

FORWARD FLIGHT •

Pushing the nose over and gaining some speed, I did notice that the 120 SR seemed to inherit a weird feeling that the mSR has. Cyclic

roll must be added to keep the helicopter going in a straight line. It's not all that bad after you get used to it. One great feature that the SR has is the ability to transition back into a hover by just letting go of the cyclic. The 120 SR will slowly level out and oscillate a bit until it settles into a stable hover.

Rating: 3.5

CYCLIC PITCH RESPONSE • The cyclic responds very smoothly. This feature helps a novice pilot, as single rotor helicopters usually feel a bit unstable and sensitive to cyclic inputs. The docile cyclic pitch response gives the new pilot time to think and correct for wrong inputs or wind adjustments.

Rating: 4

COLLECTIVE PITCH RESPONSE • Being a fixed pitch helicopter, the Blade 120 SR uses the RPM of the motor to change the altitude of the helicopter. The brushed motor has plenty of power to keep the helicopter climbing at a decent speed. One thing to watch out for with a fixed pitch helicopter is the slight inherent lag when moving the collective stick. Overall, the collective felt very precise and remained in a stationary hover with ease.

Rating: 4

TAIL ROTOR RESPONSE • The direct drive tail responded very smoothly and felt locked in throughout the flight. The 5-in-1 unit controlled the tail well and did not allow the yaw to drift very much. Only a few clicks of trim throughout the flight kept the tail in control. The tail had good response overall and the piro consistency was near perfect.

Rating: 4.5

POST FLIGHT INSPECTION • After a dozen flights both inside and outside and a few hard landings, the 120 SR seemed to be reasonably durable. The landing gear, blades, and components seem to take a beating and keep on going. No adverse wear was seen and the motors seem to produce as much power as the day we took it out of the box.

Rating: 5

CONCLUSION

E-flite and their new Blade 120 SR seem to be a good match with their single rotor beginner helicopters. Our test kit was pre-production, however we believe the final production to be almost identical. This helicopter is smooth and hovers like a dream. Keep in mind this helicopter is not as stable as a counter-rotator, however it offers a viable option for the first time pilot looking to fly both indoors and out. With the affordable price and the "everything included" package, no one that is interested in the hobby should wait. The 120 SR is a perfect choice for any pilot looking for some fun. **TRE**

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TESTING SPECS

E-FLITE BLADE 120 SR

Part #: BLH3100
 Distributor: Horizon Hobby
 Web: www.horizonhobby.com

Street Price: \$179.99
 Price as Tested: \$179.99
 Build/Setup Time: 5 minutes

PERFORMANCE

MODE FLOWN:	Normal
RPM OF EACH MODE:	Normal: Fixed Pitch
MOTOR TEMP (after flight):	105° F
BATTERY TEMP (after flight):	102° F
FLIGHT TIME:	7 minutes
CRASH COST:	Parts not available during review

TEST CONDITIONS

WEATHER:	Cloudy
TEMP / HUMIDITY:	84° F/60%
BAROMETRIC PRESSURE:	29.62 in.
WIND SPEED:	7 mph
VISIBILITY:	10 miles
ALTITUDE:	700'

PITCH CURVES

NORMAL:	N/A
---------	-----

REQUIRED TO FLY

Everything is included with the RTF Version.

WHO'S IT FOR?

The 120 SR is a great transitioning helicopter for a beginner pilot who has mastered a coaxial heli. The size allows you to fly the helicopter both indoors and out.

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

4	Instructions
4	Parts Quality/Fit
5	Durability
3	Tunability
4.5	Overall Performance
4	Value

THE GOOD

- Everything is included
- Stable flight characteristics
- Good tail performance

THE BAD

- Uses brushed motors

Is that a frog waiter I see?



3D Masters Champions

'02 '03 '04 '05 '06 '07 '09



2. Duncan Osbourne

1. Dominik Hägele



3. Eric Weber



Congratulations to:

**1. Dominik Hägele 2. Duncan Osbourn
3. Eric Weber on their First, Second,
and Third Place victories at the
2009 3D Helicopter Masters Event.**

All three pilots used COOL POWER HELI 30% to power their Helis

Yes another TREX!



Align TREX 550E

Like a Mid-size Sedan

WORDS: Ryan Kephart | PHOTOS: Jason Boulanger

ONCE AGAIN, WE'RE HERE TO REVIEW THE NEWEST ALIGN PRODUCT. THIS MONTH WE WILL TAKE A CLOSE LOOK AT THE TREX 550E. With Align producing so many different sizes of helicopter, it must be tough to find a new helicopter that will fit in the bunch. Will we see other helicopter from Align that fills the gap between each of their helicopters? Only time will tell.

It won't be the last one.

» AT A GLANCE

SIZE:	550
POWER:	Electric
TYPE:	Pod and Boom
BUILD TYPE:	Kit
TAIL DRIVE:	Torque Tube

FEATURES

The TREX 550E features a completely new design that allows the electronics to be spaced correctly to prevent interference. The helicopter is constructed from aluminum and carbon fiber, with a few plastic parts such as the tail boom clamp, battery tray, and anti-rotation bracket. The 550E we reviewed also includes everything you need to get the helicopter in the air except for a battery and radio gear.

» MAIN FRAME

SWASH CONTROL: The swash is controlled by three servos in a "direct connect" configuration. The servos are secured to the frames with self-tapping screws that thread into plastic retainers.

COMPONENT LAYOUT: The frame is designed to allow each component its own space. The battery is located up front on a plastic tray with two Velcro straps. The brushless motor rests underneath and just aft of the battery with the can facing down. Two cyclic servos are above the motor. Under the main shaft and on either side of the frame the ESC is attached using Velcro or double-sided foam tape. Holes are also provided for securing the ESC with wire ties. Inside and toward the back of the frame a carbon fiber plate serves as a mounting point for both the receiver and gyro control unit. Above this plate the tail servo mounts to a plastic spacer that is easily removed if you need to work on the tail servo. The gyro mounts to the anti-rotation bracket on an integrated platform.

DESIGN: The carbon fiber frames are a two-piece stacked design that is spaced just wide enough to fit all the electronics. The frames sides are assembled with aluminum spacers mixed with plastic parts like the tail boom mount. A carbon fiber bottom plate is also used to stiffen the frames.

CANOPY: The new TREX 550E canopy is unlike any other TREX canopy we have seen before. The new style is sleeker and has more of a point on the nose. The canopy is pre-painted in bright colors, which make it easy to see in the air.

LANDING GEAR: The landing gear is much like that of any other TREX. The gear is a four-piece design. The struts mount to the frames using machine screws that thread into aluminum brackets. The skids slide through the struts and are secured using grub screws. Four rubber stoppers are also included with the kit.



» DRIVE TRAIN

MOTOR MOUNT: The motor mount is made from aluminum and has cooling fins machined into it. The brushless motor mounts to the mount using two screws. The mount is installed on the frames using four SHCS. The mesh is adjusted using the screws that attach the motor to the mount.

PINION: A brass pinion is included with the kit and is secured to the motor using a setscrew. A 16-tooth pinion is included.

MAIN GEAR: The main gear on the TREX 550E is attached to an aluminum hub using five screws. The gear has 170 teeth.

AUTOROTATION DRIVE: The main gear aluminum hub houses the one-way bearing to provide a smooth autorotation drive. The bearing is press fit to the aluminum hub. The hub also provides cooling to help increase the lifespan of the one-way bearing.

TAIL DRIVE: Below the main gear, a large main tail gear is installed and attached to the main shaft of the helicopter. The tail gear engages with a secondary gear that drives a bevel gear that spins the torque tube. The secondary gear is dual ball bearing supported and attached to the tail boom mount for easy access. The tail is driven during an auto.



