8 PAGES OF ÜBER NEW STUFF!

RC Heli

THE WORLD'S BEST-SELLING RC HELICOPTER MAGAZINE

FAST & FURIOUS

Miniature Aircraft USA's X-Cell Fury 55

TESTED:

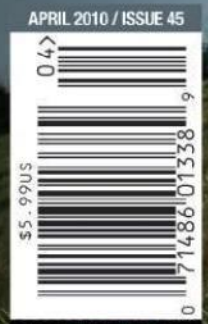
- » ESKY BELT CP CX
- » JR X9503 2.4
- » CY MINI-G GYRO

HOW-TO:

- Rebuild Your 2-Stroke
- Set Up For 3D
- Save Yourself From A Crash
- Fly Sideways

BECOME A SERVO PRO

APRIL 2010 / ISSUE 45



www.RCHELIMAG.com

THINK omnimedia

E-FEST 2010

INDOOR AT ITS BEST

HOOK-UP YOUR VELOCITY 50

Eric Brandenburg Shows You How

Thunder Tiger

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Raptor 50 2.4GHz Ready-To-Fly

Specifications:

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Total Height:	15.74"
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High performance tuned pipe

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TG-7000
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ACE8070

DS0606
Digital rudder servo
ACE8130

TRS601DD
2.4GHz 6CH Receiver
ACEAQ2257

FEATURES:

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- 2.4GHz programmable radio system with pitch control, idle up, and throttle hold
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- CNC rotor head and hardened main shaft
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Elevator push-pull control system

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Pre-painted Fiberglass Ca

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Size: 1.57"x0.79"x1.52" Weight: 2.15 oz

BL 9088 BL 9080

7.4 VOLT RATED (2 CELL LIPOS)

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Speed / Torque

6.0 v : 0.05 / 63.48 oz

7.4 v : 0.04 / 78.53 oz

8.4 v : 0.03 / 91.64 oz

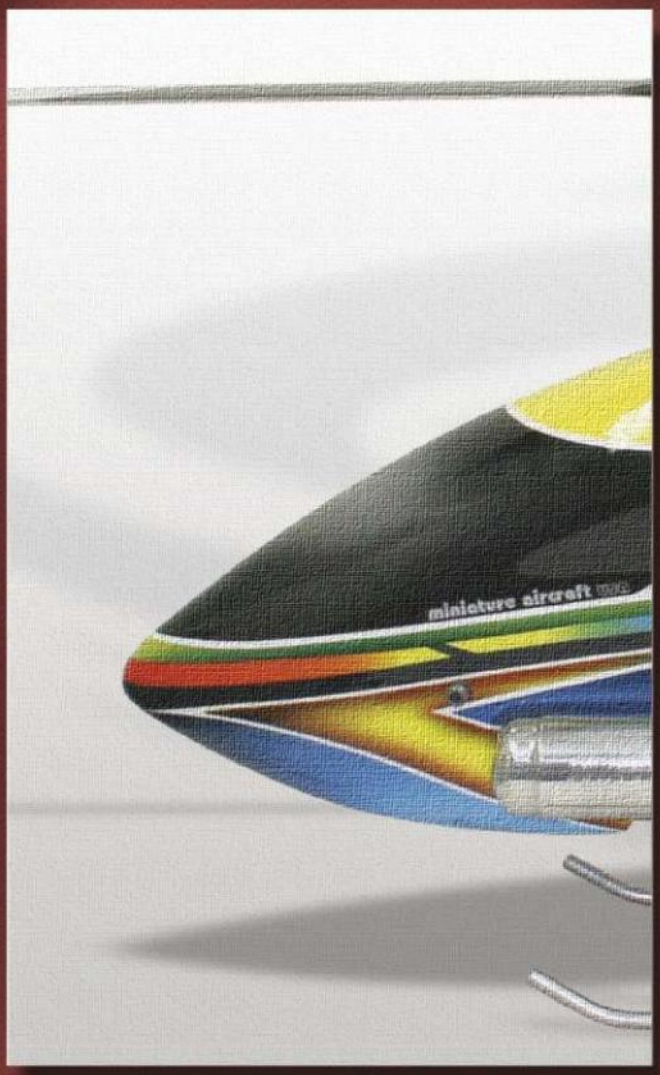
BL 9080 CYCLIC Servo

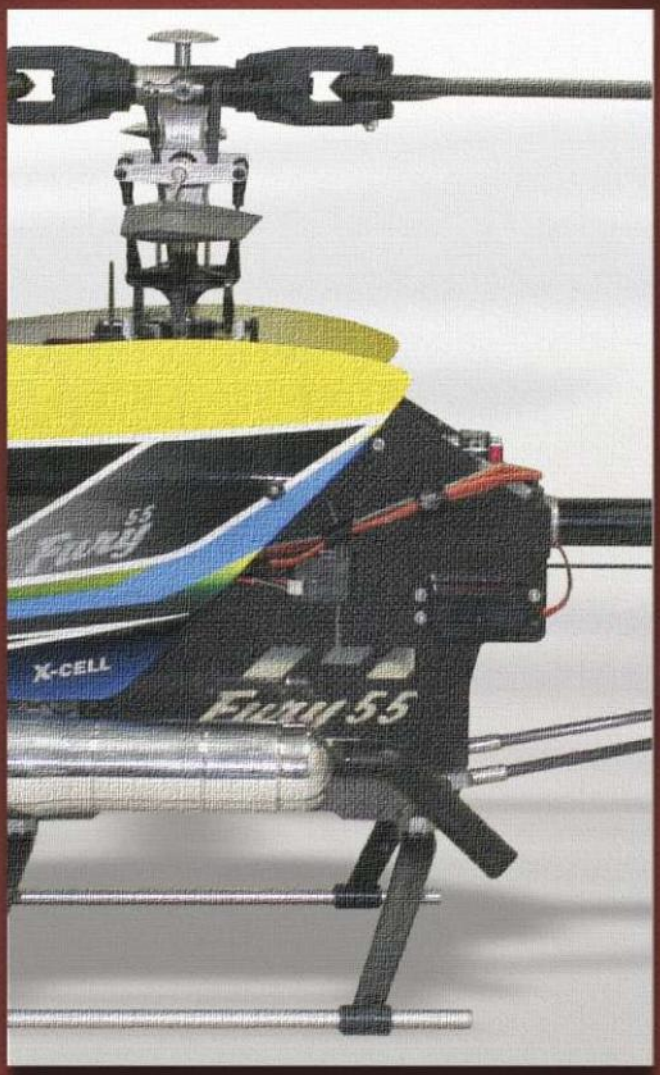
Speed / Torque

6.0 v : 0.07 / 88.32 oz

7.4 v : 0.06 / 112.35 oz

8.4 v : 0.05 / 132.86 oz





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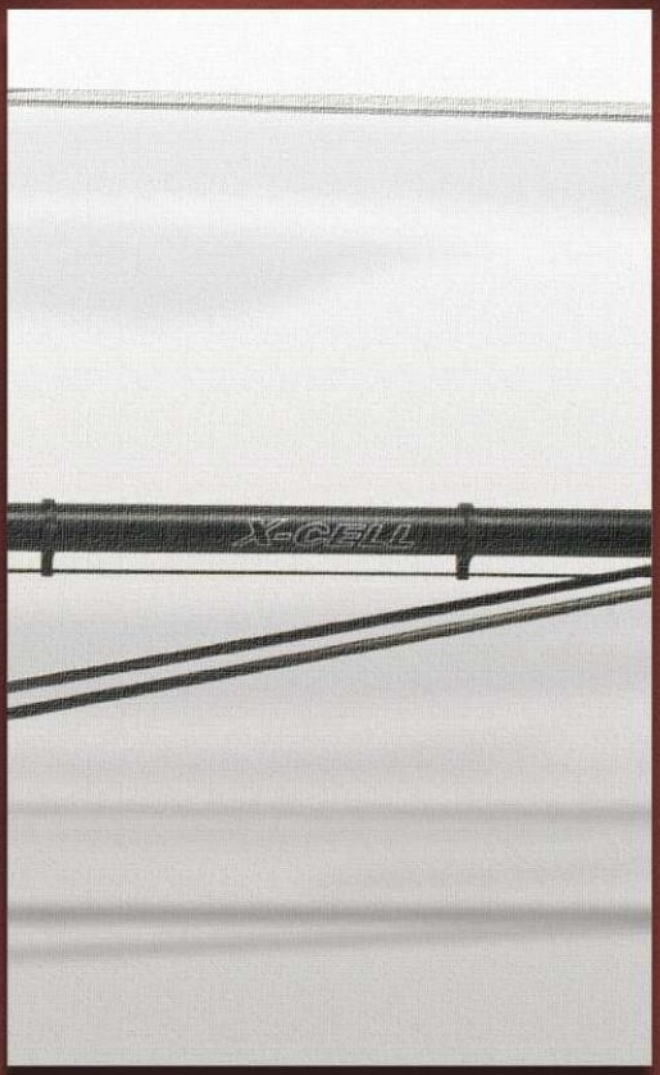
STEP UP TO EXCELLENCE WITH X-CELL



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CONTENTS

APRIL 2010 / ISSUE FORTY-FIVE

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One of these days Dave will update the template for these pages.

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IN THIS ISSUE

ON THE COVER: Mark Madson puts the new Fury 55 through its paces with Jason Boulanger behind the lens.

Hey, a girl! I remember those.

TESTED

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(For A Lot Less Than You'd Think)

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Get just the sport programming features you need without the complexity or extra features you don't.

- 6 channels
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Enjoy freedom from interference and the lightning-quick response that only DSM 2.4GHz technology provides for less than the price of a battery pack.

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Tick TOCK

WHAT A DIFFERENCE A YEAR MAKES. EVERY FEBRUARY I USE THE NUREMBERG TOY FAIR AS AN EXCUSE TO USE AIRLINE MILES AND DRINK GERMAN BEER. Last year was pretty depressing. We were well into the global recession and the look of panic could be seen on just about every vendor I visited. The trepidation was also visible in the limited number of new products slated for last year. This year the economic conditions aren't much better, and the outlook only modestly improved but I think the RC helicopter industry is done worrying and ready to move ahead. This year I came back from Germany with some optimism. The industry is innovating again, and that means exciting new products for now and the future. This issue features eight pages of show coverage, much more than last year. Although I wouldn't say there's anything super ground breaking on the horizon, there are a lot of cool new items coming. Cool enough that I think many of us will be opening our wallets with more frequency this year than last. Check out the coverage starting on page 12, I don't think you'll be disappointed.

SOME ISSUE NOTES:

- **RC HELI HOOK-UPS ARE BACK.** These are articles we used to do a while ago in which we'd take a popular kit, find a top pilot and go over his machine from nose to tail. We go over every tuning option and share with you how this pilot flies and tunes his machine. This month we get things started with the Outrage Velocity 50 and Eric Brandenberg. Eric's an up-and-coming pilot and really knows his stuff. Look for Hook-Ups at least every other month.

- **FACEBOOK,** if you haven't become a fan of *RC Heli* magazine on Facebook you need to do that soon. We're working on an entirely new website at rchelimag.com that we plan on having completed by summer. However until then look for most news updates, and information on our Facebook page. Search "RC Heli magazine" on Facebook. We'll sneak some looks of our new website soon.

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

Put side quote here please.

RC Heli magazine

CHATTER BOX

WHAT IS YOUR FAVORITE FACEBOOK FAN PAGE BESIDES RC HELI?

MIKE VELEZ - Publisher/Editor-In-Chief
Fan of: That "S" thing we all drew in elementary school. Could have been an "8" also.

RYAN KEPHART - Associate Editor
My favorite fan page is Bill Nye The Science Guy! Hey the guy knows his science.

BRANDON UPDIKE - Editorial Assistant
Six Flags Magic Mountain. As a kid I had a lot of great memories there.

JIM INNES - Editor-At-Large
NASA page. I love the continual updates on space missions, the great photos they post, and all the cool space info they share on their fan page.

CHUCK BASSANI - Editor-At-Large
Low Latency. They're mission is :To exchange and promote new ways of reducing latency in today's IT." What's not to love?

ART KORAL - Contributor
US Rowing. Yes, it is as exciting as it sounds.

SHAWN KITCHEN - Copy Editor
The "Can This Pickle Get More Fans Than Nickleback" fan page. Mostly because I can't stand Nickleback.

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THINK

RADIKAL G20

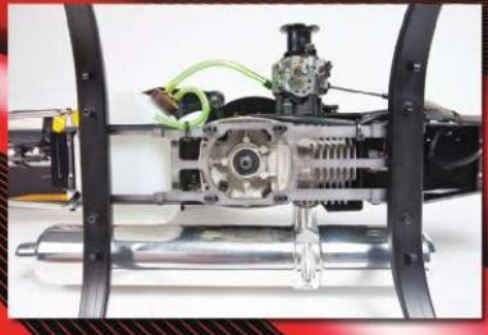
PETROL ENGINE

THE NEXT HOT THING IN GASSERS IS HERE!

G10 version with LT head shown. RotorTech 640mm Blades and Tuned Muffler are optional items.

Length: 1366mm
Height: 381mm
Width: 260mm
Main rotor diameter: 1435mm
Tail rotor diameter: 262mm
Main rotor blades: 600mm-660mm
Tail rotor blades: 95mm
Flight time: More than 30 minutes w/consumption of 300 ml
Weight complete w/electronics and engine 4500g

With our experience and knowledge from producing aerobatic and trouble free gasoline powered helicopters, Century Helicopter Products is proud to announce the ALL NEW Radikal G20! This highly anticipated helicopter (the smaller sibling of the Predator gasser) is capable of smooth F3C style flight yet has the power and agility for 3D aerobatics. Designed from the ground up with the latest manufacturing framework, we're proud to offer the latest generation of technologies which has been incorporated to produce this G10 and Carbon Fiber framed helicopter powered by the new Zenoah 20cc gasoline engine. With its high torque and its relatively low speed, the Zenoah 20cc offers smooth, vibration free operation. The gas powered engine produces absolutely no smoke offering endless capabilities for aerial photography/videography as well as scale fuselage applications. Whether you are an experienced pilot or just a beginner, the economic flight times and aerobatic flight performance of the Radikal G20 is a perfect choice for your first helicopter or a great addition to your current fleet.



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NUREMBERG TOY FAIR

February, 2010
Nuremberg, Germany

WORDS and PHOTOS: Mike Velez

It's that time of year again, when I fly halfway around the world, eat lots of schnitzel, and drink lots of German beer. I'm talking, of course, about Spielwarenmesse, or as we Americans say it, "Nuremberg Toy Fair." This year's toy fair was much more exciting than last year. Looks like companies have decided to take the global economy into their own hands and have come out with some pretty cool stuff that will practically compel you to hand over your wallet. Here are the highlights from the show that I found interesting.

Mike wanted to check out Amsterdam too!

FUTABA SERIAL BUS SYSTEM

You big scale guys are going to dig this. It's the new S.BUS system from Futaba - want to see how many servos you can get in a machine? The details are sketchy at this point so I'll read directly from some press information from Futaba:

As models have become even more sophisticated and quantities of servos and other on-board equipment has increased, the result is huge bundles of untidy and potentially vulnerable servo and extension leads. The new S-Bus system eliminates all this and enables a single heavier duty lead to be run from the specially developed R6108SB 2.4GHz receiver to the closest servo in the model, where a further lead then runs off to the remaining servos using data communication to transmit control signals from a receiver to a servo, gyro or other S-Bus compatible devise.

Basically, you're putting your machine on a LAN (local area network). Looks pretty cool. This is a technology that I can see evolving down the road into more than just scale or large ships.

WWW.FUTABARC.COM

NOVA ROSSI R91HR 3D-V2

Novarossi is an Italian engine manufacturer that makes some of the best car and truck engines in the world. Over the last few years they've begun to make a real effort to break into the helicopter market. Their latest offering looks pretty solid. It's the new R91HR 3D-V2. It features a new cooling head for more consistent operating temperature, a new 3-needle carburetor for easier tuning, and a new backplate. No word yet on price, but expect to see it here soon.

WWW.NOVAROSSI.IT

THUNDER TIGER

Thunder Tiger was, without a doubt, the company that's been working overtime to have an entire slew of new products on display.

X50

Just what the world has been waiting for (and waiting, and waiting...), and it's finally here! A new 50-Size nitro! This was easily the biggest news coming from TT. The new X50 is a state-of-the-art 50-size machine from Thunder Tiger. It does share some proven components from the Raptor, but overall it's a whole new machine. The most notable difference is the frame; gone are the molded frames, and instead there's a two-piece carbon fiber frame set with aluminum reinforcement supports. Gone is the MPM and now you get a 120° CCPM (optional 140°). The head is newly designed and features a machined block, molded grips, and an under slung flybar. All three cyclic servos are push-pull. The boom and the tail are direct from the Raptor, however a torque tube drive version will be released sometime this year. All in all, it looks like a solid machine that we're excited to get out and fly.

INNOVATOR 3D CONVERSION

This is a conversion kit for owners of the Innovator Expert. It comes with carbon fiber blades, new paddles, a long tail boom and belt, new tail drive pulley, lightened screw set, and new FRP canopy. Other conversions include software and different modules.

MINI TITAN UH-1 FUSE KIT

Everybody loves scale. With that in mind, TT's coming out with the new UH-1 conversion kit officially licensed by Bell. The kit comes with clear canopy, boom, angled tail drive components, decals for either a US Marine SAR team paint job or German Army. Later in the year, painted versions will also be available

MI-24 HIND FUSE KIT

You'll definitely scare the neighbors with this one. It's a scale fuselage of a Soviet Mi-24 Hind for the Raptor 50. It's made of fiberglass and comes pre-painted. Also included are the mechanics for the high-position tail, mechanical tricycle retracts, all the necessary hardware, and plenty of detail pieces like the Gatling gun, rocket launcher pods, optical sites, antenna set, etc. Look for this to be a future cover!

MINI TITAN V2

TT has gone crazy with the Mini Titan and come up with the V2. It's a full-blown 3D 450. The list of features is impressive. A fully metal head is probably the first thing you'll notice. The fame set is fully carbon fiber, the bearing blocks are made from machined aluminum, paddles are lightweight, the heli features CCPM controls, the battery mounts high on the fame, the main shaft has been hardened, and a new painted canopy is included.

WWW.ACEHOBBY.COM

The Hind has always been one of my favorites.

Do you think tray radios will ever make it in the US?

SPEKTRUM

Horizon Hobby had a very large booth at the show. The biggest news for us heli guys is the new DX8. I must say that our sources at Horizon USA tell us it's a European Release, with no immediate plans for release in the States. Take that with a grain of salt. It looks like a very feature packed radio that I'm sure will make it stateside in one form or another at some point this year.

The new radio has a solid list of features including a backlit screen, E-ring, has 8 channels and includes an 8-channel receiver with telemetry capabilities, throttle activated timer setting, language selection, telemetry warning (audio & vibration), integrated RF/data during range check (still looking for more detail on this) mode selection , real-time telemetry for receiver battery voltage and flight log information which includes antenna fades, frame losses, and failsafe. There is a port for an SD/MMC memory card that allows data transfer and software upgrades, along with 30 model memory. Other heli specific features include active gyro-gain adjustment, swashplate timing and a warning screen for selected controls. The telemetry-enabled receiver is the TM1000, however other receivers like the AR8000 can be used along with the telemetry module. The module allows the use of additional components to measure things like RPM, voltage, and temperature among other things.

The DX10t that some of you have seen online is a "tray" radio. I'm fairly certain that we won't see this in the States. This could mean that some of the telemetry functions and other features may make it on to a yet-to-be-seen radio, or a variation of the DX8 might be sold here in the future.

WWW.SPEKTRUM.COM

SCORPION

Scorpion has an impressive lineup of motors and ESCs and new for 2010 were some prototype HK series motors for use in 600 and 700 size helicopters. They're 10-turn delta winds, use three ball bearings to support the shaft, and are made for precision operation. Look for more details on specific winds and KV ratings soon.

WWW.SCORPION.COM.HK
WWW.INNOV8TIVEDESIGNS.COM

HOBBICO

Hobbico was promoting their latest version of the popular RealFlight flight simulator series, RealFlight G5. I think the Euros were impressed.

WWW.REALFLIGHT.COM

ESKY STATEMENT

Don't Be Fooled!

It's come to our attention that counterfeit ESKY brand products are being sold by unscrupulous vendors. These fake and shoddy products are not only causing a negative impact on our image of our commitment to quality, but threatening the safety and rights of ESKY consumers and users. To protect the lawful rights and interests of the authorized ESKY distributors and vendors as well as ESKY consumers and users, ESKY Co., Ltd makes the statement as below:

Please locate your local distributors or vendors from ESKY official website www.esky-sz.cn www.twf-sz.com ESKY confirms that distributors publicized on ESKY official website are authorized distributors of ESKY original products. As for those unpublicized distributors and vendors, ESKY will check their distributor's qualifications within 3 months since the date of issuing of the statement. Only passing our distributors and vendors qualifications then will they be publicized on our official website. Your cooperation of eradicating ESKY fake products will be greatly appreciated.

In order to help consumers to authenticate genuine ESKY products and to take more efforts in fighting against the fake products, ESKY Crop is introducing new laser technology to mark an additional ESKY registered trademark on the surface of spare and accessory parts. All the parts sold after December 23rd, 2009 are laser marked with the additional ESKY registered trademark. For the convenience of all the consumers to authenticate the ESKY products, especially the tiny parts, please browse the Anti-Fake page on our website to check for the exact spots of our trademark on those tiny parts. It may require using magnifying glass to check the laser-marked trademark because those trademarks may be smaller than 1mm.

Please find your local distributor from official ESKY website www.esky-sz.cn

NANO

NEW

Length: 128mm
Height: 47mm
Main rotor diameter: 210mm
Weight: approximately 60g

TANDEM ROTOR

NEW

Length: 251mm
Height: 153mm
Main rotor diameter: 210
Weight: approximately 145g

A300

NEW

Length: 380mm
Height: 180mm
Main rotor diameter: 340mm
Weight: approximately 230g

LAMA V4

Length: 408mm
Height: 180mm
Main rotor diameter: 340mm
Weight: approximately 230g

BIG LAMA

Length: 510mm
Height: 260mm
Main rotor diameter: 460mm
Weight: approximately 410g

HONEY BEE 2

Length: 510mm
Height: 165mm
Main rotor diameter: 510mm
Weight: approximately 304g

HONEY BEE CP3

Length: 525mm
Height: 185mm
Main rotor diameter: 540mm
Weight: approximately 410g

READY TO FLY

Your Professional Choice ESKY

ESKY 900

Length: 845mm
Height: 311mm
Main rotor diameter: 929mm
Body weight: approximately 850g

KIT Version

Your #1 Ready To Fly Source 3D Pro

NEW

BELT-CP CX

Length: 650mm
Height: 230mm
Main rotor diameter: 680mm
Weight: approximately 670g

Your #1 Ready To Fly Source 3D Pro

BELT-CP V2

Length: 650mm
Height: 230mm
Main rotor diameter: 680mm
Weight: approximately 670g

READY TO FLY

Your #1 Ready To Fly Source 3D Pro

HONEY BEEKING3

Length: 550mm
Height: 200mm
Main rotor diameter: 600mm
Weight: approximately 390g

READY TO FLY

Digital Servos7.5g

2.4GHz Receiver

2.4GHz ET6X

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86-0755-81728009 WWW.ESKY-SZ.CN

HITEC

Last month we were impressed by the quality, feel, and features of the Hitec Aurora 9. Many of those same selling points are coming to the masses thanks to the new Optic 6 Sport 2.4. It's a more affordable 6-channel digital computer radio that features Hitec's AFHSS pure digital 2.4 GHz system. It has 10-model memory, CCPM or MPM swash settings, 5-point throttle and pitch curves, yaw and throttle mix, throttle hold, revo mix, 4 ball bearing gimbals, function assignable switches, easy to read LCD screen, and adjustable gyro gain. Available with receiver or with receiver and 3 HS-55 servos. No word on price yet, but we expect it to be very economically priced compared to other 6-channel computer systems.

