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THE WORLD'S BEST-SELLING RC HELICOPTER MAGAZINE

CLASH OF THE TITAN!

THUNDER TIGER

Back with the

NEW TITAN X50

TESTED:

- » CENTURY RADIKAL G30
- » FUTABA GY701
- » HELI-MAX NOVUS AH-IJ SEACOBRA

How-To Bonanza!

- ▶ Be A LiPo Pro
- ▶ Get the Drag Out of Your Heli
- ▶ Practice Safe Flight
- ▶ Program Multiple Piro Rates
- ▶ Crash Better
- ▶ Fly The Detonator

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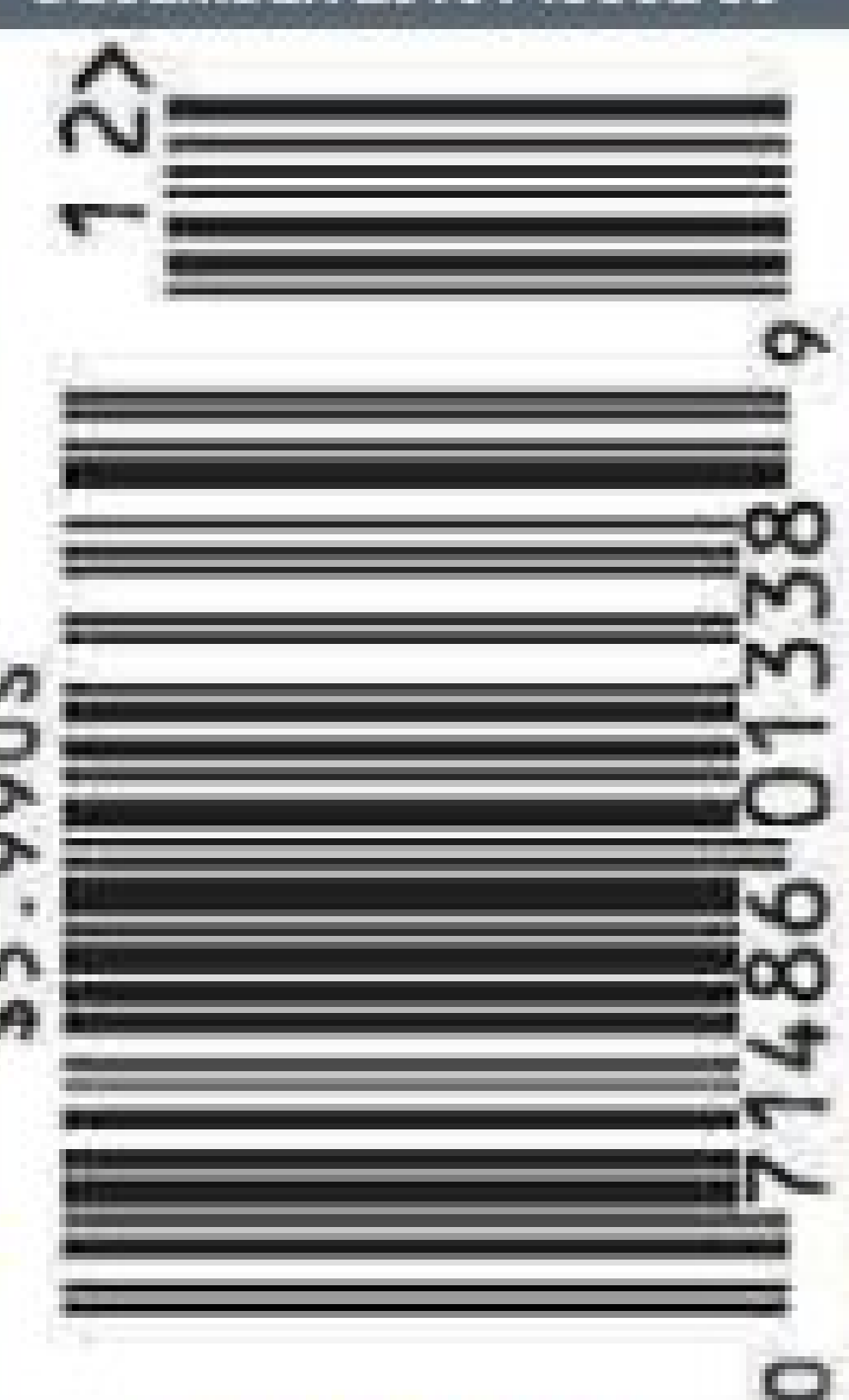


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DECEMBER 2010 / ISSUE 53



www.RCHELMAG.com



**Thunder
Tiger**

Titan X50

THE **ULTIMATE** 50-CLASS
3D HELICOPTER



Titan X50

-TTR4855-K10 Includes Kit & TT V2 Carbon Blades
-TTR4855-K11 Includes RL53H Engine, Hi-Flow Muffler and TT V2 Carbon Blades

Specifications:	
Full Length of Fuselage:	47.24" (1200mm)
Full Width of Fuselage:	7.87" (200mm)
Total Height:	15.75" (400mm)
Main Rotor Dia.:	52.95" (1345mm)
Tail Rotor Dia.:	10.24" (260mm)
Gear Ratio:	8.5:1:4.56
Total Fuel Capacity:	480cc
Fully Equipped Weight:	6.83 lbs. (3150g)

FEATURES:

- 1-piece Carbon Main Frames, Slim Profile Design (30mm Wide)
- New underslung Rotor Head for Ultimate 3D Performance
- High-quality Fiberglass Canopy Preprinted
- Main & Header Tanks Total Capacity: 480 cc
- Dual Radial, Single Thrust Bearings Metal Tail Grips w/95mm Blades
- Lightweight & Vented Clutch Bell/Metal Reinforced Ribs
- Lightweight & Vented Main & Tail Gear Set Design
- Lightweight Tail Boom Bracket & Landing Skids
- Carbon Base Plate & Carbon Fin
- Metal Tail Boom Clamp
- 10mm Hardened Main & 7mm Feathering Shaft
- Shrouded-fan for Efficient Thermal Dissipation
- Spacious 3-deck Tray for Electronic Devices
- Equipped with Lightweight Paddles for 3D (20g)

ttamerica.com/100j



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ADVANCED HIGH VOLTAGE DIGITAL SERVO

BRUSHLESS DIGITAL SERVO

HIGH VOLTAGE



WWW.OUTRAGERC.COM



BL SERIES

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

BL 9088

BL 9080

7.4 VOLT RATED
(2 CELL LIPOS)

BL 9088 TAIL Servo 760/560Hz

Speed / Torque

6.0 v : 0.05 / 63.48 oz

7.4 v : 0.04 / 78.53 oz

8.4 v : 0.03 / 91.64 oz

BL 9080 CYCLIC Servo

Speed / Torque

6.0 v : 0.07 / 88.32 oz

7.4 v : 0.06 / 112.35 oz

8.4 v : 0.05 / 132.86 oz

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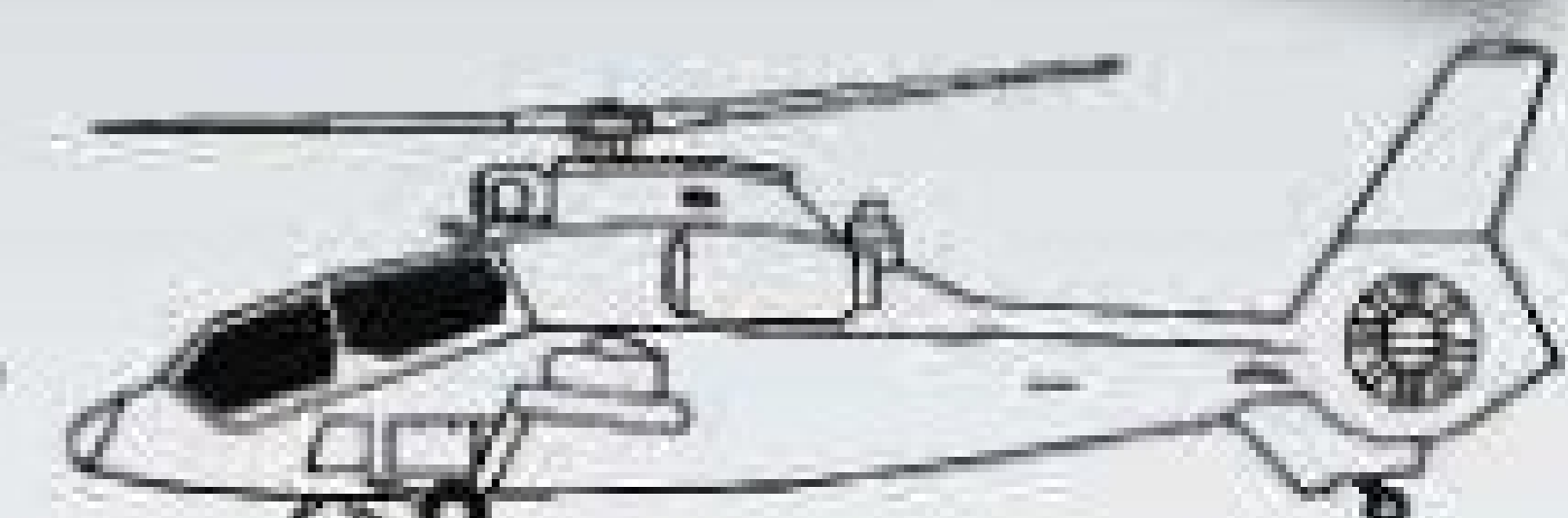


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IN THIS ISSUE

ON THE COVER: Hobbico picked up a new manufacture, and what better way to start it off then the new Thunder Tiger Titan X50.

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Mike takes a trip to the windy city to get you the latest news and products!



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FREEING UP YOUR HELI
Don't be a drag! Get to the top of your line!

PROGRAMMING MULTIPLE PIRO RATES
Because Multiple Piro Rates are Better!

Switch SELECTABLE RATES
Auto RATES

GETTING REALLY FANCY
Conclusion

The Year In REVIEW

WOW, CAN YOU BELIEVE 2010 IS ALMOST OVER? SEEMS LIKE JUST YESTERDAY I WAS WRITING ABOUT US PUTTING THE AXE TO THE JANUARY ISSUE. Well, we got through another year and what a year it was. Let me use this time to take a look back at 2010 through the lens of RC Heli magazine.

- **JANUARY** – never happen.
- **FEBRUARY** – We died and went to heli heaven with a visit to HeliProz in Montana. Readers discovered what the Wall of Death was and the original TREX 450 was refined once again.
- **MARCH** – Got to go to the set of Keeping up with the Kardashians, kidding. Met Bruce Jenner, one of the greatest American athlete's of all time and a super cool heli guy!
- **APRIL** – My annual trip to the land of Beer and Schnitzel sent me back home with eight pages of content and lots of photos and I was pretty amped about the fact that the industry was innovating again.
- **MAY** – The funfly season kicked off with a couple great events in Vegas and Phoenix. We spent three pages on how to put your belt through a boom.
- **JUNE** – Finally, a schoolgirl on the cover. Not sure what took so long. Into Scale? First scale cover of the year.
- **JULY** – My birthday month and very cool cover. This issue packed 21 pages of how-to's. Not exactly sure how we come up with all these cool ideas, but somehow we do.
- **AUGUST** – The world became more familiar with Kyle Dahl and his amazing flight skills at the XFC.
- **SEPTEMBER** – Our 50th issue, yup, 50! And what better way to celebrate it than with our most controversial cover ever. What was on that cover you ask? A half naked woman? Nope, a coaxial Walkera. Had all the diehards up in arms.
- **OCTOBER** – One word, IRCHA. Thankfully came back with no stitches once again. This is the party of all parties when it comes to RC – almost a thousands pilots make this the world's biggest RC event year after year. If you haven't made plans for next year yet, do it now!
- **NOVEMBER** – The Spektrum DX8 that we originally broke to the world back in February gets put to the test with a thirty-page review. Maybe not thirty pages, but it was a long one. Every word had us riveted (don't want to hurt Chuck's feelings, incase he's reading this).
- **DECEMBER** – You're looking at it. This issue is one that could be significant in the future. Not because it's packed with so many great articles, but it's the first look at the Parrot AR. Drone. Nope, it's not technically a helicopter, but its flight interface is revolutionary and could possibly be the future of RC flight.

Well, there you have it. Thanks to everyone for another great year. We're looking forward to an even better 2011.

Fly Safe,

Mike Velez

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

RC Heli

m a g a z i n e

CHATTER BOX

WHAT IS THE BEST AND WORST THING ABOUT FIRST PERSON VIEW FLIGHT?



MIKE VELEZ - Publisher/Editor-in-Chief

Best, introduces an entire generation of video game players into the hobby. Worst, I still suck at video games.



RYAN KEPHART - Associate Editor

The best part of FPV is the view. The worst is the feeling in your stomach after performing countless rolls!



JIM INNES - Editor-At-Large

Being able to fly from the "cockpit view," unfortunately will inadvertently put modelers closer to UAV territory in the eyes of the FAA.



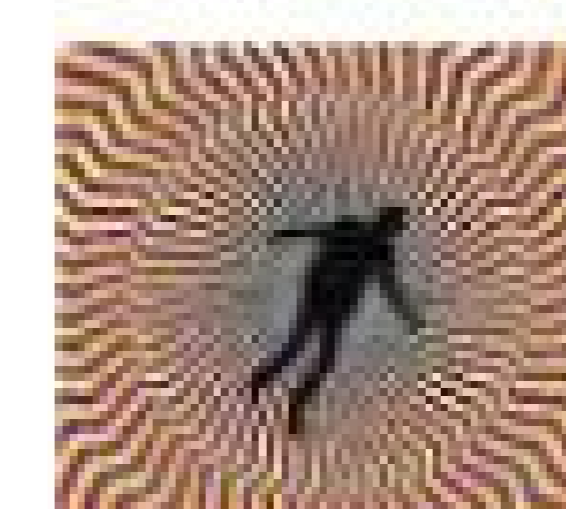
CHUCK BASSANI - Editor-At-Large

It looks REALLY cool, but I haven't tried it yet.



DANIEL COLBY - Editorial Assistant

More freedom to fly. You don't have to see your aircraft in order to tell what its doing, unfortunately it takes a lot of getting used to.



SHAWN KITCHEN - Contributor

Best, the cool factor. Worst, Vertigo. And the impact on my wallet.



ART KORAL - Contributor

The best, seeing the world from above. The worst, backward and piro maneuvers difficult and just not as fun.



AARON SHELL - Contributor

Flying like a bird, and knowing the feds want to regulate.

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PRINTED IN THE U.S.A



RADIKAL



G30 PETROL ENGINE

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

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

Specifications:

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

CN1340 Radikal G30 kit:MSRP \$650

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

CN1340C Radikal G30 Carbon kit:MSRP \$750

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

CN1340CE Radikal G30 SE Carbon kit:.....MSRP \$850

- New Style Aluminum Metal Rotor head, mixing arms and metal blade grips.
- New aluminum flybar seesaw holder.
- New aluminum seesaw assembly.



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CENTURY
HELICOPTER PRODUCTS

Coming September 2010
Release: StoreMags & Fantamag. Magazines for All

New For NEXT YEAR

Check out some of the new releases from the iHobby Expo in Rosemont, Illinois along with plenty of news from around the RC helicopter world.

SET IT AND **FORGET IT**

For a few minutes I thought I was at a military hardware show when I walked into the booth of DJI Innovations. They had on display some pretty industrial stuff that could be dangerous in the wrong hands. The centerpiece of their product line is the ACE ONE main controller. It's similar to a flybarless system, and it has all the features you'd expect, like a 3-axis gyro, engine governor, etc. But on top of that, it allows for GPS autopilot. It uses high definition GPS for auto hovering and stability. Optional equipment allows for waypoint programming. You log onto the software, plot out the mission points you want the helicopter to achieve, and hit "go". The system will take the helicopter to the preset altitude and position for the amount of time you determine. Multiple points can be set without any additional pilot input. You'll have to consult the FAA on the rules for autonomous flight and we're pretty sure it's a violation of the AMA rules. However, if you're an insurgent in a far off land this might be the equalizer you're looking for. I'm kidding of course... the system is designed for precise airdrop, aerial photography, and aerial video. These are not inexpensive systems, that's for sure. The ACE One runs about \$3500 and the waypoint system adds a few grand.

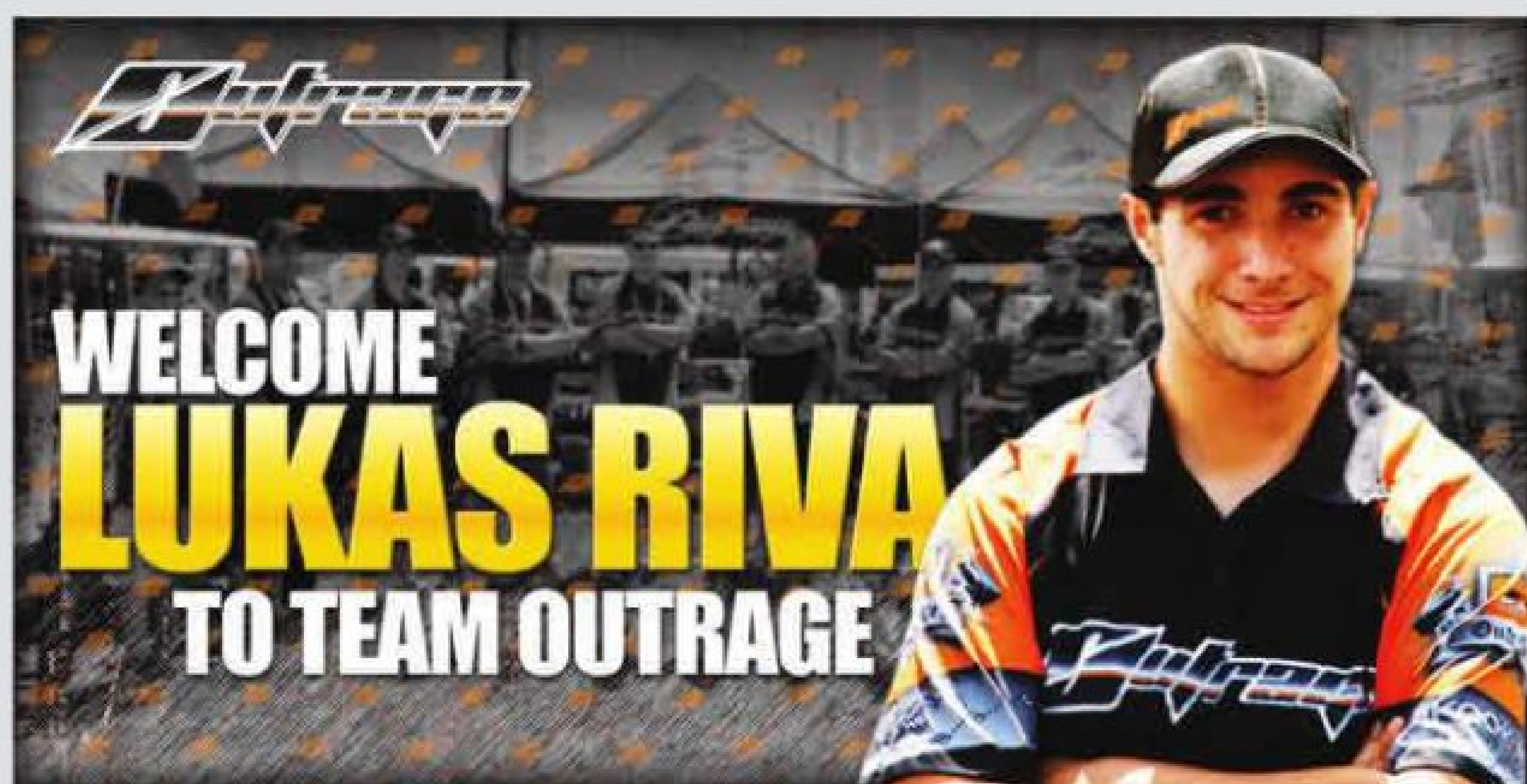
WWW.DJI-INNOVATIONS.COM



LUKAS RIVA GOES OUTRAGE

Team Outrage is getting bigger, and in a big way. One of the world's top pilots - Switzerland's Lukas Riva - has joined Team Outrage and is now flying the Outrage Velocity 90.

WWW.OUTRAGERC.COM



VIPER RC PROGAUGE AND ESCS

Viper RC was at the show for the first time to debut their product lineup. They're taking to the air soon with a complete line of ESC's and motors.

The ESC's range from 20A capacity to 120 amps with a max 14S voltage capability. All of the ESC's use the unique ProGauge, which is actually a 5-in-1 tool. It functions as an ESC programmer, but also as a battery monitor, signal monitor, prop RPM tach (for you plankers), and the most unique feature, a servo tester. The servo tester actually measures transit speed and allows you to match cyclic servos (a very cool feature). We have our hands on a ProGauge, so expect a review soon.

WWW.VIPER-RC.COM



FUTABA CGY750

If you've been flying for any length of time, chances are you've run a Futaba gyro. Futaba has been the premier gyro brand for years. With the flybarless revolution in full swing, it was no surprise that a Futaba flybarless system was in the works. The new CGY750 is a 3-axis gyro with governor. It builds off the GY701 foundation and adds all the features needed for you to ditch the flybar. It's small, lightweight (weights just 23 grams total), supports all swash plate types, is S.Bus compatible, uses an easy-to-read OLED display, and offers both "basic" and "expert" set up menus.

We're anxious to get our hands on this one. No word yet on the street price. We expect it to go on sale after the first of the year, however that's not confirmed.

WWW.FUTABA-RC.COM



I HAVE A DREAM!




...that someone made unbreakable skids for my Blade. Dream Heli was on hand with a full lineup of "bits" (as our friends in the UK say) for the Blade line of helicopters. There was some pretty cool looking stuff including fuselage kits, unbreakable skids, light kits, machined head components, and more.

WWW.DREAMPLASTICS.COM



Dreams do come true. My fortune cookie said so!

VIBE SG E12

 We saw an aftermarket conversion back in February at the Toy Fair in Germany. This, however, is the actual E12 SG (Scott Gray) kit from JR. It turns your Vibe 90 into an 700 class electric Vibe capable of some amazing 3D flight. Two 6S Li-Po packs are needed to get this beast running well. Depending on what gearing you run (it comes with three different pinions), you'll want an appropriately sized motor running between 400 and 560 KV. Look for the actual kit, no conversion needed, early next year. WWW.HORIZONHOBBY.COM



VIBE FIFTY NEX

This is the next step in 50-size performance from JR, the Vibe 50 NEX. It's a high-performance nitro 50 that uses a dual-stacked carbon fiber frame that are lighter than the previous Vibe 50. The new NEX uses a lot of the features first introduced on the 90SG, such as metal blade grips, red anodized parts, push-pull everywhere, 140° or 120° swash and a pre-painted 3-color canopy. For routine maintenance and rebuilds, the engine and tank can be easily removed with just a few screws. . Look for a street price around \$560, and it should be available before the end of the year.



BRUSHLESS SERVO FROM JR

Want the fastest tail servo you can find? Try this one out. It's the new MP80G Brushless "Ultra-Speed" tail rotor servo.

It's rated at 0.05 Sec/60° speed at 4.8V. Yeah, that's fast! A servo like this isn't cheap; expect to fork over about \$180 to get this in your bird.

WWW.JRRADIOS.COM



RON'S LASER PITCH GAUGE

Ron Lund, the man behind Ron's Heliproz South, has come up with a unique way of getting the most absolutely precise pitch measurement possible. The "Laser Pitch Gauge" comes with blade grip adapters for models with 10mm, 12mm, and 14mm grips. Thankfully that covers a lot. The laser pointer holder itself fits a T-REX 450 with out the need for a separate adapter. The Laser Pitch Gauge sells for \$35 and will give you the ultimate in precision set up.

WWW.ROLUND.COM



THUNDER POWER CHARGER

Thunder Power displayed the charger you'll be lusting for soon. It's the TP820CD, and it could probably charge your Prius. It's a dual-port charger that includes built-in balancers and 600 to 800 watts of total power. This means that you could charge Li-Po packs of 8S voltages at up to 20 amps on each full-function port... simultaneously! Of course, you'll probably need a Flux Capacitor to power the thing. This thing will charge anything you've got. That includes NiCad, NiMH, LiFe, LiPo, and Pb (lead acid).

It also features internal resistance checking and a standard USB port that allows for quick and easy firmware updates. No word yet on exact price, but we expect this one to hit the streets sometime in December.

WWW.THUNDERPOWERRC.COM



HOT MECHANIC ON MOTOR ACTION!

Lucien Miller at Innov8tive Technologies must have bought a new video camera or something. He's been very busy lately, posting a ton of new how-to and flight videos on this Innov8tive's YouTube channel. You'll have to check it out; there's some good stuff on there. Topics range from motor rebuilds to Scorpion ESC programming.

WWW.YOUTUBE.COM/INNOV8TIVE8



NANO HELICOPTER FOR BEGINNERS

NEW



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

E-500 HELICOPTER FOR ENTERTAINMENT

NEW



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

HONEY BEE CT FLYBARLESS, 3BLADES 3D AEROBATIC

NEW



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

BELT-CPX 3D PRO AEROBATIC HELI

NEW



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



ESKY STATEMENT

Don't Be Fooled!
It's come to our attention that counterfeit ESKY brand products are being sold by unscrupulous vendors. These fake and shoddy products are not only causing a negative impact on our image of our commitment to quality, but threatening the safety and rights of ESKY consumers and users. To protect the lawful rights and interests of the authorized ESKY distributors and vendors as well as ESKY consumers and users, ESKY Co., Ltd makes the statement as below:
Please locate your local distributors or vendors from ESKY official website www.esky-sz.cn www.twf-sz.com
ESKY confirms that distributors publicized on ESKY official website are authorized distributors of ESKY original products. As for those 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

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RAQUEL BELLOT JOINS VOLTZ

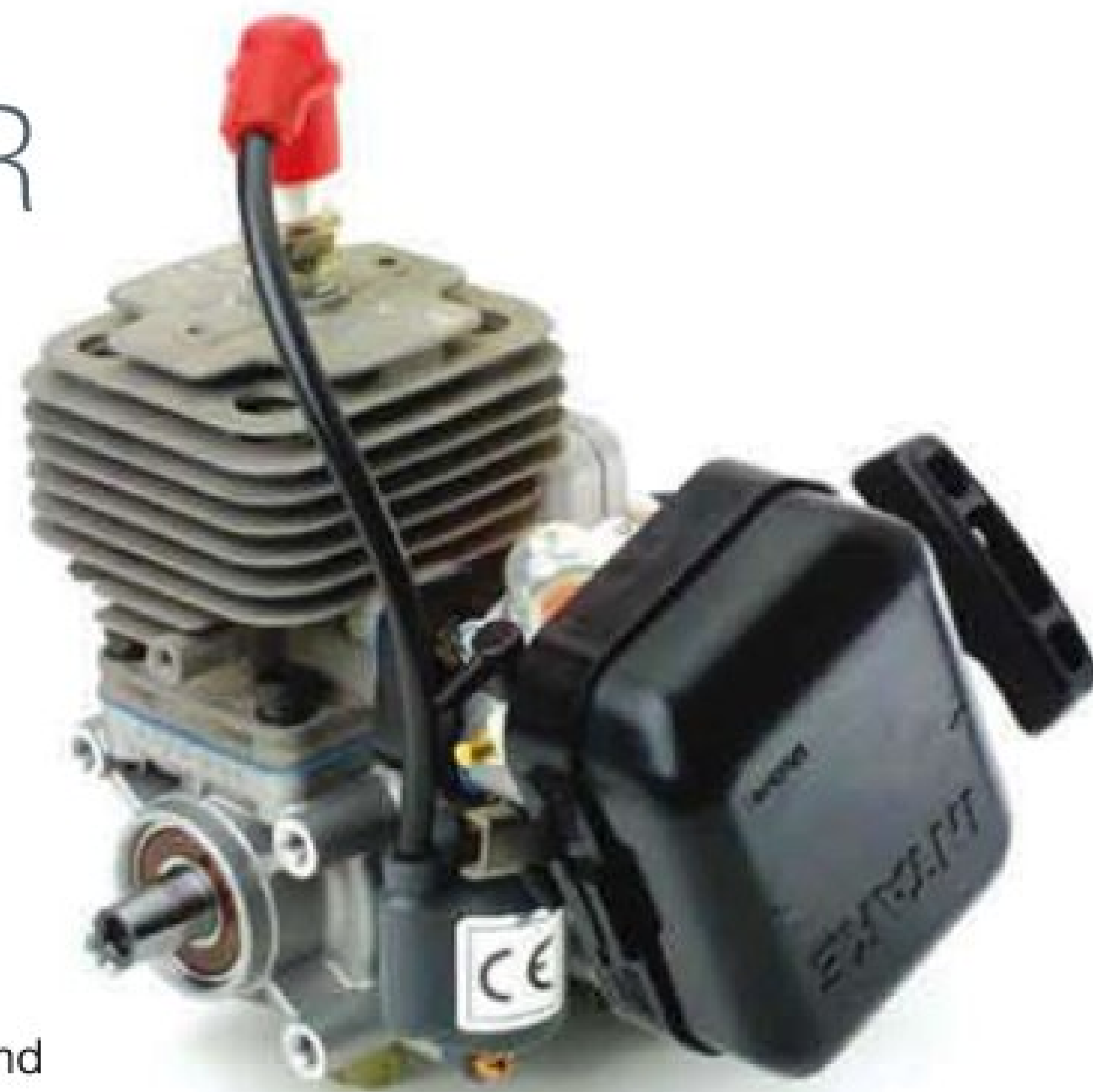
Let's face it, this hobby is mostly men. We know how it is, guys, the fact that you can figure out a KV rating is wasted on most women. But not on Raquel Bellot. "Who's Raquel Bellot?", you ask? She's the 23-year-old Spanish pilot who's making a name for herself on the flying circuit and just picked up another sponsor to add to the list. Voltz Batteries can be added to the sponsorship, in addition to Align, Freakware, Optifuel, Hacker, Edge Rotor Blades, TORQ servos, and Scott Gray.



ZENOAH HELI GASSER

Zenoah is increasing the number of engine choices out there for gas pilots. Their latest offering is the G231 Heli engine with WT-643 carburetor. It's a nice combination that should provide smooth, consistent power. It's a pull-start engine that has an easy to adjust carb and uses a magneto-driven CDI ignition system. The new engine replaces the G-23 Heli, and Zenoah claims a 20% increase in overall horsepower from its predecessor. Displacement is rated at 22.5cc. Look for a street price under \$350 and availability in early December.

WWW.ZENOAH.COM



PUT A SZABO IN YOUR TANK

If you've been in the hobby for a few years, you probably remember the fuel brand "PowerMaster." At one time, this brand of nitro fuel was very, very popular. Not too long ago, PowerMaster was purchased by Texas Allied Chemicals and is now engineered by the folks at VP Racing Fuels, one of the top names in full-scale drag racing. They're looking to get back in the market in a big way, and rumor has it that an Alan Szabo Jr. blend might be in the works. Alan's been using PowerMaster fuels for 12 years.

WWW.POWERMASTERFUELS.COM



O.S. 55HZ-R

This is the one you've been waiting for. It's the powerful O.S. 55HZ block but with O.S.'s "On Demand" regulator system. It's designed to provide a steady fuel flow through even the most demanding 3D flight. Yes, this sounds like an advertisement, but that's really how this thing works. The regulator is placed in a position where it should not interfere with most competitive 50-size helicopters. This thing is brand spanking new and there are no details yet on price or availability.

WWW.OSENGINES.COM

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Time to regulate once again.

HITEC'S TELEMETRY IS HERE

We got to check out an example of Hitec's new Telemetry system. The HTS-NAVI is a unit that plugs into your PC laptop and gives you live streaming and up-to-the-second information on what's going on in your bird. Also new for the telemetry system are two new "Minima" receivers the 6T and the 6E, the difference is whether you want to plug things in on the side or the top of the unit. Along with this are new current and voltage sensors and a new Sensor Station intended for electric powered machines. We'll be getting our hands on this equipment soon for look for a full review in a future issue.

WWW.HITECRCD.COM



WHY X-Cell?



ART HUGHES
2010 IRCHA JAMBOREE
X-CELL FURY 55

PHOTOS BY MARK FADLEY

**DON'T TAKE OUR WORD FOR IT,
LET'S HEAR WHAT THE PILOTS
HAVE TO SAY...**

For me, X-Cell helicopters are the only way to go. Very high quality components straight from the box let you build it and fly it as hard as you can without worrying about upgrades or sloppy parts. The agility and precision of an X-Cell helicopter in the air is unmatched which gives me the confidence to push my flying to the limit without having to worry if the helicopter can handle it.
Art Hughes - Team HeliWholesaler Pilot

I chose the Fury 55 among the many excellent 50-class nitro helis because of X-Cell's reputation for outstanding quality and superb flight performance. Fantastic product support, low parts count, and simple, rugged construction have made the ownership experience best-in-class.
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mCX2

LENGTH: 7.9 in (200mm)

HEIGHT: 4.7 in (120mm)

FLYING WEIGHT: 1.0 oz (28 g)

ROTOR DIAMETER: 7.5 in (190mm)

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Add to all this its sleek new body with integrated LED lights, more powerful motors and the extra capacity of a 120mAh Li-Po battery and you're in for the most fun you will ever have with a coaxial ultra micro heli.

Ready-To-Fly and Bind-N-Fly versions are available. Head to bladehelis.com right now and take the Blade mCX2 tour or pay a visit to your favorite Blade retailer for a test flight.*



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SPEKTRUM
Patented Spektrum™ 2.4GHz
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BLADE

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LETTERS

BUCKEYE PRIDE

I have not seen any pictures of helicopters from Ohio yet in your magazine. So I'm sending you a picture of my fleet of six helicopters that you might like. Pictured from right to left, Blade 400, Vibe 50, TREX 600-1, TREX 600-2, TREX 700 and a Miniature Aircraft Spectra G 3D. The Blade 400 cyclic servos are DS285 with a DS760 gyro and DS3400G tail servo. The Vibe 50 and both of the TREX 600s cyclic servos are JR8717 with JR770 3D gyros

with 8900 tail servos. All three have O.S. Hyper engines. The TREX 700, which I just built this summer, has JR8917HV cyclic servos and the gyro is a Futaba GY520 with a Futaba BLS251 tail servo. The engine is a YS 91SR-3DS. Now to the Spectra G, the cyclic servos are Futaba S9351 and the gyro is a Futaba 401 with a 9254 servo. I fly all of my airplanes and helicopters on a Spektrum



OUR NEW FAVORITE READER!

