



PUT YOUR NEW iPad TO GOOD USE! pg45

RC Helicopter

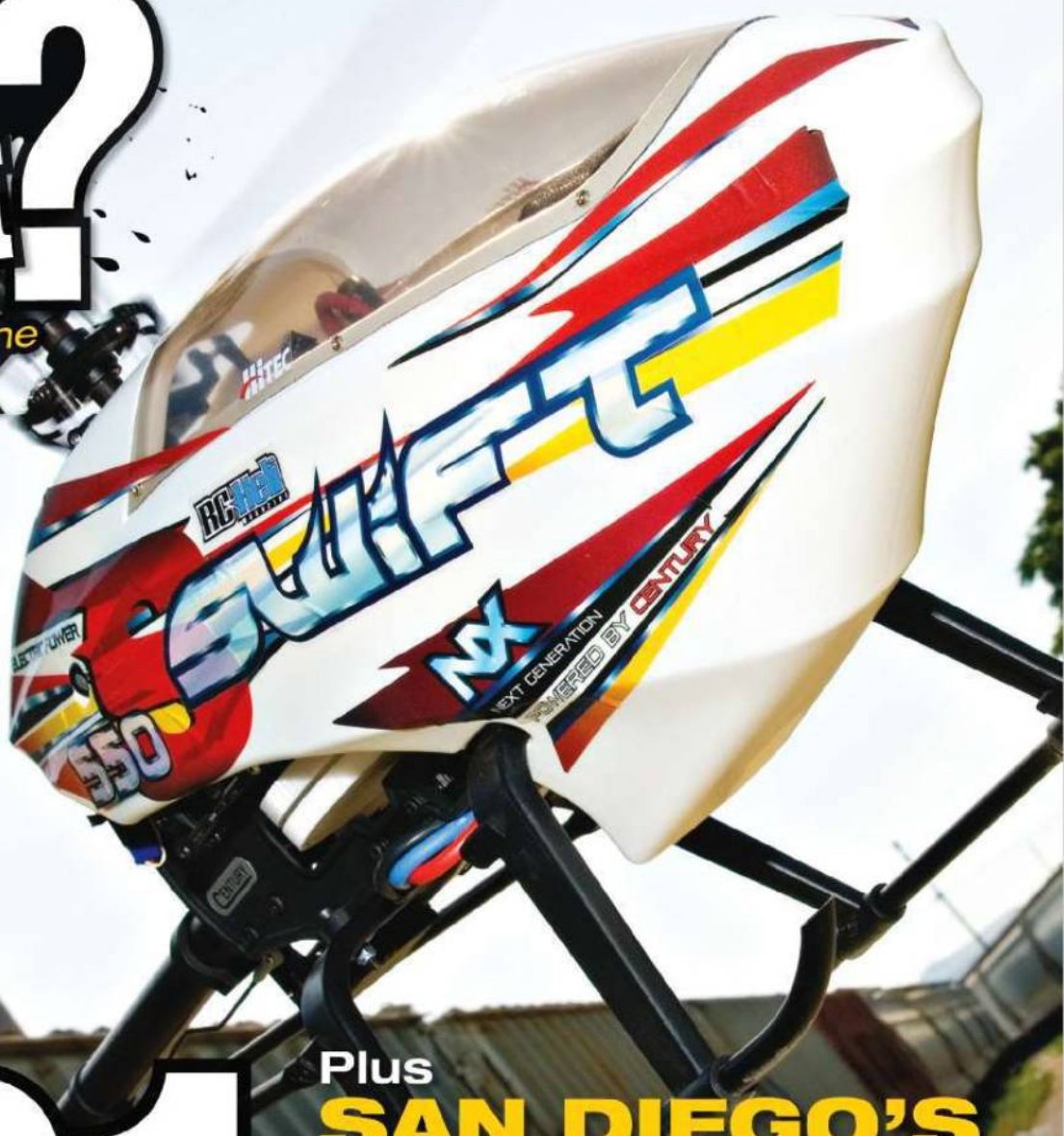
THE WORLD'S BEST-SELLING RC HELICOPTER MAGAZINE

What's Next?

Century Unleashes the **Swift NX**

TESTED:

- » **HELI-MAX** NOVUS 125CP
- » **ACE HOBBY** T6AC CHARGER
- » **PROTEK RC** SUPER PRO 40 POWER SUPPLY



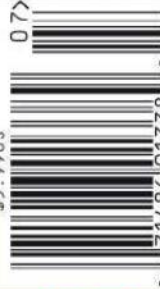
Plus **SAN DIEGO'S** Finest Fun-Fly

21

PAGES OF
TIPS and HOW-TO'S!

- Become a Better Pilot
- Get on the Deck
- Tune Any Tail Like a Pro
- Trim it Right
- 3 Needles No Waiting!

JULY 2010 / ISSUE 48



www.rcnhelicopter.com



mini Titan

BALLISTIC 3D PERFORMANCE



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



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



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



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

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

mini Titan V2

Specifications

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



TORQ

ADVANCED HIGH VOLTAGE DIGITAL SERVO

BRUSHLESS DIGITAL SERVO

HIGH VOLTAGE



Outrage

WWW.OUTRAGERC.COM



BL SERIES

BL 9088 BL 9080

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

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

worldmags & avaxhome



The 11X 2.4:
11 channels,
3 model types,
AutoAssign™ switch selection,
30-model memory,
SD card ready.

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

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

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

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

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

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

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

RCer: You know...conservative.

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

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

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

RCer: Wow.

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

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

11X: You'd lose. I'm more affordable than you may think—*far* more affordable.

RCer: Wow.

11X: Will that be all then?

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

11X: Actually, after nearly two hours of flying plus talking with so many RCers, I'm due for a charge. But visit JRradios.com and enter 11X in the search box.

You'll find my specs and answers to all your questions.

RCer: Of course—why didn't I think of that? Later!

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

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

JR
DSM[™]
feel the difference!

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This is a big one, be prepared.



HOBBY OR RECREATION?

IS THIS STILL A HOBBY? WHEN I WAS A KID GROWING UP I WOULD GO TO THE HOBBY SHOP AND BE FASCINATED AT THE IDEA OF BUILDING A MODEL, or an RC car, or plane (wasn't aware of RC helicopters back then). The "Hobby" shop was not a toy store, big difference. I knew that handing my allowance over to the gentleman across the counter wasn't just a normal transaction, it was something unique. I was going to take that box of parts home, and with the help of my dad set out on an adventure. Who knew if the finished product would look anything like the pictures on the box? Today that's all changed. When you talk to some newbies and tell them about how you used to build stuff they look at you in amazement. Thanks to cheap foreign labor and consumer demand, pre-built kits are almost more common than kits. About ten years ago I had a discussion with someone whom I was expressing to my disdain for pre-built kits, me being a purest. The guy on the other side of the discussion came up with a great point. He asked what kind of car I drove then asked me if I would have rather purchased it as a collection of parts having to built it myself? Touché. Sure it's very convenient, however if you really want to treat this venture as a "hobby" I strongly suggest you build a kit from the ground up. This will give you a much better understanding of your machine and will give you a greater appreciation for things. Sure you might stick with a RTF (Ready-To-Fly) your next time around but at least you'll have the satisfaction of considering RC helicopters a hobby rather than a recreation. With the idea of keeping this a hobby rather than a recreation was behind our including 21 pages of tips and how-to's in this issue. Your skill set will be much improved after reading this issue.

Summer is in full effect; we've got a ton of stuff coming in the next few months. Be on the lookout for the return of our monthly scale column, along with more reviews, and as always more how-to's. Lastly, have you become a fan of RC Heli on Facebook yet? If not do it now. www.facebook.com/RCHelimag

Fly Safe,

Mike Velez

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



CHATTER BOX

WHAT MAKES A HOBBY A HOBBY?



MIKE VELEZ - Publisher/Editor-in-Chief
 I can't remember, as soon as it's your job it's no longer a hobby.



RYAN KEPHART - Associate Editor
 A hobby is something you should want to do not something you have to do.



BRANDON UPDIKE - Editorial Assistant
 Who cares, I'm a Load Master now!



JIM INNES - Editor-At-Large
 A hobby is anything done regularly for diversion or to get away from normal duties. What makes a hobby a hobby is the enjoyment and satisfaction found in it.



CHUCK BASSANI - Editor-At-Large
 The compulsion to spend more money than you should on something you don't need.



SHAWN KITCHEN - Copy Editor
 Passion, plain and simple. Otherwise, it'd be a J.O.B.



ART KORAL - Contributor
 An activity that is fun, somewhat addicting by intellectual stimulation and not exhausting to the participant.

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Staff Photographer
 Jason Boulanger

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 PRINTED IN THE U.S.A



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

SCALE

Fly The Excitement!!!



Bell Textron 222
30/50/60



Schweizer 300 50



Long Ranger 30/50



Ecureuil A-Star A5350 50

AIRWOLF

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



Hughes MD500



Hughes 500E 30



BlackHawk 60



Hughes 500E 50/60



Agusta 109 30/50



Robinson R22 50



Bell Jet Ranger 60

Scale Up Your Thrill to Fly!

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

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

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



Bell Textron 47 G

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(10A)**



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**PRO 40 POWER SUPPLY
w/USB (40A)**

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(6S/10A/250W)**

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



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



BATTERIES

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POWER PACKS

LITHIUM POLYMER
RECIVER PACKS



LITHIUM POLYMER
TRANSMITTER PACKS

PARTS

CARBON FIBER &
FIBERGLASS
ROTOR BLADES



CANOPIES



AND MUCH MORE!

PROTEK RC

A higher level of performance!

HELI-MAX HIGH PERFORMANCE MOTORS



The new Heli-Max High Performance Brushless Motors have built-in cooling fins to allow the motor to run cooler. The motors are also equipped with oversized bearings to extend motor life.

Two new motors are available for 400 and 450-size helicopters. The 450 has a 3500KV rating and the 480 is rated at 4400KV. Both motors will be available sometime in early June.

HMXG8002 HP 450 3500kV Brushless Motor: \$54.99

HMXG8003 HP 480 4400kV Brushless Motor: \$59.99

WWW.HELIMAX-RC.COM

Nice looking tail huh?



vision
Competition
50
Xtreme Edition

ELY.Q DEVELOPING A NEW HELICOPTER

Last month you saw one of Ely.Q's newest helicopters, the Vision 50 Competition. Ely.Q has a new version just around the corner. The Vision 50 Competition Xtreme Edition takes the old Competition Vision and adds everything you can imagine to make this helicopter look and fly better. The Xtreme Edition includes a torque tube driven tail, metal tail blade grips, metal tail case, and metal stabilizer brackets. To further enhance the helicopter, Ely.Q added carbon fiber bottom frames, frame braces, flybar paddles, and tail blades.

WWW.ELYQ.COM

SCORPION MOUNTING KIT FOR THE TREX 700E

For those Scorpion fans wanting to run the HK4035 series motor on their TREX 700E, you will be pleased to learn that Scorpion has created a perfect mount for the job. The all aluminum mount is made from aircraft grade aluminum and have four mounting bolts spaced 25mm apart. This mount allows the Scorpion motor to be secured with all four bolts, giving the motor a solid mounting point.

WWW.SCORPIONSYSTEM.COM
WWW.INNOVATIVEDESIGNS.COM



CORRECTION ON THE ICHECKER

Last month we reviewed the Protek iChecker from A Main Hobbies and we stated that the iChecker came with an adapter to check the overall voltage of the pack. We regret to inform you that the iChecker does not come with this adapter but can be purchased separately, or you can make one yourself.

WWW.AMAINHOBBIES.COM

ALIGN RELEASES 3G UPDATE!

The time is here, and it's what we have all been waiting for. The software for the flybarless 3G system has been released and includes version 2.1 for the gyro unit. A USB interface must be purchased to update your system, but every update after that is free. The program opens up numerous parameters within the 3G, allowing you to fine tune your system. You can also save and send your configuration to friends over the Internet, which allow you to tune your helicopter exactly like your buddies. Currently, the program can run on Windows XP, Vista, and the new Windows 7. No word yet if the program will be released for the Mac operating system.

WWW.ALIGN.COM.TW

Download Now!!

Programmable
3G
Flybarless System

Lightweight! Agile! Precise!

>>You can download the setup video for ALIGN 3G systems here.

Multi-Languages support, choose the one you like!

Easy connectivity via USB interface

Instruction:

- 3G link cable incorporates PC configuration GUI (graphical user interface) and latest 3G firmware update to improve system stability, and added pirouette compensation to stabilize center point during pirouettes.
- Opens up numerous configuration parameters within the 3G system. Pilots can fine tune the system through the PC GUI to suit individual preferences.
- Configurable parameters includes options relating to aileron, elevator, rudder, and combined functions.
- Provides real time display of radio control signal speed output, so pilot can fine tune the system based on the Helicopter response to control sticks relationship display.
- Ability to display the current status of parameters in 3G system for setup verification.
- Parameter import/export function to allow backup of settings, as well as exchange of parameters with others through internet.

System Requirement
OS: Windows XP/Vista/7

ALIGN 3G Flybarless System Program download:

Date	Version
2013/05/28	3G V2.1/V2.0

Language:

ALIGN 3G FL760 install instruction download:

Date	Language
2010/06/01	Simplified Chinese
2010/06/28	Traditional Chinese
2010/05/28	English
2010/05/28	German
2010/06/01	Japanese
2010/06/01	Korean
2010/06/01	French
Coming soon...	Thai

The iChecker still receives the same score even if it doesn't come with an adapter.

O.S. ENGINES NOW PRODUCING QUALITY TOOLS

Over the years O.S. Has been known for quality engines that last a lifetime. Now that same popular manufacture is making tools with the same precise engineering and quality that you expect. O.S. Speed Racing Tools are designed for virtually any modeling preference, whether it's boats, cars, or helicopters. The drivers have diamond pattern grips with three flat sides to prevent the tool from rolling off the bench. Each driver has indicating grooves to quickly identify the size. The tools also have a rotating cap at the end of the driver that easily rotates in your palm, giving you a solid grip and the ability to rotate the driver without removing the tool from the screw. Each tool has a tip made of CAD/CNC spring steel and can be retracted into the handle for storage. The tools will be available mid June, so keep an eye out.

WWW.OSENGINES.COM



Looking good O.S. Engines, what is next?

G-FORCE TAIL SERVO MOUNT

G-Force is at it again, and this time they are looking into the TREX 700E. This new tail servo mount is made from aluminum and weighs less than 10 grams. The mount relocates the tail servo from the front of the frame to the back giving the tail a direct connection without a bellcrank. The mount uses existing holes and installs in minutes.

PART# GFT7136

PRICE: \$15

WWW.GFORCEHELI.COM



ICHARGER 3010B "MORE POWER"

We recently reviewed the iCharger 206B which is one of the most powerful 6S chargers on the market. Now iCharger is releasing an even more powerful charger. The iCharger 3010B, is a powerhouse charger that can charge up to a 10S LiPo pack up to 30 amps. The 3010B will be able to charge every battery type including LiPo, LiFe, Lilo, NiCd, NiMh, and PB.

The total output of the 3010B is 1000W with a 24V input and 500W with a 12V input. Keep an eye out for a full review in an upcoming issue of the magazine.

PART # 3010B

PRICE: \$240

WWW.PROGRESSIVERC.COM





NANO HELICOPTER FOR BEGINNERS



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



E-500 HELICOPTER FOR ENTERTAINMENT



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



BELT-CPX 3D PRO AEROBATIC HELI



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



BELT-CP CX 3D AEROBATIC HELI



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



ESKY STATEMENT

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

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NEW CANOPIES FROM ALIGN

Over the years Align stuck with the basic TREX canopies and just modified the colors a bit. Now Align has stepped up to the plate offering brighter and more unique style canopies for all your TREX models. The new canopies have been redesigned with new lines and paint styles to enhance the look of your favorite machine. Be sure to ask your local hobby shop to place an order and get your new stylish canopy today.
WWW.ALIGNRCCUSA.COM, WWW.HELIVHOLESALE.COM, WWW.ALIGN.COM.TW



That gyro is beastly!

MICROBEAST? JUMBO SHRIMP?

With the revolution of flybarless gyro systems companies from around the world are producing quality products to make your helicopter flybarless. **BeastX is a German company now producing the Microbeast 3 axis gyro system for your helicopter. The unit is made from aluminum**

composite and can be mounted both horizontally and vertically. The gyro sensors use the newest MEMS technology, and sophisticated software to run in both a nitro and electric model. The Microbeast is programmed using the unit or can be adjusted using a USB interface. The Microbeast can be used with many different radios including PPM, S-Bus, and Spektrum. An adapter can be purchased to allow the Microbeast to be used with a Spektrum radio without any additional receiver. Keep an eye out for a full review of the Microbeast from BeastX.

