
p40 FUELING FUNNY?
KNOW YOUR FUEL PUMPS
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Rotorhead Balancing Explained
JR'S Vibe 50NEX
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Make a Tail Servo Regulator
Use your GoPro Camera for FPV
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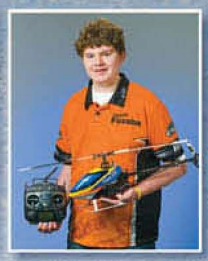
CGY750

Flybarless Gyro & Governor

The pros have voted...
...the CGY750 *rules!*


Bobby Watts


Matt Botos


Kyle Stacy


Brian Bremer

These top pilots have voted, and they all agree: the CGY750 rules! Response is so "off-the-charts" fast, no other flybarless systems can compare. Most flybarless set-ups make you feel like you're flying through a computer. With the CGY750, flight feels like it should. Smooth. Natural. Real. Bobby Watts, Matt Botos, Kyle Stacy and Brian Bremer helped refine it. Why expect anything less?

Check out the CGY750 on the Hobbico Channel at YouTube.com!

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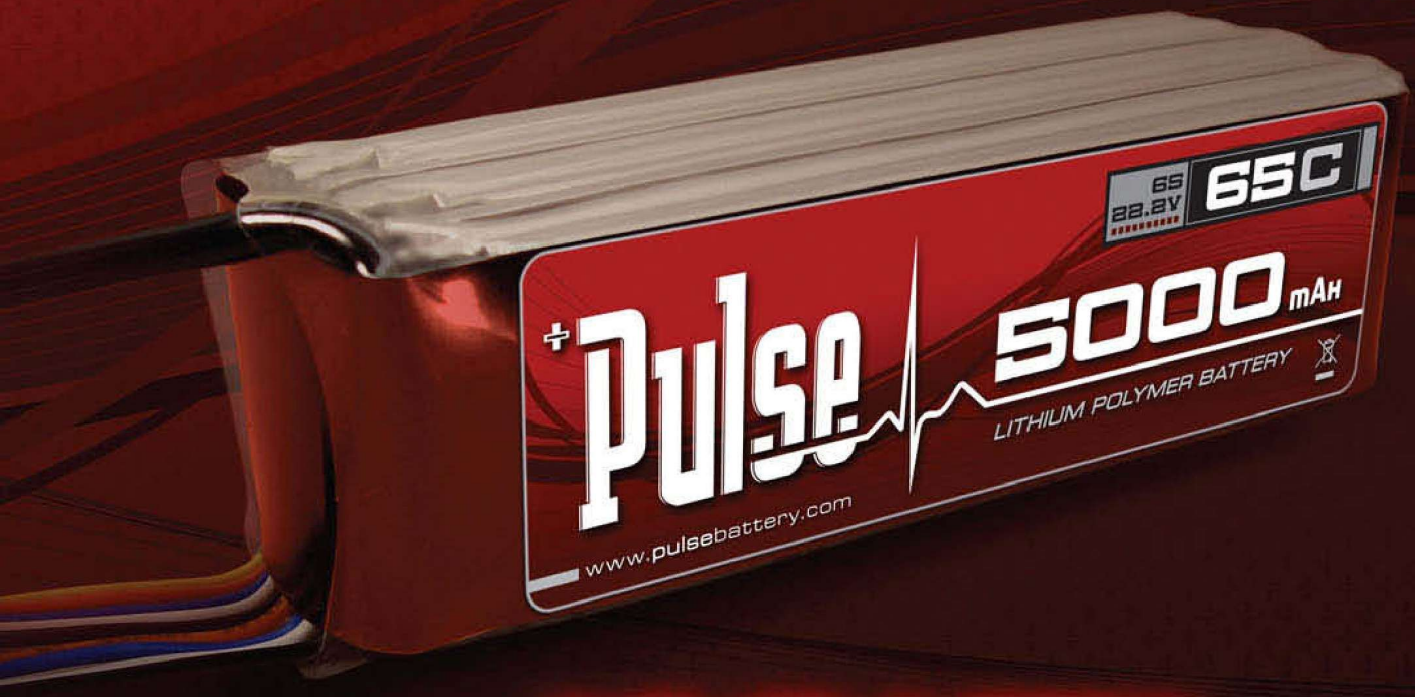
S.BUS™

futaba-rc.com/102c

Heli photo courtesy of Mark Fadley.

+Pulse

FLATLINING
THE COMPETITION



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MAY 2011 / ISSUE FIFTY-EIGHT

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FPV is considered to some as the greatest thing since sliced bread.

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bladehelis.com

ANOTHER BLADE BREAKTHROUGH

mCPX

LENGTH:	9.25 in (235mm)
HEIGHT:	3.65 in (93.0mm)
FLYING WEIGHT:	1.60 oz (45.5 g)
ROTOR DIAMETER:	9.65 in (245mm)
MAIN MOTOR:	Brushed (installed)
TAIL MOTOR:	Micro Coreless (installed)
ON-BOARD ELECTRONICS:	Flybarless 3-in-1 receiver/ESCs/gyros unit (installed)
SERVOS:	3 long-throw ball bearing linear cyclic servos
BATTERY:	1S 3.7V 200mAh 25C Li-Po (2 included)
CHARGER:	E-flite® Celectra™ DC Li-Po balancing charger and AC power supply(included)
TRANSMITTER:	Spektrum™ DX4e 2.4GHz DSM® transmitter with 4 AA batteries (included with RTF only)

RTF BNF

THE NEW ULTRA MICRO BLADE mCP X

- **LIGHTEST ULTRA MICRO CP IN ITS CLASS**
- **ADVANCED AS3X™ FLYBARLESS STABILIZATION SYSTEM**
- **INCREDIBLE AEROBATIC CAPABILITY**

The new Blade mCP X is so advanced in so many ways it's almost in a class by itself. Its flying weight is barely over 1 ½ oz—the lightest of any ultra micro CP heli around. Its advanced AS3X flybarless system uses a sophisticated 3-axis gyro in place of a traditional flybar for stabilization. The crisp cyclic response of this flybarless system combined with the low disc loading of the feather light airframe delivers extreme aerobatic performance you simply have to see to believe. Hurricanes, loops, funnels, rolls, inverted flight – the Blade mCP X can do them all, indoors or out.

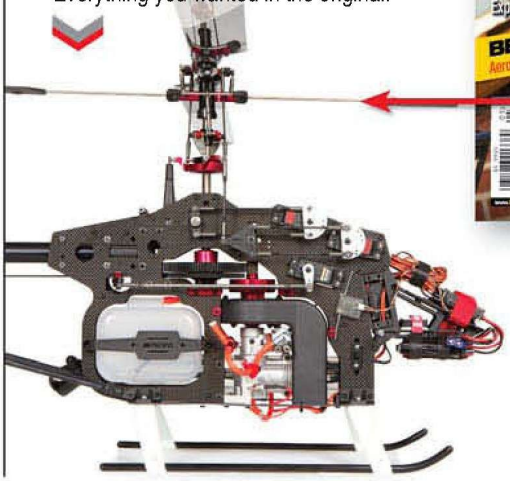
See for yourself. Get to **bladehelis.com** right now to see the mCP X in action and find the Blade retailer nearest you.

BLADE
#1 BY DESIGN

HORIZON HOBBY | horizonhobby.com

CONTENTS

ON THE COVER: This month we feature two hot new 50-sized helicopters to get your blood pumping. The Fusion 50 and Vibe 50 NEX. Check them out inside!



Just anoter brick in the wall.

TESTED

» HOW-TO'S

EXPERIENCE THE THRILL OF RC AERIAL BATTLE WITH FORCE

FORCE is the revolution in multiplayer RC fun that combines the challenge of flying an ultra micro RC heli with the visceral thrills of multiplayer battle. FORCE™ helis come ready for action with infrared battle modules that shoot and detect shots from other FORCE helis. Plus, only FORCE technology lets you customize the battle action with:

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Take shots from up to 20 feet away or cut the range in half to score a hit. Better yet, level the playing field by making the aces get in close to score a hit while FORCE rookies can shoot from further out.

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Use the optional ground target to hone your gunnery skills while flying solo or defend it from attack in a battle royale.

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Activate Team I.D. during big battles to avoid hits from "friendly fire" or leave it off for a last-heli-flying free-for-all.

GET TO YOUR FAVORITE RC HELI RETAILER RIGHT NOW TO LEARN MORE ABOUT THE WORLD OF FORCE OR VISIT FORCE-RC.COM TO FIND THE RETAILER NEAREST YOU.

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FORCE RC LET THE BATTLE BEGIN!

The Next FRONTIER

FPV (FIRST PERSON VIEW) FLIGHT IS BECOMING A GREATER TOPIC OF INTEREST THESE DAYS. TAKE ALL THE VIRTUES OF OUR HOBBY AND COMBINE THAT WITH THE AUGMENTED REALITY OF FLYING YOUR HELICOPTER FROM A FIRST PERSON PERSPECTIVE OPENS UP AN ENTIRELY NEW REALM OF POSSIBILITIES. This month we have two how-to's that I think you'll find very useful if you're looking to get into this new type of flight control. The first is on aerobatic flight. When you think FPV you might think "drone" flight just observing the surroundings, but aerobatic flight is completely possible and being done today. Along those lines one of the most popular personal camera recorders is the Hero by GoPro. Our FPV expert Aaron Shell shows you how to use the GoPro camera on your FPV adventures. So whether or not you've gotten into the FPV thing or not both of these articles are worth a read and might give you the bug to give it a try.

Also in this issue we've got a couple reviews that are great examples of the cutting edge of heli technology. The JR Vibe NEX and Fusion 50 from Outrage are feature packed and use some very cool design features that we're sure will be setting the standard of what's to be expected from the next generation of helicopter kits hitting the market.

Spring has sprung so get out there and go fly!

Mike Velez
Publisher/ Editor-in-Chief
mikev@rchelimag.com

Yo quiero *RC Heli*!

RC Heli magazine

CHATTER BOX

WHAT CAN ONLY BE DONE FROM A FIRST PERSON PERSPECTIVE?

MIKE VELEZ - Publisher/Editor-In-Chief
Working on your heli. Could you imagine watching your self wrenching from above, or the side?

RYAN KEPHART - Associate Editor
First person combat with those darn pigeons that poop on my roof!

JIM INNES - Editor-At-Large
Aerial photography would be tough to negotiate without having a First Person view of the subject.

SHAWN KITCHEN - Editor-At-Large
Oh wait; this was the Daily Double on Jeopardy... What is an autobiography?

CHUCK BASSANI - Editor-At-Large
As far as I'm concerned, everything I do is from a 'First Person Perspective'. Otherwise I'd be crazy - wouldn't I? Huh? Well?

ART KORAL - Contributor
I was going to say "Make Babies" but since my wife and I have triplets we actually got a little help from a third person.

AARON SHELL - Contributor
Slalom, pylon racing, and going around objects in your flying area.

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THINK omnimedia

RADIKAL

G30

PETROL ENGINE

*Production model may differ slightly.
Shown with optional items.

For Zenoah 23-30cc
GAS POWERED R/C HELICOPTER

Specifications:
- Length: 55 inch / 1397 mm
- Height: 17 inch / 432mm
- Main Rotor Diameter: 62.2 inch / 1580 mm (with optional RotorTech™ 710mm)
- Tail rotor diameters: 11.1 inch / 282.5 mm (with optional RotorTech™ 105mm)
- Engine: Zenoah™ Z-231, 26 or Modified Z-27 and Z-30 gasoline engine.
- Start method: Top Hex start or Optional pull start.
- Dry Weight: approximately 5 kg / 11 lbs. when full load tested with 5 Futaba digital servos, Futaba 611 Gyro, Futaba 2.4GHz receiver, Li-Po Receiver battery and Century 3D Torpedo Slim Muffler.

CN1340 Radikal G30 kit: .....MSRP $650
- Semi-metal rotor head with two types of hard dampeners. (for 690-710mm Main blades) For 3D maneuver.
- Aluminum triple bearing metal swash plate with zero-slop bearing design.
- Black modular G-10 side frames with aluminum ridge frame enforcements.
- Top quality ball bearings, thrust bearings and one way bearing.
- Aluminum bearing blocks with double upper main shaft bearing and extra thrust bearing.
- Heavy Duty double bearing supported and double NSK One-way bearing autorotation design with extra large aluminum lower bearing support.
- Advanced 4-point supported engine mounts for less vibration and highest rigidity.
- Adjustable gear ratios available: 6.0, 6.42 and 6.92.
- Designed to be powered by Zenoah G231, G26 or after market G27 and G30 modified gasoline engines. This side frame design accepts up to 4 BHP power output.
- Extra large clutch and clutch bell with Heavy Duty one way starter design.
- Advanced intake/exhaust cooling fan system and specially designed fan cover.
- Machined POM Main Gear and DuPont™ plastic parts.
- Automotive grade tail drive belt supported by aluminum timing pulley and idler pulley along with double bearing supported aluminum tail bearing coupler.
- Carbon adjustable tail pitch control rod.
- High Gloss white fiberglass painted canopy (Black windshield and white body).

CN1340C Radikal G30 Carbon kit: .....MSRP $750
- Fully carbon fiber side-frames, tail fins with rigid aluminum frame enforcements.
- Metal center hub along with two different hard dampeners. For hot 3D maneuvers.
- Aluminum tail gear box, flybar control arm set, seesaw control arms.
- Carbon tail boom supports with aluminum ends.

CN1340CE Radikal G30 SE Carbon kit:.....MSRP $850
- New Style Aluminum Metal Rotor head, mixing arms and metal blade grips.
- New aluminum flybar seesaw holder.
- New aluminum seesaw assembly.

Coming September 2010

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CENTURY
HELICOPTER PRODUCTS

COBRA COMMAND

ALTHOUGH 3D IS A BIG HIT AT THE FUN FLY, NO ONE GETS MORE EXCITED THAN WHEN THEY SEE A SCALE HELICOPTER GOING THROUGH ITS PACES. Align has just now released one of their nicest scale helicopters to date. The AH-1 Cobra was specifically designed for the Align TREX 500. It is so specific, the kit even includes two carbon fiber-side frames to lower the boom mounting position. The Cobra is loaded with detail including a scale nose gun, scale dual-seat cockpit, a variety of scale rockets and missiles that mount under the weapon stud wings, and two scale turbine engines near the top of the fuselage. The front half of the canopy is removable to allow quick battery changes and some routine maintenance. ***Keep an eye out for a full review in an upcoming issue of RC Heli Magazine.***

Wow, that cockpit looks amazing!

MSRP: $445
WWW.ALIGNRCUSA.COM

GREX TRITIUM. TS

Double action pistol style trigger, and side gravity feed is two distinct features of the new Tritium. TS from GREX. GREX is known to provide quality products that are backed by a six year limited warranty and good customer service. The Tritium is also ambidextrous allowing you to mount the side reservoirs on the left or right side of the gun. The reservoirs can also be rotated 360° allowing the paint to flow smoothly no matter what angle you are shooting. The kit also includes several interchangeable side reservoirs to accommodate the type and size of your project. The Tritium comes with an ergonomic hand grip with a textured surface for optimal control and comfort. GREX also offers a full line of paints to get the job done. These paints include transparent colors, opaque, semi-opaque, fluorescent, and high solids special FX bases. Optional nozzle conversions are available to change out to 0.2mm, 0.3mm, and 0,5mm allowing the ultimate in versatility.

Check this airbrush out as well as the other great product from GREX.

STREET PRICE: $440.00
WWW.GREXAIRBRUSH.COM

THE PRICE IS RIGHT!

Are you looking for your first computerized radio for a good price? Well, Futaba has just released their newest budget-ranged six-channel transmitter that is loaded with function. The 6J looks very similar to Futaba's older six-channel transmitter, but underneath it is loaded with plenty of programming to run your helicopter needs. The 6J also incorporates the S-FHSS mode, which allows the transmitter to communicate with the receiver at just 6.8ms. Some programming features for helicopters include an electronic swash ring, 15-model memory, four swashplate configurations, as well as throttle and pitch curves.

STREET PRICE: $180
WWW.FUTABA-RC.COM

First there was reality tv, now there is reality video game.....

DRONE GAMES

Are you ready for a totally new experience with your A.R. Drone? Parrot has just released their newest augmented reality game – AR.FlyingAce. By the time you read this, the game will already be released on Apple's App Store. This game involves two AR. Drones battling it out using plasma missiles. The object of the game is to blast your opponent out of the air using the virtual layover. So get out your phones and download the app today – it's free!

WWW.PARROT.COM

BIGGER QUAD

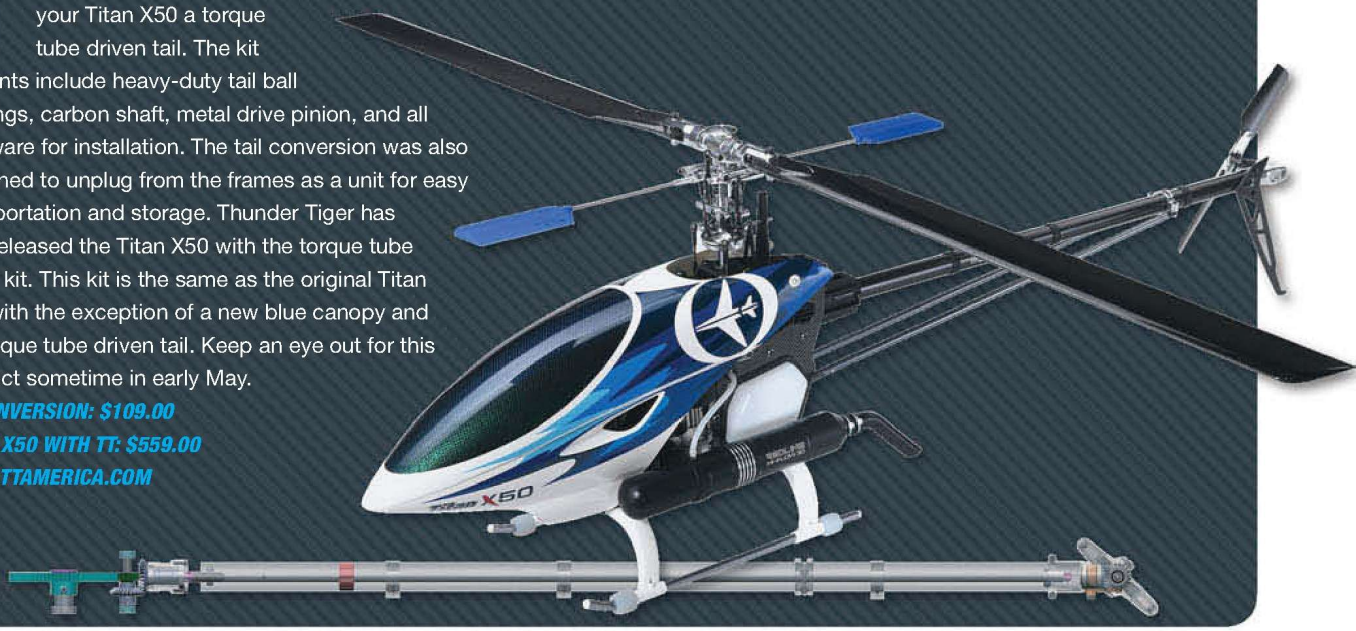
Have you been enjoying your 330X Quad Flyer? Well, if you have and just wished it were a little bigger and able to carry more weight so you could use your HD camera, your waiting will soon be over. Gaui has just announced the production of the new 500X Quad. This four-motor quad flyer is not only bigger; it also packs more punch. The 500X features four Scorpion 2212 motors, four 18amp ESCs, and can be packed up into a small travel bag that resembles a telescope case. Additional accessories are also in the works, including a landing pole, camera mount, and a carbon fiber protection frame. No word has been heard about the release date or price, but we will let you know as soon as we do.

WWW.GAUI.COM.TW

Thunder Tiger TITAN X50 & TORQUE TUBE CONVERSION

The Titan X50 from Thunder Tiger has already proved to be a worthy competitor, but Thunder Tiger wanted to make it even better with the optional Torque Tube Conversion. This conversion kit comes with everything you need to make your Titan X50 a torque tube driven tail. The kit contents include heavy-duty tail ball bearings, carbon shaft, metal drive pinion, and all hardware for installation. The tail conversion was also designed to unplug from the frames as a unit for easy transportation and storage. Thunder Tiger has also released the Titan X50 with the torque tube in the kit. This kit is the same as the original Titan X50 with the exception of a new blue canopy and the toque tube driven tail. Keep an eye out for this product sometime in early May.

TT CONVERSION: $109.00
TITAN X50 WITH TT: $559.00
WWW.TTAMERICA.COM



ALIGN
Conquer Your Heart

MICRO HELICOPTER T-REX 100S IS IN THE HOUSE

Specifications:
Length: 202 mm
Height: 82 mm
Main Rotor Diameter: 192 mm
Tail Rotor Diameter: 36 mm
Motor Pinion Gear: 9T
Main Drive Gear: 78T
Drive Gear Ratio: 1。G8.66
Weight: 27.8g
Flying Weight: Approx. 32g

LOOKING FOR FUN AND EXCITEMENT

The T-REX 100S packs in all the features you need so there is no need to purchase additional gear. The complete kit includes radio, 2-Lithium Polymer batteries, charger, and a 5-in-1 board consisting of receiver, ESC, servos, and a headinglock gyro. To test your skills we include a flight simulator so you're 100% ready for what your helicopter will do with the stick inputs you provide.

So next time your at your local hobby shop ask for the T-REX 100S.
Or to see the T-REX 100S in action now by scanning the QR code with your smart phone.

Take a Look!

Accessories: (Combo/Super Combo)
- ▶T-REX 100S Kit set x 1
- ▶AT 100 2.4GHz Radio Controller x 1
- ▶ Li-Polymer Battery x 2
- ▶ Carbon-Zinc Battery x 4
- ▶ FMS Simulator Cable x 1
- ▶ FMS CD-ROM x 1
- ▶ Screw Driver x 1

Super Combo:
includes all of the above
Plus the items noted below
- ▶Ni-MH Battery x 4 (are substituted for Carbon-Zink Batteries)
- ▶Charger USB x 1
- ▶USB Cable x 1

T-REX 100S
Combo Kit-KX022003
SuperCombo -KX022005

Features:

- ▶Utilizes AFHDS 2.4Ghz frequency hopping technology for interference avoidance and stability.
- ▶Radio transmitter consist of computer simulator output compatible with 3rd party R/C airplane and helicopter simulation software, and includes an adapter cable for FMS (a freeware simulation software).
- ▶5-in-1 electronics board consisting of receiver, ESC, headinglock gyro, servos, and mixing functions.
- ▶Supports MODE 1/ MODE 2/ MODE 3 controller modes.
- ▶Design encompasses both agility and stability characteristics.
- ▶Utilizes hobby grade micro servos and reinforced frame design for flight stability, crash sustainability, and longevity.
- ▶Charging status and power capacity display.
- ▶Blue backlit LCD display panel.
- ▶Lipo battery charging capability, capable of charging while flying.

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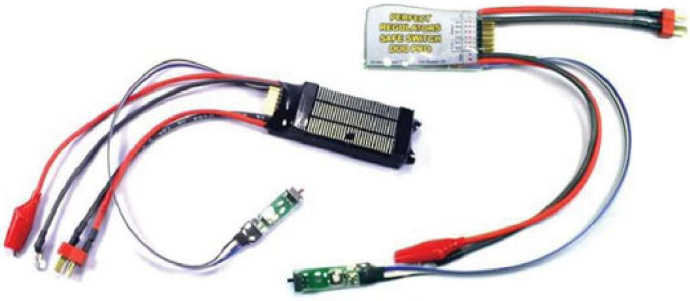
ALIGN 031011

PERFECT REGULATORS

Customer feedback is one of the main focuses for the team over at Perfect Regulators. Their original regulator was already a good product, but the customers wanted more. The new CCPM Trio Voltage Regulator takes those customers wants and combined them to make an all-in-one regulator that combined the Flex Reg Pro, Safe Switch, and the glow igniter. The CCPM Trio can handle 7.4v-11.1v batteries and can adjust the output voltage from 4.8v-8.5v. For pilots that want to run a strait high voltage system, but still regulate the tail and have a glow igniter, Perfect Regulator designed the Safe Switch Duo Pro. This electronic device can supply strait high voltage to your receiver while regulating just two channels for your gyro and tail servo. The Safe Switch Duo Pro also includes a glow igniter, and a fail-safe switch.



WHAT A TOOL

Changing dampers, removing blade grips, and replacing the spindle are all routine tasks that must be done from time to time. One thing this hobby was missing was a way to remove the spindle bolts without scarring or marking the spindle while using a pair of pliers, but thanks to G-Force a new spindle tool that grips one side of the spindle and allows you to remove the spindle bolt is on the market. This tool is made from a high-quality T6-6061 aluminum that will never scratch or scar your spindle. The tool is also designed to grip 4mm, 6mm, 8mm, and 10mm spindles.

Street Price: $23

WWW.GFORCEHELI.COM

G6 SERIES

THUNDER POWER RC

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FROM SUNDAY FUN TO COMPETITION FLYING AND EVERYTHING IN BETWEEN, THE ALL-NEW G6 SERIES HAS JUST THE LIPO YOU NEED

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Up to 60% More Power, 100% More Cycle Life, 12C Charge Rates and New Low Prices

Thunder Power RC's exclusive Generation 6 (G6) chemistry delivers the lightest, most powerful, longest lasting and fastest charge rate capable LiPo batteries yet! G6 series batteries offer the highest energy and power density in high-discharge rate capable LiPo technology, weighing less and delivering up to 60% more power than previous and 100% more cycle life than recent generation LiPo batteries. That means more power at less weight for up to an incredible 600+ cycles while also being capable of technology-leading charge rates up to 12C* for charge times of as little as 5 minutes or less. Available in capacities and configurations from 125mAh to 7800mAh and 1S 3.7V to 10S 37.0V.