YOUR 50TH ANNIVERSARY ISSUE INSPIRED ME TO TAKE ATTACHED PHOTOS. I have been an avid reader of the magazine since the very first issue. Attached is the 50 made from my archives of the 50 issues of Heli Magazine. BTW the '5' has 26 issues and '0' has 24. I forced my wife to get on the roof to take those photos. In the background are my helicopters in the size order: CX3, T-REX 450Pro, Thunder Tiger Raptor 50 (w OS Hyper 50 engine). I am reading and flying and since I have three sons, I am hoping to sell them on my passion.

Regards,
Marek Chrzanowski
Mississauga, ON, Canada

■ Okay people, pay attention, this is the new standard for getting your pics in the magazine (smiley face). Awesome Marek, this won you a T-shirt and a subscription renewal. Thank your wife for us for braving the roof to get the shot. Total dedication all around, we love it!

Mike



DX 7 radio. I have been flying airplanes for over thirty years now and helicopters for four years. With my helicopters I can do rolls and loops and now starting on auto rotations and flying upside down. Your magazine is top notch. I find myself going back over old issues to solve problems or get new ideas. YES I'm a heli freak and can't wait to get your next magazine!

Thanks
Sincerely,
Wayne-Jay Heffelfinger
Perrysville, Ohio

■ Hey Wayne, that's an impressive fleet. You need some Buckeye paint schemes on you next "bird."
Mike

WANT TO SEE YOUR HELI IN THE MAGAZINE?

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

If you still want to send film, please send your photos to:

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OOH-RAH!

Gentlemen, being a very proud American and Former Marine I had to show my true colors enjoy these pics of my Align TREX 600, built and flown by myself. The photos were taken by my friend Lou Miranda.

PS if you choose to use the pics please also mention the photographer he did an awesome job. A true Kodak moment!

John J. Swangler
Former US Marine

Semper-Fi John, thank you for your service, reading RC Heli, and sending us these beautiful pics! Keep up the flying, looks great.



T-REX 700E

[KX018E01T]



Constructors Championship

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3G
Flybarless System

Programmable

Multi (S/P) Mode (4-2) Expo (Rate) (Gain) (Trim) (Rate) (Rate) (Rate) (Rate) (Rate) (Rate)



Specification

- Length: 1328mm
- Height: 408mm
- Main Blade Length: 690mm
- Main Rotor Diameter: 1562mm
- Tail Rotor Diameter: 281mm
- Motor Drive Gear: 12T
- Main Drive Gear: 115T
- Autorotation Tail Drive Gear: 104T
- Tail Drive Gear: 24T
- Drive Gear Ratio: 1:9.58:4.33
- Weight(With Motor): 2830g
- Flying Weight: Approx: 4700g

Accessories

- T-REX 700E 3G Kits Set x1
- Aluminum Tail Boom x1
- 3K Carbon Fiber Tail Boom x1
- 690D Carbon Fiber Blades x1
- DS610 Digital Servo x3
- DS650 Digital Servo x1
- Flybarless System x1
- 700MX Brushless Motor(510KV) x1
- Castle ICE HV 120 Brushless ESC x1
- 6A External BEC w/5.1V Two-way Step down voltage regulator x1
- 105mm 3K Carbon Fiber Tail Blades x1



FREQUENTLY ASKED QUESTIONS

Q

I am a new pilot just starting out. I have a 50-size helicopter and a T Rex 450 Pro. I currently use normal throttle curves and have my Idle-up functions inhibited. I only fly figure 8's and slow forward flight. Do I need to set up my Idle-ups, and if I do, then where do I start? **-DJC**

A: Idle-ups can be used for normal flight and can hold your headspeed better than just a normal throttle curve. While flying those maneuvers at low altitude you may not notice a drop in headspeed, but as you progress and fly higher you will find yourself having to drop the collective far lower to bring the heli down. You will notice that your headspeed will also decrease. This can lead to slower response, and sometimes inadequate control. In my opinion, you should be using an Idle-up to fly around. I would start by a simple "V" curve. Your low and high point should be set to 100%, and the middle point set to about 50-60%. This will get you in the ballpark. You can fine-tune your middle point percentage to adjust the headspeed at a hover. Your Idle-up pitch curves should be linear and your normal pitch curve should match the Idle-up above half collective so that you don't get a jump when flipping to Idle-up. **-RKephart**

Q

I just graduated from micro helicopters but now I'm having a problem. I have a T Rex 450 and am just now starting to fly it around in Idle-up. My problem is that I instinctively slam the collective down as a habit when I use to fly the mCX. This doesn't work out so well with the 450, as it usually ends up sending parts everywhere. Any advice would be appreciated.

-GaryM

A

The answer to this question is practice. Whether you are on the simulator or flying in real life, the best choice is getting some stick time. Instead of trying new maneuvers, go back to the basics and train your muscles to use your throttle hold switch to land the helicopter. Hover your helicopter about a foot or two off the ground, hit your hold switch, and slowly land your helicopter. Keep repeating this until it is second nature. Practice on the simulator and really push yourself. If you are out of control, keep your finger on the hold switch and practice until you hit that switch instead of slamming the collective down. **-JasonB**

I'm reminded of an old joke about a man who walks into a doctor's office, bends his arm, and says, "Doc, my arm hurts when I do this." The doctor looked at the man and said, "Then don't do that." **-Shawn K**



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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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QUICK TIPS

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THE MANY USES OF GOOP!



LOCK DOWN YOUR SKID CAPS

Chances are you have built a set of landing gear, only to find that one of your caps is missing after a few flights. Using CA glue can seem like it gets the job done, but once you've landed a few times vibration will cause the CA to crack, thus ejecting the landing gear cap on the next flight. Use some Goop or Shoe Goo next time you build your landing gear to secure the caps. This glue dries to a hard rubber that can flex a little. This type of glue is immune to vibration and will secure your landing gear skid caps for the lifetime of the gear.



MUFFLER THREAD LOCK

After many years of flying nitro helicopters, I have encountered numerous loose exhaust pipes. Vibration, oil, and 3D flight caused the pipes to come loose even with lock washers in place. The problem with a muffler is that the heat it generates prevents the use of blue thread lock.

Using red thread lock might work, but you can be sure of a battle if you ever need to remove it. Goop or Shoe Goo can be used in this case to lock down the screws and prevent them from backing out, and the best part of it all is that the Goop will withstand the heat and still be easily removed when needed.



CANOPY REPAIR

Goop or Shoe Goo can be used to repair a cracked canopy with ease. Locate the crack and apply a bead of Goop to the inside of the crack. Put some saliva on your finger (to keep it from sticking to your skin) and spread the Goop around so that it grabs both sides of the crack and allow it to dry for about six hours. By the time you come back, the canopy will be strong and ready for the next flight.



WIRE HOLDER

Have you ever owned a helicopter that has no rhyme or reason for wire runs? I know I have run across a few, and a great way to get that gyro wire from the back to the front of the helicopter is to lock it down with some Goop. Apply a few drops of Goop along the line that you want your wires to run. This can be on the inside or outside of the frames. I like to apply it to the inside to hide the wires. Now place the wire onto the Goop and let it dry. Now your wire will be out of the way of moving parts and allow for a clean installation.



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Pilots: The Smith Brothers



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GIUSEPPE ROBERTONE

Danny Szabo

DANNY SZABO

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

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

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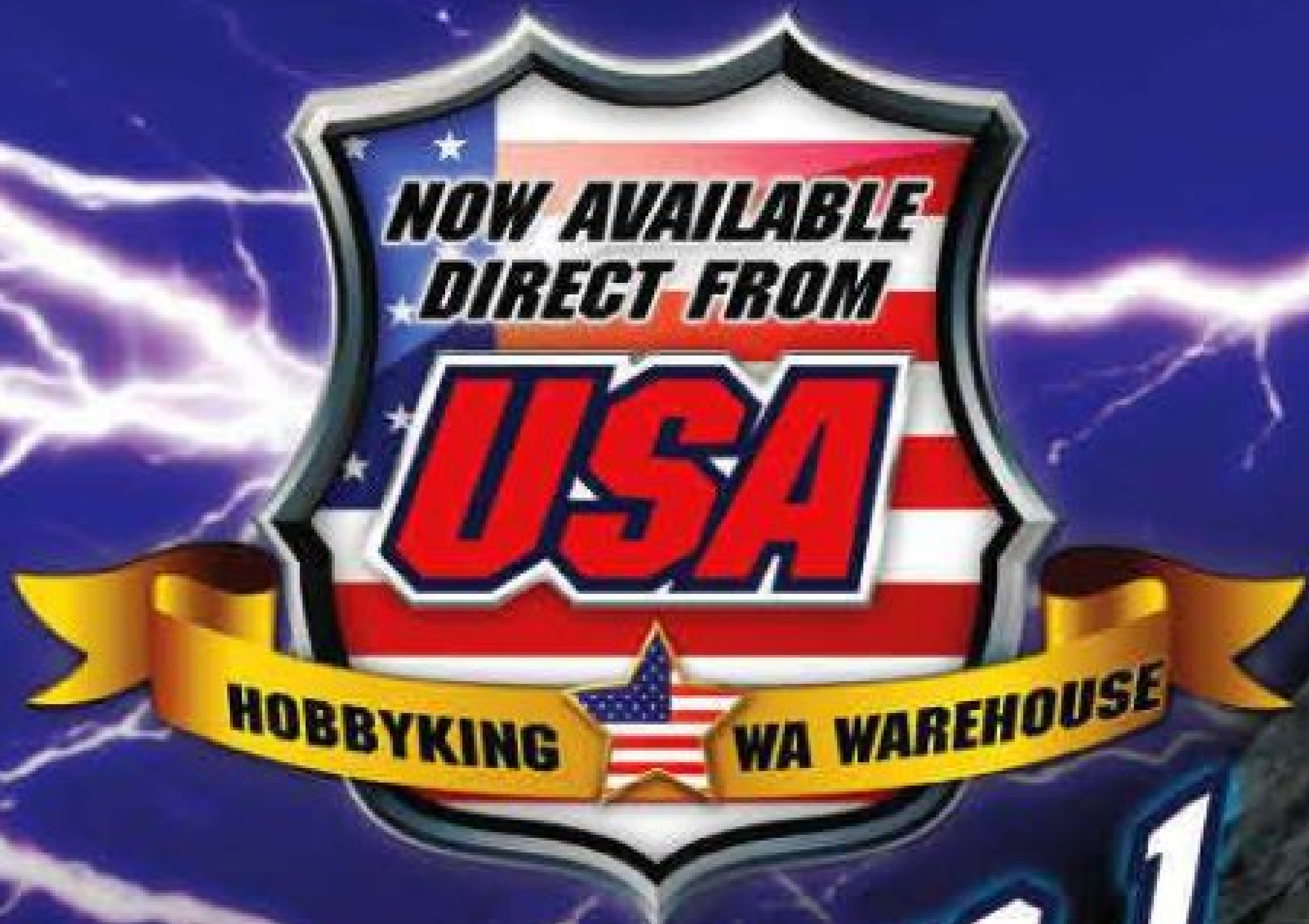


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Futaba GY701 GYRO/GOV

Futaba is Multi Tasking

WORDS: Ryan Kephart

EVERYONE KNOWS THAT FUTABA HAS WHAT IT TAKES WHEN IT COMES TO GYRO TECHNOLOGY. But what has Futaba been working on since the release of their smallest gyro, the GY520? The 520 was a small and powerful gyro that performed somewhere between the GY601 and the GY611. Now Futaba wanted a gyro that could do more than just outperform the GY611, so they developed the GY701. This Futaba gyro is more than just a simple tail-holding device. Futaba incorporated a whole new governor, linked to the gyro, to increase the performance of both the gyro and governor functions. The last governor Futaba released was the GV-1, which has been in use for years without any updates or refinements. The GY701 governor claims to be just what we were looking for in a new Futaba governor. With a totally new processor and programming to keep your headspeed in check, the governor on the GY701 is surely going to turn some heads towards Futaba. Let's take a look at this new multi-tasking Gyro/Gov from Futaba.

There is a hell in my gyro.

FEATURES

The Futaba GY701 is a two-piece unit comprised of a control unit and sensor. The control unit is small and lightweight but still carries an organic LED screen that is easy to read both indoors and out. The unit weighs in at less than a half ounce, measuring 1.7 in. x 1.2 in. The system is S. Bus capable, which allows the gyro to connect to the receiver using a single connection when using an S. Bus capable Futaba receiver. The firmware and software can also be updated on

the GY701 using the CIU-2 PC Interface, sold separately. Another key feature of the GY701 is the ability to operate with both analog and digital servos with multiple bandwidths. The gyro sensor of the GY701 uses MEMS (Micro Electro Mechanical System) technology for ultra high-speed processing. A new advanced control algorithm was designed for the 701, which offers unparalleled consistency and yaw control. Like previous Futaba gyros, the GY701 can be used in FAI mode or 3D mode, depending on your flying style. The sensor features an all aluminum alloy case and a 3-color mode indicator LED, which lights up the whole top of the gyro. The governor features an RPM range of 1000-3000 and can be selected to run in governor mode or rev limit mode. The combo kit includes the normal clutch mounted sensor, but Futaba now offers an optional back plate mount for O.S. .91, .55, and .50 engines. Futaba has also made

programming the GY701 governor and gyro functions easy by creating two sets of menus, including a basic menu and an advanced menu. The basic menu allows you to program the basic functions of the gyro/gov, while the advanced menus allow you to fine tune the program and set advanced parameters.



INSTALLATION

Installing the GY701 was no different than installing a regular gyro and governor. With one less controller, the wiring is much easier and cleaner. Overall, the gyro sensor is so small that it can fit anywhere without any problems. Futaba includes multiple foam tape pieces, in case you ever want to remove the gyro unit and place it on another helicopter. Mounting the governor is, once again, a simple process of installing the sensor and running the wire to the control box.

TESTING

We had the chance to test the GY701 on multiple platforms including the Furion 6, Radical G30, and the Titan X50. With each platform, the GY701 performed flawlessly. I set up each helicopter using the basic programming and I must say that this gyro performed perfectly on every machine without having to change a single advanced parameter. The tail authority was superb and allowed the tail to be rock solid throughout the flight, no matter if it was fast backwards flight, sideways flight, or extreme smack down maneuvers. I did notice that the GY701 was a little less sensitive than the GY520,

as vibration from the big gasser did not allow the tail to drift or wander. This is a definite plus in my books. The piro rate was very consistent and allowed for precise pirouetting maneuvers like the piro flip and pirouetting hurricanes. I also tested the governor function on both the gasser and 50-sized nitro. On the Radical G30, I installed the governor sensor so it was pointed at the magnet that drives the magneto of the engine and found this perfect, as I was getting a 90%+ reading. The governor was easy to set up using the remote RPM wire that connected to an auxiliary channel on the receiver.

The 50-sized nitro performed even better as the headspeed was stable, yet the governor allowed for a little over speeding for that extra pop during smack maneuvers. This over speeding of the governor only lasts for a second, until the governor brings the head speed back

down to its normal operating parameters. When I tested the head speed of each model with an optical tach to find out if the governor was truly keeping the head speed at the entered setting, the results were spot on. Overall, the new GY701 performed to my expectations and outperformed every previous gyro Futaba has released. The lower weight and easy programming made this gyro a must-have for the serious 3D pilot, and with the addition of the governor, makes the GY701 purchase a no-brainer.



Taste the rainbow.

CONCLUSION

Going over all the features and the ability to change advanced parameters, all from a single control box, the GY701 was hands down the easiest and most thorough multi function gyro on the market. Futaba did a great job designing this gyro to future-proof it by allowing the user to upgrade his gyro/gov to the newest software and firmware editions without having to spend extra money on a completely new system. Who knows what the future has in store for us, but at least we will know that whatever it might be, Futaba will have an update. If you are looking for a new gyro to go along with your brand new heli you got for Christmas, I would not hesitate one bit to try out the new GY 701 from Futaba. **FUTABA**



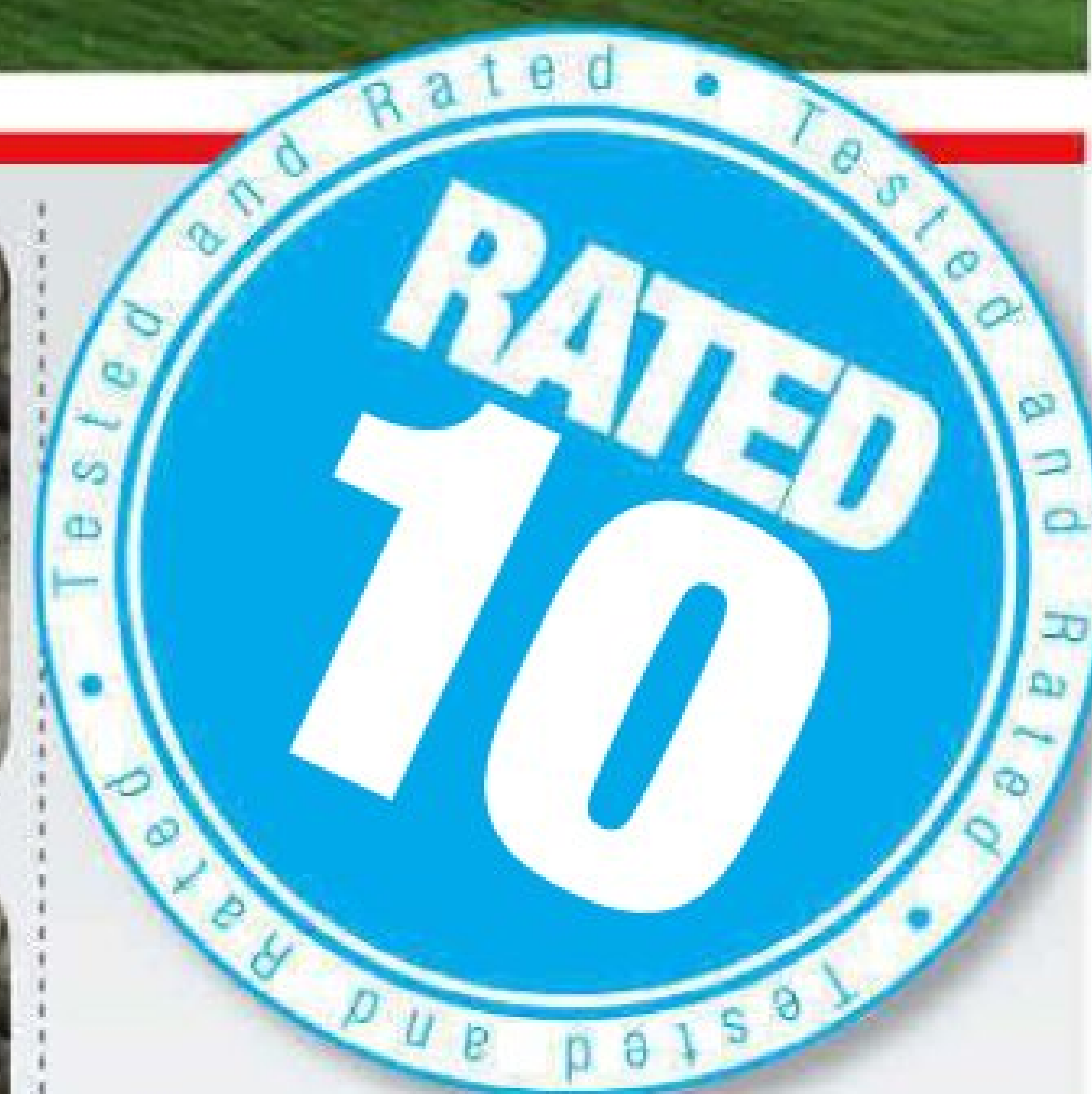
When the gyro corrects for a right nose movement the gyro lights up blue.



A solid red light indicates no movement, a flashing red indicates a correction for a left nose movement.



A Purple light indicates an input is applied to the rudder channel.



+ THE GOOD

- Lightweight
- Multiple functions
- Very accurate piro rates, and head speed RPM

- THE BAD

- None

CONNECT

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STREET PRICE:	\$399.99

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Seven of the world's best helicopter pilots were invited to compete in the First Annual "One Competition", held during the 2010 IRCHA Jamboree. All the pilots gave exceptional performances, and when the flying was over, Scorpion powered helicopters dominated the field finishing in First, Second and Third place!

Congratulations to Bobby Watts, Kyle Dahl, and Daniel Katzav for their winning performances!



First Place - Bobby Watts
Miniature Aircraft Furion 6

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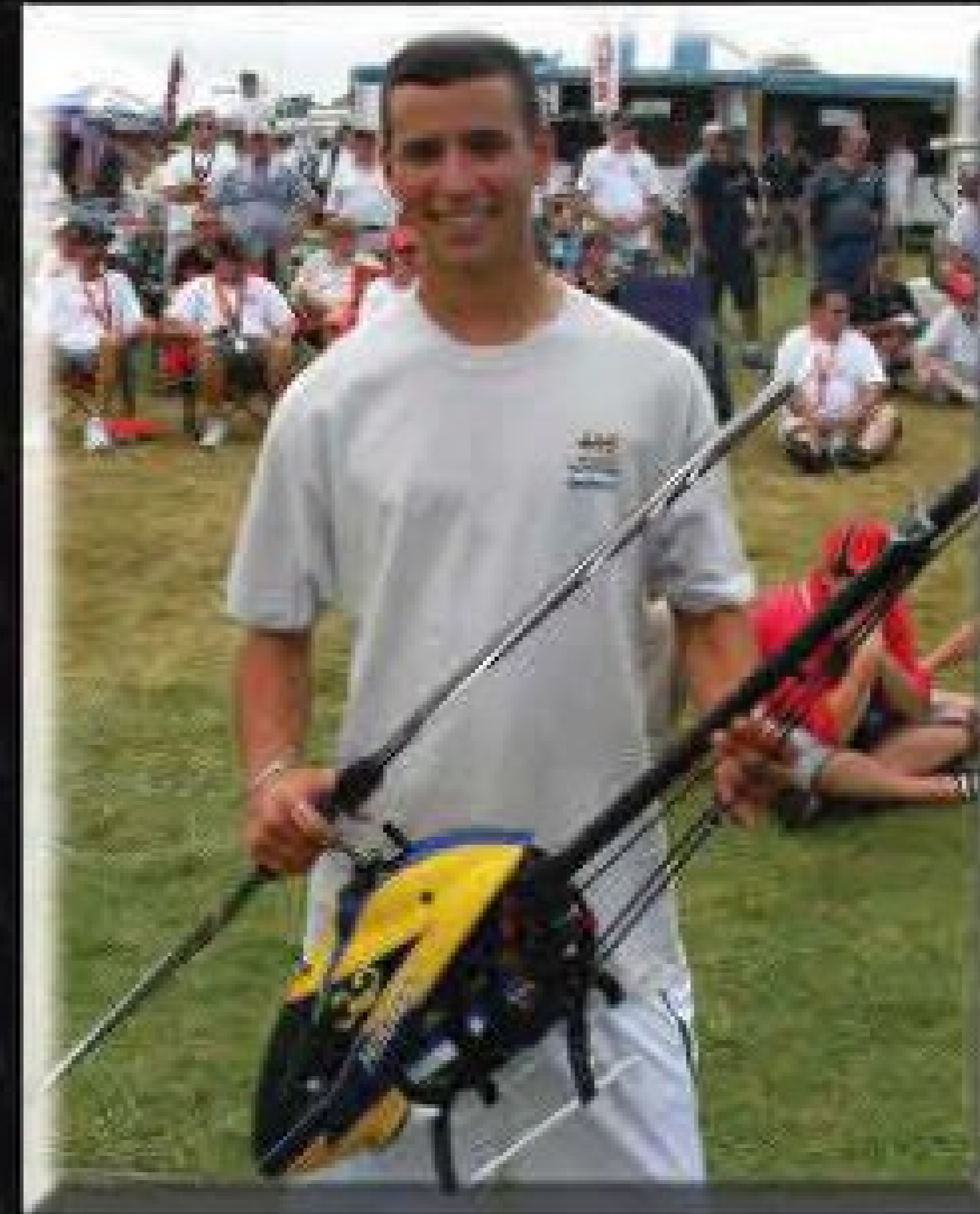
Bobby Watts and his caller
"Master Rick" proudly display
the One Competition Trophy



Second Place - Kyle Dahl
Mikado Logo 600 V-Bar



HK-4035-560



Third Place - Daniel Katzav
Mikado Logo 600 V-Bar



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Parrot AR. DRONE

The future of flight today!

WORDS: Ryan Kephart

EVERY NOW AND THEN, WE COME ACROSS AN INNOVATIVE PRODUCT THAT LEADS THE WAY FOR FUTURE RC FLIGHT. RARELY DO WE SEE SUCH A PRODUCT THAT GOES ABOVE AND BEYOND THE NORM, BUT THAT IS JUST WHAT WE HAVE SEEN NOW WITH THE PARROT AR. DRONE. This semi autonomous quad rotor helicopter has some of the most innovative and specialized features we have ever seen in one package. Parrot started out by making a name for themselves in the wireless accessories for mobile phones. The company was founded in 1994 by Henri Seydoux, to develop products to enhance the products we use in everyday life. Now, you may ask why a wireless mobile phone accessory maker would decide to take the plunge into the RC helicopter market. Well, this is where the most innovative and specialized features come into play. The AR. Drone is completely controlled by your Apple touch devices. This is the first time the RC market has ever seen a hobby grade product fully controlled by your mobile phone or wireless device. Let's take a closer look at the AR. Drone and find out what makes this product so unique, besides the obvious good looks.

FEATURES

The AR. Drone features a quad rotor design much like that of the common quad flyers we have seen, including the Gaii 330X. This Quadricopter is made from carbon fiber and high resistant PA66 plastic. Key features include the two video cameras, one mounted to a foam post facing the front of the Drone and the other pointing straight down for precision landings. The video cameras have to be for something—and no, they are not to capture the flight of your third person view. The AR. Drone features a video link straight to your Apple device. That is right; you can fly this Quadricopter in first person view. The video and all the controls are achieved by a wireless Wi-Fi connection to your iPod Touch, iPhone, or iPad. The front camera has a wide angle lens with a 93° view and a resolution of 640x480 pixels (VGA). The camera facing downward is a high speed camera with 60 frames per second refresh rate. This camera not only allows the pilot to land

the Drone with precision, it is also used in the stabilization of the Quadricopter. The main body is housed in an EPP foam shell and several tops are included in the box. A big EPP foam indoor shell is included that protects the rotor blades and the main body from anything you might strike while flying your AR. Drone indoors. A second aerodynamic body is included to fly your AR. Drone outdoors for more maneuverability and greater response. The ready-to-fly kit comes with four brushless motors and a three cell LiPo with an included charger. The brushless inrunner motors power four blades that are geared down. Two of the blades are counter rotating, allowing the AR. Drone to have yaw axis control. An ultrasound altimeter has also been installed on the Drone to increase stabilization and allow the Quadricopter to take-off and land by itself. The range of the ultrasound altimeter is 20 feet. All of these features are packaged in one small flyer for a low price of \$299.00. I guess it is time to add another item to your Christmas list. The

AR. Drone comes in two different colors to suit your style and allow for future battles with an opponent. Still in development, but the "AR" stands for augmented reality. This is a feature we have never seen until now. The AR. Drone is capable of displaying artificial opponents right in your own home. This allows you to create a battle zone and fight off virtual enemies using your Quadricopter. If you are tech savvy, Parrot designed a software development kit that allows you to create your own games, thanks to an Open Game API. One program is already in the works and, by the time you read this, it should be in full stream. The AR. Flying Ace is a program that allows you to combat other AR. Drones on the same Wi-Fi network. The software allows recognition to target both the outdoor body and indoor body, thanks to the high contrast stickers of the indoor body and the bright shell of the outdoor body. What more can you ask for? Let's see how the AR. Drone performed and find out if it is everything we hoped for.





I wonder if they made my Bluetooth?

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The front camera has a resolution of 640x480, and a frame rate at 15fps.



Each arm is comprised of a motor, ESC, rotor, and landing skid.



The bottom of the AR. Drone houses a high speed camera, ultra sound altimeter and a USB plug.

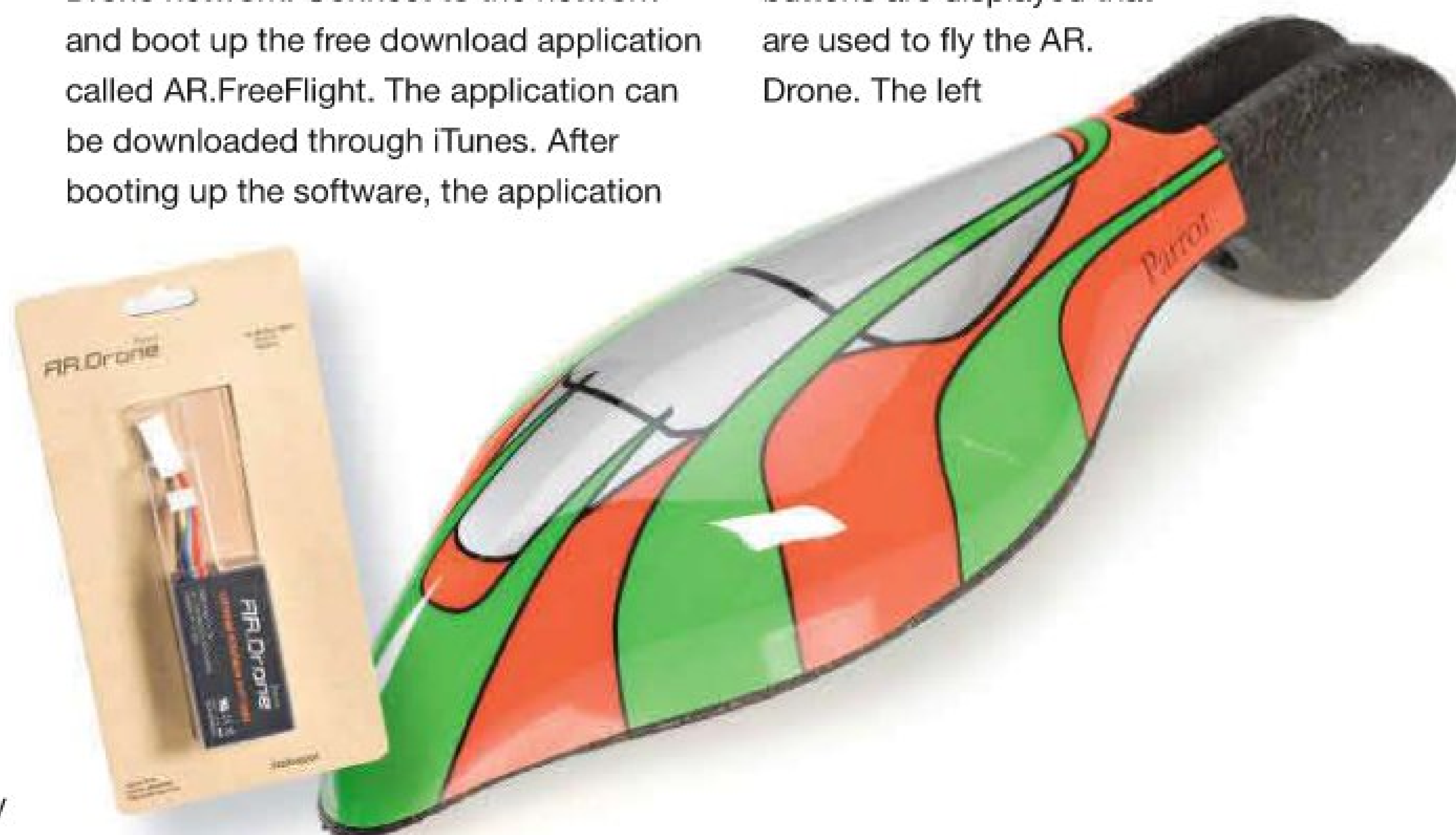
TESTING

THE BACKBONE OF THE AR. DRONE

We tested the AR. Drone with every product listed to control this unique machine, including the iPod Touch, iPhone 3G, iPhone 4G, and the iPad. The Drone was packaged in a brown box with one side printed with the product name and the other side printed with a helicopter landing pad. The box included the AR. Drone, an indoor body, and outdoor body, the 11.1V 1000mah LiPo, and a universal charger with multiple wall outlet adapters. We couldn't wait to give the AR. Drone a try, so we charged up the battery with the included charger. The charger has a built-in balance port in which the battery is charged through this connection. Four LED lights display the status of the battery, three of which indicate if a cell is out of balance, and the final LED displays the status with a red light for charging and a green light for charge complete. The battery takes about 90 minutes to charge, so a second battery should come in handy

for extended flying time. The battery fits into the main body of the AR. Drone under the protection of the durable plastic and foam cover. The battery is strapped down into a recessed section with Velcro. A small Tamiya connector is used to plug the AR. Drone in. The initial bind to your Apple device was pretty straightforward, as it requires you to plug in the battery, then turn on your Wi-Fi and search for the AR. Drone network. Connect to the network and boot up the free download application called AR.FreeFlight. The application can be downloaded through iTunes. After booting up the software, the application

will check the firmware of the AR. Drone and update it to the most current. This is all done while on a wireless network. If you wish to update your firmware manually, you can plug the AR. Drone into your computer using a USB cable. After checking and updating the firmware, the program will connect to the Quadcopter and will show the actual video from the forward mounted camera. Two green buttons are displayed that are used to fly the AR. Drone. The left

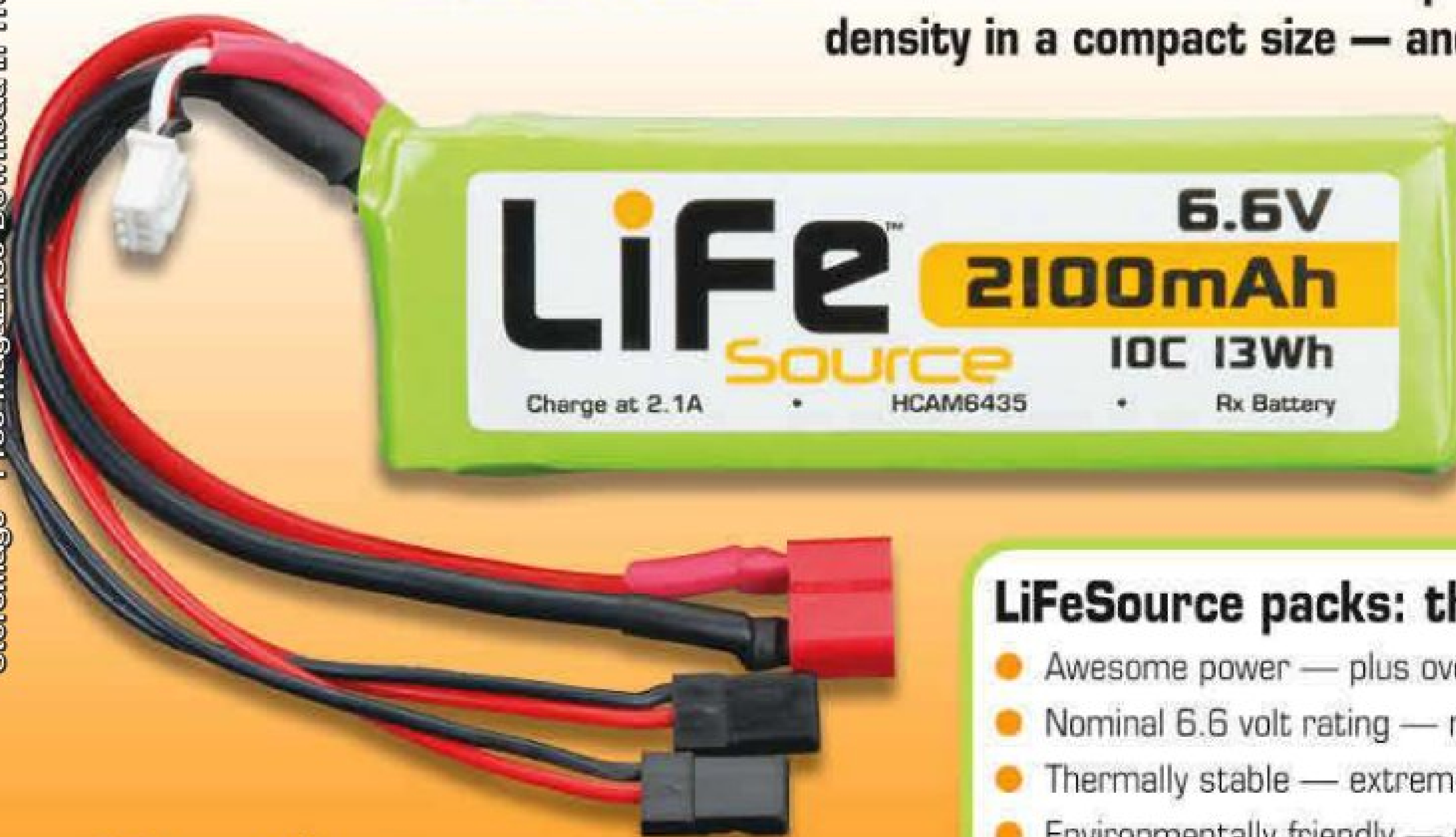


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button allows the Apple device to use its accelerometers to fly the Drone by tilting the phone. The right button is more like a simulated collective stick that allows you to control the yaw and throttle. In the middle of these two buttons is another small button that allows you to take off and land the AR. Drone with just a single push. The button changes from an up arrow to a down arrow depending on the current status of the Drone. On the upper left of the screen, two other buttons are used to adjust the settings and cycle through the different camera views, which include the forward only camera, bottom camera only, forward camera with bottom camera pip, and bottom camera with forward camera pip. In the middle, at the top, resides an emergency button. This button allows you to instantaneously shut down the motors in the case of an emergency. In the upper right hand corner of the screen, a battery status monitor is available that allows you to keep track of how much battery power is left while you are in flight. This sums up this current version of AR.Freeflight, but as new developments come out, I am

sure Parrot will release new and updated software as well as firmware. Inside the settings menu, you can select many different functions to improve or enhance the flight of your AR. Drone. You can adjust the amount that you can tilt your Apple device to either increase or decrease the sensitivity. The settings menu also displays the current hardware and software versions of the product. An altitude limited feature can also be selected to limit the height you can fly, which is limited to the range of the on board ultrasound altimeter. An outdoor flight mode can also be turned on, which automatically increases the yaw speed, vertical speed, and amount of tilt of the AR. Drone. These setting can be customized for both indoor and outdoor flight, allowing you to fine tune the feel for each condition.