WWW.BEASTX.CO



KDE DIRECT 500 SIZE BRUSHLESS MOTOR

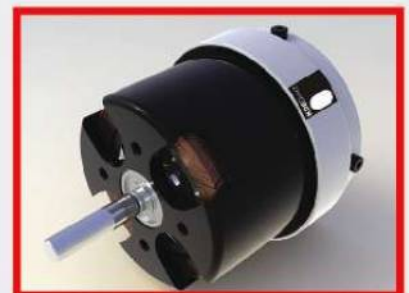
This new motor from KDE Direct is a powerful brushless motor designed for a 500-class machine. The motor claims to be highly efficient and powerful. This motor was made in collaboration with Neumotors and custom designed to fit KDE standards. This motor has an updated

N42 magnet core, and extremely low resistance windings. The bearings in this motor can easily be replaced and the unit has a built in cooling system for hard 3D flight. Keep in mind that this motor is made in the USA.

PART NUMBER: KDE1708H-N42

PRICE: \$173

WWW.KDEDIRECT.COM



Nitro T-REX 700

Go Flybarless

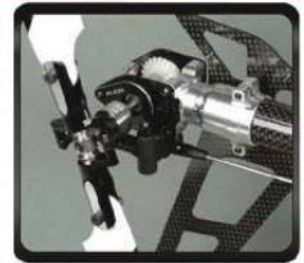


FL760
3G

Flybarless System

Programmable

Auto SMM 2.5s Easy Energy Stable 10000 RPM



Design Features:

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

Specification:

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

Accessories:

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


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RC distributor

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www.alignrcusa.com email: sales@alignrcusa.com

LETTERS

MR. HUMBLE

HEY GUYS! MY NAME IS ANTONIO, I'M FROM DUARTE CA. I have been flying for five years now at my home field in San Gabriel CA. This is my T-Rex 600N Limited Edition. I'm running an AR7100 spectrum receiver with DX7 radio. I've installed some custom carbon fiber landing gear combined with a really nice Canomod canopy. For a little extra bling I've put blue fuel line over a few linkage rods and over the tail rudder control, mixed in with the blue mesh guard for servo wire gives it the ultimate CLEAN finish!

Electronics are Futaba S9451 servos on cyclic, Align DS620 on tail, Align DS610 on throttle, and Align RCE-G600 governor. I also have the Align 3G flybarless system. It really has been trouble free. I've had no problems with the tail and can't wait for the USB to upgrade it. For power I'm using A123 2300mAh cells with an MPI regulator set at 6V. I'm also using an O.S 55HZ with a Funtech B320 muffler; it gives a nice sound and a whole lot of power thanks to that 30% Byron's Rotor Rage fuel. It really is a beautiful combination.



It is Bad Brad from our forums!

BRAD THAT'S BAD!

THIS IS MY RECENTLY COMPLETED BELL 222, complete with retracts! I had the new assembled mechanics sitting in my basement for over a year waiting patiently to become airborne! I slowly acquired the parts after finding some good Black Friday deals. Its debut was at the Heli-thon on May 16th and it attracted many eyeballs and questions! Using the Aurora 9 radio I was able to slow the retract servos to scale speed.

Here's a roster of what its got: Hirobo Sceadu Evolution 50, Hirobo Bell 222 fuselage, OS 50 Hyper engine, MP50 pipe, Futaba 520 gyro, Futaba BLS 251 on tail, Futaba S9452's on cyclic, Futaba S3010 on throttle, Hitec HS 225BB's on retracts, Mavrikk 80mm tail blades, MS Composit 610 main blades, Align B6T regulator, and a Hitec Aurora 9 transmitter.

I really enjoy the magazine and reading your reviews!
Bradley Rigdon
 Tunkhannock, PA



WIN BIG!

If you haven't sent us pictures of you, your heli, your work room, flying field or anything cool and heli related, now is the time to do so. From now until the end of August we're going to randomly select five winners among all the "Feedback" submissions we collect. Each winner will receive their choice of a "Scale" or "3D" RC Heli magazine T-shirt, and one will win a copy of Ray's Authoritative DVD Series: Shop & Field Companion!



Make them good, and email them to feedback@rchelimag.com. High-res photos, please.

WHERE'D WE GO?

Dear Mike and staff,
I WOULD LIKE TO CONGRATULATE YOU ON YOUR LATEST ISSUE MAY 2010. You are back in the game. This was the first one in a while that I was able to read from cover-to-cover like in the "old days." Your previous few issues did not live up to the high standard I've come to expect from RC Heli magazine. I've purchased every issue since your first one and started my subscription since Issue 6. More How-To articles would be nice, including updates on old ones like gyro setup and CCPM, but perhaps with a new spin. Lots of newcomers that missed earlier issues would find that invaluable. I realize the economy has affected your industry as much as it did everything else. My fleet consists of a T-Rex 600 N Pro, Hawk 30 Pro, Blade 400 as well as MCX and the new Blade Tandem. All the best and keep up the good work.
 Sincerely
Bert Van Donkersgoed
 Vancouver, Canada

X-Cell FURY 55

STEP UP TO EXCELLENCE WITH X-CELL



FURY 55 SPECIFICATIONS

- Length: 47.875" - 1216mm
- Height: 16.625" - 422mm
- Rotor Span: 1365-1405mm - 600-620mm Blades
- Tail Rotor Span: 260mm - 95mm Blades
- Avg. Kit contents Weight: 5.4lbs - 2.45kg (includes painted canopy)
- Avg. Ready-to-Fly Weight: 7.3-7.5lbs - 3.31-3.4kg (less fuel)
- Main Drive Ratio: 8.538:1
- Tail Drive Ratio: 4.61:1
- Bearings: 4-Thrust Bearings, 1-German Heim Ball, 38-Ball Bearings, 2-Torrington One-way Clutch Bearings



Graphite chassis that assembles easily and is supported by CNC aluminum frame braces



High Visibility Painted Epoxy-Glass Canopy by CanoMOD™



Rotor head is a new lighter design made just for this model.
All aluminum flybar control assembly and ball bearings throughout.



New tail rotor transmission is simple to assemble and maintain with high efficiency, low drag belt drive system.

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Hi Guys,
I thought I would send in a picture and a few words about the magazine. First, it always arrives like clockwork on my doorstep every month and it is possibly the best informative magazine available in Great Britain. I always push the magazine to our customers, especially new pilots, as the information and tips section is very helpful and keeps me off the support phone calls! My wife and I have run an Internet shop for five years now. In addition to model helicopters, we also fly a full size Enstrom Shark helicopter at our local field when funds allow, taking in the magnificent Lancashire countryside.

We get a wide range of customers from all over Europe and occasionally from the USA who visit and buy from our web shop.

The helicopter in the foreground is a 'Sonix' gasser prototype called the Eagle 260 which Sonix in China have been getting ready to produce for most of 2009.

The worldwide recession has slowed the production somewhat, but we hope that together with Sonix we will get this bird out soon.

The helicopter swings 720 to 800mm size blades with a Zenoah 23CC engine and has plenty of power and agility. I have been test flying this prototype for around six months (even crashed it once and it survived well).

Keep up the great magazine...And I'd love a little plug for my shop if you don't mind

www.sportsmoto.co.uk

Regards,

Mark & Lorraine Whalley

Thanks for reading and all the kind words! But sorry, can't plug the shop, what was the address? www.sportsmoto.co.uk

Mike

200001 3 AXIS GYRO

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



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



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



G4 Pro Lite V2 20C Series Batteries

The world's lightest, high-performance batteries for sport and competition use. Offering the highest energy density and cycle life delivery available in their class, G4 Pro Lite V2 20C series batteries are proven performers with batteries lasting years and upwards of 400 - 500+ cycles. Capable of continuous discharge rates to 20C and fast charge rates up to 4C* while delivering up to 20% more power than previous generation batteries. Available in capacities from 250 to 6600mAh and configurations from 1S 3.7V to 10S 37.0V.



G4 Pro Power 30C Series Batteries

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



G4 Pro Power 45C Series Batteries

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



G4 Sport Race 25C Series Batteries

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



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



Chargers and Balancers

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

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THUNDER POWER RC

www.ThunderPowerRC.com

FREQUENTLY ASKED QUESTIONS

Q: I've been reading your magazine for a while now and decided to take the plunge and get into the hobby. I recently purchased RealFlight G5 and have been practicing the basics. I have been steadily improving and building my confidence to start flying the real thing. I am a little hesitant, though, to start with anything major. I was thinking about buying a counter-rotator to help me transition into real flying. Do you think it would be wiser to make an investment on a larger helicopter for learning? **-MoNt1go**

A: A counter-rotator is a great start. It can be used as an excellent tool to help learn your basic orientations. Counter-rotators are relatively cheap and are quite durable. I would recommend something like an E-flite Blade MCX to help you get started. The only thing with a counter-rotator is that you may find yourself outgrowing it. **-HJdakraob**



Play it safe, buy new blades.

Q: I recently had a minor spill on my helicopter, which caused the tip of my blade to get a little scuffed up. The damage isn't that bad, but there is a chip missing from the corner of the blade tip. It's a minor chip and there doesn't seem to be any further damage, but I am still skeptical to use it. Will it be safe to fly these blades? **-GizMoDuck**

A: Whether or not you can use the blade again is dependent solely on how bad the damage is. Generally, if it's a minor chip then the blade should still be usable without issue. Some people are even able to repair chips with the use of epoxy to seal the crack. Be advised that if damage of the blade may cause the blade to split. This may not be noticeable at first, so you'll want to check the trailing edge of the helicopter and see if there are any openings. If it is split then the blade is no good. The safest thing to do is to replace the blade, but if the chip is minor you should be okay.

-CpTgaMe

A: I'm nothing if not overly cautious about helicopter flying. In my opinion, damaged blades are never something that you want to take chances with. Rotor blades are subjected to enormous stresses during flight, and the structural integrity of the blade is essential to the blade's ability to survive the loads placed upon it. Once you've hit something hard enough to remove material from the blade, you never know what kind of sub-surface damage the blade may have. In a worst-case scenario, the blade can come apart during flight and injure someone. Helicopters are fun, but should always be treated with the utmost respect. If you have a damaged blade—even if only superficial damage—replace it without question. Better a few dollars now than the cost of regret if someone got hurt.

-Shawn K





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

castle ENGINEERING DEPT.

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Class	Helicopter	Motor	Castle ESC Recommendations	Lipo Cells	Pinion	Flying Style
250	Align 250	Align BL250	Phoenix-25	3	15t	3D
	Gauli 200	Gauli GM-811-4800KV	Phoenix-25	2, 3	9t - 15t	Sport, 3D, Extreme 3D
450	Align 450	Align BL 430SP	Phoenix Ice Lite 50	3	13t	3D
		Scorpion HK 221-8	Phoenix Ice Lite 50	3	13t, 14t	3D, Extreme 3D
	Rave 450	Next D (Scorpion) 221-6	Phoenix Ice Lite 50	3	11t	3D
		Scorpion 221-10	Phoenix Ice Lite 50	4	13t	Extreme 3D
500	Trex 500	Align BL 500L	Phoenix Ice 75 or 100	5, 6	12t, 13t (6s), 14t (5s)	Sport, 3D
		Scorpion HK 3026-1600	Phoenix Ice 75 or 100	5, 6	14t, 15t (5s), 13t, 14t (6s)	Sport, 3D
550	Mikado 500	Scorpion 4025-890	Phoenix Ice 100	8	14t, 15t, 16t, 17t	Sport to Extreme 3D
		Scorpion 4025-1100	Phoenix Ice 100	8	16t, 17t, 18t	Sport to Extreme 3D
600	Trex 600	Align BL650L	Phoenix Ice 100	8	14t, 15t, 16t, 17t	3D
		Neu 1515H/2.5D-1650Kv	Phoenix Ice 100	6	12t, 13t	3D, Extreme 3D
700	Trex 700	Align 700M-510Kv	Phoenix Ice HV 80 or 120	12	12t	3D
		Neu 1915H/1.5Y-450Kv	Phoenix Ice HV 80 or 120, PH-HV110	12	18t, 19t, 20t	3D

For a more detailed list, visit www.castlecreations.com/helisetsups

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QUICK TIPS

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ELIMINATE SWASH INTERACTION

When setting up a new helicopter, we sometimes run into swashplate interactions that can be caused by servo speed differences or slight mechanical variations. These differences can be seen in the swashplate when moving the cyclic stick forward and back. Most helicopter radios have the ability to eliminate this interaction by adjusting the amount of movement on a particular servo channel to match each other. Take a look in your radio and dial in the mixing function to eliminate this interaction and your helicopter will look and fly better than ever before.



SERVO GROMMETS, DO YOU KNOW HOW TO USE THEM?

▶ Servo grommets are used to keep vibration from harming the servo. A brass insert is usually coupled with a rubber grommet that is installed on the servo mounting ears. These brass inserts are designed to keep the servo off of the servo mounting platform. If you crush these inserts, the screws can tighten down on the servo too much, which will transfer vibration to the servo. Install the inserts from the bottom of the servo and install the screws just tightly enough that the brass insert sits flush to the mounting surface without being crushed.



SAFETY WIRE PLIERS

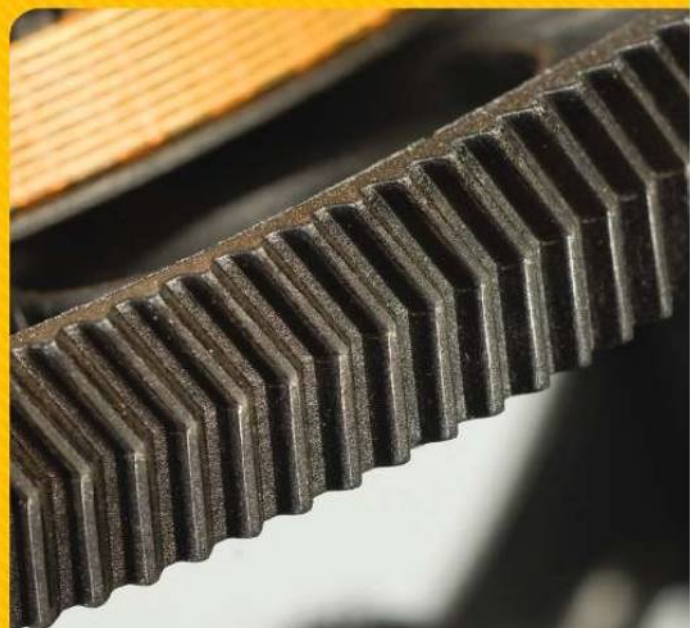
The aviation industry is no stranger to the use of safety wire pliers. These little pliers are very useful when building fuel tanks or running fuel lines. Safety wire pliers are a standard set of pliers which can lock in the closed position; this way they can grip the safety wire used to secure fuel lines to the fuel nipples or clunks. This tool can make quick and clean work of tightening the wire and securing your fuel line.



Safety wire pliers are used on big helicopters too.

GEAR MESH FOR HERRINGBONE TYPE GEARS

HELICOPTERS LIKE THE MIKADO LOGO 500 AND 600 USE HERRINGBONE GEARS that are very different from the usual straight-cut gears in most helicopters. Herringbone gears offer a quiet gear train and perform well when properly used. Many new owners of these helicopters usually set the gear mesh the same as they would for straight-cut gears, only to find that the gear will strip within the first few minutes because it is designed to operate with zero backlash. To set the mesh on this style gear, press the pinion against the main gear and rotate the gear until you find the tightest position. Then, make sure that the pinion is resting against the main gear and move it to make sure there is no backlash. Lock down the motor and rotate the main gear and test for backlash every twenty degrees or so to make sure the gear is operating smoothly.