Best of all G6 series batteries are available at our lowest prices ever, are backed by an industry-leading full 2-year warranty, 50% off damage replacement program coverage AND ARE STILL PROUDLY ASSEMBLED AND SUPPORTED IN THE USA!

G6 Pro Lite 25C Series

THE WORLD'S LIGHTEST HIGH-PERFORMANCE BATTERIES FOR SPORT AND COMPETITION USE

The standard by which all light-weight, high-performance LiPo batteries are measured, having won more national and world championships than all other batteries combined, G6 Pro Lite 25C series batteries offer the highest energy density and cycle life delivery available in their class lasting for years of use and beyond. Capable of continuous discharge rates up to 25C and fast charge rates up to 5C* while delivering up to 20% more power than previous generation batteries.

G6 Pro Performance 45C Series

AN INCREDIBLE COMBINATION OF PERFORMANCE, POWER AND PRICE

G6 Pro Performance 45C series batteries deliver pro-level performance at continuous discharge rates up to 45C, yet are available at prices up to 40% less than the world-renowned previous generation G4 Pro Power 45C series batteries. They can also be ultra-fast charged at rates up to 8C* for charge times of as little as 8 minutes or less.

G6 Pro Power 65C Series

THE MOST ADVANCED, MOST POWERFUL AND LONGEST LASTING SERIES OF BATTERIES YET

When your high-power EDF, 3D helicopter or other applications demand nothing but the best, G6 Pro Power 65C series batteries deliver up to 60% more power than previous generation LiPo batteries and up to an incredible 600+ cycles. Their ultra-low internal resistance (IR) also allows them to be capable of ultra-fast charge rates up to a technology-leading 12C* for charge times of 5 minutes or less.

TP820CD Dual Port

HIGH-POWER MULTI-CHEMISTRY CHARGER/ DISCHARGER/CYCLER/BALANCER SYSTEM

With up to 800 watts of total charging power the TP820CD is equipped with two ports that function completely independently to charge, discharge and cycle a wide variety of LiPo, Lilon and LiFe (A123) batteries up to 8S at rates up to 20 amps. Includes built-in balancers, charge, discharge and cycling functions for NiCd, NiMH and Pb (lead-acid) batteries, IR measurement plus a standard mini USB port that allows for quick and easy firmware updates.

THUNDER POWER RC™

#1 IN PERFORMANCE AND RELIABILITY

www.ThunderPowerRC.com

*When using approved charger and balancer combinations.

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READER FEEDBACK ON facebook

We recently posed the question; **What's been your worst heli related injury?**

Mike Kelley My wallet hurts at times

Steven Finch nothing serious, I have had a main blade hit me in the wrist on spool down, it hurt a lot, no gashes, it just put dent in my bone. My whole arm ached all night and the dent is still there and hurt for while after. killing machine HK 450 was the culprit. Although I have nearly chopped my wedding ring finger off with my nitro plane, and was the only time in my life I nearly passed out from pain!

Jeff Demczuk My heli fired up when connected the battery. Dislocating my knuckle and a few cuts. That will learn me

Dan Goldstein bent over to stop the blades on an Aeolus 50 and got wacked in the left shin by the blades. Minor gash, probably should have had stitches. Now I wait for the blades to slow down more before reaching in and staying aware of where my legs are.

William Meservey Took my eyes off of my Trex 250 & it backed into me. The blades sliced my right hand knuckles. I caught it just in time to get it out in front of me, but not before I had 4 bleeding fingers.

Nathan Morrison I suffer a BROKEN HEART every time I crash!!!!:-(

Steven Finch

This one is from my 46la nitro plane (11x6 prop) revving at half throttle! I put my glow igniter in front of my plane and when I past my hand pack past the prop I got bit too close, I actually thought it got my whole hand at first so I was pretty lucky to only to get one finger in the way! It has healed well.

What's on your heli?

MAVRIKK

G5 PRO WC ROTOR BLADES

SHOCK & AWE!

Beating the air into submission AND THEN SOME!

Mavrikk G5 Wide Chord
Carbon Fiber Flybar Blades
Available Sizes:
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Look for the Silver Stripe

Mavrikk G5 Wide Chord
Carbon Fiber Flybarless Blades
Available Sizes:
325, 430, 515, 550, 600, 620, 690, 710
Look for the Red Stripe

Available at your favorite hobby shop.
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www.heliwholesaler.com
For stocking dealers, visit our dealer listing at www.mavrikkblades.com

Heli WHOLESALER

LETTERS

CANADA, EH

Greetings from Kingston Ontario Canada. Your publication is always great! Here is a picture of my fleet and future Pilot. I have been flying for 5 yrs now and tell everyone I know about our great hobby.

TREX600N

Engine – OS 50 Hyper Ring
Muffler – Align Performance pipe
Servo's – DS821 on Cyclic,
Futaba Digital S9254 on the tail
Gyro – Futaba GY520

MD500E SCALE WITH TREX450 MECHANICS

Fuselage – Align
Servo's – HS65MG on Cyclic and tail
Gyro – GY401
Motor – Stock brushless

Battery – 11.1v Li-Po 3c 2200mah

TREX450 SE V2

Canopy – Align
Servo's – HS65MG on Cyclic,
JR DS3517MG on the tail
Gyro – GY401
Motor – Stock Brushless
Battery – 11.1v Li-Po 3c 2200mah

I always tell anyone new to the hobby to start reading your magazine and get a good simulator for the computer, it helped me a lot.

Shawn
Kingston Ontario
Canada

THOUGHT YOU FOLKS MIGHT LIKE THIS PICTURE OF MY FAMILY.

There's the Blue Monster, a TREX 600 FPV camera ship that I fly with goggles. It's a 12S electric with a Scorpion 4025 motor.

Next is his wife, the Green Creature. She's a TREX 600 3D heart attack with a Mikado V-Bar flybarless. And finally there's the baby, a TREX 450 fireball that's crazy fun to fly when the wind is blowing.

I fly at AMPS (amps-rc.com) in south Florida so it's pretty much year round. Once in a while we get a cold snap and I have to break out the heavy winter t-shirts. :-)
Hope you like the pic.
-Mike Rodriguez

I think Shawn might like Align helicopters.

RCHELI PHAN

Dear RC Heli,
I would like to share with you the result of reading your RC Heli magazine and thank you for a GREAT JOB you have done. These pictures were taken by my son, Anthony Phan. We learn all the tips and how-to from your magazine, from fine-tuning the helicopter to taking pictures of it.

This is our UH-1 scale model from HeliArtist, based on EXI 450 mechanics and equipped with Turnigy motor/ESC, HTX 900 servos , and DX7 transmitter.
We painted it ourselves and put your RC Heli sticker on it.
Thanks for your great magazine.
Mike Phan
Antelope, California

Ultra Compact Frame TECHNOLOGY

LENGTH : 1220MM
HEIGHT : 378MM
WIDTH : 203MM

Outrage VELOCITY 50

- Canomod's Canopy
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- Full programmable rotor head
- Precision CNC Engineered
- 3.6Kg ready to fly
- Ultra rigid compact frame design

- Main Rotor Blade Size 600-630mm
- Main Rotor Diameter: 1355mm -1415mm
- Tail Blade Length: 95mm
- Tail Rotor Diameter: 250mm

- Main Gear ratio: 8.6:1 (8.8:1 Optional)
- Tail Rotor Ratio 4.583:1
- Approximate Flying Weight with Fuel: 3.6kg / 7.936 Lbs. (depends on equipment used)

www.outragerc.com

THE BEST

First of all RC Heli magazine is the best. To say I am a "heli-holic" is an understatement. Frankly, I love the hobby. As you can see from the photo I have been down many roads in the past two years. The "LiL Stinger" co-axle was my first. Then the Walkera CB180D, and the Heli Max CP. I purchased the TREX 450 in used condition and refitted it with (mostly) genuine Align parts and replaced the 72mh radio system with the Spektrum DX8 including the telemetry. The Blade Series helis (120SR, mCPx, and SR) also fly under the control of the DX8. All of my helis look and fly like they were still brand new. And believe me...they have all had parts replaced. If you're not crashing you're not flying hard enough (someone said). Whether I am flying in the house, backyard, park field, or watching hours of "YouTube" video clips of some great rc heli pilots and reading RC Heli magazine, the "rush" is always there. I just can't get enough. Keep up the great work with RC Heli magazine!

Randy Deel
Hampton, Virginia

WANT TO SEE YOUR HELI IN THE MAGAZINE?

Send us pictures of your heli along with a description of what it's got. We prefer digital files (no zip files please) in a ***HIGH RESOLUTION,*** so be sure to flip that switch on your camera to the "fine" setting. One submission per month will receive a full-year subscription to ***RC Heli Magazine!***

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FREQUENTLY ASKED QUESTIONS

Q: I have a Blade mCP X and I am having problems with the main rotor blade grips coming off in flight. What can I do?
-HeliDude

A: The answer to your question is a simple one. Horizon Hobby is now offering new blade grips for the mCP X at no charge. This problem is solvable by filling out a form and waiting for your new grips. Here is the service bulletin:

BLADE MCP X MAIN ROTOR HEAD REPLACEMENT REQUEST BULLETIN

ATTENTION BLADE MCP X OWNERS

Horizon Product Support has received reports from customers concerning the new Blade mCP X ultra-micro collective pitch helicopter. Specifically, some customers have reported Main Blade Grips separating from the Main Rotor Head. Horizon Product Development has updated the main rotor head assembly and is offering it free of charge to end consumers.

Please inspect your Main Blade Grips. If your helicopter does not have a "B" molded into the blade grips, complete the Blade mCP X Main Rotor Head Replacement Request form below.

-RKephart

Q: I want to run my Freya on a 6.6V LiFe with a step-down on the tail servo. All the other servos are 6V. I have a GV-1 with a Spektrum backplate sensor on it. The GV-1 is rated for 6V, but does anyone know if the Spektrum sensor will handle 6V or should I step it down also? **–kcgraves**

A: The AR7100R is 6-10v on the high side, which is the same for the sensor. Running the back plate sensor on 6V should be fine. **–blax1**

Q: The March 2011 issue has a review of the new "Shape Rigid 90" heli—man, that's a nice looking heli! I was a bit disappointed when it came to viewing the head unit on pages 74-75. The pic is centered in such a fashion that the head cannot be viewed completely. Aside from that, I really like to read the reviews on the helis each month. It was this magazine that helped me in making my decision when it came to my latest project (MA-Furion 6). Keep up the great work! **–mr dan**

A: Now that's just not right! How did the head get positioned right in the middle of the page where the crease is? Sorry about that mr dan, the Shape is a great looking heli so here is a much better picture of the head. Hope this helps make your decision for an electric 90! **-RKephart**

Ah, that is a much better picture!

Hot Products for 2011!

We have raised the bar on Power for your 700-Class Electric Helicopter!

Scorpion HKIII-4035 Series Heli Motors

- New Patented Version 3 Motor Design
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- Higher Efficiency and Lower Operating Temperatures
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- Pinion set-screw keyway already cut on shaft
- Larger 4mm mounting screws for extra support
- 25mm and 30mm mounting hole spacings
- The Ultimate Power source for 700-Class Helicopters!

The HKIII-4035 Series Motors are now available for 700-Class Electric Helicopters. These new motors are the most technologically advanced design ever offered. There are a total of 5 models in the HKIII-4035 Motor Series, with Kv values of 330, 450, 500, 530 and 560 RPM/V available. When these new motors are teamed up with one of the new Scorpion 12-cell Speed Controllers shown below, you have a perfectly matched power system for your 700-Class helicopter!

Scorpion 12-Cell Speed Controllers

- New Third Generation ESC Design
- Four Years of Development and Testing
- Ultra-Thick PCB for Low Resistance
- High Stability Governor Mode
- Super Smooth Soft Start Mode
- Excellent Hardware Stability
- Heavy Duty Power MOSFET Transistors
- Extremely High Power Efficiency

The new Scorpion 12-cell HV speed controllers are now available! After several years of testing on the competition circuit, these controllers are the perfect compliment to the HK-40 and HK-50 series motors for your 600 and 700 class Electric Helicopters. The Rock-Solid Governor, Super smooth Soft-Start mode and excellent hardware stability make these some of the best brushless motor controllers in the industry!

attf AllThingsThatFly.Com

Come listen to Lucien Miller answer your technical questions on the Power System Corner each week, and get the latest information available about hot new RC Products, Flying Events and industry trends on the All Things That Fly podcast show at: www.AllThingsThatFly.com

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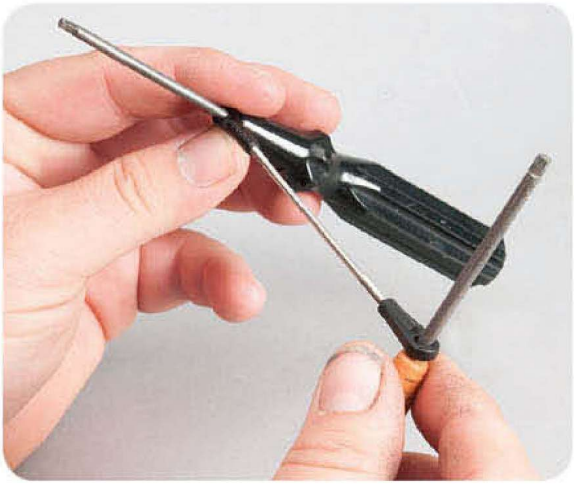
Betcha didn't know that!

YOU GOT TO KEEP'EM SEPARATED!

Have you ever blown a fuse in a transmitter? It's not fun, as Robert Kettner can protest. Robert came up with this tip and sent it in right away.

If you're like most of us, we have our chargers out in the garage plugged in at all times. Unless you trace the cord back to the wall outlet, it can be hard to determine which charge lead goes where. Some plugs will fit different charge leads, but have one crucial difference—polarity. To keep track of the plugs, use colored shrink tubing. For example, use orange or red for Spektrum and JR, blue for E-flite, and green for Futaba. These will keep them separated and prevent a blown fuse.



BALL LINK HEX DRIVERS

AFTER BUILDING COUNTLESS HELICOPTERS FOR *RC HELI MAGAZINE*, I have found myself reverting back to the most convenient way to install the plastic links onto the pushrods. I have done this many times without failure or damage to the ball links. First, thread your ball link on the pushrod by hand until the link is straight and a few threads are buried into the links. Next, take your two biggest hex drivers (usually the 3mm, and 4mm), and insert them into the ball link. Now turn the ball links using the drivers until you have reached the desired length. Keep an eye on the threads. If one side seems to be deeper than the other, take a pair of ball link pliers, grip the pushrod, and then tighten the opposite side.

Quick MAGNETIZATION

Working on small helicopters means that small hardware is used. This leads to small areas that screws must be installed. Chances are that your hands are too big to fit into these areas, and the only way to get a screw in is the use of a screwdriver alone. This can be an almost impossible task if the screw keeps falling off the screwdriver. Try placing your screwdriver tip on an electric motor until you feel the screwdriver stick to one of the magnets. Now, place the screw back on the tip of the screwdriver and you'll see that the motor's magnet transferred its magnetic properties to your screwdriver, allowing it to grip the screw with some authority.

MASTER BLADE

When adjusting the tracking of the main rotor blades, it is always a good idea to keep track of which blade you are adjusting. Select a blade and make it a master by placing a piece of tape on the blade grip and the rotor blade. You will now be able to adjust this blade for tracking as well as locate which blade goes where when you disassemble the helicopter for maintenance.

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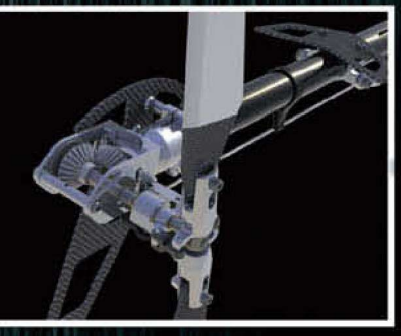

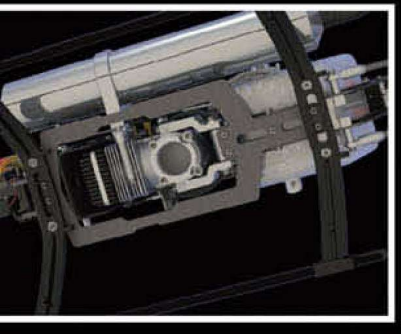

Lenght: 1340 mm Height: 400 mm

Main Blade lenght: 690/720 mm

Main Rotor Diameter: 1560/1610 mm

Motor Pignon Gear: 14T - M1

Autorotation Tail Drive Gear: 104T - M1

Flying weight: 4,100 Kg (no fuel)

Fuel Tank Capacity: 645 cc

Main Frame: Carbon Fiber 2 mm

designed in Italy

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RC Heli magazine

Viper BRUSHLESS MOTORS

Get the venom flowing

WORDS: Ryan Kephart

Ice, you go after Chester, I want Viper!

VIPER RC, ALTHOUGH NEW TO THE WORLD OF BRUSHLESS MOTORS AND ESC'S, IS NOT NEW TO THE HELICOPTER HOBBY. Viper has over 25 years of experience and knowledge to provide a quality product that the consumers want. Experienced engineers and state-of-the-art equipment ensure that Viper RC products will not only look amazing, but function as they should. This month, we'll take a look at Viper RC's newest brushless motors.

FEATURES

Seven new brushless motors are all constructed from CNC machined 6061 T6 billet aluminum. The motors are all two-tone anodized in black and orange. The initial production of these motors is focused on the most popular sizes of helicopter, with additional motors soon to follow. Two motors are available for the 200 and 250-size helicopters with KV ratings of 3600, and 5600. One motor is available for the 450 class helicopter with a KV of 3500. A 500-size motor is available with a KV rating of 1800, and two available for the 600 class helicopter, with one designed for 6S at 1300 KV and the other for a 10S at 700KV.

Each motor is equipped with a cooling fan that is machined into the case. The fan was designed to keep cool air flowing over the motor. The motors use high precision ball bearings to extend the life span. The mounting plate on each motor has two or three sets of screws to accommodate multiple mounting widths. The threaded section also comes in several sizes to accommodate larger or smaller diameter screws.

The motor leads look high quality, with a fibrous weave shield and pre-installed bullet connectors. Each motor has the correct size of bullet connector for the size and wattage of the motor. To back their craftsmanship, Viper RC features a 180-day warranty.

INSTALLATION/ TESTING

I opted to install the VSH4535 in my TREX 450 Pro, which I have been flying continuously and have been accustomed to. The TREX450 Pro used a similarly rated brushless motor and a 3S, 2200mah battery pack. The Viper motor was roughly the same size as the stock motor, but the mounting holes were a bit different. The closer spacing was needed to use the Viper motor, but these holes were designed for a bigger screw than the stock TREX 450 screws. To fit the motor, I had to enlarge the motor mount channels to accommodate the 3mm screws.

I set up the motor with a Castle Creations Phoenix Ice 50-amp ESC with stock timing and fixed endpoints. The first initial spool-up went smoothly and the motor did not have any tendencies to lag or skip during this stage. In the air, the Viper motor was no louder than the stock Align brushless motor.

I tested the motor in all three flight modes, which included a 100% throttle curve in Idle-up 2. At lower throttle settings, the motor seemed to pull well even though it was not in its power band. At maximum throttle, the Viper motor really excelled. The headspeed was consistent and provided enough power for full collective climb outs without bogging the motor.

After landing, I checked the temperature of the motor and was pleased to see that it reached a maximum temperature of only 95° F.

This is a big improvement over the stock motor, which tells me this motor will last much longer. Overall, I was pleased with the performance and I also saw an improvement in flight time.

CONCLUSION

If you're looking for a motor for your helicopter, the new offerings from Viper RC may be a good choice. They're reasonably priced and have a high quality look and feel that will have everyone at the field taking a closer look. Viper has also planned to launch some high-end speed controllers to match the motors. RCH

THE GOOD

- Cooling fan prolongs motor life
- Multiple mounting hole spacing
- Quality machining

THE BAD

- Shaft lengths are too short for pinion supported helicopters

CONNECT

MANUFACTURER:	Viper RC
WEBSITE:	www.viper-rc.com
PART NUMBER:	VSH2536, VSH2556, VSH4535, VSH5018, VSH6005, VSH6007, VSH6013
STREET PRICE:	$40, $40, $60, $80, $140, $140

JR MP80G BRUSHLESS SERVO

A new level of precision and speed.

WORDS: Jim Innes

JR has been making high quality servos for very long time. The recent growth of brushless motor servos in the market means that it was only a matter of time before JR joined the fray. The MP80G is JR's first brushless tail servo, and though this servo has been out worldwide for quite a while now, it's just starting to become more common in the USA. Does this servo live up to the success of some of its predecessors?

I love the color of JR servos.

FEATURES

The MP80G is the next evolution of JR's renowned 8900G servo. Like the 8900G, the MP80G is blazingly fast: .05 sec/60° at 4.8 volts. Torque is specified at 48 oz-in. The primary difference in the MP80G is the use of a brushless motor in the place of the regular brushed unit. The motor is energy efficient, precise, and generates little heat in use. According to JR's tech support, this servo also sports tighter deadband and runs at a very high frequency, though details are scarce on the exact frequency. It retains the same 1420us frame rate as the 8900G. This means that this servo can be used with the majority of gyros and flybarless units on the market. Other features include all nylon gears and a metal heatsink in the servo case. One thing to note is that this servo should only be run at a 4-cell NiCad equivalent of 4.8 - 5.6 volts.

Castle engineers Jonathan Feldkamp (left), and Richard Hofer (right) with Tim Jones.

Tim Jones Beast: 700mm blades, Jaw dropping power, 2300 rpm headspeed. Ballistic performance, governed to +/- 25 rpm by Castle Phoenix Ice controller and software.

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INSTALLATION/TESTING

Installing the MP80G is straightforward. It's a standard sized servo, though the case is just slightly larger than some other servos.

I tested the servo in a JR Vibe NEX airframe combined with a JR G3703D gyro first, then in an Align 750 for an extended test base. The servo mounts properly and setup with a gyro is as expected. First thing you'll notice on the bench is that this servo is truly a zero deadband unit. It centers well and reacts to even the smallest amount of feedback to the servo arm. It's also very fast and smooth in its movement. I finished setup on the bench and went out to fly.

The MP80G delivers on its expected performance in flight. This servo holds extremely well through both slow and fast maneuvers. Combined with a good gyro, this servo is capable of any maneuver a pilot can dish out. Flight after flight this servo runs strong, cool, and predictably well.

Brushless servos are now the norm!

CONCLUSION

The MP80G has proven to be a worthy contender in the high-end tail servo market. It is built well, has fantastic specifications, and meets all expectations in flight. JR has a great servo in the MP80G. Have fun, and we'll see you at the field! RCH

OSCILLATIONS ARE NORMAL?

There is something interesting to note about the MP80G. It runs at a high frequency with no deadband. Because of how this servo is built, you may notice that it will oscillate or vibrate very rapidly at times when the helicopter is on the bench. The first time this oscillation kicks in can startle you if you're not expecting it, as it makes the whole tail rod vibrate. If you simply touch the servo horn or tail control system the vibrations stop.

This was a concern at first, but after researching the issue, this appears to be normal for this servo. This condition only happens on the bench and will never happen once the servo is being used under a flight load. With that said, there is a way to lessen the oscillations on the bench. I simply added a minute amount of pressure in the tail rod. Instead of running the tail control rod right down the center of the rod supports where they can freely move side to side a little bit, I biased one of the rod supports so that the side of the rod slightly presses against the support. There is still no binding in the setup, but having that slightest amount of pressure there lowered the occurrence of oscillations greatly.

THE GOOD

- Very efficient, extremely quick and precise, zero deadband.

THE BAD

- Pretty expensive
- oscillation at center when the heli is on the bench can be disconcerting.