THE TREX 550E WE REVIEWED CAME WITH EVERYTHING WE NEEDED EXCEPT FOR THE BATTERY AND RADIO GEAR, SO WE DECIDED TO FINISH THE INSTALLATION WITH THE BEST EQUIPMENT WE HAD.



Align TREX 550E MODEL SPECIFICATIONS

CLASS:	550 Electric
BUILD:	Kit
BLADE SIZE:	520-550mm
LEVEL:	Intermediate- advanced

FRAME

MATERIAL:	Carbon fiber
TYPE:	Two-piece stacked
SERVO TO SWASH LINKAGE:	Direct
SERVO SIZE:	Standard

ROTOR HEAD

GRIPS:	Aluminum
HEAD BLOCK:	Aluminum
LINKS:	Ball
SWASH:	Aluminum
CONTROL:	CCPM 120°

TAIL

DRIVE SYSTEM:	Torque tube
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Single
TAIL BLADE GRIPS:	Aluminum
TAIL CASE:	Aluminum
BOOM STRUT MATERIAL:	Carbon

GEARING

MAIN ROTOR TO PINION RATIO:	1:10.625
MAIN ROTOR TO TAIL RATIO:	1:4.5

WEIGHT

EMPTY:	2 lbs., 2 oz. (976g)
FULLY LOADED: (Includes battery)	5 lbs., 15 oz. (2,699g)

DIMENSIONS

HEIGHT (A):	14.33 in. (364mm)
CANOPY WIDTH (B):	5 in. (127mm)
LANDING GEAR (C):	8.25 in. (209mm)
PADDLE TO PADDLE DIA. (D):	N/A
MAIN ROTOR (E):	46.5 in. (1,188mm)
TAIL ROTOR (F):	10 in. (254mm)
LENGTH (G):	41 in. (1,042mm)

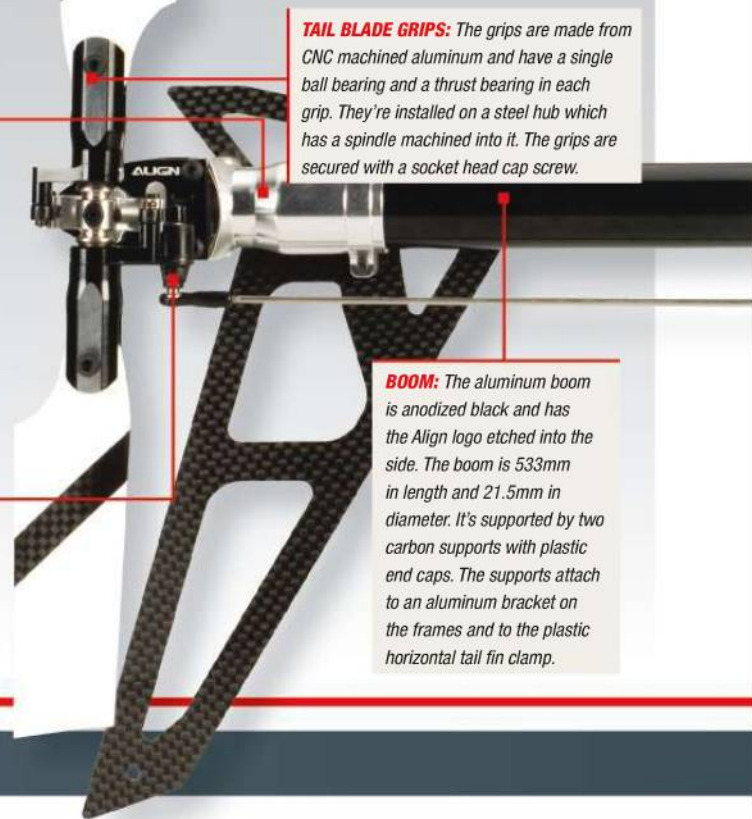
FEATURES CONTINUED

» TAIL & BOOM



TAIL CASE: The tail case is comprised of three main pieces. The aluminum tail boom clamp is machined with bearing blocks and recesses for the two aluminum side plates. The plates are secured using two screws on each side of the clamp, and a single support at the rear of the case.

PITCH ACTUATOR SYSTEM: The tail pushrod is guided down the boom using two plastic pushrod guides that are attached to the boom with a wire tie to cause a friction fit. The pushrod connects to a plastic bellcrank that is dual ball bearing supported. The bellcrank attaches to a single-point pitch slider with an aluminum pitch fork. Two plastic links attach to the blade grips.



TAIL BLADE GRIPS: The grips are made from CNC machined aluminum and have a single ball bearing and a thrust bearing in each grip. They're installed on a steel hub which has a spindle machined into it. The grips are secured with a socket head cap screw.

BOOM: The aluminum boom is anodized black and has the Align logo etched into the side. The boom is 533mm in length and 21.5mm in diameter. It's supported by two carbon supports with plastic end caps. The supports attach to an aluminum bracket on the frames and to the plastic horizontal tail fin clamp.

» ROTOR HEAD

HEADBLOCK: The anodized aluminum headblock has a slice cut out to allow the Jesus bolt to also clamp the headblock to the main shaft. An aluminum head button is also included with the head that is removable. The kit includes a temporary tool that replaces the head button to allow you to check the pitch of the blades.



SWASH FOLLOWER: The aluminum swash follower is clamped to the main shaft. The screw that clamps the follower also holds one of the two aluminum arms. The arms and links are dual ball bearing supported. The links attach to the arm using a total of four machine screws.

MAIN BLADE GRIPS: The aluminum blade grips are dual ball bearing supported and each have a thrust bearing. The grips use larger pitch arms and a "zero delta" connection.

Have you guys seen this tail rotor before?

» INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX

Upon opening the box, you will find individual boxes that are labeled with the various subassemblies. The helicopter is packaged well and parts are individually bagged to prevent scratching during shipping. You will find the canopy in the mainframe box wrapped in foam sheets to protect the brightly colored paint scheme.



MANUAL AND BUILD

Building the TREX 550E is straightforward and easy when following the manual. The kit has some parts that are pre-built, but should be taken apart to inspect the installation and ensure that thread lock and grease are applied to the correct areas. I did notice that both the tail blade grip and main grip thrust bearings were not lubed enough, so I added some Tri-Flow grease to these areas. The kit can be assembled in a single day, but programming a flybarless helicopter can take some extra time.



Align TREX 550E RTF & TEST GEAR

» SUPPLIED GEAR

-  ■ **CYCLIC SERVOS:** Align, DS610, K10425A, 2.0 oz. (56g)
-  ■ **TAIL SERVOS:** Align, DS620, K10421A, 1.95 oz. (55g)
-  ■ **GYRO:** Align, FL760, N/A, 0.95 oz. (27g)
-  ■ **MOTOR:** Align, RCM-BL600M, HML60M01, 10.93 oz. (310g)
-  ■ **SPEED CONTROL:** Align, RCE-BL70G, N/A, 2.25 oz. (64g)
-  ■ **BLADES:** Align, 520mm Carbon Fiber Blades, H55001

» TEST GEAR

-  ■ **RADIO:** JR, 11X, JRP1100, \$750
-  ■ **RECEIVER:** JR, R921, JRPR921, 0.80oz. (22g), \$170 (included with radio)
-  ■ **BATTERY1:** Thunder Power, 6s 3250mah 45C, TP3250-6SP45, 18.7 oz. (532g), \$189
-  ■ **BATTERY2:** Thunder Power, 6s 3800mah 45C, TP3800-6SP45, 21.86 oz. (620g), \$220
-  ■ **CHARGER:** Thunder Power, TP610C, THP610, \$100

SWASHPLATE: The swashplate is made from aluminum and comes out of the box without any thread lock on the ball links. The swashplate slides smoothly and does not appear to have any slop. The elevator ball link also has an integrated anti-rotation pin that rides in a plastic bracket just behind the main shaft.