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www.elyq.com

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



Giuseppe Robertone

GIUSEPPE ROBERTONE

Danny Szabo

DANNY SZABO

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

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



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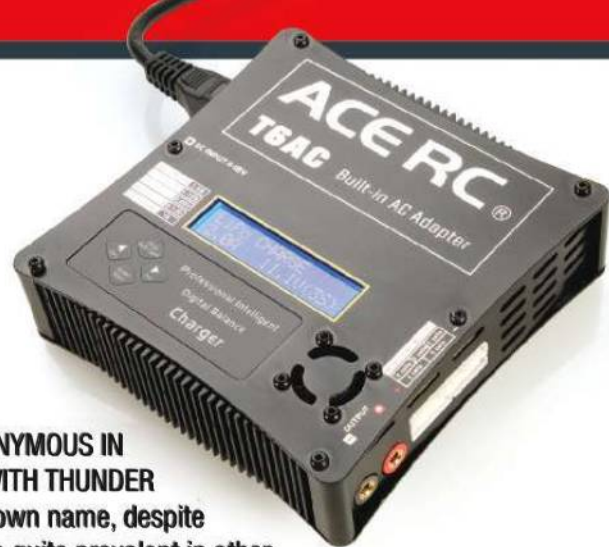
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ACE RC T6AC CHARGER

AC and DC

WORDS: Brandon Updike



THE NAMES “ACE RC” AND “THUNDER TIGER” ARE NEARLY SYNONYMOUS IN AMERICA BECAUSE OF ACE RC’S DISTRIBUTOR RELATIONSHIP WITH THUNDER TIGER. ACE has released a wide variety of products under their own name, despite the products being manufactured by Thunder Tiger. They are also quite prevalent in other areas of this hobby such as airplanes and cars. They brand their own line of chargers manufactured by Thunder Tiger. ACE sent us their newest charger—the T6AC—for testing. Having seen just about every big name charger come through here over the years, we’ve developed a personal standard for what we expect from chargers.

FEATURES

Perhaps the most prevalent feature is that the T6AC has a built in AC adapter. Not only can you use a regular wall outlet for power, but you can also use a typical DC input of 11-18v. It charges all the standard battery chemistries, including lead acid. It can charge up to 6S packs for LiPo’s and 1-15 cells for NiCd/NiMH. It uses all the standard nominal voltage ratings and peak voltage ratings for the healthiest charge.

Another cool thing about the T6AC is that it has a built in balancer that fits 2S-6S packs. The balancer is able to read each cell individually during charge/discharge and give off a warning if a problem arises. It’s also capable of using adapters for other brand specific balancers. The T6AC boasts an optimized operating system that integrates the standard safety features found in most current chargers. There is a fast charge feature that increases the charge rate at the expense of total capacity. There is also a storage battery feature, which charges a battery to 3.85V rather than the full 4.2V. This is used for batteries that will be sitting for a while before use.

The T6AC has all the standard safety shutoff features. It’s able to detect if a battery has reached full capacity and will automatically shut down. It will also shut down if the voltage spikes too high with delta-peak sensitivity. There is also a temperature threshold, so if your pack gets too hot the charger will automatically stop charging. There is input power monitoring to make sure that the charger isn’t receiving too much power. The T6AC is able to save up to 5 different battery profiles. It is capable of charging from 0.5-5A.

TESTING

After unpacking the charger, I immediately plugged in the AC power cable because all we have here is DC powered chargers. Everything fired up like normal and all the standard settings were in the proper configuration. I then grabbed a bunch of batteries and began to charge them one by one in both balance and standard mode. I didn’t have any packs that could be charged at 5C rates. I was disappointed to see that the charger can only charge up to a 5-amp rate. With new batteries having the capability of a 6C charge voltage it was a bit of a disappointment. However, for the applications I used the charger it worked well. I charged several 3S packs and each charged to full capacity at the proper voltage. I also charged a 2S2P pack with no problems whatsoever. The biggest pack I charged was a medium sized 6S pack rated at 2600 mAh. I charged it at around 5 amps and it handled it with no issue. The charger stayed cool and the fan was quiet. I had an old NiMH pack lying around and the T6AC was able to charge it despite being dormant for so long.

The interface was very simple and I had no problems switching from one pack to the other. The balancer worked well and is really convenient. I used both the AC and DC input and each one worked just as well as the other. Depending on the amperage, the packs charged in the standard 30-40 minute time frame.

CONCLUSION

Overall, the charger worked well. This

isn’t a high-end charger, and as such it was designed to suit the needs of basic LiPo charging. Even though it can charge up to 6S being limited to only 5 amps is a negative. With the new battery technology coming out today, high-powered chargers are becoming the norm. Nonetheless, it’s a good sport charger to handle your smaller packs safely and reliably. **THTL**



+ THE GOOD

- Built in AC adapter
- Built-in balancer
- Good performance

- THE BAD

- Limited to 5 amps
- Dean’s adapter not included

CONNECT

MANUFACTURER:	ACE RC
WEBSITE:	www.acehobby.com
PART NUMBER:	ACE2357
STREET PRICE:	\$121.99

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over 300 designs - check it out at www.canomod.com

Images & available

ProTekRC SUPER PRO 40 POWER SUPPLY

High Powered!

WORDS: Brandon Updike

ONE OF THE MOST UNDERRATED COMPONENTS IN A HELICOPTER PILOTS ARSENAL IS A POWER SUPPLY. With the popularity of electrics booming our complicated setups demand the best quality equipment for safety purposes. Not only should you not sell yourself short on purchasing a charger but you should also invest in a quality power supply. Power supplies and chargers go hand in hand and a quality charger 99 percent of the time will require a power supply of some sort. ProTek is known for their line of iChargers so it is only fitting that they develop a power supply to compliment it.



Wow, now we can charge several batteries at once.



INFO

- One primary 40 Amp 4.0mm Banana Plug/ Binding Post output
- Four individually switched 16 Amp 4.0mm banana plug outputs!
- One 500 Milliampere USB Charging Port
- Internal cooling fan
- LED Power Indicator lights
- Short circuit protection
- Overload protection
- Over voltage protection
- Over power protection
- 100% full load burn-in test

FEATURES

The one thing that really stands out about this power supply are that it has multiple outputs to allow for a wide variety of chargers to be ran at once. The power supply puts out solid 40 amps of power rated at 13.8 volts. It uses a typical 110-120V AC input with a power chord. There is one primary output that allows for both a Banana plug output and a binding post output. The primary output can exhibit the full 40amps that the power supply can exhibit. Then there are the four 4.0mm banana plug outputs. These outputs are all switch controlled

and are able to put out up to 16amps of power each. They each also have an LED light to indicate when they're turned on or off. There is also a master power switch that can turn off the whole system at any given time. One unique feature about this power supply is that it has a USB charge function. This is pretty cool since a lot of products now utilize a USB cable for charging. The Pro 40 contains all the typical cutoff safety features that you hope to find in any power supply that includes over voltage, over power, overload protection.

SPECIFICATIONS:

INPUT VOLTAGE: 110-120V
OUTPUT VOLTAGE: 13.8V DC +/- 5%
WATTAGE: 520W
CURRENT: 0-40 Amp
FREQUENCY: 50 / 60Hz
AC INRUSH CURRENT: Cold start: 60A @ 100%

OUTPUT CONNECTIONS:

- (1) High Output 40 Amp 4mm Banana Plug/ Binding Post Output
- (4) 16 Amp Switched 4mm Banana Plug Outputs
- (1) 500mA USB Output

DIMENSIONS

SIZE (LXWXH): 260x190x95mm
WEIGHT: 4.82lb (2.18kg)



Autos

Snakes

Big Bens

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Crack Rolls
Blade Scrapes

Hurricanes

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OF THE YEAR**



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TESTING

We decided to really push the power supply and see how well it performed. We hooked up four chargers to it one of which was a four port Imax Quattro B6 charger. We began charging a 10s 5000mAh on one charger at 1.5c. On the multi port we charged both a 3s2p 5000 mAh and a 6s 5000 mAh at 1c. Overall the power supply was able to hold it together with these three packs charging without much issue. We used a multi-meter to test the output and saw that it was reading a little above 12v's, which made sense because of the battery voltage. We decided to step it up a notch and tried to charge a 7s A123 pack at 1C on a separate charger. This put the power supply over the edge and was able to shut down power to that sole output port. It was nice to see the safety features working the way they should to prevent damage. We used the power supply for just basic charging functions and it proved to be more than enough. It has enough juice to power

any conventional charger to the max and hold its own when charging multiple batteries on multiple chargers. The one gripe I had about it was that the internal fan makes quite a bit of noise. Its not a big deal but can be an annoyance if you like a quiet environment.

CONCLUSION

The Super Pro 40 is a workhorse of a power supply. When you turn it on you know that this thing can put out some power. We really put it through the paces and it proved itself to be good performer. It also comes with a good breakdown on how to calculate battery voltage in relation to the output of the battery supply. It's a good breakdown that will help you understand when you're pushing your power supply to the limit. Even if that's the case it was nice to see the safety features work the way they should. **TREX**

+ THE GOOD

- Big Power
- Multiple ports
- USB Charging Port

- THE BAD

- Noise

CONNECT

MANUFACTURER:	ProTekRC
WEBSITE:	www.amainobbies.com
PART NUMBER:	PTK-PRO-40A-SP
STREET PRICE:	\$149.99



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Never Before Has A Servo So Small Delivered So Big!

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

Maximum Performance at Minimum Weight!



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



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OMI's ELD Fuel Magnet

That tail rotor needs to spin, too!

WORDS: Chuck Bassani | PHOTOS: Jason Boulanger

ASSEMBLE ANY GROUP OF HELI PILOTS, AND CERTAIN DEBATES ARE BOUND TO COME UP. Mechanical mix or CCPM? JR or Futaba? (I always messed up that debate, since I'm an Airtronics guy.) Nitro or electric? Scale or 3D? The list is nearly endless.

Depending on the style of flying preferred, another common item of debate arises over getting the power to the rear rotor. Is a belt-driven tail rotor the best, or is a torque tube head-and-shoulders above the rest? Well, there's an old saying about opinions and... well... you-know-whats, but we can take a look at some of the particulars of these drive systems and see the benefits for ourselves. In this month's Anatomy, we'll dissect the torque tube and see what makes it work.

THE PROBLEM

Helicopters really stress a fuel delivery system. Unusual attitudes, g-forces (both positive and negative), and the normal reduction in fuel volume during flight are all factors that cause the pickup inside the tank to briefly come out of the fuel. This lets air and exhaust fumes enter into the engine's fuel supply line.

One common way to avoid this is to run a 'header' tank. This concept basically uses a 'buffer' tank between the main fuel tank and the engine. The 'header' essentially remains full with fuel until the main tank runs dry. Although this approach works well, it obviously requires installation of an extra tank as well as additional plumbing.

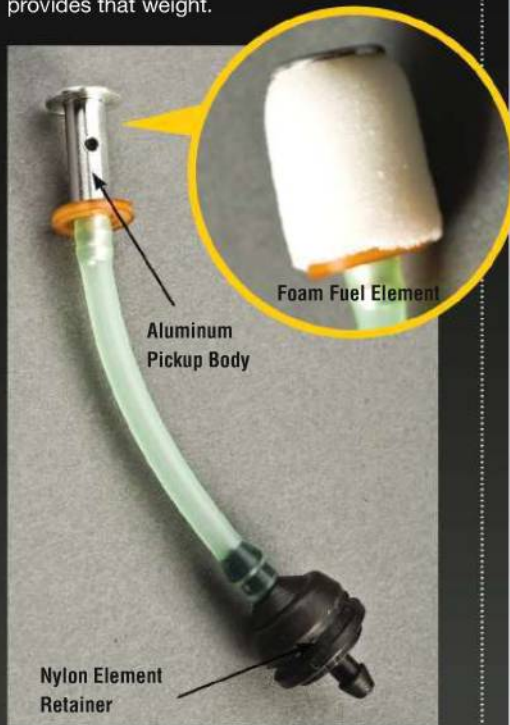
Sponge Bob's favorite job.



ELD FUEL MAGNET

James O'Neal of OMI (O'Neal's Manufacturing, Inc.) came up with a great idea, which is the basis of the 'ELD Fuel Magnet'. The acronym 'ELD' stands for 'Every Last Drop', and this device lives up to that name.

The idea is simple: Use a foam element to surround a lightweight aluminum pickup body. The foam soaks up fuel like a sponge and provides a reservoir for the times that the pickup is not immersed. This reservoir can provide upwards of ten seconds of uninterrupted fuel delivery. Another feature of the Fuel Magnet is that it doesn't rely on a heavy clunk to keep the pickup immersed in fuel. The fuel soaked element naturally provides that weight.



The element is made from unique fluid management foam which is specifically designed for this type of application. To maintain optimum performance, proper care of this element is essential.

» RECOMMENDED CARE OF THE ELD FUEL MAGNET

The online forums are littered with testimonials of Fuel Magnet failures. I believe just about every one of them can be attributed to improper care. To ensure proper operation and long life, the following guideline should be adhered to:

- **FILLING THE TANK** – Whether using an electric or manual fuel pump to fill the tank; do not use a high pressure model if you're filling the tank through the Fuel Magnet. This can deform or possibly even puncture the element. Using a dedicated fill line is the ideal situation.
- **IMMEDIATELY REFILL THE TANK** – Nitro fumes are caustic to the foam element (and your fuel lines for that matter). Refilling the tank immediately after flight purges those fumes. Keeping the element immersed in fuel also prevents it from drying out. As previously stated, the foam contains no materials that can harm the engine, but if you let it deteriorate it can clog your fuel filter and possibly cause a lean run. Use fuel line pincers on a lines coming and going to the tank. This prevents the fuel from leaking out of the tank during transportation.
- **REPLACE THE ELEMENT EVERY SEASON** – During aggressive flight, the element will rub against the inside of the tank. Not all tanks are smooth, so the outside edge (closest to the aluminum flange) can wear; reducing the element's fuel storage capacity. Therefore, it's a good idea to replace the element every season or at first sign of wear.



The one that is orange has the fuel in it.

CONCLUSION

I've been using ELD fuel magnets for years. I'd like to point out that the foam element in my TRex 600N is going on its fourth season—a firsthand testament to how proper care of the device contributes to trouble free operation. The bottom line is this: The Fuel Magnet really sucks (every last drop of fuel out of your tank, that is). www.oneals.com
Happy Flying ...*[TBL]*

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ROTARY TOOLS

You spin 'round, right baby, right 'round.

WORDS: Brandon Uptike

WE USE A WIDE VARIETY OF TOOLS FOR HELICOPTERS, SOME MORE THAN OTHERS. One that stands out but never gets a lot of recognition is the Rotary Tool. One company in particular has been the face of rotary tools – Dremel. Even though other brands make rotary tools, the name Dremel has become so synonymous that it's used as a verb to describe its actions (for example, “you need to Dremel that sideframe.”) There really isn't any tool like it, and if you're in this hobby long enough you'll find yourself using one eventually. It's an effective tool that can be applied to several different applications.

» WHAT IS A ROTARY TOOL?

A ROTARY TOOL IS A HANDHELD DEVICE THAT RELIES ON A SPINNING ACTION WHILE THE HANDLE REMAINS STATIONARY. THERE IS AN ELECTRICAL MOTOR INSIDE THE CASING THAT ROTATES A CHUCK AT THE END OF THE TOOL. THIS ALLOWS YOU TO FIT SEVERAL DIFFERENT TYPES OF BITS TO ADDRESS DIFFERENT NEEDS.

➡ One of the main differences between a rotary tool and a drill is the way it gets its power. Anyone familiar with a power drill will see that the bit does not spin at high speeds, but it has a lot of brute power. This is due to the large amounts of torque available from the drive motor.

A rotary tool, on the other hand, **relies mainly** on speed rather than torque to **perform its** job. Rather than having to torque a screw or drill holes, the rotary tool focuses on grinding, which relies more on speed. Applying a great amount of pressure to a rotary tool will cause the motor to stall. Most rotary tools are small in size for easy transportation and boast several different features.

Most rotary tools are available in nice carrying cases with space for different attachments and bits.



WHAT IS IT USED FOR?

From my experience with helicopters, a Dremel is used when I run into trouble and serious measures are called for. I've had incidences where cutouts in the frame weren't lined up properly, resulting in minor modification for extra clearance.

The possibilities are limitless with a Dremel. If something needs to be shaved or cut, a Dremel is the first tool I turn to. I've also noticed that it comes in handy with stripped bolt heads. By cutting a notch in the bolt, you can torque it out using a flat head screwdriver. Dremels also come in handy with any kind of plastics. They are widely used on plastic canopies to clean up the sloppy cuts you did with the Lexan scissors (we've all been there). You can also use them to grind down burrs on plastics, making them smooth, or you can even use it for buffing aluminum parts for a shiny finish. It also works well when cutting down bolts if they are too long.



ROTARY TOOL SAFETY

When using a rotary tool always use caution. A good pair of safety glass and dust mask should always be worn. When cutting materials such as fiberglass or carbon fiber, long sleeves and protective gloves are highly recommended to prevent the dust from irritating the skin. Use common sense and good judgement when selecting the proper RPM for the job.