CONNECT

MANUFACTURER:	JR
WEBSITE:	www.jrradios.com
PART NUMBER:	JRPSMP80G
STREET PRICE:	$180

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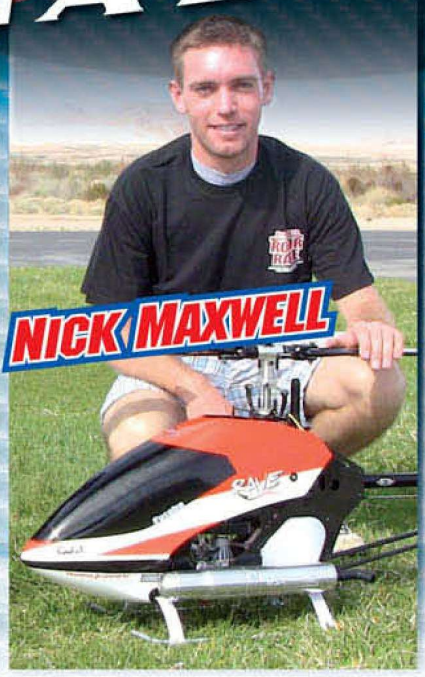

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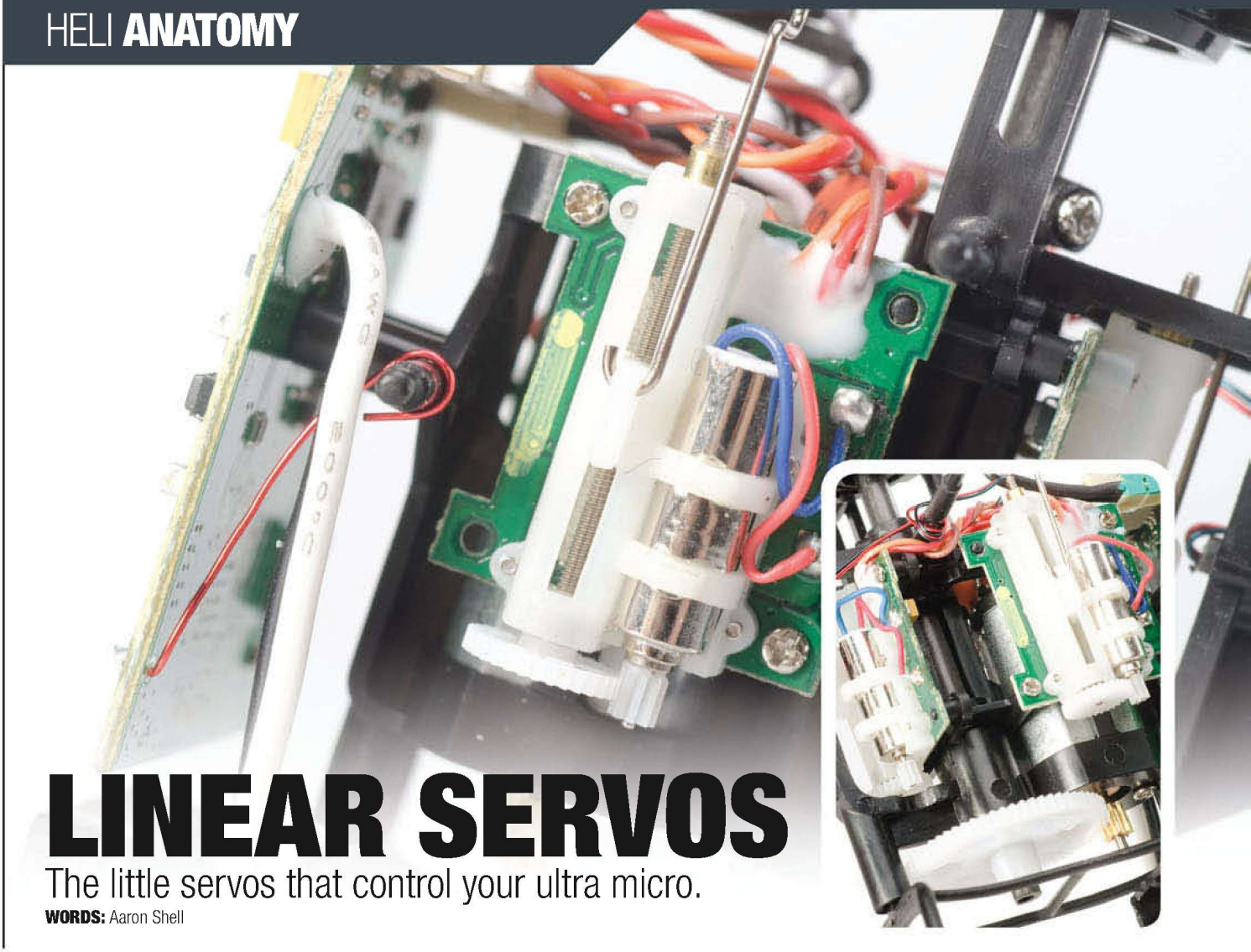

Big or small, linear servos can get the job done.

LINEAR SERVOS

The little servos that control your ultra micro.

WORDS: Aaron Shell

MOST OF THE SERVOS IN USE FOR RC HELIS USE A ROTATING OUTPUT SHAFT WITH A WHEEL OR ARM, BUT A DIFFERENT TYPE OF SERVO HAS TAKEN OVER THE MICRO HELI WORLD; THE LINEAR SERVO. Linear servos are not confined to micro helis, in industrial and robotics applications the linear servo is often referred to as a linear actuator, and they are more common than the type of servo or actuator we commonly use for RC. A linear servo has a output arm which slides along a track in a straight line instead of a rotating output shaft.

WHY HAS THE LINEAR SERVO **TAKEN OVER FOR MICRO HELIS?**

Linear servos don't require as much complicated gearing as a conventional servo, and they don't use a position sensor in the same manner. In a conventional servo a potentiometer is used to determine the position of the servo, in a linear servo a position sensor is integrated into the mechanism with the output arm carrying a set of brushes. This simple solution has allowed designers to minimize the size of the servo while still retaining excellent centering capabilities. Manufactures like Eflite have added linear servos to micro receiver boards to make tiny helis and plane a practical reality. You can even buy a micro linear servo which can plug into and standard receiver (Spektrum AS2000), but to date there are not any linear servo to compete with conventional servos.

One big advantage with linear servos is right in the name; the linear nature of their output literally translates to a more linear response to the pushrod. Using a conventional wheel output servo, only about 60° of rotation can be used or its like adding a bunch of expo in the wrong direction. With too much travel on a conventional servo the amount of output displacement is not consistent throughout the servo travel. If a linear servo were appropriately used for a tail pushrod, for example, it would eliminate the tendency to bend a pushrod toward the end of the travel as the servo reaches its limit. Swashplate servos could benefit from a linear output servo because they have to go to the extremes of travel when combining collective and cyclic pitch.

UPDATE OR OUT-OF-DATE?

There is at least one hobby manufacturer who believes a linear output servo is worth the trouble. EMS has produced a conversion kit for Futaba S 148 or 3151 servos for many years, and at this point the biggest disadvantage to this kit is the servo's being out of date themselves. EMS's solution for the retrofit kit uses a rotating drum and coil to actuate the linear output arm. While this has been proven to work, it seems the day may be near when purpose built medium and heavy duty servos will start to appear on our helis. Servo City offers custom built heavy duty linear servos for a variety of applications, and hints toward the future of what we might see in hobby servos.

Industrial Strength

Industrial applications usually entail the use of stepper motors or hydraulics, but whose to say if designers won't start applying the lessons learned from micro helis to other aspects of our hobby. With bearing supported shafts and better position sensors, whose to say we won't see more linear servos of different scales.

Can you imagine a linear servo in a 90?

CONCLUSION

The performance of the Eflite's little mCPx seems to confirm there is a future for this type of design. If a linear servo can handle the direct flight loads and quick response needed for a flybarless helicopter, they are doing something right! RCH

CONTACT:

EMS/Jomar *www.emsjomar.com*
Servo City *www.servocity.com*


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FUEL PUMPS

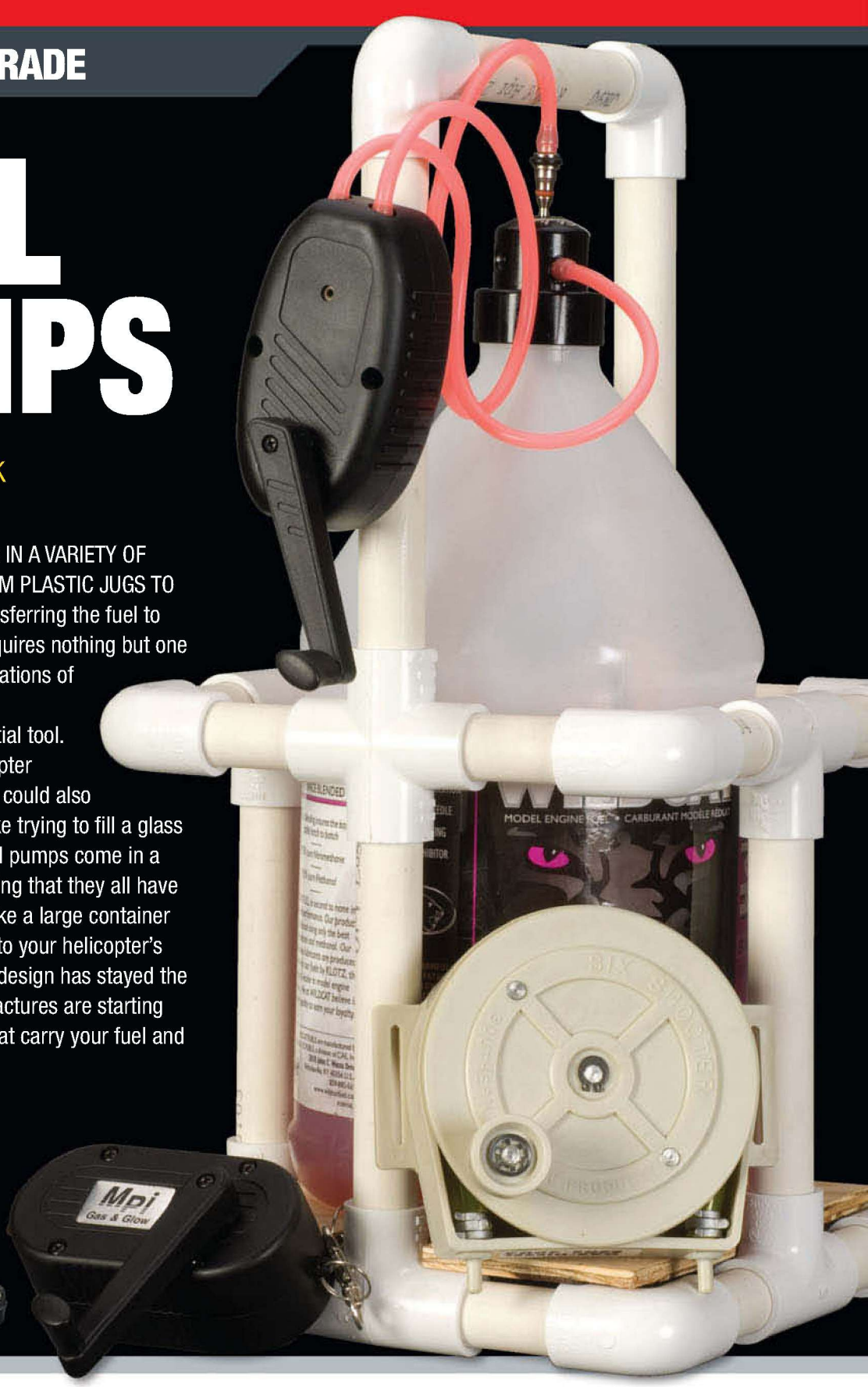
From Bottle to Tank

WORDS: Ryan Kephart

NITRO FUEL COMES IN A VARIETY OF CONTAINERS, FROM PLASTIC JUGS TO METAL CANS. Transferring the fuel to your helicopter requires nothing but one tool, one which can fit all variations of fuel containers.

The fuel pump is an essential tool. Without it, fueling your helicopter would not only be harder, but could also be very messy. It would be like trying to fill a glass of water with a waterfall. Fuel pumps come in a variety of designs, but one thing that they all have in common is the ability to take a large container of fuel and cleanly pump it into your helicopter's fuel tank. Although the basic design has stayed the same for many years, manufactures are starting to produce all-in-one units that carry your fuel and have a fuel pump built in.

Pump it up, like L.A. Gears.



DESIGN

There are two basic designs that can be mechanically driven or electrically driven to transferring fuel. Some designs can pump both gasoline and nitro, where other designs are used strictly for one type of fuel. If you have never seen the inside of a fuel pump, you might be tempted to think that it involves complex diaphragms and electrical circuits. This couldn't be further from the truth.

GEAR TYPE: Have you ever examined an automobile water pump? Chances are that the same design is used for pumping the fuel into your helicopter. Like a car's cooling system, the fuel enters the pump inlet side and travels to one side of two rotating gears with a loose mesh. As the gears spin, fuel is pushed through the meshing gears and passed through to the opposite side. From this point, the fuel travels through an outlet and into your helicopter's fuel tank.

Fuel pumps can be driven both by hand operation or an electrical motor. Sets of reduction gears are used to increase the speed of the pump for hand-operated models. This allows the fuel pump to move fuel fast enough without having to turn the handle too many times. This also reduces the wear of the pump, extending the lifespan. A brushed electric motor can be mounted directly to the pump and powered by a simple three-position switch that allows the motor to operate in both directions. The motor is typically mounted directly to the fuel pump and rotates a single gear.

ELECTRICITY & GASOLINE

It goes without saying, but if you fly a gasoline powered helicopter, you need to make sure that you don't create electrical sparks around the fuel. For that reason, fuel pumps for gasoline helicopters are usually hand operated. Do NOT use an electrical fuel pump to pump gasoline. These pumps are designed for nitro and will melt if gasoline is used. This can cause gas to enter the main body of the fuel pump where the ELECTRIC motor can ignite the fuel. Keep an eye out for the correct fuel pump; if it's rated for gasoline it will say so.

ROLLER TYPE: The roller type fuel pump consists of a housing, rollers, and a piece of fuel tubing. The fuel tubing is wrapped inside the housing, and two rollers squeeze fuel trapped inside the tubing and force it towards the output end. This also draws up more fuel behind the roller where a second roller repeats the process. This type is typically found on a gasoline style fuel pump.

Don't get stuck "empty" handed -With any mechanical fuel pump there is a chance for failure. This can be simply a seal going bad or a stripped gear. Without a fuel pump, you're going nowhere. Carrying a backup source will make sure you still get some flight time, even if it cost you a little extra work. Manufactures still sell what are called "fuel bulbs". These are nothing more than a modified turkey baster that you can find in your Grandma's kitchen.

CONCLUSION

FINDING THE RIGHT PUMPS SHOULD BE AN EASY TASK. Every hobby store usually has a small selection of both high-tech and simple to use manual pumps. Just keep an eye out for a specific fuel type and give it a go. Most fuel pumps are relatively inexpensive, so you may want to pick up an electric for your everyday use and a hand operated one for a backup. RHH

And I thought they smelt bad on the outside.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REGULAR GUY INTERVIEW

with CHRIS BOULTINGHOUSE

Welcome to this month's "Regular Guy" interview. Each month we interview a relatively unknown pilot who is one of the "good guys" at their local field. We hope to shed some light on what we consider the lifeblood of this hobby—those pilots who day-in and day-out train and help new pilots succeed, and who do so with no fanfare or payment. We're always looking for more of the unsung heroes in the hobby. If you know of such a person we could interview in your area, please email Jim Innes at rchelijim@gmail.com.

PILOT INTRO

For this month's column we have interviewed someone who some of our readers may know: Chris Boultinghouse. Chris is known to many as "justplanechris" from the InsideHeli podcast series. Chris and his cohorts spend numerous hours every couple of weeks creating this free podcast.

Chris was nominated by his friend and student, Reid Roberts. Reid considers Chris his mentor in the hobby and shared stories with us about the times that Chris has helped him. One thing Reid mentions is a time when he had a helicopter that was almost ready to fly, but still needed some servos and other equipment he planned to buy. When Chris learned of these needs, he told Reid to just come over to his house and borrow what he needed to get the bird flying. Chris sounds like one of the good guys in the hobby; let's find out more about him!

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

CHRIS: I was born and raised in the Austin, Texas area. Despite that, I've been told I have very little in the way of a Texas accent. I'm baffled as to how that happened, because the rest of my family definitely speaks with that twang. I do, however, admit to saying "y'all" now and again.

Growing up, I learned early on to be creative and to enjoy making things since my Dad was, and still is, a custom knife and black powder rifle maker. Having an awesome workshop full of tools meant that my passion for airplanes could be taken care of easily with a quick visit to the workshop! According to my parents, I've been infatuated with airplanes since the age of two. All I know is I've always loved things that fly.

My toy money is provided by a local credit union, where I've worked for over 20 years. My official title is "Solutions Developer", which really just means I think for a living. This ties in nicely with my creative streak, which lets me "think outside the box" to solve work-related problems.

RCH: HOW DID YOU GET STARTED IN RC HELIS?

CHRIS: I started flying RC in 1980. Back then, the radio gear was rather primitive (and expensive!). After flying fixed wing for a few years I got my first helicopter in 1983. It was a Gorham Cobra 50, and I learned to hover and do basic forward flight with it. As a teenager, the expense was just too much, and being nervous about crashing it made it not so much fun. I sold it and swore off helicopters.

Fast forward to 2006 when Hobby-Lobby had a "crash sale" on the Esky Honey Bee FP that coincided with my birthday. I figured for the price I'd give helis another chance, and much to

my surprise the little FP was fun! Obviously the bug bit, and bit hard.

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

CHRIS: Right now I'm trying to get comfortable with upright backwards flight. I know that sounds strange, but bear in mind that I tend to fly my helis more like planes and planes don't fly backwards! I like to say that I do "warbird style" aerobatics, but with the occasional inverted hovering or backwards loop thrown in. One thing I've been working on is performing my favorite maneuvers together with nice transitions between them. To that end, a half-piro flip is one thing I'm trying to use more as a transition. Really, I just like to go out there and have fun.

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

CHRIS: Don't stress yourself out thinking "I should be able to fly like that guy". Just have fun with the hobby! If you enjoy hovering tail-in, then don't let peer pressure make you feel bad about it or entice you into doing something that is beyond your skill set. The results will likely be expensive, humiliating, and dangerous. Also, get your basics down before you venture into 3D. I've seen plenty of guys start flipping and trying Tic-tocks before they can fly a smooth, controlled Figure 8. That's a recipe for disaster!

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

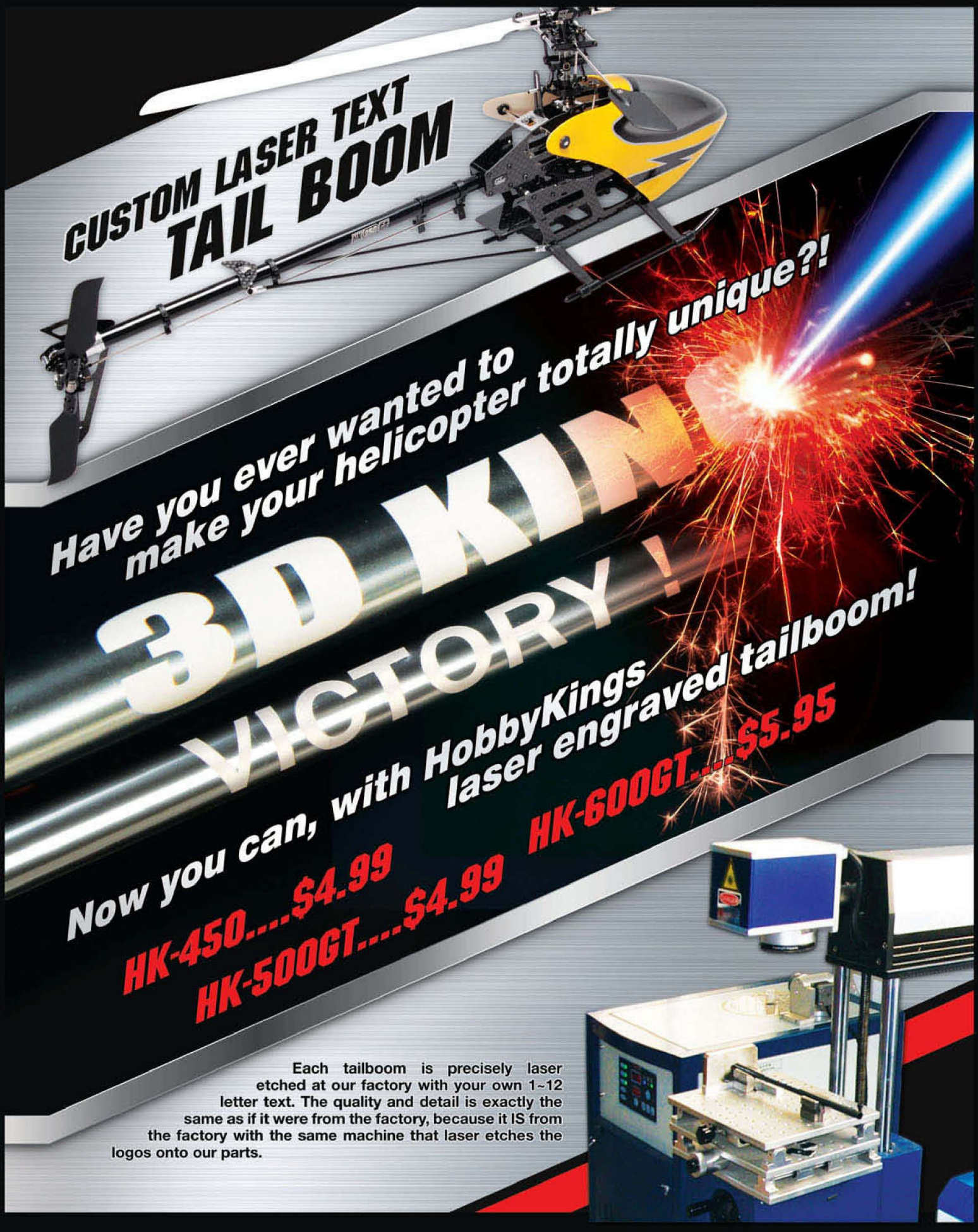
CHRIS: I think I fly them for the challenge! Here's the weird thing: When it comes to full scale, I'm actually much more interested in airplanes than helis. Maybe that's because I have a license to fly full scale fixed wing. I dunno, but when it comes to models I'm definitely more consumed by helis than I ever have been with planes. I still fly planes, but wow... helis are just completely addictive! I enjoy the researching of the next new one, I love building it and setting it up, and of course I love the challenge of flying. I also find the heli community to be a great bunch of guys, and I enjoy hanging out at the field and helping new guys get into this fascinating aspect of RC.

What's in the future? Who knows? I try not to plan my hobby; I just let it go where the fun takes me. Recently I've had a lot of enjoyment sharing my time (and spare stuff from the junk drawer) with a couple of new local heli pilots. And I'll probably keep doing the InsideHeli podcast, at least as long as it's still fun. After all, having fun is what a hobby is all about!

RCH: THANKS SO MUCH FOR THE GREAT STORIES AND ADVICE, CHRIS. I ALSO WANT TO THANK YOU FOR THE HUGE AMOUNT OF TIME YOU DEVOTE TO OTHER PILOTS AT YOUR FIELD, AS WELL AS THROUGH THE PODCAST SERIES.

CONCLUSION

Chris is one of those guys, like many of us, who have started this hobby twice. Sometimes there can be frustration in the beginning, or life plans get in the way. But, once you have the heli bug, sooner or later you come back. I think the pilots in the Austin area are glad that Chris found the hobby again and has made it his personal mission to help others succeed. With guys like Chris around, many more new pilots find success in the hobby right from the start. Have fun, and we'll see you at the field! RCH



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Use a BEC for a TAIL SERVO REGULATOR

Sometimes a step down just won't cut it!

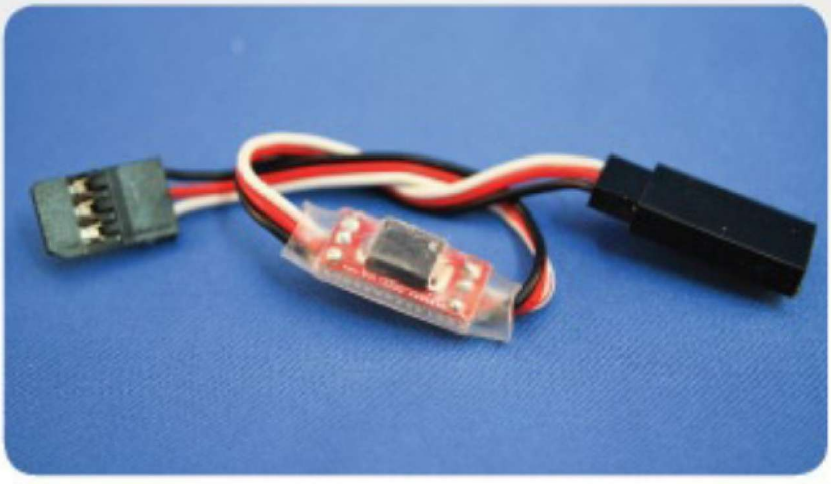
WORDS: Aaron Shell

Not the prettiest electronic, but it will work.

HIGH VOLTAGE (HV) RADIO SYSTEMS ARE BECOMING ALL THE RAGE BECAUSE YOU CAN SIMPLY PLUG YOUR FRESHLY CHARGED LIPO INTO THE RECEIVER AND GO! Having the added complexity and weight of a regulator is all unnecessary if you just go HV! But what about your tail servo? You've got one of those little tail servo step downs plugged in between the servo and gyro... that should do it, right? Wrong! With an HV radio system, a diode-based tail step down just won't cut it if you want to be nice to your tail servo.

» DIODE-BASED TAIL STEP DOWN

The little $5 step down you normally use with a 6V radio system works fine for up to 6 volts because they only reduce the voltage a given amount. Most of the step downs on the market step the voltage down 0.8 volts, so on your 6-volt system the tail servo sees 5.2 volts. With the exception of a few new tail servos on the market, this is about the most you'd want to feed a tail servo. If you increase the main voltage of the system, the tail step down is still only going to drop your voltage 0.8 volts, so a freshly charged 8.4 volt LiPo would deliver 7.6 volts to the tail servo through the step down! Even 6V rated tail servos are likely to have an issue with that much voltage!



» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

2.0

» TIME TO COMPLETE

30 Minutes

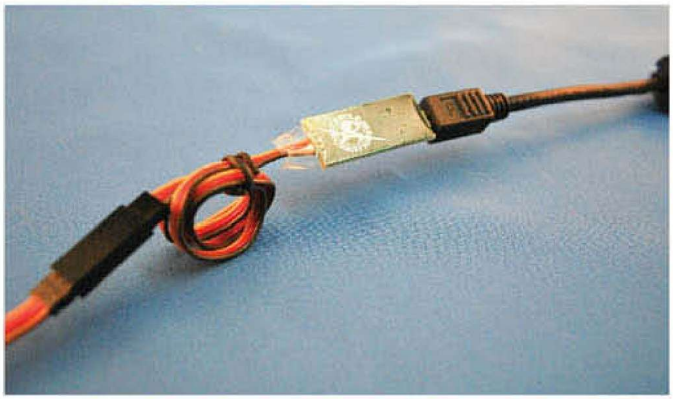
» TOOLS NEEDED

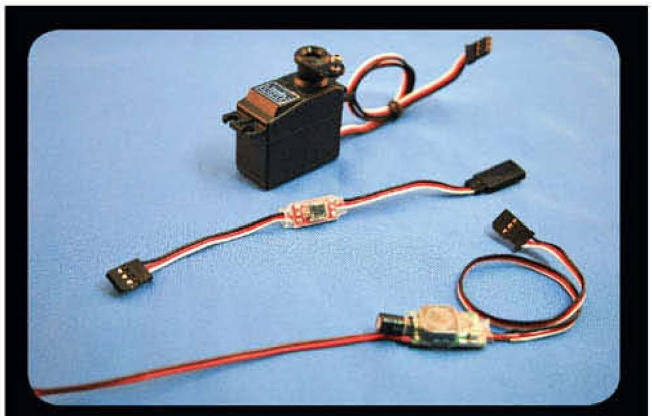
- SMALL BEC (USUALLY 3-5 AMPS WITH A 5V OUTPUT)
- MALE AND FEMALE SERVO CONNECTORS
- INDIVIDUAL STRAND OF SERVO WIRE
- CRIMPERS OR SOLDER IRON & SHRINK TUBING

» USING A BEC DEDICATED FOR YOUR TAIL SERVO

THERE ARE NUMEROUS SMALL (3-5 AMP) BECS ON THE MARKET WHICH ARE DESIGNED TO RUN THE ENTIRE RADIO FOR SMALL MODELS. These BEC's take a direct battery input and deliver a 5V output. While smaller BECs are not suitable to run five full sized, high speed, high torque heli servos, they are perfect to protect your tail servo from HV systems! Some BEC's even allow you to set the output voltage. Once you've selected a BEC, its easy to modify it for a tail servo step down.

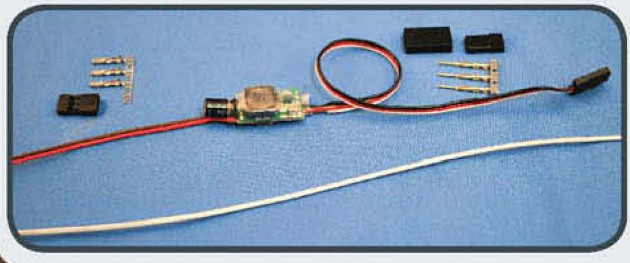
1. If you need to program your BEC through the servo connector (such as for the Castle Creations CC BEC), do it now. You can tuck the signal wire away with the servo pin still on it for later programming, but it won't be as simple as just plugging it into the servo connector anymore.

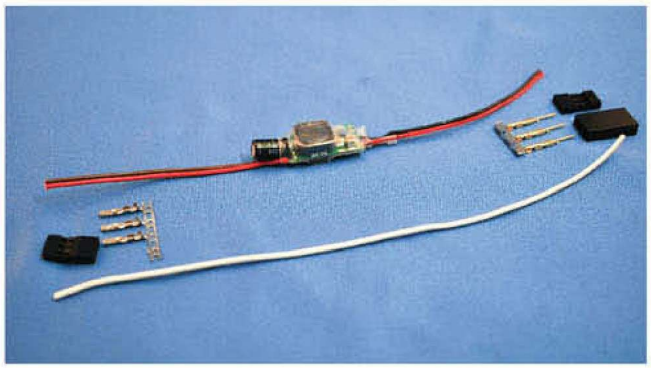




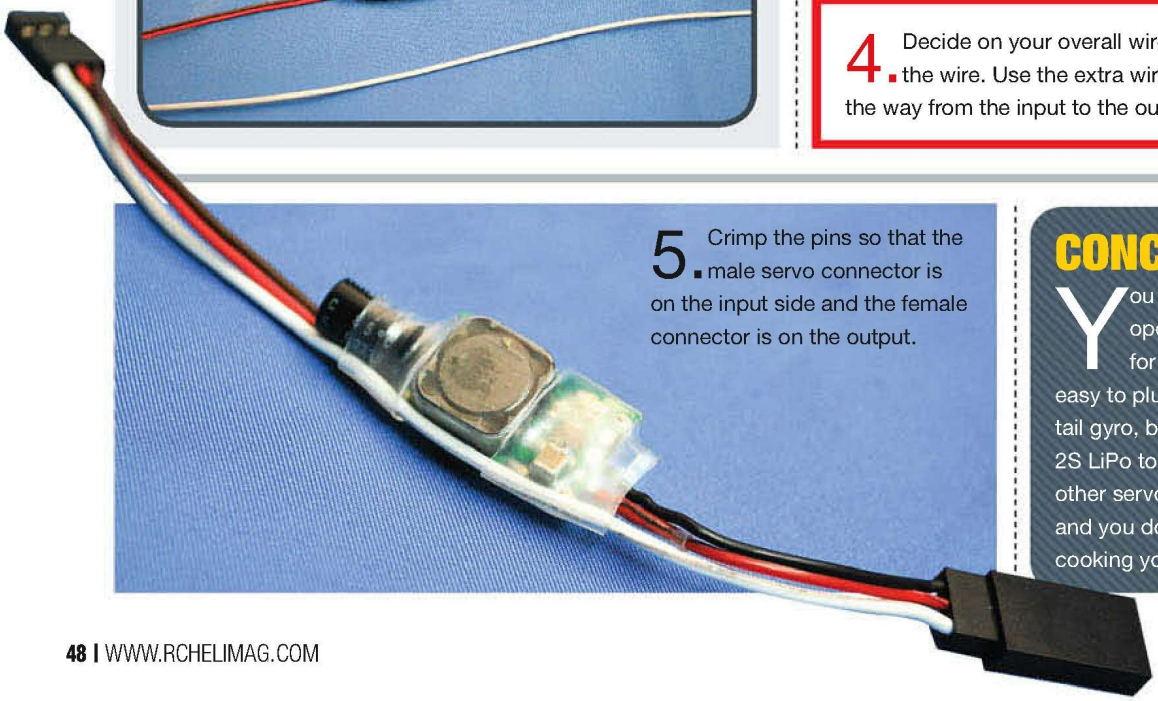
2. Decide whether you want to connect the BEC directly to the servo, or just add a servo connector. This How-To will cover using a connector like most step downs so you can unplug your servo.

3. Find a suitable length of wire for the signal wire, and servo connectors for the input and output. Since BECs usually have a male servo connector on the output side where they plug into a receiver, we will have to change this connector to a female for the servo to plug into. I recommend using new connectors and crimping the pins on, but you can also cut a servo extension in half and solder the wires.





4. Decide on your overall wire lengths, and then cut off the wire. Use the extra wire for your signal wire all the way from the input to the output.



5. Crimp the pins so that the male servo connector is on the input side and the female connector is on the output.

CONCLUSION

You now have a BEC which will operate as a 5 volt regulator for your tail servo. It's just as easy to plug in between the servo and tail gyro, but now you can run direct 2S LiPo to your radio (assuming your other servos are rated to handle it) and you don't have to worry about cooking your tail servo! RCH

Aaron always comes up with clever ways to power his helicopter.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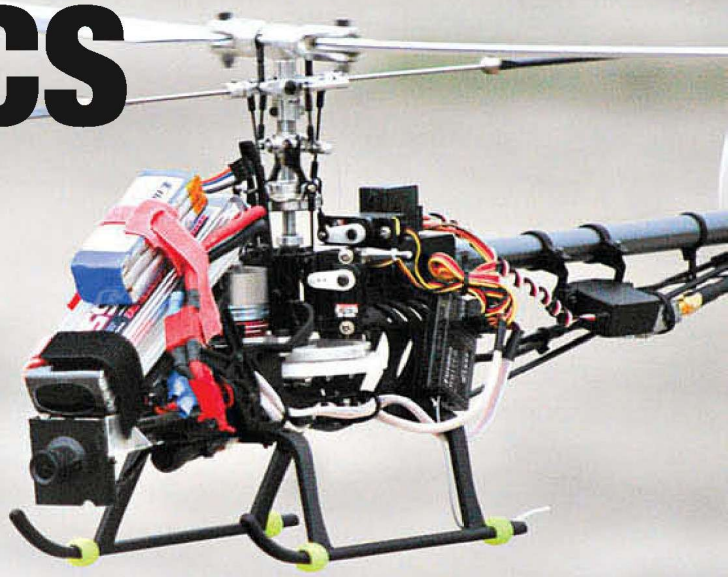
FPV HELI AEROBATICS

One hell of a ride!

WORDS: Aaron Shell



HAVE YOU EVER WONDERED WHAT IT WOULD BE LIKE IF YOU WERE ABLE TO FLY ALONG ON YOUR 3D HELI? With all the backwards and pirouetting maneuvers we normally see during a 3D flight, it would be pretty dizzying. How far could you push an RC heli if you were flying it FPV (first person video)?

During the last few years I've been experimenting with FPV helis, and the more I've flown them, the more it feels like a real helicopter experience. Like a full size helicopter, while flying from the video link you'll want to avoid backward or wild pirouettes, but who's to say you can't fly some aerobatics? As I venture into FPV heli aerobatics I'm constantly reminded of and inspired by one of the most amazing events in my life; going for a ride with Chuck Aaron in the Red Bull BO105.

Check out the 'stache on that guy.

INSPIRATION IN FULL SCALE

If you want to know how hard a full scale heli can push the aerobatic envelope, you don't have to look any further than the Red Bull sponsored BO105. With Chuck Aaron at the controls, we flew through almost every maneuver in his airshow routine, and I've dreamed about re-creating it with my models ever since. While our models are more capable of aerobatics than any full size machine, flying from the pilot's perspective really changes things. Like a full size heli, an FPV heli pilot has to be able to keep his perspective during the aerobatics, which is entirely different than keeping your orientation from the ground.

HOW DIFFICULT IS IT?

While it may seem very challenging to fly aerobatics from the on-board perspective, it has actually turned out to be rather easy. Getting the initial feel for the helicopter and mastering the hover from on-board was much more challenging than throwing it around a bit. If you are a decent heli pilot who can flip and roll your heli and feel comfortable with the transitions between upright and inverted flight, then FPV heli aerobatics is within your reach!

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

5.0

PICKING A MODEL **FOR FPV AEROBATICS**

Pretty much any heli can be used for FPV, but if you expect to carry any extras you'll want to consider a slightly larger machine. Using a simple lightweight video setup, I've been very happy with my FPV experience on my 450-size Mini Titan SE. If you want to be able to carry a GoPro camera, an OSD (on screen display) or a larger video transmitter, you may want to look into a 500-size heli. Larger helis naturally work very well and don't care about carrying a little extra weight, but I highly recommend leaving the bigger models for when you are really confident with your FPV flying and setup skills. Flybarless models offer a few advantages that make them well worth considering for FPV. A flybarless model will be much more locked-in for high speed flight than a flybar equipped heli, and they will also help minimize vibration, as well as allow for great performance with lower headspeeds, and you'll get longer flight times as icing on the cake!

VIDEO EQUIPMENT

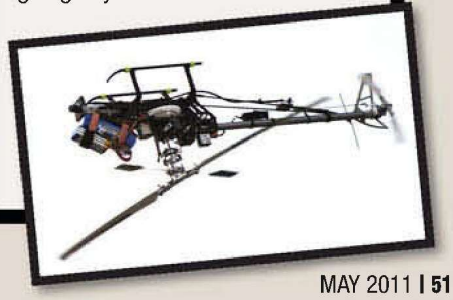
There are all kinds of fancy goodies you can get for FPV flying, but keeping it simple and light has worked out great for flying aerobatics with the Mini Titan. Control on my Mini Titan is handled with a Futaba 12FG on 2.4 GHz FASST and a Futaba R617 receiver. Because long range is really not a concern for aerobatics, I'm using a tiny, 100mw, 1.28 GHz video transmitter with a simple home-made dipole antenna. (NOTE: A HAM radio license is required for 1.28 GHz) My video camera is a 16 gram CCD camera with 420 lines of resolution and a 3.6mm /F2.0 92° lens. I've found a 90-130° lens works best for me for a fixed camera on a heli; anything less and you don't get the full picture, while anything more and you start to loose details and get a distorted sense of distance. I've added a home-made microphone circuit to pick up the audio, and all of these 12V components are powered by a dedicated 3-cell, 800mAh LiPo battery.

You can build a power filter to run all your video equipment off the main flight pack, but the video performance is likely to suffer toward the end of the pack as the voltage drops off. Because of the power hungry nature of our helis, this ends up being a real problem unless you want to start getting fancy with your electronics, adding a DC-DC converter with a power filter to provide a solid 12V to your video gear.

On the ground I have two video receivers with stock dipole antennas, and I'm using an Eagle Tree Systems Eagle Eyes for video diversity. For a monitor, I'm using a pair of Trimersion gaming goggles hacked for FPV, and I record on the ground with an Aiptek MPVR DV5800 camcorder which can record video. Optimally, I'd like to build a circularly polarized antenna for both the heli and the ground station to avoid a loss of video signal during aerobatics. For information on building FPV antennas, do an internet search on "IBCrazy FPV antenna"

SETTING UP **YOUR MODEL**

FPV helis really don't need the wild, snappy performance that we expect from our 3D helis. What's more important is a smooth drivetrain, and making sure that the model has zero vibrations. Be sure that you add your video equipment in a manner which maintains the proper CG (center of gravity). Your FPV heli will naturally weigh a little more with the video gear tagging along, but even for small helis this isn't a problem; if anything, it helps the model feel more solid in flight. You don't need to run the maximum headspeed your heli can handle; you'll get longer flight times and minimize vibrations if you drop the headspeed just a bit. Running a lower headspeed may also allow you to safely run softer dampers in the head than you would for 3D, further minimizing vibrations. If you drop your headspeed, you may have to increase the gain on your tail to compensate. I use mild cyclic travel with flybar weights on my Mini Titan to give it a very neutral feel. The piro rate is pretty slow and all of the controls take deliberate inputs to get the Mini Titan moving. It has enough cyclic agility to flip and roll without a problem, but it would be very slow for 3D. I find that this gives me all the performance I need for FPV aerobatics, and it again reminds me of the Red Bull BO105. Watching Chuck Aaron fly flips and rolls may look a little slow from outside, but when you are on-board you really don't want to be going any faster!



Aaron now wants to be called Shell Aaron when he mimics Chuck Aaron.

TAKING THE FIRST STEPS

Like anything in this hobby, you have to walk before you can run; in this case that means figuring out how to get all your video gear working properly and feel comfortable with basic FPV flight. Once you can take off and land FPV and really put the model where you want, flipping or rolling is just the next natural step! If you have a simulator that will let you practice FPV, use it! I've been able to use my old Real Flight G3.5 for practice, and I don't know if I ever would have gained enough confidence to do FPV heli aerobatics without it. On my Real Flight I have to select a field that is not a photo-field, and then I can select the cockpit view. One key is that you have to "zoom out" to get a wide enough field of view.

Baby steps.

One great aspect of FPV heli flying is that you never have to worry about being high enough to be "a few mistakes high" while still being able to see your heli. You do have to keep it under 400ft, but this gives you more than enough room to explore the controls and feel out the model. You never have to worry about the controls feeling odd from a nose-in orientation, instead you have to be able to distinguish where you are and where you're going. When you're ready to do your first flip or roll, remember to move the collective! When doing a new maneuver FPV, I like to go through it a few times from the normal RC perspective first, and I try to really think about what kind of inputs I'm using to get model to fly like I expect. During these flights I have all my video equipment running and recording on the ground. Then I can go back and watch my flight and really know what to expect, and this also confirms that the wireless video link is working adequately.

When I feel like I've really got it down, its time to let the fun begin! So far I've been able to master forward and backward flips, loops, rolls, and forward inverted flight. Pretty much any combination of flips and rolls can be accomplished as long as you avoid backward flight and fast piros. Flying backward is practically out of the question, because all you see is sky and you can't tell where your are going or if you are descending, but I have been able to do a little sideways flight pretty easily.

RESPECTING THE BOUNDARIES

You have to be able to obey flight boundaries like any normal model, which includes respecting the flight line, staying within line-of-sight distance, and keeping it below 400 ft. If you are at an AMA field, you are bound by AMA code 550 which requires you to fly with a buddy box. You may be able to fly aerobatics from the cockpit perspective on the simulator, but until you learn all the ins and outs of your wireless video system and are confident that it's going to perform adequately, don't push it too much. Its important to understand the limits of your video system as well as your control system.

Although 2.4 GHz control works great for normal RC, you have to be aware of its limitations for FPV. Line-of-sight is critical for 2.4 GHz, so flying behind a group of trees or putting your body between the transmitter and the model can drastically reduce the range. Keep in mind that it's better to have an understanding of your system's limitations and attempt to avoid reaching them instead of experimenting during a flight.

CHUCK AARON'S BO 105 MANEUVERS

1. Enter with speed and pull up into a vertical climb, level out at apex. Pirouette, pull into back flip. Half roll on the vertical down line, pull out
2. Roll
3. Half Cuban 8
4. Roll
5. Loop
6. Pull up into 45° climb, push over into front flip at apex, half roll on the vertical down line, pull out
7. Hammerhead
8. Two rolls
9. Half Cuban 8
10. Hammerhead
11. Half Cuban 8
12. Loop
13. Roll
14. Split S into flyby, turn and come in for a nose-in hover toward crowd.

CONCLUSION

FPV Heli aerobatics is just in its infancy, with only a handful of pilots around the world doing this type of flying. I see it becoming more and more popular because its not terribly difficult, nor does it require super fancy systems, and it's quite exhilarating! You can get away with a simple, cheap heli and a basic video system. You don't need to carry a huge video transmitter or even use high gain antennas to get great performance around your flying field. All it takes is a little experimentation and respecting your system's limitations to have a lot of fun! As inspiration, I've written down the sequence of maneuvers from one of Chuck Aaron's BO 105 videos on the internet. RCH

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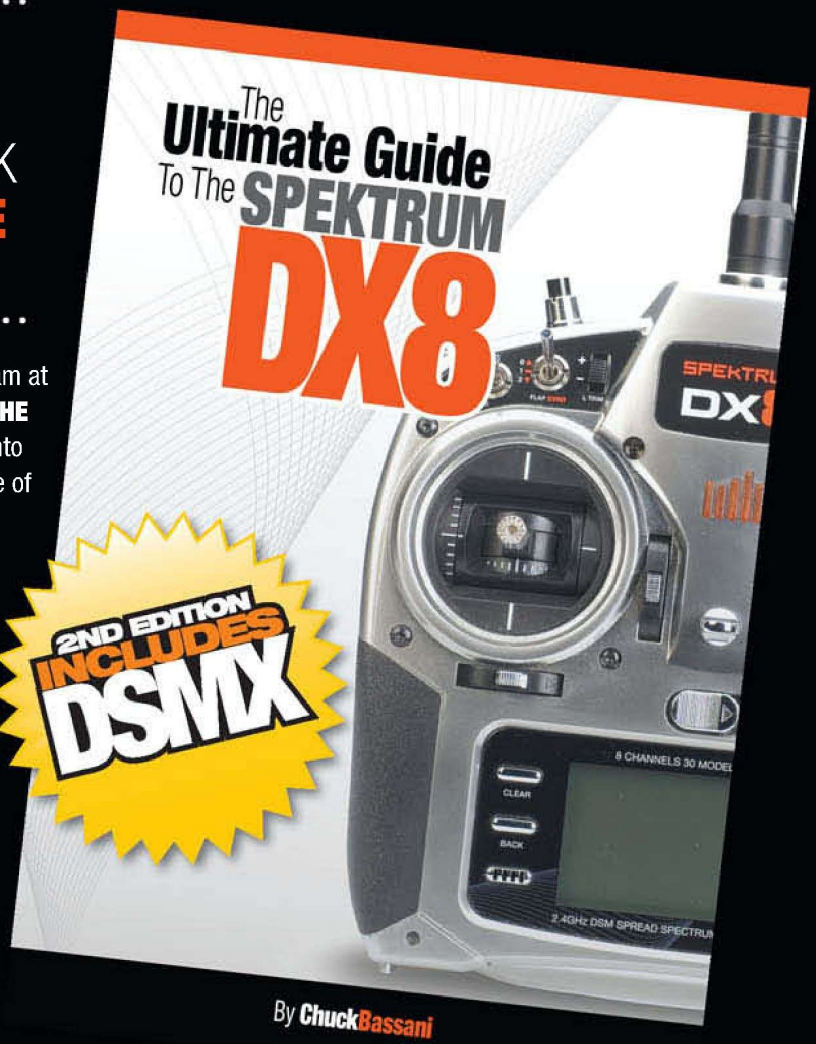

Written by **Chuck Bassani** and published by the team at **RC Heli Magazine, "THE ULTIMATE GUIDE TO THE SPEKTRUM DX8"** takes you on an in-depth trip into the features, functions, performance, programming, and use of the Spektrum DX8.

Each and every one of the DX8's **'System Setup'** and **'Function List'** menu selections are broken down in excrutiating detail. In fact, this book even documents functions not even covered in the system's "Instruction Manual". Photographs, figures, and screen images are used extensively througout the book. Installation and setup tips will detail how to get the best possible performance out of the DX8's control and telemetry features.

At the end of the book you'll find **"Step-by-Step" tutorials** that will walk you through the complete programming of a basic 4-channel electric trainer airplane, an advanced airplane setup that includes dual ailerons, dual flaps, and retractable landing gear, and a 3D capable nitro powered helicopter. Dual Rates, Exponential, Pre-programmed and General Purpose Compensation Mixes - ***they're all covered.***

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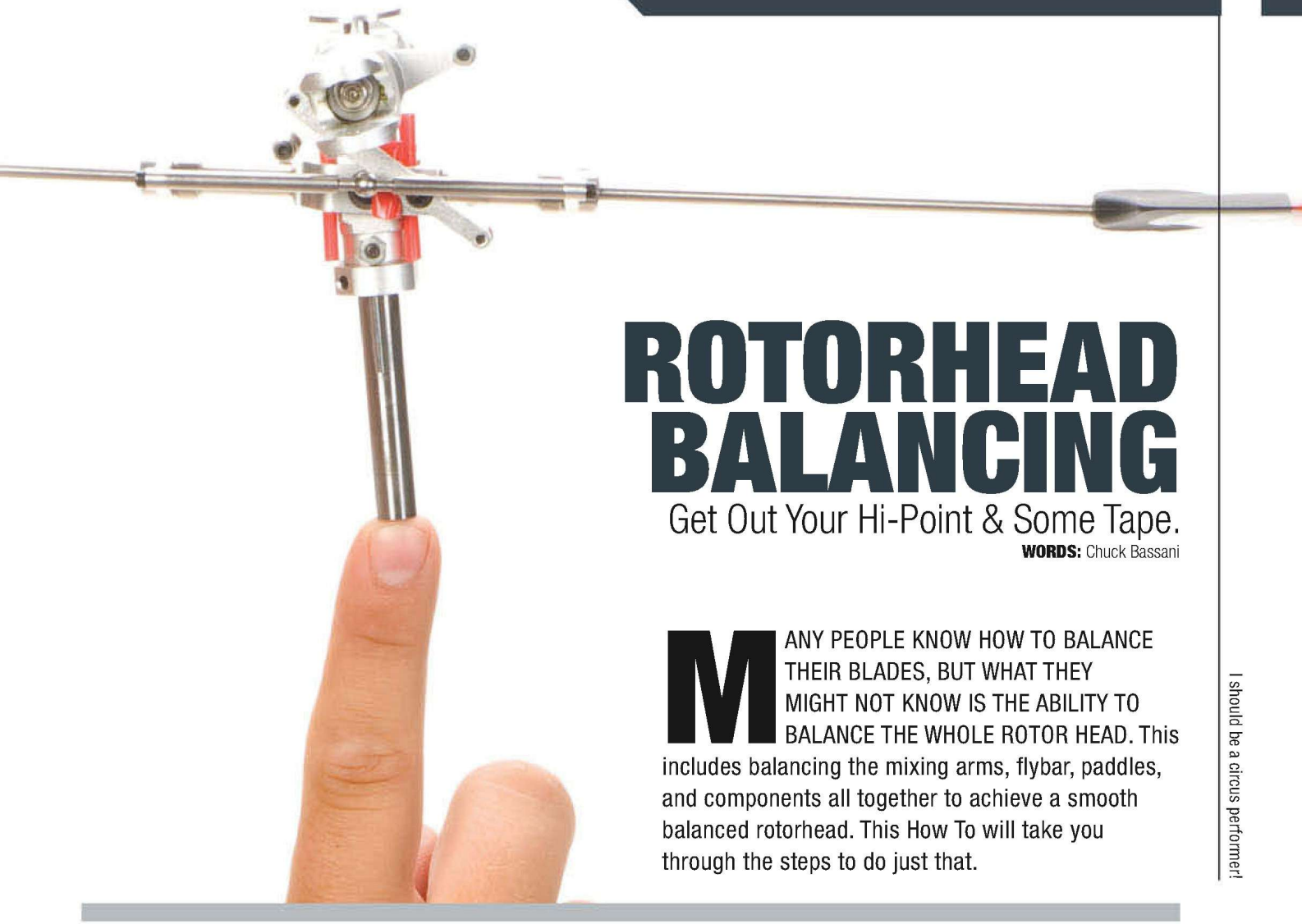


ROTORHEAD BALANCING

Get Out Your Hi-Point & Some Tape.

WORDS: Chuck Bassani

MANY PEOPLE KNOW HOW TO BALANCE THEIR BLADES, BUT WHAT THEY MIGHT NOT KNOW IS THE ABILITY TO BALANCE THE WHOLE ROTOR HEAD. This includes balancing the mixing arms, flybar, paddles, and components all together to achieve a smooth balanced rotorhead. This How To will take you through the steps to do just that.