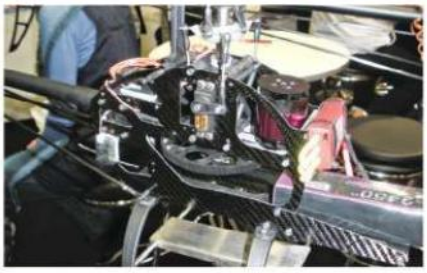
WWW.HITECRCD.COM

MIKADO

Mikado was on hand with quite a display. They're celebrating their 20th anniversary this year and look to have a great 20th in style. We were teased with the fact that a Logo 700 is in the works, however no details were shared. We're guessing a carbon fiber frame of some sort, and flybarless head. (Yeah, we're really going out on a limb with those predictions.) Here's what we know for sure is coming from Mikado:

LOGO 400 CARBON

This is the newest version of the popular Logo 400. It features a carbon fiber main frame, tail rotor, new landing gear, an airbrushed canopy, and is only available in a flybarless version.



LOGO 500/600 CHASSIS

Talk about poetry in motion, this thing is beautiful. It's a machined carbon fiber main frame for the 500 or 600.

LOGO 600 SE

This is a stretched version of the Logo 600 with a few other options. You can run up to 690mm blades on this one thanks to a boom that's 6cm longer than the Logo 600.

WWW.MIKADO-HELI.DE / WWW.READYHELI.COM

Mikado goes carbon¡

THUNDER POWER

Thunder Power wants to power your Blade CX and other small helis with their new 150mAh and 120mAh 1S 30C packs. Also new from TP is a 2600mAh 3S transmitter pack. It includes circuitry to protect your transmitter from being accidentally left on. The biggest new from Thunder Power was the TP-820CD charger. It's a new top of the line unit capable of charging virtually every battery type you'll ever use, can charge two batteries at once, and even more features that weren't quite finalized yet. Look for more details on all three items soon.

WWW.THUNDERPOWERRC.COM

Ultra Compact Frame TECHNOLOGY

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

Outrage VELOCITY 50

- Canomod's Canopy

- Torque tube tail drive
- Full metal tail unit

- 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

IKARUS AEROFLY 5

Ikarus used to be a much bigger player in the US market, but lack of consistent distribution has caused the brand to wither. One product that has managed to weather the storm is the aerofly 5 flight simulator. It's a solid performer and feature packed. Imported by Hobby Lobby.

WWW.IKARUS.NET / WWW.HOBBY-LOBBY.COM

JR HELICOPTER

JR always has a stable of impressive machines on display in Nuremberg, the only down side is that it's usually a tease, since only a fraction of their kits are imported into the States. Two items we're hoping to see land on our shores are the Vibe E8 and E12. The components that make these electric versions of the Vibe 50 and Vibe 90 are actually produced by a European company named AK Mod. Details were sketchy, but it appears that the electric models will be available as both kits and conversions.

WWW.JRPROPO.CO.JP / WWW.HORIZONHOBBY.COM

TSA

At last IRCHA, TSA showed off a new kit that caused some stir. They're still working on three kits that they hope to release in just a few months. There are two 90's, (one nitro and one electric), and a nitro 50. The Infusion 90N, 90E, and 50N; we'll let you figure out which is which. All three share some nice design features, including a dual- point elevator control that eliminates the need for an anti-rotation guide. There are multiple points to mount your electronics, a dedicated mixture servo placement allows for carb adjustments during flight , and a torque tube tail on all three kits. The company is still in negotiations with a distributor in the States.

WWW.TSAMODEL.COM

HELICOMAND 3-XTREME

HeliCommand has been a product line known for flight stabilization controls., The latest offering incorporates no horizontal or position stabilization and is instead meant for competition flybarless flight control. It can also be used in scale machines with either twin or multi-bladed heads. It packs a heading hold gyro and works with all current analog, digital, and brushless servos.

WWW.HELICOMMAND.COM

Power Supplies

Pro 10 Power Supply (10A)

Pro 20 Power Supply w/USB (20A)

Pro 40 Power Supply w/USB (40A)

Chargers

PTK-106B+ (6S/10A/250W)

PTK-1010B+ (10S/10A/300W)

PTK-208B+ (8S/20A/350W)

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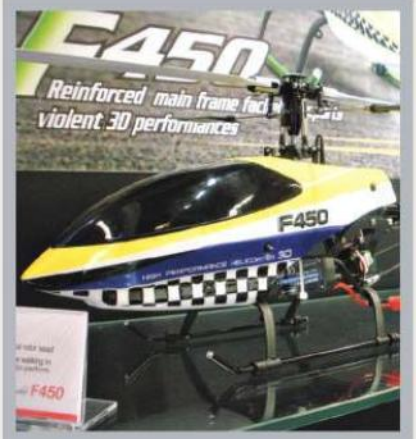
WALKERA

WWW.WALKERA.COM

LAMA 3

It's funny, just the other day I was having a conversation with someone about a 450- size coaxial helicopter and how it would fly. Well, the folks at Walkera read my mind; check out the Lama 3. It's pretty close to a 450 in overall dimensions. It features a metal head, single motor coaxial collective pitch controls, and all the electronics you need to get up in the air.

F450



This is a very nice looking RTF 450 that comes with all the electronics installed. The head is CNC-machined, features an underslung flybar, Bell-Hiller mixing and a fiberglass frame.

OSPREY

Not quite a helicopter, but damn it's cool. It's a scale Osprey that has us anxious for more details. It takes off and lands vertically, uses a pair of rudders on the tail for yaw control, and looks awesome. We're dying to get our hands on this one.

Almost looks like a crystal ball.

MS COMPOSIT

MS Composit had a couple of cool items that may or may not make it to the States. The most intriguing was the Duzi R5 450-size electric. It features CCPM, shaft driven tail rotor, over 70 ball bearings, push-pull linkages, and a very unique gearbox system. Maybe it's a bit overcomplicated, but it looks pretty cool. It's made in the Czech Republic and it appears that the street price would be very high if imported. For night flight pilots, the new Lightex LED lights look very promising. They run off a 12V power source, and allow for multiple colors from a single strip.

MSH 450 AND FLYBARLESS

MSH had a prototype of their upcoming Protos 450. The name may change but essentially it's a scaled down version of their 500. It features the same unique single belt drive system that uses the same main belt to rotate the main gear and tail gear. "How is this unique?", you're thinking. Well, the pinion is actually a pulley. So the pulley/pinion applies power to the belt that runs the length of the machine from main gear/pulley, to the tail. It's a pretty cool system that we reviewed last year. MSH is expecting a June release with a price competitive with other high-end 450 kits.

WWW.MSHELI.COM

SANWA SD-6G

Sanwa (sold under the Airtronics brand in the States) is releasing this new SD-6G 2.4GHz system. It's a digital 6-channel radio with 10 model memory, digital trims, 5-point throttle and pitch curves, CCPM mixing, flight timer, and more. No official word when it will be sold stateside, or how much it will sell for.

WWW.AIRTRONICS.NET

RELY ON THUNDER POWER RC

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Since 2003 more pilots and drivers have chosen the #1 in Performance and Reliability for long-lasting power and performance over any other brand. And now Thunder Power RC is proud to announce **exclusive Generation 4 (G4) chemistry** that offers a realm of power delivery, cycle life delivery and ultra-fast charge rate capability never before seen. G4 series batteries offer up to **40% more power, 6-times better cycle life and the ability to be ultra-fast charged at rates up to 6C*** with no discernable loss of power or cycle life delivery. G4 cells are built using the highest quality Japanese-made materials, including the latest in super-fine substrate (nano) technology to offer the lowest possible internal resistance for the most performance and lowest cost per cycle. Plus Thunder Power RC batteries are **still proudly matched, assembled and supported in the USA** and backed by an **industry-leading full 1-year warranty and 50% off damaged battery replacement program coverage.**

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An excellent combination of power, performance and price, G4 Pro Power 30C series batteries are proven by world-renowned pilots and independent testers to deliver 300+ cycles in a wide variety of powerful airplane, EDF, 3D helicopter and other applications. Able to deliver up to 30% more power and 5-times more cycle life than previous generation batteries at lighter weight than most other lesser performing G3 20C to 35C batteries. Available in capacities from 320 to 5000mAh and configurations from 1S 3.7V to 10S 37.0V.

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The world's most advanced, most powerful and longest lasting series of batteries – ever! G4 Pro Power 45C series batteries are the pinnacle in performance for high-powered airplane and helicopter applications. Delivering up to 40% more power, 6-times more cycle life (proven 300+ cycles even when charged at rates up to 6C) and ultra-fast charge rate capability up to 6C* means they surpass all other batteries on the market today. Available in capacities from 325 to 6500mAh and configurations from 1S 3.7V to 10S 37.0V.

G4 Sport Race 25C Series Batteries

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

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The world's fastest and longest-lasting batteries for surface vehicles! G4 Pro Race 40C series batteries are the best choice for powering sport and race vehicles using 10.5T, 13.5T, 17.5T and other 'stock' motors, while G4 Pro Race 50C series batteries are the most powerful batteries ever made available for pro- and competition-level racing in the hottest 'mod' motor classes. Capable of being charged at rates up to 6C* and available in capacities from 3200 to 5200mAh and configurations from 1S 3.7V to 4S 14.8V.

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Our full-line of chargers and balancers includes many of the world's safest and most advanced offerings to date. From LiPo battery balancers capable of being used independently or interfaced with a variety of chargers, to powerful chargers capable of charging and discharging LiPo batteries up to 10S 37.0V along with a variety of LiFe, NiCd, NiMH and lead-acid cells, there's a choice perfect for any battery charging and maintenance need.

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THUNDER POWER RC

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*When using approved charger and balancer combinations

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KONTRONIKS

Kontroniks was showing off the new Progdisc. It's a handheld ESC programmer that's designed for easy use and a finished look and feel. It features a color display, sensor control that allows you to scroll through options by tilting the Progdisc then hitting the confirmation button. It also serves as an interface between your PC and ESC. It can also update itself with new software through an Internet connection to the KONTRONIK web site.

WWW.KONTRONIK.COM
WWW.READYHELI.COM

AERONAUT WHOOPI

Don't plan on seeing this imported anytime soon, but I thought it was pretty cool for all the Autogyro fans out there. It's from a company called Aeronaut, and it's the Whoopi. It uses a nitro engine for forward propulsion and an electric helicopter head and drivetrain for lift. Looks fun.

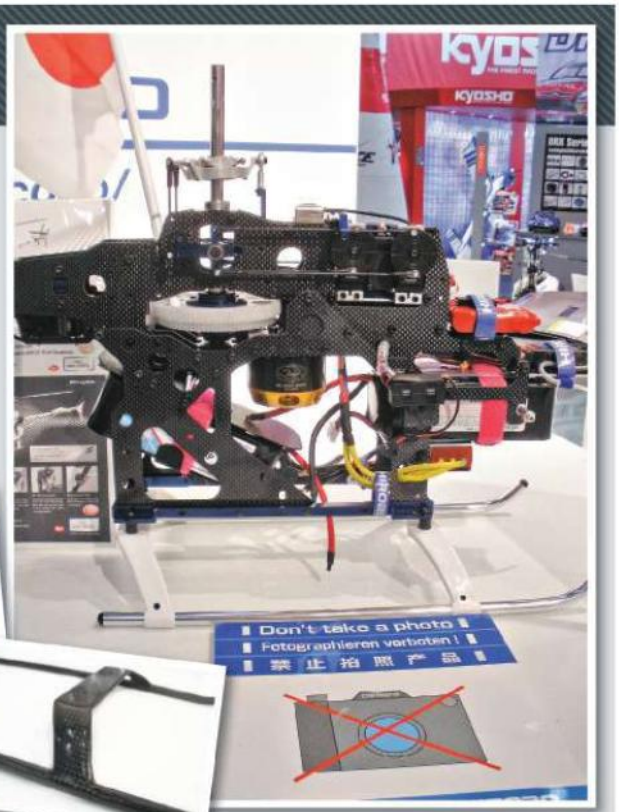
WWW.AERO-NAUT.DE

HIROBO

Hirobo never fails to impress. Their SRB Quark was pretty ground breaking when it was released; they look to up the ante with the new SG. The SG (Second Generation) features all the easy-to-fly details found on the original and now features Idle Up for inverted and more acrobatic flight.

ELECTRIC CONVERSION

As you can see from the photo we'll do whatever it takes to get you the goods! This is an electric conversion for the SDX .50, it may also be sold as a kit. More details to come.

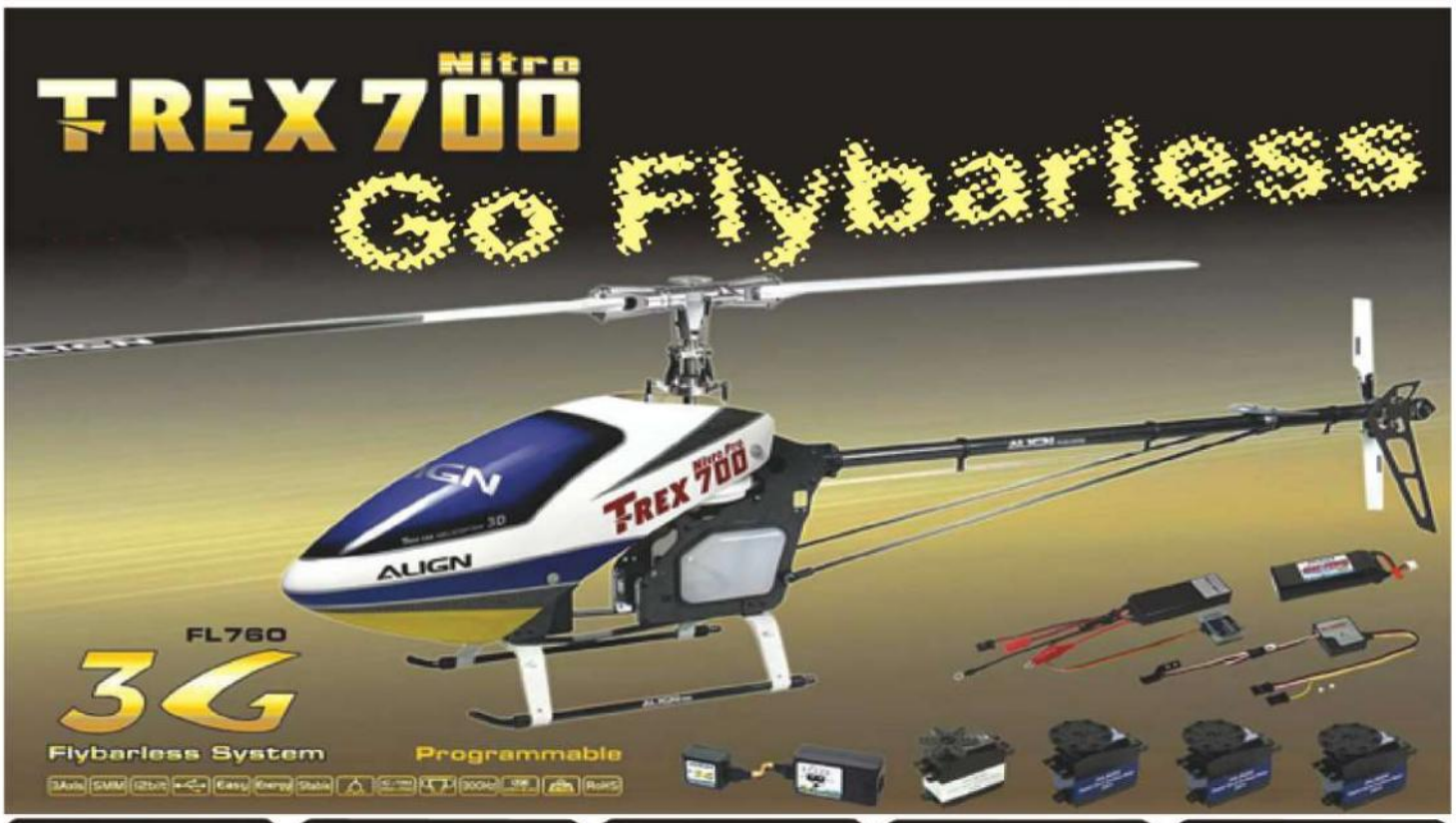


Other items on display were these low-profile carbon fiber skids, they're a prototype so no official word on whether or not we'll see those. Also unique was this transmitter enclosure that helps to keep your hands warm and out of the wind when flying.

WWW.HIROBO.CO.JP
WWW.MODELREC.COM

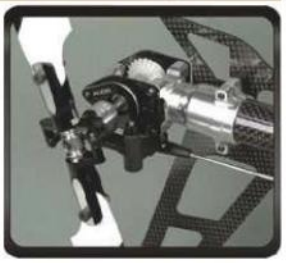
Nitro TREX 700

Go Flybarless









Design Features:

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

Specification:

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

Accessories:

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

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CENTURY

"The bigger, the better" is one of those sayings that can haunt you for the rest of your life. Century thought the same thing and developed a larger 60/90- sized MD500E that is simply gorgeous. These new fuselages are pre painted professionally and are clear coated with a fuel resistant coating. The fuselage is designed for multiple mechanics and includes assembly instructions for the Century Predator, Thunder Tiger Raptor, Hirobo Freya, and the Align Trex 700. Lighting is also another thing Century has thought about and has included working light ports in the kit. Although the lights themselves are not included, they can be purchased separately. This model, coupled with a 5-blade rotor head, should look amazing.

WWW.CENTURYHELI.COM

THUNDER TIGER

Although Thunder Tiger released a bunch of new helicopters at the toy fair, they didn't show one of their newest helicopters. The Raptor 50 RTF is an all-in-one package that includes the servos, radio, engine, and gyro. Keep an eye out in future issues of RCHELI for a full review.

WWW.ACEHOBBY.COM

ALIGN 700 GETS ELECTRIFIED!

As the aftermarket manufactures have been pumping out conversion kits for the TRex 700 to convert it to electric power, Align has been sitting back and watching. This is all about to change. Align has a new 700 in the works and it is designed from the skids up to be an electric helicopter. Not much has been said about this new 700E, but what has been said is that the main gear has been redesigned bettery performance, the bottom frames have been extended for ease of battery installation, and an Align brushless out-runner will be mounted below the main gear.

WWW.ALIGNRCUSA.COM
WWW.HELIWHOLESALER.COM

RC HELICOPTER ORIGINS

Have you ever wondered how RC helicopters came about? Recently on YouTube we spotted some of the original footage from Dieter Schlüter's adventures. This is a three-part video so make sure you check them all out. You can find these videos by searching for tutelarRC's homepage on YouTube.

WWW.YOUTUBE.COM/USER/TUTELARRC

2010 is already starting off good.

LETTERS

MACHINE OF THE MONTH

IMPROVISED FLYING

This is me and my MA Furion 450 up on the North Ridge on Al Asad Air Base, Iraq. I fly a Raptor Titan back in the states, but I figured that she would be just a bit too big to ship out to Iraq, plus I'm sure that the leadership out here would not really like me having 30% sent out here in the mail. We already have enough problems with things that blow up...

This little guy runs off of 11.1V 2600 mAh Thunder Power Pro Lite V2's. Those power up the Scorpion Commander V2 60 Amp Heli ESC which powers the Scorpion HK 2221-6 motor. The cyclic servos are Hitec HS-5065MG's. I keep the tail straight with a Futaba GY 401 and S9257. To top it all off she swings Mavrikk G5 Pro Wide Chord 300's. I had a blast keeping up thumbs in training while overseas. The Furion will now be my travel heli and I'll go back to the Raptor as soon as I can.

You all do great work with the magazine. I look forward to the next issue every month. Keep it up!

SSgt. Alex W. Barron, USMC

■ ***Alex, first and foremost thank you for your service. The free world owes everyone that serves a huge debt of gratitude. Yeah, shipping a case of 30% to a base in Iraq would probably not go over too well. Glad to see you're getting some stick time over there. Thanks again for everything and be safe.***
Mike

PONY UP!

Hi Guys, here are a couple pics of my Hirobo AS365 Dauphin painted to match my special built Ferrari edition Range Rover. I'm currently working on a new roof rack to launch from. When it's parked of course. Hope you enjoy.

Peter Edelhertz

QUITE A FLEET

Hi, I have been reading RC Heli since I started flying helis, what a great mag. My first heli was a Esky HBK King II with the Blue canopy to the far left. The next heli. I bought from a friend second hand, it is an E-flite Blade 400 now a with an MD 500 fuse in camo. The Align TREX 450 SE V2 started life as a HDX 450 SE V2 but is all Align but the Super Frame. The Align TREX 500 CF with upgraded torque tube was the next heli in my hanger. The Funkey Bell 222 started life as a E-Smart 600 Pro and now lives on my shelf in my studio. Last but not least is my newest and biggest heli the Align TREX 600 ESP. I use all Futaba Gyros with Futaba radios. Thanks for your wealth of knowledge I look forward to your magazine every month. Search "saitoking" on Youtube. My Fun-Key Bell 222 build videos are on there.

Thanks,
Charles King
Dallas, TX

STARTING THE LITTLE GUY OFF YOUNG....

Hey guys, My name is Jasser Valerio, I love your magazine, and I have always been into heli's and started getting more involved with them in the middle of the summer '09. Right now I have four heli's which include a Blade mSR, Blade CPPro2, a Raptor 50 Titan, and my newest build is my TREX 600N Pro. I have included a picture of my son Jaiden with two of "his" favorite helis (That's what I let him think....lol. Specs on the Raptor and T-Rex are as follows:

- ***RAPTOR 50 TITAN:*** *O.S. 50 Hyper with Thunder Tiger Pipe, JR servos on cyclic and throttle, Spektrum AR7000 Receiver, GY401 gyro and 9254 servo, all running on stock woodies*
- ***TREX 600N PRO:*** *O.S 50 Hyper with Align Pipe, Align DS610 on cyclic and throttle, Align GP780 and DS650, Spektrum AR7000 Receiver, NHP 600mm Carbon Blades, Align Governor, and Align 2-in-1.*

All my birds are bound to my Spektrum DX7. Well I want to thank you again for an awesome magazine and all the tips, reviews, hints that you guys provide, and I wish you the best.

Thanks,
Jasser Valerio

QUICK TIPS

SPONSORED BY: Ely.Q

NEED A GASKET?

Often times we find ourselves removing the muffler to get better access to the engine bolts, or it could be that we want to to give that pipe a nice polish. This poses a potential problem of breaking the gasket between the pipe and crankcase. Fortunately, we have a tip that will work great for you and save you some money in the long run.

Auto part stores sell gasket material that can work well in your helicopter. The material is a rubberized fiber that comes in a 10"x26" roll and is 1/32" thick. The roll can be purchased for around $5 and can make a slew of gaskets.

Take your pipe and place it on the material and trace the exhaust port. **(1)** Next, place the cut piece on the pipe and poke out the bolt holes. **(2)** Thread a couple small screws through the material and into the pipe so the material cannot move around. **(3)** Next, take a sharp hobby knife and cut out the exhaust port. **(4)** (Be careful not to loose the piece that you are cutting down the pipe.) Remove the screws and you have a perfectly good gasket ready for flight.

That gasket looks like camo.

A SIMPLE TUG CAN SAVE YOU MONEY

Pre-flight checks are an every day part of full-scale aviation. Perform a simple pre- flight check on your RC helicopter at the beginning of the day. Before each flight, give the ball links on your rotorhead a slight tug; if all is well the ball link will stay in place and not pop off. If the link pops off with ease, it could come off in flight. That small tug can save you money in replacement parts.

BLADE SPACER TOOL

Have you ever installed a blade that required spacers to make them fit the grips correctly? If you have, then you have probably realized that getting those spacer lined up and in the grips a bit of a pain. To ease this process you'll need an old blade bolt and the required spacers for your blades. Place the spacers on each side of the blade and measure the overall width of the root including the spacers (a pair of calipers will come in handy for this). Next, take that measurement and cut the bolt to the correct length by removing the head portion of the screw leaving the threaded portion the correct length. To install the spacers, place them on each side of the blade, slide in the tool, then slide the blades into position. Push the blade bolt through and the tool will eject through of the bottom of the blade grips.