FLIGHT TESTING

Like I mentioned before, we tested the AR. Drone with an iPod Touch, iPhone, and iPad. Using the 1st generation iPod Touch, the video stream was a little choppy, which made flying the Drone using the

video feed almost impossible. Although the video was choppy, the actual flight controls were smooth and responsive, without any noticeable lag. These same characteristics were the same for the 3G iPhone. I, however, had a chance to try it on a new generation iPod Touch and the results were dramatically better. I was able to fly the AR. Drone around slowly and still tell what it was doing. But by far the best experience I had with the AR. Drone was with the 4G iPhone, and iPad. The video was smooth and the controls were even smoother. This is what the AR. Drone was built for. FPV flight was easily accomplished and the range was much further than I expected from a Wi-Fi signal. I did notice a single loss by going around buildings, but in the office and through the walls was not a problem. I also had a chance to test out all of its safety features. These features allow the AR. Drone to stay in one piece even if you hit a wall, tree, or simply can't figure out what you are doing. The first safety feature I had the pleasure of viewing was the low voltage alarm. This alarm is displayed across the

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Flying the AR. Drone on the iPad had to be the best experience. The screen was big enough to see well, and still have enough room for my thumbs.



HOW WILL YOU CONTROL YOUR AR. DRONE?

Before takeoff or while in flight, the AR. Drone can enter the settings mode that will allow you to do several functions to improve the feel, or use a feature that limits the flight in one way or another. If you are like me and most people in the United States, we are used to the mode 2 transmitter. This is apparent, as the collective/yaw stick is on the left hand. Parrot didn't leave us out and added a left hand mode. This moves the throttle and yaw stick to the left side. Parrot has also added a disable Accelero setting. This shuts off the accelerometers in your Apple device and replaces the button with a simulated cyclic stick.

screen, letting you know when to land. Along with this safety feature, I decided to see how far the battery can be drained before one of the motors quit, but I was surprised to find that the AR. Drone is programmed to land itself to prevent the battery from getting ruined, or one of the motors shutting down and causing an out of control situation. Several other warnings are built into the AR. Drone, including an over tilt emergency, and the motor cut off emergency. The motor cut off emergency automatically activates if one of the propellers strikes an object. This makes the AR. Drone one of the safest hobby grade helicopters on the market. I tried out this feature by hitting a wall without the guard and instantly the motor shut off and kept everything in one piece, including the wall. One other unique feature of the AR. Drone is the ability to hover on its own without a signal from your Apple device. I tried a long distance run and found the AR. Drone will simply hover in one spot if you lose reception. This beats any traditional helicopter, which would simply crash if it lost the transmitter signal. Overall, the AR. Drone is a great flying machine that I just couldn't get enough of. I must

have flown a good 100 flights in the course of a week. The feel and ability to easily control the helicopter through your Apple device is a unique experience and probably the most fun I have ever had with a machine that only costs \$300.

CONCLUSION

I thoroughly enjoyed the Parrot AR. Drone and all of its features. If there is one gift I would want for Christmas, it would be this one. What better way to enjoy your New Year than with this crazy little flying spy cam? Overall, the AR. Drone is built to last with its highly durable protective foam and strong plastic blades. One good thing about a hobby grade product is the parts support. Parrot offers replacement bodies, motors, speed controllers, main board, ultrasound altimeters, and the most important—extra blades and batteries. Right now, you can find the AR. Drone at your local Brookstones, or check out their website. You can also purchase this product through Amazon. Good luck to all of you out there and I hope you have as much fun as I did with the AR. Drone. **T.H.L.**



+ THE GOOD

- Durable
- Affordable
- Fun

- THE BAD

- Motors can come loose from the end cap, but can be glued back on
- Video is a little too choppy on older generation Apple devices

CONNECT

MANUFACTURER:	Parrot
WEBSITE:	ardrone.parrot.com www.brookstone.com
PART NUMBER:	PF720000AA
STREET PRICE:	\$299.99

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BLADE

#1 BY DESIGN

Heli-Max NOVUS AH-1J SEACOBRA

GET IN THE CHOPPA!

WORDS: Daniel Colby

WE HAVE SEEN MANY SMALL INDOOR HELICOPTERS FROM HELI-MAX'S NOVUS LINE, AND WITH THE GROWING POPULARITY OF INDOOR HELICOPTERS, MORE AND MORE VARIATIONS KEEP SHOWING UP, BUT WE HAVE YET TO SEE ONE OF THIS CALIBER. Heli-Max is well known for producing affordable and durable ready-to-fly helicopters. We have enjoyed flying some of the other helicopters from the Novus line, and are interested to see how the SeaCobra will compare.



Miniturized Cobra.

FEATURES

The AH-1J SeaCobra is a micro size indoor scale helicopter that's a fully licensed replica of the Bell AH-1J SeaCobra. Taking after its full size counterpart, the micro SeaCobra comes with machine guns, mini cannons, cockpit details, panel lines, and incorporates a CNC black anodized head and swash assembly that makes it more durable,

flies more precisely, and gives this little mini chopper an authentic military look. Underneath the scale body, the SeaCobra utilizes a 5-in-1 circuit board that houses the receiver, servos, gyro, and speed control. The motor mounts in the front of the main shaft, and the whole setup is powered by a 400mah LiPo battery that resides in a compact battery tray located on bottom of the helicopter.

to be a sensitive helicopter to fly. Once I got it up and trimmed, it actually held a hover quite well; it would even hover hands-off for a couple seconds. When put in motion, the SeaCobra really shines; with its increased cyclic speed it's able to sustain much higher speeds both forwards and backwards compared to other similarly sized helicopters. The tail is solid; to give you an example, I was able to perform tail down funnels with ease.

TESTING

Going into this test, I knew from flying previous Novus helicopters that they have a much faster cyclic than most other micro sized helicopters. The SeaCobra only required 8 AA batteries for the transmitter and a quick charge to the included 400mAh LiPo pack before getting airborne. Upon takeoff, I knew that it was going

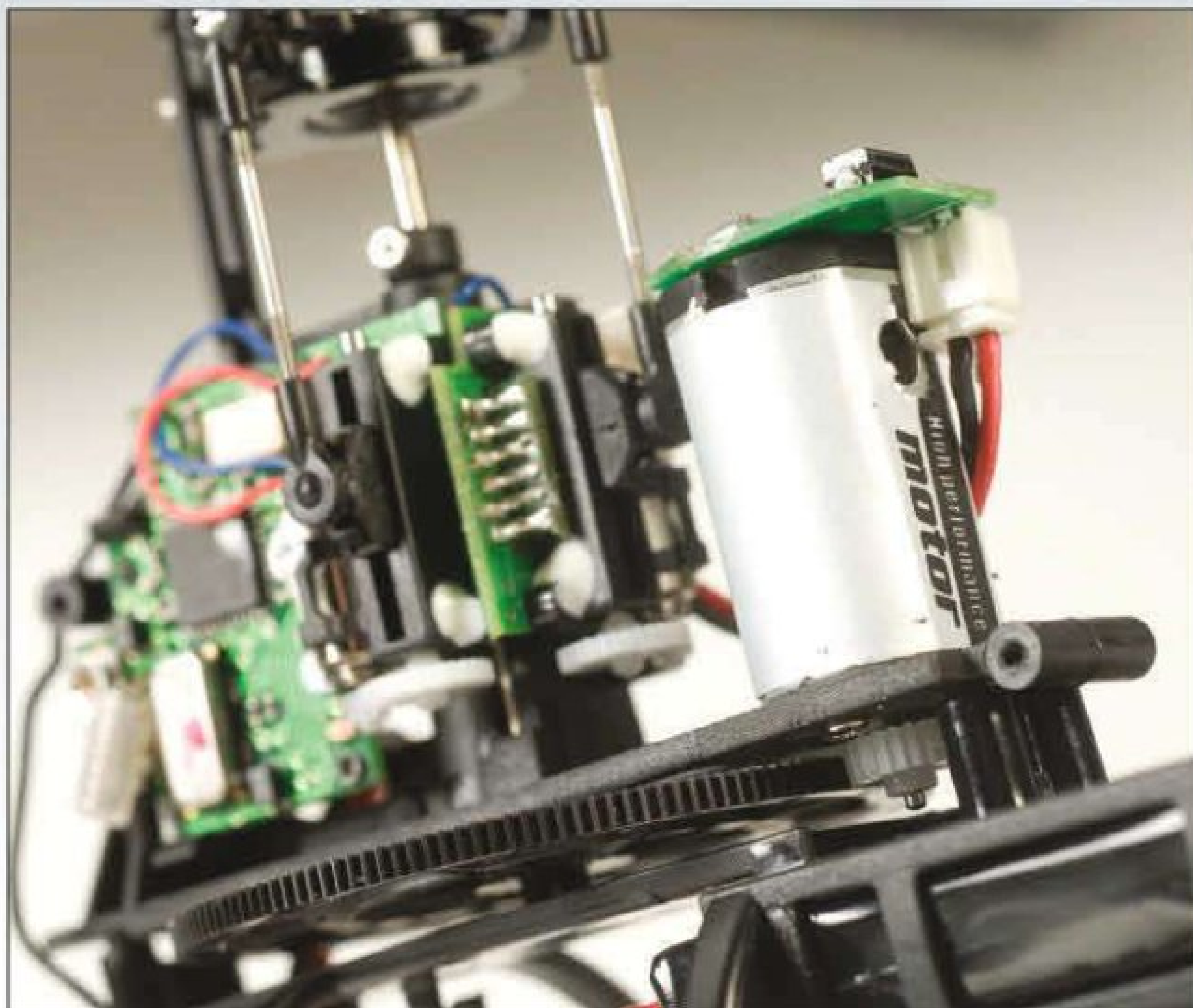
CONCLUSION

If you enjoy flying scale helicopters and want one to fly around your house, the Novus SeaCobra is a great helicopter to consider. It does everything asked of it and more. However, if you're a beginner I wouldn't recommend this for your first helicopter. If you have the basics down and want a fun indoor scale helicopter, don't be afraid to give the SeaCobra a shot. **TREK**





They all look the same on the inside!



+ THE GOOD

- Fast cyclic
- Tail control is fast and solid
- Great scale look

- THE BAD

- Some scale parts are fragile

CONNECT

MANUFACTURER:	Heli-Max
WEBSITE:	www.helimax-rc.com
PART NUMBER:	HMXE0805
STREET PRICE:	\$100



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REGULAR GUY

REGULAR GUY INTERVIEW

with **TIM HURLEY**

WELCOME TO THIS MONTH'S "REGULAR GUY" INTERVIEW. EACH MONTH WE INTERVIEW A RELATIVELY UNKNOWN PILOT WHO IS ONE OF THE "GOOD GUYS" AT THEIR LOCAL FIELD. We hope to shed some light on what we consider the lifeblood of this hobby: those pilots who, day-in and day-out, train and help new pilots succeed and do so with no fanfare or payment. We are always looking for more of the unsung heroes in the hobby; if you know of such a person we could interview in your area, please email Jim Innes at rchelijim@gmail.com.

PILOT **INTRO**

 Our pilot this month is Tim Hurley (on the left) from the great state of Hawaii. Tim has been in this hobby for a long time, and his association to helicopters goes beyond the RC world. He spent over two decades serving his country in the Army National Guard, and was a Chinook pilot in Iraq. Tim was nominated for this interview by his wife, Pat, who had this to say about her husband: "Tim helps others for the love of the hobby, without any compensation or recognition. He's a wonderful husband and father, and I'm proud to be supportive of his hobby." Let's learn more about this month's regular guy: Tim Hurley.

RCH: So, tell us a little bit about yourself. What do you do? Where do you live?

Tim: I was born and raised in Hawaii. For 24 years I have been working for the local utility company that produces electricity for the Island of O'ahu. After a year long tour flying CH47Ds in Iraq, I retired from the Hawaii Army National Guard in 2005 as a CW4 with 26.5 years of service. I completed flight school in 1981 as a UH1H Pilot from Fort Rucker Alabama and am now qualified (but not current), in the TH55 (Hugh 300), UH1H Huey, OH58 Kiowa (Jet Ranger) and the CH47D Chinook.

RCH: How did you get started in RC Helis?

Tim: In 1973, I left flying control line models to fly remote control airplanes. My first radio was an EK Logic system

with a .15 Cassette Quarter Midget Racer airplane. I have been building and flying RC model airplanes ever since. I started flying RC Helicopters in 1986; that began with the Schluter Heli-boy and then the Kalt Baron 20 while using either a JR Century Seven single or dual stick Radio. Today I'm using a JR9303 radio to fly two modified fixed winged airplanes and a fleet of three Raptor 50s. One Raptor is in a semi scale Century Long Ranger fuselage, another is in a Century Hughes 500D which is waiting for an upgraded five blade head from Cliff Turnbull at RC Aerodyne, and my current project is a four bladed main and tail rotor system that will find its home in a HH-60 Jayhawk also from RC Aerodyne.



RCH: What are some of the maneuvers you are currently working on? What are your favorites?

Tim: I'm constantly working on real scale helicopter maneuvers. I enjoy flying slow 360 degree hovering turns along with right and left traffic pattern circuits. Right now I am very interested in multi-bladed helicopters and flying them with or without the aid of flybarless electronic systems. I love these models, building them, flying them, and, most of all, working with anyone who needs help.

RCH: What are your top tidbits of advice for new pilots?

Tim: My advice to the new pilot is to take your time!

- Read anything and everything that you can get your hands on related to your interest in this hobby. RC Heli is excellent reading material.
- Make friends. Your local hobby shop and the flying field are two great locations to meet and make friends. Ask questions on how to get started. A friend in the hobby will make things a lot easier for understanding basic helicopter dynamics and setups. A computer simulator would be an ideal investment.
- When you're ready to fly, first perfect the lifting of the model to a hover as slowly and as smoothly as possible and then back down. Next, while hovering in the same spot, slowly move each individual control one at a time until the helicopter moves away from the hover spot just little and then work it back. Do these things over and over again until it becomes second nature. During each flight, work just a little further beyond your comfort zone.

- If you take things slowly and deliberately, you'll have fewer crashes, which will save time, money, and frustration. The more you fly, the more confident you'll become. This hobby will last a lifetime along with all the friends that you will make along the way. So don't rush - take your time and enjoy every flight!

RCH: Why do you fly helis now and what are your future plans with the hobby?

Tim: It's amazing how far this hobby has come along since I have been in it. Someday I hope a CH47 Chinook gasser or a gasser Osprey will be developed. I've made some really great friends who share the passion that I do for the hobby. Everyone at our flying field is enthusiastic about helping anyone get started. The more the merrier!

RCH: Thanks so much for sharing your time and thoughts with us Tim, and also a big thanks for your years of service to your country!

CONCLUSION

Tim is another one of those good guys who we are lucky to have in this hobby. He is happy to help any new pilot that he meets and he does so as often as he can. Tim has been in this hobby for long enough to appreciate how far it has come along and to make lifelong friendships. We are grateful for good guys like Tim in involved in RC helicopters, their influence and helpfulness are truly the lifeblood of the hobby! *RCH*

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Hirobo SRB Quark SG RTF

\$748⁹⁹

You'll really FLIP for this one. Second Generation SRB Quark from Hirobo features a new Bell/Hiller collective pitch rotor head, direct drive tail motor, larger and thicker main blades, control unit with idle up mode, high performance gyro and sensors, and 3-cell lipo battery. Comes ready-to-fly with transmitter, battery and charger. Matt flew his upside down for at least a few seconds.



\$599⁹⁹

Miniature Aircraft USA X-Cell Fury 6

You only live once, but if you work it right, once is enough; so get ready for the ULTIMATE electric helicopter experience! The Fury 6 utilizes the proven head and tail system from the Fury 55 for super hot performance and rock solid stability. Fly with either a 6S LiPo setup, or for mind boggling performance, try the 10S LiPo set up. Top it all off with the included sweet canopy by CanoMOD™.

Flybar or Flybarless Versions Available



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Miniature Aircraft USA X-Cell Fury 55

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Miniature Aircraft USA X-Cell Fury 450

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JR Heli Tool Set with Aluminum Carry Case \$149⁹⁹



Tim "The Tool Man" would pee himself over this one! This tool kit is tailored specifically for heli flyers and includes every tool you could need out at the field. Plus it includes a really cool aluminum carry case. Check out our website to see everything this set includes.

Futaba GY701 Gyro/Governor

- Gyro/Governor... **\$269⁹⁹**
- Gyro Only..... **\$219⁹⁹**
- Governor Only.... **\$149⁹⁹**



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FLYBARLESS HEAD

What is the difference?

WORDS: Ryan Kephart

BY NOW, YOU PROBABLY KNOW THAT THERE ARE AN INCREASING NUMBER OF FLYBARLESS CONTROL UNITS ON THE MARKET. To match these control units, manufacturers are now producing kits with or without a flybar. What does this mean exactly? The movement of flybarless rotorheads will soon take over the market, and one day this will be the only way we fly. Flybarless units make flying a helicopter much more enjoyable, as a three axis gyro allows the helicopter to have a locked-in feel throughout any maneuver. What exactly are the differences of a flybarred head compared to a flybarless head? This month's Anatomy has you covered.



Look Ma' no flybar!

» FLYBARRED VS. FLYBARLESS

FLYBARRED

- The headblock must be made to mount the flybar cage either above the main blade grips or below.
- Bell/Hiller arms need to be added to adjust stability and control from both the flybar and the swashplate.
- Phasing must be incorporated on the headblock. This can be done with either press fit pins or a separate adjustable block.
- Washout arms must slide up and down the main shaft smoothly without inducing slop between the pins and washout base.

FLYBARLESS

- The grips are usually controlled from the leading edge of the blades.
- The pitch links are usually centered to accommodate a straight linkage from the swashplate.
- The headblock only serves as a place to hold the grips and the unit to the main shaft
- Bell/Hiller arms are not used for a flybarless head
- A swash follower that locks to the main shaft accomplishes phasing. Two links connect to the swashplate to keep the inner race spinning in sync with the head.
- Flybarless heads use less moving parts, thus reducing the overall weight of the head.



ELECTRONIC STABILIZATION UNITS **COMPARED** **TO A STANDARD TAIL GYRO**

As electronics progress, we find our gyro units becoming smaller and smaller. At one time we used to have to install an additional gyro unit on top of the tail gyro to handle the cyclic stability. Now companies are creating three-axis gyros to handle both the tail and electronic stability. These new gyros do not weigh

any more than the standard tail gyros of yesterday. These three-axis gyros allow the main cyclic gyros to interact with the tail gyro, giving you perfect phasing when it comes to pirouetting maneuvers. This is the biggest benefit when searching for a flybarless control unit. Two axis gyros that use a separate tail gyro usually feel loose

when performing pirouetting maneuvers, so depending on your flying style you will want to choose a gyro that will work for you. If you're a scale pilot, a two-axis gyro just might be the only thing you need, but for you hard-core 3D pilots a good three-axis gyro is the only way to go.



Technology rocks!

ADVANTAGES AND DISADVANTAGES **OF A FLYBARLESS HEAD**

Flybarless heads offer advantages over flybarred models. This is one of the major reasons that companies are moving ahead and producing kits that come standard with a flybarless rotorhead. The advantages not only help the manufacturer of the helicopter, but other companies that produce gyros and servos. The cost of producing a flybarless head is much cheaper, as it does not require all the parts of a flybarred head. This includes the flybar, paddles, Bell/Hiller arms, seesaw, phasing pins, and additional linkages. Here is a list of the advantages and disadvantages of a flybarless rotorhead:

ADVANTAGES:

- Rotorhead is lighter weight
- Cyclic speed can be adjusted electronically both faster and slower than a flybarred head
- Stability is increased throughout big maneuvers (requires less corrections throughout a maneuver).
- Cheaper to manufacture
- Less moving parts
- Reduced slop
- Less drag, allowing more power to be transferred into flight

DISADVANTAGES:

- Setup is a little more advanced
- Gyro units typically cost a bit more
- Higher torque servos required
- Some flybarless control units require digital servos only

CONCLUSION

As you can tell, flybarless rotorheads are the way of the future, and soon enough will probably be the only way to buy a helicopter. Overall, a flybarless head allows for infinite adjustments that give the pilot room to grow. You can set up your rotorhead to feel as soft as a counter-rotator for beginners, or you can set it for blazing fast cyclic response for hard 3D. Pod-and-boom pilots are not the only ones who benefit from a flybarless head—so do scale pilots, as most real helicopters do not use a flybar to control their flight. It's the way of the future. *TREX*

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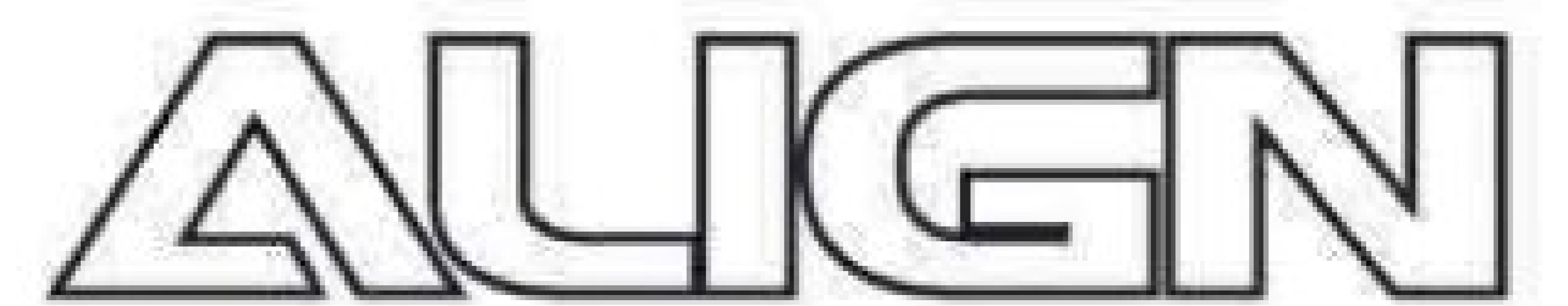
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TRANSMITTER ACCESSORIES

Upgrade for you transmitter

WORDS: Ryan Kephart

LIKE YOUR FAVORITE HELICOPTER, TRANSMITTERS HAVE THE ABILITY TO BE UPGRADED TO IMPROVE THE AESTHETICS AND FUNCTIONALITY. The great thing about upgrading your transmitter is the fact that you have to do it only once to enjoy it with all of your models. Many aftermarket accessories are available for a wide range of radios, and most accessories you will find are universal. Let's take a look at some of these everyday tools that make your transmitter everything it can be.

NECK STRAPS

Radio manufacturers sometime include neck straps with the radio. Older radios use to come with thin, crude neck straps that were nothing more than a safety net in case your hand slipped from the radio. Since then, manufacturers of transmitters started to notice more pilots flying with neck straps and decided to include thicker straps to provide more comfort for the pilot while flying. Nowadays, pilots use neck straps to stabilize their radios and relieve the weight from their hands as they fly. This also provides a repeatable radio height and allows muscle memory to retain precise maneuvers more easily.

INCLUDED WITH THE RADIO

These neck straps are usually made from nylon and provide some support, but can be a little rough around the neck. The clasps at the end of the neck straps are usually of the generic type like you would find on a dog leash.



GENERIC AFTERMARKET

These neck straps can usually be purchased from your favorite helicopter parts store or hobby shop. The straps are usually printed with the manufacturer's logo or name but provide about the same quality and feel as the straps that come with your radio. You can sometimes find these straps at a local fun fly, or an event such as a giveaway.



Does Coach make neck straps?

PREMIUM AFTERMARKET

Manufacturers like PureTech dedicate their product line to neck straps and quality radio gear accessories. These neck straps are usually designed from a soft blend of material, and have a nice clasp to keep your radio locked to the neck strap at all times. On top of the quality material used, these neck straps usually include a padded section for your neck to provide the utmost comfort and support.



TRAYS

If a neck strap is not enough for you, manufacturers also provide transmitter trays. These trays usually have their own neck strap mounting points and include the neck strap itself. Trays allow pinch-style flyers a way to hold the transmitter without the worry of the radio twisting or moving as they fly. Some trays are also manufactured with side hand rests.



I use the PureTech neck strap for every flight and I love it!

NECK STRAP
BALANCING MOUNTS

As 2.4-GHz technology became available, radios were usually converted from an old-style transmitter case with new internal electronics. These old cases provide a perfect balance when the long 72-MHz antenna was extended. The 2.4-GHz antennas are much smaller and lighter weight, which caused the transmitter to pivot toward the battery compartment when attached to a neck strap. Aftermarket manufacturers came up with a clever way to eliminate this problem using an aluminum mount that attached to the pre-existing neck strap mount. These balancers moved the attachment point back and allowed the transmitter to sit level when using a neck strap.



DRESS IT UP

Want to add a little flair to your radio? Elevated RC provides anodized switch nuts to add some color to your transmitter. These nuts can be purchased for any major brand transmitter, including Spektrum, JR, and Futaba. The kits come with a complete set of anodized aluminum nuts, a stock removal tool, and an installation tool.



CONCLUSION

If you look down the flight line at your next local event, you will notice almost every pilot using a neck strap or radio accessory to aid them while flying. Buying a nice neck strap, or adding a balancing mount will not only last a lifetime but will also provide a locked-in feel every flight. *TRFL*

Mavrikk, Really? Yeah Really!

AGAIN!

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SAFETY FIRST

Safety comes first when you fly RC

WORDS: Aaron Shell

THERE ARE MANY THINGS WE DO IN OUR EVERYDAY LIFE WHICH PRESENT SAFETY CONCERNS. LIKE ANYTHING WITH THE ABILITY TO IMPART DAMAGE, SAFETY SHOULD BE HIGH ON YOUR PRIORITY LIST WHEN YOU FLY RC HELIS. As the pilot, mechanic, and inspector, it's your job to go over every nut and bolt on your model before you commit it to aviation. Sometimes things just happen, but taking preventive measures and always having a safety mindset while flying can mitigate the risk of something going wrong with your RC heli.

Don't run with scissors or don't let scissors run.

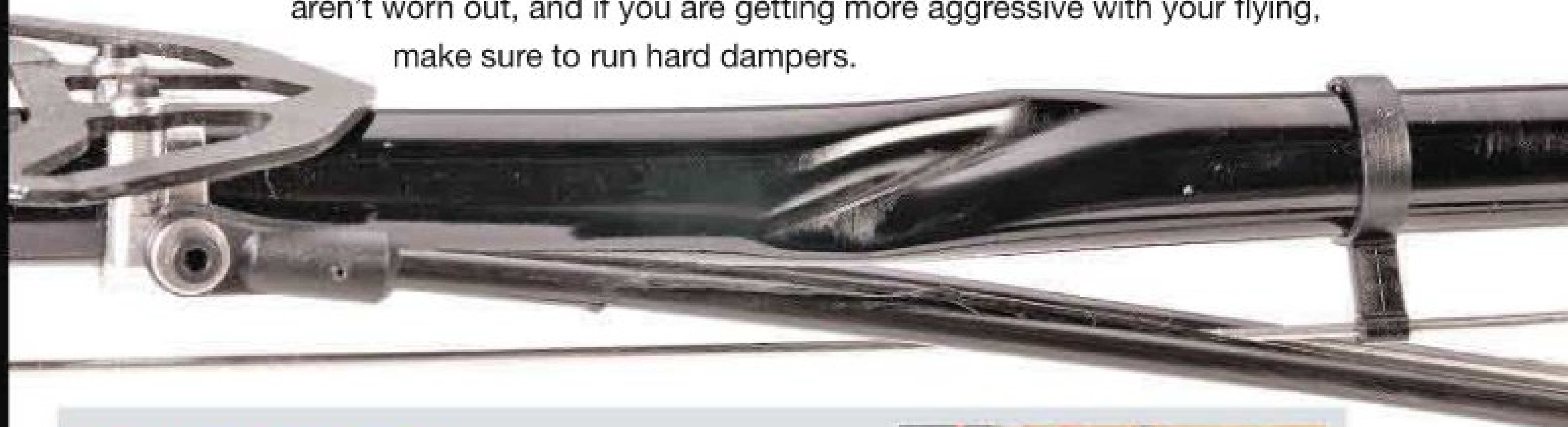
PREVENTIVE MAINTENANCE

It's amazing how much people get away with while neglecting their machine's mechanics. Don't expect that your machine will remain in perfect working condition; like full sized helis, RC helis require a significant amount of maintenance to stay in proper working condition. As you become accustomed to your model, you'll be able to catch worn parts easily with a quick pre-flight inspection.



A FEW PARTS TO INSPECT REGULARLY

DAMPERS This is more important the more aggressive you are with your model. If you really like to do Tic-tocks and hard stops and beat the crap out of your heli, you need to inspect your dampers frequently. If your dampers start to get soft and allow the spindle to move too much, you will eventually boom strike on a hard direction reversal. Make sure that your dampers aren't worn out, and if you are getting more aggressive with your flying, make sure to run hard dampers.



BATTERIES Don't expect your batteries to work perfectly forever. Every few flying sessions you should cycle your batteries. Having a charger with an LCD readout telling the battery's capacity is very helpful. You should be able to get close to the battery's rated capacity. If your pack isn't holding as much capacity as you expect, replace it before you fly again.