I should be a circus performer!

WHAT IS THE DIFFERENCE IN STATIC VS. DYNAMIC BALANCING?

When you're working on helicopters, 'static' and 'dynamic' balance are terms you'll come to know rather intimately. Static balancing refers to getting a component, or group of components, balanced when stationary. Dynamic balancing refers to balance while in motion.

It's easy to visualize static balance. By using some sort of low friction fulcrum, the object(s) being balanced are simply observed while rotating about the pivot point. If not in balance, the heavy side becomes obvious. But just because something achieves a good static balance doesn't necessarily mean it will yield good dynamic balance. When put in motion, other forces begin to exert their influence on balance.

For example, consider the main rotor blades. You may put them on a seesaw type balancer and observe a perfect static balance. However, when you spin up the rotor head, centripetal forces may compel each blade to seek a different lead/lag if the blades have a different span-wise center of gravity. As a result, they will not demonstrate a good dynamic balance. Aside from this example, there are many potential reasons a rotor head that exhibits good static balance may not yield a good dynamic balance.

Here are some other examples:

- Bearing play and/or worn bearings in the blade grips
- Worn or enlarged blade mounting holes
- Bent feathering spindle
- Asymmetrical spacing between head components
- Worn dampeners
- Unbalanced blades

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

3.0

» TIME TO COMPLETE

20 Minutes

» TOOLS NEEDED

- LOW FRICTION HI-POINT STYLE BALANCER
- LINKAGE SECURING
- TRACKING TAPE

LET THE FUN BEGIN

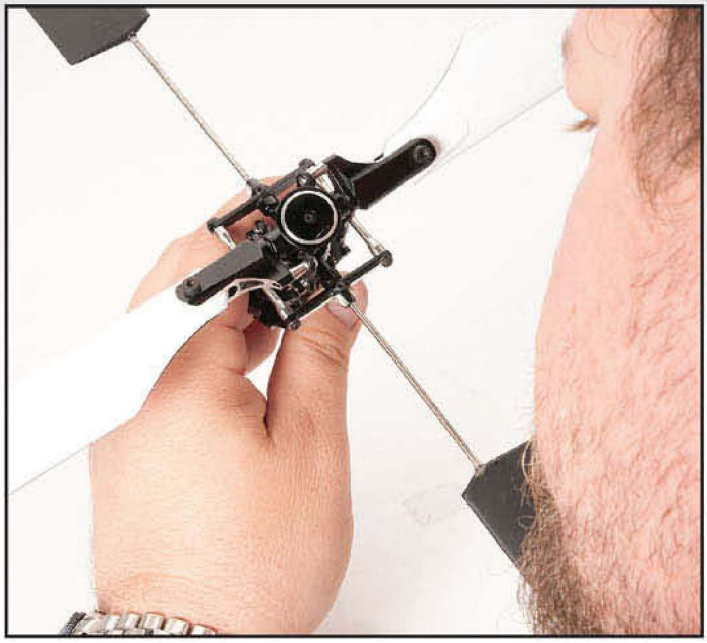
As you'll undoubtedly come to find out, there are many different ways to balance a rotor head. What I'll present here is the procedure that I use. It produces extremely accurate results. I do feel compelled , however, to mention that I learned the essence of this procedure many years ago, from reading Ray's Authoritative Helicopter Manual. In fact, Ray Hostetler has just released an updated version of this book called Rays' Authoritative DVD Series: Shop & Field Companion and I highly recommend it.

I'll assume you're beginning this process with a perfectly matched set of main blades. So, if you haven't done so yet, balance and match the main blades. By doing this, you can be assured that any imbalance is being introduced by the rotor head components themselves and not the blades. We'll begin by balancing the rotor head without the blades attached.

In preparation for balancing the head, we must first remove it from the helicopter. You can either remove the head from the main shaft or pull the entire main shaft with the head attached. I prefer the former and use a spare main shaft to work with.

» PRE-BALANCE CHECK

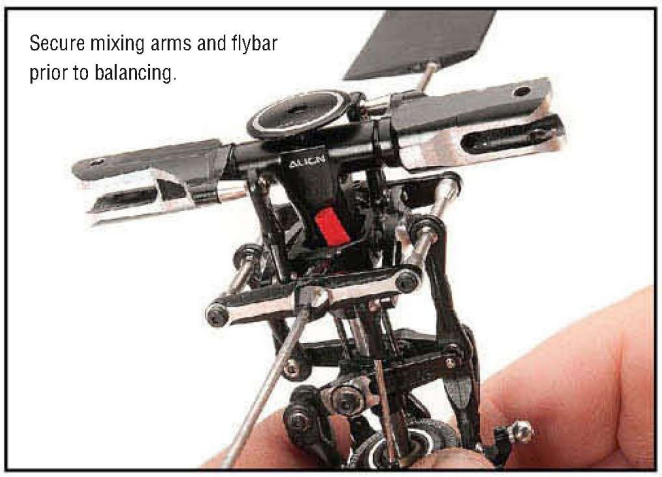
Prior to balancing, take a close look at the rotor head. Look for any obvious asymmetry that may affect balance. For example, there should be equal spacing between each blade grip and the rotor hub. Missing washers / spacers during assembly could account for a problem found here.



BATTEN DOWN THE HATCHES

Locking the head refers to positioning and immobilizing any moving parts. The swash plate and washout base (with washout arms) do not need to be balanced. Remove those parts, as well as all links that attach to them. What should be remaining are the links between the blade grips and the mixing arms, and if you have captive flybar links—the links between the flybar and the swashplate.

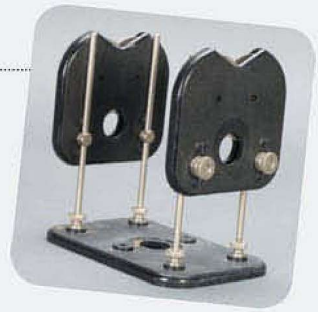
Use shims to lock the mixing arms to keep them from moving. They should be locked at their neutral position. The flybar should be locked at neutral as well. We want to ensure that the head is completely symmetrical and remains that way during balancing.



Secure mixing arms and flybar prior to balancing.

TOOLS OF THE TRADE

The following tools are used to balance your rotor head:



LOW FRICTION HI-POINT STYLE BALANCER: This device can support your main rotor shaft and rotor head in a vertical orientation outside of your helicopter. It allows you to spin your rotor head and observe any static imbalance tendencies. The DuBro Tru-Spin Balancer; indispensible and relatively inexpensive.

LINKAGE SECURING DEVICES: Purpose built devices, small wedges, toothpicks, coffee stirrers, etc. Items like these can be used to position and immobilize loose components in the rotor head (such as the flybar seesaw and mixing/ washout arms). It's necessary to secure all the free moving head parts so the head is symmetrical when balancing. Items such as small balsa wedges can be used to secure the moving parts.

ROTORHEAD & FLYBAR BALANCING

For the most part, cord-wise balancing is balancing the flybar. It's important to make sure the flybar extends equally from the rotor hub in both directions. Furthermore, it's just as important to make sure the paddles are also installed at equal distances.

If you haven't done so already, remove the paddles and ensure that the flybar is centered. This is a good time to add flybar weights if your heli is not equipped with them. They help greatly with the balancing procedures. Either purpose built weights or wheel collars will do; one on each side of the flybar. I begin by moving both weights as close in to the rotor hub as I can. Re-install the flybar paddles and make sure they are equal distances from the hub.

Put the head and main shaft on the balancer. Rotate the assembly and make sure it stops at random positions. Should one side be heavier than the other, that side will have a tendency to cause the assembly to settle with the heavy side down. Move the flybar weight out a little on the light side and repeat until the cord-wise balance is achieved.

Cord-wise balance is performed without the main blades installed.

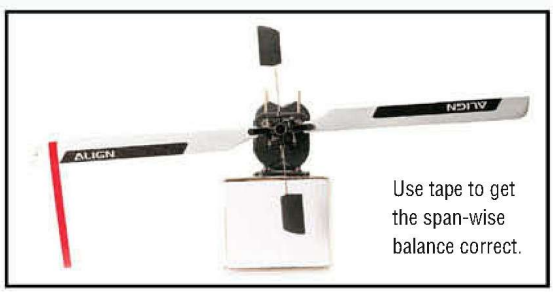
That rotorhead looks all out of balance.

» OVERALL BALANCING WITH MAIN BLADES

Now we'll bolt on the main blades and perform the span-wise balance. But first, we want to make sure the 'lead / lag' is adjusted so the blades balance around the feathering spindle. Adjust the blade bolt so you can freely swing the blades in the grips with a little force, but so they will not move on their own. Now position the blades in the grips, such that they have no tendency to flop either way (positive or negative pitch). When final position is achieve, lock down the blades by tightening the blade bolt a little more.

Once again, put the assembly on the balancer and observe the balance. If one side is heavier than the other, figure out how much weight is needed to adjust the balance by using strips of tracking tape (or something like MonoKote Trim Sheet) over the CG of the light blade. It shouldn't take much. The tape's length should be double the blade's cord plus about 10 mm for overlap. Weight is fine tuned by adjusting the width of the strip. Once the correct weight is established, stick it down for good right over the CG.

Your rotor head should now be able to spin on the balancer with no tendency to stop in any one position.



Use tape to get the span-wise balance correct.

Tip – Make sure any backing is removed prior to testing the balance.

CONCLUSION

Rotor head balancing is absolutely necessary. Taking the time here to do this right will be time well spent. An unbalanced rotor head, at a minimum, is embarrassing. Aside from that, it has its share of unwanted side effects. It will cause your heli to shake but can also cause premature wear on the parts, make the heli harder to control, and most likely contribute to some sort of electronics failure down the road. Definitely not cool—so don't skip this step. Happy Flying… RCH

The red devil

JR VIBE 50 NEX

Revised Perfection

WORDS: Jim Innes | **PHOTOS:** Jim Innes

JR IS ONE OF THE MOST ESTABLISHED COMPANIES IN THE INDUSTRY AND IS KNOWN FOR MAKING HIGH QUALITY, COMPETITION LEVEL MACHINES. Just over two years ago, JR released the game-changing Vibe 50. This nitro heli hit the market with a slew of features and a competitive price point. JR has taken the proven design of the Vibe and upgraded many features. Does the NEX live up to the expectations?

I love bling!

AT A GLANCE

SIZE:	50
POWER:	Nitro
TYPE:	Pod & Boom
BUILD TYPE:	Kit
TAIL DRIVE:	Torque Tube

FEATURES

The Vibe NEX is constructed almost entirely of thick carbon fiber and anodized aluminum components. JR has redesigned crucial areas such as the tail assembly, fan hub, and clutch. Adjustable ratios, a pre-painted canopy, and a heavy-duty drivetrain round out the package.

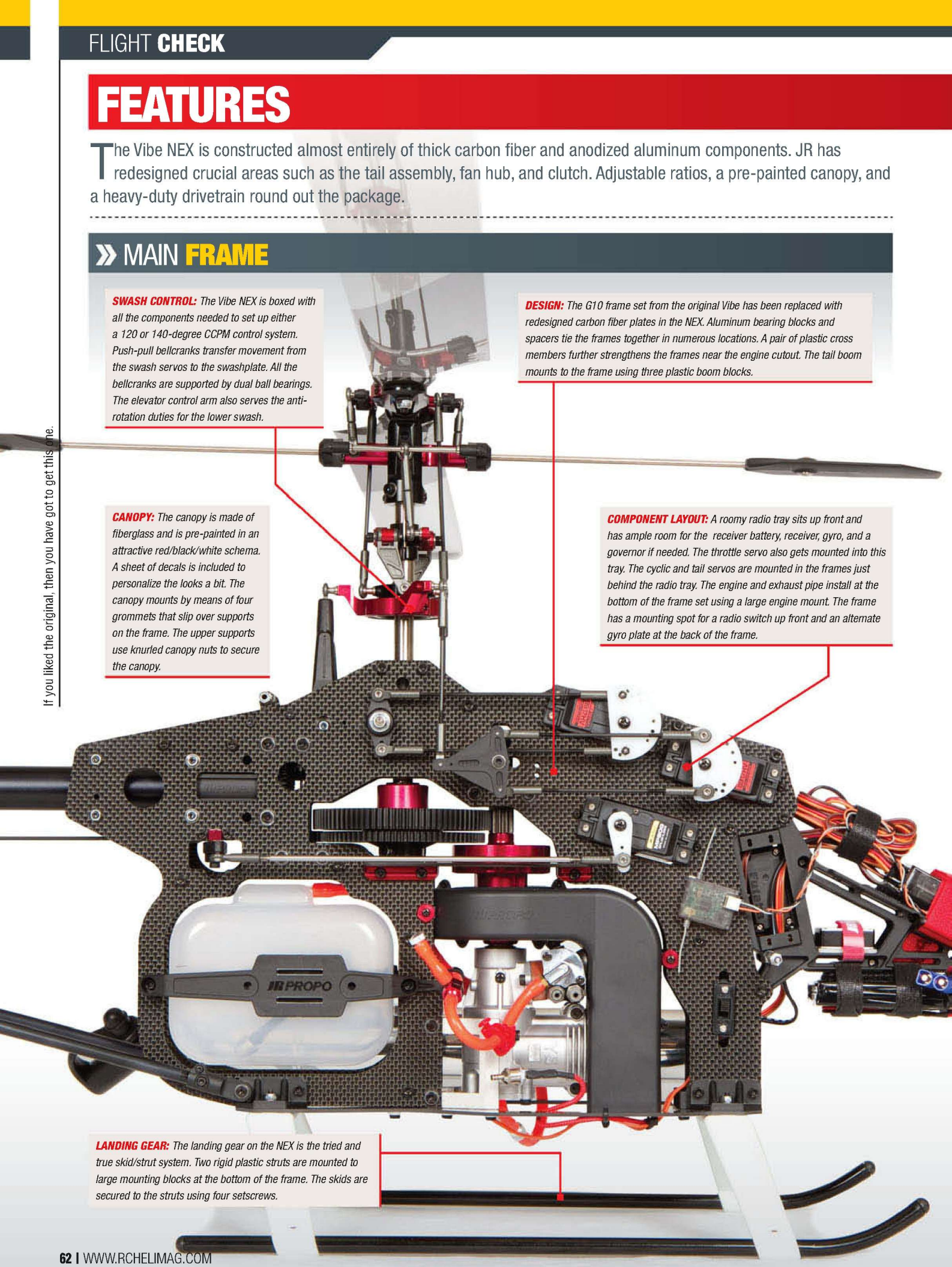
MAIN FRAME

SWASH CONTROL: *The Vibe NEX is boxed with all the components needed to set up either a 120 or 140-degree CCPM control system. Push-pull bellcranks transfer movement from the swash servos to the swashplate. All the bellcranks are supported by dual ball bearings. The elevator control arm also serves the anti-rotation duties for the lower swash.*

DESIGN: *The G10 frame set from the original Vibe has been replaced with redesigned carbon fiber plates in the NEX. Aluminum bearing blocks and spacers tie the frames together in numerous locations. A pair of plastic cross members further strengthens the frames near the engine cutout. The tail boom mounts to the frame using three plastic boom blocks.*

CANOPY: *The canopy is made of fiberglass and is pre-painted in an attractive red/black/white schema. A sheet of decals is included to personalize the looks a bit. The canopy mounts by means of four grommets that slip over supports on the frame. The upper supports use knurled canopy nuts to secure the canopy.*

COMPONENT LAYOUT: *A roomy radio tray sits up front and has ample room for the receiver battery, receiver, gyro, and a governor if needed. The throttle servo also gets mounted into this tray. The cyclic and tail servos are mounted in the frames just behind the radio tray. The engine and exhaust pipe install at the bottom of the frame set using a large engine mount. The frame has a mounting spot for a radio switch up front and an alternate gyro plate at the back of the frame.*



LANDING GEAR: *The landing gear on the NEX is the tried and true skid/strut system. Two rigid plastic struts are mounted to large mounting blocks at the bottom of the frame. The skids are secured to the struts using four setscrews.*

If you liked the original, then you have got to get this one.

» DRIVE TRAIN

MOTOR MOUNT: The engine mount is a large one-piece aluminum unit. This mount is sandwiched between the main frames and the bottom plate of the heli using eight machine screws to add rigidity to the assembly. The engine bay is large enough to accommodate any current 50-56 size power plant.

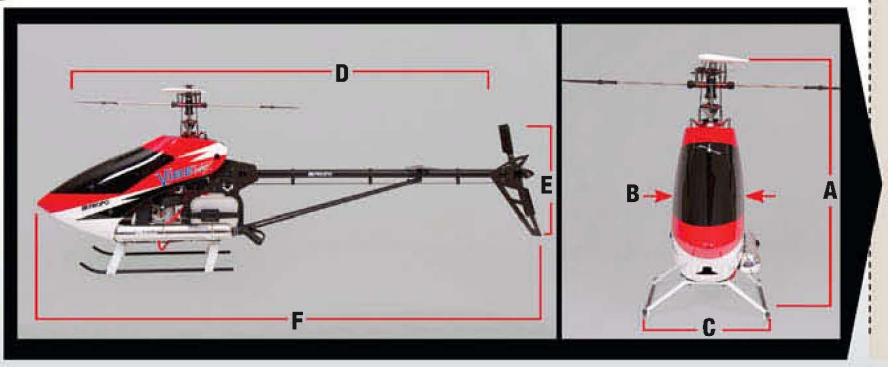
CLUTCH/FAN: JR updated the whole clutch and fan assembly for the NEX. The fan hub now screws onto the engine crankshaft directly, omitting the need for collets or extra efforts in dial-indicating the unit. On the test model, the hub dial-indicated to under .002" on the first attempt. A completely enclosed fan shroud directs cooling air over the engine. The new clutch design uses a much larger one-way bearing to ensure proper engagement with the start shaft and good longevity for the assembly. If you use governor magnets, they are installed into pre-drilled pockets at the top of the clutch bell.

MAIN GEAR: The main gear is carried over from the original Vibe. It's made of thick plastic and runs true around the circumference. It has 87 teeth and mounts to the aluminum autorotation hub using four machine screws.

AUTOROTATION DRIVE: The autorotation hub is anodized red and has the one-way bearing pressed into it. Two large ball bearings are mounted on either side to keep the main shaft centered in the hub.

TAIL DRIVE: The tail drive system is also carried over from the original Vibe. An 80-tooth tail drive gear is mounted to the bottom of the main shaft, which then turns a counter gear mounted at the front of the tail block. A bevel gear at the top of the counter shaft drives another bevel gear at the front of the torque tube assembly. The aluminum torque tube is supported by a bearing in the boom.

"One of the most amazing things about this heli is how JR took an already amazing machine, upgraded nearly every component, and did this without raising the price."



JR VIBE 50 NEX MODEL SPECIFICATIONS

CLASS:	50 Nitro
BUILD:	Kit
BLADE SIZE:	600-620mm
LEVEL:	Beginner - Advanced

FRAME

MATERIAL:	Carbon fiber
TYPE:	Two-piece sandwiched
SERVO TO SWASH LINKAGE:	Bellcrank, push-pull
SERVO SIZE:	Standard

ROTOR HEAD

GRIPS:	Aluminum
HEAD BLOCK:	Aluminum
LINKS:	Ball
SWASH:	Aluminum
CONTROL:	CCPM (120°, 140°)

TAIL

DRIVE SYSTEM:	Torque tube
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Dual-point
TAIL BLADE GRIPS:	Plastic
TAIL CASE:	Aluminum
BOOM STRUT MATERIAL:	Aluminum with plastic ends

GEARING

MAIN ROTOR TO PINION RATIO:	1:8.7
MAIN ROTOR TO TAIL RATIO:	1:4.7

WEIGHT

EMPTY:	5 lbs., 10 oz. (2552g)
WITHOUT FUEL:	8 lbs., 3 oz. (3714g)
FULLY LOADED:	9 lbs. (4082g)

DIMENSIONS

HEIGHT (A):	16.94 in. (405mm)
CANOPY WIDTH (B):	5 in. (127mm)
LANDING GEAR (C):	8.5 in. (216mm)
MAIN ROTOR (D):	53.75 in. (1,365mm)
TAIL ROTOR (E):	10.13 in. (257mm)
LENGTH (F):	48 in. (1,219mm)

A bulls worst nightmare.

FEATURES CONTINUED

» TAIL & BOOM

TAIL CASE: *The tail case is made up of five aluminum components. The plate on the back side of the case is removed to install the tail shaft and bevel gears. As on the Vibe 50, a set of small washers is included to allow for precise adjustment of gear mesh in the tail. The tail case is attractively anodized in both red and black. It's mounted to the boom using a clamp, and another bolt is threaded into the boom to act as a safety/anti-rotation pin.*

TAIL BLADE GRIPS: *The tail system on the NEX is a complete redesign. Everything has been beefed up in the tail rotor assembly. The enlarged two-piece plastic grips now sport three bearings each; one thrust bearing and two radial bearings. The tail hub has been modified to fit the new grips properly. A set of machine screws and washers are used to secure the grips to the hub.*

BOOM: *The black anodized tail boom for the NEX retains the same specs as the one on the original Vibe. The boom measures in at 708mm in length and a diameter of 22mm. Slots are located on the boom to line it up properly inside the frames. An aluminum strut with beefed up plastic ends support the boom on each side.*

PITCH ACTUATOR SYSTEM: *Tail pitch is achieved on the NEX 50 in the same way as the original Vibe. A plastic fork assembly is connected to the tail case through a set of bearings. A set of pinned screws on the top and bottom of the fork engage in a slot on the pitch slider. Finally, a set of links connects the slider to the tail grips.*

» ROTOR HEAD

HEADBLOCK: *The head block is also solid aluminum, anodized black. The block gets attached to the main shaft using a single Jesus bolt, and a pair of bolts at the bottom of the block forms a clamp for increased strength. A set of O-rings on each side handle the dampening duties. A plastic sleeve is also placed inside the head block to further dampen the spindle.*

BELL/HILLER ARMS: *The Bell-Hiller arms are carried over from the Vibe 50. Each arm is fully ball raced and mounts directly to the rotor grips using a machine screw. Two mixing options are available for the control ball on the flybar side of each arm.*

PHASING: *Phasing on the NEX is accomplished by two pins in the head block that ride in corresponding grooves in the washout assembly. The phasing is not adjustable on this heli.*

I think I am in love!

» INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX: The box to the NEX 50 is attractive on the outside, but even more so once you look inside. The parts are all organized neatly into numbered bags. Each numbered bag contains smaller bags that are also labeled for each step in the assembly process. The canopy is well protected in the box and the manual, carbon frames, and a decal sheet sit underneath it. Much like its predecessor, the Vibe NEX is packaged extremely well.

MANUAL AND BUILD

The manual for this heli is superb. Detailed parts listings and blown-up diagrams are pretty straightforward and simple to understand. Each page in the manual corresponds to a numbered bag of parts. This helicopter is a kit with no pre-assembled components; this fact should make any builder out there happy. Assembly of this model was a dream; each component fit together perfectly with no need to sand or tweak anything. I was grinning ear-to-ear for most of the build. The only thing I had to do was add about 2 ounces of weight to the front of the model to get a perfect balance. I plan to install a larger receiver battery in the future, which would negate the need for the balance weight.

MAIN BLADE GRIPS: *The grips on the NEX are all aluminum. The grip is anodized black and the control arm is anodized red. There are no adjustable mounting options for the control arms. Each grip has two radial bearings and one thrust bearing.*

WASHOUT ARMS: *The washout arms are anodized red and are fully ball raced. They bolt into the metal washout block on either side, and a swash link is attached to each arm using e-clips. Only one mounting location is available for the control ball on the mixing arms.*

SWASHPLATE: *The swashplate is all red anodized aluminum. A large center bearing assembly keeps the upper and lower portions together, and three setscrews are used to adjust out any slop. This swashplate turns smoothly with little to no play. Anti-rotation duties are handled by the elevator arm link.*

JR
VIBE 50 NEX
RTF & TEST GEAR

» TEST GEAR

- **RADIO:** Spektrum, DX7, SPMR7710, **$200**

- **RECEIVER:** Spektrum, AR7100R, SPMAR7100R, 1.15oz. (32.5g), **$220**

- **CYCLIC SERVOS:** JR, 8917HV, JRPS8917HV, 2.5oz. (71g), **$150 ea.**

- **THROTTLE SERVOS:** Futaba, 9252, S9252, 1.8oz. (50g), **$85**

- **TAIL SERVOS:** JR, MP80G, JRPSMP80G, 2.25oz. (64g), **$180**

- **ENGINE:** YS, 56SR, YSE0015, 14.3oz. (406g), **$300**

- **PIPE:** Outrage, Hyper Rage 56, HR1159, 5oz. (142g), **$60**

- **RECEIVER BATTERY:** Spektrum, 2000mAh LiPo RX pack, SPMB2000LP, 3.3oz. (93g), **$70**

- **GYRO:** JR, G3703D, JR-PG3703D, .56oz. (16g), **$160**

- **FUEL:** Magnum, Heli Plus 30%, HP30, **$25**

- **BLADES:** SAB, 600mm Carbon Blades, SAB0330, 5.1oz. (145g), **$95**

Now that is a great package deal.

TESTING

The Vibe 50 NEX was outfitted with some top-of-the-line equipment for this review. JR's HV servos, brushless tail servo, AR7100R, the 3703D gyro, and a 2S Spektrum LiPo battery were selected for the electronics. A YS 56SR engine and Outrage 56 pipe were chosen to provide the grunt. Considering how enjoyable the assembly process was, I couldn't wait to see if this thing would fly as good as it looks.