CONCLUSION

Rotary tools can be used for many different things and every pilot should have one. They're even small enough to fit in most field boxes. You never know when you'll need a Rotary tool at the field, but I've personally seen the opportunity arise. It's another one of those nice tools that makes life a little bit easier at home and at the field. **REI**

FEATURES & ACCESSORIES

There are a wide variety of bits for rotary tools. If your need requires carving, cutting, polishing, sanding, routing, or grinding, there is a bit specifically designed for it. The most widely used in the RC helicopter world are the cutting wheel and grinding bits. Grinding wheels are thin fiberglass reinforced wheels. When spun at high speeds, they can cut through a wide variety of materials.

Rotary tools come either corded or battery-powered versions. Newer models are even supplied with Lithium-Ion batteries. All of them have adjustable speeds to accommodate different applications.



In this hobby, Dremel is synonymous with a rotary tool; kind of like Kleenex is to facial tissue.

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TRIM YOUR NEW HELICOPTER

Just a little off the top please

WORDS: Brandon Updike

TRIMMING YOUR HELICOPTER IS ONE OF THOSE MINOR TASKS THAT CAN COMPLETELY CHANGE HOW YOUR HELICOPTER FLIES. A poor setup will result in a bad flying helicopter with interaction issues. Flying a well-trimmed helicopter is a pleasant experience. Having proper trim on your helicopter starts at the beginning of your assembly. It then transitions to finely tuned field adjustments. In this How-To, we'll discuss the proper way to trim your new helicopter.



Ryan's mom is a hair trimming expert!

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

1.0 *RC-Heli*

» TIME TO COMPLETE

 **5** Minutes

» TOOLS NEEDED

-  ■ **HEX WRENCHES**
-  ■ **BALL LINK PLIERS**
-  ■ **BALL LINK MEASURING TOOL**
-  ■ **GOOD PAIR OF EYES**

ALL ABOUT THE SETUP

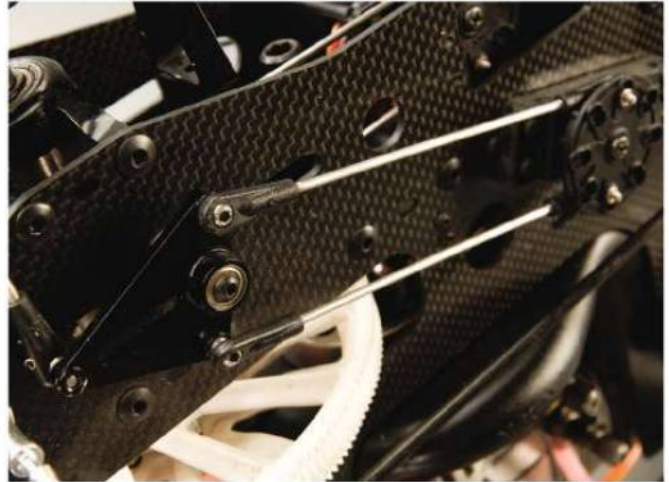
Take a look at your swashplate and bellcranks during assembly. This will be the first indication of whether or not your helicopter will be out of trim. Ideally, you want your helicopter to have bellcranks angled at 90° and a swash that is completely level at zero degrees of pitch. In a CCPM helicopter it's especially important, since proper geometry is key to eliminating control interaction.



1 Fit the servo wheel to the output shaft when your helicopter is set at 0° pitch. The servo linkage should come off the servo arm (or wheel) at a 90-degree angle relative to the servo's output shaft. This will allow for equal travel on both ends of movement. Sometimes it won't be perfect, so you might want to use some subtrim to get it completely centered. If you want to adjust it mechanically, use a horn drill gauge to mount the linkage ball in the perfect position. The manual will give you a proper distance away from the center of the servo arm for the linkage ball. Leave your helicopter on when screwing the horn to keep the servo from turning.



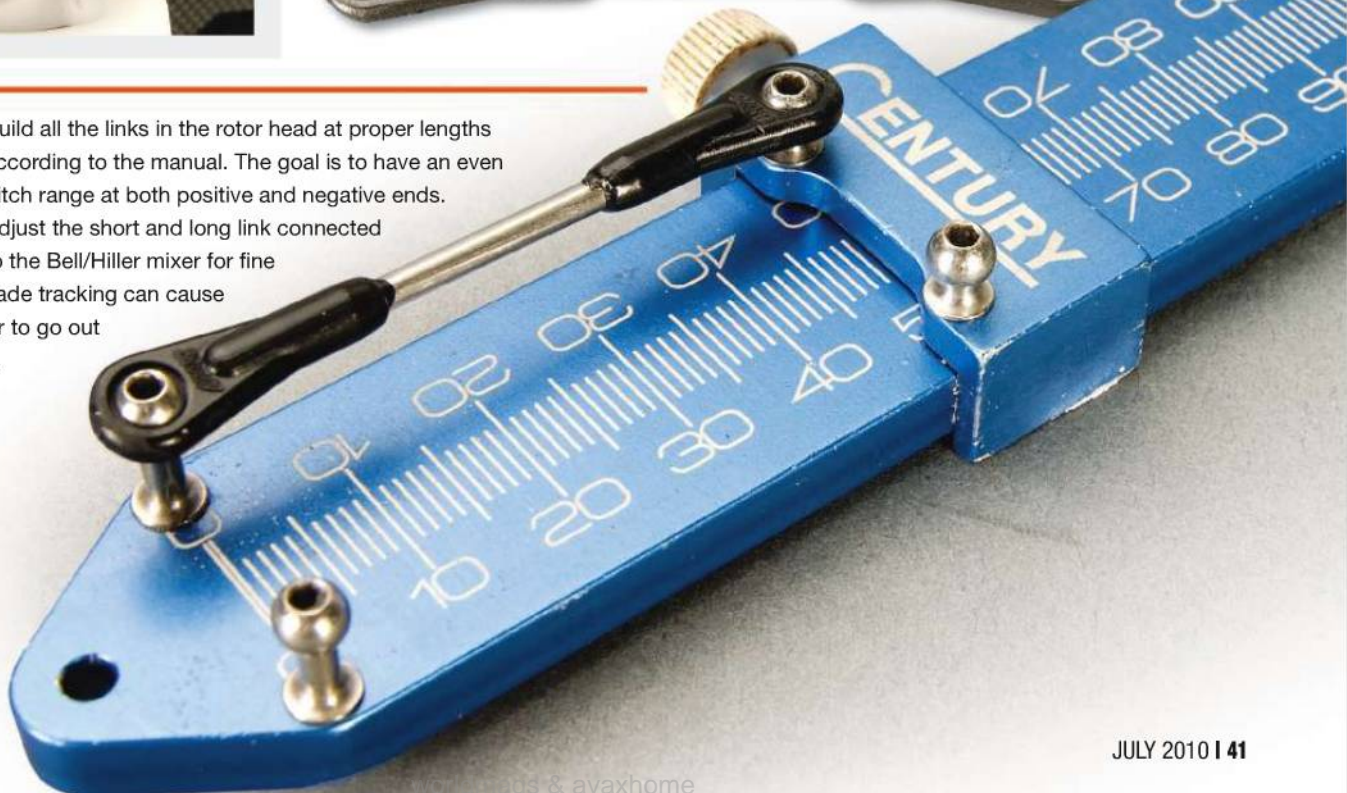
2. If using a push-pull setup you'll want to make sure that your pushrods are of equal length. When adjusting push-pull links you'll need to make opposite adjustments; when you increase the length on one you'll decrease the length on the other.



3. The links going to the swashplate need to be of equal length. The manual will give you a baseline measurement for these linkages. If your swashplate is still crooked even with matching swash linkages, then most likely something is skewed from the bellcrank back to the servo horn. Check the servo horn and adjust the push-pull links until the swash levels perfectly. In most cases, if your bellcrank and your servo wheel are both centered perfectly then your swashplate will follow suit. A "direct connect" swashplate has no bellcranks in the system, you'll adjust the linkages from the swash to the servo. Even with the servo horn centered the swashplate can sometimes still be crooked. Adjusting the three swashplate links won't harm the setup, and will result in perfect swash trim.



4. Build all the links in the rotor head at proper lengths according to the manual. The goal is to have an even pitch range at both positive and negative ends. Adjust the short and long link connected to the Bell/Hiller mixer for fine tuning. Bad blade tracking can cause your helicopter to go out of trim as well.



Remember the 90° rule!

5. Check your swashplate at the negative, zero, and positive range for any kind of interaction. If you are a little off, use travel adjustments to make any corrections. Just remember to use opposite channels when it comes to positive and negative adjustments. For example, if you adjust the aileron subtrim you'd have to make opposite adjustments to the pitch servo to keep the swashplate from moving up or down.

NEGATIVE



ZERO



POSITIVE



6. Setting up a mechanical pitch helicopter is easier in concept than a CCPM helicopter. You'll still want your linkages to be at 90 degrees to the servo arm at zero degrees of pitch, but if your swash is crooked you can just merely adjust the link attaching to the swash level it off. It doesn't require the same amount of precision that a CCPM setup demands. Be sure to follow the manual for all the proper linkage measurements.



The Thunder Tiger Raptor is a mechanical pitch helicopter that uses separate servos for each function.

7. Now that your helicopter is ready to fly, perform a bench test to make sure that nothing is binding and that everything is in working order. If you followed all the steps above, your helicopter will be very close to perfect trim. When you take it up for its first hover, keep it in a stationary spot and feel if the helicopter has a tendency to drift in a certain direction. If it has a small drift you can compensate with minimal inputs of digital trim. Digital trim simultaneously trims all three servos. Remember that you'll have to trim it in all flight modes if digital trim is used. If a large amount of trim is required (more than 10 clicks), then something is wrong and you'll need to go back over your setup.



! TIPS: It's important to feel your helicopter out when you first fly to check for any trim changes. If your helicopter is severely out of trim since the last time you've flown, then you might have a major issue. This can be caused by a failing servo or a faulty servo horn. Land your helicopter and perform an inspection.

Check for swash interaction.

CONCLUSION

Now that you know how to set up and trim your helicopter, your first flight will most likely not be that stressful. Setting up your helicopter to be as predictable as possible is the safest way to fly. Just be sure to check out the helicopter before each flight. **TIP!**

Ultra Compact Frame TECHNOLOGY



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



VELOCITY 50



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► 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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BEST HELI APPS

Very App-etizing

WORDS: Jim Innes

I Appologize:

UNLESS YOU HAVE BEEN LIVING UNDER A ROCK, YOU ARE WELL AWARE OF APPLE INC.. APPLE, once just a focused computer company, took the world by storm with its release of the initial iPod some years back. In 2007 they released the iPhone, which in three short years has become arguably the most popular cell phone in the USA. The iPod Touch soon followed. To add to its touch screen devices, Apple™ released the iPad earlier this year. Chances are high that nearly every person reading this article owns or has access to one of these devices in their home. With so many of them out there, it was only a matter of time before heli guys found and created ways to utilize them in the hobby.



WHAT ARE APPS?

Beginning with the iPhone, Apple started offering "apps" (applications) from its iTunes App Store. Apps are simply defined as software downloads that are used to fulfill a purpose on the device. Some apps are used to take notes, others to look up movie show times, and many are games or other diversions. Over the last few years a number of apps have been written specifically for radio control enthusiasts. Some of these are free, while others have a minimal cost involved. As time moves forward I suspect we will see more and more heli apps developed.

MY TOP TEN HELI RELATED APPS

In my research for this article, I downloaded dozens of apps that I thought may benefit me as a RC heli enthusiast. In my case, I used an iPad as my test device, but the majority of the apps listed are also compatible with the iPhone or iPod Touch. I have whittled the list down to the ten that I found the most useful for someone in our hobby (not listed in any particular order):



Hey we reviewed the Heli Tach in a previous issue.

1. "Safari" - Apple - cost: FREE. The built-in web browsers on the iPhone, iPod, and iPad are all based on Safari. As far as mobile devices go, these web browsers are near the top in handling all kinds of web content (Flash excluded, of course). The reason I put the browser on this list is simple: information at your fingertips. Being able to visit a heli forum or website for answers at any time or in any place is invaluable. I have seen quick web searches at the field save flying days for some pilots.



2. RCLogbook - Clever Tangerine Software - cost: \$4.99. RC

Logbook is one of the first RC apps created for the iPhone. This app has grown over time to be a fantastic tool for keeping track of all your models and flight batteries. It also keeps track of the number and duration of

each flight with its built-in timer function. All data is exportable to view in a spreadsheet on your home computer. Though the app was built with electric flight in mind, it still works as a great flight log tool for nitro birds as well.

3. Heli Tach - Jacob Niehus - cost: \$3.99. The

Heli Tach is one of the most exciting apps in the hobby. It's specifically designed to measure head speed on our models without the need for an expensive tachometer or another person to assist. It estimates head speed using acoustic algorithms, translating what it hears from the heli into a very close estimation of headspeed. I found it quite accurate with all my electric models and reasonably close with my nitro helis. If you don't have access to a tach, this app might be right up your alley.



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THE IPAD ROCKS!

As a previous iPhone user and tech-junkie, the initial release of the iPad did not intrigue me as much as you might think. I saw it as an overgrown iPod that was kind of a gimmick. Even with all that, there was always the geek side of me that wanted one, but I just didn't have reason to get it. When this article assignment came around, the geek side won out. I became an iPad dork.

Having had the iPad for a little while now, I must say that my thoughts and views on the device have changed drastically. The speed, screen size, clarity, and fantastic battery life make the device completely useable for so many things that the smaller devices aren't designed for. Things like apps to watch your Netflix queue, others to read books and magazines in perfect clarity, and even some that allow quick photo edits really make the iPad a neat device.

One thing I have found since getting the iPad is that my laptop is only now used when I have to do work with a specific program. All my electronic communication, news reading, browsing, video watching, etc. is now all done using the iPad. If you have been considering one, go for it – you'll use it much more than you think.

Did you know that the Heli Tach is available on the Android Market now?



4. RCtoolbox - Patryk Cleslak - cost: \$1.99.

This is a very new RC app and has a lot of potential with some updates. It lets you keep track of all your models, as expected, but it also adds the ability to GPS tag all your flying sites. One of the best features of the app is the built in email tool that allows you to send your model and field data to any email address. This is a cool feature when you find a new place to fly and want to let all your buddies know right away.

5. PitchCalc - ic engineering & research - cost: FREE.

This free app is a great tool for figuring blade pitch. You simply set the rotor blades at full stick, fold them back until they line up and measure the vertical space between them at the tips. Enter this data and the blade length into the app and the blade pitch is displayed. It is quite accurate in my tests, and it is free!



6. Weather Channel - Weather Channel Interactive - cost: FREE.

A weather app is a must for rotorheads. The weather can be a heli pilot's worst enemy or best friend. On those days when the weather is iffy, an app like this with its built-in radar maps and other tools can give you a heads-up on what's coming. At a funny last year, the info from this app allowed me to get my gear put away just minutes before a fast moving storm came rolling in.

7. RC Heli Gold - Ethernvision - cost: \$2.99.

This is a heli game that has you fly an RC helicopter in various scenes and races using virtual radio sticks on the screen. It is quite fun to fly the little heli around on the screen. Though not a useful tool, it is a great diversion for heli addicts!





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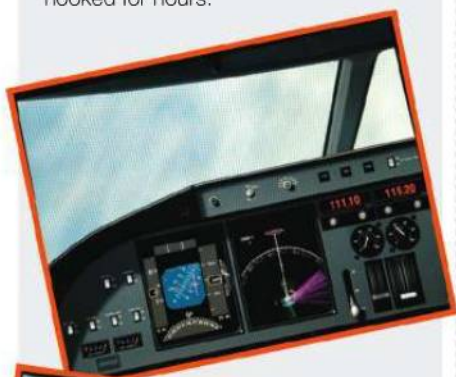
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8. X Plane (iPhone Helicopter version or the full iPad version) - Laminar Research - cost: \$9.99.

Laminar research specializes in full scale simulator software, which is something you can see in their simulators for the iPhone and iPad. The aircraft are realistic, react to weather, can be stalled, etc. Also, you can view the working instrument panels in flight. Though this app will not teach you to fly RC helicopters, the fantastic controls and sceneries will keep a rotorhead hooked for hours.



10. Photogene - Omer Shoor - cost: \$1.99 iPhone/iPod, \$3.99 for iPad version. Photogene is a brilliant photo editing tool that runs on your mobile device. Though not heli specific, many heli guys are also into taking photos at the field, and this app allows you to make some moderate edits to a photo before uploading to the site of your choice. The iPad version is fantastic on the large screen and does some great basic photo processing.