BALL LINKS Perhaps one of the most failure prone parts on your model if you don't pay attention to their condition, losing a ball link can result in anything from a loss of accurate control to your helicopter simply disintegrating. All it takes to prevent their failure is to make sure that there aren't any cracks, and to make sure they are snug but still move freely. Simply replace any questionable links ASAP, and that's all there is to it! Nitro helis tend to wear out ball links much faster than electrics because the oily exhaust collects on the links, dust sticks to them, and when you move the link it acts like sandpaper.



BALL BEARINGS

Especially after a crash, it's important to double check your bearings and make sure that everything moves freely. If you think that a bearing is gritty or notchy, replace it. While a bearing is not likely to fail entirely in flight, it could cause RF interference (especially if you still fly with a 72 MHz radio), and it's possible that it could lock up or produce enough vibration to cause damage to something else on your model. Depending on where the bearing is located, this could easily result in a crash.



SERVOS This is more for the aggressive pilots, but still important for everybody; keep an eye on your servo's condition. Servos do wear out. If a servo starts to develop slop in the gear train, it will get worse and worse until the servo eventually locks up. The best servos have no slop, but its okay to have a tiny amount. Don't wait until a servo locks up in flight. Keep an eye on your servos by gently twisting the servo arm back and forth to feel if there is any slop in the gear train. If it feels excessive, replace the servo, install new gears, or send it back to the manufacturer to be rebuilt.

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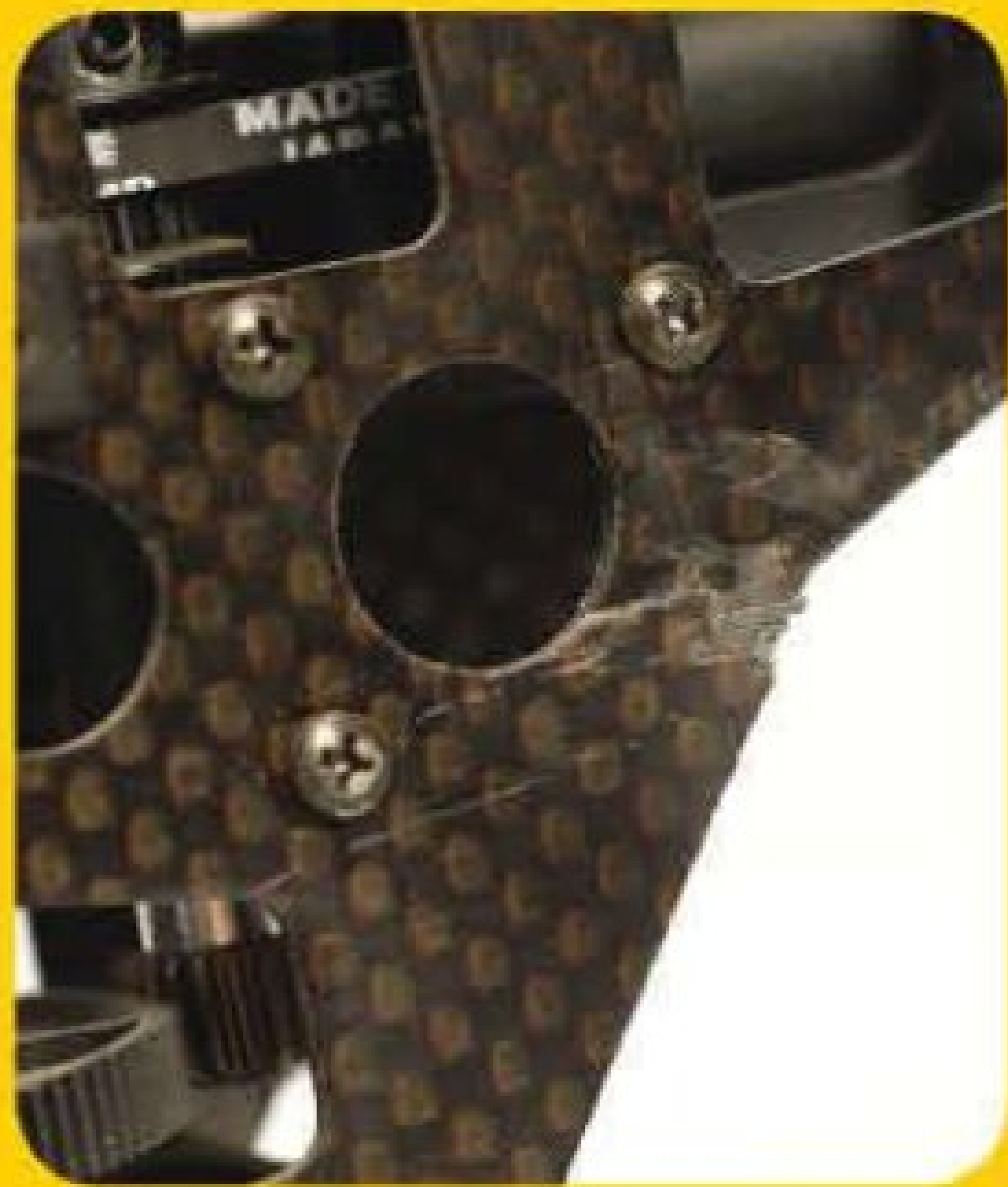


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OVERALL

Anything looking

bent, broken, out of place, sloppy, notchy, or just "not right" should be addressed before you fly again. Look for loose connectors, frayed wires, questionable switches, nicked blades, partially stripped gears, cracked parts, and whatever else you can find. Keep your heli in good working order if you expect it to stay in flight worthy condition!



ALWAYS FLY WITH SAFETY ON YOUR MIND

No matter how well maintained your model may be, it all comes down to you, the pilot. During flight you have to make numerous decisions at a moment's notice, and many of these involve important safety decisions. It's very important to know your own skills and fly within your skill set; getting ahead of yourself can lead to trouble very quickly.



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GYRO: **3-axis**
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SOME THINGS TO REMEMBER **WHEN YOU FLY**

SAFETY COMES FIRST: One of the great things about our hobby is that we can experience the majesty of flight without all of the personal risks. It's very important to always have a bailout move in the back of your mind. As the pilot, it's your responsibility to prevent the model from causing damage to people or property. If you crash, you crash, and so be it. But don't let your model get so far out of control that you can't prevent it from hitting something. For example, if you are piro flipping away and at some point you loose orientation, you **MUST** stop fighting the model and bail out before it hits the ground. It's your responsibility to try to keep the model away from the flight line. I've seen so many crashes where the pilot never tried to bail and fought the controls all the way to the ground. These types of crashes are most likely to cause damage or injury. If you lose control, you should stop pirouetting (or whatever maneuver you are trying) first, and then if you still can't recover it's time to hit throttle hold. In a worst case scenario, the model will do far less damage if the engine is disengaged.



G0000AAAAALLLLL!

NEVER FLY OVER PEOPLE

It's not okay to fly your model in an area where you fly over people. Use common sense to find flying sites; If there is an open park with no signs forbidding it, you should be okay. If the field is in use, don't fly over the people. It's not even a good idea to fly in an area with people on the opposite side. Do everything you can to prevent flying your model over or near people. If someone shows up and intrudes upon your flying area when your are in the air, try to land away from them and ask if you can use the field for a few minutes.



FLY WITH A SPOTTER

No matter how good you are, you can't beat a spotter for catching something out of place in your flight area. It may be another pilot getting out of control, an ATV rider wandering onto the end of the runway, or someone going out to get a plane that crashed. There are a million scenarios when a spotter comes in handy, and what it boils down to is that you just can't beat a second set of eyes and ears focused on your flying area so you can focus on your flying.

CONCLUSION

Make no mistake about it, RC helis can cause serious bodily harm. People have been killed by RC helis, but usually RC heli flying is only dangerous when fliers get negligent. Use common sense and remember at all times how dangerous it can be if something goes wrong. Like an exotic sports car, you have to treat your incredible flying machine with respect. Always keep your bailout plan in the back of your mind and be prepared to do whatever it takes at any moment to keep your model from going out of control and causing damage to something or someone. **TRE**

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8S (33.6V)



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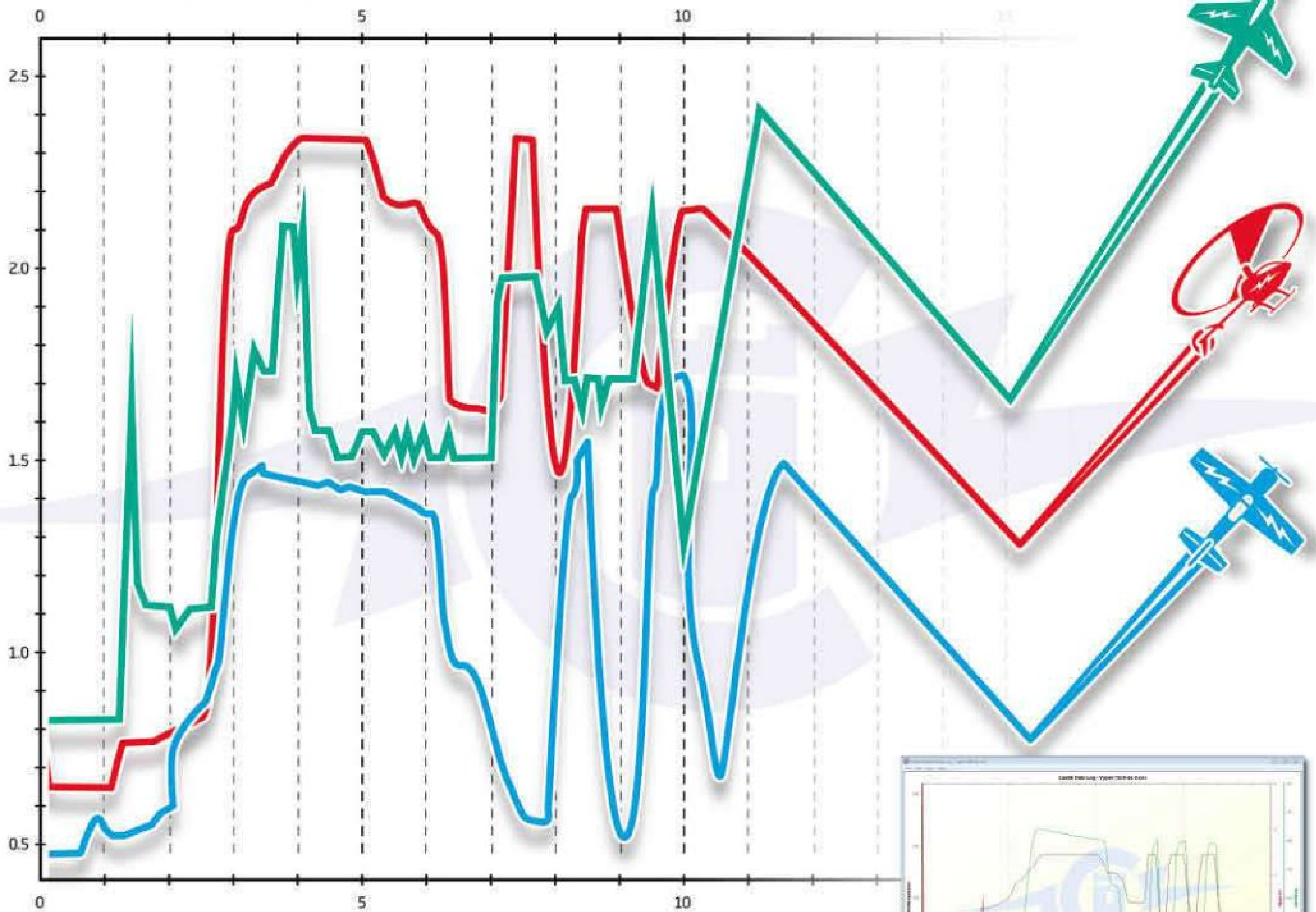
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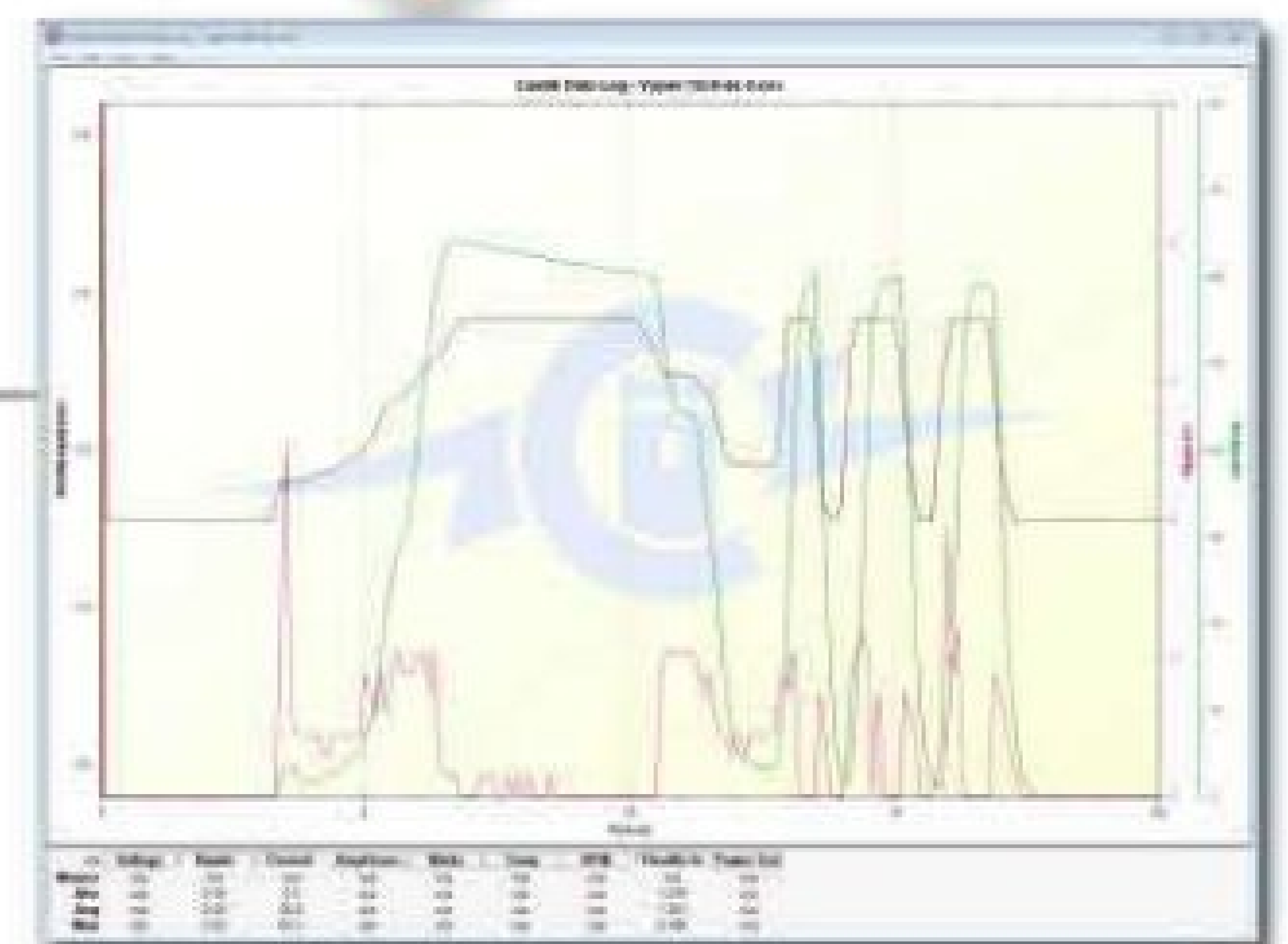
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Guide to LIPO BATTERIES

Packed with Go-Juice

WORDS: Aaron Shell

IT'S BEEN ALMOST A DECADE SINCE I FIRST HAD MY HANDS ON A LITHIUM BATTERY FOR AN RC HELI. I placed an order with an online shop for 3 Kokam 1020 mAh cells as soon as they became available. At the time, I was flying a collective pitch MS Hornet with a brushed speed 300 motor. It was barely capable of basic flight for a few short minutes using 720 mAh NiMh cells, but LiPo batteries promised a huge decrease in weight while increasing capacity! Unfortunately for my little Hornet, the first generation of LiPos were best kept to slow flier airplanes; there still was not enough power available to fly helis, yet. In the years since, with my Hornet having gone the way of the Dodo, a lot has changed in lithium battery technology; performance has reached new unimaginable heights, and safety has been increased through improvements to charging technology and educating users about LiPo safety.

What is a LiPo?

LiPo refers to a lithium ion polymer battery. Technologically evolved from lithium ion batteries, LiPos feature a solid polymer that retains the lithium-salt electrolyte, as opposed to a liquid solvent in lithium ions. LiPos are assembled in a flat, soft foil packaging. With individual cells producing an average of 3.7 volts, cells are connected in series in a battery pack to obtain the final voltage. When I bought the original Kokam 1020 mAh cells, I had to assemble them myself, and it's not as simple as their metal-cased NiCad or NiMh cousins. LiPos have one steel tab and one aluminum tab for making electrical connections, and the aluminum tab can tear very easily. In addition, it's not simple to solder aluminum, further complicating assembly. For these reasons and more, you'll almost never find individual LiPos anymore. Most of the time, you'll find finished packs, complete with balancing leads, ready for charging and use.



SAFETY

LiPos may have presented huge potential for the future of electric RC, but the technology almost didn't take root because of valid safety concerns. During the first few years of LiPo use, fires were unacceptably common. LiPo batteries pack a bunch of energy into a tiny package, and like all alkali metals, lithium is highly reactive and flammable; combine those two ingredients, and there is a huge potential for a fire when things go wrong. So, what can go wrong with a lithium battery to cause concern? A direct short, physical damage, or an over-charge situation all can lead to a LiPo fire. The first two are pretty simple to address. If the battery is damaged, keep an eye on it; the standard is to give the battery at least 10 minutes in a fire-safe area where you can watch it. If you have a dead short, it's the same deal; keep an eye on it for at least 10 minutes. If you physically damage the battery or experience a dead short, the battery is likely to incur some level of damage, reducing the battery's performance. The third issue, overcharging, was more complicated for the industry to address. Many homes, garages, workshops, and cars burned during the first few years LiPos were being used in models. I know of two cars that burned from LiPo fires just in my metropolitan area! Fortunately for the future of electric RC, adequate chargers and balancing technology were just around the corner, and the frequency of LiPo fires has plummeted.



CHARGING, BALANCING, & OVERCHARGING

Because the overcharging issue can lead to such dangerous fires, noxious fumes and all, understanding your LiPos and your charging system is critical. LiPo cells peak at 4.2 volts each, and when one cell gets above 4.2 volts while the pack is still taking a charging current, that's when the problems arise. A balancer has the relatively simple but important job of keeping all the cells at an equal voltage during the charge cycle, and to prevent any cell from getting above 4.2 volts. If you have a one-cell LiPo, there is no balancing to worry about, but for every cell you add to the pack, the more critical balancing becomes. Two cell packs are very unlikely to get out of balance, but by the time you have three cells, it becomes more important. Three cell packs should be balanced every charge if possible, but you can get away with balancing every few cycles if you must. By the time you get up to five, six, or more cells, you should never charge without using a balancer, because the chance of overcharging one individual cell is simply too great to risk. Some chargers can connect to the balancer or even have one integrated; these are the most desirable because they can reduce the charging current if a cell gets out of balance.

Most chargers have the user select the cell count and a charge current before beginning. The battery's capacity tells you its best charge rate, for a safe 1C charge. If it's a 2200 mAh battery, then your charge rate would be 2.2 amps. A 5000 mAh LiPo should be charged at 5 amps, etc. Charging above 1C may get you back in the air quicker, but it's likely to reduce the longevity of your cells.

Because of the dangers involved with charging, you should never leave a LiPo on charge unattended.

In the event of a lithium fire, do not use water or a conventional fire extinguisher. A lithium fire requires a Class D fire extinguisher. Containment devices like the LipoSack (LipoSack.com) offer the best option for preventing any fire from causing damage.

» C RATING

LiPos carry a "C" rating to tell the user how much power he can expect to draw. The higher the C rating, the better the battery's ability to hold the voltage up under load and deliver current. My first Kokam 1020 mAh cells were rated at 1-2C continuous with up to a 5C burst. That meant a hefty 2 amps could be pulled continuously, and you would be really stretching it to get 5 amps for more than a few seconds. Today, the newest cells on the market have 40, 45, even 50C continuous ratings! Modern LiPo cells have so much power they've had to beef up the little metal tabs for the



electrical connections to prevent them from melting! A modern LiPo with a 45C rating at an equivalent 1020 mAh would be able to deliver almost 46 amps continuous! The numbers speak for themselves in flight. LiPo batteries have brought electric flight into the modern era, and more power is available from electric helicopters than similar fuel-powered models.

DISCHARGE

Discharging is just as important for the health of your LiPos as charging, but doesn't have the same safety risks. There are still a few things to consider for your safety, and these mostly come from the medium- to large-sized packs in 500 and larger helicopters. By the time you start getting up to some of the huge 12 packs, you've got to be very cautious about the potential for a severe burn if you create a short next to your skin. You should never discharge a LiPo cell below 3 volts, even under load. It's important to understand the voltage will recover when you reduce the load, so your dead 3s LiPo may read 10.5 volts after you fly, but it is likely closer to 9 volts (3 volts per cell) by the time you land. You should always strive to calculate your flight time and use only 80% of your battery's available capacity to prolong longevity.

BREAK IN

While you can just charge up and go abuse your cells, you should take it easy on them for the first half a dozen cycles or so. You should keep charging to 1C, and you should avoid getting the cells hot or pulling excessive amps on them. For a heli, this means basically just cruising around at a lower headspeed for a few flights, and then start working your way back up to your normal power demands. The newest generation of high C-rated batteries helps this tremendously; these new batteries don't have to work as hard for a gentle hop around the field, so even if you bang on your batteries a bit during break-in, you should have plenty of reserve.



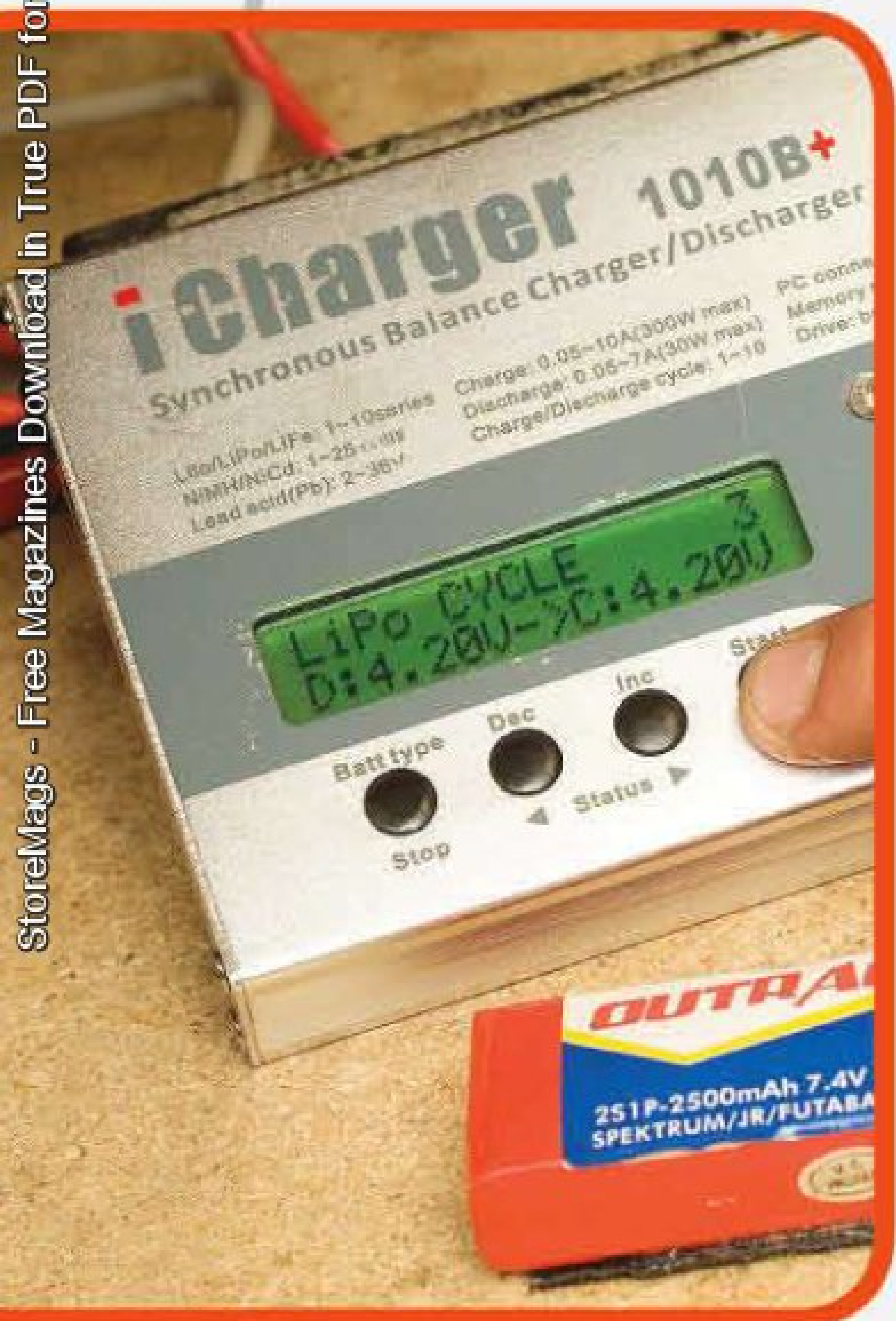
Calculating Flight Time

You need to have a timer and a charger with an mAh reading, and you might want a calculator. Simply do a short, timed flight, for instance, two minutes. Try to fly as aggressively as you normally would, and conclude the flight as close to your time as you can. Charge the battery after the flight, and the amount of capacity used will give you your rate of discharge. For our theoretical example, if you used 500 mAh for a two-minute flight, you are using 250 mAh per minute. Then you can take 80% of your capacity, so if it's a 2200 mAh pack, you have 1760 mAh of usable capacity, and divide that by your 250 mAh per minute discharge rate for your safe flight time. So, in this example, you could put in a seven-minute flight and feel confident you've used about 80% of the capacity, where a longer flight would likely lead to a decay in performance.



Don't give your LiPos a bath.

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Ultra Compact Frame TECHNOLOGY



LENGTH : 1220MM

HEIGHT : 378MM

WIDTH : 203MM



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

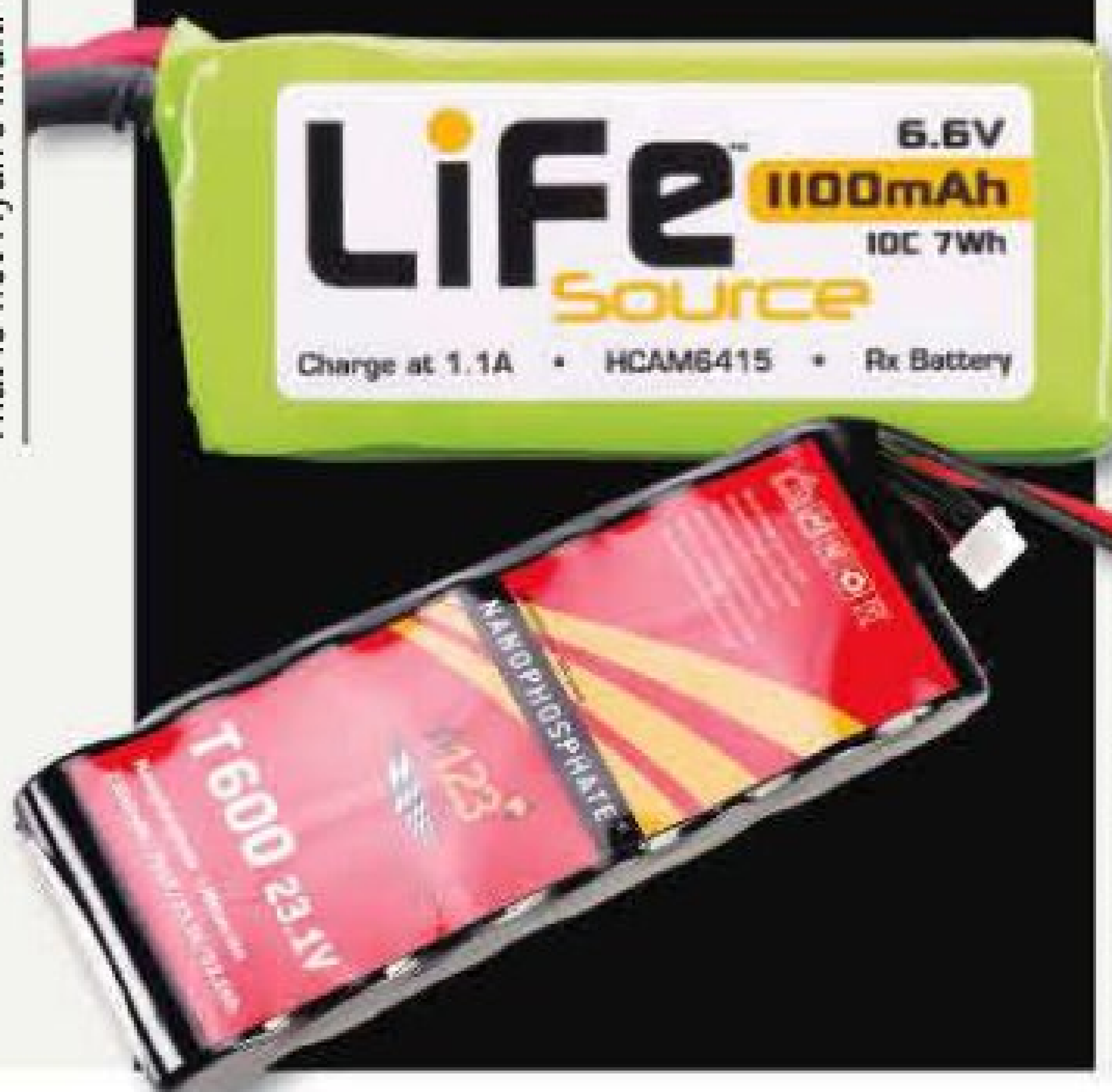
- Main Gear ratio: 8.6:1 (8.8:1 Optional)
- Tail Rotor Ratio 4.583:1
- Approximate Flying Weight with Fuel: 3.6kg / 7.936 Lbs. (depends on equipment used)

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VARIATIONS; LI- BUT NOT -PO

Not all lithium batteries being used in models are LiPo. The most common runner-up is the LiFe, or lithium iron. First seen in A123 cells, this technology offers a lower risk of fire. Since A123 cells are a bit heavier than LiPos, their use has been limited, but their safety advantages should not be ignored, and most newer chargers have a setting to deal with the LiFe's slightly different voltage range. The LiFe Source cells are a great option for receiver packs on your model. Although they don't yet offer enough discharge ability for a power pack, they have a 6.6 volt rating, which is more radio friendly without using a regulator than using a LiPo.

That is not Ryan's Multi-Grain bread or V8 juice.



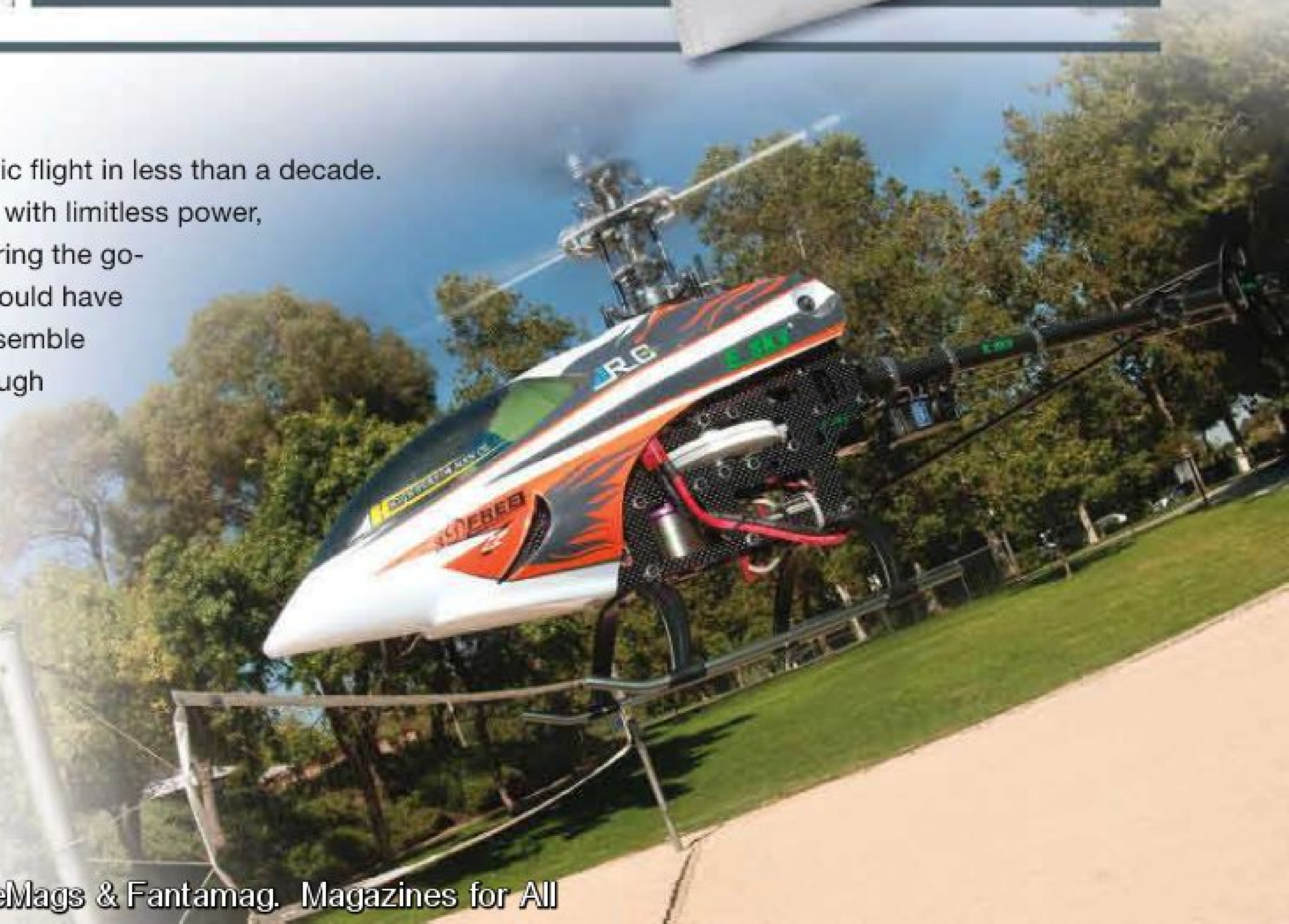
Storage

Unlike most other rechargeable batteries, LiPos can be stored for days, weeks, even up to a month with a full state of charge and not lose much. However, if you leave them fully charged for longer than that, they will start to lose performance. Most manufacturers recommend storing LiPos with a 40-50% charge, and some even recommend storing them in the refrigerator (not freezer). Consult your battery's manufacturer for storage recommendations.