HOVERING • Only one or two flights were needed to get everything on this model trimmed out and dialed in. As an owner of the previous Vibe, I fully expected the NEX to hover with the best of them; I was not disappointed. This heli hovers like a dream. It is easy to put into an altitude and hold it there. Beginners and experts alike will appreciate the hovering characteristics of this bird.
Rating: 5

FORWARD FLIGHT • You often read the term "like it was on rails" in regards to how well a helicopter can follow a path in forward flight. The NEX 50 fits within this category. The heli simply goes wherever you point it. There is no bobbing or other strange tendencies found during flight. Corrections were rarely needed in testing. Basic turns were also predictable and smooth.
Rating: 5

CYCLIC PITCH RESPONSE • The NEX is fast on the cyclics. This heli can flip and roll on a dime and reacts very quickly to stick inputs. It retains that very axial feeling in its aerobatics that the first Vibe was known for. Aerobatics of both the precise and stick-banging varieties should pose no problem for this machine.
Rating: 4.5

COLLECTIVE PITCH RESPONSE • Combined with the power of the YS56 engine and a healthy 12 degrees of pitch, the NEX climbs quickly and responds well to collective changes. You barely notice the extra weight of this helicopter when it comes to stops and direction changes.
Rating: 4.5

TAIL ROTOR RESPONSE • This heli has a very solid tail system. When you need it to piro at a high rate or stop suddenly, it's up to the task. This tail rotor has a large disk and spins at a high speed, so the power is always there for even the hardest of maneuvers. On the flip side, this tail system is also very precise and controlled. The tail system is one of the strong points of this model.
Rating: 5

AUTOROTATION CAPABILITIES • Autorotations are efficient and predictable with this helicopter. The one-way bearing assembly spins freely and very little power if robbed to run the tail. Because I did much of the testing with heavy blades, there was plenty of head speed left at the end of each auto. The machine behaved well during transition all the way to the ground.
Rating: 4.5

POST FLIGHT INSPECTION • As expected during the build, the Vibe NEX is showing no abnormal wear issues thus far. Each component and assembly has been inspected and everything is still like new. Considering how well made the components are on this bird, I expect that it will hold up with little maintenance needs for a very long time.
Rating: 5

Follow the red brick road.

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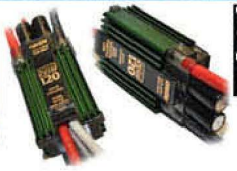
BEASTX Be Absolute Stable · Ely.Q · JR · miniature aircraft usa

WE ARE 3D

PHOENIX BRUSHLESS CONTROLLERS



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TESTING SPECS

JR VIBE 50 NEX

Part #: JRP9575
Distributor: Horizon Hobby
Web: www.jrpropo.co.jp

Street Price: $560
Price as Tested: $2,180
Build/Setup Time: 12 Hours

PERFORMANCE

MODE FLOWN:	Normal, idle up 1, idle up 2
RPM OF EACH MODE:	Normal: 1800 Idle Up 1: 2000 Idle Up 2: 2050
ENGINE TEMP (after flight):	125° F
FLIGHT TIME:	6-8 minutes
CRASH COST*:	$43

TEST CONDITIONS

WEATHER:	Partly Cloudy
TEMP / HUMIDITY:	63° F/40%
BAROMETRIC PRESSURE:	29.75 in.
WIND SPEED:	0-8 mph
VISIBILITY:	10 miles
ALTITUDE:	4200 feet

PITCH CURVES

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

** includes main shaft, tail boom, spindle, landing gear, flybar, torque tube*

REQUIRED TO FLY

Transmitter, receiver, matched cyclic servos (3), tail servo, throttle servo, gyro, engine, muffler, receiver battery, 600-620mm blades, basic tools, fuel line, fuel, starter, glow igniter.

WHO'S IT FOR?

The Vibe 50 NEX is a great machine for almost any level of pilot. The price points for the kit and spare parts are low enough to accommodate a fairly new pilot. The flying characteristics and fully upgraded airframe should appeal well to more advanced pilots. The heli can be tuned to fly any style from hovering to heavy 3D flight. The Vibe NEX is also precise enough in flight to use for competition and scale applications as well.

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

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

THE GOOD

- Chocked full of upgrades right from the box
- Parts are of the highest quality
- Great flight characteristics

THE BAD

- Slightly heavy
- Fan shroud is tight when using a large 55-56 engine
- Not currently available in a flybarless variation

CONCLUSION

JR has long been known for designing high-quality competition level machines. The Vibe fifty NEX is certainly no exception. While many helis in the 50 nitro category fly very well, the NEX stands out from the pack in its build quality. One of the most amazing things about this heli is how JR took an already amazing machine, upgraded nearly every component, and did this without raising the price. The NEX is a great addition to any pilot's fleet. See you at the field! RHI

Watch out, you are low on fuel!


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Use a GoPro Camera FOR FPV

Download That Video

WORDS: Aaron Shell

View of Oregon from the GoPro.

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

3.0 RC Heli Magazine

» TIME TO COMPLETE

30 Minutes

» TOOLS NEEDED

- 2.5 MM 4 PIN CONNECTOR
- MINI-B TYPE USB CABLE
- 5 VOLT BEC
- WIRELESS VIDEO LINK
- ASSORTED SHRINK TUBING
- SOLDERING IRON

FPV FLYING HAS BECOME ONE OF THE FASTEST GROWING ASPECTS OF RC, but one thing you hear all the time is the desire to have HD video. At this time it's not practical to downlink an HD video signal with hobby grade equipment. FPV modelers fly from a standard analog composite video signal on the ground, so how do people get those amazing videos you see online? Some of the videos may come from medium sized hand-held type cameras on a professional heli camera mount, but these cameras are too heavy for most FPV models. Most of the FPV videos you see online in HD come from a tiny HD camera like the GoPro HD.

» WHAT IS A GoPro

GoPro has quickly become synonymous with helmet mounted cameras. Often when you see a head shot from a skydiver, or from the fender of a car on television these days, it comes from a GoPro HD. (You can frequently pick them out in other shots with their characteristic clear snap together case.) These cameras offer a commanding field of view, and they come with a variety of cases and mounting systems. Because of their performance and relatively small size, they have quickly become the HD camera of choice for FPV fliers. With a little ingenuity, you can make even more use of the GoPro by tapping into its A/V out for your video downlink, and feeding it with 5 volts so you don't have to worry about the camera's battery.

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Nathan Spencer *Ron Lund*

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» HOW DOES THIS ALL WORK?

FIRST OF ALL, YOU HAVE TO UPDATE YOUR GOPRO TO THE LATEST FIRMWARE, WHICH ENABLES THE LIVE A/V OUT FEATURE. This will also allow you to turn off the camera's OSD (on screen display) on the A/V out, which is just a timer and a record icon which take up real estate on your screen. There is a method to trick the GoPro into live A/V out mode without the firmware update, but I'm recommending just going with the firmware update instead. Once you've updated the firmware, you can go through the settings to enable the live A/V out, turn off the OSD, and choose your shooting mode. You can pick from any of the resolution settings (R1-R5), it's really up to you for what you feel most comfortable with. I prefer the R5 mode which has a 127° field of view, I find the 170° settings are just too wide, and the R5 mode has the highest resolution on the recording anyway.

Once you've enabled the live A/V out feature, you can experiment by plugging the factory A/V cables directly into your monitor (or video goggles) to get an idea of how its going to work. Building your own wiring harness from these instructions will allow you to power the GoPro from the same power as the rest of your video system and wire it directly into your video transmitter for video and audio without any bulky A/V connectors.

NOTE: ***Cut off some excess USB wire and practice trimming the outer rubber coating and the individual wires before tackling the project. Using a hobby knife to cut the insulation has proven to be a delicate, but rather easy way of stripping USB wires.***

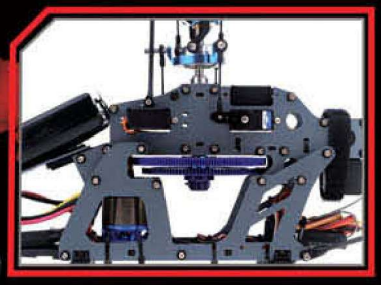
FPV can be very complicated.

MAKING THE HARNESS

STEP 1. PREPARE THE MINI-B USB.

Cut off the mini-B USB connector about 1.5 to 3 inches from the rubber housing. Roll the wire under a hobby knife about ¾ of an inch back from the end of the wire with gentle pressure to cut only the insulation. Peel back the wire shielding and twist it together into one wire. Carefully trim away the aluminum foil part of the shielding. Trim back the white and green wires, these are not needed at this end and should be insulated to prevent them from shorting out. Carefully roll the red and black wire under a hobby knife with just enough pressure to nick the insulation, then you can easily pull off the tip of the insulation without damaging the wire.

XHELI.com



EXCEED-RC BLUERAY

Length:660mm
Height:230mm
Main Blade Length:325mm
Main Rotor Diameter:700mm
Tail Rotor Diameter:150mm
Motor Pinion Gear:12T/13T
Tail Drive Gear:25T
Drive Gear
Ratio:1:12.5:4.24/1:11.5:4.24
Weight (w/o main blade):450g
Flying Weight:Approx.730~760g

Main Rotor Diameter: 630 MM Fiber Glass Blade
Tail Rotor Diameter: 145 MM
Overall Length: 610 MM
Overall Height: 195 MM
All-up Weight: 580g (battery included)
Battery: 11.1V 1200MAH LiPo Battery
Power: 400 Brushless Motor
ESC: 30A Speed Controller
Servo: 4 x 9g

EXCEED-RC G2

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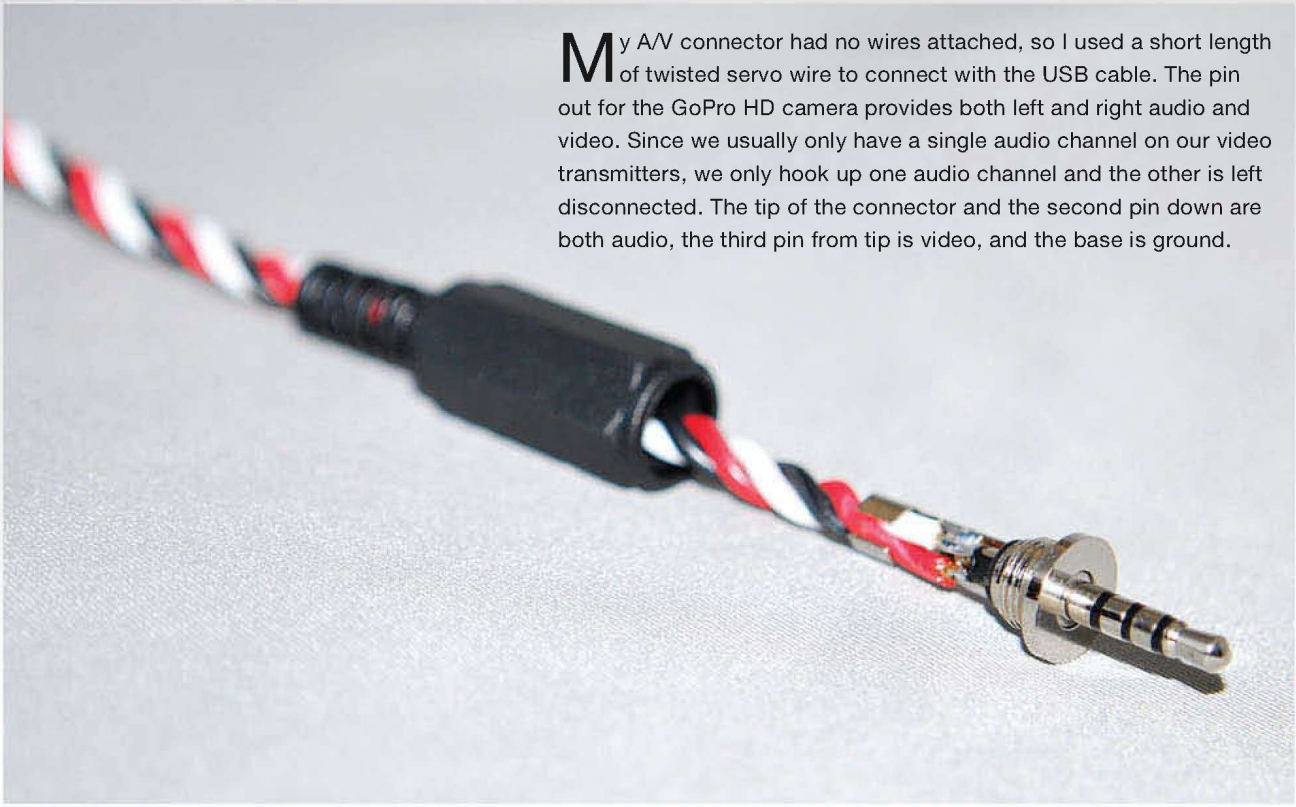
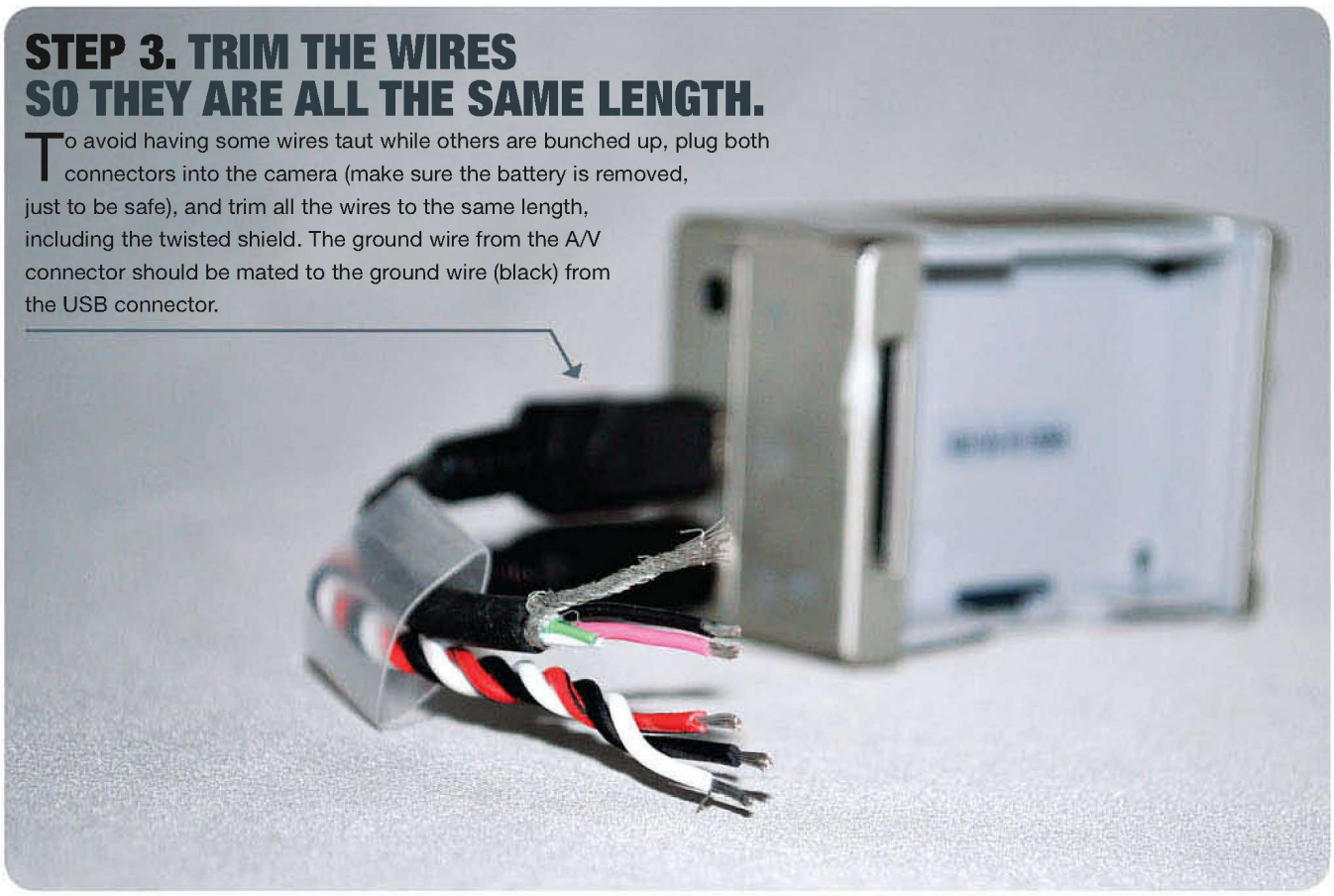
» STEP 2. PREPARE THE 2.5MM 4 PIN A/V CONNECTOR.

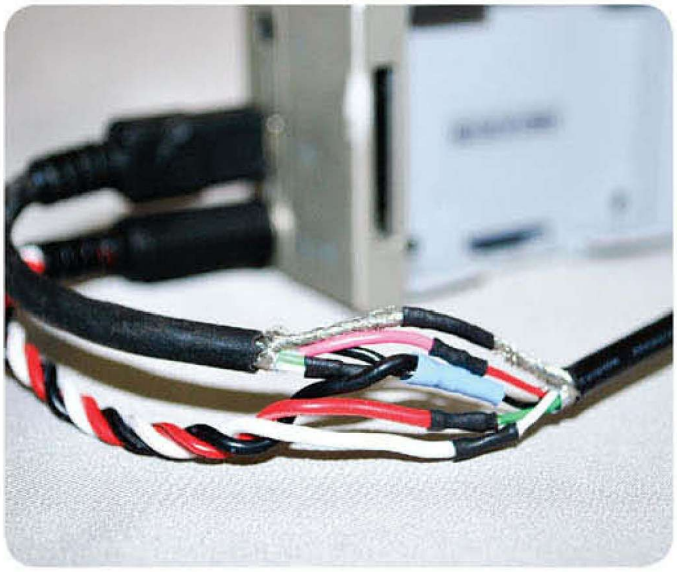


My A/V connector had no wires attached, so I used a short length of twisted servo wire to connect with the USB cable. The pin out for the GoPro HD camera provides both left and right audio and video. Since we usually only have a single audio channel on our video transmitters, we only hook up one audio channel and the other is left disconnected. The tip of the connector and the second pin down are both audio, the third pin from tip is video, and the base is ground.

STEP 3. TRIM THE WIRES SO THEY ARE ALL THE SAME LENGTH.

To avoid having some wires taut while others are bunched up, plug both connectors into the camera (make sure the battery is removed, just to be safe), and trim all the wires to the same length, including the twisted shield. The ground wire from the A/V connector should be mated to the ground wire (black) from the USB connector.



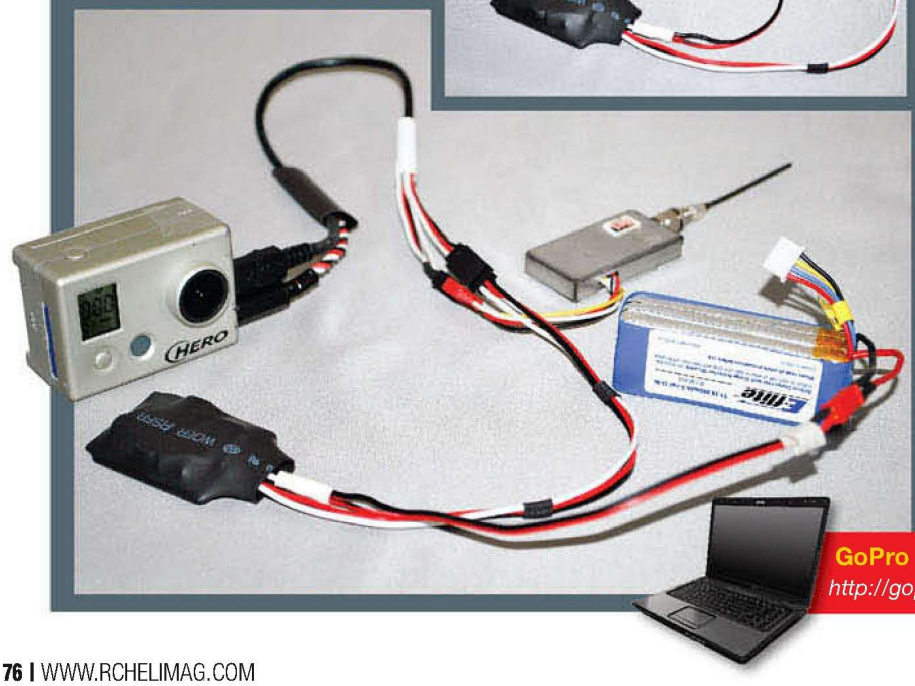


STEP 4. SOLDER THE USB CABLE TO THE WIRES

Trim off the outer insulation, twist the outer shielding together, and trim back the aluminum foil on a length of USB cable that is longer than what you expect to need. Strip the individual wires, including the white and green wires, which will now carry your video and audio signals. I try to always use the white wire for audio and the green for video to be consistent. Make sure to have short lengths of shrink tubing on the wires before you begin soldering, and solder them up in the following manner: red to red, black to black (ground from the 2.5mm in parallel with the ground from the mini-B USB), and white and green to their corresponding video and audio wires from the A/V connector. The twisted shield from the USB connector should be soldered to the twisted shield off the hacked USB cable. Slip a length of shrink tubing over the end of the USB cable that will cover everything, but wait until you have it all tested before you shrink it down.

STEP 5. HOOKING IT INTO YOUR SYSTEM

At the end of your USB cable where you want to make your connections, trim back the insulation and prepare the wires. Solder the red and black output wires from your 5 volt BEC to the red and black wires from the hacked USB cable (Note: These would normally be going to the servo connector on a BEC). At this point, you need to connect the twisted outer shield to the black ground wire, and also connect your ground wire for your video system to this joint. The green and white A/V wires should be connected into your wireless video system as needed. Most video transmitters are 12V, so your dedicated BEC for the GoPro will run directly off the same power source as your video system. Solder the input for the BEC in parallel with the main video power connector. I prefer to use a 4-pin Dean's connector between these types of harnesses and my video transmitters to keep things clean. This allows me to have power as well as video and audio all going to the video transmitter through one connector.



CONCLUSION

Tapping into the GoPro's live A/V out provides a really great picture with rich colors on the ground, even if its only in standard definition. You get to see the full HD recording after you fly, so you really aren't missing much. The GoPro is known to produce some degree of RF interference, so make sure you range check your system with the camera recording before you fly. Another factor is the known lag with the GoPro, its been tested to have a 67ms delay on the live A/V out, but this is still acceptable for FPV. For normal RC, a hot 3D pilot would get way out of whack with a 67 ms delay, and while things don't happen so fast in FPV, this is still a factor. It's also commonly accepted that the GoPro doesn't do too swell when the lighting gets dim or under heavy vibration situations, so there are limitations to consider. I like to use a video switcher with a basic CCD cam (which works much better in the dark and doesn't have any delay), so I've always got a backup. On a clear day when its really bright, the image on the ground from my GoPro is exactly what I'm looking for in my FPV experience. RCH

GoPro website for firmware update
http://gopro.com/support/hd-hero-firmware-update/

Good luck and happy HD flying.

bladehelis.com

THE BOLDEST BLADE YET

450 3D

LENGTH:	25.8 in (655mm)
FLYING WEIGHT:	26.9 oz (760 g)
ROTOR DIAMETER:	28.4 in (720mm)
MAIN MOTOR:	E-flite 420H brushless outrunner, 3800Kv (installed)
ESC:	E-flite 35A Pro S-BEC brushless (installed)
RECEIVER:	Spektrum AR6115e 2.4GHz DSMX (installed)
CYCLIC SERVOS:	E-flite DS76 Digital (3 installed)
TAIL SERVO:	E-flite DS76T Digital (installed)
GYRO:	E-flite G210HL micro heading lock MEMS gyro (installed)
BATTERY:	E-flite 3S 11.1V 2200mAh 30C Li-Po (included with RTF)
CHARGER:	E-flite DC 3S 11.1V Li-Po balancing (included with RTF)
TRANSMITTER:	Spektrum DX6i 2.4GHz DSMX™ 6-channel computer radio (included with RTF)

RTF BLH1600 | **BNF BASIC** BLH1650

The Blade® 450 3D is a completely new ready-to-fly heli design that lets you boldly fly aggressive, stick-slamming 3D maneuvers as soon as you can get it out of the box and charge the battery. The Blade development team set out to equip it with engineering and mechanics that rival anything you would find on more expensive machines that take hours to build. It even comes equipped with new cyclic and tail servos that were developed specifically for the hard 3D maneuvers it was designed to fly.

Blade 450 3D Advances Include:

- **NEW** rotor head mechanics and engineering
- **NEW** weighted tail blade screws that improve tail response
- **NEW** wider diameter tail boom for added stiffness and precision
- **NEW** E-flite® G210HL MEMS gyro for superior heading hold performance
- **NEW** E-flite DS76 digital cyclic servos for more precision and power
- **NEW** E-flite DS76T digital tail servo for faster response
- **NEW** E-flite 35A Pro S-BEC brushless speed controller for more power and efficiency
- **NEW** E-flite 3S 11.1V 2200mAh 30C Li-Po battery (included with RTF)
- **NEW** Spektrum™ DX6i DSMX™ 6-channel transmitter with two pre-programmed setups (included with RTF)

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Baby blue, now that is a man's color.

Outrage RC FUSION 50

Loaded with IONS

WORDS: Ryan Kephart | PHOTOS: Jason Boulanger

The Outrage Fusion 50 is new 50-size electric helicopter that began as a concept over two years ago. Outrage RC designed the Fusion to handle multiple battery pack sizes ranging from 6S to 12S. This gives the Fusion a wide range of flight performance for the beginner or advanced 3D pilot. Two versions of this kit are available—a flybared version with a programmable head, and a flybarless version. This month we'll take a look at the more complex flybared version and show you the details that Outrage RC is known for.