9. Zinio Reader - Zinio - cost: FREE. The

Zinio app allows a user to read from any of their Zinio magazine subscriptions right on their device. Besides being home to your favorite RC helicopter magazine, Zinio is home to thousands of other titles. I must say that RC Heli Mag looks fantastic on the iPad and it's fun being able to carry multiple issues around with you.



Simulator meets iPad. NICE!

A COMPLETELY UNTAPPED MARKET

In my research I did not find any heli manufacturers that currently have an app available for mobile devices. I suspect that with the proliferation of programmable electronics now flooding the market, we should see some of these companies taking advantage of the app idea to create useful programming interfaces to use in the field. Can you imagine being able to simply plug your phone into your heli's ESC or gyro unit (or even make a Bluetooth connection) and making any edits needed on the fly, wherever you are? I would gladly pay a few bucks for such an application, and I am assuming many of you would, too.

CONCLUSION

An iPhone, iPod, or iPad loaded with the right apps can be a fantastic tool. Even if none of the apps interest you, the idea of having instant access to online forums and hobby shops while at the field can be a lifesaver when you need to find an answer or make an order after a crash. Something like this was unheard of just a handful of years ago. I am excited to see how heli manufacturers will take advantage of these devices to better the way in which customers interact with their products. If you have found apps that are really useful to you in the hobby that I have not mentioned, please visit the RC Heli Mag forums at www.rchelimag.com and tell us about them. See you at the field! **TIR!**

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REGULAR GUY

REGULAR GUY INTERVIEW


with

JIM GRIFFIN

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

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

PILOT INTRO

 Our pilot this month is Jim Griffin of Birmingham, Alabama. Jim was recommended for this interview by his brother Phil. Phil showed a lot of admiration for his brother and what he does for those in the hobby. Jim is the type of guy who loves to help someone start out and see them succeed. By the usual standards, Jim got into helicopters much later than most, in fact when I first contacted Jim about the interview, one of the things he wrote back was "At age 66 I'm probably a bit older than the average guy who gets addicted to RC helis".

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

JIM: My life is all about flying. I'm a commercially rated fixed wing and helicopter pilot. My day job is directing the Southern Museum of Flight in Birmingham, AL. I have a lot of time in experimental aircraft and have owned two full-scale helicopters, a TH-55 and a S-300. My dad was a career Navy officer and I have been around planes and helicopters all my life. I'm married and have a son and two grandchildren. I belong to the Alabaster RC Club and the Birmingham RC Helicopter Club.

RCH: HOW DID YOU GET STARTED FLYING RC HELIS?

JIM: I started flying RC planes three years ago and quickly found that RC helis are far more interesting. They are technically more complex, more challenging to fly, and require 100% of your attention. My first helicopter was a T-Rex 450. I loved

that little bird. The learning curve was like standing at base camp and looking at the top of Mt. Everest. It was one of the most demanding things I have ever tried to master. RC helicopters are every bit as demanding as learning to fly the real thing. I was fortunate to find mentors like Bill Kervaski and Joe in the Birmingham RC Helicopter Club.

RCH: WHAT ARE SOME OF THE MANEUVERS YOU ARE CURRENTLY WORKING ON? WHAT ARE YOUR FAVORITE FALLBACK MOVES?

JIM: I love doing inside-outside Cuban 8's, transitioning to a rolling vertical climb, continuing the roll on the way down and using the momentum to enter a reverse





In the future, I want to improve my 3D flying and enter more scale competitions with my 50-size MD 530.

RCH: THANKS FOR YOUR TIME, JIM, AND FOR YOUR HELP IN THIS HOBBY!

CONCLUSION

Sounds like Jim lives an aviation nut's dream life! Being able to fly full scale aircraft and also work in a museum where you can share the joys of flight with the next generation must be very fulfilling. It was only natural that a guy like Jim would eventually find out how great this hobby is and then start sharing it with others. Keep up the good work Jim! See you at the field! *TIBL*

tail-first loop. I like to do rolls and tail down and sideways tic-tocs. I'm working on tail down Funnels.

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

JIM: Buy a good simulator and practice every day. Learn to hover tail-in, nose-in, and left and right. Get the basics down pat before heading to the field. Start with a good helicopter, and skip the low dollar, fly-me-now machines that waste your time and money. Don't be afraid to ask for help from local hell flyers. Crashing is part of the game and rebuilding will lead to better understanding.

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

JIM: Flying RC helis is a great alternative to flying full scale planes and helicopters and much less expensive. It's every bit as much fun and just as much of a challenge as the full scale helicopters.



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DEMYSTIFYING THE THREE NEEDLE CARBURETOR

Three are better than two

WORDS: Aaron Shell



RC HELIS PRESENT A HUGE CHALLENGE FOR INTERNAL COMBUSTION ENGINES. Not only do we demand a crazy amount of power, but it has to be properly regulated. Most engines—such as those for an RC car or airplane—rev up and down with torque requirements. Unlike cars and planes, RC helis attempt to hold the same RPM, while the amount of required torque changes. Because of these demands, RC heli carburetors differ from those made for other applications. A three-needle carburetor offers the best tuning throughout the throttle range, but tuning can be confusing and mistakes can be costly. Understanding why manufactures put three needle carbs on their engines will help you decide if you need one, and understand how to go about tuning it.

UH OH, Aaron's back!

» SKILL LEVEL

SCALE RATING: 1=EASY 5=ADVANCED

2.0 *RC Heli*

» TIME TO COMPLETE

 **20** Minutes

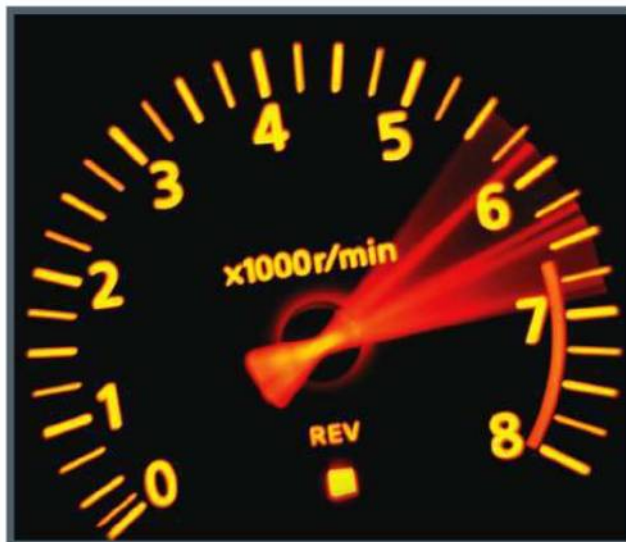
» TOOLS NEEDED

-  ■ FINGERS
-  ■ FLAT HEAD SCREWDRIVER

WHY THE SAME RPM?

We go to great lengths to keep the RPM the same on our model helis. Keeping the RPM consistent is one ingredient to predictable control response, so even for beginners

it's very important. Advanced pilots rely on consistent RPM even more as the torque demands change rapidly in fast paced 3D maneuvers. Electronic governors or rev limiters are often added to do the job automatically, but with a fuel powered heli none of the fancy electronics will work unless the engine is properly tuned.





WHY WOULD YOU WANT THREE NEEDLES?

A needle valve provides precise metering for the fuel flow going to the engine. With a tapered tip, the needle restricts flow as it is threaded in or out of the carburetor. In most applications there is a "main" needle that regulates the fuel flow coming directly off the fuel line. Most RC car and airplane engines have two needles, a low end and a high end. In this case, the low end adjusts the transition from low to mid-range, and the high adjusts the mixture at full throttle.

With a two needle heli carb, the situation is similar except that the low needle must be tuned for both the transition from idle to mid-range, as well as the mid-range when the head is spooled up and unloaded. If you have a two-needle carburetor engine with the high end already set correctly, and your engine loads up during transitions and loses head speed, your only option is to lean out the low end. You may find it's not practical to lean the low end enough to satisfy the mid-range needs without making the transition too lean from idle. While getting the low end set as well as possible with a two needle carb, it's somewhat common to see a bit of extra smoke during transitions in aggressive maneuvers as the engine gets momentarily too rich. This is where the third needle comes in. Adding a third needle to the mix can reveal hidden power as you tune the engine's mid range.

WHAT DOES EACH NEEDLE DO?

LOW NEEDLE

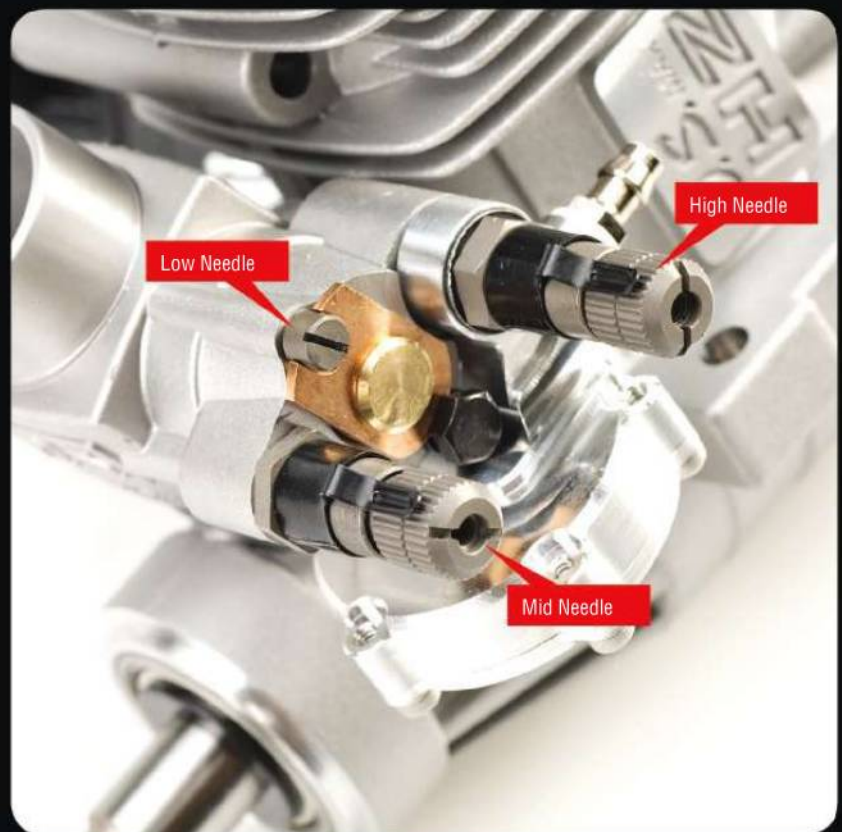
Located either inside the throttle barrel or as a cam adjustment on the body of the carburetor, this needle does not actually control how low the idle is or even the idle mixture. Its purpose is to adjust the transition from the idle up through the RPM range to get the rotor head spooled up. During this phase, the torque demands are high, and the fuel flow is adjusted rich to compensate.

MID NEEDLE

When the rotor head is spooled up and unloaded, the mid-range needle will affect the mixture. This needle is tuned far less frequently, and should be adjusted with care to avoid getting too lean. The engine is spooled up the entire time while on the mid-range needle, but it's only implemented when the engine is unloaded. During this time, the engine has low torque demands despite the high RPM, and the mid needle can be leaned to prevent this mid-range from becoming excessively rich and bogging down the engine. These situations happen any time there is a transition from positive to negative pitch or when the rotor head is near zero pitch, such as on the down side of a loop, the middle of a Tic-Tock, during a tail slide, etc.

HIGH NEEDLE

This is the main needle and adjusts the flow of fuel directly into the engine. During climb outs or aggressive maneuvering, the engine is demanding full RPM with high torque loads. When the engine is running wide open, this needle will affect its operation. However, any adjustments made to this needle will affect the entire RPM range.



Hey three needles are better than two.

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1. Dominik Hägele



3. Eric Weber



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3. Eric Weber on their First, Second,
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HOW TO TUNE

Like any nitro model engine, the smoke coming out of the exhaust is your number one indicator of the engine's tune. You should also pay close attention to the temperature. If you have a temp gauge, most heli engines should be kept around 190 degrees during operation, but consult your engine's manual. Begin with the factory suggested settings if possible. These settings can vary wildly from engine to engine, so it would be pointless to suggest baseline settings in general. Start with factory settings; the needles will be safely on the rich side if you start there. If your engine is new, you'll need to keep it extra rich for the first few flights during the break-in cycle. Keep in mind that any changes made to the high-end needle will affect the entire range, so there will likely be changes to the other needles as well.

NOTE-

All adjustments should be made in small increments (one or two "clicks", or a few degrees at a time) and care should be taken to avoid going too lean. You can always err on the rich side, but don't ever let your engine get too lean or damage will occur very rapidly. You should follow these simple steps for every flying session to compensate for changes in the atmosphere.

Ya, he is back and better than ever.



1. LOW NEEDLE

Spool up the helicopter from an idle and pay close attention to the exhaust. If the engine dies or has minimal smoke, the low end is too lean; richen or "fatten up" the low end. If the engine sputters and/or spits out a bunch

of oil with the smoke during the transition from idle, lean out the low-end slightly. This adjustment should be made with the governor turned off, if you have one.

2. HIGH NEEDLE

Get the helicopter up in a hover. If at this point the smoke is noticeably thin, land and richen the mixture. Perform a climbout



and adjust the high needle so there is a nice smoke trail with good power. This adjustment is made at full-pitch, but be cautious not to overload the engine. Once again, this setting is made without the governor on.



3. MID NEEDLE

Once your engine is close enough to start getting a little more aggressive, turn on the governor if you use one and set it to hold the headspeed you want in a hover and climb out. (If you don't use one, now is when you should be working on your throttle curves.) Perform some Tic-Tocks, Rainbows, or something you are comfortable with that unloads the head for a moment. If the engine loads up, slows down, and puts out an extra puff of smoke during the transition, lean out the mid-range needle just a bit. If the headspeed fluctuates up and down, if it loses the smoke trail, and/or speeds up during the transition, fatten up the middle. Try to perform your test with the same maneuver every time so you know what to expect. Go back and forth between this test and the climb out test for the high needle before you are done to be sure that your settings are correct.

DO YOU NEED AN ENGINE WITH A THREE NEEDLE CARBURETOR?

If you know your way around a two needle heli engine and can tell when the engine bogs during your 3D flying, you should consider getting an engine with a three needle carb. If you aren't comfortable tuning a two-needle carb, a three-needle carb is going to be a huge challenge. Three-needle carburetors allow the pilot to tune the engine for maximum performance. Tuned correctly and with the use of a throttle governor, they deliver consistent RPM throughout the changing demands of a wild heli flight and allow the engine to load and unload properly without bogging down or leaning out. *TRH*

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TAIL TUNING LIKE A PRO

Your Comprehensive Guide

WORDS: Eric Brandenburg

PIROUETTING MANEUVERS ARE WIDELY CONSIDERED SOME OF THE HARDEST THINGS TO LEARN WITH AN RC HELI. It's very critical when learning this new segment of flying that your heli has a tail that holds well, pirouettes without whipping, stops well, changes direction effectively, and doesn't load up the motor more than necessary. It sounds like a lot of work, but when you know what to look for it's really very simple.

The difference between a good tail setup and a bad one is night and day, and you will notice that the more confident you are in the performance of your tail system the more comfortable you will be in flight. The tail is a crucial aspect of setup and many overlook the finer points.

SETTING IT UP

The first thing you'll need to do when setting up your heli for maximum tail performance is to perform a thorough inspection of all of the moving parts. For a new heli, simply building everything according to the manual should do it. Make sure that any thrust bearings in the tail blade grips are greased and installed properly.

Aside from making sure that the tail is built correctly, you should also check to make sure that the tail shaft and tail rotor hub are not bent. The final critical components for a good mechanical set up are the tail pitch slider and the tail linkage system. If your heli has a boom-mounted tail servo, make sure that the servo is



A loose screw can make all the difference in proper tail control. Make sure your screws are attached with thread lock.

tight on the boom and doesn't shift under force. Also, make sure that any tail pitch bellcranks on the frame are secure and have thread locking compound on the bolts. If the bearings in the tail bellcrank get sloppy, replace them. Any unwanted play here will decrease tail rotor precision. The tail pitch slider should also be inspected to be sure that the bearings are smooth and that all of the moving parts move freely. Any binding will cause an increased load on the tail servo.