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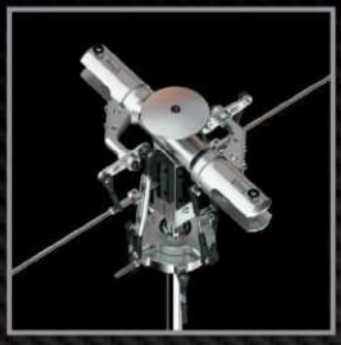
3D MASTERS 2009
Synchro Fly Competition
1st CLASSIFIED
Pilots: The Smith Brothers

GIUSEPPE ROBERTONE DANNY SZABO

Lenght: 1180 mm **Height:** 420 mm
Main Blade lenght: 600/620 mm
Main Rotor Diameter: 1335 mm
Motor Pignon Gear: 11T

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



Ely.Q

UPGRADE YOUR EXPERIENCE

FREQUENTLY ASKED QUESTIONS

Q: Hello all. I am new to the fast action of RC and let's just say that I have been hearing a lot of crashing and breaking. I have been flying a few RC heli's over the last few months (mainly some cheap 3- channel helicopters) and recently a Blitz Works MD 500 4-channel coaxial. I have been doing well (replaced several parts on the MD500) and am feeling comfortable with the **4-channel setup,** but the MD500 really doesn't have much power to fly outdoors with any type of wind.

I have been looking at the Walkera Lama 400D and the Lama 2-1. They look durable and reasonably priced, but I've been hearing so many nightmares with regards to electronics. I'm trying to find as much information as I can so that I don't waste money. What would be a good step? Coaxial? Walkera? **-dhutcher**

A: Well, it sounds like you have already invested in a few cheap helicopters to find out if you are ready to embark on a long journey into the wonderful world of RC. Keep the helicopters you have for the sake of basic flight orientation. Fly them in your garage or an area where your wife won't mind some marred up walls.

If you're looking for the next step, there are many helicopters out there that will suit your needs. Look for major brand names such as E-Flite, Align, and Thunder Tiger to mention a few. These helicopters will allow you to buy parts easily and are usually stocked at your local hobby shop. A simulator would also be a good investment, as you can practice flying without the expense of a crash. If money is an issue, stick with a 450-sized helicopter or smaller. Don't buy another counter-rotator, as almost all of them cannot fly outside. **–RKephart**

Questions are hard to come by.

Q: What are the advantages associated with going FBL (flybarless)? **–Ots**

A: This is a common question. Many advantages are seen when switching over to a flybarless helicopter. Flybarless helicopters offer a locked-in feel that is superior to the flybar. Gyros are used on each axis. Another advantage of a flybarless system is the performance increase. Without the drag of the flybar, more power is transferred to the main rotor blades, giving you more performance. Another advantage is less mechanical parts, which not only saves weight, but also is easier to maintain. **-RKephart**

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JR X9503

A step above the 9303

WORDS: Chuck Bassani

THE JR XP9303 AND X9303 RADIOS WERE STAPLES IN JR'S RADIO LINEUP for the past five years, with the latter of the two being a fully integrated 2.4 GHz system introduced about two years ago. These 'Pro Class' systems feature comprehensive heli programming, excellent performance, and that much desired JR quality feel. They are the radio of choice for many of us.

So how does JR top this? They take the X9303, add some much desired features, and reduce the price by about $80.00.

What they ended up with is the new JR X9503. For those not familiar with JR's naming convention; the 9503 identifies the radio as having 9-channels, 50 model memory, and programming for 3 model types (airplane, heli, and glider).

The X9503's features and programming are essentially identical to the X9303. Since scores of reviews have already been published for the X9303, this review will focus on changes incorporated into the new X9503.

Up to 50 models now

WHAT'S IN THE BOX?

The X9503 is offered as a TX/RX only package. Included are:

- X9503 Transmitter
- 9.6 v / 1500 mAH NiMH TX Battery Pack
- R921 Receiver (including one remote RX)
- Bind Plug
- AD35M05 110 mA TX / 110 mA RX Battery Charger
- Receiver / Battery Switch w/Charge Lead
- Instruction & Programming Manual

TRANSMITTER FEATURES

The transmitter features nine fully proportional channels. Control resolution is 1024-step when used with all Spektrum 5-channel and 6-channel receivers as well as with the Spektrum AR7000 7-channel receiver. When using it with all other Spektrum and JR receivers, you'll realize 2048-step resolution.

Programming wise, the X9503 provides virtually all of the standard features you'd expect to find in a high-end radio, plus these that warrant special mention:

- Customizable switch assignments for specific channels and functions
- Up to six flight modes
- Normal (mCCPM) and 90°, 120°, & 140° (eCCPM) swash geometries
- Dedicated Throttle to Aileron, Throttle to Elevator, and Throttle to Rudder compensation mixes
- Dedicated Governor and Gyro functions
- Up to 7-point pitch and throttle curves
- Six general purpose programmable mixes (two multi-point and four standard)
- Two failsafe options: Hold and pre-programmed positions

JR has also addressed some mechanical issues that have plagued the X9303. Inside the transmitter you'll find that the wires serving the gimbal sub-assemblies have been run out towards the outside edges of the case. This is a fix for gimbal wires that were getting chaffed by a regulator chip on the RF board. Another wire protection fix is in the battery compartment. It has been fitted with a foam battery cradle to keep the battery snug and so that it can't slide around and pinch the battery wires.

WHAT'S NEW?

As mentioned earlier, functionally the X9503 is essentially the same as an X9303—but with three updates.

BACK-LIT DISPLAY

There's nothing like a back-lit display to increase LCD readability indoors. I find that it helps a great deal during setup, so much so that upgrading the X9303

The back-lit display used on the X9503 is among the best I've seen.

You won't forget to start your timer if you use the X9503's 'Auto Start' feature.

The X9503 allows you to store up to 50 models internally.

INDEPENDENT SPECIFICATION VERIFICATION

JR SUPPLIED R921 RECEIVER:

WEIGHT

Main: 15g / 0.6 oz
Remote: 3g / 0.2 oz

SIZE (W X L X H)

Main: 1.23" x 1.94" x 0.56"
Remote: Not provided

Current Drain: 70 mA

MEASURED R921 RECEIVER:

WEIGHT

Main: 17.7g / 0.62 oz
Remote: 3.4 g / 0.12 oz

SIZE (W X L X H)

Main: 31.3mm x 49.1mm x 14.1mm / 1.23" x 1.93" x 0.56"
Remote: 20.1mm x 25.8mm x 7.1mm / 0.79" x 1.02" x 0.28"

Current Drain (w/1 remote receiver): 78.3 mA
Power source used for this measurement was a fully charged 4-cell, 1450 mAh NiMH battery pack.

JR SUPPLIED TRANSMITTER:

Transmitter Current Drain: 180 mA (DSM2), 280 mA (DSM1)

MEASURED TRANSMITTER:

Current Drain (w/back-light off): 230 mA (DSM2)
Current Drain (w/back-light on): 255 mA (DSM2)
Power source used for this measurement was a fully charged 8-cell, 1500 mAh NiMH battery pack. This will provide over 5 hours of operational use.

with a back-light is a popular DIY mod.

With the X9503, JR took care of that for you. One of the most impressive features of this radio is its beautiful back-lit display. It sports the same type high-quality display found in JR's flagship 12X transmitter. I personally find it to be one of the most readable displays in the industry.

THROTTLE ACTIVATED TIMER

Its lack of a throttle activated timer has been one of the most talked about shortcomings of the X9303. If you're flying electric, not activating your timer may quite possibly result in an extended duration flight, which we all know could permanently damage the batteries.

The X9503 adds an 'Auto Start' feature to the 'TIMER' function, giving you the option to start the timer using the throttle stick when it's moved above 20%. Note that this feature only starts the timer, so the timer will continue to run even if you move the stick back below 20%. Also note that when the Auto Start feature is active, the traditional starting and stopping of the timer with the spring-loaded trainer switch also remains functional.

50 MODEL MEMORY

Who would have ever thought that 30 model memories wouldn't be enough? Considering that many of you commonly use one radio for helis, airplanes, gliders—and probably a plethora of micro BNF models—the more model memory the better. The X9503 has enough internal memory to store up to 50 models.

Just as important as loads of internal memory is having a way to electronically back up and transfer those settings. The X9503's 'Model SEL' function allows you to copy models from one memory location to another. Using a trainer cord, you can use the 'TRANSFER' function to copy settings to/from another X9503 as well as to/from an X9303/XP9303. Plus, you can also use JR's PC Data Transfer Interface to back up, restore, and edit the X9503's model settings on a PC.

You can backup, restore, and edit the X9503's model settings on a PC using JR's PC Data Transfer Interface.

9503= 9 channels, 50 model memory, and 3 types.

LATENCY

MEASUREMENTS PERFORMED BY JOHN KOS

The X9503's latency is essentially identical in normal and eCCPM swash modes.

DSM2 PROTOCOL (TESTED WITH A SPEKTRUM AR7000 1024-STEP RESOLUTION RECEIVER):
Channels 2, 3, & 6 - Minimum: 24.0 mSec, Maximum: 45.5 mSec, Average: 36.2 mSec.
Aileron and Elevator input latencies fall within this range.

DSM2 PROTOCOL (TESTED WITH A JR 921 2048-STEP RESOLUTION RECEIVER):
Channels 2, 3, & 6 - Minimum: 24.0 mSec, Maximum: 45.5 mSec, Average: 36.7 mSec.
Aileron and Elevator input latencies fall within this range.

THE GOOD

- Nice price reduction
- Stick activated timer
- Gorgeous back-lit display
- 50 model memory

THE BAD

- No performance improvements

CONNECT

MANUFACTURER:	JR
WEBSITE:	www.jrradios.com
PART NUMBER:	#JRP2935
STREET PRICE:	$549.99

RECEIVER

Included with the X9503 is the JR R921 receiver. This is a full-range, 9-channel receiver that utilizes two internal receivers and one remote receiver. It also supports the use of one additional remote receiver.

The R921 features 'Quick Connect' brown-out recovery, Flight Log support, and two types of failsafe options; SmartSafe (which holds servos at position) and Preprogrammed Failsafe (which moves servos to pre-programmed positions). The receiver also supports a high-speed (11 mSec) frame rate, currently only available on the Spektrum DX7se.

FLIGHT TESTS

Installation and setup for my flight tests couldn't be easier. I already had a JR 921 receiver mounted in the test heli, so I simply downloaded my model's backup file from my PC into the X9503 using the PC Data Transfer Interface. I tweaked the sub-trim settings and … DONE.

Unfortunately, the weather around these parts hasn't been conducive to flying for some time. So the flight tests will have to wait. But considering this radio is essentially the same as the X9303 I've been flying with, I fully expect nothing less than the performance I'm used to.

CONCLUSION

The X9503 is certainly not a revolutionary product, but it does address some of the issues and feature shortcomings of X9303. At the time of the X9503's introduction, the X9303 was still very much a popular and highly regarded radio. I think that considering the updates, JR could have very easily justified a price increase, so the fact that they actually lowered the price by almost 13% is indeed admirable. I love my X9303, and I'm sure I'm going to love this radio even more. I'll bet this is going to be another very popular transmitter.

Happy Flying … RCH

Same performance.

iPhone App **HELITACH**

HeliTach on a budget

WORDS: Ryan Kephart

Have you ever wondered what headspeed your helicopter is running? Have you looked into buying an optical tach but just can't seem to fork out the bucks? You're in luck if you have an iPhone. This new app allows you to find your headspeed by listening to the rotor blades of your helicopter and matching the harmonics to a certain headspeed.

Tested and Rated • Tested and Rated • Tested and Rated •

RATED 8.0

THE GOOD

- Affordable
- Works excellent for electrics
- Can read multi bladed heads

THE BAD

- Slightly off from optical tach that most pilots use
- Nitro helis are a bit difficult to read

CONNECT

CURRENT VERSION:	2.1
WEBSITE:	iTunes Store
APP NAME:	HeliTach
STREET PRICE:	$3.99

FEATURES

The app can be used for nitro and electric helicopters but a nitro is read a bit differently from an electric. An electric helicopter is read using the sound of the blades alone, whereas nitro heli's headspeed is read using the harmonics of the engine and then converted to headspeed by inputting the gear ratio. The HeliTach features an easy to read display that shows you both a numerical display and an analog gauge. Multi-bladed heads can also be read by selecting how many blades are used. Two simple steps are all that are required to read the headspeed of your helicopter. First, you select either the gear ratio or select what your estimated headspeed might be. Then, press the measure button and the app will wait to hear a constant harmonic when the helicopter is spooled up.

TESTING

Being heli guys and gadget freaks (and with the boss being a big Mac guy), we couldn't keep our hands off this one. We **gave it a test and took it out to the field** along with two other optical tachometers for reference. We tested this app using both a nitro and electric helicopter at several different headspeeds. The electric helicopter tested very well with just about a +/- 30 rpm difference from the optical tach. The nitro helicopter was a bit more difficult to get a reading but eventually resulted in a +/- 50 rpm differential.

CONCLUSION

For the price, the HeliTach app worked well. Even though the rpm reading wasn't exact with optical tachs, it was repeatable and consistent. However perfect to give you a solid reference when tuning. If you don't own a tach already or want to cut down on the amount of stuff you lug to the field this is a very worthwhile investment for iPhone owners. The app designer is also working on a similar version of this app to be used on the Android market. Since I have a Droid, I can't wait. RHL

Ryan has a C-3PO

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Mountain View, California

DARRELL BELL
Detroit, Michigan

ANDY PANONCILLO
Muncie, Indiana

FRANK COLUMBIA
Port Jefferson Station, New York

ART HUGHES
Dryden, New York

ALVIN CHAI
Burnaby, British Columbia

JEFF PFEIFER
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CJ Youngblood Enterprises **MINI G**

Developed by the Master

WORDS: Art Koral

With all the tail rotor gyros on the market, it's often difficult to choose the right one for your needs. One way to choose is by the reputation of the developer. The Mini-G has been designed to the high standards of The Man himself, FAI and 3D world champion Curtis Youngblood. Curtis has introduced a high performance mini gyro fit for all helicopters.

FEATURES

- Programming via the transmitter.
- Compatible with all servo types
- Model specific default programming

GYRO SPECS

PRICE: $149
WEIGHT: 20g
CASE DIMENSIONS: 25x25x15mm (LxWxH)

The Mini G is a heading hold gyro. The gyro is designed for both digital and analog servos. It has remote gain, sensor reversing, travel limit, and rudder neutral setup. And for ease in tuning, the Mini G has preset model selections. For more advanced pilots, the Mini G has advanced tuning parameters which adjust variables such as stopping behavior and pirouette starting behavior. These advanced settings are only adjustable when used with the G-View.

SETUP

The included instructions are very clear and simple to follow. Initial setup is accomplished via two LED lights or by an optional G-View display in combination with the single pushbutton on the gyro and the rudder control stick. During initial setup, servo type, model type, servo neutral, sensing direction, rudder direction and travel limit are selected. Mechanical setup is similar to most other gyros by starting at rudder neutral with the servo horn placed at 90 degrees from the control rod.

FLYING THE MINI G

TEST PLATFORM

HELICOPTER: Rave 450
BLADES: 350mm Radix
BATTERY: 4s1p 2200 batteries
MOTOR: Next D Scorpion 8 Motor
ESC: CC 30 HV
T/R SERVO: JR DS3500G

After initial installation and programming, I performed a quick check with radio power on to verify sensing direction and tail rudder direction. For sensing direction, I pushed the tail to the right and watched the trailing edge of the T/R blades move right and for tail rudder direction I moved the rudder stick to the right and watched the trailing edge of the T/R blades move right again. Initial flight setup involved placing the gyro in rate mode and lifting into a hover. With a slight left drift at rudder neutral, I adjusted the length of the control rod to increase right rudder. After a few adjustments it stopped drifting. I then set the bird on the ground, unplugged the battery, switched the transmitter to heading hold mode, and powered up the helicopter. Initially, the tail oscillated a bit. I backed the gain down a few points and lifted off again. The tail was nice and solid and ready for the flight test.

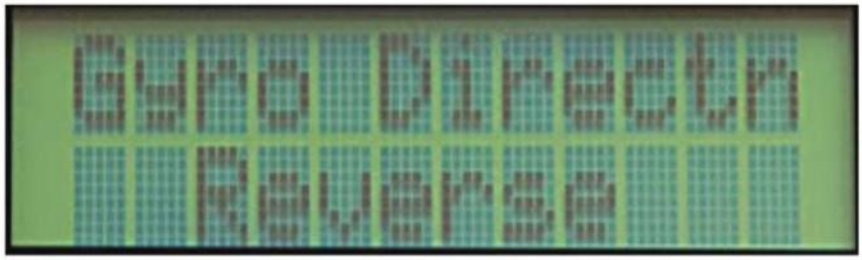
Heading lock was great in a hover. Rapid pirouettes were consistent in rotational speed and resulted in fast yet controlled stops when the rudder was relaxed. Forward flight was locked in without drift. Backward, inverted, and upright flight were all easily handled. I put the helicopter through a series of hard backwards funnels and pirouettes to see how well the tail held. The tail never blew out. In a hard cross wind, the tail also held without any drift. Tail slides were confidence inspiring, locking the tail at 0 and 90 degrees to the fall without any drift.

CONCLUSION

The Mini G is a great tail control option. Given the reasonable cost, low weight, and great performance, this gyro has tremendous value. What else would you expect from a legend like Curtis Youngblood? RCHI

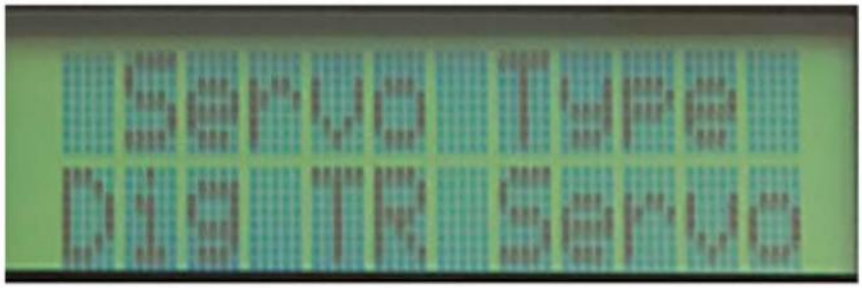
Next stop, Total G!

SERVO DIRECTION



The G View programmer makes easy work out of gyro programming. On this screen the direction that the gyro corrects can be reversed by a push of a button.

SERVO TYPE



The G View programmer can also adjust what type of servo that is being used with the Mini G. In this case we are using a digital JR DS3500G tail rotor servo.

THE GOOD

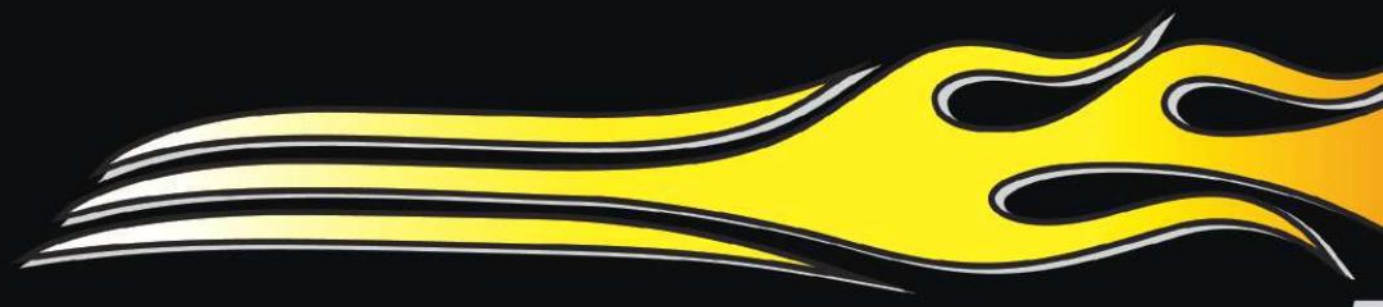
- Good for all helicopters and all pilots

THE BAD

- Needs G-View for advanced setup

CONNECT

MANUFACTURER:	CJ Youngblood
WEBSITE:	www.curtisyoungblood.com
PART NUMBER:	Mini G
STREET PRICE:	$149.99



A MAIN H

ELECTRONIC STABILIZATION SYSTEMS

It's the way of the future.

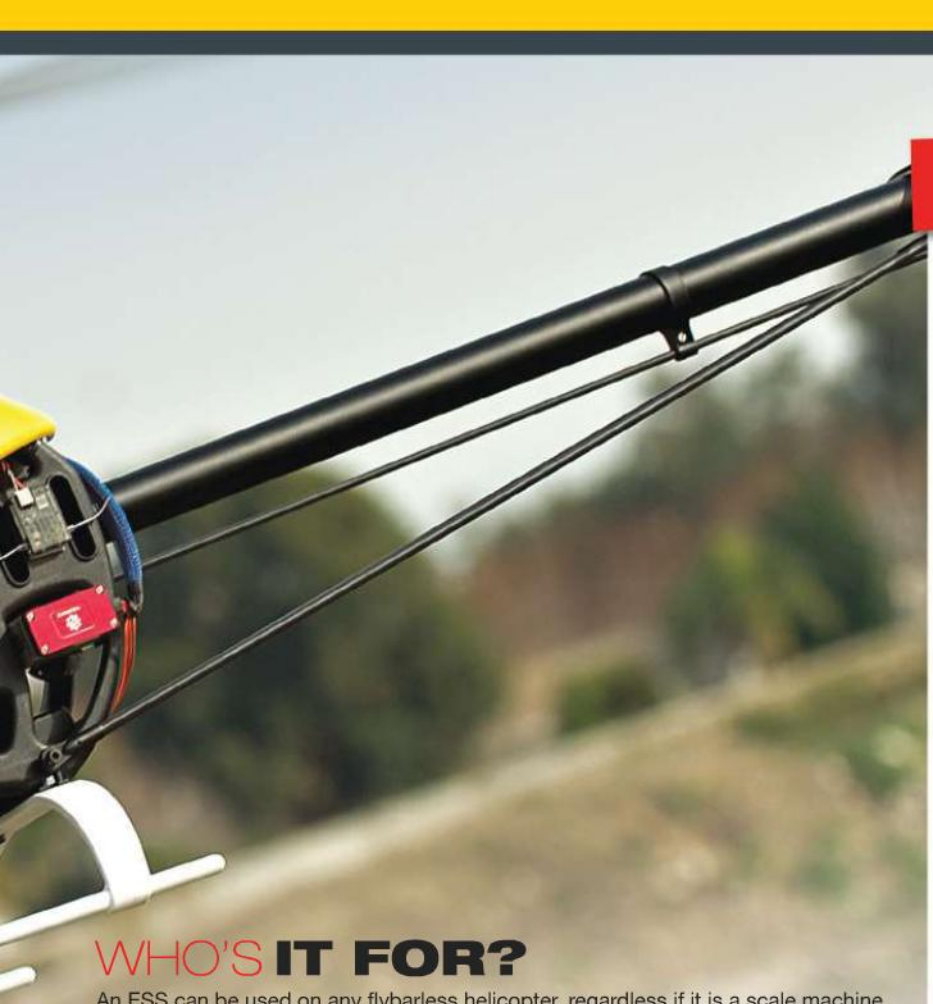
WORDS: Ryan Kephart | **PHOTOS:** Jason Boulanger

With the trend in RC helicopters moving towards flybarless systems, it's no wonder that electronic stabilization systems are becoming more and more commonplace. Many manufactures are venturing into electronic stabilization for their helicopters. This month we'll show you what all of the fuss is about, how these little wonders work, and what they can do for you.

We've seen the future... and it's flybarless!

» WHAT IS AN ELECTRONIC STABILIZATION SYSTEM

An electronic stabilization system is essentially a gyro for each rotation axis of the helicopter. The electronic stabilization system (we'll call it the ESS) works in the same matter as any heading hold gyro. When the helicopter tilts without an input from the transmitter, the gyros will correct the tilt with an opposite control. For example, if the helicopter rolls to the left, the ESS will apply a right cyclic input to correct it. Most ESSs are programmed using PC-based software, but now some manufactures have enabled programming by a few pot switches on the unit itself.