And the train kept a rollin all night long.

AT A GLANCE

SIZE:	50
POWER:	Electric
TYPE:	Pod & Boom
BUILD TYPE:	Kit
TAIL DRIVE:	Torque Tube

FEATURES

The Fusion 50 features a fully adjustable head, allowing multiple setups from high stability to maximum agility. The Fusion can also be programmed with a maximum collective travel of +15 / -15 degrees of pitch. The kit also includes a fully painted fiberglass canopy professionally done by Canomod.

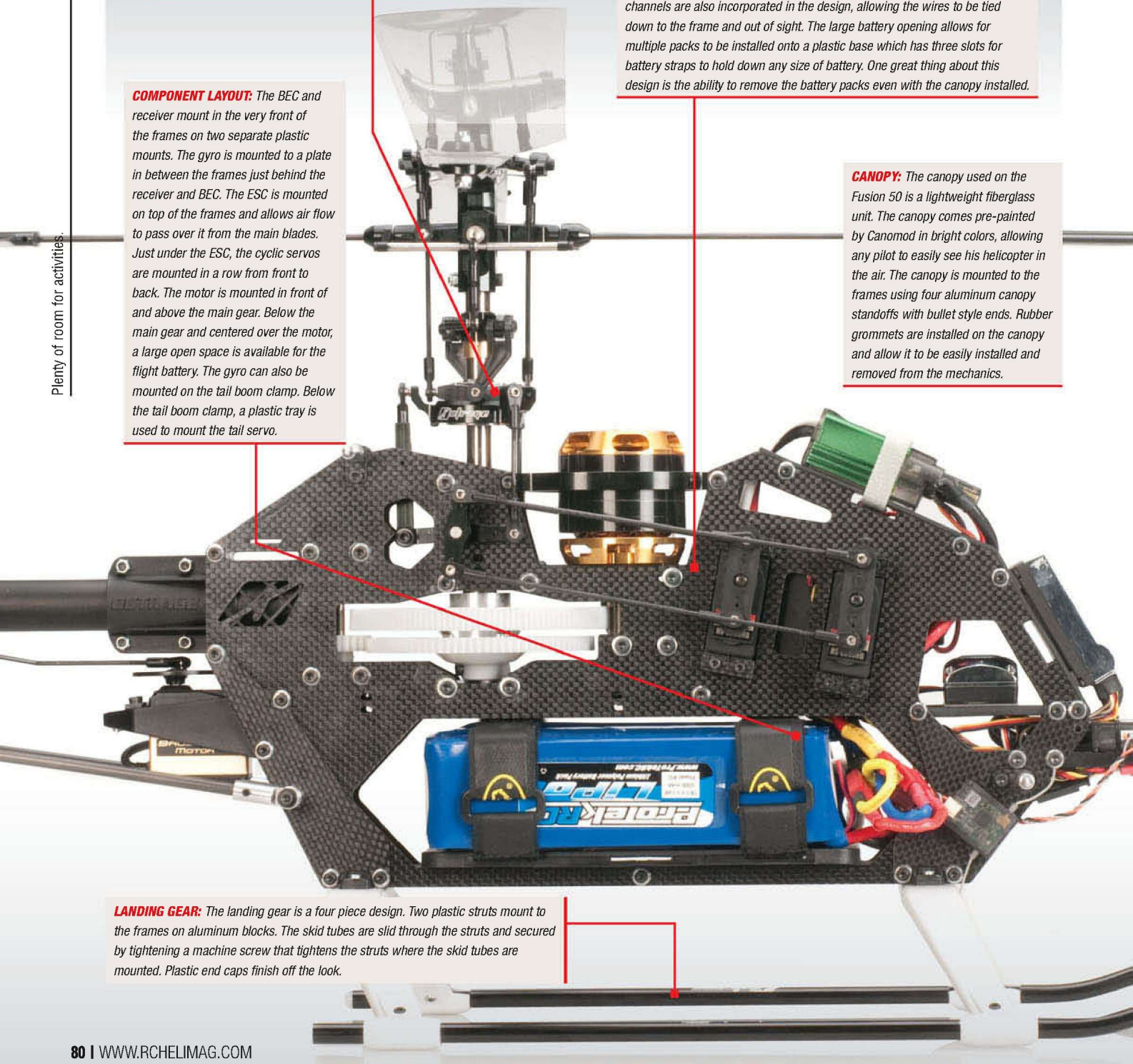
» MAIN **FRAME**

SWASH CONTROL: *The swash is controlled using a push-pull connection from the servos to aluminum bellcranks. The bellcranks are all dual ball bearing supported and machined so that the balls thread into them. From the bellcranks, a single pushrod is used to connect them to the swashplate.*

DESIGN: *Like many high end machines, the Outrage RC Fusion 50 is designed with a compact and slender look that is just barely wider than a standard sized servo. The design features two-piece carbon fiber plates that are machine cut and spaced by a mixture of plastic and aluminum spacers. Wire routing channels are also incorporated in the design, allowing the wires to be tied down to the frame and out of sight. The large battery opening allows for multiple packs to be installed onto a plastic base which has three slots for battery straps to hold down any size of battery. One great thing about this design is the ability to remove the battery packs even with the canopy installed.*

COMPONENT LAYOUT: *The BEC and receiver mount in the very front of the frames on two separate plastic mounts. The gyro is mounted to a plate in between the frames just behind the receiver and BEC. The ESC is mounted on top of the frames and allows air flow to pass over it from the main blades. Just under the ESC, the cyclic servos are mounted in a row from front to back. The motor is mounted in front of and above the main gear. Below the main gear and centered over the motor, a large open space is available for the flight battery. The gyro can also be mounted on the tail boom clamp. Below the tail boom clamp, a plastic tray is used to mount the tail servo.*

CANOPY: *The canopy used on the Fusion 50 is a lightweight fiberglass unit. The canopy comes pre-painted by Canomod in bright colors, allowing any pilot to easily see his helicopter in the air. The canopy is mounted to the frames using four aluminum canopy standoffs with bullet style ends. Rubber grommets are installed on the canopy and allow it to be easily installed and removed from the mechanics.*



LANDING GEAR: *The landing gear is a four piece design. Two plastic struts mount to the frames on aluminum blocks. The skid tubes are slid through the struts and secured by tightening a machine screw that tightens the struts where the skid tubes are mounted. Plastic end caps finish off the look.*

Plenty of room for activities.

» DRIVE TRAIN

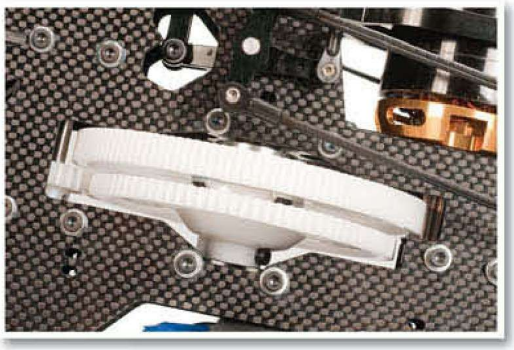
MOTOR MOUNT: The motor is mounted to a black anodized aluminum mount. The mount can be removed and adjusted for gear mesh. It's currently only available in smaller screw spacing, but Outrage should soon have an aftermarket mount for bigger motors. The mount is attached to the frames using four machine screws, but it's also attached to the main shaft bearing block. This locks down the mount and keeps the pinion aligned to the main gear.

PINION: Three pinions are included with the Fusion kit. Every pinion is designed for a 5mm motor shaft. The pinions are secured to the shaft using a single setscrew. 6mm pinions are also available for purchase. The pinion is also supported by a ball bearing support just below the main gear. This helps keep it aligned with the main gear during hard 3D maneuvers.

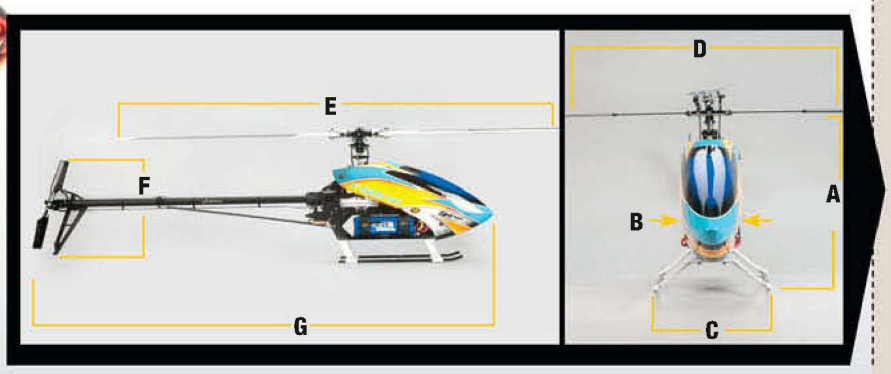
MAIN GEAR: The main gear is made from white plastic and molded with lightening holes. The teeth have a 0.8 module, which is a little tougher than the common .7 module gears we see. The main gear is attached to an aluminum hub using four screws.

AUTOROTATION DRIVE: The autorotation drive is located inside the main gear hub. A one-way bearing locks onto the main shaft for drive, and free spins when the engine is shut down.

TAIL DRIVE: The tail rotor is driven by a tail drive gear located just below the main gear. This gear is locked to the main shaft and allows the tail to be driven during an autorotation. The tail drive gear then drives a secondary gear system that ultimately drives the torque tube by means of a bevel gear.



> "The helicopter can be set up for a complete beginner or an all-out 3D whiz."



Outrage RC FUSION 50

MODEL SPECIFICATIONS

CLASS:	50 Electric
BUILD:	Kit
BLADE SIZE:	600-640mm
LEVEL:	Beginner - Advanced

FRAME

MATERIAL:	Carbon fiber
TYPE:	Two piece
SERVO TO SWASH LINKAGE:	Push-pull, bellcranks
SERVO SIZE:	Standard

ROTOR HEAD

GRIPS:	Aluminum
HEAD BLOCK:	Aluminum
LINKS:	Ball
SWASH:	Aluminum
CONTROL:	CCPM 120° or 140°

TAIL

DRIVE SYSTEM:	Torque tube
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Dual
TAIL BLADE GRIPS:	Aluminum
TAIL CASE:	Aluminum
BOOM STRUT MATERIAL:	Carbon with aluminum ends

GEARING

MAIN ROTOR TO PINION RATIO:	1:10.75, 9.21, 8.05
MAIN ROTOR TO TAIL RATIO:	1:4.58

WEIGHT

EMPTY:	6 lbs., 6 oz. (2880g)
FULLY LOADED:	9 lbs., 8 oz. (4309g)

DIMENSIONS

HEIGHT (A):	14.4 in (368mm)
CANOPY WIDTH (B):	4.25 in (108mm)
LANDING GEAR (C):	8.25 in (209mm)
PADDLE TO PADDLE DIA. (D):	21.75 in (552mm)
MAIN ROTOR (E):	(1355-1425mm)
TAIL ROTOR (F):	9.84 in. (250mm)
LENGTH (G):	47.5 in. (1207mm)

This is no cold fusion!

FEATURES CONTINUED

» TAIL & BOOM

TAIL CASE: *The tail case is comprised of a single piece of aluminum, machined to accommodate the bearing supports for the bevel gear, vertical tail fin, and mounting of the bellcrank base. Two aluminum side plates are then mounted to the tail case that sandwich the tail shaft and keep it in place.*

TAIL BLADE GRIPS: *Each blade grip has a total of two ball bearings and a thrust bearing. The grips attach to a steel hub using a single screw that threads into the hub. The grips are machined from aluminum with the pitch arms.*

PITCH ACTUATOR SYSTEM: *Below the boom and attached to the frames lies the tail servo. From the servo, a pre-bent push rod is feed through three plastic guides that lock down to the tail boom using a self-tapping screw. The pushrod is then connected to a dual bearing supported bellcrank assembly. The assembly then drives the tail pitch slider. The slider attaches to the blade grips using plastic links and a shouldered screw.*

BOOM: *The boom is anodized black and attached to the frames using a two piece plastic boom clamp. The boom is supported by two carbon rods with aluminum ends. The supports attach to the frame using anodized aluminum spacers that thread into an aluminum frame spacer. An aluminum tail boom clamp is attached to the boom using two machine screws. Two additional screws secure the horizontal tail fin to the boom clamp.*

» ROTOR HEAD

HEADBLOCK: *The head block is machined from aluminum and anodized black to match the rest of the head components. Ball bearings are installed onto the head block to help support the flybar seesaw. The head block is installed onto the main shaft using a single Jesus bolt that also serves as a clamp screw. The Fusion 50 comes with two sets of dampers to provide a soft feel for beginners and an agile feel for the 3D pilot.*

BELL/HILLER MIXER: *The Bell/Hiller arms are mounted to the pitch arms of the main blade grips. The arms are dual ball bearing supported and offer multiple mixing options. Three input options are available from the swashplate linkage, and two from the flybar linkage. The linkage balls on the seesaw also can be installed on three different settings.*

PHASING: *Two steel pins are press fit into the head block and are not adjustable. The washout base has two machined channels that slide on these pins without any noticeable slop.*

WASHOUT ARMS: *The washout arms are machined from aluminum and mount to a longer washout base. The longer base provides additional support and minimal slop. The arms are dual ball bearing supported. Two output options are available. The radius arms are attached to the arms using two machine screws each. The links are also dual ball bearing supported.*

Multiple mounting positions for the ESC and gyro.

INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX: Much like the bigger Outrage Velocity 90, the Fusion's box is a work of art on the inside and out. Opening the box you will find several individual boxes, including the separate foam-lined canopy box. In another box you'll find the boom, flybar, tail pushrod, and torque tube. In the final box you'll find the parts neatly organized in a foam holder that cradles each part in its own enclosure.

MANUAL AND BUILD

Building the Fusion 50 is almost exactly like building any other Outrage helicopter. The manual does a perfect job displaying the parts and hardware locations. To back up the pictures, Outrage has detailed text to support the separate installations. Overall, the build was smooth except for a few modifications needed to accommodate the larger motor, as the larger motor mount was not available at the time of this build.

Outrage RC
FUSION 50
RTF & TEST GEAR

TEST GEAR

RADIO: Spektrum, DX-8, SPMR8800, $350

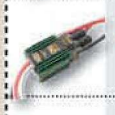
RECEIVER: Spektrum, AR7610, SPMAR7610, 0.31 oz. (8.9g), $120

CYCLIC SERVOS: Hitec, HS-6965HB, Discontinued, 1.83 oz. (52g), $85

TAIL SERVO: Futaba, S9256, S9256, 2.0 oz. (57g), $included w/ gyro

GYRO SYSTEM: Futaba, GY611, GY611, 2.24 oz. (63g), $355

MOTOR: Scorpion, HK-4225-610 HK-4225-610, 13.76 oz. (390g), $350

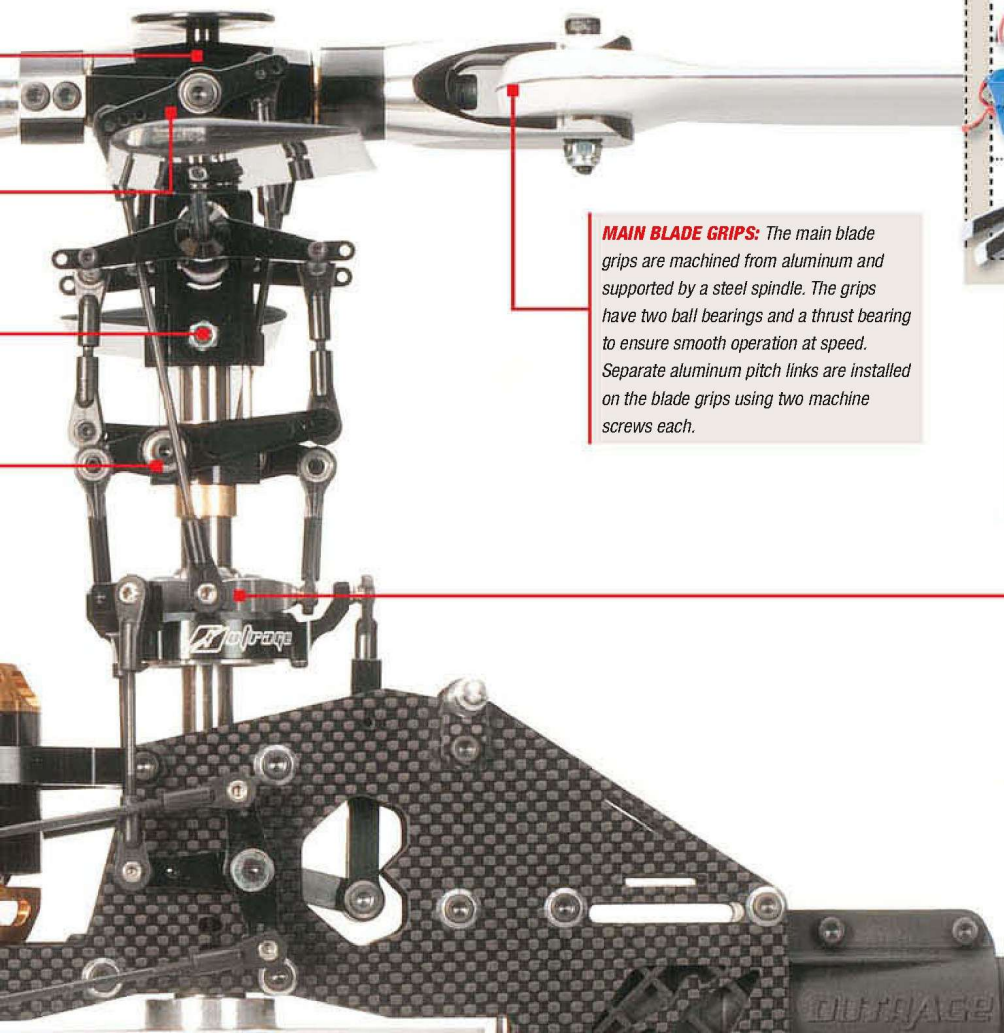


ESC: Castle Creations, Phoenix ICE HV80, 010-0075-00 , 2.1 oz. (60g), $162

BATTERY: Protek, 5S 5000mah 45C, PTK-LP-5000-5S45, 24.8 oz. (705g), $165

MAIN BLADES: Mavrikk, 600mm G5 Pro, 802259, $90

This kit comes in a flybar, or flybarless version.



MAIN BLADE GRIPS: *The main blade grips are machined from aluminum and supported by a steel spindle. The grips have two ball bearings and a thrust bearing to ensure smooth operation at speed. Separate aluminum pitch links are installed on the blade grips using two machine screws each.*

SWASHPLATE: *The swashplate is dual ball raced and provides smooth operation. The swash can be set up for 120 or 140-degree CCPM operation. The swash is also fully serviceable by the removal of the bottom bearing which is held in place by three tiny machine screws.*

TESTING

When this helicopter was designed, the big brushless motors were commonly seen with 5mm shafts. Since then, motors have been outfitted with 6mm shafts. Outrage RC includes all the hardware and components needed, including three pinions for a 5mm shaft motor. We opted to use the more common 6mm shaft motor, which required bigger pinions and a bigger pinion support. Outrage RC also designed these parts for the Fusion and can be purchased separately.

HOVERING • With the recommended advanced settings for 3D, the Fusion 50 was very nimble on the sticks. This resulted in an agile hover that seemed a bit too sensitive for the normal pilot. I added some expo and gave it another try. I found that 15 percent was just about right, and allowed the Fusion to remain sensitive enough for 3D while having a softer feel towards center for precision hovering. Overall, the Fusion 50 hovers well and with the adjustable head you can really make this helicopter stable.
Rating: 4

FORWARD FLIGHT • The Fusion 50 is not the fastest 50 sized electric helicopter I have flown, but it gets the job done. I noticed a slight attitude change when really nosing the helicopter over and maximizing forward speed, but it was easily manageable with a little forward cyclic pressure. Overall, the forward flight felt good and tracked well right to left, but just needed a little tweaking of the mixing ratios to eliminate the pitch changes.
Rating: 3.5

CYCLIC PITCH RESPONSE • With the recommended settings for 3D, the cyclic pitch response was more than antiquate for the job at hand. I set up the helicopter originally with a 14-tooth pinion, which gave me a maximum headspeed of 2000 RPM, which is slower than most 50-size electrics today. Even with this lower headspeed, the Fusion 50 really responded quickly and aggressively. With the mixing ratios set to a stable feel, the Fusion was transformed into a smooth flying and docile FAI machine, perfect for a beginner looking for a larger, more stable machine.
Rating: 5

COLLECTIVE PITCH RESPONSE • The collective pitch mechanism on the Fusion 50 has a total pitch range of 30 degrees. We used a maximum amount of pitch to establish the most aggressive feel on the collective. The Fusion 50 has an aggressive feel with good collective pop. Although we had a lower headspeed due to the smaller size pinion, the Fusion reacted well and allowed aggressive 3D.
Rating: 4

TAIL ROTOR RESPONSE • The tail rotor had plenty of authority for any aerobatic maneuver in the book. Piro speed was consistent throughout any maneuver, and it also held well during tail slides. Quick starts and stops were crisp and accurate. I was very satisfied with the tail performance.
Rating: 5

AUTOROTATION CAPABILITIES • The Fusion perform autorotations well considering the weight of the helicopter. Using larger sized blades, the Fusion would autorotate much better. The autorotation drive was smooth and allowed the rotor head to retain enough energy to float at the bottom of the autorotation.
Rating: 5

POST FLIGHT INSPECTION • Upon inspecting the helicopter, I was pleased to find that every part was an excellent condition without any abnormal wear. The only suggestion I have for the Fusion 50 is to run a headspeed of 2200 or greater. This will allow the collective to have an even snappier feel, as well as increasing cyclic response.
Rating: 5

I am working on the rail road!

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TESTING SPECS

Outrage RC **FUSION 50**

Part #: KR50F01
Distributor: Heli Direct
Web: www.helidrirect.com

Street Price: $399.95
Price as Tested: $2412.00
Build/Setup Time: 14 hours

PERFORMANCE

MODE FLOWN:	Normal, idle up 1, idle up 2
RPM OF EACH MODE:	Normal: 1800 Idle Up 1: 1900 Idle Up 2: 2094
MOTOR TEMP (after flight):	120° F
BATTERY TEMP (after flight):	102° F
FLIGHT TIME:	5-8 min
CRASH COST*:	$49

** includes main shaft, tail boom, spindle, landing gear, flybar, torque tube*

TEST CONDITIONS

WEATHER:	Sunny
TEMP / HUMIDITY:	75° F/14%
BAROMETRIC PRESSURE:	29.92 in.
WIND SPEED:	6 mph
VISIBILITY:	10 miles
ALTITUDE:	725 feet

PITCH CURVES

NORMAL:	-4, 0, 15
IDLE-UP 1:	-15, 0, 15
IDLE-UP 2:	-15, 0, 15

REQUIRED TO FLY

Radio transmitter, receiver, speed control, 2 5S 5000mah batteries, battery charger, 3 matching cyclic servos, gyro, tail servo, BEC, 600-640mm blades.

WHO'S IT FOR?

The Fusion 50 is a perfect helicopter for both beginner and advanced pilots due to the programmable head. The Fusion can even be setup for FAI style flight. If you are looking for a 50-size helicopter that can take you all the way to the top, this one just might be it.

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

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

THE GOOD

- Unique battery mounting
- Quick battery changes
- Sleek design

THE BAD

- Battery tray seems a bit flimsy

CONCLUSION

The Fusion 50 is a solid helicopter with a good design. It utilizes the same programmable head as the Velocity, which we have all come to love. The helicopter can be set up for a complete beginner or an all-out 3D whiz. The build was fun and challenging, flight performance was on par, and the helicopter looks amazing both on the ground and in the air. What more could you want? RCH

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RC Heli magazine

Understanding the TENNIS RACKET EFFECT

Counterbalance weights are in effect

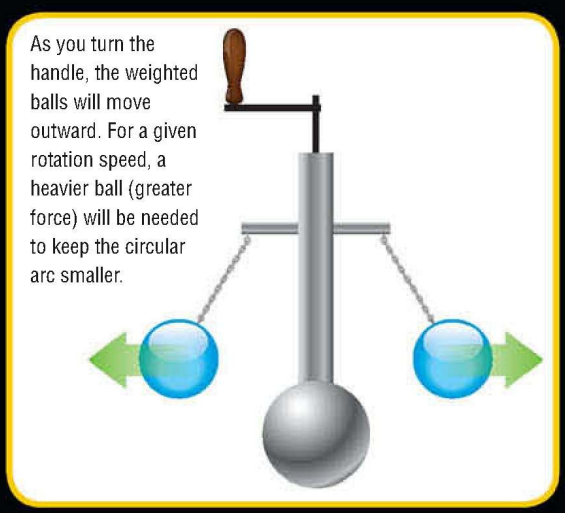
WORDS: Arthur Koral | **ILLUSTRATIONS:** Dave Palacios

ONE OF THE GREATEST THINGS ABOUT THIS HOBBY IS FIGURING OUT NEW AND IMPROVED WAYS TO ENHANCE PERFORMANCE. One modification that has caught the attention of many RC Heli enthusiasts is the addition of weights to the blade grips to counterbalance a phenomenon referred to as the "Tennis Racket Effect." Recently manufactures have also caught on to this and are including this style tail blade grip on their helicopters. In this issue of RC Heli magazine, we're going to explain the physics of the Tennis Racket Effect and how to overcome it by using counterbalance weights.