TESTING

The TREX 550E we reviewed came with everything we needed except for the battery and radio gear, so we decided to finish the installation with the best equipment we had. The helicopter was powered by a powerful 45C pack supplied by Thunder Power, and the brand new JR 11X transmitter connected us to the model.

HOVERING • The weight and stability from the 3G system made the TREX 550E hover like a dream. The cyclic was set up to be docile around the center and it really paid off. In heavy wind conditions the 550 did not have any problems staying over one spot on the ground, but it did change altitude during a gust. This is to be expected and did not count against the rating in this section. Overall, the hovering characteristics were spot on.

Rating: 5

FORWARD FLIGHT • Smooth forward flight is the key word when it comes to the TREX 550E. The helicopter is fast and smooth with zero pitching tendencies until you hit the maximum speed. The only time I noticed the helicopter wanting to dip its nose was in full collective fast forward flight. Overall, the helicopter tracked well and looked natural in forward flight.

Rating: 4.5

CYCLIC PITCH RESPONSE

• The cyclic response is the best characteristic of the TREX 550E. The response was instantaneous and fast. Flips and rolls were lightning quick and allowed even the hardest 3D maneuvers to be achieved. Some transitions did make the servos bog down a bit, which made the helicopter act a little weird, but overall you can't ask for a better cyclic pitch response.

Rating: 5

COLLECTIVE PITCH RESPONSE • We tested the 550E with several different packs of various sizes and the collective seemed to be responsive enough for up to a 3800mah battery pack. The lighter packs really made a big difference and gave the helicopter a much more snappier feel. Any pack above a 3800 still had enough pop, but just felt a little mushy for my taste.

Rating: 4

TAIL ROTOR RESPONSE • The tail control on the 550E felt adequate and never blew out. Piro stops and starts were spot on and did not overshoot or bounce. The TREX 550E was a little tricky to find that sweet gain spot, but once it was found the tail was unstoppable. Pirouetting consistency was really good even on windy days.

Some maneuvers while pirouetting would change a little, but nothing to complain about.

Rating: 4

AUTOROTATION CAPABILITIES • The autorotation drive worked flawlessly on the 550E. The headspeed held well throughout the descents and had just enough energy to set it on the skids softly. Inverted autos are also easily accomplished and seemed to retain enough energy to flip the helicopter back over with ease.

Rating: 4.5

POST FLIGHT INSPECTION • Going over the TREX 550E, I was pleased to find everything in the same place. The ball links did not wear and slop was nowhere to be seen. Overall, the helicopter was very reliable throughout the testing and it even survived a few rough landings.

Rating: 5



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TESTING SPECS

ALIGN TREX 550E

Part #: KX021002T
Distributor: Heli Wholesaler
Web: www.heliwholesaler.com

Street Price: \$999
Price as Tested: \$1,938
Build/Setup Time: 12 hours

PERFORMANCE

MODE FLOWN:	Normal, Idle-Up 1, Idle-Up 2
RPM OF EACH MODE:	Normal: 2000 Idle-Up 1: 2400 Idle-Up 2: 2550
MOTOR TEMP (after flight):	100° F
BATTERY TEMP (after flight):	98° F
FLIGHT TIME:	7 minutes
CRASH COST:	\$60

TEST CONDITIONS

WEATHER:	Cloudy
TEMP / HUMIDITY:	73° F/58%
BAROMETRIC PRESSURE:	30.05 in.
WIND SPEED:	3 mph
VISIBILITY:	10 miles
ALTITUDE:	675'

PITCH CURVES

NORMAL:	-5, 0, 12
IDLE-UP 1:	-12, 0, 12
IDLE-UP 2:	-12, 0, 12

REQUIRED TO FLY

Radio, receiver, 6S 2600-5200mah battery

WHO'S IT FOR?

This helicopter is great for a middle-of-the-road type of guy. Although this helicopter is a great flyer, someone that already has a 500 or 600 sized helicopter may not need every helicopter inbetween thier current size.

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

4.5	Instructions
5	Parts Quality/Fit
5	Durability
4	Tunability
4.5	Overall Performance
4	Value

THE GOOD

- Most everything is included
- Nice separation of components
- Big battery range

THE BAD

- A little heavy for the stock 520mm blades

I am liking the new canopy design.

CONCLUSION

The TREX 550E is a great all around helicopter and is perfect for someone looking for a larger machine then a 450. Although the 550 is close in size to both the 600 and 500 class helicopters, the 550 flies like a bigger machine. However, the weight did feel a little heavy at times, this would quickly be eliminated using 550mm blades. The TREX 550E has a place in my collection of helicopters to take to the field every weekend. **TREX**





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ESKY RG 900

E-SKY 900, AKA ES500

WORDS: Daniel Colby | PHOTOS: Jason Boulanger

FOR YEARS NOW ESKY HAS DEVELOPED GREAT BEGINNER HELICOPTERS. Now they have moved into larger, more up-to-date electric helicopters. This month we are reviewing possibly the best ESKY helicopter to date, the ESKY 900. Although the 900 may not be the largest, it sure looks the best. Let's put this new helicopter to the test and find out if it can fly as well as it looks.

3D Freeeeeeee!

» AT A GLANCE

SIZE: 500

POWER: Electric

TYPE: Pod and Boom

BUILD TYPE: Kit

TAIL DRIVE: Belt



Nice graphics.

FEATURES

The ESKY 900 features carbon fiber and aluminum construction. The 900 can take both standard and micro size servos. The kit comes 90% ready to fly—just add electronics, slap on the blades and landing gear, and you will be in the air in no time. Several different models are available, including one with an aluminum frame and a plastic head. Both kits can be found with or without a power system.

» MAIN FRAME



SWASH CONTROL: The ESKY comes with CCPM swash control. All servos are connected to the swash in push-pull format. The bellcranks are aluminum and use dual ball bearings for smooth movement.



CANOPY: The canopy for the 900 is made of plastic and comes in either a blue or orange scheme. It's mounted with a tab on the bottom and with two posts on the frames.

DESIGN: The two-piece frame design is spaced with metal bearing blocks and plastic trays, allowing your radio gear and electronics to sit safely out of harms way.

COMPONENT LAYOUT: The cyclic servos are located around the swashplate in CCPM format. The two rear servos mount side by side, while the front servos mounts to the frame in front of and to the right of the main shaft. The motor mounts in front of the main gear with the can facing down. The battery sits up front above the receiver tray. The gyro mounts safely under the boom and between the frames. Beneath the gyro is a plate which allows the speed control to be mounted with either two-sided tape or Velcro strap. The tail servo mounts to the boom with two CNC aluminum brackets.

LANDING GEAR: The landing gear is a common four-piece design using two plastic struts that mount directly to the frame with four screws, and two aluminum skids that are held in place using two setscrews per strut.

Daniel really liked the design of this helicopter.

» DRIVE TRAIN

ENGINE/MOTOR MOUNT: The motor is mounted to the bottom front of the heli using a metal mount/frame spacer. The mount has two slots to adjust for the correct gear mesh.

PINION: The 900 kit comes with two pinion options a (11T or 13T), allowing for use of several different motors to accommodate your flying style. The pinions are brass and mount using two small setscrews.