WHO'S **IT FOR?**

An ESS can be used on any flybarless helicopter, regardless if it is a scale machine with multiple blades or a 3D pod and boom. Although an ESS is not an autopilot beginners will enjoy the use of an ESS for the simple fact that it can be programmed to lock the helicopter in without the usual drift from the wind or ground effect. Most ESSs can be set up to be as docile as a helicopter with flybar weights, or can react as aggressively as your skills will control.

WHAT AN ESS DOES **FOR YOUR HELICOPTER**

Conventional helicopters use mechanical methods of stabilization. Flybars require additional connections from the swashplate to function properly. The flybar and additional components needed for proper operation adds considerable weight and potential slop to the rotor head. On top of the weight is the loss of energy to the rotor blades caused by drag. Drag can affect both normal flight and autorotations, as the drag will decrease the amount of energy that is retained during an autorotation. Mechanical failure is another big disadvantage of a helicopter that utilizes a flybar. Lets face it the more mechanical parts the more likely you will have a mechanical failure. The use of an ESS eliminates many of these problems. A flybarless rotorhead eliminates the extra weight, reduces aerodynamic drag, and minimizes slop inherent in mechanical designs.

CONCLUSION

RC helicopters have been around for more than four decades and the basics of the design have not changed much. This new era of stabilization represents the way of the future for helicopter design. It's no secret that many companies are in full force to produce increasingly advanced electronic stabilization systems. RCH

POPULAR **ESS'S**

SKOOKUM SK360

FEATURES: 2-axis system, USB programmed, can be mounted in any direction, suitable for 120, 135/140, and 90-degree eCCPM, as well as mCCPM swashplates.

SPECS

PIECES: 1 Piece
WEIGHT: 16 grams
DIMENSIONS: 41x31x15mm
OPERATION VOLTAGE: 3.6 to 8.5 VDC
SERVO OPTIONS: Digital or Analog
PROGRAMMED: USB, or Transmitter
PRICE: $280
www.skookumrobotics.com

MIKADO V-BAR

FEATURES: 3-axis system, USB programmed, Satellite Receiver ready, Suitable for 120, 135/140, and 90-degree eCCPM, as well as mCCPM swashplates.

SPECS

PIECES: 2 Pieces
WEIGHT: 56 grams
DIMENSIONS: Control Unit: 47x33x16mm, Sensor: 28x28x15 mm
OPERATING VOLTAGE: 3.5 to 9 VDC
SERVO OPTIONS: Digital or Analog
PROGRAMMED: USB
PRICE: $475
www.readyheli.com, www.vstabi.de

ALIGN 3G FLYBARLESS

FEATURES: 3-axis system comes with a full metal head conversion, suitable for 120, 135/140, and 90-degree eCCPM, as well as mCCPM swashplates, software upgradeable through PC interface adapter.

SPECS

PIECES: 2 Pieces
WEIGHT: 25 grams
DIMENSIONS: Control Unit: 42x26.5x14.5mm Sensor: 22.3x21.7x14mm
OPERATING VOLTAGE: 4.5 to 8.4 VDC
SERVO OPTIONS: Analog and Digital
PROGRAMMED: On Unit
PRICE: $369 to $499

SJGD FS600

FEATURES: Designed for electric helicopters from 200 to 90 size, suitable for 120, 135/140, and 90-degree eCCPM, as well as mCCPM swashplates, can be programmed using a portable LCD box.

SPECS

PIECES: 1 piece
WEIGHT: 15 grams
DIMENSIONS: 33x34x18mm
OPERATING VOLTAGE: 4 to 10 VDC
SERVO OPTIONS: Analog and Digital
PROGRAMMED: Using a LCD programming box
PRICE: $335 to $349

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T-Rex 500 Electric Super Pro - #317008	~~$620.99~~
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T-Rex 450 Pro Super Combo - #315074	~~$573.99~~
T-Rex 450 Pro Kit - #310173	~~$427.99~~
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Raptor E620 Kit - #134530	$419.99
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Mini Titan E325 ARF - #101555	~~$264.99~~
Mini Titan E325 SE Kit - #101500	$379.99
Mini Titan E325 w/o electronics - #101472	$129.99
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E-Flite Blade mCX S300 - BNF #142380	$79.99
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Elevated RC Raptor 90 Delrin 90T Main Gear - #254357	$27.99
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LAPTOP COMPUTERS

The smarter way to program!

WORDS: Ryan Kephart

WITH TODAY'S GADGETS AND GIZMOS GETTING MORE COMPLICATED, NEW WAYS ARE REQUIRED TO PROGRAM THEM without having a ton of buttons. This not only saves on the weight of the components, but also allows the user to program their gizmos with an alternate source. The PC laptop is making its way into the hands of many RC helicopter pilots for good reason.

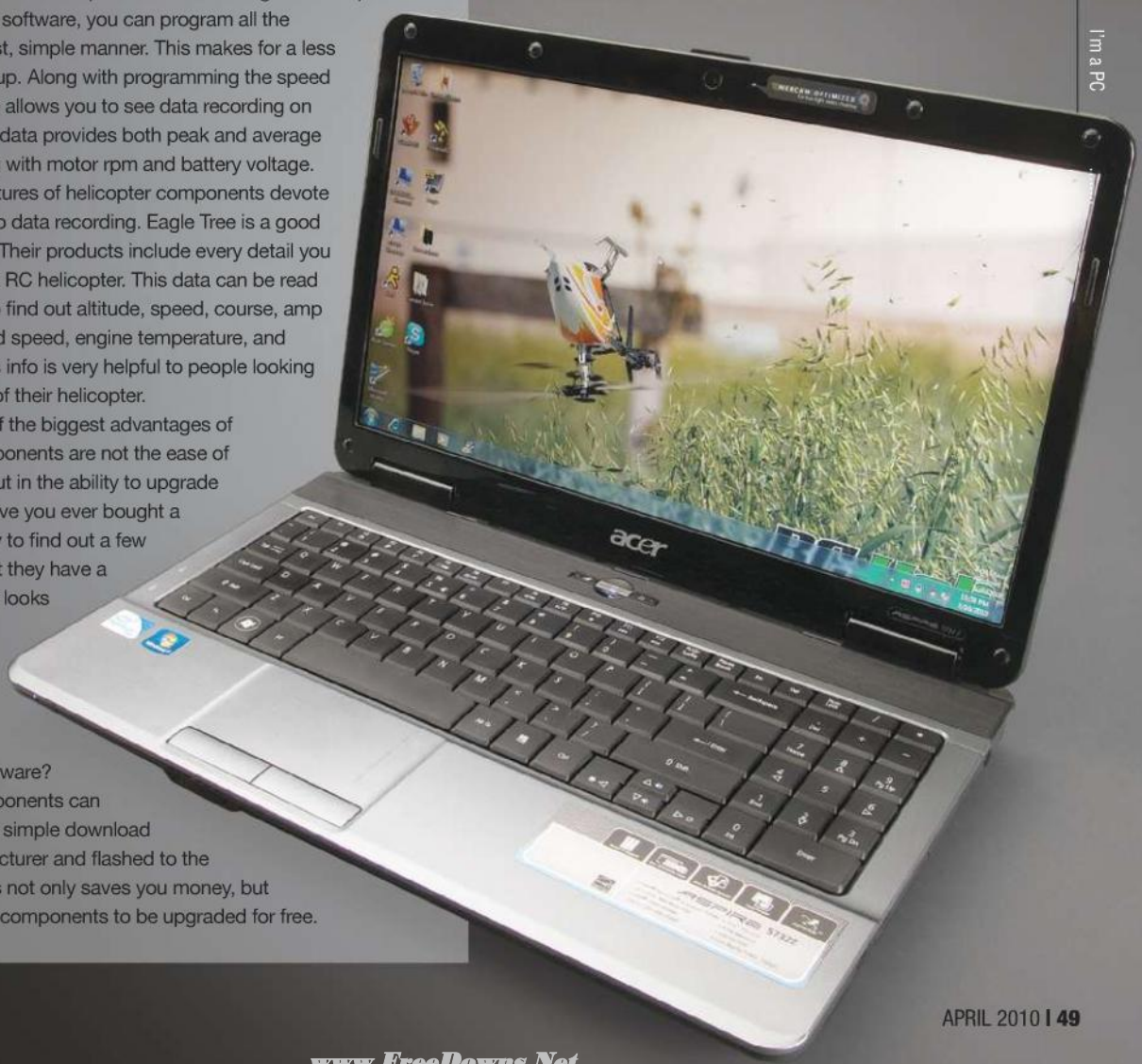
One of the most advanced components of today's helicopters is a flybarless electronic stabilization unit. Mikado, one of the leading manufactures of these units, require the V-Bar to be set up using a PC. What better way to set it up then at the field then with a laptop? This not only makes it easy to set up, but also makes it easy to adjust the parameters at the field.

WHAT ARE THE USES **OF A LAPTOP?**

Laptops can be used for more then just programming your gyro. Many other components can also be programmed through specific software. Castle Creation speed controls are a good example of this. From the software, you can program all the functions in a fast, simple manner. This makes for a less complicated setup. Along with programming the speed controller, Castle allows you to see data recording on your flights. The data provides both peak and average amp draw, along with motor rpm and battery voltage.

Other manufactures of helicopter components devote their resources to data recording. Eagle Tree is a good example of this. Their products include every detail you can think of on a RC helicopter. This data can be read using a laptop to find out altitude, speed, course, amp draw, RPM, head speed, engine temperature, and much more. This info is very helpful to people looking to get the most of their helicopter.

Probably one of the biggest advantages of PC- based components are not the ease of programming, but in the ability to upgrade the firmware. Have you ever bought a component, only to find out a few months later that they have a new version that looks just like yours, but performs better because the manufacture updated the firmware? PC- based components can be updated by a simple download from the manufacturer and flashed to the component. This not only saves you money, but also allows your components to be upgraded for free.



I'm a PC

WHAT TO LOOK FOR **IN A LAPTOP**

If you're looking for a new laptop to aid you with RC helicopters, certain features can benefit you more than others. If you plan on running a simulator, you'll want to look for a computer that has a dedicated video card. These will provide the fastest and most reliable video without overloading the motherboard. A separate video card is not a requirement, as most simulators will run well with an integrated card with more than 512MB of RAM. A good laptop should have a dual core processor and around 1-2 gigs of RAM. If the simulator is not your concern, then video memory is not important. Newer laptops will perform well for programming and reading the data for RC helicopter components. Bluetooth capability should also be considered, as some gyros offer a wireless Bluetooth adapter that allows you to make changes in the programming without using an interface cord.

Yes, Skype and Aim are required tools.

SIMULATOR ON THE GO!

Have you ever been at the field, wanted to try a new move, and then ended up with a pile of helicopter parts on the turf? With newer laptop PC's this can be all but eliminated by the use of a simulator. Most laptops now provide enough video and internal memory to run even the most demanding of simulators.

CONCLUSION

There is no doubt that as electronics get more complex, manufacturers will start using PC software to control and simplify the setups. Buying a laptop can help you along the way. What better way to let your friends give flying a try than with a simulator that they can crash all day without spending a penny? RCH

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REBUILD A NITRO ENGINE

So easy a caveman could do it... if he flew nitro helicopters

WORDS: Shawn Kitchen | **PHOTOS:** Carl Hyndman

YES, I KNOW THAT ELECTRIC POWER IS CLEAN. Yes, I know that 90-size electric helis make gobs of power. Yes, I know that it's considered "green" to power everything from automobiles to bar stools with electric motors. But I can't help it—I love nitro engines! I love the smell of the exhaust, I love the glorious sounds that they make, and I like that they can run all day if you keep stuffing fuel in them. Long live internal combustion!

When you're a nutter for nitro like I am, you'll eventually need to disassemble your engine. More often than not, it's to replace bearings (I've replaced enough O.S. .91 rear bearings that I know the part number by heart), but sometimes it's to do things like replace a ring or sleeve, modify internals (can you say "crank mod"?), or just give it a good going-over. If you've never disassembled a nitro engine before, it can seem a little daunting. But fear not, intrepid reader, for engine rebuilds need not be fraught with fear. Luckily for you, you had the good sense to pick up this issue.

Cavemen, please direct all hate mail to Shawn.

GETTING STARTED

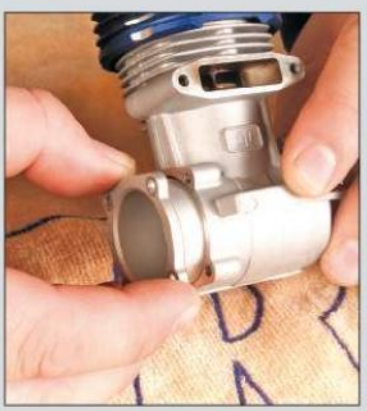
One of the most important steps in doing an engine rebuild is making sure that you have a clean workspace. Proper lighting is essential. Having a few small bowls available helps keep things organized. A little mood music never hurts, either. It's also a good idea to lay an old towel over your work table; small screws have a nasty way of bouncing off a flat, hard surface and rolling into the darkest, most inaccessible corner of the room.

THE BREAKDOWN

Once you have the basics in place, it's actually quite easy to do open heart surgery on your engine. We'll start under the assumption that you've already dropped the engine from your heli's frame and removed the motor mount.

1 Loosen the retaining bolt for the carburetor and remove the carb from the engine. If there's an insulating block between your carb and the engine, remove this as well. Set them in a small bowl so you don't lose them.

2. Remove the engine's back plate.



3. Insert the crank locking tool in the back of the engine and remove the cooling fan and fan hub from the crankshaft.

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

2.0 RC Heli

» TIME TO COMPLETE

60 Minutes

» TOOLS NEEDED

- ALLEN WRENCH SET (METRIC)

- OVEN

- OVEN MITTS

- BAKING SHEET (ALUMINUM FOIL OPTIONAL)

- SMALL PIECE OF 2X4" WOOD (6" LONG IS PLENTY)

- 1/2" WOOD DOWEL

- 3-IN-1 OIL, OR OTHER LIGHTWEIGHT ASSEMBLY/ MACHINE OIL

- CRANKSHAFT LOCKING TOOL

- GLOW PLUG WRENCH

- NEEDLE-NOSE PLIERS

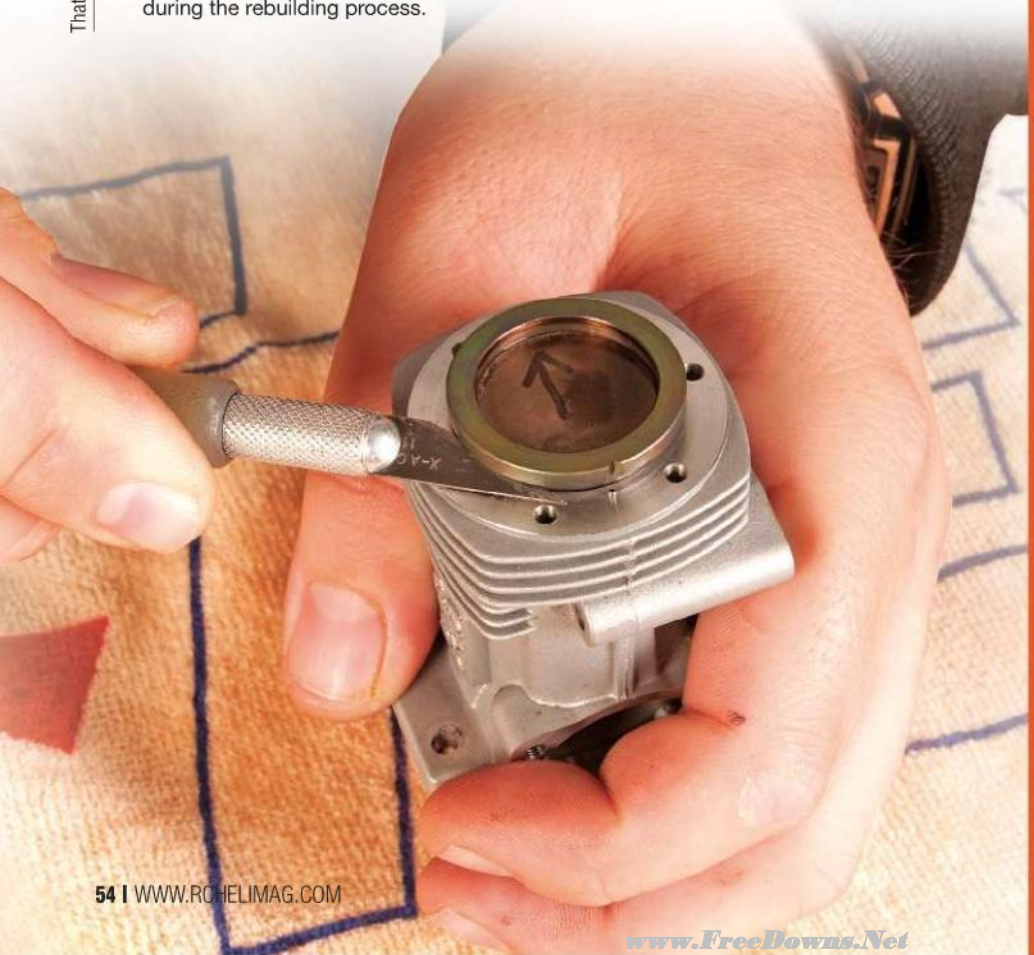
- HOBBY KNIFE

- SHARPIE (PERMANENT MARKER)

4. Remove the bolts holding the cylinder head to the cylinder. The head will lift off at this point. If any shims are present, put them in a bowl to protect them. Make sure they don't get bent, as you'll need to reinstall them later.

5. With your Sharpie, draw an arrow on top of the piston pointing to the "front" of the engine. This will aid in orientation during reassembly.

6. Extract the cylinder sleeve from the engine. In many cases, turning the crankshaft by hand will cause the piston to push the sleeve out of the cylinder. If yours is a little more stubborn, you'll need to use the blade of a hobby knife to wedge beneath the cylinder and the top ring of the liner. Be careful not to break off the small pin on the top of the cylinder that sits in the V-shaped groove on the liner. You'll need this pin during the rebuilding process.



7. After the sleeve is removed, rotate the crank to the TDC (Top Dead Center) position. Use the needle-nose pliers and gently grab the connecting rod through the engine's backplate. Pull gently on the connecting rod until it slides off the crank pin. Remove the piston and connecting rod out the top of the engine.

8. Pull the crankshaft out through the backplate hole.

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This section started out sounding like a baking recipe.

FIRE UP THE OVEN!

Now that you have the engine nearly fully disassembled, the only thing left to do is remove the bearings from the crankcase. For this, we'll hit the button on the Wayback Machine, take a visit to high school science class, and apply some of the science of heat and cold.

Preheat the oven to 350 degrees. Cover the baking sheet with aluminum foil (it'll keep the wife—if you have one—happy and keep your food from tasting like burned synthetic oil). When the oven's up to temperature, stick the engine and baking sheet in there for 5–7 minutes. Take your new bearings and put them in the freezer. Go make yourself a sandwich.

After the time has passed, take the engine out of the oven. Grab it with a pair of oven mitts and gently but firmly pound the backplate side of the crankcase against the piece of 2x4. If the rear bearing doesn't come out after a couple of tries, stick it back into the oven again, heat it up some more, and give it another try. You could also take a small piece of wooden dowel at this point and use it to push out the front bearing from inside the crankcase, but in many cases the front bearing doesn't take the same beating as the rear bearing, and as such doesn't need to be replaced as often.

By this point, the crankcase has probably cooled a great deal. Stick it back into the oven and reheat it. After it's warmed back up, take the bearing out of the freezer and just drop it into the crankcase. With luck, it'll drop right into place. If it doesn't, use the 1/2" wood dowel to work it into place. The bearing needs to be fully seated in order for the engine to be reassembled properly.

While we're doing all this work, now is a good time to replace the piston ring if it's needed. "In for a penny, in for a pound," as they say.

BACK THE WAY WE CAME

We're in the home stretch now! Putting it all back together is as simple as reversing the steps during disassembly.

1. Drop the crankshaft in through the back of the engine.
2. Put the piston and connecting rod back in through the top of the cylinder and slide the connecting rod over the crank pin.
3. Coat the outside of the cylinder sleeve with a little 3-in-1 oil and slide it over the piston. The oil will help it slide into the cylinder. Make sure that the V-shaped cutout in the top of the sleeve lines up with the pin in the top of the cylinder.

4. Place the cylinder head and shims back on the engine and tighten the bolts.
5. Place the crank locking tool in the backplate hole and put the cooling fan back on the end of the crankshaft.
6. Reinstall the backplate and a new glow plug.
7. Reinstall the carburetor (and insulating block if you had one) and re-tighten the retaining screw.
8. Pat yourself on the back for a job well done.

CONCLUSION

Congratulations! You've just performed a successful open heart surgery on your helicopter. If you replaced the piston ring and/or sleeve, remember that you'll need to treat your engine like a brand new unit. This means that you'll need to take the time to properly break in your engine for optimum performance. If all you needed to do was replace a bearing or two, then pump some fuel into the tank and hit the skies! RCH

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ULTIMATE 3D SETUP

So you want to be a 3D master?

WORDS: Brandon Updike | **PHOTOS:** Jason Boulanger & Carl Hyndman

If anyone can tell you how to 3D, it is Brandon.

Everyone who gets into this hobby has goals they would like to achieve. One of the more common goals is to become proficient in 3D flying. 3D flight isn't only challenging on the sticks, but it's also a challenge to obtain the right setup. Even though most of your favorite pilots use all high-end equipment, their setups are generally pretty simple and share a lot of similarities. In this article we'll break down the general consensus of what a "higher end" 3D setup may consist of.

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

2.0 RC Heli

» TIME TO COMPLETE

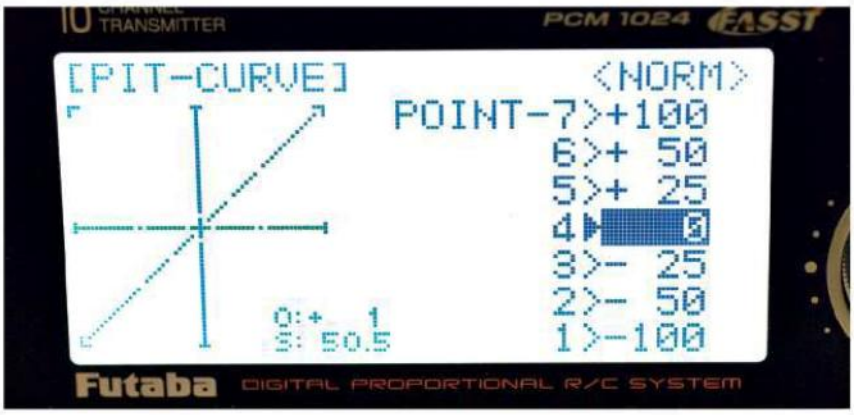
4 hours

» TOOLS NEEDED

- RADIO
- HELICOPTER
- BRAIN

BASIC SETUP

Setting up a 3D helicopter is actually quite simple. 3D pilots like to run a lot of pitch, usually 12 to 14 degrees. Remember that the higher the pitch, the easier it is to bog your motor. The pitch range will usually be symmetrical (even on both negative and positive pitch). This allows your helicopter to exhibit the same flight characteristics while both upright and inverted. Almost all 3D pilots run a linear pitch curve in their radio to mimic the even pitch range in their rotor head, although some pilots like to use an S-shaped curve for a different feel around center stick. All CCPM helicopters need to be set up properly with centered control arms and bellcranks. Everything must be as mechanically precise as possible for the best control.



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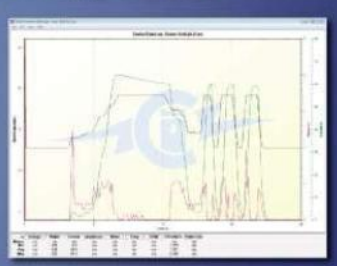

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COMPONENTS

GYRO

This is arguably the most important component when it comes to aggressive flying. A high-end gyro is a necessity when you began expanding your flight envelope and really putting a strain on your tail. You'll want a gyro you can trust to keep your tail steady through all moves. 3D is possible with a low-speed gyro, but you'll find yourself babying the helicopter through maneuvers to prevent the tail from blowing out. A high-end gyro eliminates this. It will also allow you to have a consistent pirouette rate and will allow you to fine tune your pirouette speed to your liking.