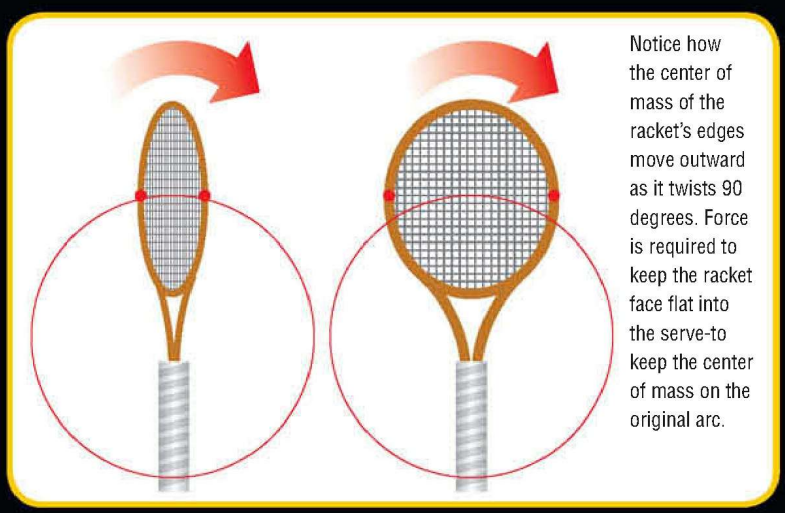
I suddenly hear grunting noises.

WHAT IS THE TENNIS RACKET EFFECT?

The term Tennis Racket Effect literally comes from forces felt by your hand from a tennis racket when you make an overhead serve. The tennis racket will want to align its edge facing the ball instead of its face. This will cause a torque felt by your hand to keep the racket face in the direction of the serve. So why does this happen? Basically, the same reason a flywheel works, and the same reason you feel a strong rather than gradual force when you make a hard turn in your car. Centripetal force causes an object to maintain a circular path. To bring an object into an even smaller circular path from a larger one requires greater force. Due to the geometry and the center of mass of the tennis racket edge, it will always want to align itself on the largest arc.



As you turn the handle, the weighted balls will move outward. For a given rotation speed, a heavier ball (greater force) will be needed to keep the circular arc smaller.

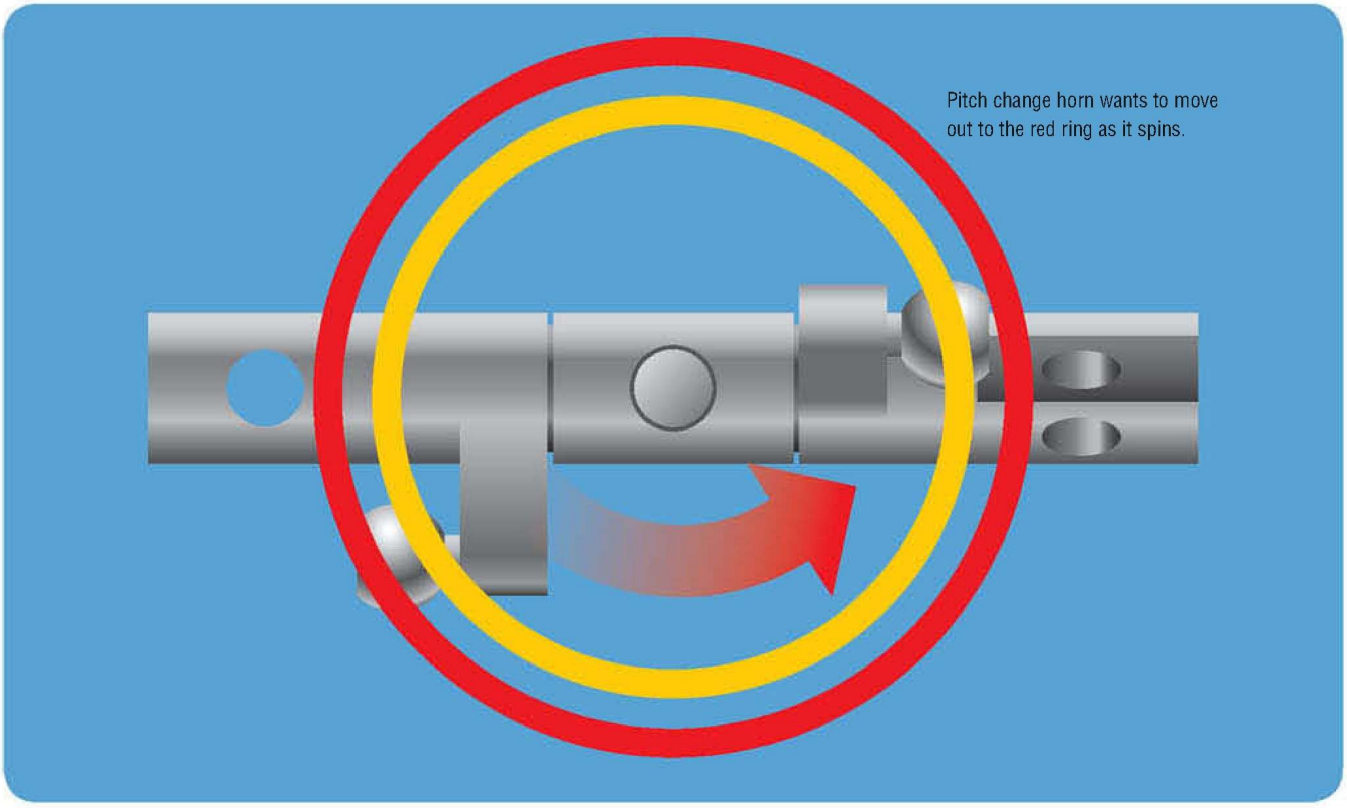


Notice how the center of mass of the racket's edges move outward as it twists 90 degrees. Force is required to keep the racket face flat into the serve-to keep the center of mass on the original arc.

HOW DOES THE TENNIS RACKET EFFECT OUR BLADE GRIPS?

In the case of RC helis, we have the weight of the servo pitch change horn that extends from the bottom edge of the blade grips. The pitch change arm will always want to move outward toward zero pitch angles due to the Tennis Racket Effect. This force creates load on the servo arm when it tries to move the blade pitch from zero degrees. In the case of all helicopter blade grips (tail rotor and main blade), they are always at pitch settings other than zero; thus, a load is constantly placed on the servos due to the centripetal force required to keep the pitch change links at a given arc.

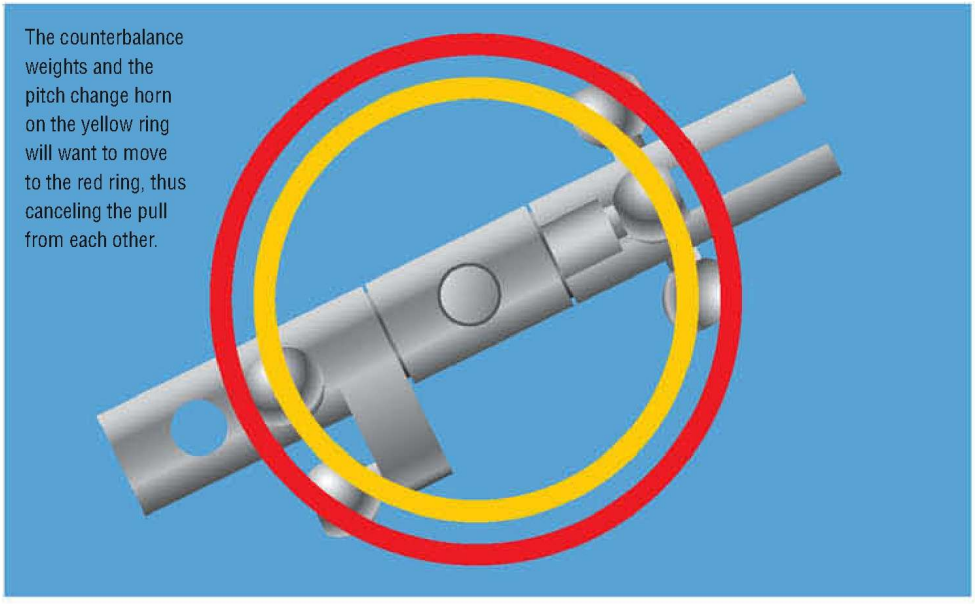
The rings show the path taken by the center of mass of the pitch change horns. This picture shows one grip horn at 0 pitch on the red ring, and the other grip horn off zero degrees on the yellow ring. As the grips spin around, the balls will want to move out to or remain at the red ring. Any pitch angle changes away from the red ring will require greater force from the servo to get there.



It is kind of like how we feel in a pool (almost weightless).

HOW IS THE TENNIS RACKET EFFECT OVERCOME?

A simple way to overcome Tennis Racket Effect is by the addition of weights 90 degrees off axis. Each weight will want to move outward, thus canceling each other out as they are all mounted on the same grip.



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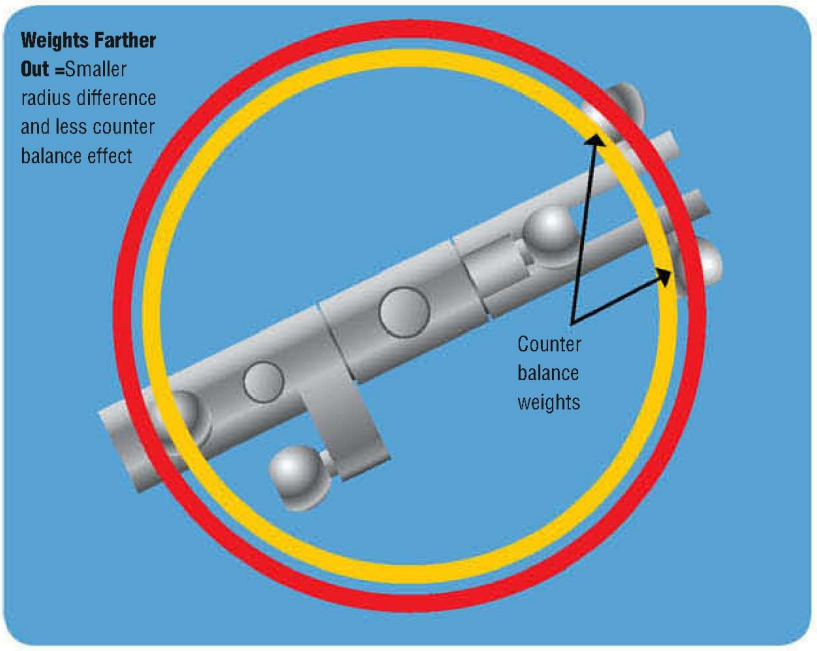

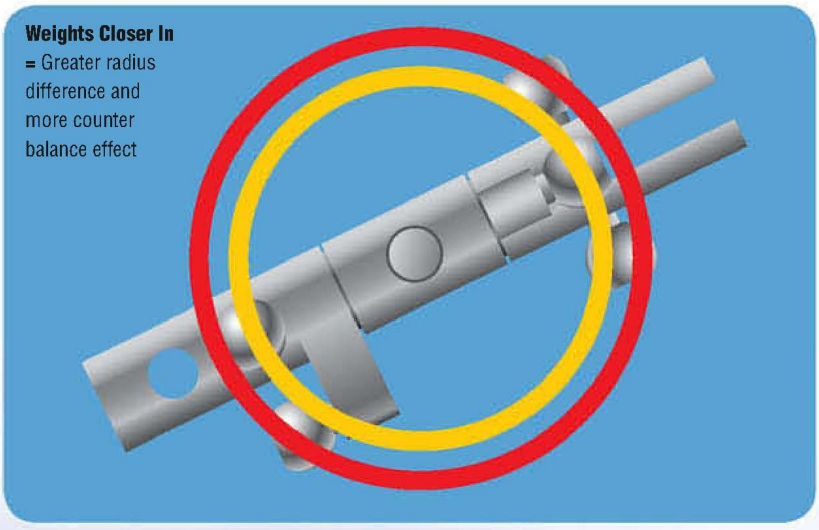

WHERE SHOULD I INSTALL THE COUNTERBALANCE WEIGHTS?

Weight placement determines the amount of impact a given weight will have in countering the Tennis Racket Effect. The largest counterbalance impact will occur when the added weights can travel the greatest distance when the grip swivels. If a small change in radius occurs, the counterbalance effect will be smaller. The preferred location is closest to the hub. Simply placing longer, blade-retaining bolts with weights at the end will not have nearly the impact as placing those same weights closer to the hub.

Notice in the first illustration that where counterbalance weights are mounted farthest from the hub, a small difference in radius exists between the red ring and the yellow ring when the grip is at 0-degree pitch and 90-degree pitch. This mounting position offers less counterbalance effect.

Notice in the second illustration that where counterbalance weights are mounted close to the hub, a large difference in radius exists between the red ring and the yellow ring when the grip is at 0-degree pitch and 90-degree pitch. This mounting position offers more counterbalance effect.

CONCLUSION

This modification isn't a new idea. Some RC helicopter designs already take advantage of counterbalance weights as well as many full-sized helicopters. For those of us who don't have this design built into our machines, it's a worthwhile modification to consider. The biggest benefit is the reduced load on the servos. When it comes to micro helicopter, where servos and gyros seem to work a bit harder in keeping the tail under control, this modification may improve your helicopter's tail-holding power. A smaller servo with lower torque may offer the same performance as a larger, heavier one due to the reduced workload, thus saving weight and increasing overall performance.

Gotta love physics!

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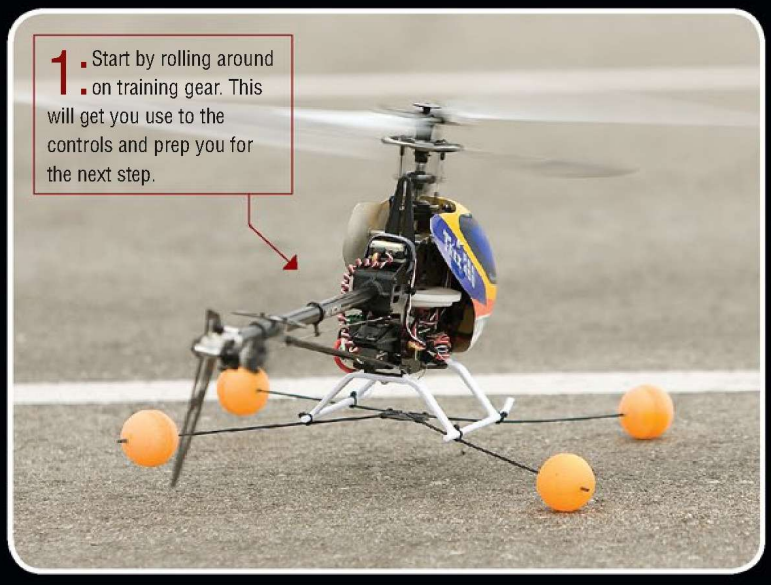
FIRST FLIGHT

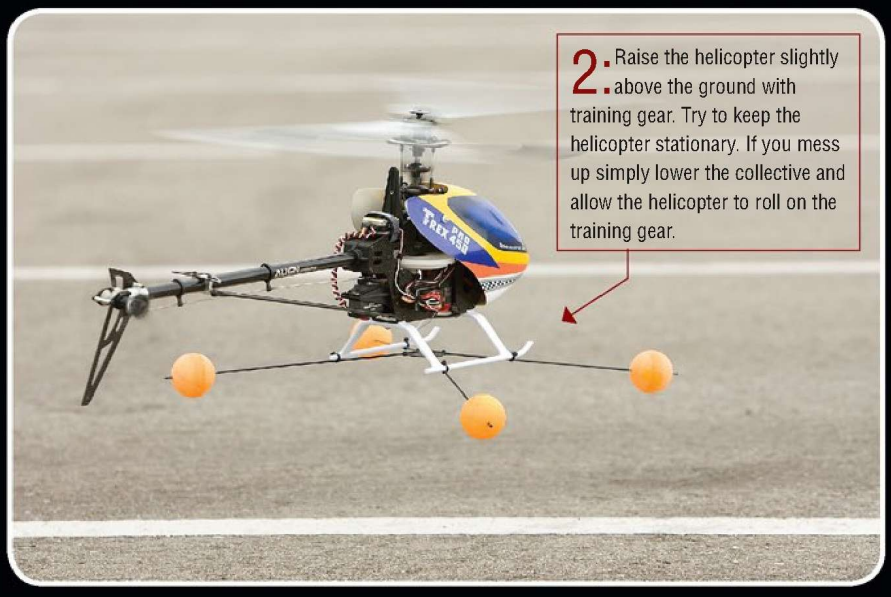
We All Have to Start Sometime.

WORDS: Ryan Kephart

Four steps to freedom.

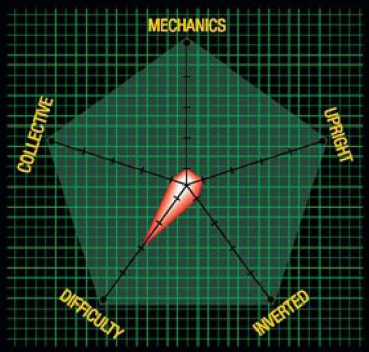
Every inspiring pilot has to accomplish the inevitable first flight. This Beginner Pilot Skills is devoted to just that. We'll guide you on your first steps to becoming an RC helicopter pilot, including what to expect, what to watch out for, and some great tips to make your first flight a successful one.





» 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.

Flight School Training

BASIC SETUP:

Being a new pilot, often times we start with a new helicopter. If you have done your research, you've probably selected a smaller, more affordable helicopter to start your training process. The first helicopter you fly should be a hobby grade product with parts readily available. This doesn't mean that you have to start off with a counter rotator or fixed pitched helicopter. If you chose a standard kit helicopter that is not a ready-to-fly, the setup can be quite tricky for a first time builder. For this style I suggest getting with a local helicopter pilot or the sales person you purchased your helicopter from. If you bought your helicopter online, you can get some pointers and have your questions answered on forums such as ours at: ***www.rchelimag.com***

HOW TO PREPARE:

Preparing for your first flight will test your building skills and nerves. Understanding how a helicopter works is your first step to a successful first flight. Study each control and pretend that you're actually flying the model. You can even run imaginary scenarios through your head and try to understand how you would react to them. It's these scenarios that will prepare you

the most. You can even have an assistant hold the helicopter in the air and go through the movements before even powering on the helicopter.

If you choose a small indoor helicopter, you'll also want to prepare your flying area by making a nice clear open space that you can fly in. This could be a bare garage or a large living room with any clutter removed from the center of the room. If you chose an outside helicopter, make sure that you select a location that is away from trees and other obstacles. You'll also want to wait for a calm day so that wind is not an additional difficulty factor.

TIMING IS KEY:

Being a first time pilot, there will be plenty of things to look out for. The first is to watch out for the wind if you are outside. Wind can cause the helicopter to move around more, causing the pilot to add additional inputs to keep the helicopter stationary. This can cause the first time pilot to overreact or simply lock up and let the helicopter fly too far away. The second thing to watch out for is ground effect. Although you are learning and tend to stay as low to the ground as possible, ground effect will have an effect on your helicopter. Ground effect will cause your helicopter to oscillate and feel as if you are trying to balance the helicopter on a ball. To combat ground effect, we use a training tool called training skids. This can be constructed using wooden or carbon dowels and ping pong balls. This extends the landing gear and prevents the helicopter from tipping over.

CONCLUSION

With a little patience and perseverance you will be off to a good start. The one great thing about this hobby is the ability to learn something new everyday. It will keep you entertained, and mentally challenged (in a good way) for a very long time. So don't give up now, I know it is a challenge, but the first step is always the hardest. Good luck and happy flying. RCH

BLADE STOP AUTO

Dangerous is my Middle Name!

WORDS: Ryan Kephart

ONE OF THE EASIEST MOVES CONCEPTUALLY—but quite possibly the hardest move to pull off in real flight—is the blade stop auto. If you don't believe me, jump on your computer and take a look at a few videos. You will see many attempts go horribly wrong. Professional pilots are pushing their helicopters and skills to the edge, and one way to express this is by performing a blade stop auto.

The blade stop auto is exactly how it sounds. The move involves taking your helicopter up, shutting the motor off, stopping the blades, and then regaining sufficient headspeed to make it back to the ground in one piece. Last year at the IRCHA Jamboree, several pilots performed numerous blade stopping autorotations in one shot. With the help of flybarless systems, blade stopping autos are becoming easier as more energy and less drag is introduced to the rotor system.

Flight School Training

HOW TO PREPARE FOR:

- Be very, very confident in your ability to autorotate. Practice and practice until you are completely confident in your abilities to recover from any attitude. You'll also want to practice inverted autorotations, as the blade stop auto can flip your helicopter over and you will have to recover from an inverted position.
- Secure your blades tightly to prevent them from folding when they slow down. This can prevent a boom strike from happening.
- Do not go all out on your first attempt. You'll want to gradually progress until you can see the individual blades in the air. Practice slowing down your autorotations first and allow your head speed to drop gradually with each attempt. This will prep your collective management.
- You don't want to stop your blades completely in this maneuver. Being able to see the blades is still considered a blade stop auto. It's much harder to recover from the maneuver if your blades are completely stopped as compared to a slight rotation to begin with.

THINGS TO LOOK OUT FOR:

- If your blades stop completely, put your collective stick in the center position and attempt to re-engage your engine (nitro) or restart your motor (if you're flying electric). If you tightened your blades enough, you should be able to spool back up without hitting the boom. This may wear out your clutch if you try to bail out too many times, so keep an eye on the clutch liner by removing the clutch and inspecting it.
- Keep this maneuver as far away as possible from any spectators or obstacles. Things can get out of control, and you don't want to try and restart your helicopter and regain control over people's heads.
- If for some reason you cannot restart your helicopter, the second best option is to fly your helicopter all the way down to the ground. In other words, don't just give up. Keep your wits about you, keep working the controls to the best of your ability, and you may save it after all!
- Don't jam full negative collective when you start seeing your blades. This can cause the rotor head to slow even more. Instead, gradually lower the collective to regain your headspeed.

1 Climb to a high altitude and maintain a steady hover with the nose pointed into the wind.

2 When ready, hit the throttle hold and drop your collective stick to slightly below center stick.

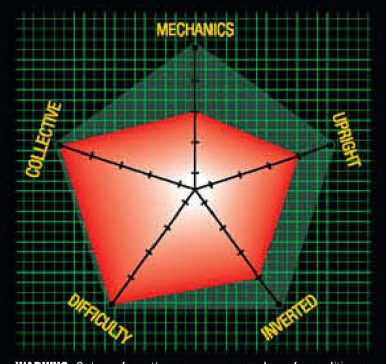
3 During the decent, make sure to keep your helicopter as level as possible and start raising the collective until the helicopter starts to slow down.

4 Keep your collective stick slightly above half stick. You don't want to slow down the blades too quickly; you'll only want the blades to slow down enough to visually see them.

5 As soon as you see the individual blades, slowly drop the collective until you're about half way between center and the bottom position.

» 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.

CONCLUSION

If one word were used to describe the blade stop auto, it would be "unpredictable". Often times you'll even see the pros mess this maneuver up, but one thing separates you from them—the cost of parts. Remember, they're sponsored and usually get their parts either free or for a discounted price. So keep it safe and don't push yourself too much, as one mistake can lead to a total re-kit. RCH

Load up the Jet Jeep hun, I'm going camping!

American Helicopter XH-26

Jet Jeep

WORDS: Ryan Kephart

The XH-26 Jet Jeep—otherwise known as the XA-8 -was an experimental helicopter developed by the American Helicopter Division of the Fairchild Engine and Airplane Corporation. The project was created for a special need to meet the U.S. Army and USAF request for a collapsible and air-droppable observation helicopter. The Jet Jeep was one of the first attempts to accomplish this role.

SPECS

CREW: 1
LENGTH: 12 ft. 0 in. (3.73m)
MAIN ROTOR DIAMETER: 27 ft. 0 in. (8.23m)
HEIGHT: 6 ft. 2 in. (1.88m)
EMPTY WEIGHT: 298 lbs. (135kg)
GROSS WEIGHT: 705 lbs. (320kg)
POWERPLANT: 2 x American Helicopter XPJ49-AH-3 pulsejet, 35 lbf (0.2kn) each

PERFORMANCE

MAX SPEED: 84 mph (135km/h)
SERVICE CEILING: 7000 ft. (2134m)

DESIGN

American Helicopter named the "Jet Jeep" because it was designed with the same sort of every day usability of a Jeep, but in the air. The helicopter could be transported by a Jeep and even use the same fuel. The design of the Jet Jeep was constructed from the beginning to be collapsible and handle being delivered by air drop.

To further enhance the design, the Jet Jeep had to be easily assembled with a regular set of tools by a two-man team. When collapsed, the helicopter could be carried in a 5x5x14' container, air transported to a location, and assembled in less than 30 minutes.

Most of the Jet Jeep was constructed from lightweight aluminum except for the aft fuselage, which was created using laminated fiberglass. To keep the weight down and the design simple, the Jet Jeep was outfitted with two 6.75-inch pulse jet engines in each rotor blade tip. These engines weighed just 16 pounds each and could produce 35 pounds of thrust. The rotor-mounted pulse jets were designed to be started using an internal compressed air system. The pulse jet engines did not require a warm up procedure, which allowed the Jet Jeep to be in the air in just 30 seconds. The pulse jets also produce less torque in the main rotor, which allowed the helicopter to fly using a small belt driven tail rotor that was mainly used for directional control.

TESTING

The construction of the XH-26 began in 1951 and by the same time the following year the first prototype was flown. Five prototype Jet Jeeps were constructed and evaluated by the Army and USAF. The helicopter proved to be quite capable, as it could reach a top speed of 80mph with a ceiling of 7000 feet. Unfortunately the project was scrapped as soon as the armed forces heard the roar of the two pulse jet engines. The military was looking for a quieter option that could be used for observation.

CONCLUSION

The Jet Jeep of the past is much like todays single person kit helicopters like the Mesquito. I think I might want one. RCH

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