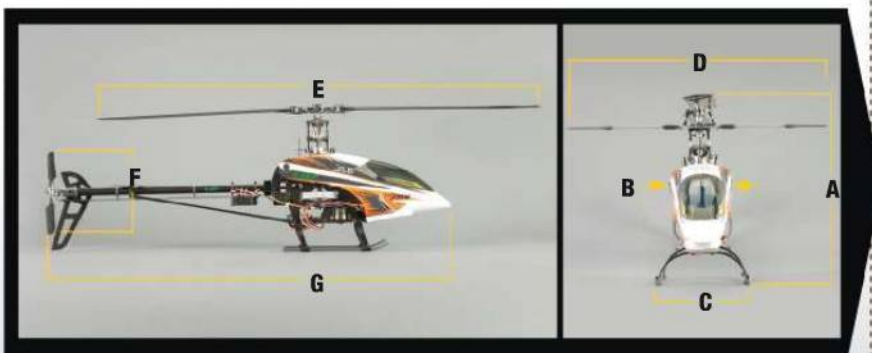
MAIN GEAR: The 133T main gear is molded with lightning holes and is made of plastic.

AUTOROTATION DRIVE: The one-way bearing is press fit into the main gear's hub, providing a constant tail drive which allows for tail control during autorotations.

TAIL DRIVE: The 108T main tail gear is located above the main gear and meshes with the secondary gear to drive the belt-driven tail rotor.



ONCE I SLAPPED ON A 6S 2200MAH PACK, I WAS ABLE TO PERFORM MILD 3D MANEUVERS WITH EASE. THE INCREASED HEADSPEED GAVE THE HELICOPTER A LIGHTER FEEL AND SNAPPY RESPONSE.



E-Sky RG 900

MODEL SPECIFICATIONS

CLASS:	500 electric
BUILD:	Kit
BLADE SIZE:	424mm
LEVEL:	Novice-Intermediate

FRAME

MATERIAL:	Carbon fiber
TYPE:	Two-piece
SERVO TO SWASH LINKAGE:	Bellcrank with push-pull rods
SERVO SIZE:	Mini or standard

ROTOR HEAD

GRIPS:	Metal
HEAD BLOCK:	Metal
LINKS:	Ball
SWASH:	Metal
CONTROL:	120° CCPM

TAIL

DRIVE SYSTEM:	Belt drive
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Single-point
TAIL BLADE GRIPS:	Metal
TAIL CASE:	Metal
BOOM STRUT MATERIAL:	Carbon

GEARING

MAIN ROTOR TO PINION RATIO:	1:10.23
MAIN ROTOR TO TAIL RATIO:	1:4.5

WEIGHT

EMPTY:	1 lbs., 14 oz. (851g)
WITHOUT BATTERY:	3 lbs., 2 oz. (1417g)
FULLY LOADED:	3 lbs., 14 oz. (1757g)

DIMENSIONS

HEIGHT (A):	12.25 in. (311mm)
CANOPY WIDTH (B):	4.5 in. (114mm)
LANDING GEAR (C):	6 in. (152mm)
PADDLE TO PADDLE DIA. (D):	18 in. (457mm)
MAIN ROTOR (E):	37 in. (940mm)
TAIL ROTOR (F):	7 in. (178mm)
LENGTH (G):	33.25 in. (845mm)

FEATURES CONTINUED

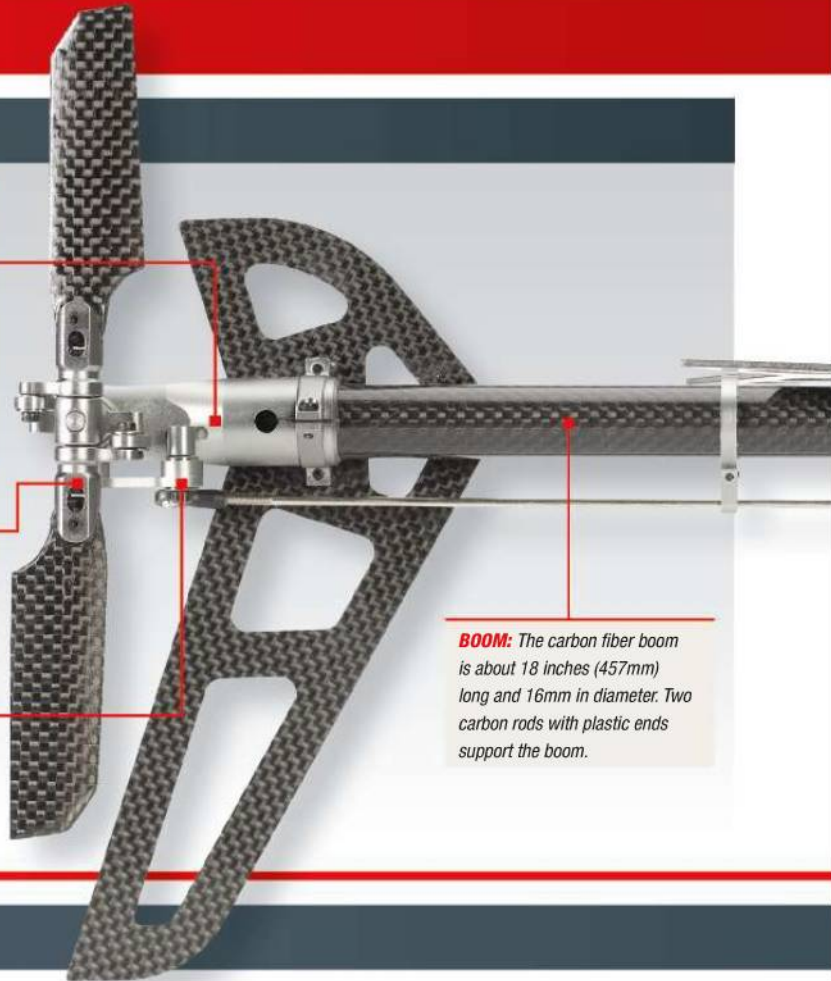
» TAIL & BOOM



TAIL CASE: The tail case is a one-piece CNC machined aluminum clamp design that houses two bearings to support the tail pulley. The left side plate is the mounting point for the vertical fin.

TAIL BLADE GRIPS: The aluminum tail grips house two ball bearings each and attach to a hub that is secured to the tail shaft with a setscrew. The carbon tail blades are held in place using a machine screw and locknut.

PITCH ACTUATOR SYSTEM: The tail is controlled by a boom mounted tail servo using two aluminum brackets. The pushrod runs through two aluminum guides that clamp to the boom. An aluminum bellcrank is attached to the tail case and is supported by dual ball bearings. The bellcrank attaches to an aluminum tail pitch slider using a single ball link. The slider has a brass bushing and slides on the tail shaft. Two aluminum links attach to the pitch fork and blade grips. These links are dual ball bearing supported at each attachment point.



BOOM: The carbon fiber boom is about 18 inches (457mm) long and 16mm in diameter. Two carbon rods with plastic ends support the boom.

» ROTOR HEAD

HEADBLOCK: The metal headblock is also a two-piece design with a head button that is attached by a single machine screw. The headblock mounts to the main shaft using a Jesus bolt and nut. The spindle is supported by two rubber O-rings for damping. The blade grips attach to the spindle using two machine screws that thread into each end of the spindle.

BELL/HILLER ARMS: The aluminum Bell/Hiller arms are connected to the flybar seesaw and use dual ball bearings. They don't offer mixing options.



WASHOUT ARMS: The aluminum washout arms are dual ball bearing supported and attach to the washout base using a machine screw. The plastic links that connect them to the swashplate are connected using a small, press-fit pin.

PHASING: Phasing on the 900 is provided by two pins that are pressed into the head block. They are not adjustable, but do have a small amount of play in connection with the washout.



Esky loves carbon fiber and aluminum.