FAST SERVOS

Servo technology has come a long way in recent years. Running servos with a direct 8.0v setup is common practice but not all servos can handle that kind of power. When looking for servos, see what voltage they're rated for. Most of the fastest servos on the market are around .07 sec/60° transit speed at 6.0v. One of the more underrated performance specs is torque. High torque servos can really give your helicopter a snappier feel. Top of the line servos will have a torque rating of over 200oz-in. Find a servo that has both a high-speed rating and a high torque rating.

GOVERNOR/LIMITER

Some of the old timers may tell you that the only true way to fly is with pitch and throttle curves. However, the only way to get optimum performance from your engine is by the use of a governor or a limiter. Each component does what their names imply; a governor will lock in a specific head speed, while a limiter will limit it from surpassing a certain head speed.

There are many different makes and models of helicopters, and setup is dependent on the type that you get. For .50 size helicopter your headspeed can range from 1900rpm to 2200 rpm, while a .90 will most likely range from 1800-2000rpm at the most. Most governors and limiters use a sensor that picks up a reading from a magnet that is glued to a fan. With electronic assistance, you'll notice a great increase in consistency in your engine performance. For electrics you might have a governor option built into the speed controller. However, most pilots run a straight line in their throttle curve for optimum performance. Some may lower the curve in the center to get the head speed down. Gear ratio will also affect your head speed.

RECEIVER BATTERY AND REGULATOR

If you're running a setup that will not be able to handle straight current, you'll need to regulate it. Regulators modulate the power output of your batteries to a specific voltage to prevent damage to electronics. Most high-end regulators will regulate your servos to 6.0V and your gyro and other components to 5.1V. Some regulators are capable of regulating 7.3V. It's advantageous to run a setup with a regulator because your servos won't see spikes in power. If you decide to run straight voltage to your electronics, you'll need a step down transformer to regulate the power going to your gyro and tail rotor servo. Some receivers have this step down built into it. You'll notice a huge increase in performance if you increase the output to your servos (but only if they're rated for it!).

There are many options when it comes to receiver batteries. Most pilots use Li-Po receiver packs in their setups that are usually 3-cell packs with varying mAh ratings. The higher the mAh rating, the more flights you'll be able to get out of the pack. However, the packs get heavier as the capacity rises, so there is a tradeoff. Another popular choice is A123 packs. These packs are unique in that you can charge them in about 10-15 minutes. With high-end batteries, you need to invest in a quality charger.This is important for the health of your batteries and your safety.

BLADES AND PADDLES

One of the more underrated components in a setup is your choice of blades and paddles. For hard 3D you want a stiff carbon fiber blade setup and that's it! The lightest blades you can possibly find will give you a faster cyclic speed. Newer blades have a marked effect on cyclic speeds. Paddles also make a huge difference. Airfoil design and weight can make your helicopter fly hyper reactively or very sluggishly. You'll want to find a good set of paddles that will be a balance between the two. Carbon fiber tail blades will give you crisper tail response, but you can get away with plastic blades.

CONCLUSION

If you want to really get into 3D flight, don't sell yourself short and opt for the cheaper products. High-end equipment will make performing aggressive 3D easier and the equipment more durable . However, the setup isn't what makes the pilot, and it really comes down to how good your thumbs are. Once you begin flying harder, you'll notice the differences that various components might bring to your helicopter. RCH

SERVOS

Anatomy, Care, and Repair

WORDS: Chuck Bassani | **PHOTOS:** Carl Hyndman

We all have our own unique flying style. These styles will range from sport flying all the way through to hard core 3D. As a rule of thumb, the harder we push our machine, the more attention we should pay to the health of our servos.

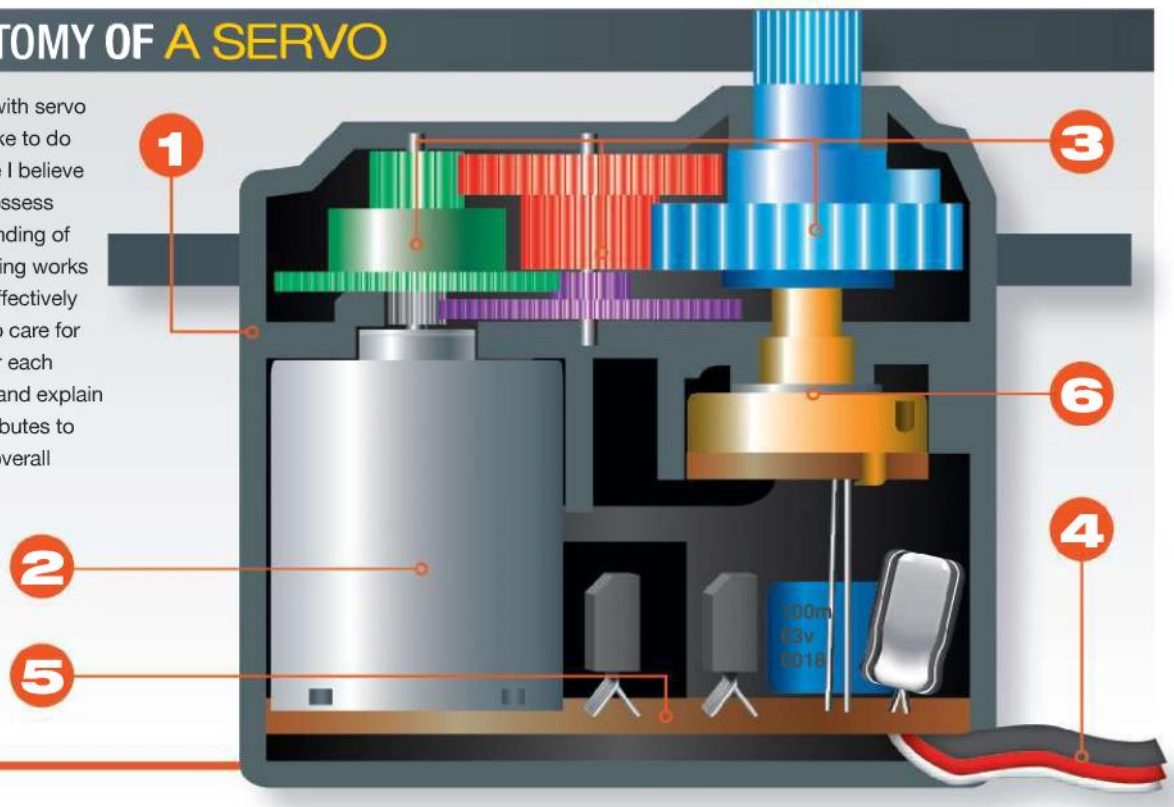
Servos bear the brunt of the aggression we take out on our heli and are prone to failure simply by the effects of their operating environment. Things like self- generated heat, vibration, and force feedback from the control surfaces are primary contributors to a servo's overall wear and tear. Then there's the inevitable crash; this single event can impose quite a shock on just about every component.

This month, let's dissect a servo and see what makes it tick. I'll go over what you can do to minimize the destructive potential the heli places on it. Finally, I'll discuss how to make the necessary repairs, should that need arise.

It's what is on the inside that counts.

» ANATOMY OF A SERVO

Let's begin with servo anatomy. I like to do this because I believe one must possess an understanding of how something works in order to effectively know how to care for it. I'll go over each component and explain how it contributes to the servo's overall operation.



1. CASE

The servo's case serves as an enclosure that protects the servo's internal components from the elements. It has mounting tabs for attaching the servo to the helicopter. Holes or cutouts in those tabs accommodate the fasteners. Rubber grommets are commonly used when vibration damping is needed. Eyelets inserted through the grommets help prevent over-compression when tightening down the fasteners, because over-compressing the grommets will reduce their vibration damping capability.

Internally, the case provides mounting surfaces for the internal components. Servo cases are typically molded from nylon or plastic, although some of the high-end servos will use metal case parts in order to provide better heat dissipation qualities and a more solid structure. The mating surfaces between the case parts, the output shaft's exit hole, and the servo lead's exit hole may be sealed with rubber o-rings and grommets to further protect against contamination.

Notice that this particular servo uses a metal center section to improve rigidity and heat dissipation.

2. MOTOR

The servo's motor converts electrical energy to the mechanical motion necessary to move the servo's output shaft. The two commonly used types of motors are 'cored' and 'coreless'.

Cored motors contain armatures made up of wires wrapped around iron cores, and are the less expensive and least efficient of the two types. High performance servos often use coreless motors. Coreless motors respond quicker because their armatures are constructed using only the wire. The wire is formed and held in shape with nothing more than a bonding agent, producing an armature that has much less mass than its cored counterpart.

Both of the motors discussed so far are 'brushed' motors, meaning they use carbon brushes to form the electrical connection between the stationary part of the motor and the spinning armature. The brushes need to make physical contact with the armature, creating an associated transmission loss at the junction due to the inherent resistance. And because spring tension is used to keep the brushes firmly pressed against the armature, friction is also produced, further contributing to inefficiency.

High-end servos take coreless motors one step further, essentially eliminating the brushes. These are marketed as 'brushless' servos. Brushless servo motors contain coils that are switched on/off in phases, so no physical contact is required between the stationary and rotating parts of the motor (other than the bearings supporting the shaft). This offers a significantly quicker response time as well as a substantially longer service life.

Coreless motors have very light-weight armatures, allowing them to accelerate faster.

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

3.0 RC Heli magazine

» TIME TO COMPLETE

20 Minutes

» TOOLS NEEDED

- MINIATURE PHILLIPS, SLOTTED, & HEX DRIVERS
- NEEDLE NOSE PLIERS
- SMALL DIAGONAL CUTTERS
- WIRE STRIPPER
- LOW WATTAGE, FINE-TIPPED SOLDERING IRON AND RESIN CORE SOLDER
- TOOTHBRUSH
- DE-SOLDERING BULB OR SOLDER SUCKER
- HEAT- SHRINK TUBING
- SERVO DRIVER

Yes we went down to the core of a servo.

ANALOG VS. DIGITAL

THERE'S REALLY NO APPRECIABLE DIFFERENCE BETWEEN ANALOG AND DIGITAL SERVOS with respect to the majority of their components (case, motor, gear train, etc.). There is however one MAJOR exception; and that's the servo's control board. Suffice it to say, the performance difference between the two types is dramatic.

It has long been convention for the servo's input signal's frame rate to be in the neighborhood of 45 Hz (or 45 times per second). This frame rate is fairly close to an analog servo's upper limit. Digital servos, on the other hand, are capable of accepting input pulses at a much faster rate. This allows them to responding more quickly to changes in commanded position. Peripheral components such as gyros, throttle governors, and most recently the new breed of high-speed receivers are all capable of driving digital servos at a higher frame rate.

When a servo is at position, there's really nothing actively forcing it to hold a position. The motor is not energized, and remains off until some event overcomes the servo's deadband (smallest change in position that the servo will recognize). This event could be either a change in its specified position or some external force acting on or moving the servo's output arm. Once the deadband is overcome, the motor is once again energized.

Now here's the big difference … Analog servo motor drivers 'pulse' the motor at the input signal's frame rate of around 45 times per second. These motor driver pulses have a duty cycle that's essentially

Digital is the way to go.

3. GEAR TRAIN AND OUTPUT SHAFT

In order to transfer motion from the motor to the output shaft, the servo utilizes a series of gears commonly referred to as the 'gear train'. The first stage is a small gear called a pinion; this is mounted on the end of the motor's shaft. This in turn meshes with a larger intermediate gear that contains a smaller output gear. When smaller gears drive larger gears, speed is reduced and torque is increased. In servos, there are typically multiple stages of gear reduction. Manufacturers design gear ratios to produce specific speed/torque characteristics. The final gear in the train contains the servo's output shaft. Depending on the servo, the output gear and shaft may be supported by bushings, bearings, or a combination of the two.

Servo gears are made from a variety of materials. Non-metallic gears are commonly made from plastic, nylon, or some proprietary formula such as Hitec's 'Karbonite' gears. Metal gears may be made from steel, brass, titanium, or proprietary composite, and are considered to have a longer life expectancy and better survivability in a crash. Typically, they are more expensive than their non-metallic counterparts and are commonly found in high-performance servos.

Servos with metal gear trains offer longer life and better crash resilience.

4. LEAD AND CONNECTOR

A servo's lead consists of three flexible wires. These wires are required to transfer electrical power as well as a position signal to the servo.

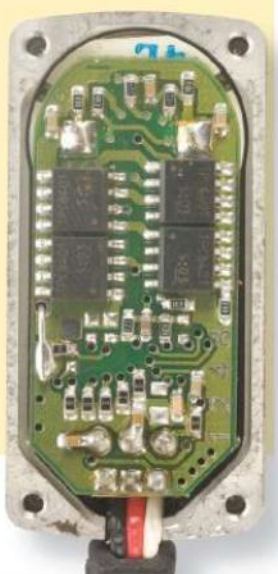
The exposed end of the lead has pins enclosed in a molded housing known as the connector. Inside the servo, the lead is attached to a board containing the servo's control electronics. Where the lead exits the servo, you'll often find a rubber grommet. This grommet provides both strain relief a seal to help keep out contaminants. Check this grommet regularly, as it is prone to hardening and/or splitting.

5. CONTROL ELECTRONICS

A servo's 'control board' contains the circuitry (and sometimes firmware) necessary to decode the input signal, interpret the servo's output shaft position, and drive the servo's motor.

Input circuits must first determine the width of the incoming position pulse. That width specifies the desired output position.

Using the servo's position feedback sensor, the control electronics can compare the actual position of the output shaft with the specified target position. If the output shaft is not at the target position, the control electronics will energize the motor, spinning it in the appropriate direction. The mechanical motion generated by the motor is transmitted through the servo's gear train, moving the output shaft towards the target position. Once the position sensor indicates the output shaft is at the target position, the motor is turned off.



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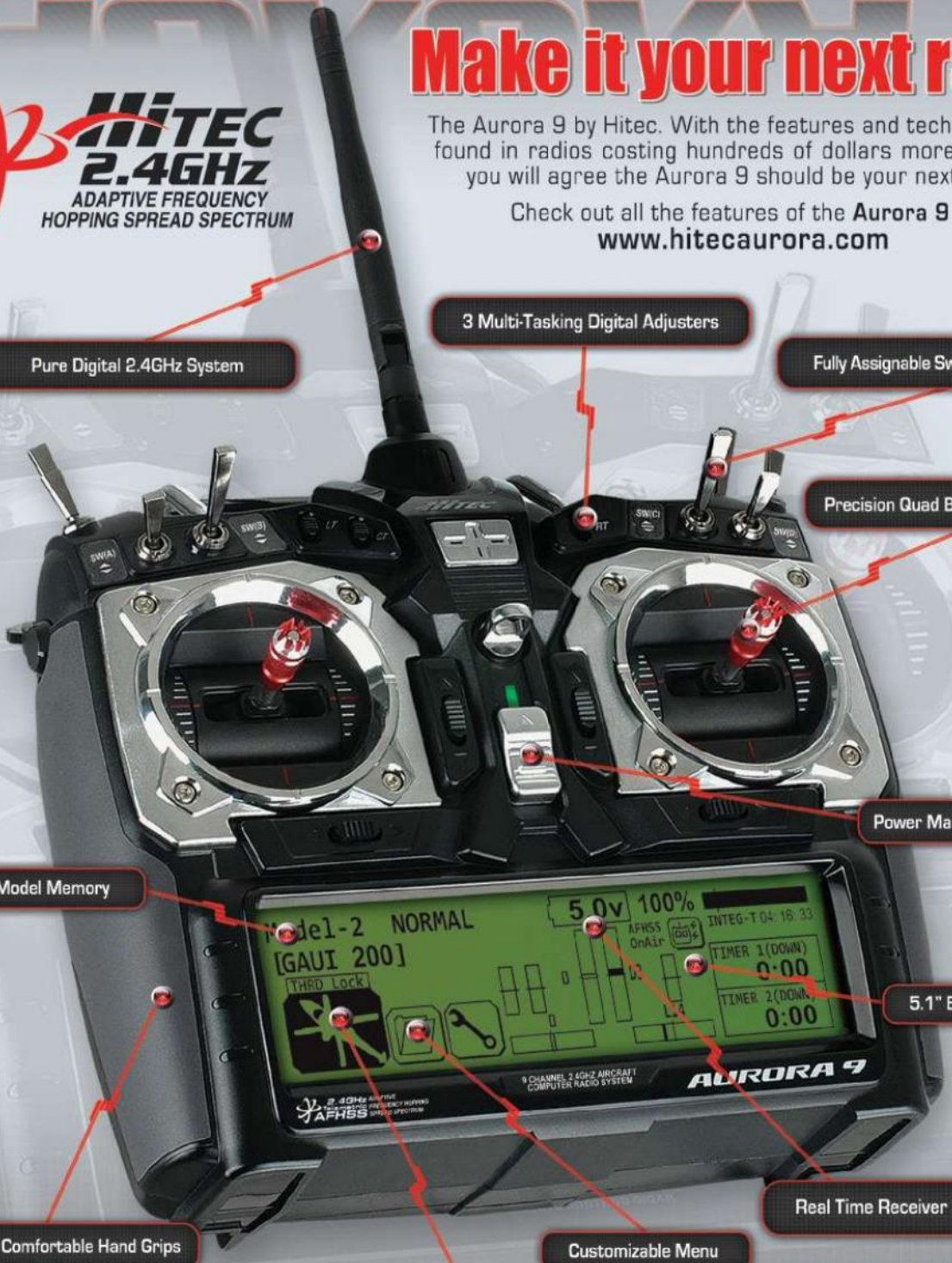

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ANALOG VS. DIGITAL CONTINUED...

proportional to the difference between the servo's actual and target positions. From this you should be able to realize that the short duration pulses (such as those that would be generated due to a small change in position) will not keep the motor energized for as long as those that are produced as a result of a large change in position. Consequently, full torque will not be developed. This is why analog servos aren't exceptionally good at position holding.

Digital servo motor drivers operate at a much higher frame rate (in the order of 333 Hz). This allows the motor to come up to speed much more quickly, allowing it to develop full torque much more quickly. The benefit is substantially greater holding power. This comes at a price, though – digital servos consume more power.

Another thing to be aware of regarding digital servos is that techniques used in the motor driver's control logic do vary across models and brands. For example, analog servos historically go limp upon loss of an input signal. Digital servos, however, may be designed to hold the last commanded position for a while under this same circumstance. Also, the number of consecutive pulses required for a digital servo to traverse a complete change in position may vary as well. Some can do it with as little as one pulse, while others may take many. The point is that digital servos are not all created equal.

Many digital servos are programmable. Programmable digital servos will allow you to tailor some of their operating characteristics, such as transit speed (the ability to slow it down), deadband, travel limits, fail safe position, etc.

Lube it or lose it.

6. OUTPUT POSITION SENSOR

The output gear's shaft also drives a position sensor. This 'feedback sensor' is typically a variable resistor called a potentiometer.

A potentiometer is a resistor with movable tap, called a wiper. The resistance (and subsequent voltage drop) between the wiper and its end terminals will change in proportion to the wiper's position. The control electronics use this voltage as a way of determining the servo's output shaft position.

PREVENTIVE MAINTENANCE

Let's take a look at what we can do to help keep our servos in good operating condition. Some simple tasks, performed periodically, will help extend your servo's service life.

CASE

Oil residue and other contaminants will cause premature wear of the gear train and moisture will cause corrosion if it gets inside the servo. Most servos – and especially the inexpensive ones - don't generally provide sufficient seals between the case halves or around the output shaft and servo lead exit holes.

A small dab of silicone sealer around the servo lead where it exits case will keep the elements from getting in. It will also provide additional strain relief. If you have rubber o-rings between the case halves, lube them up periodically with some petroleum- based grease. If there aren't any o-rings, a small bead of silicon sealer applied to the seams will do wonders. You don't need much, just a very thin film.

Another thing you want to keep an eye on are the rubber mounting grommets. They're consistently exposed to oil, dirt, and vibration fatigue. Change them at the first sign of cracking or deformation. They are the only source of damping between the servo and the airframe. Most importantly, don't over tighten them.

SECURE THE LEADS & CONNECTORS

Proper servo lead strain relief is crucial for preventing an electrical failure. Over flexing will stress the wires, resulting in intermittent operation or total failure. When routing and securing the leads, take caution to not allow them to run past any sharp edges that may cut through the insulation. If you use nylon wire ties, wrap a small piece of silicon fuel tubing around the lead wherever the tie comes in contact with it. This prevents the wire tie from cutting into the insulation. Better yet, use small hook & loop (Velcro) straps instead of nylon cable ties wherever you can. They won't t cut into the wires like the cable ties often do.

Pulling on the leads and vibration can cause the connectors to come loose. There are many products on the market designed to secure the male/female servo connectors junctions.

I prefer to use a piece of heat shrink tubing for this job. When heated, the tubing shrinks around the connectors and the connection will never come apart. This method also keeps oil and grime out, keeping the connection clean.

KEEP THE GEAR TRAIN LUBRICATED

Gears wear out from normal use. It's a good ideal to periodically inspect, clean, and re-lubricate them.

This maintenance also includes the pin- type gear shafts as well as the bushings or bearings supporting the output shaft. Check bushings for play and replace them if necessary. If you notice any sign of worn or broken gear teeth, replace the gear set.

Use your cell phones camera to take a photo if you're unsure of the order of things.

HOW DO YOU DO IT?

Now that you know what needs to be done, you're probably wondering how to do it. The technique explained here are the same whether you're performing maintenance or repair.

INSPECTION

This is the key to determining the health of your servos. It is especially important to perform a detailed inspection following a crash.

Begin with a thorough visual inspection. Look for cracks or dings in the case. A damaged case is a good indication that the servo took a pretty good hit. Try moving the output arm by hand. There shouldn't be any play in the gears. The lead should not have any kinks or frayed wires. Make sure the connector isn't broken and makes a nice, solid connection.

If all looks good here,then disconnect any pushrods attached to the servo. Operate the servo while applying slight resistance to its movement. Make sure that it can travel its entire range without any unusual noise or erratic operation. A stand-alone servo driver works best here, as you can move the servo across its entire range without upsetting your programming. . If your output arm/wheel doesn't seem to positively engage with the output shaft, the output shaft's splines may be damaged.

Intermittent operation can be a little more difficult to track down. It can usually be traced to a broken wire, failed solder connection, or a cracked circuit board.

DISASSEMBLY

Although this may seem obvious, unplug and remove the servo from your helicopter. Keep a small bowl nearby for containing all removed parts. Consider labeling the parts, as it will help you remember where they go during reassembly.

Begin by removing the servo arm/wheel. This is secured to the output shaft with one screw. Next, look at the case; you'll notice small screws holding it together. Remove all of them. Carefully separate the case. If there's an o-ring seal, be careful not to damage it. Separating the case exposes the control electronics, motor, gear train, and feedback pot.

GEARS

Be especially observant while removing the gears. They MUST be removed and re-installed in the proper order. The pinion gear is pressed onto the motor shaft and does not need to be removed. The final gear is supported by bushings and/or bearings. This gear also contains the output shaft and interfaces with the feedback pot.

To clean the gears, wipe off the old grease with a paper towel. Use a toothbrush to get between the teeth. Wipe off the gear shafts as well. Spread some fresh grease on the shafts and gear teeth and reassemble the gear train. When reinstalling the gears, do not force them. They should just slip into place.

***NOTE** - Gears can be manufactured from a variety of materials. Not all gear types require lubrication. Follow the manufacturer's recommendation as to what kind (if any) of lubricant should be used.*

BEARINGS / BUSHINGS

The bearings and bushings slip onto the output shaft. Simply slide them off to clean or replace.

If your servo has bushings, they are cleaned and greased just as the gears are. Replace them if there are any nicks or signs of deformation or play. Bearings should rotate smoothly. Any binding or gritty movement warrants replacement. To clean bearings, soak them in denatured alcohol and blow them dry with compressed air. Finally, lubricate them with grease.