CONCLUSION

LiPo batteries have revolutionized electric flight in less than a decade. If you ever dreamed of having a model with limitless power, it's now possible with a LiPo battery delivering the go-juice. I never would have dreamed LiPos would have progressed so fast when I was trying to assemble my own LiPo packs and getting barely enough power for marginal flight performance, just a few years ago. If you use well-accepted chargers with a balancer (especially on those big packs!), and you pay attention to what you're doing, you shouldn't have any problems. Don't leave your packs alone on charge, and consider getting a protective containment device like a LipoSack to improve your margin of safety. **RCHL**



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Fuzzy hand cuffs would have been better.



FREEING UP YOUR HELI

Don't be a drag! Guide to freeing up your heli

WORDS: Jim Innes

A RADIO CONTROLLED HELICOPTER IS A COMBINATION OF A COMPLEX SET OF BLADES, CONTROL LINKAGES, FRAMES, POWER SOURCES, ROTATING PARTS, AND ELECTRONICS. All of these sub-systems are required to work together flight after flight to create the symphony of flight. It can be said that these components must run nearly perfectly in order for a flight to start and end successfully. One step a pilot can take in helping these systems work their best is to free them from binding conditions and excess friction (also known as drag).

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

3.0 **RC Heli**

» TIME TO COMPLETE

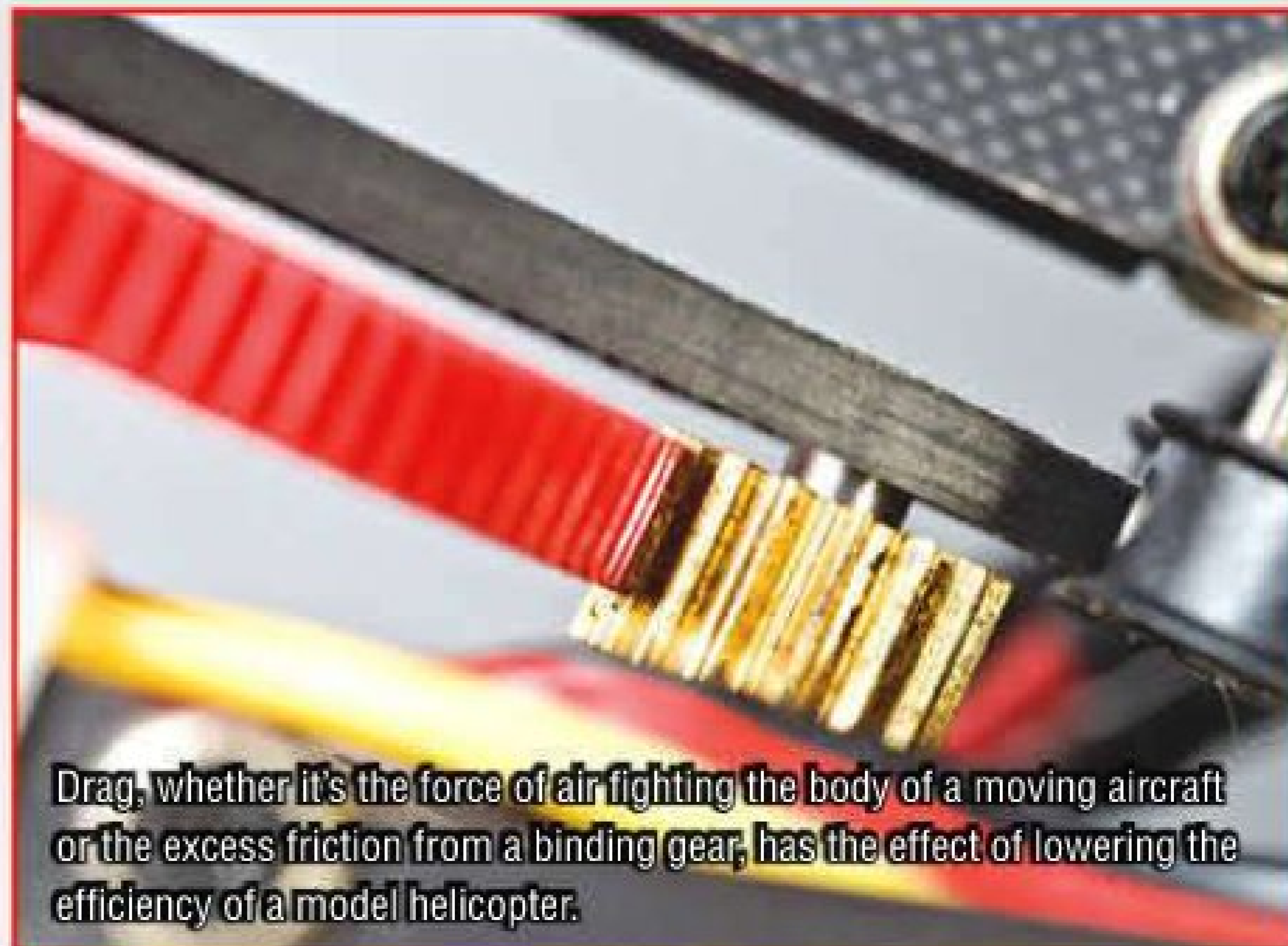
 **30** Minutes

» TOOLS NEEDED

-  ■ BALL REAMER
-  ■ BASIC TOOLS
-  ■ LIGHTWEIGHT OIL

» DRAG: THE KILLER OF EFFICIENCY

THE TERM "DRAG" IS OFTEN USED TO DESCRIBE THE FORCE OF AIR AGAINST AN AIRCRAFT AS IT MOVES, WHICH LOWERS THE EFFICIENCY OF THE MACHINE. There is another form of drag that also reduces the efficiency of a model aircraft, which is physical drag placed on moving components in the model.



Drag, whether it's the force of air fighting the body of a moving aircraft or the excess friction from a binding gear, has the effect of lowering the efficiency of a model helicopter.

This type of drag is often caused by components that fit too tightly, are installed incorrectly, made poorly, or that rub against something while in use. This physical drag adds to the strain on these systems and often results in premature wear and failure. We will discuss the main areas found on modern helicopters where drag may be present and, more importantly, how to reduce drag in these systems.

Drag in the **DRIVE SYSTEM**

The drive system on a helicopter consists of all the moving parts that transfer power from the engine/motor to the main and tail blades. There are numerous areas in this system that can be negatively influenced by drag. Some of them are:

- **THE ENGINE/MOTOR ITSELF:** With an engine or electric motor, there are bearings that should be checked and replaced as they wear. The bearings on an electric motor should also be lubricated occasionally so that they can run freely. A locked up or ruined bearing will induce extra wear on the crankshaft or motor shaft as well as rob some power.

Keeping your motor or engine running smoothly is the first step in creating a more efficient machine.



Proper gear mesh allows the energy coming from the motor or engine to transfer through the drive train with minimal loss along the way.

- **GEAR MESH:** The gear mesh between the pinion gear and main gear needs to be set properly. Too tight of a gear mesh puts a large amount of strain on the system, induces premature wear, and robs power. Too loose of a mesh will also result in early wear. The same holds true for counter gears that drive the tail rotor. Set the gear mesh so that there is a tiny amount of play or backlash in the mesh.

When in doubt use the old paper trick!



MIDDLE BEARING BLOCK

• **SHAFT ALIGNMENT:** The helicopter main shaft, tail shaft, torque tube, and other pieces are all designed to spin freely within their bearings and housings. If these shafts are aligned crooked or too tight in their bearings, some drag may be introduced. Take time during a build to line the rotating parts so they spin freely within their bearings.



UPPER BEARING BLOCK

LOWER BEARING BLOCK

Any rotating part in a model heli that is supported by bearings needs to turn freely in those supports. Binding in any one of the bearings creates drag in the system.

The difference can BE NIGHT & DAY

SOME OF YOU READING THIS WILL CALL UNIMPORTANT, ESPECIALLY WITH THE HIGH POWER MACHINES WE HAVE NOWADAYS. I can attest to the differences these small adjustments can make to a helicopter, especially when performed in a small model like a Trex 250.

A small heli like this needs to have all its components setup to be as free from binding and drag as possible. The small servos and motors will thank you!



If you have a model that doesn't autorotate well, never centers up correctly when brought into a hover, or one that seems to drain a LiPo too quickly—look through the machine for areas that can be freed up from drag. You will be surprised how much better a helicopter can fly when things are allowed to rotate or move just a little more freely. Give it a try!

• **BELTS:** If your helicopter uses a belt for the main drive or tail rotor, adjust it properly. A tight belt induces drag on the drive train. The belt should be tight enough to not flex or skip during use, any more than that will waste energy in the system.



When a tail belt is tightened properly, it can be a very efficient energy delivery vehicle getting power from the main gear to the tail rotor. Unnecessary tightness in the belt will just rob power.

• **BEARINGS:** Besides the bearings mentioned, any bearing in the drive train and helicopter must be in good shape and turn freely. A notchy or locked up bearing creates drag in the system. Keep an eye on those bearings and replace as needed.

Following the simple recommendations can make a world of difference in a machine's efficiency. A drivetrain will always lose some power along the way (no system is perfect) but by freeing up the system in key areas, the helicopter will get the most power it can from its engine or motor.

FACTORY TEAM PILOTS

BERT KAMMERER

Tequesta, Florida

KYLE STACY

Sodus, New York

DARRELL BELL

Detroit, Michigan

MITCH MAROZAS

Chicago, Illinois

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Mountain View, California

FRANK COLUMBIA

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Bellcranks and mixing levers need to be installed so that they turn freely on their bearings; binding here adds strain to the servos and can prevent proper centering.

FREEING UP LINKAGES

THE OTHER KEY AREA WHERE MECHANICAL DRAG IS VERY PREVALENT IS IN THE HELICOPTER'S CONTROL SYSTEM. The control system includes everything from the servo to the end control surface or component. These components are the main blades, tail rotor, flybar, or throttle linkage. Servo energy is transferred from the servo horn to the component through linkages, usually ball links. Areas to consider in the control system are:

- **SERVOS:** Inside a servo are bearings, gears, a motor, control pot, and a logic board. While servos usually run quite smoothly and trouble free for many years without user intervention, keep an eye on your servos for any wear or strange behavior.
- **BELLCRANKS AND BEARINGS:** Ensure that all control bellcranks and their associated bearings are able to turn smoothly with no binding. This also includes mixers and washout levers on the rotor head. All of these components should be free from binding.

• **BALL LINKS:** The area where most drag is found on a helicopter's control system is in the ball links. Ball links are simply plastic links that are molded with a cup-like groove in them that snap over a control ball to transfer motion from one area to another. Ball links can often fit tightly on a control ball. The friction caused by tight links wastes power and often results in a heli that does not quite center correctly. Fixing a tight ball link is quite simple. I recommend that you use a commercially available ball link sizer to remove some material from the inside of the link. Only remove a small amount at



a time and test fit the link. A ball link should fit securely on the ball with no slop, but should be able to move around the ball freely. If you are in a bind you can also use the "pliers method". Using a set of needle nose pliers, you gently squeeze the sides of the ball link while it is mounted on the ball. This squeezing deforms the plastic a little bit, loosening up the joint. Be careful to not over-loosen or damage a link.

The process of sizing ball links only takes a few extra minutes during a helicopter build and the results can be quite significant, especially on smaller helicopters.

• **END COMPONENTS:** At the end of these control systems you will find the rotor grips, tail grips, and often an engine carburetor. Make sure that the rotor grips rotate freely on the spindle, that the tail pitch slider moves freely, and that the carb can rotate with no binding.



Some simple adjustments to a helicopter's control links and components will result in a system that is precise and drag free.

Nobody likes a tight link.

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CONCLUSION

A model helicopter is much like a symphony; you have all these different components which are designed to play a unique role. When you combine all these components together you end up with something much more than the sum of the parts. Fine-tuning each section of your helicopter to operate at its best will result in a masterpiece. See you at the field! **TBL**

nano-tech

HIGH DISCHARGE LI-PO BATTERY

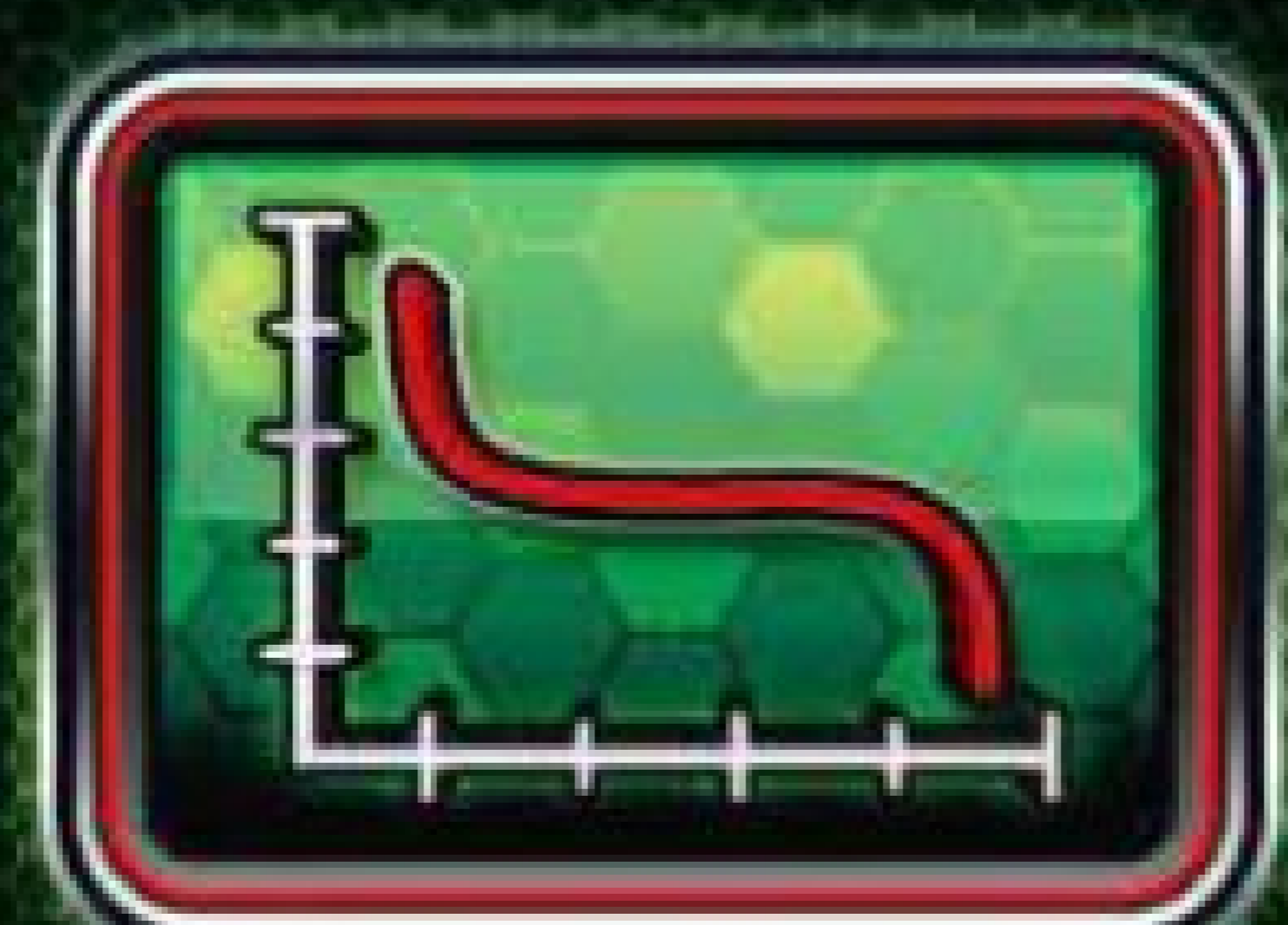
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CELL MATCHED



FAST CHARGE RATE

NANO CORE TECHNOLOGY

The nano-core technology in lithium ion batteries is the application of nanometer conductive additives.
 ① The nanometer conductive additives form ultrastrong electron-conducting networks in the electrodes which can increase electronic conductivity.
 ② These additives create a superstrong ability for imbibition in the carrier liquid to supply more ion channels. This improves the ability of ion transmission and ion diffusion.
 Through improving electronic conductivity and ion transmission, the impedance is reduced and the polarization of high rate discharge decreases greatly.

ADVANTAGES OVER TRADITIONAL LIPO BATTERIES

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- Thickness swelling during heavy load doesnt exceed 5%, compared to 15% of a normal Lipoly during heavy load.
- Higher capacity during heavy discharge. More than 90% at 100% C rate.
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PROGRAMMING MULTIPLE PIRO RATES

Because Multiple Piro Rates are Better!

WORDS: Chuck Bassani

WE ALL KNOW THAT THE RUDDER CHANNEL'S 'TRAVEL ADJUST' (OR END POINT ADJUST) FUNCTION IS USED TO SET A DESIRED PIRO RATE. But did you know that there are ways to program multiple piro rates and switch between them on the fly? If you didn't, read on ...to trim your new helicopter.

HOW PIRO RATE IS CONTROLLED

When all is said and done, what ultimately controls the piro rate is the pulse width output on the rudder channel. The further away it is from neutral, the faster your heli will piro. That being said, we generally 'limit' the maximum piro rate by using the transmitter's 'Travel Adjust' (or 'End Point Adjust') function.



Programming Multiple PIRO RATES

Just as is normally done, we'll use the rudder channel's 'Travel Adjust' function to dial in our piro rate. The only difference is that this sets the MAXIMUM piro rate. As a result, you may want to just max out this setting. This lets us adjust our subsequent selectable piro rates to anything from slow to insane.



Switch **SELECTABLE RATES**

The easiest way to realize more than one piro rate is to assign your rudder channel's dual-rate function to a switch. If you can assign it to a 3-position switch, then you can have up to three different piro rates at your disposal. Assigning it to a 2-position switch will, of course, allow you to switch between two different rates.

Whatever the case may be, a dual-rate setting of 100% will result in no reduction of the maximum piro rate. Reducing the setting from 100% will begin to slow down the piro rate. Simply dial in the desired piro rate for each switch position.



Auto RATES

Many of today's radio systems have the ability to assign a 'Dual Rate' setting to each flight mode. Better yet, some systems even allow you program multiple dual-rate settings per flight mode by combining it with a switch. The HiTec Aurora 9 is one such system.

You spin me right round.



GETTING REALLY FANCY

In addition to what I've already discussed, we can get creative and use programmable mixes for an almost unlimited number of ways to control your piro rate. You could even assign a variable 'Aux' control to a mix to get an infinitely adjustable rate on the fly.



Conclusion

I encourage you to experiment on the bench. Be careful; with flexibility comes complexity. You may not always realize the total effect that your programming has on the channel output. You should always verify proper operation using the 'Servo Monitor' function. Hold full rudder stick deflection and observe the rudder channel's output on the monitor. Remember that the further away from center, the faster the piro rate. Check all your flight modes and switch positions. **THI**



I thought Raptors were extinct?

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Thunder Tiger TITAN X50

The First Carbon Fiber Titan

WORDS: Daniel Colby | PHOTOS: Jason Boulager

WE ALL KNOW THE NAME THUNDER TIGER; IT'S A VERY COMMON NAME IN THE HELICOPTER WORLD. The TT company has produced many reliable and capable helicopters over the years. This month we are going to take a look at what is arguably their best helicopter to date: it's called the Titan X50. It's TT's first nitro carbon fiber CCPM helicopter, so let's take a look at the new design and see what this helicopter is all about.

» AT A GLANCE

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

I thought ACE was extinct!

FEATURES

The Titan X50 is a completely new helicopter. The only thing I recognize is the tail case—it's still the original Raptor design except for the tail grips, which are metal and incorporate thrust bearings. The X50 uses a completely different head that can achieve +/- 15° of pitch for some ultimate 3D flying. The power setup we used when reviewing this kit features the powerful TT Redline 53H engine, Redline high flow 3D tuned muffler, and a set of TT v2 carbon fiber blades.

» MAIN FRAME

SWASH CONTROL: The 120° CCPM swash control is very slick on the X50. All the cyclic servos are connected to push-pull bellcranks that share a common pivot point lined up with the main shaft of the helicopter. The end result of this setup is an interaction-free system that is easy to set up and gives the model a smooth, locked-in feel.

DESIGN: The frames are a one-piece carbon fiber design. Plastic bearing blocks with metal strengthener beams, plastic servo bays, and the plastic boom clamp are used to space the frames 30mm apart.

COMPONENT LAYOUT: The servos are laid out in a CCPM manner that has never been seen in previous nitro Raptor models. There are two platforms and a tray on the front of the helicopter for mounting your battery, governor, and other important electronics. The gyro mounts directly in front of the main shaft on a flat platform that also serves as a servo bay. The tail servo mounts up front to keep it away from harm from exhaust residues.

CANOPY: The canopy is made up of thick fiberglass material that is gel coated—it comes pre-decorated using a process called water transfer, with a coat of clear over the top to protect it and give it that nice glossy shine. The canopy mounts using the post and grommet method, along with a clip that attaches to the landing gear.

LANDING GEAR: The white plastic landing gear is made up of four pieces in total: two struts and two skid tubes. The struts attach to the frame using four self-tapping screws that thread into plastic brackets attached to the helicopter. The skid tubes attach to the struts with four setscrews that thread into the struts and secure the skids in place.

That is one clean wiring job, or so Daniel thinks!

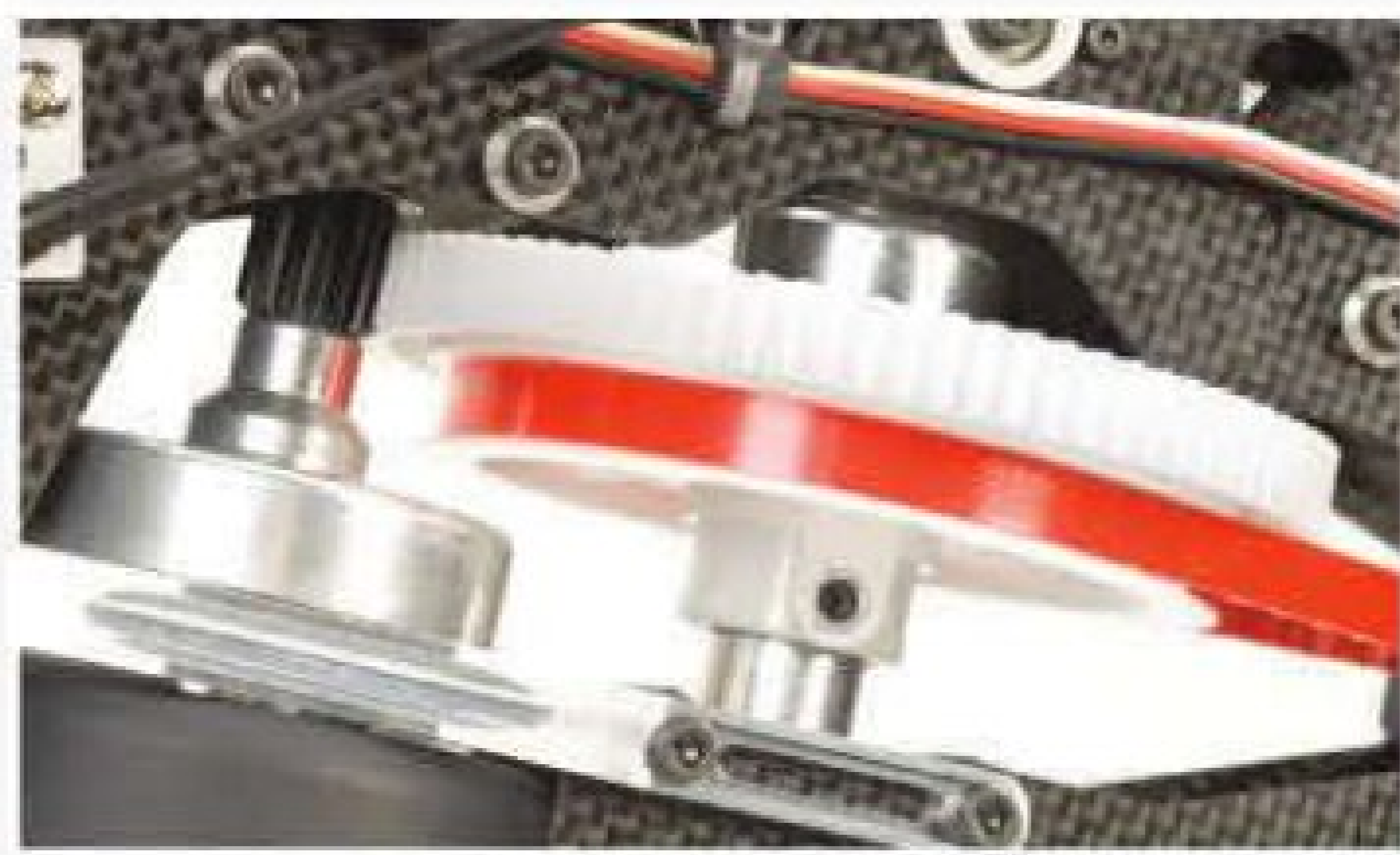
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» DRIVE TRAIN

ENGINE MOUNT: An aluminum U-shaped cage mounts the engine to the side frames. Four screws hold the engine to the cage and six screws hold the assembly to the helicopter. The motor mount also serves as a frame stiffener.

CLUTCH: The clutch mounts to the topside of the fan with two machine screws. It houses a one-way bearing that's press-fitted into it to allow the starter shaft to spin freely once the engine is running. The clutch bell is ventilated and supported by three bearings—this assembly is slop free.

COOLING FAN AND SHROUD: The cooling assembly consists of an aluminum hub with a plastic fan bolted to it. The fan threads onto the engine shaft and is secured from backing off with a nut; it has two pre drilled holes to allow for governor magnets. The plastic fan has straight fins and pushes air through the shroud that mounts to the frames with four self-tapping screws.



MAIN GEAR: The main gear on the X50 sits above the tail pulley gear. It is made of white plastic with large lightning holes. The main gear meshes perfectly with the pinion without any adjustments.

AUTOROTATION DRIVE: The autorotation hub mounts to the main gear using four machine screws. Inside, the hub has a one-way bearing that allows the tail to be driven during autos. A hardened auto unit sleeve is used to connect the main tail gear to the main shaft.

TAIL DRIVE: The plastic main tail drive gear is mounted right below the main gear. The main tail gear drives a belt that connects to a pulley gear in the tail case and this, in turn, powers the tail system.

“arguably their best helicopter to date”



Thunder Tiger TITAN X50

MODEL SPECIFICATIONS

CLASS:	50-sized
BUILD:	Kit
BLADE SIZE:	600-620mm
LEVEL:	Novice to Advanced

FRAME

MATERIAL:	Carbon Fiber
TYPE:	One-piece
SERVO TO SWASH LINKAGE:	Bellcrank and Push pull
SERVO SIZE:	Standard

ROTOR HEAD

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

TAIL

DRIVE SYSTEM:	Belt driven
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Single
TAIL BLADE GRIPS:	Metal
TAIL CASE:	Plastic
BOOM STRUT MATERIAL:	Aluminum

GEARING

MAIN ROTOR TO PINION RATIO:	1:8.5
MAIN ROTOR TO TAIL RATIO:	1:4.56

WEIGHT

EMPTY:	5 lbs., 10.6 oz. (2570g)
WITHOUT FUEL:	7 lbs. (3175g)
FULLY LOADED:	7 lbs., 13 oz. (3543g)

DIMENSIONS

HEIGHT (A):	15.7 in. (400mm)
CANOPY WIDTH (B):	4.5 in. (114mm)
LANDING GEAR (C):	7.8 in. (200mm)
PADDLE TO PADDLE DIA. (D):	22 in. (558mm)
MAIN ROTOR (E):	52.95 in. (1345mm)
TAIL ROTOR (F):	10.24 in. (260mm)
LENGTH (G):	47.24 in. (1200mm)

Any lighter and it would compare to a feather.

FEATURES CONTINUED

» TAIL & BOOM

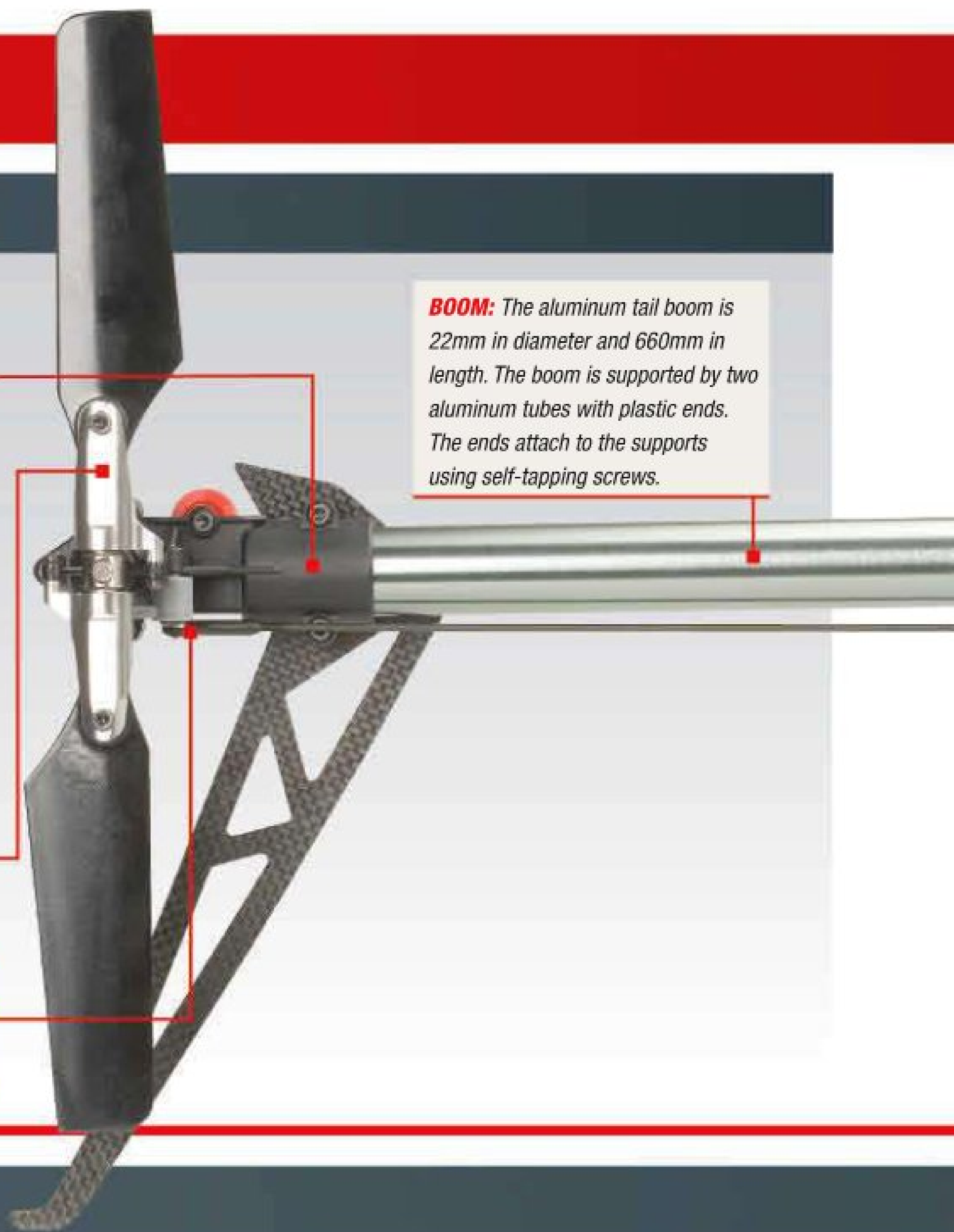


TAIL CASE: The tail case is made of black plastic and has molded-in bearing blocks. The tail is also molded with an arm for attachment of the bell crank. A red plastic guide is sandwiched between the two tail case halves to keep the belt in line with the pulley.

TAIL BLADE GRIPS: The tail grips are made of high quality CNC aluminum. Each grip houses a thrust bearing and two ball bearings to accomplish smooth tail control. The tail blades attach to the grips using a single screw and lock nut.

PITCH ACTUATOR SYSTEM: The X50 comes with a plastic tail pitch slider that is dual bearing supported. The pitch slider rides on a brass sleeve that connects to the plastic tail pitch fork. The fork is connected to the plastic links by pressing in a pin. The links attach to the tail blade grips with using a machine screw.

BOOM: The aluminum tail boom is 22mm in diameter and 660mm in length. The boom is supported by two aluminum tubes with plastic ends. The ends attach to the supports using self-tapping screws.



» ROTOR HEAD

HEADBLOCK: The head block has made to accommodate the underslung flybar. The head block attaches to the main shaft using two Jesus bolts. The damping is achieved by using a two-piece flap dampener system.

PHASING: Phasing is accomplished by two steel pins that are press fit inside the headblock. The pins feed into the washout assembly. There is no play in this setup.



BELL/HILLER MIXER: The metal bell/hiller arms are mounted to the flybar seesaw. They do not offer option inputs. The arms allow the helicopter to achieve up to 30° of total pitch and increase the cyclic performance. Each arm is dual bearing supported.