» INSTRUCTIONS & BUILDING TIPS

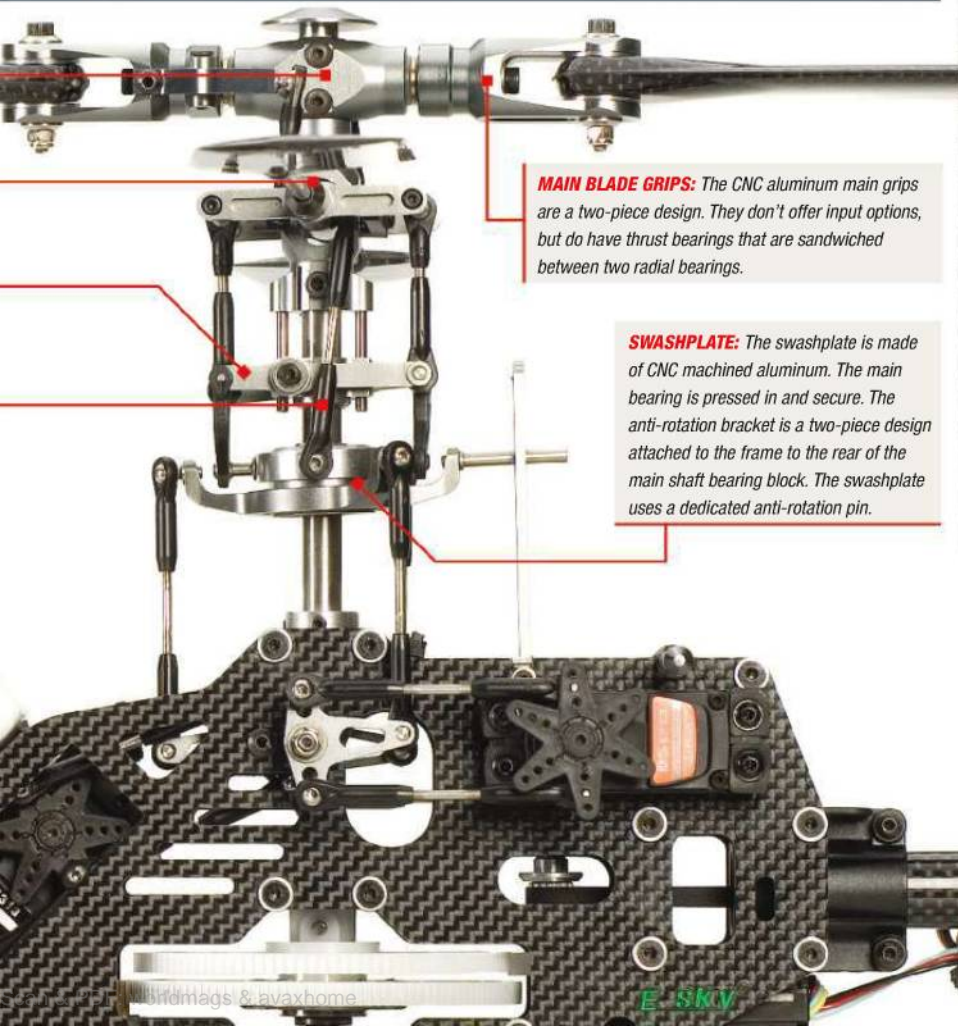
WHEN YOU OPEN THE BOX

The ESKY 900 is 90% assembled. The canopy is sealed in a plastic bag next to the helicopter, and beneath the helicopter you will find your blades and all necessary hardware.

MANUAL AND BUILD

All bolts were thread locked, but I advise to always check and make sure. The build was fairly simple;

the only issue I had was with the servo mounting hardware. Since you have to use spacers between the servos, it requires 12 long screws and only four are supplied. If you purchase this helicopter, you'll also need to order a screw kit. The assembly manual could use some finer detail but is suitable for the task.



MAIN BLADE GRIPS: The CNC aluminum main grips are a two-piece design. They don't offer input options, but do have thrust bearings that are sandwiched between two radial bearings.

SWASHPLATE: The swashplate is made of CNC machined aluminum. The main bearing is pressed in and secure. The anti-rotation bracket is a two-piece design attached to the frame to the rear of the main shaft bearing block. The swashplate uses a dedicated anti-rotation pin.

E Sky RG 900

RTF & TEST GEAR

» SUPPLIED GEAR



■ **MOTOR:** ESKY, Brushless Outrunner, TBA

■ **BLADES:** ESKY, 425mm CF Blades, TBA

» TEST GEAR



■ **RADIO:** Hitec, Optic 6 Sport 2.4 GHz, HRC159241, \$150



■ **RECEIVER:** Hitec, Optima 6, HRC28410, .54oz. (15.3g), \$50



■ **CYCLIC SERVOS (3):** ACE, DS1313, ACE8128, 2.33oz. (66g), \$75 ea.



■ **TAIL SERVO:** Futaba, S9254, FUTM0224, 1.8oz. (51g), \$120



■ **SPEED CONTROL:** Castle Creations, Phoenix Ice Lite 75, 010-0070-00, 2.4oz. (68g), \$102



■ **BATTERY:** ProTek, ProTek 6s 2500, PTK-lp-2200-6s30, 13.6oz. (387g), \$93



■ **GYRO:** Futaba, GY401, FUTM0807, (27g), \$150



■ **CHARGER:** Thunder Power, 610C, TP-610C, (26g), \$115

Put side quote here please.

TESTING

The ESKY 900 was tested using the suggested electronics in the manual. We used the supplied ESKY brushless motor paired with a 75A Castle Creations speed control. This combo gave the 900 superior power to perform mild 3D maneuvers. We used the supplied 425mm carbon fiber blades and DS1313 digital servos from Ace RC. The Futaba GY401 gyro was paired with the S9254 digital tail servo.

HOVERING • After installing the radio gear and charging the battery, I took the 900 straight to the skies. The 900 was easy and predicable to hover. I hovered in both calm and windy situations, and as expected the helicopter handled both with great authority. The added weight to the flybar definitely helped, making this a great beginner heli. When moving the flybar weights in, the helicopter felt much more sensitive but still very manageable in windy conditions. This gives the 900 a broad range of flight characteristics that can challenge the beginner pilot until they are ready for 3D flight.

Rating: 4

FORWARD FLIGHT • I started off doing some slow circuits to get a good feel for the helicopter. I'm happy to say that the 900 was docile and easy to maintain in a straight line in both slow and fast flight. I did not notice any pitchiness or

weird tendencies; it's a very smooth and predictable helicopter.

Rating: 4

CYCLIC PITCH RESPONSE • I set up the 900 using the recommended settings. With the added weight to the flybar, the cyclic response was slow and mushy. Once I moved the weights inward, it made a big difference in being able to perform harder maneuvers. All and all, it has the potential to be a very capable helicopter.

Rating: 3.5

COLLECTIVE PITCH RESPONSE • The included ESKY motor does an adequate job delivering power to the main rotors. At first I used a 4S 3000mah, which was great for hovering, and flying circuits. Once I slapped on a 6S 2200mah pack, I was able to perform mild 3D maneuvers with ease. The increased headspeed gave the helicopter a lighter feel and snappier response.

Rating: 3.5

TAIL ROTOR RESPONSE • The tail rotor on the 900 performed okay with the Futaba GY401. For a beginner this is a great set up, but once you wanted to start performing 3D aerobatics I would recommend using a mid to high-end gyro. On full pitch climbouts, the tail would drift but pirouetting stops were spot on, and I didn't notice any bouncing or over shoot.

Rating: 4

AUTOROTATION CAPABILITIES • Using the supplied 425mm carbon blades, the 900 performed good autorotations for a 500-size helicopter. Coming out of Idle-Up 2 into throttle hold, the helicopter retained its headspeed quite well, but when performing an auto from Normal mode (which has a slower headspeed), the 900 did not like to pick up the energy needed to perform a clean auto.