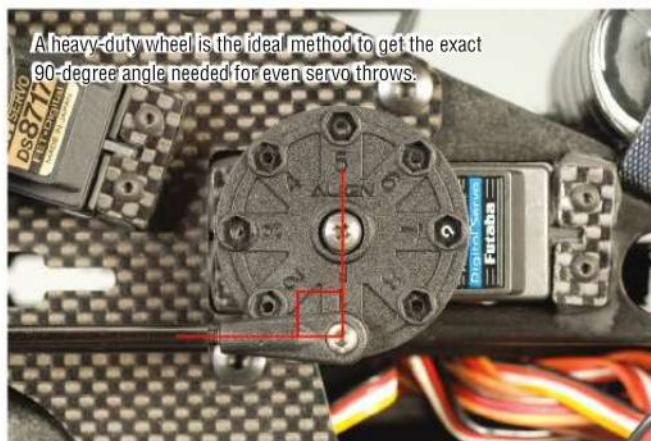
Luckily, the rest of the setup process is much less time consuming. First, make sure that your tail linkage is set to the length recommended by the manual for your particular helicopter. These settings might not be perfect, but they will get you close enough to start with. Ideally, you will want your links set up so that when the servo is centered, your tail blades will have roughly 5-7 degrees of corrective pitch. This will give the tail a natural sense of center to start with, which you will fine tune later.

If you have a boom mounted servo, this is as simple as moving the servo itself, but with a frame mounted servo with a bellcrank, you'll need to keep the bellcrank centered so that you don't have more throw one way than the other. That means that you will need to adjust the long linkage going down the boom to get your center position. Keeping throws even on the tail is critical if you are interested in piro reversing maneuvers.

The final component of the mechanical setup is the servo arm selection and ball distance from center. In general, the best type of arm would be a heavy duty wheel. These allow you to drill custom holes, and you can also make sure that the ball will line up at an exact 90 degrees to get even servo throws. Heavy duty wheels can also take more of a load without flexing. With the proper servo arm/wheel you can adjust the ball distance from center for the best resolution from the tail servo. For a heli using a full size tail servo, it's recommended to place the ball roughly 13-17mm from the center of the arm, and for smaller servos figure about 7.5mm. As long as you can still get enough throw, it's better to go closer in with the ball position. The higher you can get the servo limits in the gyro the more gain you can run, and the better it will perform.



To start out, you will want your links set up so that when the servo is centered, your tail blades will have roughly 5-7 degrees of corrective pitch.



A heavy-duty wheel is the ideal method to get the exact 90-degree angle needed for even servo throws.

Too late, it belongs to the Fury 55, from issue 45.

GYRO

To make adjustments in the gyro, the first things you will want to set are either the servo type (if your gyro can do it) and the direction. Some gyros—such as the Spartan Quark—are very versatile in their ability to use many different types of servos, whereas some less expensive gyros are internally programmed to run only one type of servo (based on the pulse width of the servo and its update frequency specs). All you need to do is follow your particular gyro's manual and be sure to set the servo type to match your particular servo. If your servo is not listed by the gyro manufacturer, just look

up the specs of your servo (pulse width and frequency), and pick another servo on the gyro that has the same specs. To set the direction of the gyro, make sure that when the heli is on and you move the tail to the left or right, the tail blades should give pitch to pull the tail the opposite direction to the movement you made. If they give pitch in the same direction, the gyro is backwards, and you need to reverse it.

The final step is to set your tail servo endpoints in the gyro and you will have a working and flying tail. Depending on your gyro, you'll either use your radio's



programming or an adjustment on the gyro itself to get the endpoints as close to each other as possible and at or above 100%. (This ensures that you're using the servo's maximum control resolution, which yields better performance.) It's also very important that you get every last bit of travel on the tail shaft possible without binding.

Now that the limits are set, the tuning and tweaking begins. The first tuning option most people learn how to use is the gain adjustment. The general rule of thumb is to run the gain as high as you can get without getting any "wagging" on the tail in a hover. There is no magic number, it is usually somewhere between 30-50% gain.

To tweak the gain in the air there are a few simple tests I use. The first is a simple full collective pump from a hover. If the tail starts to drift as the heli climbs or blows out all together (rotates without input) it usually means that the gain is too low. If the tail wags as the heli climbs, it means the gain is too high. When changing the gain I usually go in increments of 5% at a time and will then fine tune it further in smaller increments. To fine tune the gain setting, do a very fast Funnel and watch the tail while the heli is flying sideways. If the tail wags in fast sideways flight then the gain is too high; you should lower it until the wagging goes away. It's best to lower it gradually and only take out as much gain as needed to get rid of the wagging.

The final basic tuning ritual is to make sure that in Normal mode on the gyro that the tail is trimmed well for a hover. You can mechanically adjust your tail linkage to set this, or some gyros will have an electronic adjustment.

This is about all of the tuning most people do, but if you are looking for that last 2% of performance (and you should be!) there are a few other options in most gyros available today that you can tweak to match your particular flying style and helicopter.

Most high-end gyros have options for in-flight feel such as expo, stopping gains, stick deadband, and other features.

Exponential ("expo") is an adjustment which alters the response curve of a control around the servo's center point. For my style of flying with lots of reversals, expo causes a softer feel around center that makes it harder to maintain a consistent pirouette rate during sustained



This picture shows the end point adjustments being made.



Don't allow the tail blades to over rotate or they can lock up in flight and cause an out of control piro rate.

piro maneuvers. For some, however, it gives a softer feel that allows you to have a smoother tail at center for better tracking in fast forward maneuvers.

The next options to tweak are the stopping gains. These settings allow you to change the way the tail stops pirouetting when you return the stick to center. If your heli has a belt drive the default settings will work fine; belts are a bit more rugged and can withstand overly aggressive stops. For a torque tube tail, however, if the stop gains are too high the tail may stop too aggressively and can possibly strip tail gears. I usually leave these alone and run the stock settings on my heli's, but on

some machines you may get an unwanted "tail bounce" or wagging effect when you return the stick to center after pirouetting. Turning down either of the settings will soften the stops and eliminate the bounce effect when set properly

That about covers all of the programming options in modern gyros for flight performance. Some gyros have similar settings but under different names, so you'll have to look through your manual to be sure of what you are changing. You can experiment with these and change them to your liking to get the tail to fly comfortably for your skill set and style.

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TAIL BLADES

Tail blades, like almost everything else about your tail system, is fairly style specific. Certain tail blades may have less drag for better engine loading, some may have different tip designs to aid in holding power, and then there is the choice of materials (plastic or carbon fiber). Most 600-size helis run 92-95mm blades (but some can go up to 105mm), while 700-size helis usually runs 105's or larger.

For a given blade design, a longer tail blade will give you more tail authority. This will allow the tail to hold better, piro more consistently, stop harder, and feel more locked in. The only thing to worry about when running a longer blade is that the overall disk is larger, so you will likely load the engine more with tail inputs, and you will lose ground clearance which may lead to physical damage. The best option would be to run the smallest tail blades that you can get away with. Shorter blades will not perform as well as longer ones for very piro heavy flying styles, but it all depends on how you like to fly. Fly as many different types of blades as you can and decide what you like the most.



A smooth tail is a happy tail.

MAINTENANCE

There are a few things to keep an eye on to keep everything running smoothly. As mentioned before, anything that is bent or broken will cause vibrations which could lead to failures, so be sure to check all of the rotating shafts. Aside from crash related damage, I always like to grab the tail hub and make sure that it is bolted down tightly. I also go over the tail pitch slider and check the color of the tail shaft. If it is still shiny and new as if you just built it, then you are good to go. If there is dark colored grime buildup make sure you clean the tail shaft and re-lube it with Tri-flow or similar light oil.

If your heli has a torque tube tail, check all of the gears to be sure that there is no debris inside the gear teeth or any stripped teeth on the gear. If the gear mesh is adjustable, check to make sure that there isn't any extra slop building up that could cause a gear to strip in flight.

For a belt, routinely lube it with something such as a silicone spray lube or graphite spray from your local hardware store. These will both prevent the buildup of static electricity and will also allow the belt to run on the pulleys more freely. With a belt that has a lot of time on it, check to see that there is no fraying or stretching and that there are not any teeth missing.

It's also a good idea to go over the tail linkages to be sure that the links are not getting loose or worn; replace them if they are. While you are looking at the linkages, check the tail servo to see if there is any slop building up in the gears. If there is an excessive amount of slop, replace the gears.

The final maintenance item is the gyro tape. On a nitro helicopter, the exhaust from the engine will deteriorate the foam tape to the point that a gyro could fall off if left unchecked. Give the gyro a tug and check to see if the tape lifts or separates. I change all of my gyro tape at the beginning of the season and as needed during the season.



WD-40 or a form of lubricant can keep your tail smooth and clean.

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GYRO TAPE SELECTION AND METAL PLATES

Without damping, a gyro will see vibration the same way it would see movement on the tail if it was not holding properly and will try to correct it. There are many different tapes available, and the most popular seem to be the stock tapes that come with the Futaba gyros, the Spartan gyros and the green Zeal gel from Kyosho. All of these tapes have excellent vibration absorbing properties. I have had the best luck with the Spartan tape, as it tends to last longer on a nitro helicopter and is slightly thicker than the Futaba tape, but not as soft as the Zeal gel which can cause problems with a heavier gyro sensor due to the gyro moving in the air.

On some machines, a single layer of vibration absorbing tape is not enough, and most high end gyros include a small metal plate to be used between the tape and the gyro. By adding a heavy metal plate you are changing the resonant frequency of the gyro sensor and the way

it will vibrate on an airframe. When using a metal plate, you should use a very thin and stiff tape between the gyro itself and the metal plate. The reason for this is that you are trying to add weight to the gyro sensor itself; you don't want the two moving independently of one another. By doing this you are changing the resonant frequency of the gyro sensor, so vibration will show up as something out of its sensing range for movement, effectively making it think that there is no movement/vibration. The metal plate is not always necessary (for small electrics I leave them off), but for 600 size machines and up I use them.



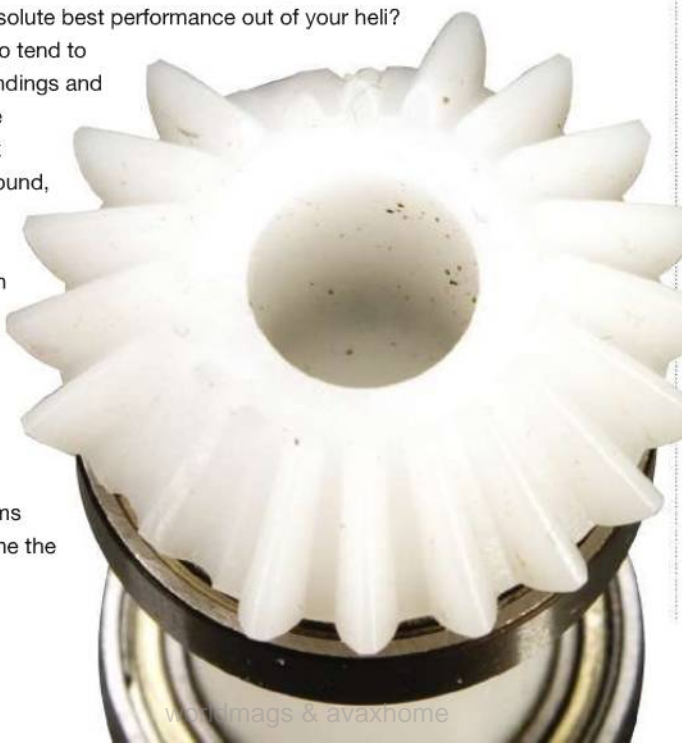
Zeal tape looks like it was made from Gummy.

BELT VS SHAFT

The age old argument is basically that a torque tube is more efficient, meaning it takes less power to spin the blades, while a belt will allow you to hit the tail on the ground accidentally and not have to worry about stripping gears. A torque tube is beneficial for aggressive flight because of the increased efficiency, but also for the fact that under a load, a torque tube will not slip. With a belt driven tail under a very hard load (such as a reversing piro maneuver) a belt can slip on the pulleys. If the belt is slipping you lose tail authority, which is something we never want.

This brings about another consideration—what you prefer to pay for in crashes or hard landings. Would you rather pay for parts if you hit the tail on the ground but have otherwise superior performance, or would you rather be able to take a hard landing without breaking gears, but not get the absolute best performance out of your heli? A belt is cheaper for beginners who tend to hit the tail on the ground during landings and don't need the benefits of a torque tube. However, you can also break belts from hitting the tail on the ground, and a new belt is usually more than a set of gears would be.

The last compelling argument in favor of a torque tube is the fact that the natural shrinkage and expansion of a metal tail boom on a cold winter day, or a hot summer afternoon will change the tension of the belt. With a torque tube there is no worry. Both systems have their pros and cons, but for me the torque tube is the best option.



CONCLUSION

The quest for a good tail is all about how much work you want to do experimenting past the basic settings and making sure that everything is mechanically sound. As long as you get the mechanical setup done well you will be off to the best possible start. The easiest way to get things flying the way you like is to carefully tinker with settings or setups, and to change only one thing at a time so you can learn how that particular function will affect your heli's feel. If you take your time and do it right, you will learn a lot about how the system works and will be able to diagnose problems much more effectively. **TBL**



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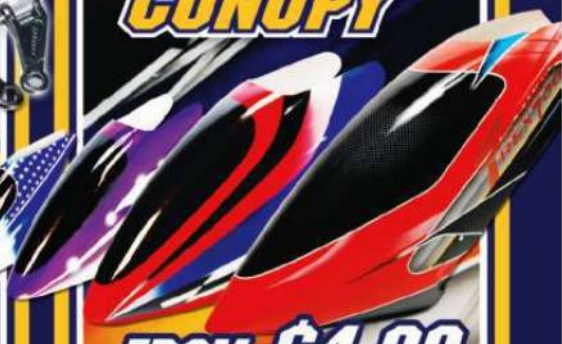
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- Weight(w/o main blade): 1340g
- Tail Rotor: 240mm(9.45 in)
- Motor Drive Gear: 10T(11T optional)
- Main Drive Gear: 170T
- Autorotation Tail Drive Gear: 180T
- Tail Drive Gear: 40T
- Drive Gear Ratio: 1:17.0:4.5/1:15.45:4.5
- Main Rotor Diameter: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



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Heli-Max NOVUS CP N125

The Novus revamped

WORDS: Brandon Updike | PHOTOS: Jason Boulanger

HELI-MAX IS NO STRANGER IN THE SMALL HELICOPTER MARKET. They've developed a wide variety of helicopters with their Novus line. The original Novus CP closely resembled the popular Walkera 4G3. The original Novus CP was unique because of its size and ability to perform moderate 3D. For its RTF status and size it was definitely a surprise for me. Now, Heli-Max is back with their newest Novus, the N125, an improvement of the original CP.

» AT A GLANCE

SIZE:	125
POWER:	Electric
TYPE:	Pod & Boom
BUILD TYPE:	Ready To Fly [RTF]
TAIL DRIVE:	Torque Tube

Brandon couldn't help but smile when flying this helicopter.

FEATURES

The most noticeable difference between the N125 and the CP is the absence of a tail motor. The N125 has a dedicated torque tube tail drive system. In true Heli-Max fashion, the helicopter comes in RTF form. Other than the re-designed tail, the N125 shares many features with its predecessor.

» ROTOR HEAD

HEADBLOCK: The one-piece plastic head block is pinned to the main shaft. There is an elongated area in the head block for the floating flybar to move. There is one rubber O-ring on each side for damping.

CONTROL: The N125 has a 120° CCPM direct link control system.

SWASHPLATE: The swashplate is a one-piece plastic design that has a radial bearing in the inner race. The anti-rotation bracket sits behind the swash and is molded to the frame.

ROTOR BLADES: The blades are just like the previous Novus CP. They're made of foam and have a nice painted scheme on them. The blade diameter is 305mm.



A better gyro would do the trick.