WASHOUT ARMS: The washout arms are made from plastic and offer two output options. The links are pinned to the arms using two C-clips. The arms are supported by two ball bearings each and attach to the washout base using two machine screws.

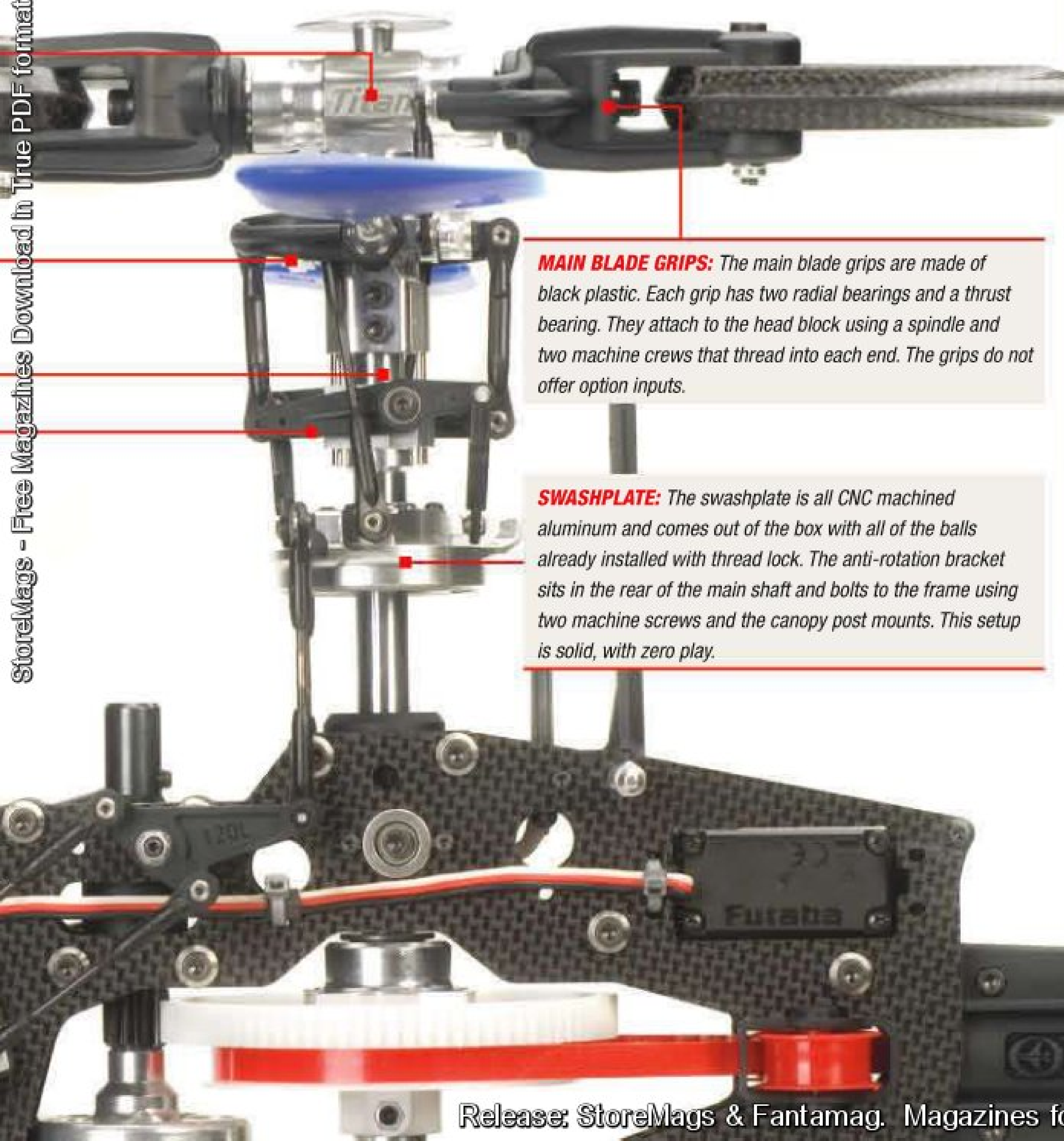


» INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX: Upon opening the box, you will see that every thing is packed away very neatly. One section houses a box with the canopy and most of the kit, which is tucked up inside it. The other half holds some of the parts in sectional bags, the manual, and boom.

MANUAL AND BUILD: The manual is pretty straightforward and has very detailed pictures that

correspond to each appropriate step. The overall build was a pleasure and went with out a hitch. All parts fit very well together and required no additional alteration. The only struggle I had with the build was the hardware location: each bag was labeled per step, but some of the hardware bags were located in a bag designated for another step.



MAIN BLADE GRIPS: The main blade grips are made of black plastic. Each grip has two radial bearings and a thrust bearing. They attach to the head block using a spindle and two machine crews that thread into each end. The grips do not offer option inputs.

SWASHPLATE: The swashplate is all CNC machined aluminum and comes out of the box with all of the balls already installed with thread lock. The anti-rotation bracket sits in the rear of the main shaft and bolts to the frame using two machine screws and the canopy post mounts. This setup is solid, with zero play.

Thunder Tiger TITAN X50

RTF & TEST GEAR

» SUPPLIED GEAR



■ **ENGINE:** Thunder Tiger, Redline 53H, TTR9606, 13.4oz. (380g)



■ **BLADES:** Thunder Tiger, 600mm CF Composite V2, TTR3878



■ **MUFFLER:** Thunder Tiger, Redline hi-flow 3d, TTR9722, 6.5oz (186g)

» TEST GEAR



■ **RADIO:** Futaba, 10CHG, FUTK9256, \$650



■ **RECEIVER:** Futaba, R6008HS, FUTL7639-GP, .48oz. (13.5g), \$140



■ **CYCLIC SERVOS:** Futaba, BLS352, FUTM0554, 1.8oz. (51g), \$159 ea.



■ **THROTTLE SERVOS:** Futaba, BLS352, FUTM0554, 1.8oz. (51g), \$159



■ **TAIL SERVOS:** Futaba, BLS254, FUTM0524, 1.8oz. (51g), \$139



■ **FUEL:** Byron, 30% Rotor Rage Masters Blend, \$28



■ **GYRO:** Futaba, GY520, FUTM0810, 0.243oz. (6.9g), \$149



■ **RECEIVER BATTERY:** Intellect, IP2300 mAh, IP-2300J2S2P, 4.8oz. (136g), \$20

TESTING

The Thunder Tiger X50 kit we received came with an engine and blades. The only thing we needed to do was build the kit and add some top of the line Futaba electronics, and that's just what we did. Below are the results of how Thunder Tiger's new X50 performed.

HOVERING • After breaking in the engine, I put the X50 up in a hover. I only needed to adjust for blade track and add a small amount of left trim for it to stay centered. This helicopter, although sensitive and agile, is solid. It hovered hands-off, both upright and inverted. Overall, the hovering characteristics were dead on.

Rating: 4.5

FORWARD FLIGHT • The transfer from a hover to forward flight is very natural. I started with some figure eights to get a feel for the helicopter. After getting comfortable, I put the nose forward and began fast circuits to see if it had any odd tendencies. The only time I noticed the helicopter wanting to dip its nose was in full collective fast forward flight. Other than that, the helicopter tracked and flew very well.

Rating: 4.5

CYCLIC PITCH RESPONSE • The cyclic response is instantaneous; although it is a bit slow for my taste, it was quick

and nimble—flips and rolls were fast and allowed even the toughest 3D maneuvers to be performed. The stock paddles offer a good balance between cyclic speed and stability. Upgrading to some carbon paddles will increase the speed even more if it's not quite fast enough for you.

Rating: 4.5

COLLECTIVE PITCH RESPONSE • The lightweight X50 and powerful Redline 53 combo makes for an unstoppable machine with great collective response. No matter what I did, it would not bog. It cut through the air with lots of power to spare. This helicopter has a lot of pop. It did everything I expected and more.

Rating: 5

TAIL ROTOR RESPONSE • We opted to use the GY520, one for its size and two for its outstanding performance. The tail response is phenomenal—it's fast and precise. The tail never blew out. Piro stops and starts were solid; they never overshoot or bounced. The pirouetting

consistency was great. When all is said and done, the tail worked perfectly.

Rating: 5

AUTOROTATION CAPABILITIES • The one-way worked flawlessly on the X50. The head speed and tail held well throughout descents and had more than enough energy at the end to set it down softly. I did many high altitude autos and all of them were performed without a hitch.

Rating: 4.5

POST FLIGHT INSPECTION • After we were done testing the helicopter, the X50 stayed fully intact. I was pleased to find everything in its place. The ball links showed no signs of wear and were slop free. Overall, the helicopter was reliable and performed perfectly throughout our testing.

Rating: 5



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TESTING SPECS

Thunder Tiger **TITAN X50**

Part #: TTR4855-K11

Distributor: Great Planes

Web: www.greatplanes.com

Street Price: \$700

Price as Tested: \$2,762

Build/Setup Time: 13 hours

PERFORMANCE

MODE FLOWN: Normal, idle up 1, idle up 2

RPM OF EACH Normal: 1800

MODE: Idle Up 1: 1900

Idle Up 2: 2000

ENGINE TEMP

(after flight): 190° F

FLIGHT TIME: 8 minutes

CRASH COST: \$45 (includes main shaft, tail boom, spindle, landing gear, flybar)

TEST CONDITIONS

WEATHER: Cloudy

TEMP / HUMIDITY: 66° F/64%

BAROMETRIC 30.04 in.

PRESSURE:

WIND SPEED: 5 mph

VISIBILITY: 10 miles

ALTITUDE: 725ft

PITCH CURVES

NORMAL: -5, 0, 13

IDLE-UP 1: -13, 0, 13

IDLE-UP 2: -15, 0, 15

* includes main shaft, tail boom, spindle, landing gear, flybar, belt

REQUIRED TO FLY

Radio transmitter, receiver, all required servos, gyro, battery, battery charger.

WHO'S IT FOR?

The X50 is a great choice for a first time nitro, or a seasoned pilot looking for his/her next quality 50 sized helicopter to add to the fleet. It can be set up to fly docile for the beginner or all out for those hardcore 3D masters.

» SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

4 Instructions

5 Parts Quality/Fit

5 Durability

4 Tunability

4.5 Overall Performance

4 Value

+ THE GOOD

- Very light
- High quality
- Great performance

- THE BAD

- Manual detail

CONCLUSION

I'm very happy with Thunder Tiger's design of the X50. It's much better all around than the previous 50 size line—it's lighter, better looking, and has CCPM. Having flown a handful of 50's, this is definitely one of the better ones I've flown. The Titan X50 is a solid flyer for anyone looking either for their first nitro helicopter or for a machine capable of handling any 3D maneuver you can put it through. *RHJ*



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2. A 2.4GHz Radio with Dual Rates

It's incredible dependability and even more handling help, all in one great radio. Low rates mean gentler, smoother flying while you're learning how. And once you know how, you don't pull out the tools. You simply flip a switch and enjoy the added freedom and response high rates offer.

3. Big-heli performance

Novus 125s handle like larger helis because they're designed and equipped like them. They're built on a true heli frame, with real performance components: a brushless motor; a torque tube-driven tail; high-performance digital micro servos; and, a heading-hold gyro.

4. The Perfect (Sub-Micro) Size

Nano helis are limited to indoors. 250s are best suited for outdoors. Novus 125s can do both. If it's nice, you fly outside. If it's not, you stay in — and fly anyway. The best of both worlds.

5. Two Great RTF Choices.

The Novus 125 FP (Fixed Pitch) heli has it all. The Novus 125 CP does, too, plus a collective pitch head for all-out aerobatics.

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RADIKAL G30

Century

The Next Generation of Gassers

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

TO MAKE IT IN THIS BUSINESS, COMPANIES ARE REQUIRED TO MAKE A COMPETITIVELY PRICED HELICOPTER OF GOOD QUALITY AND STRONG SUPPORT.

Century helicopters do just that. Recently, Century has introduced a new line of helicopters with the Radikal name. This month we'll take a close look at the Radikal G30 Carbon SE version. This helicopter is not only affordable, but it can also save you money in fuel costs when comparing against a similarly sized nitro machine.

Weed wacker powered heli!

» AT A GLANCE

SIZE:	90 / 700
POWER:	Gasoline
TYPE:	Pod & Boom
BUILD TYPE:	Kit
TAIL DRIVE:	Belt

FEATURES

The Radikal G30 features a lightweight carbon fiber/aluminum frame construction that allows this helicopter to be one of the lightest gas powered helicopters on the market. The G30 carries on some of the unique features of the Radikal G20, as it has split frames and generally the same look. The Radikal G30 also features triple bearing supported main and tail grips for reliability and smooth control feel. The Carbon SE kit features a full aluminum head and upgraded tail case.

» MAIN FRAME

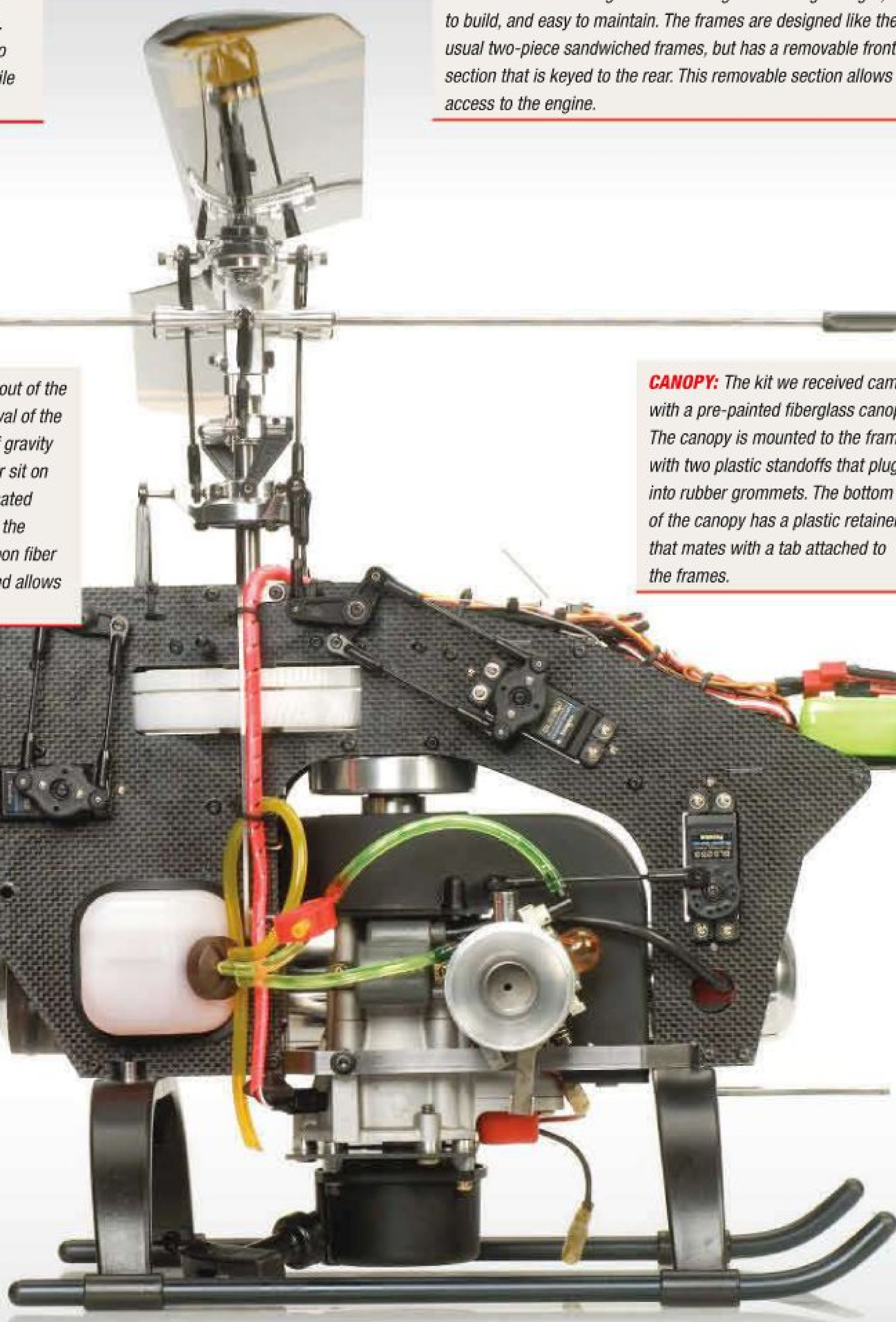
SWASH CONTROL: The Radikal G30 is controlled by a 120-degree CCPM system that includes a push-pull connection from the servo to dual ball bearing supported bellcranks. The elevator link uses an A-arm to keep the swash from twisting while providing elevator control.

DESIGN: The Radikal G30 is designed in three different versions including the G10 version, Carbon version, and the Carbon SE version we're reviewing. The kit is designed to be lightweight, easy to build, and easy to maintain. The frames are designed like the usual two-piece sandwiched frames, but has a removable front section that is keyed to the rear. This removable section allows easy access to the engine.

COMPONENT LAYOUT: The component layout of the Radikal G30 allow for quick and easy removal of the engine while still allowing optimal center of gravity balance. All the servos, battery, and receiver sit on a removable front section. The engine is located below and in front of the main gear. Behind the engine resides the 300 mL fuel tank. A carbon fiber gyro plate is located above the tail boom and allows enough room for any size gyro.

CANOPY: The kit we received came with a pre-painted fiberglass canopy. The canopy is mounted to the frames with two plastic standoffs that plug into rubber grommets. The bottom of the canopy has a plastic retainer that mates with a tab attached to the frames.

LANDING GEAR: The landing gear on the Radikal G30 is a four-piece design. Two black plastic struts are secured to an aluminum bottom plate with four screws. The skids slide through the struts and are secured by four set screws. The kit also includes plastic landing gear caps to finish off the look.



That engine looks like it takes up the whole frame.

» DRIVE TRAIN

ENGINE MOUNT: The engine is mounted to the Radikal using a total of four bolts. Two main bolts slide through the bottom plate and secure the motor using the stock mounting holes. A G10 plate is then installed near the output shaft of the motor and is attached to the frames with an aluminum post.

CLUTCH: The clutch is mounted on top of the fan and houses a one-way bearing for easy starts after the engine is warmed up. The clutch is smooth and grabs perfectly as the engine speed increases. A large aluminum clutch bell secures the pinion and a heavy duty clutch liner is installed into the bell by the factory.

COOLING FAN AND SHROUD: The cooling fan is made from plastic and is mounted to an aluminum hub. The hub is machined with the bevel to align it with the engine's crankshaft. The hub is also threaded to receive the clutch. A plastic fan shroud is installed before the clutch and fits perfectly on the engine. The shroud is mounted to the top engine mounting plate with three machine screws.



MAIN GEAR: The 90-tooth Delrin main gear is mounted to an aluminum hub with five machine screws. The hub houses dual one-way bearings for optimal support and a positive grip on the main shaft. The gear is thick and has five lightening holes.

AUTOROTATION DRIVE: As mentioned before, the autorotation drive consists of two large one-way bearings housed in the main gear's aluminum hub. A steel sleeve is used to keep the bearings from grabbing the main shaft and to lock the tail drive gear to the autorotation drive for driven tail autos.

TAIL DRIVE: The tail is driven by a Delrin tail drive gear that sits just above the main gear. This gear drives a secondary gear mounted to the tail boom clamp. A large rubber tail belt then drives a metal pulley attached to the tail case.

Century RADIKAL G30 MODEL SPECIFICATIONS

CLASS:	Radikal G30
BUILD:	Kit
BLADE SIZE:	690mm-720mm
LEVEL:	Intermediate or Advanced

FRAME

MATERIAL:	Carbon Fiber
TYPE:	Two Piece with removable front
SERVO TO SWASH LINKAGE:	Push Pull to Bellcrank
SERVO SIZE:	Standard

ROTOR HEAD

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

TAIL

DRIVE SYSTEM:	Belt
AUTO DRIVEN:	Yes
TAIL PITCH SLIDER:	Single
TAIL BLADE GRIPS:	Plastic
TAIL CASE:	Alum/Carbon Fiber
BOOM STRUT MATERIAL:	Carbon Fiber w/ Aluminum Caps

GEARING

MAIN ROTOR TO PINION RATIO:	1:6.42
MAIN ROTOR TO TAIL RATIO:	1:4.56

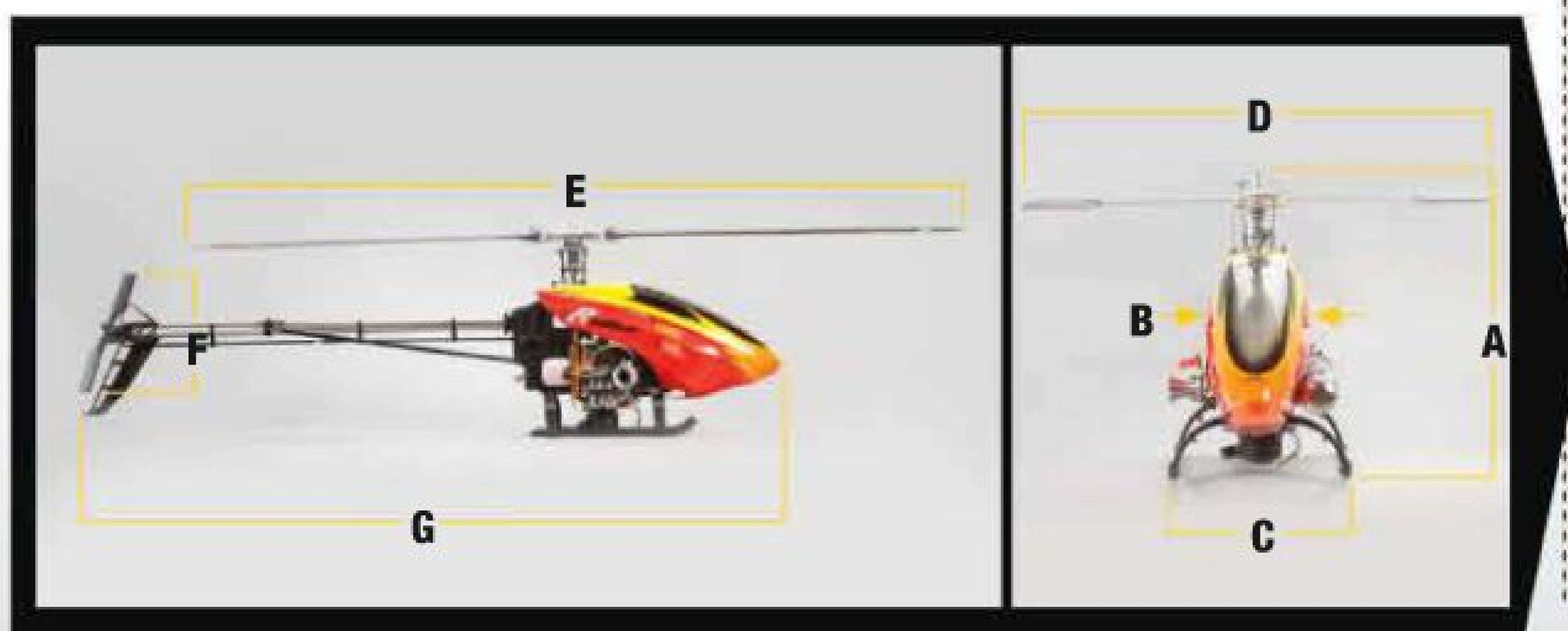
WEIGHT

EMPTY:	7 lbs., 4 oz (3,299g)
WITHOUT FUEL:	12 lbs., 4 oz (5,556g)
FULLY LOADED:	12 lbs., 10 oz (5,738g)

DIMENSIONS

HEIGHT (A):	17 in. (432mm)
CANOPY WIDTH (B):	5.5 in. (139mm)
LANDING GEAR (C):	10.25 in., (260mm)
PADDLE TO PADDLE DIA. (D):	27 in. (686mm)
MAIN ROTOR (E):	62.25 in. (1580mm)
TAIL ROTOR (F):	11.12 in. (282.5mm)
LENGTH (G):	55 in. (1397mm)

The Radikal G30 is an affordable 3D capable gas powered helicopter that can bring hours of enjoyment using low cost fuel.



FEATURES CONTINUED

» TAIL & BOOM

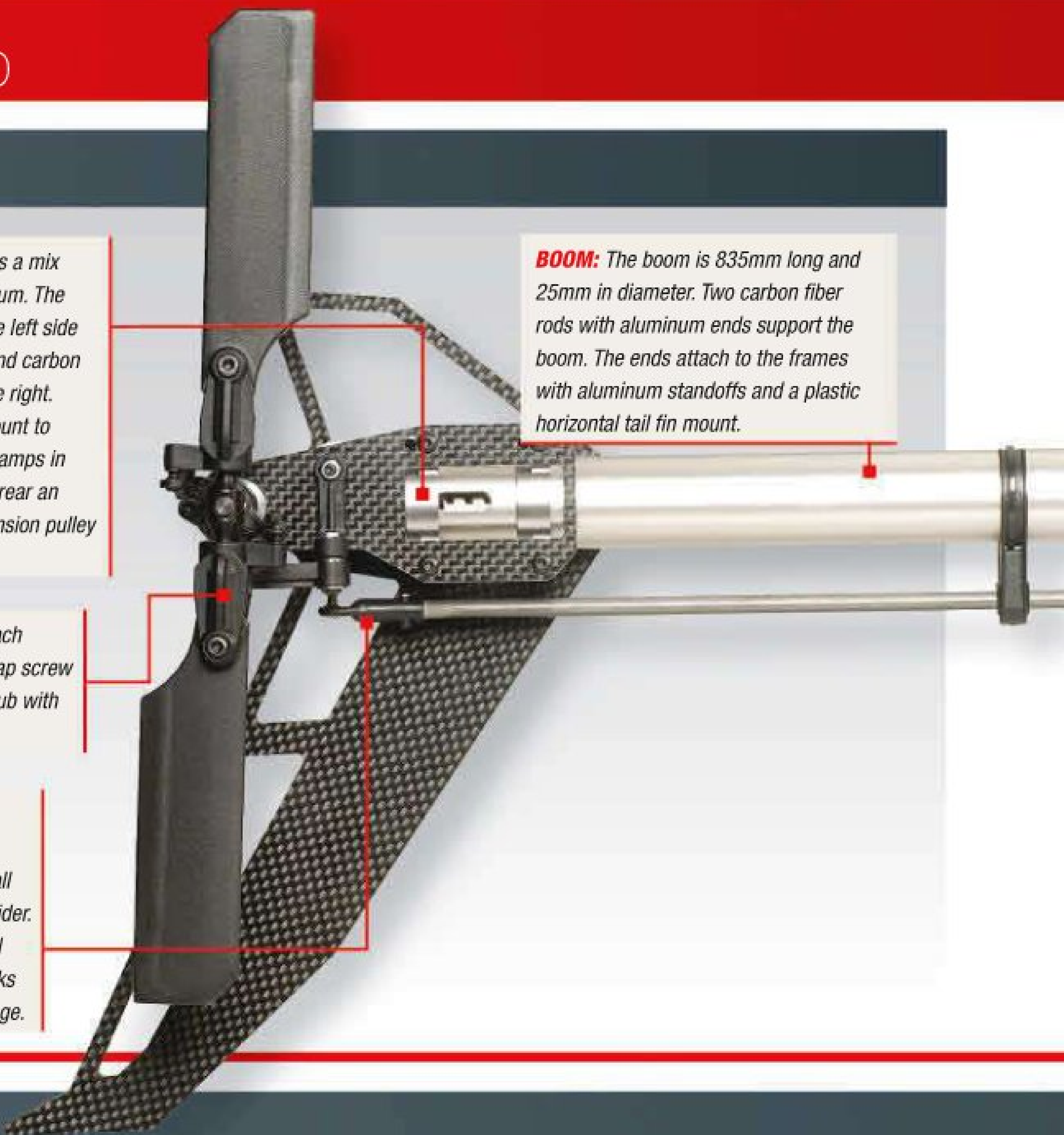


TAIL CASE: The tail case is a mix of carbon fiber and aluminum. The vertical fin incorporates the left side of the tail case and a second carbon fiber plate is located on the right. The carbon fiber plates mount to two aluminum tail boom clamps in the front, and towards the rear an aluminum spacer and a tension pulley support the case.

TAIL BLADE GRIPS: Two ball bearings and a thrust bearing support each plastic tail blade grip. The grips are molded with nut retainers for the cap screw that threads through the tail blades. The grips are attached to a steel hub with threaded posts. A nylon lock nut secures the grip to the hub.

PITCH ACTUATOR SYSTEM: A carbon fiber pushrod with a length adjustment section attaches to a plastic bellcrank. Two ball bearings support the bellcrank to a plastic bracket attached to the tail case. A ball link is used to make the connection between the bellcrank and pitch slider. The slider has a brass bushing to provide a smooth glide across the tail shaft. The plastic slider then attaches to a plastic tail pitch fork. The links of the fork are pinned and attach to the tail grips using a ball type linkage.

BOOM: The boom is 835mm long and 25mm in diameter. Two carbon fiber rods with aluminum ends support the boom. The ends attach to the frames with aluminum standoffs and a plastic horizontal tail fin mount.



» ROTOR HEAD

HEADBLOCK: The headblock is made from aluminum and is attached to the main shaft with a 4mm Jesus bolt. Two machine screws also clamp the headblock to the main shaft.



PHASING: A separate phasing block is locked to the main shaft with two set screws. The pins allow the washout base to slide freely without any noticeable slop.



BELL/HILLER MIXER: The Bell/Hiller arms are mounted to aluminum pitch arms and can be positioned in two different places. The arms are dual ball bearing supported and the machine screw threads into the pitch arm. Mixing options are available from both the swashplate and flybar.

WASHOUT ARMS: The washout arms are made from aluminum and are dual ball bearing supported. The arms attach to an aluminum washout base that has a brass bushing. The two links that attach to the swashplate are held in place by a pin which is secured by a setscrew. No mixing options are available.



» INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX: We received a pre-production kit and did not receive the final box,



but we did notice that Century was organizing the contents as usual. Each section of the build was placed in a separate bag followed by individual bags that separated the hardware from the parts. Each bag was labeled and easily found when building the kit.

MANUAL AND BUILD: The Radical G30 was built easily and each part fit together perfectly with the exception of the front half of the frames. I had to sand a little bit off the tabs to line them up for a perfect fit. Overall, Century did a great job designing this gasser. Every detail was thought out, including a place to run the gyro wires and enough room for future upgrades.

Century RADIKAL G30 RTF & TEST GEAR

» TEST GEAR



■ **RADIO:** Futaba, 10C, FUTK9256, \$650



■ **RECEIVER:** Futaba, R6014FS, FUTL7644, .72oz. (21g), \$199 (included with radio)



■ **CYCLIC SERVOS (3):** Futaba, BLS252, FUTM0552, 2.11oz. (60g), \$150 ea.



■ **THROTTLE SERVO:** Futaba, BLS253, FUTM0523, 2.0oz. (59g), \$150



■ **TAIL SERVO:** Futaba, BLS251, FUTM0521, 2.1oz. (60g), (included with gyro)



■ **ENGINE:** B.H. Hanson Zenoah, 260 3D Max, 3lb. 5oz. (1,442g), \$495



■ **OIL:** Penzoil, 2 cycle 100% syn. Marine, \$37 (per gal)



■ **GYRO/GOV:** Futaba, GY701, FUTM0823, .79oz. (23g), \$399

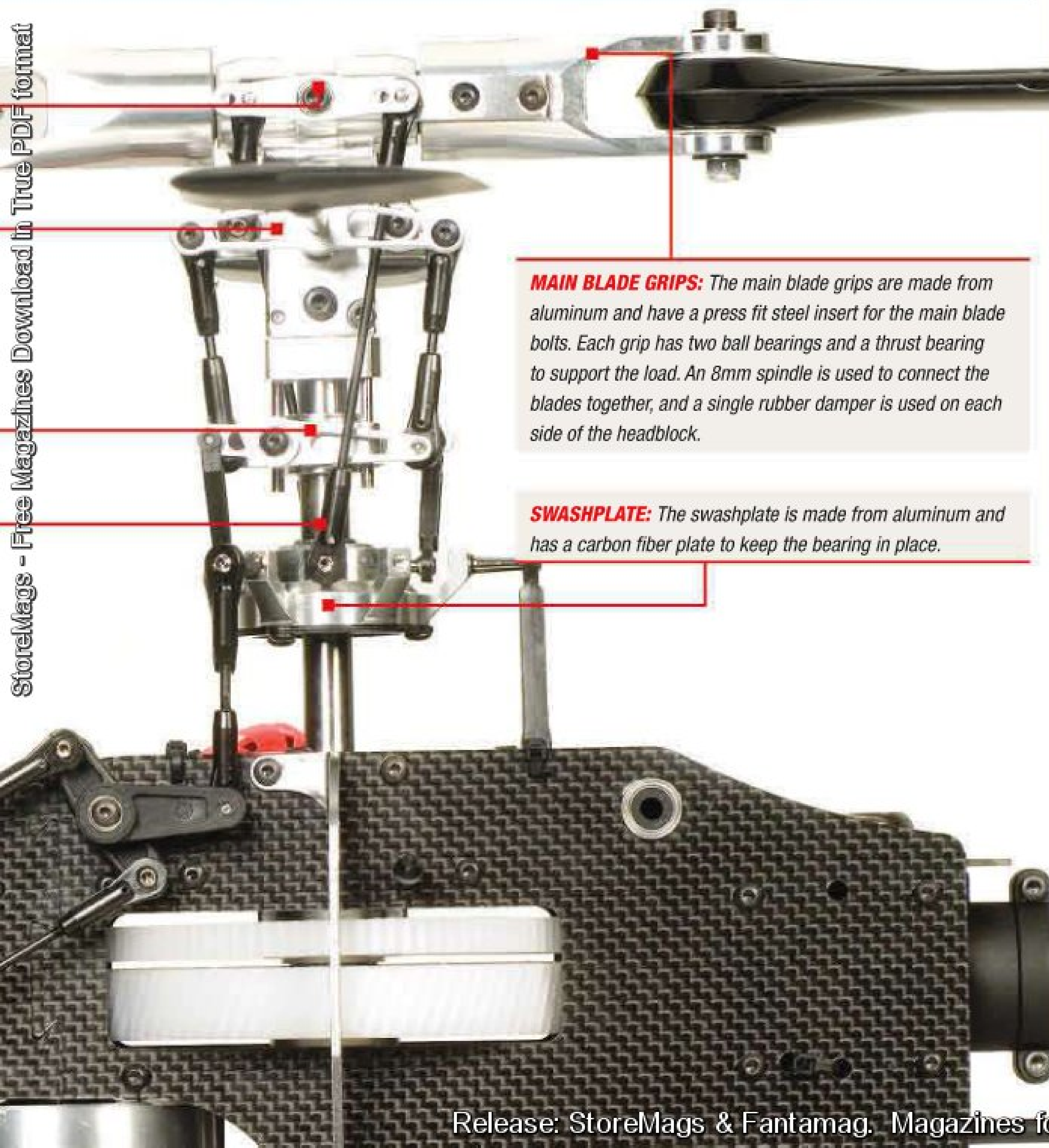


■ **RECEIVER BATTERY:** LiFe Source, 6.6V 3200mAh 10C, HCAM6445, 7.2oz. (204g), \$59



■ **BLADES:** RotorTech, 710mm CF, CN267166C, \$125

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MAIN BLADE GRIPS: The main blade grips are made from aluminum and have a press fit steel insert for the main blade bolts. Each grip has two ball bearings and a thrust bearing to support the load. An 8mm spindle is used to connect the blades together, and a single rubber damper is used on each side of the headblock.