Rating: 3

POST FLIGHT INSPECTION • After several flights I looked the helicopter over and noticed no abnormal wear in the ball links. During the course of the testing we started noticing a clicking noise coming from the helicopter. A single tooth had broken off on the main gear and eventually it stripped completely when using a 6S battery pack. We landed the helicopter, replaced the main gear, and have not had a problem since. Overall, the ESKY 900 is a sturdy machine that does not have bad wearing tendencies.

Rating: 4

CONCLUSION

The ESKY 900 is a solid flying 500. For a beginner, the weighted flybar and smooth control makes the bird ideal, so whether your looking to get in to the hobby or just add a solid heli to your fleet this helicopter is a good choice. **TFL**

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TESTING SPECS

E Sky RG 900

Part #: RG900
Distributor: Esky
Web: www.esky-sz.cn

Street Price: TBA
Price as Tested: TBA
Build/Setup Time: 2 hours

PERFORMANCE

MODE FLOWN: Normal, Idle-Up 1, Idle-Up 2

RPM OF EACH MODE:
 Normal: 2000
 Idle-Up 1: 2300
 Idle-Up 2: 2800

MOTOR TEMP (after flight): 130° F

BATTERY TEMP (after flight): 100° F

FLIGHT TIME: 7 minutes

CRASH COST: \$25

TEST CONDITIONS

WEATHER: Cloudy
TEMP / HUMIDITY: 73° F / 58%
BAROMETRIC PRESSURE: 30.05 in.
WIND SPEED: 3 mph
VISIBILITY: 10 miles
ALTITUDE: 675 feet

PITCH CURVES

NORMAL: -4, 0, 11
IDLE-UP 1: -11, 0, 11
IDLE-UP 2: -11, 0, 11

REQUIRED TO FLY

Radio transmitter, receiver, 3 cyclic servos, gyro, speed control, battery, and battery charger.

WHO'S IT FOR?

This is a great helicopter for the beginner looking for a larger size bird to go from first flight to basic 3D.

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

3.5 Instructions

3.5 Parts Quality/Fit

4 Durability

4 Tunability

4 Overall Performance

4 Value

THE GOOD

- Quality
- Mini or standard servos can be used
- Good all around flight performance

THE BAD

- Servo mounting hardware insufficient

The helicopter is not even out yet!





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T W O - T H O U S A N D T E N

FUTABA XFC

WORDS & PHOTOS: Staff

ONCE A YEAR, A CERTAIN MIDWEST TOWN IS TRANSFORMED INTO A HOTBED OF EXTREME RC ACTION. Over a long weekend, the tranquil droning of nearby farm equipment is drowned out by the roar of 3D heli action. All the excitement is because of the Futaba International Extreme Flight Championships (XFC). The event includes airplanes and helis. The AMA's home flying site in Muncie, Indiana is the venue. The wide open fields of lush sod make it the perfect spot to hold this event. The Futaba XFC committee invites pilots, and there are a few open slots for some lucky "extras" to try out on-site just prior to the start of the contest. This year there were 13 invited pilots, and 5 that flew their way in as "last chance qualifiers".

AKA "Extreme Flight Championships"





That is Kyle Stacy and his dad.....

“TO SAY THE FLYING WAS EXTREME
WOULD CERTAINLY BE AN
UNDERSTATEMENT.”

To say that the flying was extreme would certainly be an understatement. This year's group of pilots were intent on setting a new standard for 3D flying. The panel of experienced judges had a tough job critiquing them because all of their skills are insanely high. If you ever get a chance to attend the Futaba XFC you'll see what I mean. The focus and intensity of the players is at a different level.

DAY ONE • CAUTIOUS AGGRESSION

The contest starts on Friday and runs through Sunday evening. This year it was held June 11-13, 2010. Friday flights are always a bit tamer than in the later rounds. Most of the pilots came out on the first day with a mindset to survive the first two flights of the competition while earning a decent score. Contestants are required to fly one known flight that includes three pre-determined maneuvers, and one unknown flight that is made up entirely by each pilot. Each pilot flies a total of four flights in hopes of making it to the Sunday finals.



NIGHT FLY COMPETITION

Once again, the Futaba XFC organizers treated the crowd to a fireworks show and night fly contest. Bobby Watts once again won the night fly in extraordinary fashion. Bobby spent countless hours perfecting a special lighting setup on his model which was completely computer controlled. All of the LED lights on his heli were set to display various patterns and rhythms in perfectly choreographed patterns with the music. It was incredible to see, and I seriously doubt anyone will ever replicate the artistic display that Bobby put on this year. As a result, Bobby won the Crowd Favorite award.

WHAT KINDS OF HELIS ARE FLOWN AT FUTABA XFC?

This year, all the helis were 90 size nitro or electric machines except for one. Interestingly, it was Kyle Dahl who flew the smaller 600 size electric Mikado model to his first XFC win. No sub-90 size model has ever won the event. Other 600 size models have placed high in the past, but have never won.



Justin is back in the action! And with a new last name.



DAY TWO • RIP IT!

The flying always gets more radical as the contest moves ahead. This year the helis were stressed to the limit as the second full day of flying got underway. There were a few rain delays that kept it interesting. As soon as the rain stopped, the helis were in the air. Lower, harder, and faster were the key words to describe Saturday's action. Most of the pilots did not want to talk a lot. It was pretty serious business, with many of the competitors displaying somber attitudes between flights. Incredibly, very few crashes occurred this year.



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WHAT DOES IT TAKE TO FLY IN THE FUTABA XFC?

The Futaba XFC is an invitational event. There are two ways in which an aspiring pilot can get in. The most common way is to send a video of your flying to the Futaba XFC committee. If they feel you have the Right Stuff, then you will be notified and you're in. You can also show up at the event on Thursday and fly in the Last Chance Qualifier competition. There is some intense flying going on for the last chance spots. In fact, the last chance guys of today would have been capable of winning the contest just a few years ago. That is how good many of the Futaba XFC pilots have become.

Make sure to see this event in 2011. Each year the bar is raised in flying talent and showmanship. It's a unique competition that entertains like no other show in the world. Congratulations to all the pilots, judges, staff, and volunteers who make this event happen. Frank Noll of Great Planes leads the group of dedicated people who host the Futaba XFC. All of the proceeds from the competition are given back to the pilots in prize money. Frank wanted to personally thank each of these people for all the work they put into the show.

- **BILL CLINE**
- **RICK BARCH**
- **BLAINE MILLER**
- **STEVE KALUF**
- **MARK & CHERYL JORGENSON**
- **WILL & MARIAN BERNINGER**
- **KEVIN CORDELL**
- **GREG POPPEL**
- **BID "D" DARRELL BELL**
- **GEORGE RODRIGUEZ**
- **BOB & JOANNE BROWN**



First place gets a giant beer glass! Sweet!