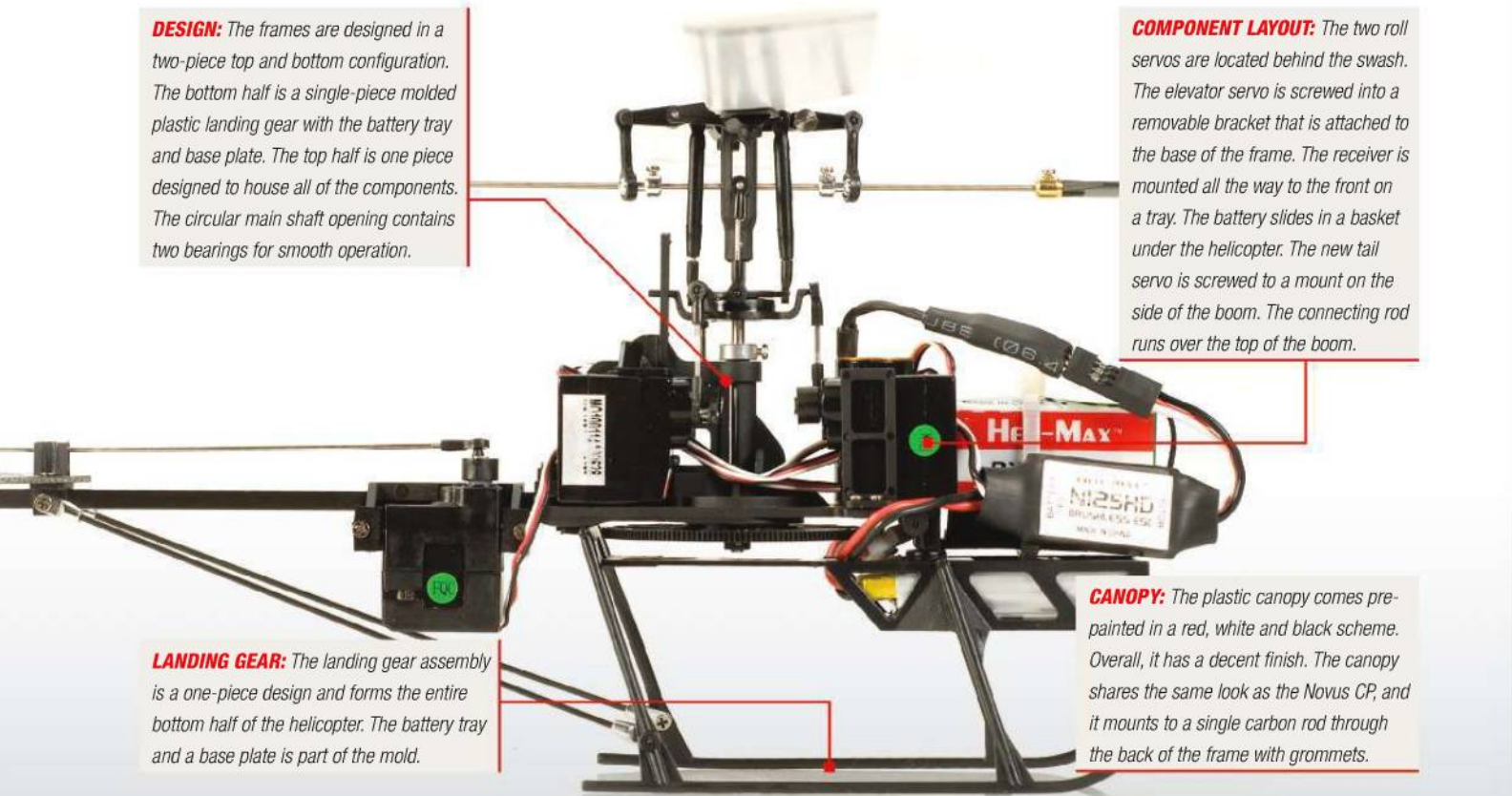
» MAIN FRAME

DESIGN: The frames are designed in a two-piece top and bottom configuration. The bottom half is a single-piece molded plastic landing gear with the battery tray and base plate. The top half is one piece designed to house all of the components. The circular main shaft opening contains two bearings for smooth operation.

COMPONENT LAYOUT: The two roll servos are located behind the swash. The elevator servo is screwed into a removable bracket that is attached to the base of the frame. The receiver is mounted all the way to the front on a tray. The battery slides in a basket under the helicopter. The new tail servo is screwed to a mount on the side of the boom. The connecting rod runs over the top of the boom.

LANDING GEAR: The landing gear assembly is a one-piece design and forms the entire bottom half of the helicopter. The battery tray and a base plate is part of the mold.

CANOPY: The plastic canopy comes pre-painted in a red, white and black scheme. Overall, it has a decent finish. The canopy shares the same look as the Novus CP, and it mounts to a single carbon rod through the back of the frame with grommets.



» DRIVE TRAIN

MOTOR MOUNT: There is a flat area in the frame in front of the main shaft where the motor is mounted. There are elongated holes in the frame to allow for mesh adjustment. The motor is mounted in an inverted position.

PINION: The brass pinion is press fit to the motor output shaft.

MAIN GEAR: The main gear is made of plastic with molded-in lightening holes. However, it has teeth at the center for the torque tube bevel gear.

TAIL DRIVE: The tail drive is a fairly typical torque tube design, not common for this size of helicopter. There's a bevel gear at each end of the torque tube.

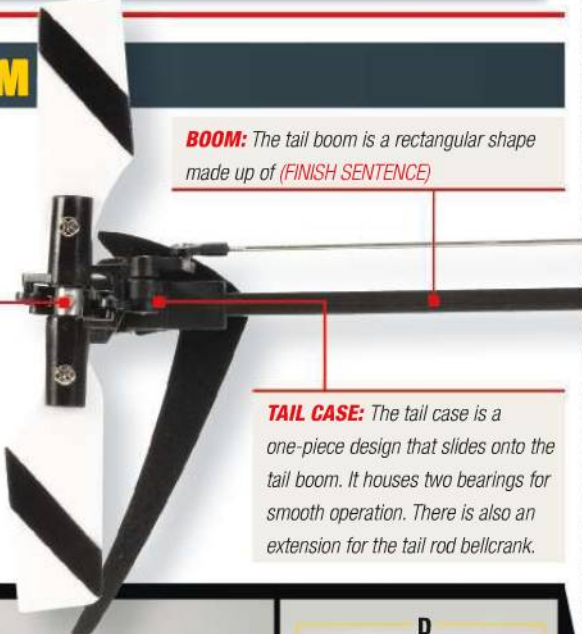


» TAIL & BOOM

TAIL ROTOR SYSTEM: The N125 is unconventional, in that it uses a simple torque tube design for tail control. I've never seen a torque tube design on a helicopter this small before.

BOOM: The tail boom is a rectangular shape made up of (FINISH SENTENCE)

TAIL CASE: The tail case is a one-piece design that slides onto the tail boom. It houses two bearings for smooth operation. There is also an extension for the tail rod bellcrank.



HELI-MAX NOVUS CP N125 MODEL SPECIFICATIONS

CLASS:	125 Electric
BUILD:	RTF
BLADE SIZE:	305mm
LEVEL:	Novice-Intermediate

FRAME

MATERIAL:	Plastic
TYPE:	Two-piece
SERVO TO SWASH LINKAGE:	Direct
SERVO SIZE:	Sub micro

ROTOR HEAD

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

TAIL

DRIVE SYSTEM:	Torque tube
AUTO DRIVEN:	No
TAIL PITCH SLIDER:	Dual
TAIL BLADE GRIPS:	Plastic
TAIL CASE:	Plastic
BOOM STRUT MATERIAL:	Carbon

GEARING

MAIN ROTOR TO PINION RATIO:	1:12.75
MAIN ROTOR TO TAIL RATIO:	1:3.75

WEIGHT

EMPTY:	0 lbs, 2.65 oz. (75g)
FULLY LOADED: (Includes battery)	0 lbs, 3.20 oz. (91g)

DIMENSIONS

HEIGHT (A):	3.94in (100mm)
CANOPY WIDTH (B):	1.5 in. (39mm)
LANDING GEAR (C):	1.78 in. (45mm)
PADDLE TO PADDLE DIA. (D):	5.71 in (145mm)
MAIN ROTOR (E):	12 in. (305mm)
TAIL ROTOR (F):	2.8in. (70mm)
LENGTH (G):	11.2 in. (285mm)

TESTING

Even though I liked the Novus CP, I didn't like the way the tail handled during flight. I've never been big on tail motors, but I do understand the purpose they serve. Seeing the N125's torque tube system, I'm pretty excited to see how well it handles. If it's able to hold during moderate flight, I won't hesitate to call this helicopter a success. I am also interested to see how much the performance increased using a brushless motor.

HOVERING • The first time I flew the N125 was outside with a heavy breeze. I immediately noticed that the helicopter didn't like the wind, which was understandable. It bounced around a fair bit and was very twitchy. I decided to bring it inside and fly it around in the warehouse in the back of the office. After lifting off, I noticed that the tail wasn't holding very well so I added some trim and it held decently after that. Overall, the helicopter was pretty twitchy but it was manageable and easy to maintain in a stable hover.

Rating: 3.5

FORWARD FLIGHT • I began to do some circuits and it took a little effort to keep it in line. Once you get the hang of it, you start appreciating how well it flies. The tail would throw in some odd wobbles every once in a while, but for the most part the helicopter flew well for its size. I was able to get it up to quick speeds with ease and was able to keep it in line without much issue. It does get twitchy, but if you're easy on the sticks it'll maintain its heading.

Rating: 3.5

CYCLIC PITCH RESPONSE • This helicopter is twitchy! You'll notice it immediately when you take off. It takes

a little getting used to. For a helicopter this size it's expected to be twitchy. I can see that it might be a little too twitchy for some people. It would get a little out of trim at times, but it wasn't bad for the little helicopter that it is.

Rating: 3.5

COLLECTIVE PITCH RESPONSE • The collective response is more than adequate for sport flying. I never felt that there was any lack of power through all the basic moves. The limitations begin to show when you push the helicopter hard. You're not going to perform advanced 3D with this helicopter, so the collective power is suitable for what it's meant for. I was able to do some very minor 3D, even though it was a little difficult.

Rating: 3.5

TAIL ROTOR RESPONSE • I was looking forward to see how the new torque tube system would work. The tail never really did hold well and it was always out of trim at least just a little. Any kind of decent collective input would automatically make the tail let loose. It had a nice pirouette rate and decent stopping power, but was a little too inconsistent for my liking. I was able to get used to it, but I feel that it

performs no better than the motor driven tail of the Novus CP.

Rating: 2.5

POST FLIGHT INSPECTION • The helicopter held up well through most of the flights I put it through. However, I did have a hard crash with it (my fault) when trying to flip it. I broke a few parts and scuffed up the blades, but the helicopter was still flyable afterward. I was impressed with the durability. I wouldn't recommend crashing this helicopter on a normal basis, but it did survive my hard crash.

Rating: 4.5

CONCLUSION

The N125 is a fun indoor helicopter to fly around with. It has a little more presence in the air than your typical counter-rotator and performs fairly well. The stock performance is good enough for sport flying and very moderate 3D flying. The new torque tube design is cool, but I wish that it held just a little bit better. Overall, it's not a bad little helicopter for those wanting some indoor fun. *T.H.I.*

The smaller they are the twitchier they become.



TESTING SPECS

HELI-MAX NOVUS CP N125

Part #: HIMXE0806

Distributor: Great Planes

Web: www.helimax-rc.com

Street Price: \$279

Price as Tested: \$279

Build/Setup Time: 0 hours

PERFORMANCE

RPM IN HOVER: 2350

MOTOR TEMP

(after flight): 140° F

BATTERY TEMP

(after flight): 65° F

FLIGHT TIME: 6 minutes

FLIGHT TIME: 6 minutes

TEST CONDITIONS

WEATHER: Indoors

TEMP / HUMIDITY: Indoor

BAROMETRIC PRESSURE: 30.07 in.

WIND SPEED: Indoor

VISIBILITY: Indoor

ALTITUDE: 675 feet

REQUIRED TO FLY

Fingers

WHO'S IT FOR?

Anyone wanting a fun indoor helicopter to mess with during their downtime.

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

4 Instructions

4 Parts Quality/Fit

4.5 Durability

3.5 Tunability

3.5 Overall Performance

3.5 Value

+ THE GOOD

- Not a bad sport flyer
- Durable

- THE BAD

- Tail Control

Brandon can't seem to fly the smaller ones as good as his Aurora.



Nice stickers.





Century SWIFT NX

The Next Generation

WORDS: Ryan Kephart | PHOTOS: Jason Boulanger

CENTURY HAS DEVELOPED SEVERAL NEW HELICOPTERS OVER THE LAST FEW YEARS AND HAS RECENTLY REVISED SEVERAL OF THEIR EXISTING MODELS.

These newly revised helicopters shares the same names as the originals, but are stamped with "NX". The "NeXt" generation helicopters are easier to build and fly, but with the same style and grace as the originals. The last NX we reviewed was a50-size nitro helicopter which proved to be a solid stable machine perfect for a scale application. This month we will take a look at the new Swift NX, which is a 30-size machine powered by an electric motor.

They were a pain to put on.

» AT A GLANCE

SIZE:	30-size
POWER:	Electric
TYPE:	Pod and Boom
BUILD TYPE:	Kit (Quick Build)
TAIL DRIVE:	Belt

FEATURES

The Swift NX features a composite plastic structure that is lightweight and strong. The swashplate is controlled by a 120° CCPM system. The Swift NX was designed with a high centralization of mass giving it a nice clean roll and flip on axis. The Swift has a large electronics tray which is located underneath the canopy to provide protection to valuable components.

» MAIN FRAME

SWASH CONTROL: The swash control is accomplished by 120° CCPM. The servos are connected to bellcranks using a push-pull linkage. The bellcranks are made from plastic and are dual ball bearing supported.

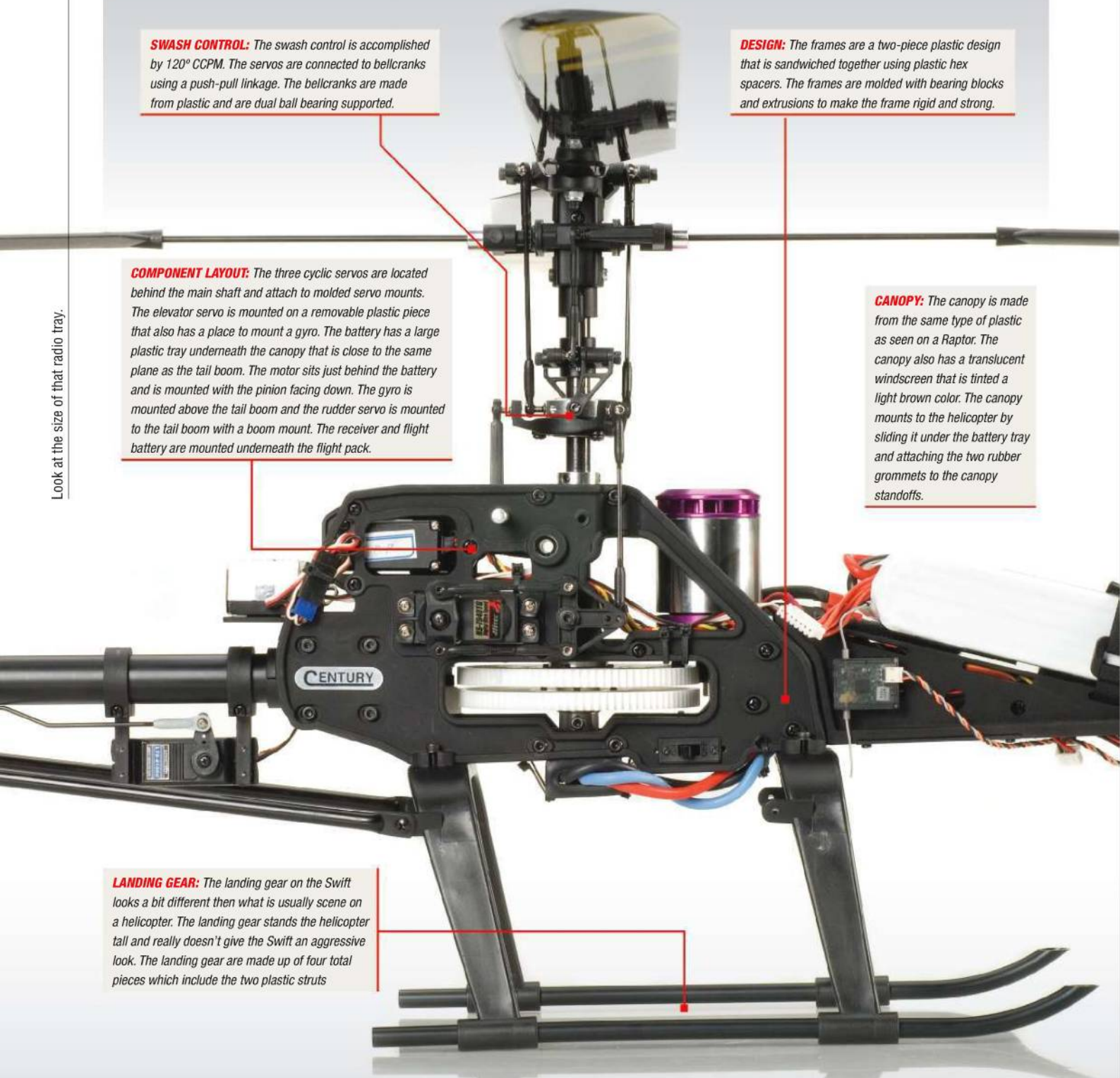
DESIGN: The frames are a two-piece plastic design that is sandwiched together using plastic hex spacers. The frames are molded with bearing blocks and extrusions to make the frame rigid and strong.