SWASHPLATE: The swashplate is made from aluminum and has a carbon fiber plate to keep the bearing in place.

The best of the best radio gear.

TESTING

We used the best equipment for this gasser to find out if it had what it takes to perform 3D with a gasoline engine - top-of-the-line Futaba brushless servos, the new GY701 gyro/gov, and a fully modified Zenoah 230 by B.H. Hanson finished off the build. This engine was balanced, ported, lightened, and tried to make around 4.8 horsepower by the leading name in gas engine modifications.

HOVERING • The Radikal performed just as you would expect from a big, heavy helicopter. Weighing in at just over 13 pounds, it's not your normal 90-sized nitro. The hovering characteristics were very smooth and locked-in, with minimal drift in windy conditions. Overall, the Radikal is perfect for a beginner looking for long flight times without the costly price of nitro fuel.

Rating: 5

FORWARD FLIGHT • Usually, when you want a heavy helicopter to achieve forward flight you would feed the input and wait a few seconds, but with the Radikal G30 the response was instantaneous. The helicopter achieved forward flight with ease and really moved through the air well. Tracking was spot-on and high-banked turns felt solid. I didn't notice any tendencies like ballooning or the nose dropping. Overall, the forward flight characteristics were pleasing and fun.

Rating: 5

CYCLIC PITCH RESPONSE • The Radikal G30 response was crisp and accurate. I noticed a little bobble in the head when maneuvers were stopped or a hard input was entered. The cyclic speed, however, was not very fast, but fast enough to perform mild 3D. I tried a different mixing ratio, and the cyclic jumped out of bed. Tic-tocks were easily achieved and tight rolls looked amazing. Overall, the cyclic is perfect for any pilot from beginner to advanced.

Rating: 4.5

COLLECTIVE PITCH RESPONSE • When first testing this helicopter, it seemed as if it would barely lift off the ground as I was breaking in the engine, but as soon as the engine was running to its full potential the Radikal felt really good. The collective was not ballistic by any means, but it good enough to play around with. The collective felt responsive and had enough authority to perform quick stops and direction changes. Overall, the collective felt right on par with some of the more expensive gas powered helicopters.

Rating: 4.5

TAIL ROTOR RESPONSE • The tail response is probably the weakest section of the Radikal G30. A helicopter of this size should use a torque tube and it shows. I noticed a lag in the response both during left and right piro directions. I tried tightening the belt as much as I could and the response was better, but eventually the belt started to stretch and I ran into the same problem. Overall I would have like to seen a torque tube used, I would love to

see Century make an upgrade for the G30 in the near future.

Rating: 2.5

AUTOROTATION CAPABILITIES • The Radikal performed autos very well despite the weight. The two one-way bearings were very smooth and allowed the helicopter to float for a long time.

Rating: 4

POST FLIGHT INSPECTION • Going over the helicopter, I didn't notice anything out of place. The only thing I noticed was that the tail belt would stretch after a dozen flights, but everything else seemed to be in tip-top shape. As with any gasser, you should check your bolts every so often as the vibration tends to loosen things up even with thread lock. I did loose one skid cap during the testing process, and that is how I came up with using Goop to secure your caps, so check out this month's Goop inspired Rotorhead Tips.

Rating: 4



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TESTING SPECS

Century **RADIKAL G30**

Part #: cn1340ce

Distributor: Century

Web: www.centuryheli.com

Street Price: \$850

Price as Tested: \$3,178

Build/Setup Time: 14 hours

PERFORMANCE

MODE FLOWN: Normal, idle up 1, idle up 2

RPM OF EACH MODE: Normal: 1700

Idle Up 1: 1800

Idle Up 2: 1900

ENGINE TEMP

(after flight): 195° F

FLIGHT TIME: 15 minutes

CRASH COST: \$43*

TEST CONDITIONS

WEATHER: Sunny

TEMP / HUMIDITY: 73° F / 24%

BAROMETRIC PRESSURE: 29.78 in.

WIND SPEED: 12 mph

VISIBILITY: 10 miles

ALTITUDE: 750 feet

PITCH CURVES

NORMAL: -5, 0, 12

IDLE-UP 1: -11, 0, 11

IDLE-UP 2: -12, 0, 12

* includes main shaft, tail boom, spindle, landing gear, flybar, tbelt

REQUIRED TO FLY

RADIO, RECEIVER, BATTERY, GAS ENGINE, THREE MATCHING CYCLIC SERVOS, THROTTLE SERVO, GYRO, TAIL SERVO, 2 CYCLE OIL, GAS

WHO'S IT FOR?

THE RADIKAL G30 IS A PERFECT FIT FOR THE CONSERVATIVE FLYER THAT WANTS TO PERFORM 3D WITHOUT SPENDING EXTRA DOUGH ON NITRO.

» SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

4 Instructions

4.5 Parts Quality/Fit

4 Durability

5 Tunability

4 Overall Performance

4.5 Value

+ THE GOOD

- Carbon Fiber
- Lightweight
- Easy to maintain

- THE BAD

- Belt Driven Tail
- No Governor Mount

CONCLUSION

The Radikal G30 is an affordable, 3D capable, gas powered helicopter that can bring hours of enjoyment using low cost fuel. The design work showed that Century has what it takes to compete with today's market. Other than the tail being driven by a belt, Century hit the nail square on the head with the Radikal G30. *(TH)*

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BEHIND THE SCENES AT SCORPION PRECISION INDUSTRIES

A Company that Stings!

WORDS: Mark Madsen | PHOTOS: Mark Madsen

A RECENT TRIP TO HONG KONG AND CHINA PROVIDED THE OPPORTUNITY TO GET A BEHIND-THE-SCENES LOOK AT SCORPION PRECISION INDUSTRIES, as well as a chance to sit down and chat with the owner of Scorpion, Georges Van Gansen. It was a very interesting and informative trip that provided a lot of information about the origins of the Scorpion company, as well as a chance to see how these high performance motors are made at the Scorpion factory. Scorpion brushless hit the market in January of 2007, and since then they have grown to become very popular.



COMPANY HISTORY

Scorpion Precision Industries was founded by Georges in Taiwan in 1987 as an RC hobby company to produce glow plugs for model engines. Shortly after the Scorpion Company began operations, a series of fires at several US nitromethane plants drove glow fuel prices up and put a damper on glow plug production. At this time, Georges had to re-group and figure out how to keep his factory running. With all of the metal stamping equipment that was at the factory for making glow plugs, it was fairly easy to convert the machines

to make other products, so Scorpion began producing items such as key chains, enameled collector pins, badges, and other items. Over the next few years, Scorpion Precision Industries grew and by 1992 they had become the second largest pin supplier and one of the top exporting firms in Taiwan.

Throughout the 1990's Scorpion continued to grow and diversify their product line. After outgrowing their facilities in Taiwan, Scorpion moved to a much larger factory in China and set up

their corporate offices in Hong Kong. In 2001, Scorpion became one of the first companies to realize its impact on the environment and began operating under ROHS standards (Removal of Hazardous Substances) by using manufacturing material free from lead and other heavy metals. At this time, they also began making products for companies such as Disney, BMW, Porsche, McDonald's, Coca-Cola and others.

In 2003 Scorpion received ISO 9001:2000 certification for their quality

AT THE OFFICE

WHEN WE MET UP WITH GEORGES AT HIS OFFICE IN HONG KONG, IT WAS IMMEDIATELY APPARENT THAT HE IS TRULY A MODELER AT HEART. At the end wall of his office is a custom display case that houses a collection of over 200 model engines. Many of these engines are from Georges' early days in modeling when he flew in control line speed competitions. Another thing that we found very interesting is the fact that Georges has a fully equipped model workshop connected directly to his office. When he needs to test fit a new motor in a helicopter or check out a new product, he is only three steps away from his workshop! Looking out the window of the workshop, there is a very nice view of the downtown Central Hong Kong skyline.

Georges and his staff handle all of the logistics of the RC division from the Hong Kong office. All of the products are brought here from the factory in Xaio Lin and then sent out to the Scorpion distributors around the world. While we were at the office we also got a chance to meet Perry Wong, who works under Georges managing the day to day operations of the Scorpion Power Systems division. Perry is the point of contact for all of the Scorpion distributors worldwide and processes all of the orders that are received for the Scorpion products.

Once the tour of the Hong Kong offices was complete, the next item on the agenda was a trip to the Scorpion manufacturing plant, which is about 120 miles to the north in Xaio Lin City in the Guangdong Province of China. It was a very interesting trip with a brief stop at the border between Hong Kong and China. One other thing of note: since Hong Kong used to be a British Territory, they still drive on the left side of the street. When you cross the border into China, you have to remember to drive on the right side of the road!



Dorm Life

AFTER SEEING ALL OF THE MANUFACTURING AREAS, THE NEXT STOP WAS OUT BACK BEHIND THE FACTORY BUILDING. Back here is the six story dorm facility where all of the factory workers live. All together, about 1200 workers live here in the dorm facility, which is very similar to a US college dorm building. There is also a large recreational yard with basketball hoops and a nice break area with tables where the workers can sit and read and enjoy the outside. On the back side of the factory is the cafeteria area where all of the workers eat. As part of their compensation package as a factory employee, Scorpion provides all of the workers with breakfast, lunch and dinner for the entire week. Next to the cafeteria is a small convenience store, where the workers can purchase drinks, snacks, magazines (*RC Hel!*), personal care items and other things that they might need.

The final building of the complex is quite unique, and shows the kind of dedication that Scorpion has to their products and their workers. This last building houses three enormous diesel generators, one that can power the office building, one that can power the entire dorm facility, and the third and largest one, rated at 1.5 million watts of power, that can power the entire factory! As the manufacturing capacity of China has grown over the past few years, the infrastructure of the country has not been able to keep up with the demand for electrical power. Because of this, in the summer when electrical demands are at their highest, on two days every week the government shuts off the electrical power. Most companies simply work their schedule around this, but it's extremely uncomfortable for the workers to not have air conditioning and it makes it pretty hard to cook and do just about everything else you would normally do. Plus, it makes it hard to maintain your work schedules when you have to completely shut everything down for two days each week. At the Scorpion factory the generators come on line and they are able to continue working and living like nothing has happened.



Looks a little foggy in Hong Kong.

control processes. In 2004 Scorpion moved to their new 360,000 square foot manufacturing facility in Xaio Lan, which now employs over 1500 workers. In 2007, Scorpion's factory was re-certified to the new ISO 9001-2002 certification for quality control and also received ISO 14000-2004 certification for proper control of their factory's environmental impact. At this time, Scorpion also relocated their corporate offices to the Excelsior Industrial building in downtown Hong Kong, where they still operate today. Now that we have

the history of the company established, let's take a look at the genesis of the RC motor division of the company.

Back in 2005 and 2006, Georges was very interested in the newly available electric power systems for RC models. Li-Po batteries were becoming a common sight on the market and offered the answer people had been looking for to powering electric models. At that time there were not many companies offering brushless power systems. After burning out dozens of motors and speed controllers in

pylon racers and pattern ships, Georges had become pretty frustrated. During a conversation over lunch with a good friend of his who was also an RC modeler, Georges said, "I wish someone would make a good motor that would hold up to competitive use". His friend said, "You have a factory, why don't you make your own motors?" At that point Georges thought for a minute and said, "I think I will," and began the process of creating the line of Scorpion brushless motors and speed controllers.



Part of the punch press and stamping press room inside the factory.



Three auto-feed CNC lathes where many of the motor parts are made. Two workstation machines can be seen in the background of this photo.



Bearing tubes and fan assemblies for HK-4025 motors being prepped for plating.



Scorpion makes all of their own stators. Here are stacks of individual laminations after they have been punched, on the way to the press where they will be assembled into stators.



Wound stators having the leads trimmed and prepped for soldering on the bullet connectors.



Trays of completed stators, ready to go to final assembly.

AT THE FACTORY

After a two hour car trip we arrived at the factory. The factory complex is made up of five separate buildings arranged on several acres of property.

Centered in the middle of the property is the four-story office building that houses all of the sales and marketing staff as well as the factory production managers. The first floor has all of the production manager offices, plus several conference rooms. The second floor houses all of the sales staff and the IT department. Georges has his office on this floor as well. The third and fourth floor of the office building contains the rooms where all of the people that work in this building live. Since most of the people that work in the manufacturing districts in China come from areas that are hundreds or in some cases thousands of miles away, the workers all live in dorm facilities right at the factory.

Behind the office building is the 360,000 square foot manufacturing area where the Scorpion products are made. This is a very impressive facility that is divided into several different sections. There is a complete CNC machining area, as well as a fully stocked conventional machine shop complete with milling machines, lathes, electrode EDM and wire EDM machines, plus other machining equipment. There is also a die cast injection molding area with 12 molding machines, plus a stamping and punching area with dozens of machines working away. The assembly area of the factory is three stories tall, and up on the third floor we found the motor and speed controller assembly areas.

The motor assembly area is very impressive, with each area dedicated to a specific task. In one area, teams of workers were carefully hand winding stator assemblies. In another area, the stator assemblies had the wires trimmed and tinned to get them ready for soldering. Another station had a team of people gluing magnets into motors, which were then set aside in trays to cure. Completed magnet assemblies were taken to another station where they were spun up on a balancing machine. Small epoxy putty weights were

added as needed to perfectly balance the motors, and these were then set aside for the epoxy putty to harden. From there the rotor assemblies went off to another section of the factory where the model number and Scorpion logo is carefully laser engraved on each motor.

On the other side of the room, the stator assemblies were glued and pinned to the motor bearing tubes, and from there they went to another station where bullet connectors were soldered to the motor leads and heat shrink was applied. Next, these parts went to a station where the motor bearings were carefully pressed into place and checked for proper smooth running. At the final assembly station, the completed stator assemblies were carefully mated up with the finished rotor assemblies to complete the production of the motors. Each completed motor then gets tested with a speed controller, and the operating parameters are checked to make sure that the motor functions properly. Once that is done, the trays of finished and tested motors go off to final packaging where they are placed into the signature Scorpion metal can packages and packed for final shipment to one of the many worldwide Scorpion distributors.

In another area on the third floor, the assembly of the Scorpion Speed Controllers takes place. In this area, the workers solder the input and output leads as well as the capacitors that attach to the end of the PC boards. Once that is done, the ESC's are tested on a motor to verify that they work properly. One that test is complete, the ESC's go to the final assembly area where the gold heat sinks are installed and the final covering of heat shrink tubing is applied. Once the ESC's are fully assembled, they go to a test area where each one is run up with a motor and prop that puts a load that is equal to 110% of the speed controller's rated capacity. One they pass this test, the ESC's are packed up in their metal can packages and prepared for shipping to the Scorpion distributors.

THAT'S A WRAP

Special thanks to Georges and everyone at Scorpion for allowing us an inside look at the facilities and for brining us up to speed on this unique company's history. **TBL**

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Specification:

Main Rotor Diameter: 450mm (17.7 in)

Length: 450 mm (17.7 in)

Height: 250 mm (10 in)

Flying Weight: 350g (12.5 oz)

Driven system: 2x 370 carbon brushed motor

Servo: 2x 9g servos

Battery: 7.4v 1000mAh Li-polymer

Control system: 2.4Ghz RC Transmitter

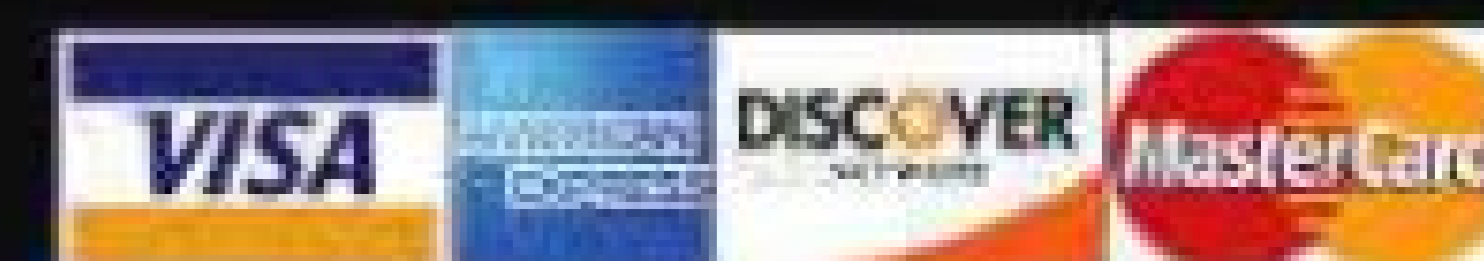
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SOUTHERN SCALE HELICOPTER CHALLENGE

Way Down Yonder!

WORDS: Andrew Griffith | PHOTOS: Andrew Griffith

THE UNASSUMING TOWN OF DALTON, GEORGIA IS NESTLED IN THE FOOTHILLS OF THE APPALACHIAN MOUNTAINS JUST A STONES THROW FROM CHATTANOOGA, TENNESSEE. The rolling hills provided the scenic backdrop for the Southern Scale Helicopter Challenge. Held on Saturday and Sunday September 11th and 12th 2010, campers and participants started arriving and setting up shop as early in the week as Tuesday. Hosted by master scale builder and competitor Darrell Sprayberry, this year marked the 10th anniversary of the Southern Scale Challenge. When I say Darrell hosted it, I mean that literally! Darrell opened his home and workshop and several of the pilots including me stayed there for several days. No anniversary is complete without a party, so two cook outs and a Happy 10th Birthday cake were served up over the course of the weekend.



Steve Poretz, Atlanta GA, Raptor 50 electric conversion, home built 4 blade head with no stabilization, Thunder Tiger A119 Koala body.



Peter Wales from Orlando Florida - Vario Aerospatiale SA-315B Llama, turbine powered, 3 blade head.



Sandy Jaffee from State College Pa, Vario MD-600N "NOTAR", G23 powered, 5 blade head.

No Blades & Heavy Lift

There were so many other great people and helicopters at the event I don't have time to describe them all. I would like to single out Joel Rosenzweig and Sandy Jaffie though. Sandy, from State College, PA had two NOTAR (No Tail Rotor) helicopters that flew extremely well. Sandy has the bugs worked out of his NOTAR machines and they look and fly great. Joel made the trip all the way from Boston, Massachusetts with his gigantic electric powered S-64 Skycrane. Spinning a 6 blade rotor disk of over 2000mm the Skycrane got a lot of attention during each of its flights.



Joel Rosenzweig, Boston, MA—Vario Sikorsky S-64 Skycrane, home built electric conversion, Vario 6 blade head with 1000mm blades.



THE EVENT

WHILE THE NAME, SOUTHERN SCALE CHALLENGE, IMPLIES THAT THERE IS A COMPETITION, THE EVENT IS REALLY NOTHING MORE THAN A LAID BACK GATHERING OF OLD AND NEW FRIENDS. It was a good thing too because my Thunder Tiger Raptor converted to an MD-530 paled in comparison to most of the helicopters in attendance in both quality and size. Official pilot registrations totaled 24 but there were many more friends and family at the field socializing throughout the weekend.

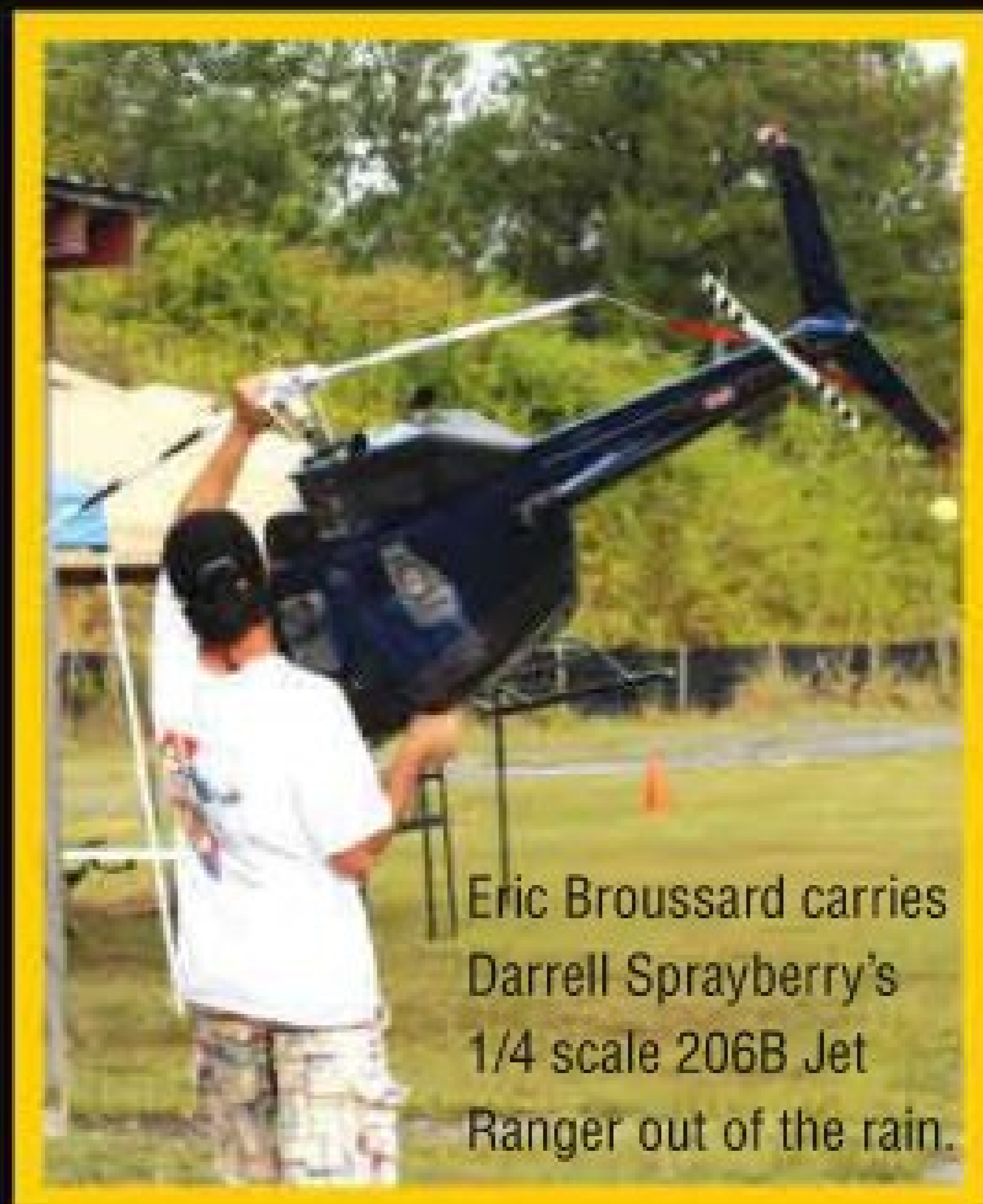


Eric Babineaux from Broussard, Louisiana brought a gigantic pork loin and spent most of the day Friday in front of the grill preparing an authentic Cajun dinner that all of the participants took part in Friday evening. When he wasn't busy cooking, Eric was flying his gorgeous G23 powered Vario Hughes 500. After seeing so many of the 530 models, Eric's 500 was a great reminder of how pleasing the lines of the older, bubble nose 500's look in flight. Following up Eric's cooking was tough but on Saturday night, Joe Howard of East Coast Scale Helicopters sponsored a steak dinner for all of the registered pilots. In keeping with the family atmosphere of the entire event, Darrell, his father Earl, and his fiancé Jan Meadows spent the afternoon cooking steaks and all the fixin's. Saturday night's dinner was capped off with a 10th birthday cake celebrating the 10th year of the event.

I know what I am having for dinner.

DARRELL'S JET RANGER

The word "impressive" really doesn't do his Jet Ranger justice. The size alone is enough to stop most people in their tracks. The helicopter weighs 43 pounds when loaded with 4 6 cell, 5000mah batteries (2 12S sets in parallel). The main blades are an astounding 1050mm each (popular 50 size helicopters use 600mm blades, 90 size machines run 700mm). Another interesting feature is that his large electric setups include a clutch that he modified from a gasser design. The clutch allows a very scale looking start up, as well as being easier on the gear train than the direct drive traditionally used in electric helicopters. His clutch adapters have become so popular that almost all of the large electrics at the Scale Challenge had them installed.

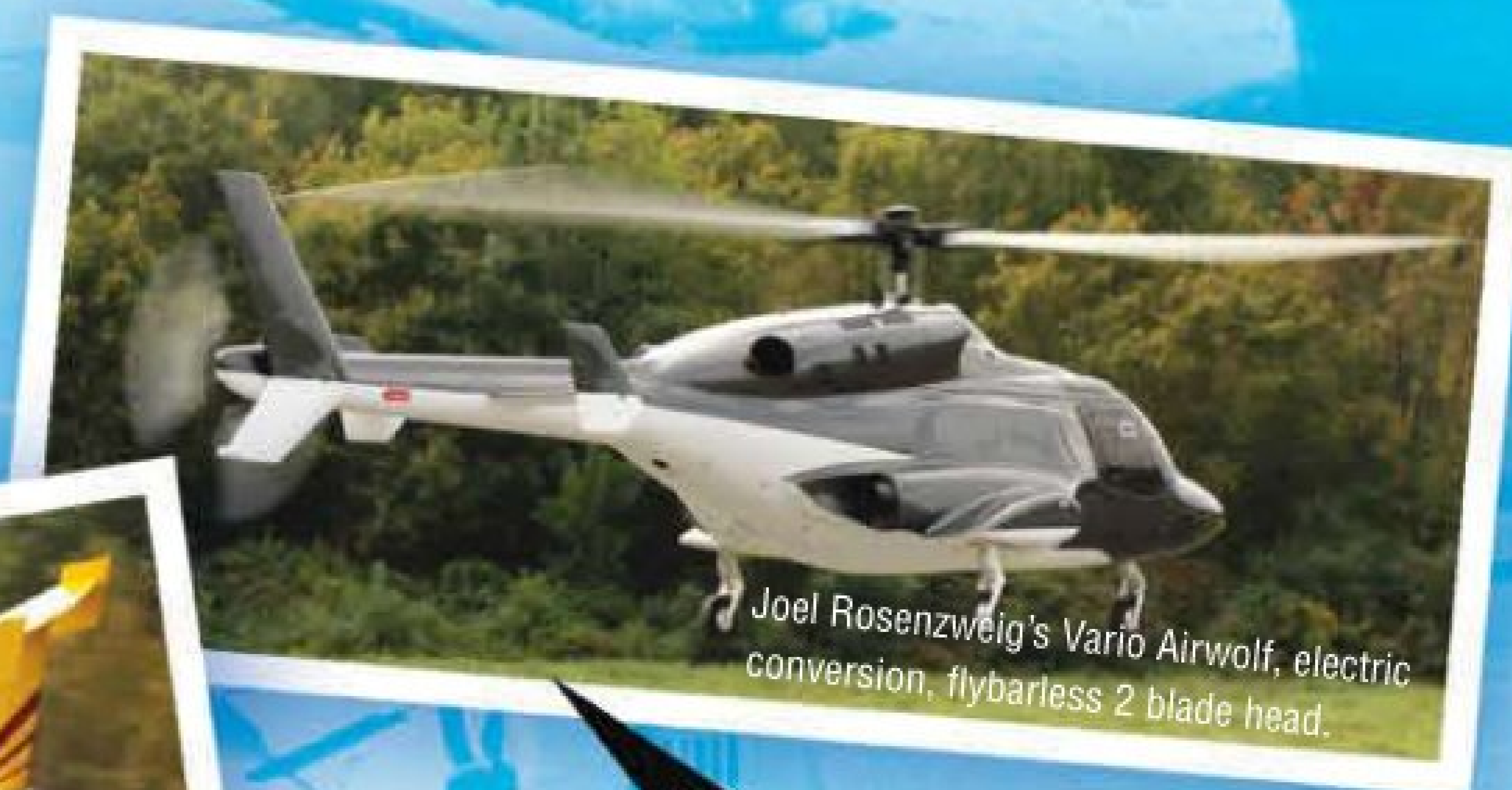


Eric Broussard carries Darrell Sprayberry's 1/4 scale 206B Jet Ranger out of the rain.

HIGH VOLTAGE & MORE

THE FIRST THING I NOTICED WHEN I GOT THERE WAS THAT THE SCALE HELICOPTER SCENE IS BEING TAKEN OVER BY ELECTRIC POWER. The benefits of course are many. Outwardly the sound is very turbine like but without incurring the cost, complexity, and waiver required to operate a turbine-powered helicopter. Also, by moving away from nitro or gasoline power the builder has more paint and finish choices, as fuel proofing isn't required with an electric power system. Unlike 3D flying, scale flying isn't particularly taxing on the batteries so modestly priced batteries can be used and they also tend to last a lot longer. Aside from the benefits in scoring in scale competition, a scale helicopter just plain looks better without a fly bar. Multi-blade and flybarless rotor heads were the norm at this event, flybars were definitely the exception. There seems to be a lot of talk about the requirement to have a stabilization system to fly a multi-blade head but two participants, Emile Sheriff of Daleville, Alabama, and Steve Poretz of Atlanta, Georgia both flew 4 and 5 blade rotor heads (Steve designed and built his himself) without any stabilization systems. Emile explained that careful setup and experimenting to find the proper blades are the key to flying without a stabilization system. For the rest of us, cost effective stabilization systems from manufacturers such as CSM, Skookum, Youngblood, and Mikado are bringing flybarless and multi-blade helicopters to the masses.

Many of the most notable names in the scale helicopter scene were in attendance starting with our host Darrell Sprayberry. Darrell came in a VERY close second in this year's scale helicopter nationals with his 1/4 scale Bell Jet Ranger done in the livery of the Georgia State Patrol. The Jet Ranger, nick named "Junior", started life as a Vario fuselage but not being satisfied with the design of the mechanics, Darrell fired up his personal machine shop and decided to make his own. Unlike many scale mechanics that take up the majority of the helicopter interior, Darrell's home built mechanics move much of the equipment up to the dog house or to the rear of the helicopter and allow a full front and rear cabin. Another area of concern was that at his scale looking rotor head speed of 830 RPM the tail rotor doesn't develop enough thrust to provide positive tail authority. No problem for Darrell, he machined a new set of gears to change the gear ratio and give the tail rotor more RPM.



Joel Rosenzweig's Vario Airwolf, electric conversion, flybarless 2 blade head.



Joel's Vario MD-530, electric conversion, 5 blade head.

That's A Wrap

If you have any interest in scale helicopters I highly recommend a trip to this fly in. The people alone made my 6-hour drive worth every minute. The helicopters were just a bonus! I hope you enjoy the pictures as much as I enjoyed taking them. **TRH**

Hey buddy, you should have a crane to lift that monster!



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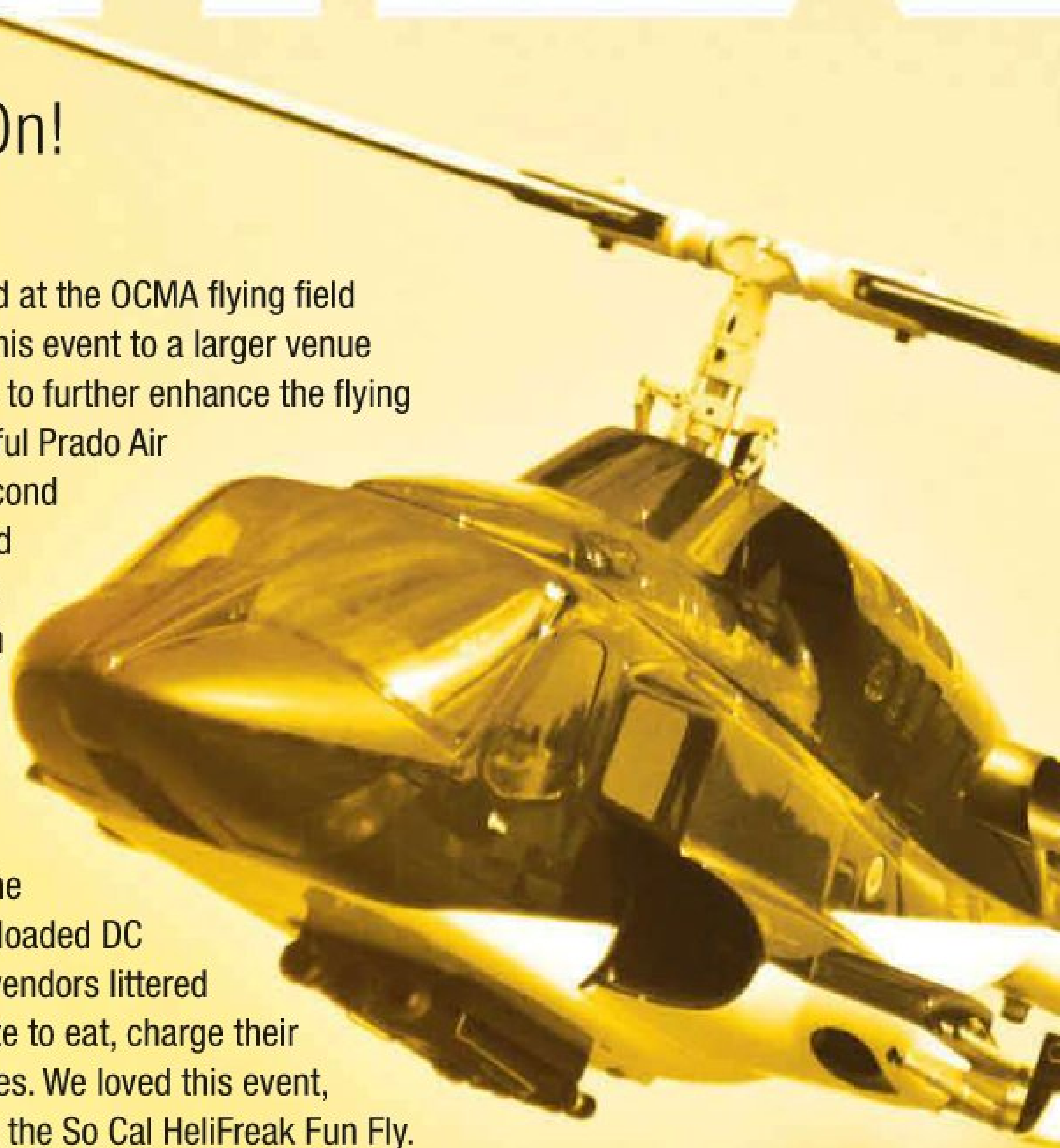


SO CAL HELIFREAK

Get your West Coast Freak On!