THE FINALS

NICK MAXWELL FLEW SOME AMAZING FLIGHTS THAT IMPRESSED THE JUDGES AND SPECTATORS ALIKE. He was solidly in first position going into the finals on Sunday. The top seven pilots advance to a fly off on Sunday. Each of the seven finalists flies two known and two unknown flights on the last day. The best score from each type of flight is then averaged with the score they brought from the preliminary rounds. Unfortunately, Nick suffered some mechanical complications that prevented him from scoring in the finals. That moved him to the bottom of the group of 7. 16-year old Kyle Dahl was consistent and precise throughout the three day event. He was poised in second place and when Nick had his trouble, Kyle found himself in the winner's circle of this year's Futaba XFC. Veteran competitor Bobby Watts flew fiercely and earned second place when it was all over. Last year's champion, Jamie Robertson, showed us some outstanding flying again this year and took third place. Here is the final list of pilot standings. **TFL**

- | | | |
|--------------------|----------------------|--------------------|
| 1. Kyle Dahl | 7. Nick Maxwell | 13. Mitch Marozas |
| 2. Bobby Watts | 8. Bert Kammerer | 14. Frank Columbia |
| 3. Jamie Robertson | 9. Adriano Neto | 15. James Haley |
| 4. Kyle Stacy | 10. Benjamin Storick | 16. Mike Fortin |
| 5. Colin Bell | 11. Justin Jee | 17. Andrew Merlino |
| 6. Matt Botos | 12. Tom-Erik Rolfson | 18. Rob Wagner |

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DOING IT!

Thunder Tiger factory pilot Colin Bell gets up close and we're there to capture it.

Photo: Staff



Some extra shots from the XFC.

Ryan looks kind of angry in this pic.



HOVERING

Your first skill to master

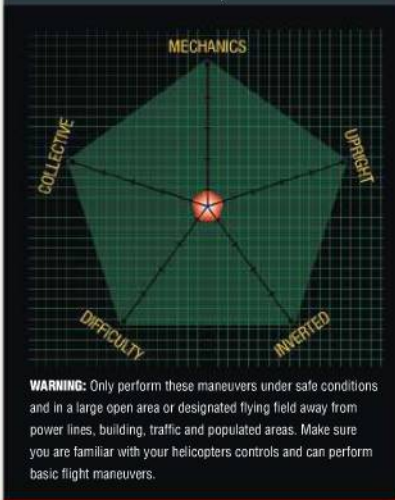
WORDS: Ryan Kephart

EVER SINCE YOU WERE A NEWBORN BABY, THERE WERE STEPS THAT YOU NEEDED TO DO TO ACHIEVE THE FULL POTENTIAL AND CONTROL YOU HAVE OVER YOUR BODY TODAY. You had to crawl before you walked, and you had to walk before you could run. These basic steps are repeated in helicopter flight as well. We have to learn to hover before we can move forward, and we have to learn to move forward before we can move backwards or upside down. These stepping stones are a very important process that take time and effort, but like a riding a bicycle, once you learn them you will know how to do them for the rest of your life.

Flight School Training

» SKILLS NEEDED

SCALE RATING: GREEN = Easy / RED = Advanced



SETUP: The foundation of hovering is the helicopter itself. A solid, docile setup will allow a new pilot to hover the helicopter without the fear of overly sensitive cyclic and collective.

- Smooth out the collective pitch curve by reducing the maximum pitch to -4 and +10 degrees. This will give the helicopter a docile collective feel.
- Adding dual rates and expo can soften the helicopter's response around center stick. For beginners, use no more than 10-12%.
- Adding flybar weights will increase the stability of the helicopter and slow down the cyclic rate.
- A heading lock gyro will provide a stable tail rotor, giving the new pilot one less control to worry about when learning to hover.
- Training gear provides a wider stance and gives the helicopter a little extra weight, which leads to stability.

LIFT OFF: What to expect and how to control the helicopter once you are in the air.

- Before trying to hover, remember that you need to crawl before you walk. When using training gear, get the helicopter light on the skids and "roll around" on the ground by using very small cyclic inputs so that you can get a feel for what the controls do.
- When spooling up the main rotor, you will notice that the helicopter will want to rotate counterclockwise. This happens because of the torque of the engine, and because the tail rotor does not have enough authority to counteract engine torque until the speed increases. This is less noticeable on grass than it is on concrete, and is just a momentary condition.
- Just as you lift off, you will notice that the helicopter will want to move slightly to the left. This is caused by the anti-torque

thrust of the tail rotor wanting to push the helicopter to the left. You will quickly learn that a helicopter requires a certain amount of tilt to remain stationary.

- Keep the tail rotor facing you before liftoff. This will ensure that all of the controls will correspond to the helicopter movement. For example, right cyclic will move the helicopter right. Forward on the cyclic will move the helicopter forward.
- Breezy wind conditions will move your helicopter around, so be ready for this and use small corrections to keep the helicopter in one spot. Save your first flight for calmer weather.
- If you get into trouble, slowly move the collective down until your training gear touch the ground, then move the collective all the way down and start over by grabbing the helicopter and moving it back in front of you.



One of the easiest maneuvers yet one of the hardest to master.

CONCLUSION

Hovering is one of those skills that must be mastered, and one of the toughest hurdles to overcome when learning to fly a helicopter. Keep practicing and before you know it you will have a rock solid hover. This foundation will provide many benefits throughout your training, since every flight will always start and end with a hover. *(THL)*

THE SNAKE

Snakes on a Helicopter

WORDS: Brandon Updike

THE SNAKE IS A MOVE THAT WORKS MORE LIKE A PUZZLE TO GET IT RIGHT. You need to be able to do a number of moves, then be able to piece it all together to achieve the snake. The snake is basically a backwards hurricane that moves from upright flight to inverted flight using smooth transitions. It's necessary for you to know all of the hurricane orientations so that when you transition from one aspect to the other, it won't bother you. The maneuver gives the illusion that your helicopter is slithering like a snake—hence the name. Once pieced together, the snake is a move that looks impressive and will garner you respect at the flying field.

Would this be called a Solid Snake?

4 Repeat this process until you are satisfied, and with any luck it should look like a snake.

3 Next transition into a upright hurricane by adding left cyclic and positive pitch. Add some forward cyclic to bring the tail back towards you.



FLYING THE MANEUVER

The best way to begin the snake is to ease into it during backwards-upright flight. I'm going to talk about doing the snake starting from right to left. When you're flying backwards and you have a good amount of speed, add right cyclic so that the heli disc is facing you in knife-edge flight. Begin doing your backwards-inverted hurricane by continuing to move your cyclic so your blade disc is a little off axis to create lift. You then want to pull back on your cyclic and add negative pitch so that your tail begins to turn away

from you. Make sure to keep your tail down to maintain momentum because it's going to want to rise up, so add slight left rudder inputs. When the helicopter's nose is beginning to face you, then you will want to transition into the next phase of the move. This is when the backwards-upright hurricane comes in handy. Begin adding left cyclic so you create positive lift. Begin adding forward cyclic inputs and slowly add positive collective input until your tail begins to face you. Once again, you want to keep your tail down

to continue the momentum, so continue to add slight left tail inputs. When the tail is facing you, transition back to the backwards-inverted hurricane. You want to tilt the rotor axis once again to create negative lift. Apply right cyclic, then pull back on the stick so your heli begins to turn while adding negative pitch. Then repeat the process as needed.

The next part is where it gets a little tricky. This is when your hurricane orientations will truly be tested. The next part of the maneuver requires you to

Flight School Training

» SKILLS NEEDED

SCALE RATING: GREEN = Easy / RED = Advanced



WARNING: Only perform these maneuvers under safe conditions and in a large open area or designated flying field away from power lines, building, traffic and populated areas. Make sure you are familiar with your helicopters controls and can perform basic flight maneuvers.

BUILD UP:

The key to the snake is being able to be proficient in flying the hurricane. You need to be able to fly the hurricane backwards in all aspects and orientations. Due to the constant orientation shift of the snake, you'll be able to piece all the hurricane moves together and make your transitions smooth from one angle to the other. You want to be comfortable with backwards flight, because almost the entire maneuver will be performed backwards. You want to be able to fly the hurricane backwards inverted and backwards upright with the skids facing towards you going both directions. You want to run a fundamental 3D setup and be comfortable with basic orientations of

flight. You want to have good collective management skills so that when you transition from one phase to the other you don't overwork your motor.