RPM RC Products makes a "Bearing Blaster" tool that works perfectly for cleaning out bearings. Simply insert the tube from a can of motorspray found in the RC car section of your hobby shop.

Continued on page 101.

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You wouldn't know it but the wind was gusting this day!

Miniature Aircraft USA FURY 55

The Fury is back

WORDS: Mark Madsen | **PHOTOS:** Jason Boulanger

MINIATURE AIRCRAFT USA HAS BEEN AROUND FOR A LONG TIME AND HAS ALWAYS BEEN KNOWN FOR THEIR QUALITY, competition grade helicopters. From their classic XL-Pro design to their Fury line, Miniature has always stood for quality. Now that they have been acquired by FlyCo, Miniature's future is even brighter with their own in-house CNC shop and additional resources. The first offering since the deal is the new Fury 55. Miniature has attempted to make mid-size helicopters in the past, but none were ever a true market successes. They were generally scaled down from their flagships and proved to be too heavy for their class. Now Miniature feels that they have winner with a simple original design that still maintains the quality they're known for. Are they able to pull it off?

» AT A GLANCE	
SIZE:	50-size
POWER:	Nitro
TYPE:	Pod and Boom
BUILD TYPE:	Kit
TAIL DRIVE:	Belt

Mark forgot to put on the skid caps.

FEATURES

The Fury 55 comes with a carbon fiber frame and a lot of CNC machined aluminum parts. Anyone familiar with Miniature Aircraft will quickly recognize the head even though it does have some small cosmetic changes. Overall, there hasn't been a design quite like this from Miniature Aircraft.

» MAIN FRAME

SWASH CONTROL: *The Fury uses a direct connect 120° CCPM control system. It's a clean setup that isn't commonly seen in larger sizes of helicopters.*

COMPONENT LAYOUT: *The cyclic servos are mounted directly below the swashplate in a direct connection setup. The two forward cyclic servos sit on separate mounts that are bolted to the frame. The battery sits on the angled component tray on the front of the helicopter along with the receiver. There are holes cut out of the plate to run straps through them and around the components. The engine can be removed from the side of the helicopter thanks to a removable carbon plate on the side of the frame. The fuel tank sits to the rear of the helicopter.*

DESIGN: *The carbon fiber side frames are a one-piece design that has the Fury 55 name cut into it. All of the bearing blocks are nicely machined aluminum. The frame is a very clean design with a large opening for the entire motor assembly to be removed with ease.*

CANOPY: *The kit comes with a pre-painted Canomod fiber class canopy that comes in a multi-color scheme. Overall, it's not a bad looking canopy and the quality is actually pretty good. The canopy mounts on two aluminum posts with rubber grommets at the rear, and two aluminum posts with thumbscrews on the front.*

LANDING GEAR: *The landing gear is the familiar "two struts and two skid pipe" design. The struts are made of black plastic and have elongated holes for different mounting positions on the frame. The landing gear screws into aluminum tabs that are screwed to the frame.*

Quality that you can see.

» DRIVE TRAIN

ENGINE/MOTOR MOUNT: The engine mounts to two aluminum motor mounts that bolt to an aluminum plate sitting between the frames. After the assembly is completed, the motor can be removed from the side of the helicopter.

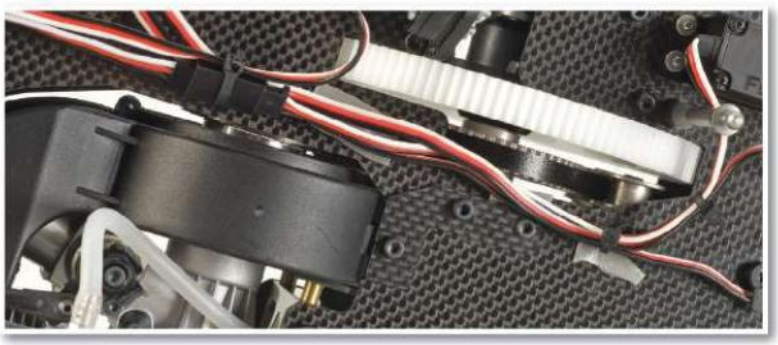
CLUTCH: The pinion comes already fitted to the clutch bell. The clutch bell slides into a one-piece aluminum bearing block. The start shaft slides through the clutch bell assembly and is held in place by the starter coupler. The clutch is screwed to the fan hub with the use of two machine screws.

COOLING FAN AND SHROUD: The fan shroud assembly is fitted to the motor before installation. The fan shroud design is a little different, as there is a carbon fiber plate installed inside the shroud for added stability. There are also tabs on the side of the shroud fitted with a rubber grommet that slides into the frame.

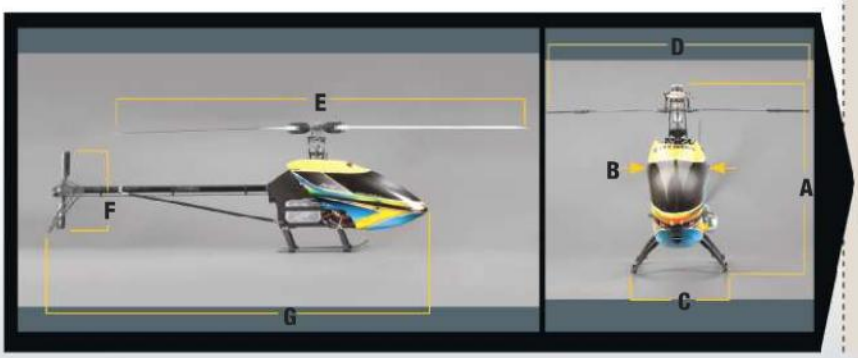
MAIN GEAR: The white plastic main gear has the autorotation hub screwed into it. It sits nicely in the main frame, as there is barely any clearance to the rear as it rotates.

AUTOROTATION DRIVE: The autorotation hub screws into the main gear with the one-way bearing inside of it. The one-way bearing requires lubrication for smooth movement. There are bearing blocks that are both above and below the main gear.

TAIL DRIVE: The belt pulley is CNC aluminum and is one of the nicer pulleys I've seen. It sits below the main gear and has teeth to grip the belt.



"HAVING PERSONALLY FLOWN MANY MINIATURES DATING FROM THE CUSTOM 60 DAYS, I BELIEVE THIS IS THEIR BEST COMBINATION OF DESIGN AND PERFORMANCE TO DATE."



Miniature Aircraft
FURY 55
MODEL SPECIFICATIONS

CLASS:	.50 Size Nitro
BUILD:	Kit
BLADE SIZE:	600mm
LEVEL:	Intermediate-Adv.

FRAME

MATERIAL:	Carbon Fiber
TYPE:	One-Piece
SERVO TO SWASH LINKAGE:	Direct connection
SERVO SIZE:	Standard

ROTOR HEAD

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

TAIL

DRIVE SYSTEM:	Belt Drive
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Dual-point
TAIL BLADE GRIPS:	Plastic
TAIL CASE:	Metal & CF
BOOM STRUT MATERIAL:	Carbon fiber

GEARING

MAIN ROTOR TO PINION RATIO:	8.54:1
MAIN ROTOR TO TAIL RATIO:	4.6:1

WEIGHT

EMPTY:	4lbs 84oz (2195g)
WITHOUT FUEL:	7 lbs 5 oz (3400g)
FULLY LOADED: (includes fuel)	8 lbs 3 oz (3764g)

DIMENSIONS

HEIGHT (A):	17in (431mm)
CANOPY WIDTH (B):	5 in. (127mm)
LANDING GEAR (C):	8 in. (203mm)
PADDLE TO PADDLE DIA. (D):	24 in (609mm)
MAIN ROTOR (E):	30 in. (762mm)
TAIL ROTOR (F):	10 in. (254mm)
LENGTH (G):	47 in. (1194mm)

FEATURES CONTINUE

» TAIL & BOOM

BOOM: *The aluminum tail boom is 22 mm in diameter and 736mm long.*

TAIL CASE: *The tail case is a two-plate design. The plates are made of carbon fiber and bolt to the aluminum transmission clamp on the boom. There is also an aluminum post to the back that bolts the plates together and houses the tail pitch bellcrank. There is also a tensioner pulley near the output shaft to keep tension on the belt.*

PITCH ACTUATOR SYSTEM: *The tail rotor bellcrank screws into the post at the back of the tail case. It has two bearings and a brass sleeve fitted between them. The bellcrank is connected to the ball on the pitch slider. The slider moves smoothly on the tail output shaft and has two control arms pinned to it.*

TAIL BLADE GRIPS: *The plastic blade grip has radial and one thrust bearing in each grip. They are held to the tail hub assembly with a lock nut.*

» ROTOR HEAD

HEADBLOCK: *The aluminum head block is a revamped version of Miniature's traditional rotor head. It uses the double rubber O-ring and C-clip design. It utilizes a pin that holds the head block to the main shaft. The pin is held in place with a setscrew. There are also two bolts that help clamp it to the main shaft.*

BELL/HILLER ARMS: *The aluminum Bell/Hiller arms come with dual bearings press fitted in them. I They are screwed to the main grip with a self-tapping screw. They do have input options but Miniature Aircraft does not recommend setting the link on the inside hole.*

PHASING: *There are two phasing pins that come out of the head block and go straight to the washout assembly. There is no play in this setup.*

WASHOUT ARMS: *The plastic washout arms have dual bearings with a brass sleeve fitted between them. It screws into the plastic washout base with two self-tapping bolts. The washout link is pinned to the washout arm with a pivot pin and an e-clip.*

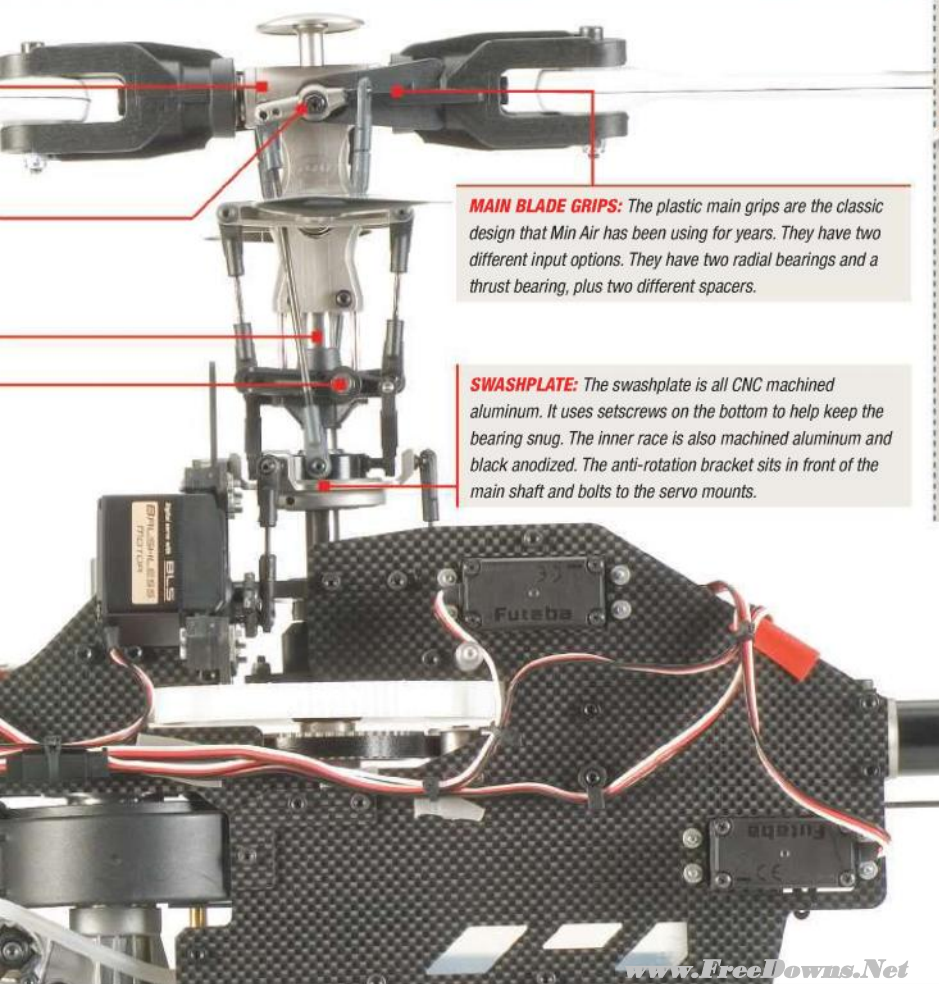
» INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX

The box is highly decorated with several different pictures of the Fury 55. It's a stark contrast to the box that comes with the classic Fury heli but more reminiscent of the old X-Cell's in the 90's. All the parts come in well-organized bags that are separated for each build section. There is also a large bag that contains all the different hardware for each section. The canopy comes well protected and has its own area within the box. Min Air also included a bench towel with its logo.

MANUAL AND BUILD

Anyone who's built a Min Air heli in the past knows that it's a builder's heli. They usually contained a million parts and had a manual that was mostly text and hard to decipher. I was surprised to find out that this helicopter was a very simple build and the manual was very well done. Each step had a drawing and description to compliment it. There was an error in the manual with the bolt that threads into the aluminum tail transmission clamp. It had you screwing into the wrong side, rendering the clamp useless. Also, with shimming the head the manual called for two shims but this made popping the C-clip in nearly impossible. Miniature acknowledged this error and said that there is a new manual already completed. Other than that, the build was super easy and went without a hitch.



MAIN BLADE GRIPS: *The plastic main grips are the classic design that Min Air has been using for years. They have two different input options. They have two radial bearings and a thrust bearing, plus two different spacers.*

SWASHPLATE: *The swashplate is all CNC machined aluminum. It uses setscrews on the bottom to help keep the bearing snug. The inner race is also machined aluminum and black anodized. The anti-rotation bracket sits in front of the main shaft and bolts to the servo mounts.*

Miniature Aircraft
FURY 55
RTF & TEST GEAR

» TEST GEAR

- **RADIO:** Futaba, 10CHG, FUTK9256, $649.99

- **RECEIVER:** Futaba, R6008HS, FUTL7639-GP, .48oz. (13.5g), $139.98

- **CYCLIC SERVOS (3):** Futaba, BLS352, FUTM0554, 2.2oz. (63g), $159.99 ea.

- **THROTTLE SERVO:** Futaba, BLS352, FUTM0554, 2.2oz. (63g), $159.99

- **TAIL SERVO:** Futaba, BLS254, part number, 1.8oz. (51g), $139.99

- **ENGINE:** OS, 55HZ-H, 15630, 14.39oz. (408g), $299.97

- **RECEIVER BATTERY:** Intellect, IP2300 mAh, IP-2300J2S2P, 4.78oz. (136g), $19.99

- **GYRO:** Futaba, GY520, FUTM0810, .243oz. (6.9g), $149.97

- **REGULATOR:** Scott Gray Products, Reactor X, SGH5268X, 2.01oz. (57g), $134.99

- **BLADES:** Mavrikk, G5 Pro, 802259, .62oz. (280g), $79.99

Yes RC car receiver batteries will work for helicopters too.

TESTING

The Fury 55 takes quite a departure from past Miniature Aircraft designs. The much simpler build and overall simplicity of design was a breath of fresh air. Even though I've loved the Miniature Aircraft heli's of the past, I've learned over the years that you really don't need a complicated helicopter to fly well. It is nice to see a dedicated .50 size design from them and I was eager to get it in the air.

HOVERING • The direct link control system made setup on this helicopter easy. I followed the link measurements from the manual and it was pretty close to perfect without adjustments. When I flew the helicopter for the first time, I only needed to add a small amount of trim to keep it centered. The tracking was perfect and the helicopter felt locked in. I expect most larger scale helicopters to fly hands-off and the Fury 55 was no exception. It remained super stable as I hovered it in all orientations.
Rating: 5

FORWARD FLIGHT • I started out with some slow circuits to get a feel for the helicopter and I was immediately impressed. Following the head settings in the manual, the helicopter was docile and easy to maintain in a straight line. I was happy that Miniature was able to maintain its awesome stability, staying close to their roots from their early F3C models. During high-speed circuits the helicopter really shined as it cut through the air with precision.
Rating: 5

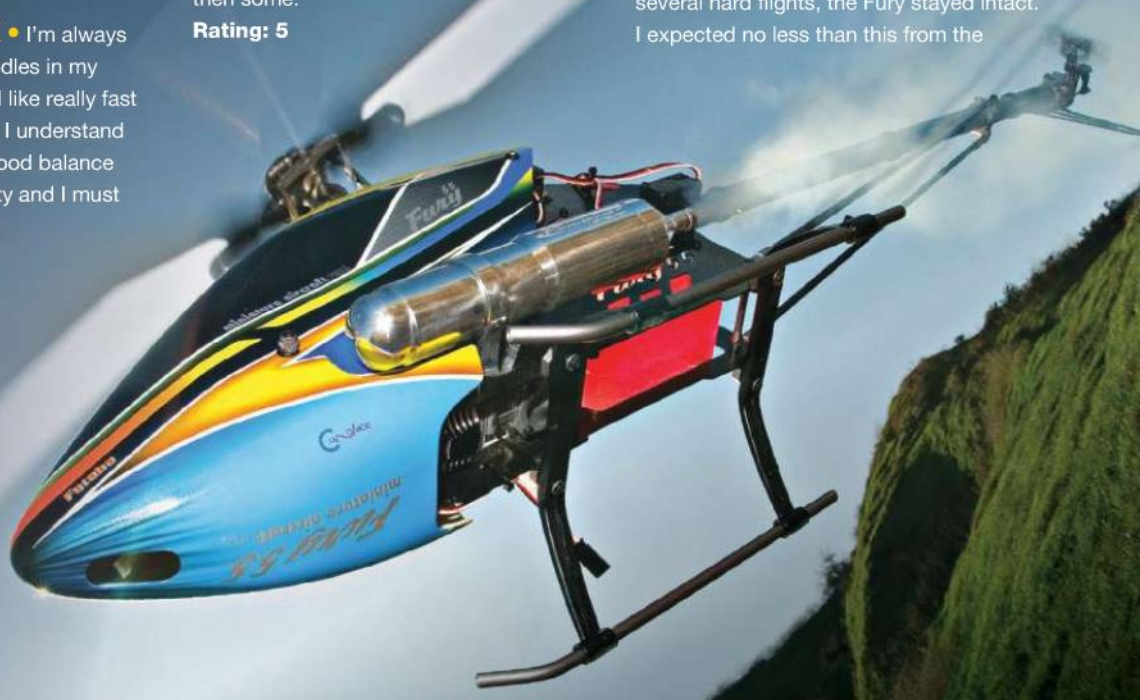
CYCLIC PITCH RESPONSE • I'm always skeptical to use stock paddles in my helicopter setup because I like really fast cyclic response. However, I understand that there needs to be a good balance in cyclic speed and stability and I must say that the stock paddles do just that. They performed very well through 3D maneuvers, but the stability was still there when I needed it. The paddles allowed me to maintain a straight line through maneuvers. Overall, I was happy with the balance between precision and speed with the stock setup.
Rating: 4.5

COLLECTIVE PITCH RESPONSE • Having flown many different .50 size models, I've developed a pretty high standard when it comes to collective response. Being smaller than their .90 counterparts, they generally fly more nimble with excellent collective response. I'm happy to say that the Fury 55 paired with the OS-55HZ makes a deadly combination with great collective response. After playing with the needles for a little while, I was able to find the sweet spot in the power band. Whenever I punched the collective, the helicopter would cut through the sky with large amounts of power but would stop on a dime whenever I chose. It was everything that I expected from this helicopter and then some.
Rating: 5

TAIL ROTOR RESPONSE • Any tail rotor paired with a GY520 gyro will perform very well. With its simple tail belt design, the only thing that I was worried about was whether the belt would slip. I made sure that belt tension was perfect and began putting heavy loads on the tail. It never slipped and always stayed consistent during pirouettes. I've always felt that belt-driven tail rotors were underrated in performance and had a reduced risk of failure in comparison to a torque tube design. I was happy to see Miniature Aircraft go this route.
Rating: 5

AUTOROTATION CAPABILITIES • The Fury 55 was what I expected for autorotation performance in a .50 size heli. It holds its headspeed well and has good tail control. I did many high altitude autorotation, and all of them were performed without a hitch. There was enough headspeed built up to flare the helicopter for long periods of time.
Rating: 5

POST FLIGHT INSPECTION • After doing several hard flights, the Fury stayed intact. I expected no less than this from the



A pre-painted canopy from MA is a nice addition.

A HEAD OF OUR TIME

Hirobo's new SDX .50 kit with cutting-edge head design

The SDX carries Hirobo's legendary reputation for quality and durability complemented by MRC's excellent service and huge parts inventory. See the SDX .50 at your hobby dealer or visit www.modelrectifier.com

Hirobo's SDX .50 is the most competitive .50 ever developed. It borrows advanced head technology from our .90 Turbulence D3, winner of the 2007 Masters and 2008 XFC Championship. The SDX can be minutely adjusted for a wide range of performance levels, from beginners to seasoned 3D pilots.

The SDX... more tunable and adjustable than any .50

The rotor head furnishes outstanding control for any maneuver, while a precision machined, aluminum hub and spindle design easily cope with the most demanding 3D flying.

All three control bell cranks rotate on a single pivot as opposed to the conventional two or three. In addition, the new swash plate delivers almost 60% more precise movement than our older aileron and elevator throws... result: there's no binding, and we've virtually eliminated control interaction.

Unlike ordinary .50s that deliver only 120° eCCPM mixing geometry, the SDX provides both 120° and 135° options for unprecedented precision and rock solid control.

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TESTING SPECS

Miniature Aircraft USA X-CELL FURY 55

Part #: FURY55
Distributor: Heli Wholesaler
Web: www.heliwholesaler.com
Street Price: $629
Price as Tested: $2885
Build/Setup Time: 16 hours

PERFORMANCE

MODE FLOWN:	Normal, Idle 2
RPM OF EACH MODE:	Normal: 1700 Idle Up 1: 1950 Idle Up 2: 2070
ENGINE TEMP (after flight):	180° F
FLIGHT TIME:	6 minutes
CRASH COST:	$45.33

TEST CONDITIONS

WEATHER:	Sunny
TEMP / HUMIDITY:	68° F/ 41%
BAROMETRIC PRESSURE:	30.04 in.
WIND SPEED:	5 mph
VISIBILITY:	10 miles
ALTITUDE:	675 feet

PITCH CURVES

NORMAL:	-13, 0, 13
IDLE-UP 1:	-13, 0, 13
IDLE-UP 2:	

REQUIRED TO FLY

Radio transmitter, receiver, all required servos, gyro, engine, muffler, battery, battery charger, Blades

WHO'S IT FOR?

Anyone looking for a quality good flying .50 size helicopter.

» SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

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

THE GOOD

- Excellent quality
- Simple design
- Great performance

THE BAD

- A little expensive

impressive build quality of the helicopter. I put the helicopter through its paces for many flights and it continues to hold together without any issue.

Rating: 5

CONCLUSION

I'm happy with the route that Miniature Aircraft took with this helicopter. It is much simpler than past designs, but doesn't skip out on the quality that MA was always known for. It also performs like the helicopters of their past and is one of the better flying .50's I've flown. With many of the components now being produced in-house for Miniature, I see a much brighter future as they continue to expand their X-Cell line of helicopters. Having personally flown many Miniatures dating from the Custom 60 days, I believe this is their best combination of design and performance to date. RCHL

Look out for a video of the Fury 55 in action.

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Esky BELT-CP CX

Your first scale kit

WORDS: Brandon Updike | **PHOTOS:** Carl Hyndman

FOR MANY YEARS ESKY HAS PUT OUT PRETTY GOOD BEGINNER HELICOPTERS, GOING ALL THE WAY BACK TO THE HONEY BEE SERIES. They also found retail success with the Belt CP, which allowed them to venture into bigger helicopter kits. In the past we've reviewed the E-Smart and the G-Smart and found them to be great sport helis. Esky went back to their roots by refining their Belt CP, now called the V2. The V2 improved on certain characteristics and is overall a better helicopter. To fulfill the needs of the scale lovers, Esky is offering the Belt CP with a scale body. In this case, the new Belt-CP CX is a V2 fitted with a Bell 222 fuselage. With the sport flying tendencies of the past now mixed with scale appearance, Esky might have a potential winner on their hands.