WORDS: Ryan Kephart | **PHOTOS:** Adam Schubert

THE SOCAL HELIFREAK FUN FLY was once located at the OCMA flying field in Orange, California, but this year they moved this event to a larger venue that offered many accommodations to the pilots to further enhance the flying experience. This year the event was held at the beautiful Prado Air Park located in Chino, California. The PVMAC is the second largest club in the United States and has the flying field to prove it. The runway is a beautifully paved 800-foot stretch of asphalt that is 50 feet wide and painted with a runway centerline, taxiways, and pit areas. The field offers ample parking allowing overnight camping, RV's, and travel trailers. The pit area is constructed from asphalt and allows up to 30 pop-up canopies to keep you and your gear in the shade and away from the warm California sun. Accommodations such as a fully loaded DC or AC charging stations, food vendors, and helicopter vendors littered the field behind the pit area, allowing pilots to get a bite to eat, charge their batteries, and pick up some parts in a matter of minutes. We loved this event, and hope to see the people at PVMAC continue to host the So Cal HeliFreak Fun Fly.





o c t o b e r f i r s t - t h i r d t w o t h o u s a n d t e n

K FUN FLY

Airplanes at a heli event?



THE EVENT

Throughout the weekend, "Finless Bob" and Jerome Mezzasalma announced the Fun Fly through a PA system. These guys kept the crowd entertained while the pilots took to the skies. The announcers did a great job keeping the crowd safe and the events organized as the day went on. The total amount of registered pilots was a mix of 80 people that brought out everything from 3D, gassers, and scale helicopters. Professional pilots from around California such as Tim Jones, Kyle Dahl, and Ray Nemovi attended this event. Even Tony Whiteside flew out from Kentucky to enjoy the California sun and this great event. If you needed a part for your helicopter, you could get it right on the field as MTA Hobbies, Gyro Hobbies, and a few others were selling parts out of their booths. Manufactures from around the globe also set up booths with professionals at hand waiting to help out a fellow pilot. These manufactures included KME Engines, Mikado, Pure Tech, Cermark, Compass, and Castle Creations. Cermark has slowly been moving its way into the helicopter market and there was no better way to do it than by letting pilots try out their newest set of carbon fiber blades made by Chameleon. These blades come in sizes from 325mm up to 700mm. The larger blades were still in the prototype stage, but pilots of 450 to 500 class helicopters were able to get a free set to try out. Throughout the day, music was played on the loud speakers and if you wanted to fly to your own music, an iPod hookup was available upon request.

SO CAL HELIFREAK FUN FLY

ACTIVITIES

What better way to enjoy a Fun Fly than actually having fun? The coordinators staged a few competitions that allowed all skill levels of pilots to attend. A drag race was held for fun and allowed the winner to go home with bragging rights, but the real competition was the autorotation event. The winner of this event went home with a trophy and a little extra cash. The competition was filled with pilots both young and old. You could see the pilots practicing throughout the day preparing for success, as autorotations were performed left and right. This year, Ray Nemovi took first place and walked away with a smile and his first place trophy.

Shortly after these two events, a huge raffle was held with pilots and spectators anxiously waiting for their number to be called. The raffle had several helicopter kits and more than a dozen helicopter parts donated by the vendors and manufactures that help sponsor the event.

As the sun faded and the night fell, another competition took place in the dark sky. The night fly competition gathered a big crowd as eight pre-registered pilots went face to face. This year showed that you don't need a set of glowing lights to take a first place win and a grand prize of \$500. The majority of pilots flew their helicopters at night using what the community calls "redneck night flying". This involves several high-powered spotlights and a few talented flashlight operators. If you thought it was hard keeping track of a helicopter with a camera, try operating a spotlight on a helicopter moving at full speed at night. Tim Jones took the first place finish with his insane performance under spotlight using his high powered, highly modified TRES 700 nicknamed "The Beast".



CONCLUSION

This event was fun and exciting, and allowed every pilot here in California a chance to end the summer with a bang. All of the proceeds from the event and raffle went to the PVMAC to further enhance the flying field by purchasing a water truck to maintain the vegetation and parking lot. If you missed out this year and you are in the California area, I would plan to attend the event next year. Besides, you know that RC Heli will be there, as this event is minutes from our office. You can pick up your free issue of the magazine and even sign up of a subscription and get \$5.00 off. Hope to see you guys next year. Until then, happy flying. **TREX**



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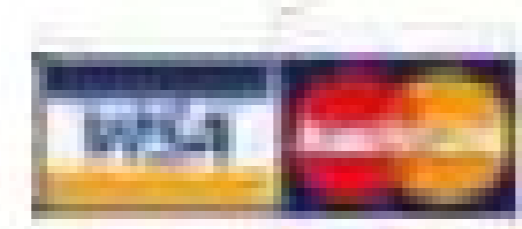
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CRASH RIGHT

WORDS: Ryan Kephart

LEARNING HOW TO CRASH A HELICOPTER APPEARS TO BE SOMEWHAT OF A WEIRD MANEUVER TO LEARN, BUT TRUST ME, EVENTUALLY YOU WILL USE THIS VERY ARTICLE. We all start somewhere, and that's usually in our backyard or local park learning how to hover. This can be a challenge to the new pilot, and usually ends in a crash.



You want me to do what?

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.

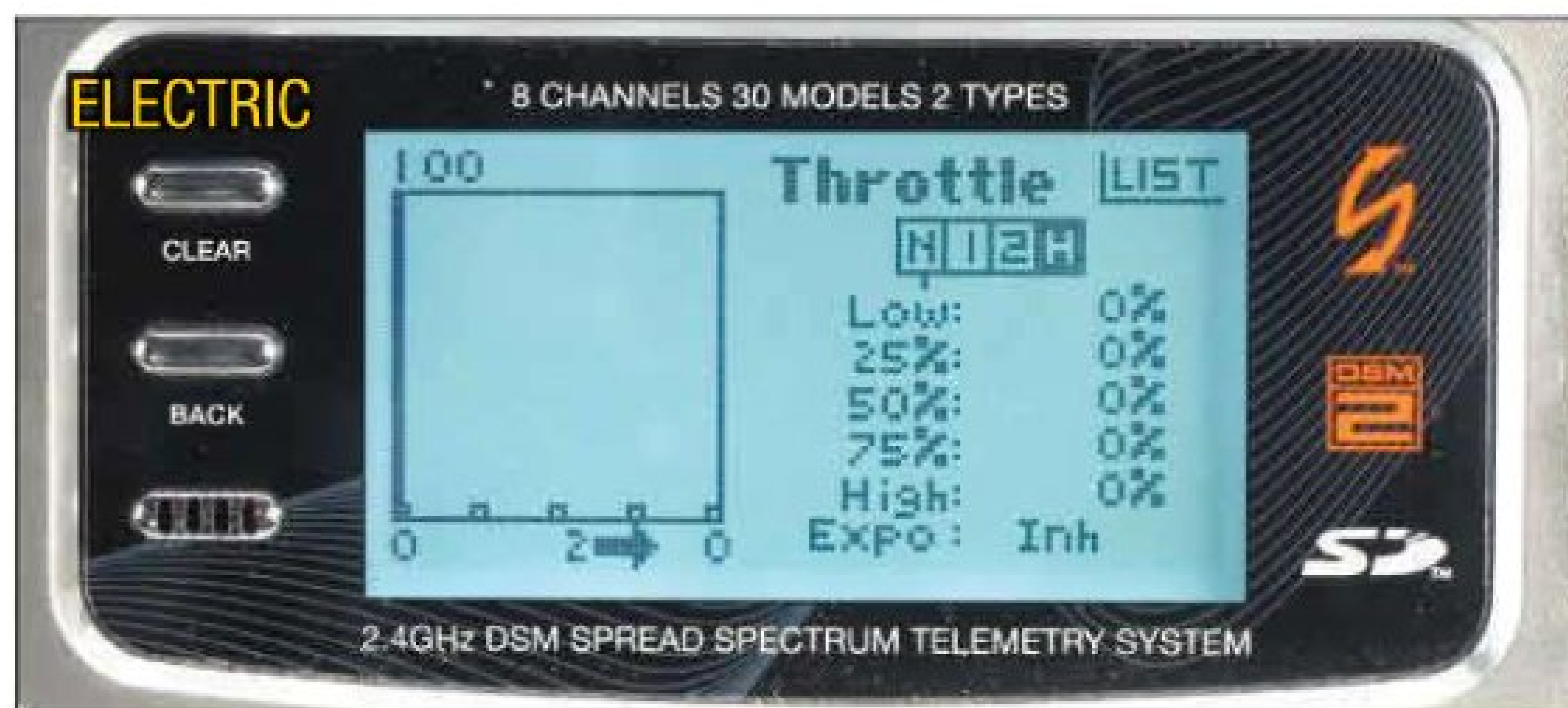
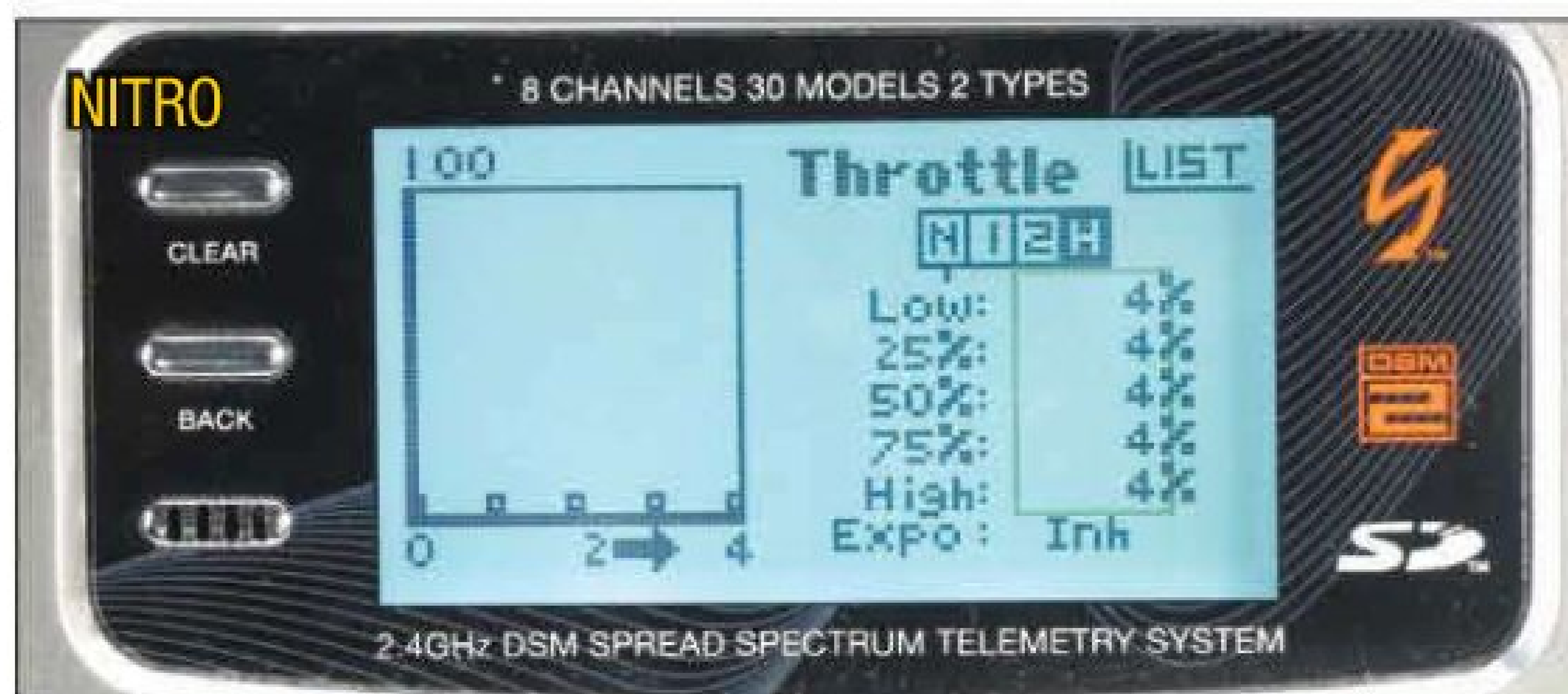
When starting out, you'll find that a conventional helicopter can be very different and almost alien. With a mCX, mSR, or an airplane, there is one major thing you should do before every crash, and that is jamming your throttle stick down until the motor shuts off. This can lead to a bad habit when flying a collective pitch helicopter. The throttle is linked to the collective control on a standard helicopter. This means that the pitch of the blades will slam the helicopter faster into the ground if you jam the throttle stick to idle. Using Throttle Hold will allow you to remove the power from the main blades, yet still have the ability to control the pitch. Let's go over the basics of crashing the proper way.



BASIC SETUP:

Setting up your helicopter to use Throttle Hold is a simple task and should only take a few minutes. Depending on the radio that you're using, the throttle hold command can be set up to operate on several different switches. The most common switch position (and usually the default setting) is the back top two-position switch. This will allow your finger to rest on this switch and make it readily available in the event of a crash or malfunction. If you are setting up an electric helicopter, the throttle hold position should be set to 0% throttle, while a nitro helicopter should be set to idle.

To set the throttle hold, you must first start your helicopter and adjust the engine to an idle at low throttle position. Shut down the helicopter and adjust the throttle percentage in the Throttle Hold menu screen to match the normal idle. Flip the Throttle Hold switch back and forth, and keep adjusting the menu until the throttle servo does not move when you switch from Normal flight mode to Throttle Hold mode.



HOW TO PREPARE FOR IT:

Preparing for a crash is something that many people seem to leave out. While flying, you should always expect the unexpected. Start out by flying on the simulator and keeping your finger close to the hold switch. Fly the simulator just like you would in real life, and try your best to keep your simulated helicopter in one piece. If you find yourself out of control, flip the hold switch and try to land softly. If you're not having any problems with that, try flying outside of your comfort zone. When you lose orientation or strike the tail on the ground, your first action should be to flip the hold switch. Keep practicing on the simulator until the Throttle Hold switch becomes second nature.

WHAT TO DO BESIDES THROTTLE HOLD:

Throttle Hold being the back bone to every crash, it still isn't the only thing you

should be concerned with to minimize the damage of a crash. Things like keeping your helicopter square with the ground and floating your helicopter should be considered before contacting terra firma. After hitting Throttle Hold, you should try to level your helicopter to the ground. This may seem impossible, but trying is better than letting your helicopter hit its side or land at an awkward angle. After leveling the helicopter, you'll need to prepare yourself for the impact. Try floating the helicopter by adding collective pitch so the helicopter will slow down before impact. Depending on the orientation of the helicopter, you might have to add negative

pitch if you are inverted. The best way to practice recovery is to jump on the simulator and position the helicopter in an unusual attitude, then hit the throttle hold and try to recover before the helicopter hits the ground. With any luck, you just might land without a scratch.



CONCLUSION

With today's economy and the price of major parts, crashing well might save you some cash and keep you in the air longer. Damaging frames, breaking blades, and stripping servos can add up to big bucks, but keeping the parts count down will greatly decrease these numbers with a simple plan of attack and the ability to react on a moment's notice. **TRU**

DETONATOR

KA-B000000000000000M!

WORDS: Ryan Kephart

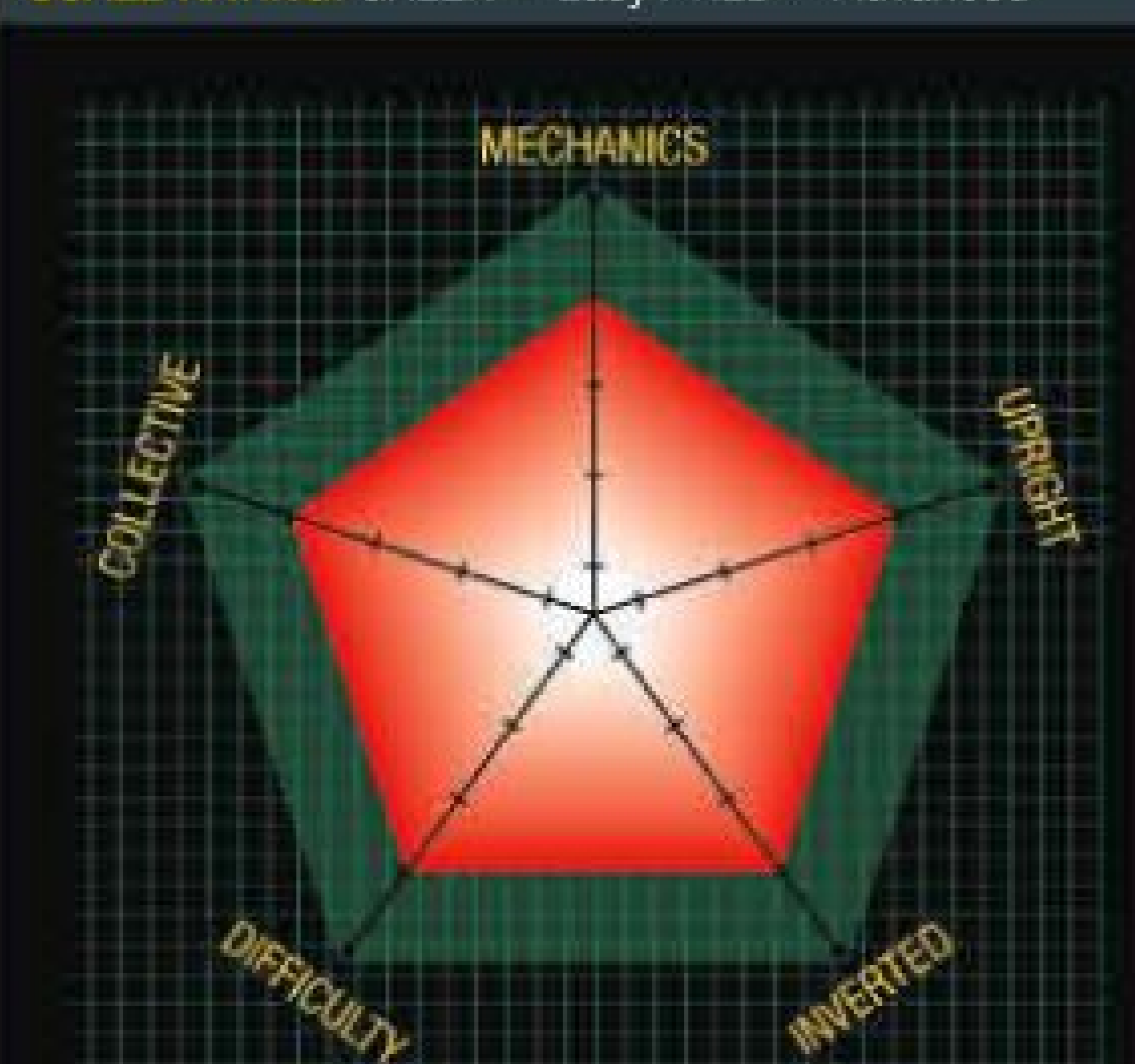
The Detonator is a move that is used for one of the set maneuvers at 3D masters. This single maneuver requires precision, good vision, and a powerful 3D setup to be performed right. Although this maneuver may sound easy on paper, it is quite a different story when taking it out to the field. The move consists of a basic funnel that increases in elevation with your skids towards the center. At the top of the first half, you must rotate the helicopter so the skids are facing towards the outside and continue to funnel all the way down to the starting point of the maneuver. Ok, maybe it doesn't sound that easy, but with a little practice you should have this move down in no time.



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.

BASIC SETUP:

THE BASIC SETUP OF YOUR HELICOPTER

should be a solid 3D programming. This is pretty much the backbone to any advanced 3D maneuver. A good working gyro and governor is a must as you will be increasing the collective to make the helicopter climb and a constant pressure

on the rudder to keep the tail pointed at the center of the funnel. You might want to setup your collective a little soft when first learning this maneuver so you cannot bog the engine. So if your collective isn't setup like this already, try lowering the pitch and punching out to see if your motor bogs. If it doesn't then you are in good shape.

HOW TO PREPARE:

PREPARING YOURSELF FOR THIS maneuver is not all that bad. You will first want to master a regular funnel with your skids in and out. Once you have this down you will need to start adding some collective to make the helicopter climb while performing a funnel. You can do this over and over again until you have mastered the climb. You will want to keep the helicopter angle stationary without any variations, the only thing that you should see it the helicopter climbing without changing the size of the funnel. Next you will want to prepare yourself for the descent. Try performing a skid out funnel while at a high altitude. Try to maintain

this altitude until you are comfortable. Now slightly lower the collective until the helicopter starts to descend. Keep practicing your high altitude funnel until you can keep the funnel one size without varying the angle of the helicopter. After you have mastered the descent all that is left is the transition at the top. This is a simple rainbow roll, which is basically a roll in the center of a rainbow. You can also transition by a simple negative push and reversing the rotation of the funnel. This is entirely up to you.

WHAT TO LOOK OUT FOR:

BOGGING YOUR ENGINE is probably the most dangerous part of the whole maneuver. If you notice that you are excessively bogging, remove some of the collective during the climb and start over. Bogging can be caused by too much collective input mixed with too much cyclic command. If you find yourself bogging too much increase the size of the funnel. This is easier on your helicopter and you shouldn't bog as much.

2 At the top of the maneuver finish off the funnel by lowering the collective a little to maintain altitude. Next transition into a skids in funnel by rolling, or a negative collective push.

START

1 Start by flying a normal funnel, then applying some collective to generate additional lift. As the helicopter is lifted keep the angle and diameter of the funnel the same.

FINISH

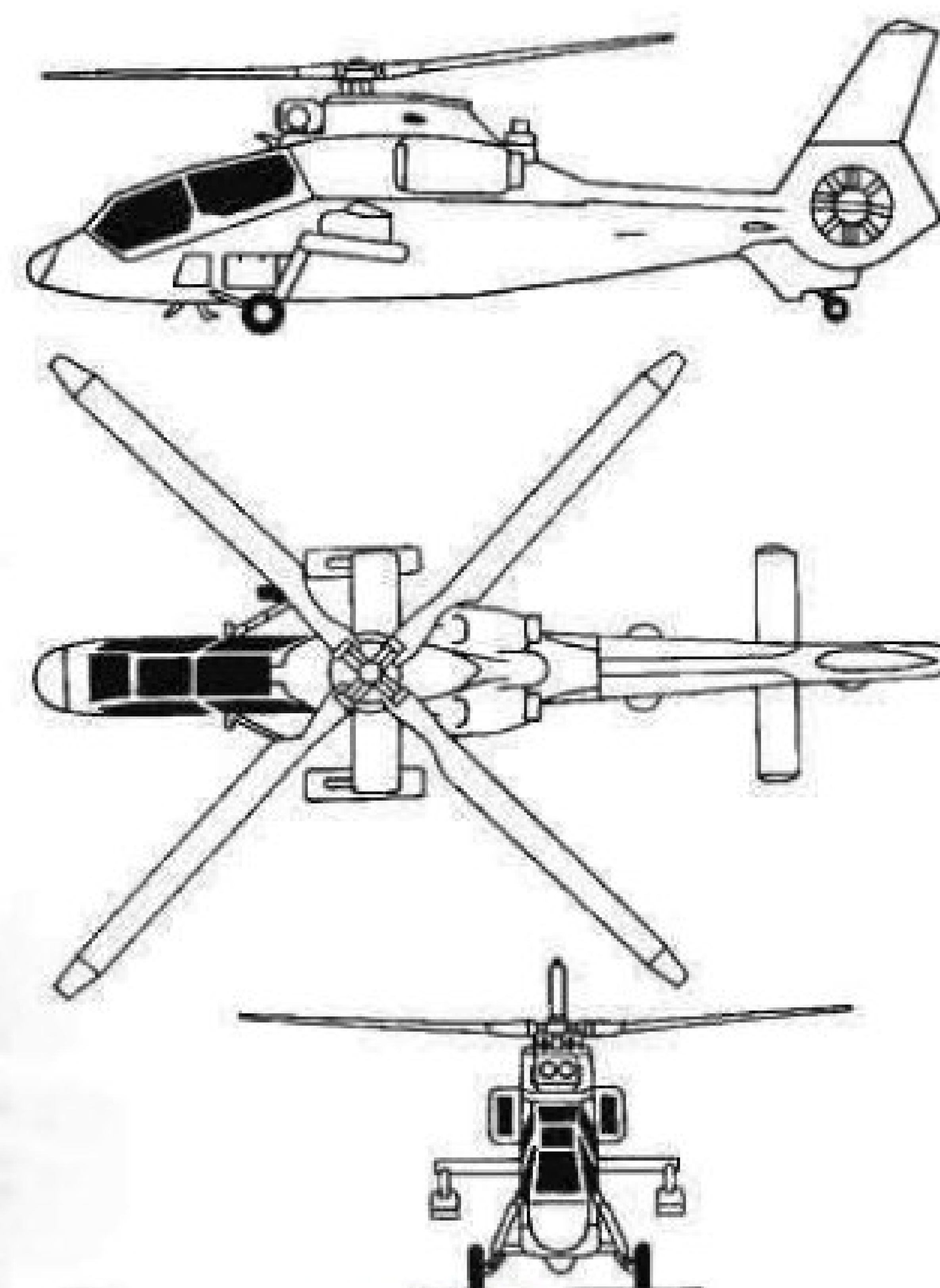
3 To finish off the Detonator you must descend during a skids in funnel. This is much like a climbing funnel but using negative collective. Practice, practice, practice is the only way to master this maneuver.

CONCLUSION

The Detonator can be used to show the skill needed to pilot a RC helicopter with precision, and collective management. This maneuver can change a normal everyday funnel into a work of art. Just remember that practice makes perfect, and the only true way to learn this maneuver is with stick time. **TBL**

Get it? Tic-Toc.... (insert uncomfortable laugh here)





SPECS

CREW: Two, pilot and observer
LENGTH: 12.00m (39 ft., 4 in.)
ROTOR DIAMETER: 11.60m (38 ft., 1 in.)
HEIGHT: 3.80m (12 ft., 6 in.)
DISC AREA: 105.6 m² (1,136 ft²)
EMPTY WEIGHT: 2,450kg (5,400 lb.)
MAX TAKEOFF WEIGHT: 4,000kg (8,820 lb.)
POWERPLANT: 2x Mitsubishi TS1-M-10 turboshafts, 660 kW (884 shp) each

PERFORMANCE

MAXIMUM SPEED: 278 km/h (150 kn, 173 mph)
CRUISE SPEED: 220 km/h (120 kn, 137 mph)
RANGE: 540 km (292 nmi, 336 mi.)
SERVICE CEILING: 4,880m (16,000 ft.)

ARMAMENT

4 x pylons for disposable stores

Does "Ninja" mean it is silent?

KAWASAKI OH-1

TYPE: Armed Observation Helicopter

WORDS: Daniel Colby

BACKGROUND

The OH-1 was developed as an observation helicopter for the Japan Defense Agency, to replace the Kawasaki OH-6Ds. Proposals to meet the OH-X requirement were submitted by Kawasaki, Fuji, and Mitsubishi. The JGSDF (Japan Ground Self-Defense Force) selected Kawasaki's design as the winner, while Fuji and Mitsubishi served as subcontractors. Preliminary design began on October 1, 1992. A mockup of the helicopter was made public on September 2, 1994 under the Japanese name Kogata Kansoku, meaning 'new small observation helicopter'. The first prototype rolled out at Gifu on March 15, 1996 and made its first flight August 6, 1996. A total of 6 prototypes were built, four for flying and two for ground testing.

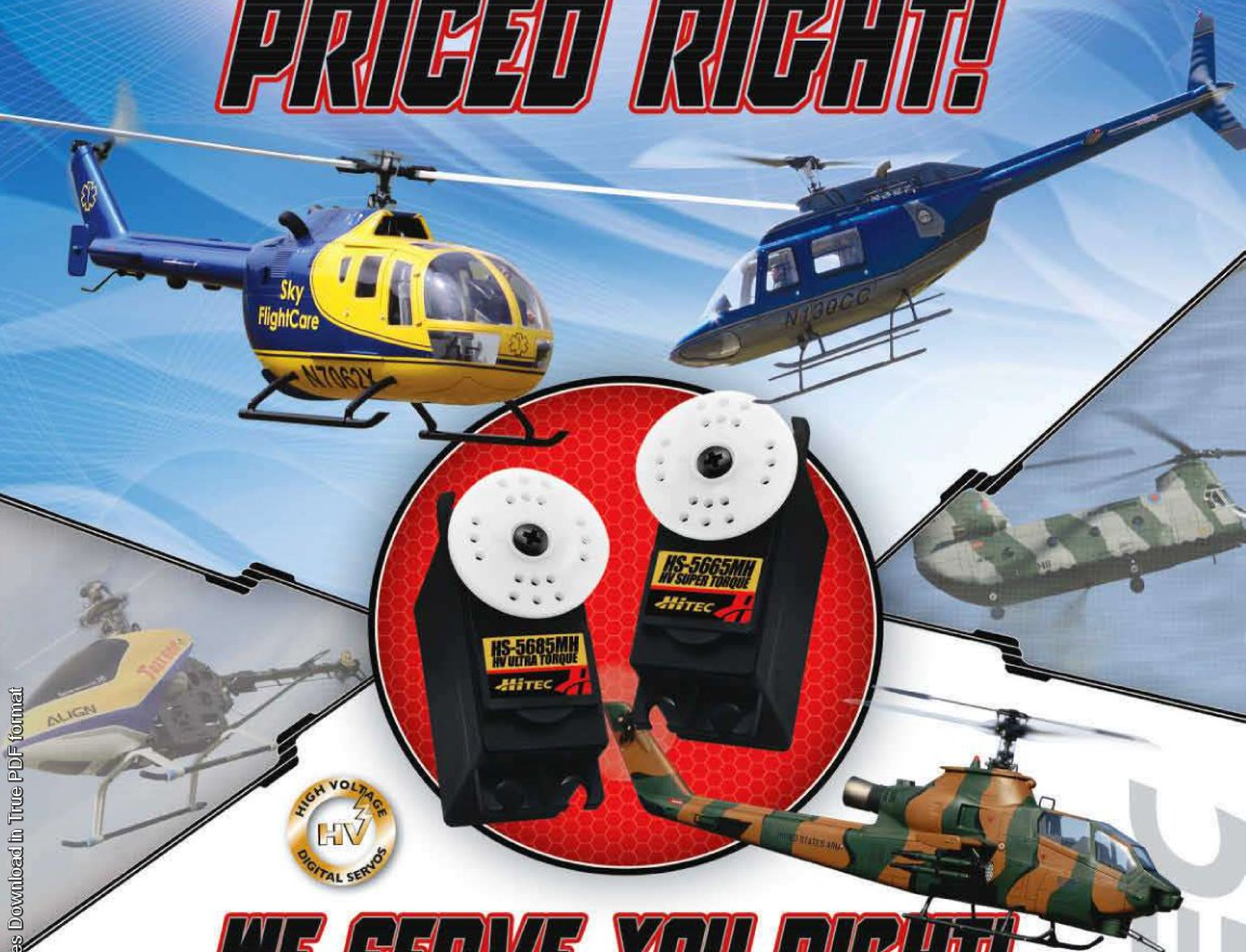
FEATURES

The OH-1 integrates a Kawasaki hingeless, bearingless, and 20mm ballistic-tolerant four-blade elastomeric main rotor that is stabilized by an active vibration damping system. The transmission system is a Fenestron-type tail rotor that spins eight unevenly angled scissor blades (35 and 55°). There are four hardpoints fitted under stub wings to allow the helicopter to carry extra storage, with a total capacity of 132 kg (291 lb). The outer pylons are able to carry four Type 91 guided AAMs, while the inner pylons are used for carrying external fuel tanks to extend the OH-1's range of flight.

CONCLUSION

The OH-1 was a helicopter that failed to really pick up steam and become a success. With an original production order set at 200, only 28 have been produced to date. They have begun a study on a version of the OH-1 with more powerful engines using the LHTEC T800 and R-R/Turbomeca/MTU MTR 390. They have also upgraded the transmission gearbox and named it OH-1Kai, which is the possible candidate for an AH-X requirement using the tentative designation AH-2, with armor-plated forward and center fuselage, and additional weapons carriage. **RH**

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HS-5685MH	0.20	157 oz-in	0.17	179 oz-in	35685S	1.6 x 0.8 x 1.5 in	2.1 oz

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