BAILING OUT:

The snake is a pretty simple move to bail out of because you can simply roll your heli to a comfortable orientation if you get in trouble. Whether you're falling too fast or end up in an odd angle, just roll your helicopter either inverted or to an upright orientation. If you're comfortable with your orientations, then you should have no problem. You also want to make sure you keep your heli at a little angle so it doesn't merely fall out of the sky.

2 Apply right cyclic input and enter an inverted hurricane for a brief second or two. Add some back cyclic to swing the tail away from you.

START

1 You will want to enter the snake while flying backwards upright. This example shows you flying right to left.



turn around and perform the snake with opposite orientations. There are two ways you can go about doing this. You can either turn around by doing a backwards-inverted hurricane, or turn around by doing a backwards-upright hurricane. When turned around in the opposite direction, the same basic stick inputs are used. For example, you're still going to be applying right cyclic to angle your helicopter, and you'll be pulling back on the stick to bring it back towards you. The tail is going to want to rise up, so make sure you continue

to add slight left tail inputs to keep the tail in a straight plain. The tough part is turning around and trying to keep the helicopter under control. The helicopter will be in a different angle as well, so don't let the different orientations fool you. Try to keep the helicopter in a solid, straight line.

CONCLUSION

The snake is a tough move that takes a lot of practice. Just remember to get all your hurricane orientations down first. Once this is done, it's relatively easy to piece it all together. This maneuver will open the door to better knife-edge flight and give you more confidence when it comes to faster and bigger backwards flight. Before you know it, you'll be slithering around the field in no time. **TBL**

It's like Brandon's still here.

Looks ahead of it's time doesn't it?



MIL MI-12

The World's Largest Helicopter

WORDS: Ryan Kephart

THE MIL MI-12 WAS THE LARGEST HELICOPTER EVER BUILT TO DATE. The massive size of this helicopters rotor disks spanned the size of a Boeing 747 wingspan. The Mi-12 nicknamed "Homer" never really made it into service, but several prototypes were built and flown setting several world records and winning the prestigious Sikorsky Prize awarded by the American Helicopter Society for outstanding achievements in helicopter design. The first prototype lifted off on June 27, 1967 and had some oscillation problems in ground affect that forced the test pilot to set the massive helicopter down, which caused one wheel to explode and bend the wheel disk. After a few adjustments the Mi-12 took off from Mil's factory pad in Panki and flew to the Mil OKB test facility in Lyubertsy. The first prototype lifted a 31,030 kg (68,409 lb.) to an altitude of 2,951m (9,682 ft.) in 1969. Six months later the Mi-12 took to the skies again, but this time carrying a 44,205 kg (88,636 lb.) payload to an altitude of 2,255m (7,398 ft.) setting a world record.

SPECS

CREW: 6 (pilot, copilot, flight engineer, electrician, navigator, radio operator)

CAPACITY:

- VTOL 25,000 kg (55,000 lb.) or
- STOL 30,000 kg (66,000 lb.) or
- 40,204.5 kg (88,636 lb.) record

LENGTH: 37.00 m (121 ft. 4 in.)

ROTOR DIAMETER: 2x 35.00 m (114 ft. 10 in.)

HEIGHT: 12.50 m (41 ft. 0 in.)

LOADED WEIGHT: 97,000 kg (213,850 lb.)

MAX TAKEOFF WEIGHT: 105,000 kg (231,500 lb.)

POWERPLANT: 4x Soloviev D-25VF turboshaft, 4,048 kW (6,500 shp) each

PERFORMANCE

MAXIMUM SPEED: 260 km/h (140 kt)

RANGE: 500 km (310 miles)

SERVICE CEILING: 3,500 m (11,500 ft.)

FEATURES

The Mil Mi-12 featured a twin rotor system that did not require an anti torque rotor. The massive main rotors were taken from the Mil Mi-6 and mounted to two outrigger wing supports that extended from the main fuselage that closely resembled a transport plane. The twin-engine transverse helicopter was not new to helicopter technology but the Mi-12 was Mil's first attempt to create such a platform. The Mi-12 or V-12 had a cockpit that set above the fuselage giving the pilots an unobstructed view. This large helicopter was capable of carrying 120

passengers, or a massive amount of major missile components.

HISTORY OF THE MI-12

Although several prototypes were built and flown successfully the need for such a helicopter had diminished over the years. The Soviet Air Force refused to accept the helicopter for the state acceptance trials due to the fact that the purpose that the helicopter was designed for no longer existed. Originally the Mi-12 was designed to carry strategic ballistic

missile for rapid deployment, but the military had changed their concepts of deployment and the original missiles were phased out due to disappointing performance. All the development on the Mi-12 stopped in 1974, but the two prototype helicopters were not demolished. The first prototype remained at the Mikhail Leontyevich Mil helicopter plant in Panki-Tomilino, Lyuberetsky District near Moscow and it is still there to this day. The second prototype was donated to Monino Air Force Museum which is just 50km away from Moscow and is on public display. **TML**



Never Before Has A Servo So Small Delivered So Big!

Don't let its small size fool you. The new HS-35HD promises the same precision and reliability that brings modelers back to the Hitec family time after time. Weighing in at just 4.5 grams, this powerful, long-lasting servo delivers in a big way! Featuring our exclusive Metal Karbonite™ gear train and producing 14 oz.-in. of torque and 0.10-sec. speed at 6 volts, Hitec's little flyweight is the heavyweight champ for anything micro. It may be the "tiniest" servo we have ever made, but it is the strongest performer you have ever seen!

Maximum Performance at Minimum Weight!



Model	4.8 Volts		6.0 Volts		Part#	Dimensions	Weight
	Speed	Torque	Speed	Torque			
HS-35HD	0.12	11.2 oz-in	0.10	14 oz-in	33035	0.74 x 0.30 x 0.62 in	0.16 oz



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We Serve you Right!

A conversation between an intrigued RC enthusiast and JR's striking new 11X advanced-class radio. (That's a photo of one, below.)



RCer: *(Staring at an 11X)* Wow. Look at that—I'm speechless!

11X: Go ahead—just say whatever comes to mind.

RCer: *(Startled)* Beside looking so... exciting, you actually *speak*?

11X: Only to perceptive RCers like yourself. And perhaps I'll do a video one day.

RCer: Well, no offense, but you really don't *look* like a JR radio.

11X: What do you think a JR radio looks like?

RCer: You know...conservative.

11X: *(Indignantly)* So Who says *I* have to look conservative?

RCer: Nobody...Not me! But tell me this: Can you look like you do and still have the unmatched quality, ease of programming along with Spektrum DSM2 2.4GHz technology and the integrity of a genuine JR?

11X: Absolutely. And as for programmability and other functions, I'm all new, starting from zero—with features lots of RCers have asked for.

RCer: Wow.

11X: No offense intended on my part either, but you seem to say "wow" a lot.

RCer: *(Embarrassed)* Yeah, I've gotta cut down on "wow." But hey, I'd bet anything you cost an arm and a leg.

11X: You'd lose. I'm

far more affordable than you might think.

RCer: Wow.

11X: Will that be all then?

RCer: Gee—I'd really hoped to be able to inspect you more thoroughly.

11X: Actually, after nearly two hours of flying plus talking with lots of RCers, I'm due for a charge. But visit JRradios.com then enter *11X* in the search box. You'll find my specs and answers to all your questions.

RCer: Of course—why didn't *I* think of that? Thanks for your time and I'll catch up with you later!

On the other hand, of course, you can see the 11X 2.4 in person at your local JR dealer's shop.

And there's a good chance the 11X will speak to you too.

JR
DSM
feel the difference!