This fuselage even had Brandons colors.

» AT A GLANCE

SIZE:	450
POWER:	Electric
TYPE:	Scale
BUILD TYPE:	Ready To Fly [RTF]
TAIL DRIVE:	Belt

His Aurora is painted red and black too!

FEATURES

So pretty much this is a Belt-CP V2 fitted with a scale body to keep things simple. It comes with a pre-painted plastic utility style helicopter body that is already fitted to the frames. All the components needed to fly are included making this a true RTF.

» MAIN **FRAME**

SWASH CONTROL: *Three servo, 120 degree CCPM is used for the control. The Belt CP uses a series of bellcranks and even uses a push-pull layout for the forward elevator servo. The two servos to the rear are connected to plastic bellcranks that are, in turn, attached to the swash. Each bellcrank contains bearings.*

CANOPY: *The polycarbonate Bell 222 body comes pre painted with a red, black and white scheme that looks pretty clean. Overall, the scale features are pretty nice, such as the motor exhaust ducts and minor body details. The body is split into two parts and the rear one is mounted on two aluminum posts with the use of grommets. It is also screwed to the frame with two screws on the bottom of the helicopter. The front part slides onto the landing gear and also mounts to the same canopy posts with the use of grommets. It also is mounted to two plastic posts located on the back half of the body using grommets.*

DESIGN: *The Belt CP uses one-piece plastic frames with plastic bearing blocks. Overall, the design is well thought out and everything works together well.*

COMPONENT LAYOUT: *The servo locations are unique for a helicopter of this size because they implement the use of bellcranks instead of the standard direct connect system we generally see. Two servos sit to the rear of the main shaft with one sitting all the way below the boom. The other one sits all the way towards the front of the helicopter on the angled tray. The motor sits comfortably in front of the main shaft in its own motor mount. The battery has a nice compartment towards the bottom front of the helicopter where it's a perfect fit.*

LANDING GEAR: *The landing gear is a classic two-piece plastic strut design with two skid pipes. It is connected to the frame via landing gear tabs.*

Belt CP on the inside. Scale body on the outside.

» DRIVE TRAIN

MOTOR MOUNT: The motor mounts inverted on a plastic motor mount directly in front of the main shaft. It cannot be adjusted for gear mesh.

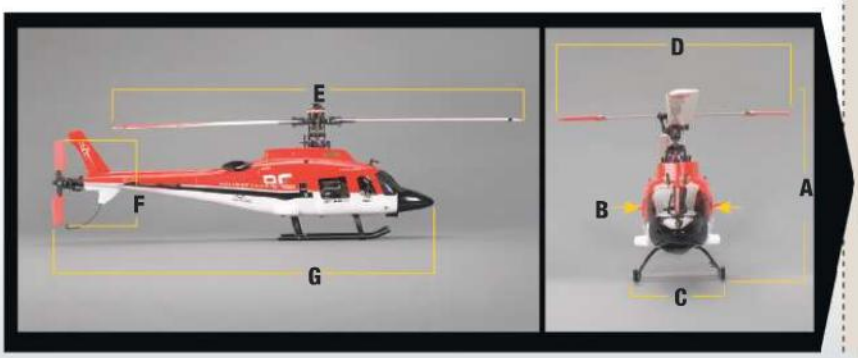
CLUTCH/PINION: The 11-tooth brass pinion comes press fit onto the motor shaft.

MAIN GEAR: The black plastic main gear, like most main gears, is molded with lightening holes.

AUTOROTATION DRIVE: The one-way sleeve is pressed into the main gear. The bearing is also fitted.

TAIL DRIVE: The plastic tail drive gear is placed right below the main gear and meshes with a gear on the bottom of a secondary shaft. The shaft turns a gear on the top that holds tension on the tail belt.

"THE BELT CP CX IS A VERY SOLID SCALE FLYER FOR ANYONE LOOKING FOR AN ENTRY INTO THE SCALE WORLD."



Esky
BELT-CP CX
MODEL SPECIFICATIONS

CLASS:	450 sized electric
BUILD:	RTF
BLADE SIZE:	325mm
LEVEL:	Novice-Intermediate

FRAME

MATERIAL:	Plastic
TYPE:	One-Piece
SERVO TO SWASH LINKAGE:	Bell cranks with both single and push-pull configurations
SERVO SIZE:	Micro

ROTOR HEAD

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

TAIL

DRIVE SYSTEM:	Belt Drive
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Dual point
TAIL BLADE GRIPS:	Plastic
TAIL CASE:	Plastic
BOOM STRUT MATERIAL:	N/A

GEARING

MAIN ROTOR TO PINION RATIO:	1:14.15
MAIN ROTOR TO TAIL RATIO:	1:4.4

WEIGHT

EMPTY:	0 lbs., 14 oz. (389g)
FULLY LOADED:	1 lbs., 7 oz. (670g)

DIMENSIONS

HEIGHT (A):	9in (230mm)
CANOPY WIDTH (B):	6.25in (158mm)
LANDING GEAR (C):	4.5in (115mm)
PADDLE TO PADDLE DIA. (D):	12.5in (318mm)
MAIN ROTOR (E):	26.5in (680mm)
TAIL ROTOR (F):	5.5in (140mm)
LENGTH (G):	25.5in (650mm)

We couldn't figure out which full size model this is modeled after.

FEATURES CONTINUED

» TAIL & BOOM

TAIL CASE: *The plastic tail case is made of two halves and clamps onto the boom. There is an aluminum tensioning pulley above the belt.*

BOOM: *The aluminum boom is 340mm in length and 12mm in diameter.*

TAIL BLADE GRIPS: *The plastic blade grips have one bearing each with no thrust bearings. They're screwed to the tail hub and each tail grip uses a bolt and nut.*

PITCH ACTUATOR SYSTEM: *The tail linkage rod connects to a dual bearing equipped control arm. The control arm bolts to a sleeve that slides along the tail output shaft. The sleeve has two pinned arms that connect to the blade grips for pitch control.*

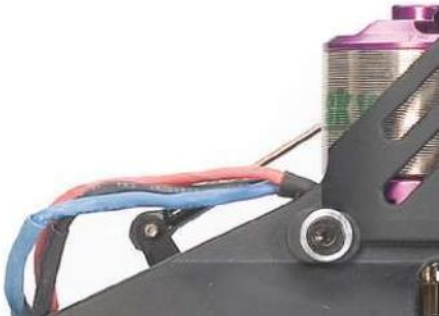
» ROTOR HEAD

BELL/HILLER ARMS: *The Bell/Hiller arms are located on the flybar seesaw above the blade grips. They're plastic and have dual bearings in each arm.*

HEAD BLOCK: *The plastic head block attaches to the main shaft with the use of a single Jesus bolt. There is also an aluminum plug fitted in the center of the head to help keep the spindle from rotating. The flybar assembly is all located above the head rather then below, making the head block a little taller than usual. There is one rubber o-ring on each side of the head axle for damping.*

PHASING: *Two phasing pins are pressed into the head block and run through the washout assembly.*

WASHOUT ARMS: *The plastic washout arms contain two bearings each for smooth movement. There are no output options.*



Looks kinda like a Dauphin

» INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX

The helicopter comes in a nicely decorated fold out box. Inside, the helicopter sits nicely in cutouts along with the necessary components such as the transmitter and charger. Everything was well packed and fit in its designated slot without any signs of moving around. The box even has a handle.

MANUAL AND BUILD

The kit actually comes with two manuals; one is a regular Belt-CP book while the other is a Belt-CP V2 book with the scale information in it. Each manual does a good job considering that most RTF manuals don't have much information at all. Each manual had a complete breakdown on helicopter assembly and parts list. It had the typical basic setup breakdowns and checklists to help give you an idea on what to do when starting.

Esky BELT-CP CX

RTF & TEST GEAR

» SUPPLIED GEAR

- **RADIO:** Esky, 2.4GHz 6-Chan Transmitter, 00989

- **RECEIVER:** Esky, 2.4GHz 6-Chan RX, EK2-0424, .4oz. (10g),

- **CYCLIC SERVOS (3):** Esky, DigServo, EK2-0508, .3oz. (7g)

- **TAIL SERVO:** Esky, Tail servo, 001609, 1.2oz. (33g),

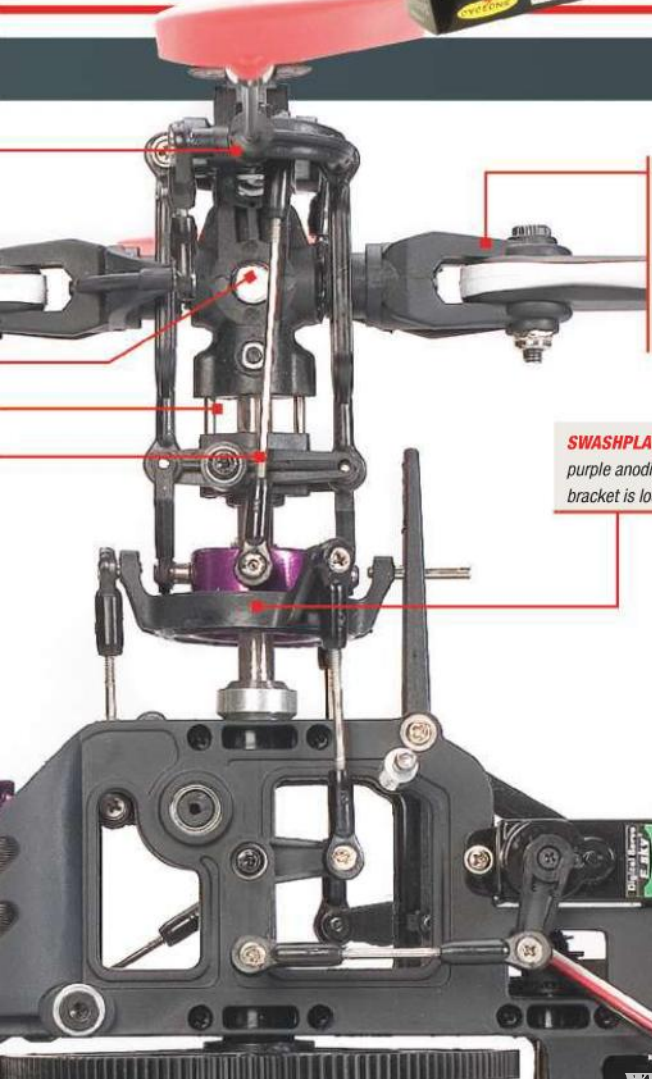
- **SPEED CONTROL:** Esky, Electric Speed Control, EK1-0350, .9oz. (24g)

- **MOTOR:** Esky, Brushless Motor, 001134, 1.8oz. (49g)

- **BATTERY:** Esky, 1800 mAh Li-Po, EK1-0186, 5.2oz. (146g)

- **GYRO:** Esky, Gyro, EK2-0704B, 4oz. (11g)

- **BLADES:** Esky, Wooden Blades, 1.6oz. (44g)



MAIN BLADE GRIPS: *The plastic main blade grips use a rubber o-rings for the damper system. There is also a regular thrust bearing assembly setup with additional bearings at the base of the blade grip.*

SWASHPLATE: *The plastic swashplate has a purple anodized inner race. The autorotation bracket is located behind it.*

A look out to follow!

TESTING

With Esky's history of focusing on the beginner market, I knew this was going to be an easy flyer. Pair this with the scale body and you have a combination that will always go hand in hand. However, with most RTF's, there is usually a question about the quality of the electronics. The only question with this one is whether it is suitable enough to perform scale- like flying.

HOVERING • After charging the pack I wasted no time getting the Belt CP into the air. After plugging everything in the helicopter and binding the radio, I began my spool up. My initial impression was that it hovered very well. Very little trim was needed, as it was able to keep its place with relative ease. When I flew it in heavier breezes, the heli was pushed around a little bit but was still tolerable.
Rating: 4.5

FORWARD FLIGHT • Usually, well set up helicopters with a scale body perform forward flight easily. The Belt CP CX was no exception, as it performed forward flight very well. The helicopter always stayed on track and it was easy to keep into the air. There were times where I needed to add a little more collective but overall it did just fine and was very manageable. It did get a little weird at times, though, as the tail would blow out randomly. Adjustment to the gyro gain may be required out of the box.
Rating: 4

CYCLIC PITCH RESPONSE • As you can imagine, the cyclic was very slow but is in keeping with this helicopter. This ones an easy flyer, so don't expect your cyclic to be rippin' by any means. The cyclic was very suitable when I was doing my circuits and felt like it had a good speed reserve.
Rating: 3

COLLECTIVE PITCH RESPONSE • There is hardly any collective response with this heli, but once again it's expected. If you goose the collective it'll take a little while for the helicopter to go anywhere, so watch how close you are to the ground. You'll lose altitude quickly if you're not paying attention. There were a few instances where I wanted a little more input, but for basic flight there isn't much need for a lot of collective. Just keep an eye out on your height and you'll be okay.
Rating: 3

TAIL ROTOR RESPONSE • This was easily the weakest link of the helicopter, as the tail never really felt quite right to me. It will hold fine in a hover, but when any kind of load is applied to the tail things get a little tricky. When adding a moderately quick collective input the tail would blow out. Also, when gaining higher speeds during forward flight the tail would begin to lose track and sometimes blow out. These unpredictable blowouts can be a little nerve racking but aren't too hard to recover from. I adjusted belt tension and tried to play with the minimal gyro settings without much effect. It does a decent job for basic flight, but could be better.
Rating: 3

AUTOROTATION CAPABILITIES• I tried a couple autorotations, which are always tricky with 450's. With the heavy scale body I wasn't expecting much and to no surprise it didn't perform that well. I don't think its fair to score it in this category.
Rating: 2.5

POST FLIGHT INSPECTION • Everything went well, but after flying for a little while I had a lockout for which I was unable to figure out the exact cause. The lockout resulted into a crash. It definitely felt like a radio caused lockout. If you do decide to pick up this helicopter I would look into possibly upgrading your radio system. Other than that, the helicopter held up well to its sport style flying.
Rating: 3

CONCLUSION

The Belt-CP CX is a very solid scale flyer for anyone looking for an inexpensive entry into the scale world. The servos are suitable for easy flying and even though the tail setup isn't quite the best it will get you through the basics. My only concern is the radio system. It's a 2.4 system with a decent list of features, however I wouldn't push the range. Be sure to perform a thorough pre-flight inspection and range check before each flight. The price is right and the performance is solid for a machine of this type. Esky has been around for years and parts availability is good online. RCH

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TESTING SPECS

Esky **BELT-CP CX**

Part #: 002728
Distributor: HeliDiect
Web: www.helidirect.com

Street Price: $249
Price as Tested: $259
Build/Setup Time: 1 hour

PERFORMANCE

MODE FLOWN:	Normal
RPM OF EACH MODE:	Normal: 1600 Idle Up 1: N/A Idle Up 2: N/A
MOTOR TEMP (after flight):	150° F
BATTERY TEMP (after flight):	105° F
FLIGHT TIME:	6 minutes
CRASH COST:	$25

TEST CONDITIONS

WEATHER:	Sunny
TEMP / HUMIDITY:	73° F/ 37%
BAROMETRIC PRESSURE:	30.32 in.
WIND SPEED:	3 mph
VISIBILITY:	10 miles
ALTITUDE:	675 feet

PITCH CURVES

NORMAL:	-9, 0, 9
IDLE-UP 1:	N/A
IDLE-UP 2:	N/A

REQUIRED TO FLY

Thumbs

WHO'S IT FOR?

Anyone wanting a good cheap scaled RTF

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

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

THE GOOD

- Nice body
- Stable flyer

THE BAD

- Questionable electronics

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E-FEST TWO-THOUSAND TEN

WORDS and PHOTOS: Mark Fadely

Two-Thousand Ten marks the fifth edition of America's biggest indoor RC event. Here in the frozen Midwest all pilots eagerly await this annual wintertime mega fly- in. Heli and airplane pilots can't wait to get inside a warm arena to take off their gloves and fly. E-Fest (hosted by Great Planes) is the largest indoor fun fly and welcomes all types of RC aircraft. This year there was a record attendance of 340 registered pilots!

Great Planes and Futaba host the event in the University of Illinois Track and Field Armory in Champaign, Illinois. The building is huge and has 100' high ceilings. Frank Noll heads up the organizing committee that makes sure that everything is taken care of. The event was held January 30th – 31st. Frank chooses the darkest, dreariest part of winter to hold the event. He says it brightens every pilot's spirits to fly at E-Fest when the outdoor conditions are so dismal.

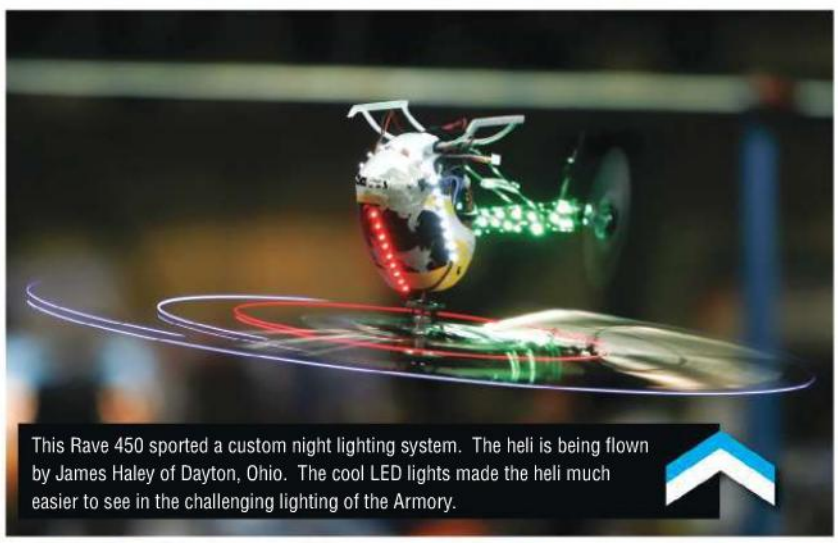
3/4 of a mile, call the ball.

SPECIAL HELI AREA AT E-FEST

Safety is a prime concern at E-Fest. This year, perimeter netting was installed around the heli flying zone. This was a welcome addition that made all the people in the nearby pits feel a lot safer. Last year there were a few out-of-control helis that flew outside the designated fly zone. There is no worse feeling than to be sitting at a table working on your heli when a rogue 3D 450 lands in your lap. The see-through netting was about 10' high and encompassed the entire heli airspace. The organizers need to be congratulated for this excellent safety addition. The helis and 3D airplanes get one end of the building to themselves, and that is where the nets were set up. The main floor area is reserved for airplanes flying in a racetrack pattern. The size limit for helis at E-Fest is 450 and smaller with blades of 350mm or less. Fortunately, there were no serious incidents this year.

18-year-old Peter Sripol brought his incredible foam aircraft carrier again this year. A mechanical undercarriage from an RC car enables Peter to drive/float the craft around the micro flying area. Each day hundreds of pilots attempt to land and take-off on the flight deck.

The E-Fest 2010 3-D Smackdown competition pilots lineup for the award presentation. L-R (Eric Brandenburg, Nick Maxwell (winner), Kyle Stacy, James Haley, Jamie Robertson, AJ Jaffe, Andy Ponocillo, Curtis Youngblood).



This Rave 450 sported a custom night lighting system. The heli is being flown by James Haley of Dayton, Ohio. The cool LED lights made the heli much easier to see in the challenging lighting of the Armory.

Curtis Youngblood shocked the 2010 E-Fest crowd with some old-school 3-D demonstrations. Curtis owns the company that makes the Rave electric heli. Larger outdoor Nitro-powered Raves were on display at the event.

3D SMACKDOWN CONTEST

At 7pm Saturday all flying was shut down so that the heli 3D Smackdown could take place at center stage. This is an annual event that attracts thousands of spectators from the general public. This year the lineup of pilots was potent. Everyone was surprised to see the master, Curtis Youngblood, emerge from the crowd with his new Rave 450 in hand and ready to do battle with the youngsters. The other pilots who signed up were Nick Maxwell, Kyle Stacy, Jamie Robertson, Eric Brandenburg, AJ Jaffe, Andy Ponocillo, and James Haley. James Haley and AJ Jaffe were first-time competitors who did a great job flying hardcore 3D in a difficult indoor environment. Even though E-Fest is held in a huge space, the modern 450 size helis can get away from a pilot quickly and find their demise in a wall or ceiling at any time.

The DJ played each pilot's custom music during their flight. Curtis's flight was excellent. He showed everyone that his superior outdoor skills could translate to work with smaller indoor models. His fast-moving flight demonstrated the precision capabilities of Rave 450 heli. Last year's Smackdown winner, Kyle Stacy, threw down a flight that could easily qualify him for the Heli 3D Hall of Fame. Jamie Robertson was right there with Kyle in his display of unreal 3D smack. In fact, all eight Smackdown pilots wowed the audience with flights that would have won any 3D contest in the world just a short time ago. There had to be only one winner though, and that pilot was Nick Maxwell. Nick just keeps raising the bar in his flying. The energy he packs into each radical performance is like watching an artist in action. Congratulations to Nick and all the other brave competitors that stepped up to thrill the crowd of thousands. It's very intimidating to fly in an armory in front of all your peers and with so many spectators watching every move.

Nick Maxwell proudly holds the $500 winner's check for his 1st place finish in the Smackdown. Nick works and flies for Curtis Youngblood Enterprises.

Heli-Max has a new Sea Cobra to accent their Novus line of helis. This is a nano sized scale heli that looks as good as much larger machines. It flies great and tracks well in forward flight.

IF IT FLIES, YOU WILL SEE IT AT E-FEST

The micro flying area is on the opposite end from the heli area. There were people of all ages flying anything from RC surfboards to clear plastic balls with rotors on top. Our friends Peter Sripol and his brother Steven, were there again this year. They brought dozens of uniques aircraft of their own designs. 18 year-old Peter designed and built a scale aircraft carrier for everyone to use. It used RC car mechanics inside which allow it to be "sailed" around the E-Fest tarmac. Peter showed me his latest heli project. It was a Blade CX heli with a custom heli fuselage. He spent a lot of time flying it around the aircraft carrier making take-offs and landings while interacting with the other helis and planes. The E-Fest organization even added a "Micro Port" mini airport runway and obstacle hoop to the micro area this year. This added a new element of fun for the pilots in that section.

WHY COME TO E-FEST?

The best reason to make the trip to Champaign is for the fun. I heard everybody saying how much fun they had all weekend. After all, isn't that what this hobby is all about? The central location of E-Fest makes it convenient and close for a lot of people. If you live close enough and need a break from the cold Midwest winter, then get to E-Fest 2011. HH

This is Nick Maxwell's winning Rave 450 heli. It used a 3-cell Lipo battery and 350mm Radix rotor blades. When Nick gets behind the sticks everyone takes notice. Besides being a great pilot he is a super nice guy.

JC Zankl has catapulted his flying skills into the upper echelons. He is a competition pilot that flies for Empire Hobbies and Gaui. Here he is showing how stable the Gaui 200 series helis are while inverted.

This is a view of the 3-D heli area and the protective nets that were installed. The nets will stop any rogue helis from flying into the crowd. The E-Fest organizers are to be commended for this smart safety addition.

OUTRAGE VELOCITY 50

With Eric Brandenburg

WORDS: Mike Velez | **PHOTOS:** Carlos Galavis

Looks cold, better put some booties on that heli!

Outrage has been around for years, producing some very solid electric kits. Last year they made a huge splash on the competition scene with the release of the Velocity 50. It is a state-of-the-art modern 50-size nitro kit. We were instantly impressed with the helicopter's performance and LONG list of included features. There were essentially no options because it was a fully loaded kit. This, coupled with an aggressive street price, make it a real winner.

Since the kit's release, the Outrage flight team has grown. One young, up-and-coming pilot for Outrage is Eric Brandenburg. Eric is 19 and resides in Milwaukee, Wisconsin. He's been flying helicopters for 5 years and has quickly become a known pilot on the competition seen. He made the cut in last year's XFC and has been invited to fly in the 2010 3D Masters in the Masters category. We sat down with Eric to find out more about his Velocity 50, how he has it set up, and how he tunes it for the performance he needs.

PILOT **PROFILE**

Age: 19
Residence: Milwaukee Wisconsin
Years Flying: 5
Sponsors: Outrage RC, Spartan, YS Engines

KIT BUILDING

The auto hub bearing has been upgraded since the first kits were shipped from the factory. The initial batch had some bearings that were failure prone. The new bearing is distinguished by a laser etched "Outrage" on the sleeve.

It was very rare, but some of the earlier kits also experienced premature clutch failure. Since then Outrage has upgraded the clutch and is including it with all kits shipped in the last few months.

The newest swashplates have also been upgraded from 2mm to 2.5mm bolts on the balls. All new kits have all the updates, but if you purchased an older helicopter you can contact the hobby shop you bought your kit from, or you can contact Helidirect for your updates.

"Follow the directions" might seem obvious enough, but many builders take things for granted. Read the directions carefully and also check with the Outrage website for any addendums or additional tips. ***www.outragerc.com***

ERIC'S GEAR

Eric's sponsorships include Outrage RC, YS Engines, and Spartan RC. Which means many of the items he runs are purchased with his own hard earned cash.

■ RADIO: Eric is using a JR 9303 2.4GHz and loves this radio. It offers all the features he needs to fly any helicopter and likes the feel when combined with a G-Force transmitter balancer. He also performs a radio mod which entails removing the throttle stick tensioner, which allows the collective to feel frictionless in order to get a more smooth pitch response. Without the mod Eric felt that during precise maneuvers the collective would feel a little "sticky" and by removing the stick tension the collective no longer had that unwanted feeling.

■ ENGINE: Eric's engine choice is a stock YS .56 SR. He runs the needle settings at ¼ turn in from the break-in positions from the manual. He doesn't change the settings unless there's a 20° or more temperature change from his baseline conditions. This engine runs best at lower RPM than the OS .55 or Novarossi .57. Because of this, the powerband feels more like an electric. This means that the helicopter should be geared to achieve target headspeed with the motor turning roughly 17,600 RPM. This allows you to maintain the increased torque with a consistent headspeed rather than running higher rpm on the engine and rotorhead and bogging into the powerband under a load.

■ RECEIVER: Eric uses a Spektrum 7100R receiver, however he doesn't use the built-in governor. Eric runs the gyro and throttle servo at 5.2V, which is the regulated voltage from the receiver. On the cyclic servos, power is unregulated from an Outrage 2-cell 2100mah Li-Po receiver battery.

■ BLADES: Giving his machine lift are a couple of SWE 630s. These blades have a narrower cord than other blades, so he has no problem going a bit bigger without sacrifice. Eric likes the collective pop and general floaty feeling that these blades allow due to the decreased disk loading. The Velocity is a bit bigger than most and is capable of running 640's.

Looks like a hot setup though

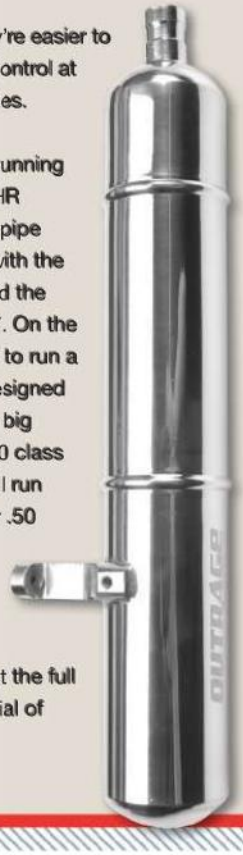
ERIC BRANDENBURG

■ TAIL BLADES: Eric uses the stock tail blades. Any 95-105mm carbon tails will work just fine though.

■ FUEL: Outrage Formula 30%, easy to tune, consistent, and provides good lubrication.

■ PADDLES: He likes the stock paddles. Some other team members like the SWE paddles that are slightly lighter. They're more aggressive and provide a faster cyclic rate. Eric likes the stock paddles and feels that they're easier to maintain full control at high cyclic rates.

■ PIPE: Eric's running the Outrage HR 56 pipe. This pipe works great with the YS engine and the Novarossi .57. On the YS, you need to run a larger pipe designed for the newer big block style .50 class engines. It will run with the older .50 pipes, but you won't be able to lean out the needles to get the full power potential of the engine.



THE SETUP

ROTOR HEAD • The rotor head on the Velocity is amazingly adjustable; arguably the most tunable head available on a 50. For that reason we've broken down Eric's setup adjustment by adjustment.

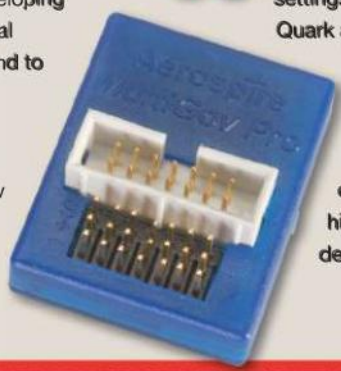
UPPER MIXING ARM • *Closest in on the two hole side (E2), three holed side furthest out (B3). Going inside on the three hole side will reduce the cyclic rate. Going outside increases the cyclic rates. On the two hole side, running further in will give you a snappier collective response at the expense of some control resolution. Even at this adjustment, Eric still has his swash ATV's running at 60%, which is more than enough. Eric also runs the pitch/cyclic ball upgrade part # R50N981-SS (still bolted to hole position E2). This allows you to get about 1.5 more degrees of positive and negative pitch. This is especially useful for people running longer than 600mm blades.*

GEARING AND HEAD SPEED • *Eric runs the stock 129-tooth main gear. This gives the Velocity an 8.6:1 ratio, There is an optional Delrin main gear which is 132-tooth (Part no. R50N114-1). Running this gear gives the kit an 8.8:1 ratio. This gearing is more advantageous for Novarossi .57 or O.S. .55 higher RPM engines. Through testing, they found that the head likes between 2000 and 2100 RPM. This should be the ideal range for the Velocity 50.*

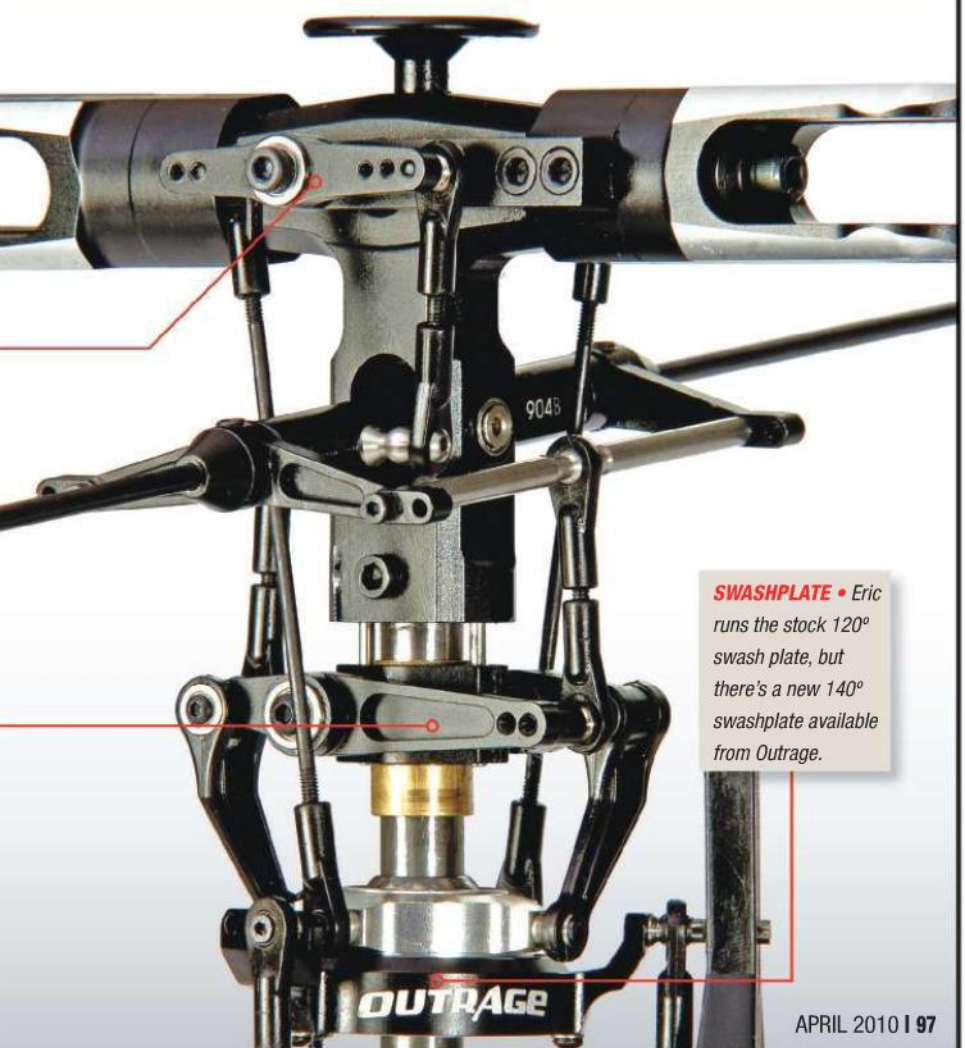
LOWER MIXING ARM • *The lower mixing arm has two adjustments; Eric flies with this adjustment in the furthest outside hole (M2 in the manual). This is the more aggressive setup and gives the flybar paddles more throw for a given swash input, which allows for faster overall cyclic rates on the head. Moving to the inside position here would slow down the control response and make the helicopter more sedate for beginner flight.*

■ CYCLIC/COLLECTIVE SERVOS: Three Outrage TORQ 9080 servos operate the cyclic and collective. These are the new brushless servos from Outrage and they are amazingly fast and strong when running the high-voltage setup like Eric is. The gearing in the servos allows them to stay very tight without developing the slop that metal geared servos tend to accumulate.

■ GOVERNOR: Eric runs the MultiGov Pro from Aerospire. With the YS engine and its low RPM torque, headspeed is set to 2050.



■ SPARTAN QUARK: Eric has been running the Spartan ds760 gyro and recently upgraded to the new Quark. The Quark smaller, lighter, and like the 760 is capable of operating with an 8.4V input. Eric mentions that the main benefit of the Quark over the 760 is that the Quark is much easier to set up, and the factory settings are much more usable. The Quark also has a much more consistent pirouette rate during high speed maneuvers, and during piro reversing maneuvers the Quark doesn't have any overspeeding or whipping tendencies. Eric sets his gain to between 30% and 50% depending on what's needed.



SWASHPLATE • *Eric runs the stock 120° swash plate, but there's a new 140° swashplate available from Outrage.*

ERIC BRANDENBURG

PITCH • *Eric runs -7°, 0, +14° in normal mode and -14°, 0, +14° with all linear curves in Idle-Up and Throttle Hold. For his 3D flying there's never a need to deviate from this setup.*

DAMPING • *Eric runs the stock black dampers that come with the kit. These work great for him; he hasn't gone any stiffer or softer, but does replace them whenever the head begins to feel sloppy on the bench (you can rock the blade grips back and forth in the head block) or the blades go out of track. The replacement interval is typically four gallons of fuel. The dampers tend to last longer when they are lubed as well. Eric uses Tri-Flow grease on his. For pilots looking for a more sedate setup, Eric suggests trying the red 80 durometer dampers.*

PADDLE PLACEMENT • *The stock paddles have two mounting positions. The position towards the leading edge is recommended for most. Eric always runs in this position. He feels that moving the paddles to the rear hole (further from the leading edge) makes the helicopter excessively pitchy and hard to control when doing very precise styles of flying.*

BLADE GRIP ARM • *Eric runs his blade grips in the center position (G2). This setting changes the Delta of the rotor head. The center position that Eric runs (0 Delta) is the same as Henry Caldwell and most other Outrage pilots. The center spot allows the heli to track very well through fast maneuvers and isn't as pitchy as going with the more aggressive inside position might provide.*

FLYBAR CARRIER • *Eric is running the innermost setting out of two (H2); this setting allows you to get full pitch out of the paddles with less movement of the flybar cage. I Conversely on the lower mixing arm, the inner hole allows you to reach full paddle throw with less swash movement, yielding faster cyclic. Running outward will give the flybar paddles less pitch for a given swash input which will slow down the rotor head response.*

SEESAW • *There are three positions on the seesaw that can be utilized. Eric runs his in the innermost position (S3). Moving inward will increase the flybar's response rate, while going outside will slow it down. Think of the hole positions on the flybar carrier as adjustments for the overall stability of the head. Further in (closer to the head block) makes the head more responsive around center and allows the heli to break from smooth flight more aggressively. Further out allows the head to "lock in" much more and softens response around center.*

Vvvverrrryyy aggressive.

MAINTENANCE **TIPS**

If you remove the ball links a lot then keep an eye on them. Eric usually sets things and doesn't have to make adjustments too often. But if you find yourself trying different adjustments and are regularly removing and installing ball links, give them a feel and make sure there's no slop. If you feel them loosening up, replace them immediately.

Keeping the main shaft well lubricated is key to any smooth flight. Eric keeps his well lubricated with Tri-Flo oil. If you fly in dusty conditions, be sure to clean before reapplying lubricant. RCH

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Continued from page 68.

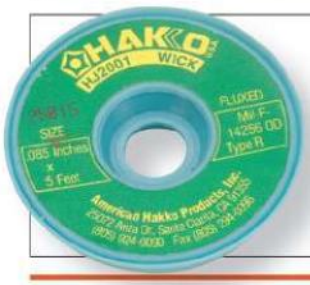
LEADS AND CONNECTOR

If you see a broken, kinked, or frayed (exposed) wire in the lead, or the connector is broken and you'll need to replace it. The lead and connector can be purchased as an assembly. You can also splice in a spare servo extension.

You'll need to unsolder the lead wires from the control electronics circuit board. Take note where each color wire goes. Some servos have the leads soldered directly to small pads. Others will have the wires passing through holes in the board and are soldered underneath. In either case, heat the solder until it melts, remove the wire, and use a desoldering bulb to suck up the melted solder. This leaves a clean surface (and hole).

Strip the new leads and melt a small amount of solder to the exposed wires. This is called "tinning". Some replacement leads may already come pre-stripped and tinned.

Make sure that you reinstall any grommet that may have been on the old lead. To re-solder the wire, hold it against the foil or pass it through the hole. Heat the wire and the foil pad together and feed a small amount of solder. The solder should flow out and create a smooth joint. Use just enough solder to cover the foil. Make sure not to create a solder bridge (electrical short) between any adjacent foils.



Though not as effective, soldering wick can also be used to clean up old solder joints.

Remember to properly package your servos if sending them back to the manufacturer.

ELECTRONICS, MOTOR, & OUTPUT POSITION SENSOR

If you suspect that anything may be wrong with the control electronics, the motor, or the output position sensor, I'd recommend returning the servo to the manufacturer for professional servicing. These are typically not user serviceable parts.

Although some people have successfully cleaned a dirty feedback pot or replaced a bad motor, it's better to leave this to a qualified technician.

Symptoms of any of these parts going bad include:

- Slow (or no) movement
- Servo moving in only one direction
- Centering or hunting problems
- Intermittent operation that cannot be traced to the lead or connector

CONCLUSION

As you can see, servos are fairly complex devices. Fortunately, it's not very difficult to maintain your servo and perform most common repairs. Hopefully, this 'How-To' gave you the knowledge and confidence necessary to keep those servos in tip-top shape. TECH

RECOVERY

When things start to go really bad.

WORDS: Brandon Updike | **PHOTOS:** Jason Boulanger

ANYONE WHO HAS ATTEMPTED A NEW MANEUVER WILL QUICKLY LEARN THAT SOMETIMES THINGS DON'T GO AS PLANNED. All of a sudden, that move you've mastered on the simulator isn't as easy as you thought. Now your helicopter's plunging towards the ground and you're in a panic as you try to decide what stick input to make. It will most likely end in disaster before you can comprehend what just happened. This is why mastering recovery techniques is very important. Having good recovery ability means being able to get your helicopter back into a comfortable orientation once you've lost control. Practicing your recoveries is key so that it becomes second nature and you'll be prepared if you ever get in trouble.

FIRST THINGS **FIRST**

I CAN'T STRESS THIS ENOUGH - all pilots must understand the importance of flying your helicopter at a safe distance and altitude, especially when performing new maneuvers. When I first attempt a new maneuver, I like to try them at what many will call " three mistakes high." This is generally about 100 ft in the air and a safe distance away from the pits and myself. When things go wrong, not only will you have more time to recover but it also reduces the danger of losing your helicopter and flying behind yourself. Just make sure you don't fly out of your visual range, because that can be just as tragic.

Flight School Training

PRACTICE YOUR ORIENTATIONS:

When performing any kind of new maneuvers, you're going to find your helicopter in all sorts of new and odd orientations. This can cause problems if you're not prepared to fly in an uncomfortable orientation. One wrong input and you'll quickly find your helicopter hitting the ground. In a worst-case scenario, it can end up hurting someone. The first thing to practice is your orientation in all aspects of flight. Start by working on your hovering until it's perfected. This includes tail-in, side-in (both sides), and nose-in orientations. Do this until you are able to hover comfortably in all orientations while keeping your helicopter over an imaginary spot on the ground.

Another technique that will help you with your orientations is working on your stationary pirouetting skills. Start out by trying to keep your helicopter in one spot while doing a slow pirouette. This will require that you make different corrections during several different orientations. You'll quickly learn that this is a lot harder than it sounds, but it is a very good technique to help perfect your orientation skills. Continue to do this while slowly speeding up your pirouetting rates until you're able to manage a healthy pirouette rate in one spot.

SIMULATOR AND PRACTICE:

The simulator is a powerful tool when practicing recoveries. A good technique is to start your helicopter in random orientations at a low altitude and see if your reflexes are fast enough to recover on the sim. When you lose control, try to save it rather than letting it crash and restarting the program. There is no real way to practice recovery techniques in real life because it'll always feel staged and orchestrated. The best thing to do is keep working on your orientations and to have a good understanding of the maneuver before attempting it. This means that you'll want to have the move broken down in your head to the point where you'll know exactly what you want to do through each phase of the move. If you stay calm you'll quickly learn how similar doing a move in real life is to the simulator.

FAILURES WILL HAPPEN:

Anyone who has flown helicopters long enough knows that failures are bound to happen. It's always good to be prepared for something to go wrong. If you're in an upright position then you're pirouetting hovering practice will come in handy; all you need to do is hit Throttle Hold and land it. During inverted flight is when things get a little crazy. Some pilots like to right the helicopter with the motor running, but this requires you to stir the cyclic stick very similar to a pirouetting flip. Things can go wrong very quickly with the motor running as well. If you hit Throttle Hold immediately, it buys you some time to compose yourself and time your flip back to an upright position.

Electronic failures are always sketchy. The best thing to do is to hit Throttle Hold and try your best to fly it back to the ground. If its coming towards you out of control, do your best to bury it in the ground before it gets any closer to you or others. Your helicopter will always be replaceable.

It's not a matter of IF your crash, but WHEN.

CONCLUSION

As stated earlier, try all new moves at a safe distance. The higher you are, the more time you'll have to prevent your helicopter from hitting the ground. Practice all your orientations and you'll see that when you do someday get in trouble you'll know exactly what to do. Practice until things become second nature. **Good luck.** RCH

SIDEWAYS FLIGHT

It's like drifting in the sky.

WORDS: Brandon Updike | **PHOTOS:** Jason Boulanger

One of the unique features of flying a helicopter is that you're not just limited to the conventional forward flight that you'd find in an airplane. With a helicopter, you can fly in all directions and orientations. Flying your helicopter sideways is pretty fun and is a good challenge. It will also open the door to a wide range of maneuvers that are directly related to sideways flight.

You have forward down, now lets try sideways!

FLYING IN BASIC **SIDEWAYS FLIGHT**

Flight School Training

» SKILLS NEEDED

SCALE RATING: GREEN = Easy / RED = Advanced

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

SETTING UP:

- **SETUP ISN'T THAT CRUCIAL** because nearly any helicopter can fly sideways. That includes even the beginner choppers like counter-rotators.
- **THE BEST WAY** to prepare for this maneuver is is to start with a tail-in hover and begin to ease your cyclic stick into one general direction and then stop.
- **KEEP REPEATING** this process until you're able to drift to both the left and the right with pretty good control

STICK INPUTS:

- **TAIL-IN** stick inputs are pretty self explanatory, as it consists of the same inputs of a basic hover.
- **NOSE- IN** is when things get tricky, as all your cyclic inputs are backwards.

WHAT IT OPENS THE DOOR TO:

- Being proficient in sideways flight will open the door to several different maneuvers, the least of which is a simple roll.
- You can also pull off impressive looking sideways loops and half loops
- Overall, you can incorporate sideways flying in many aspects of your routine. Get creative and you'll see how well it can fit.
- It also helps you become more comfortable in s multiple orientations.

Sideways flight might be easy, but try a sideways circuit.

2 Begin adding right cyclic and a little positive collective input to get your helicopter going.

3 Make any necessary corrections to keep your helicopter perpendicular to the flight line. For example, if your helicopter is drifting towards you correct it by adding forward cyclic.

4 Once you get to the right side of the flight line, begin adding left cyclic to slow your helicopter down and bring it back towards the other side. When your helicopter begins to pitch towards the left add a positive collective input to stop it.

CONCLUSION

Sideways flight is a pretty cool maneuver to experiment with. It's simple and easy and it'll help you expand your flight catalog. If your comfortable with both inverted and upright sideways flights in all orientations, you'll eventually find yourself doing it throughout your flights and mixing it up with other maneuvers. HH

BRANTLY B-2

Not the bomber

WORDS: Brandon Updike

Is this thing stealth?

BACKGROUND

Brantly Helicopter Corporation was started in 1945 by Newby O. Brantly. Intrigued by helicopters, he decided to design one on his own - the Brantly B-1. This was a coaxial helicopter that he hoped would have appeal to a mass market. The B-1, however, proved to be too complicated so he scrapped the idea. Brantly went back to the drawing board and designed a new helicopter. He came up with the B-2, which had a more conventional single axle rotor head design accompanied by a tail rotor.

Brantly wanted the B-2 to appeal to a mass audience, and it became a popular choice in the commercial world. The prototype first flew in 1953 and was ready for production in 1958. The helicopter went on small-scale production for over 30 years. Brantly eventually gave up ownership in his company but the new owner created a new identity called Brantly-Hynes Inc. and continued to support the large amounts of B-2's that were already sold. Like most helicopter designs of that era, the military took notice and decided to buy five of the B-2's but deemed it too small for any practical military use.

FEATURES

The helicopter was a very simple design that had an aluminum alloy fuselage. It had a sleek appearance and gave the B-2 a unique look. The cabin also had its own storage compartment and two hinged doors with side- by- side seating. The helicopter used a 3- bladed rotor head that could be easily removed for storage. It used wooden rotor blades with metal spars. The B-2 was powered by a horizontally opposed four piston engine which was mounted vertically.

CONCLUSION

Even though the B-2 was never a prolific commercial helicopter, it did form a strong following. Some have even flown for 40 years or more. Brantly made a few other variations of the B-2 design, such as the B-2B which has a metal rotor blade system and more powerful piston engine. This is the only version available to this day. RCHL

SPECS

LENGTH: 21 ft 9 in (6.63 m[4])
ROTOR DIAMETER: 23 ft 9 in (7.24 m)
HEIGHT: 6 ft 9 in (2.06 m)
DISC AREA: 442 ft² (41.06 m²)
EMPTY WEIGHT: 1,020 lb (463 kg)
MAX TAKEOFF WEIGHT: 1,670 lb (757 kg)
POWERPLANT: 1× Avco Lycoming IVO-360-A1A air-cooled flat-four piston, 180 hp (134 kw)

PERFORMANCE

MAXIMUM SPEED: 100 mph (87 knots, 161 km/h) at sea level
CRUISE SPEED: 90 mph (78 knots, 145 km/h) (75% power)
RANGE: 250 miles (217 km, 400 km)
SERVICE CEILING: 10,800 ft (3290 m)
RATE OF CLIMB: 1,900 ft/min (9.7 m/s)

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