COMPONENT LAYOUT: The three cyclic servos are located behind the main shaft and attach to molded servo mounts. The elevator servo is mounted on a removable plastic piece that also has a place to mount a gyro. The battery has a large plastic tray underneath the canopy that is close to the same plane as the tail boom. The motor sits just behind the battery and is mounted with the pinion facing down. The gyro is mounted above the tail boom and the rudder servo is mounted to the tail boom with a boom mount. The receiver and flight battery are mounted underneath the flight pack.

CANOPY: The canopy is made from the same type of plastic as seen on a Raptor. The canopy also has a translucent windscreen that is tinted a light brown color. The canopy mounts to the helicopter by sliding it under the battery tray and attaching the two rubber grommets to the canopy standoffs.

LANDING GEAR: The landing gear on the Swift looks a bit different than what is usually seen on a helicopter. The landing gear stands the helicopter tall and really doesn't give the Swift an aggressive look. The landing gear are made up of four total pieces which include the two plastic struts

Look at the size of that radio tray.



» DRIVE TRAIN

MOTOR MOUNT: The motor mounts to a plastic mount that also acts as a spacer between the two frame halves. The mount has slotted keys to provide gear mesh adjustments.

PINION: A pinion is not included with the kit, allowing the pilot to select the right gear ratio depending on the power system used.

MAIN GEAR: The main gear is made of Delrin and has lightening holes

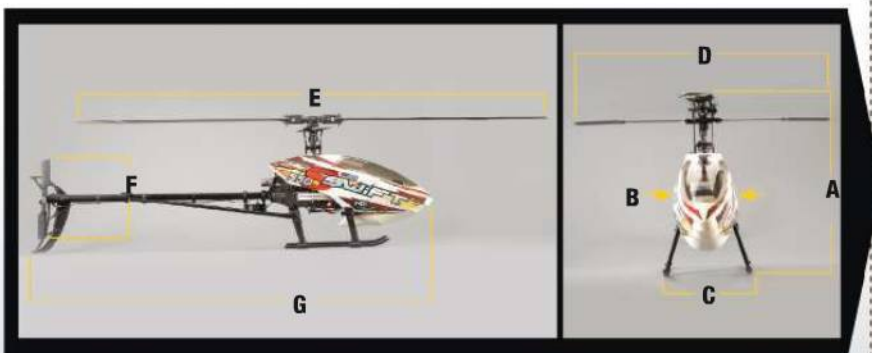
to provide airflow. The main gear mounts to an aluminum hub using four screws.

AUTOROTATION DRIVE: The autorotation system is mounted to the main gear and uses a one-way bearing.

TAIL DRIVE: The tail boom can be removed without the need to adjust the belt tension.



“ THE SWIFT NX IS A GOOD DOCILE HELICOPTER FOR THE BEGINNER PILOT ”



Century SWIFT NX

MODEL SPECIFICATIONS

CLASS:	30-size electric
BUILD:	Kit
BLADE SIZE:	520-550mm
LEVEL:	Novice-Intermediate

FRAME

MATERIAL:	Plastic
TYPE:	Two Pieces
SERVO TO SWASH LINKAGE:	Bellcrank w/ push-pull control
SERVO SIZE:	Standard

ROTOR HEAD

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

TAIL

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

GEARING

MAIN ROTOR TO PINION RATIO:	1:10.6
MAIN ROTOR TO TAIL RATIO:	1:5,14

WEIGHT

EMPTY:	5 lbs., 9 oz. (2,517g)
FULLY LOADED: (includes battery)	7 lbs., 2 oz. (3,243g)

DIMENSIONS

HEIGHT (A):	14.2 in. (360mm)
CANOPY WIDTH (B):	4.75 in. (120mm)
LANDING GEAR (C):	7.25 in. (184mm)
PADDLE TO PADDLE DIA. (D):	22 in. (558mm)
MAIN ROTOR (E):	49 in. (1,244mm)
TAIL ROTOR (F):	8.25 in. (209mm)
LENGTH (G):	43.5 in. (1,105mm)

FEATURES CONTINUED

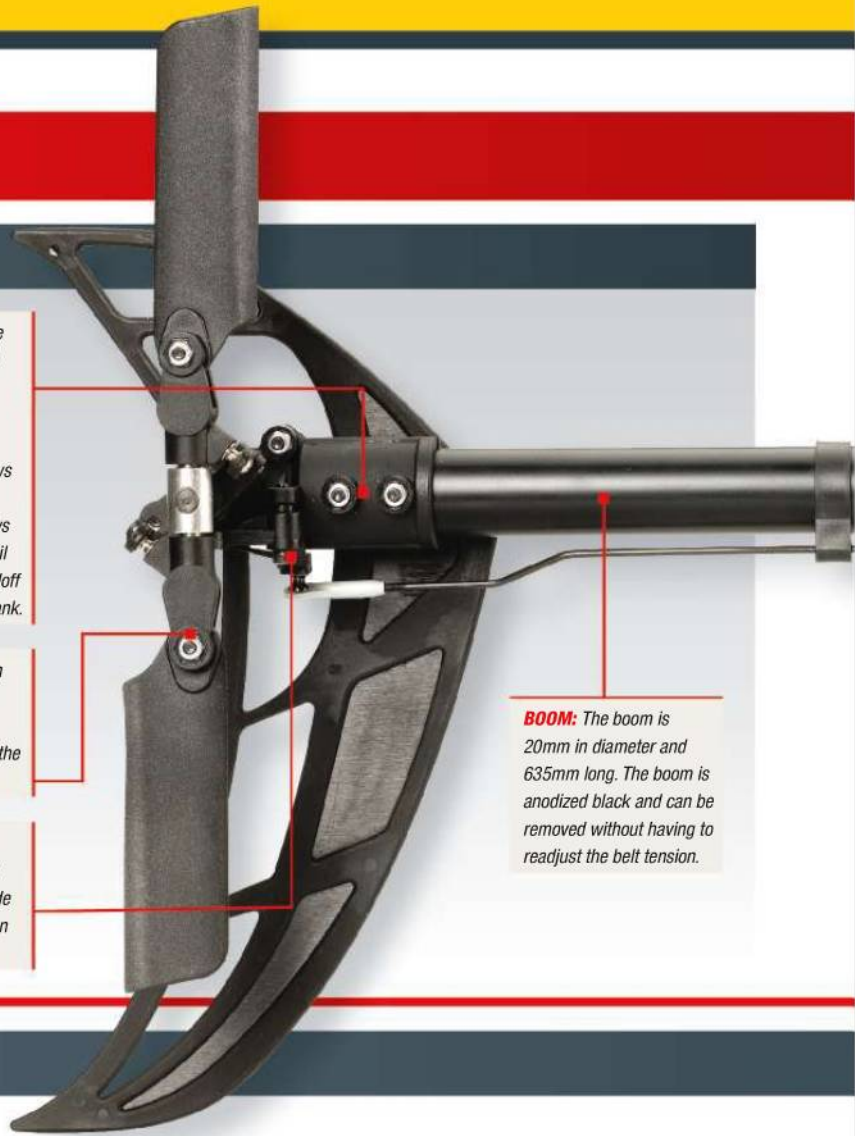
» TAIL & BOOM



TAIL CASE: The tail case is molded from plastic in two halves. The halves are sandwiched around the boom and are held together using two screws that clamp to the boom and additional two screws towards the back. The tail case has a molded standoff for the tail control bellcrank.

TAIL BLADE GRIPS: The blade grips are made from plastic and attach to an aluminum center hub using a machine screw that threads into the hub. Two radial bearings support the grips. The tail blades attach to the grips using a machine screw and a lock nut. The grips have molded nut retainers to ease the installation and adjustment of the tail blades.

PITCH ACTUATOR SYSTEM: The tail control pushrod connects to a plastic bellcrank which is supported by two ball bearings. The bellcrank attaches to a single point on the tail pitch slider with a ball connection. The slider is made from plastic and has a brass bushing that slides on the tail shaft. The links on the pitch fork are pinned and attach to the blade grips using a ball link.



BOOM: The boom is 20mm in diameter and 635mm long. The boom is anodized black and can be removed without having to readjust the belt tension.

» ROTOR HEAD

HEADBLOCK: The headblock is made from composite plastic that is molded with the phasing pins pressed into the headblock. The mold also incorporates a recess for the dampers. The block is attached to the main shaft using a single Jesus bolt and a friction fit.



BELL/HILLER ARMS: The Bell/Hiller arms are located on the blade grips and are composed of composite plastic. The arms are dual ball bearing supported and have a brass insert between the bearings. No mixing options are available.



PHASING: The phasing is not adjustable on the Swift. The pins are pressed into the head block and a plastic washout base slides smoothly across the pins. Some slop is noticeable in this design.

WASHOUT ARMS: Along with most of the rotor head, the washout arms are made from composite plastic. These arms are dual ball bearing supported with a brass bushing sandwiched between them. No mixing options are available. The washout arms are attached to a plastic washout base that has two pin guides for the phasing. The link attaches to the arms using a single pin without any bushings.



This helicopter accepted a wide range of batteries.

» INSTRUCTIONS & BUILDING TIPS

WHEN YOU OPEN THE BOX

When opening the box you will notice that the Swift NX is well organized, using separate boxes inside that contain the frames and canopy in a large box, the boom and other various long parts in another, and the landing gear and hardware in one final box. We received this kit before the production of the boxes so we can't show you the fancy print, but we did get the manual so we will show you a picture of that.

MANUAL AND BUILD

Building the Swift NX is a strait forward and easy process. No experience is necessary when building this



kit. Most of the kit is pre assembled and the manual goes into great detail if you want to take the parts apart. The Swift NX comes with two different manuals, a quick build manual which shows you how to put the parts together that were pre assembled, and a full detailed manual if you want to take the pre assembled parts apart and start from scratch. The more detailed manual is a definite plus in the event of a crash, and having to rebuild the sections of the helicopter.



MAIN BLADE GRIPS: The main blade grips are made from composite plastic and are molded with channels to improve rigidity and strength. Two radial bearings and a thrust bearing support the grips. The grips attach to a spindle using a socket head cap screw that thread into the spindle.

SWASHPLATE: The swashplate is comprised of a lower and upper section. The upper section is made from aluminum and the lower is made from composite plastic. The elevator arm also acts as an anti-rotation device to keep the swash from spinning.

Century SWIFT NX RTF & TEST GEAR

» TEST GEAR



■ **RADIO:** Spektrum, DX6i, part number, \$200



■ **RECEIVER:** Spektrum, AR7600, SPMAR7600, 0.3oz. (8.9g), \$125



■ **CYCLIC SERVOS (3):** Hitec, HS-7940TG, 37940S, 2.4oz. (68g), \$149 ea.



■ **TAIL SERVO:** Logitech, LTS6100g, 138373, 2.0oz. (56g), \$99 included w/gyro



■ **SPEED CONTROL:** Century, Electron 80A, CNE480, 2.96oz. (84g), \$95



■ **MOTOR:** Century, Outrunner 1110KV, CNE274, 9.52oz. (270g), \$120



■ **BATTERY:** Common Sense, 6S 2600mAh 35C, 6S2600-35-L, 15oz. (427g), \$140



■ **GYRO:** Logitech, LTG-6100T, 138370, 1.03 oz. (31g), \$180



■ **RECEIVER BATTERY:** Align, 2s 1900mAh 18C, 860015, 3.17oz. (90g), \$25



■ **CHARGER:** iCharger, 206B, part number, \$149



■ **BLADES:** RotorTech, 560mm CF Blades, CN265666C, \$85

What gear would you use?

TESTING

The Swift NX was tested with a 7.4V servo system from Hitec and the Logitech gyro on the tail regulated to 5 volts. The power system is comprised of Century's brushless motor and speed control. We opted to use the carbon fiber RotorTech blades in place of the stock blades to give this Swift some performance. Overall the electrical system had plenty of room under the canopy to fit whatever 6S battery we could find all the way up to a 5000mAh. We reviewed this helicopter with the softer dampers and geared this helicopter toward the beginner pilot. Let's see how the Swift NX performed.

HOVERING • With the stock paddles and larger main rotor blades the Swift NX hovered like a dream. Windy conditions did not affect the hover much and it was very manageable in gusty conditions. Overall the Swift NX had a graceful centered feel and did not take much cyclic input to keep the helicopter in a stable hover. My initial feeling of this helicopter lead me to believe that this would be a good beginner helicopter for a pilot looking for a larger and more visible option.

Rating: 5

FORWARD FLIGHT • Cruising the Swift NX in forward flight is nice and graceful. The helicopter tracks well and the controls feel docile. The Swift is not a fast flying helicopter but for a beginner helicopter it has a good overall feel to it. Keeping the helicopter flying in a strait line is pretty much a hands off operation, very little cyclic and collective inputs are needed to keep the Swift flying exactly where you want it to fly.

Rating: 4

CYCLIC PITCH RESPONSE • The Swift NX is more geared to the beginner pilot and the cyclic pitch response is setup for just that. The controls are nice and docile giving the beginner pilot some room for error. The Swift NX includes some stiffer dampers in the kit that will allow the pilot to switch them out and increase the response of the cyclic when he is ready. Lighter flybar paddles are also available for the Swift NX, which will give the helicopter a faster cyclic rate and increased response. Overall the cyclic is plenty fast enough to get out of a sticky situation, yet slow enough to give the pilot some time to react if a wrong input is applied.

Rating: 4

COLLECTIVE PITCH RESPONSE • The collective on the Swift NX is also geared towards the beginner. The collective operates smoothly even with a linier curve giving the pilot a stable hover without the helicopter bouncing up and down. The collective range is big enough to provide adequate climb out speeds but has a bit of a lag when it comes to quick collective inputs. Overall the collective feels docile and has a slow to moderate response time. Replacing the dampers with the included stiffer dampers would increase the response time when the pilot is ready to move to the next step.

Rating: 4

TAIL ROTOR RESPONSE • With the use of a heading lock gyro the tail performed well as expected. The tail ratio was adequate enough to keep the tail locked in a hover flying in normal mode, but would give out

a little when a quick collective input was applied. Switching to a higher headspeed in an idle up mode the tail held much better and quick collective inputs did not affect the tail as much. Overall the tail is setup well for a beginner but leaves a 3D pilot wanting more authority.

Rating: 3

AUTOROTATION CAPABILITIES •

Autorotations seemed a bit weak on this helicopter. The gear train that operates the tail was not as smooth as I would have like to seen within the first dozen flights. The Swift did auto rotate but the main rotor blades would lose their inertia quickly towards the landing portion of the auto. This problem should solve itself as the gears wear in and provide a smoother mesh between the main tail gear and secondary gear.

Rating: 3



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S032

3 Channel RTF Co-axial Electric Helicopter w/ Gyroscope

Specification:

Product Size: 305mm x 72mm x 150mm

Flight Time: Approx. 12 min

ON/OFF Switch: YES

Control Range: 100m

Charging Time: Approx 60 min

Battery: 3.7v 500mah

Battery for Transmitter: 4 x AA (not included)



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

Specification:

Main Rotor Diameter: 450mm (17.7 in)

Length: 450 mm (17.7 in)

Height: 250 mm (10 in)

Flying Weight: 350g (12.5 oz)

Driven system: 2x 370 carbon brushed motor

Servo: 2x 9g servos

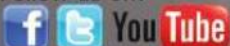
Battery: 7.4v 1000mAh Li-polymer

Control system: 2.4Ghz RC Transmitter

Radio Control Range: 2500 ft (762m)



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TESTING SPECS

CENTURY SWIFT NX

Part #: CN1045
Distributor: Helicopter World Inc.
Web: www.centuryheli.com

Street Price: \$219.95
Price as Tested: \$1,635
Build/Setup Time: 8 hours

PERFORMANCE

MODE FLOWN: Normal, idle up
RPM OF EACH: Normal: 1800
MODE: Idle Up 1: 2000
MOTOR TEMP
 (after flight): 109° F
BATTERY TEMP
 (after flight): 106° F
FLIGHT TIME: 6 minutes
CRASH COST: \$42.00

TEST CONDITIONS

WEATHER: Sunny
TEMP / HUMIDITY: 89° F / 30%
BAROMETRIC PRESSURE: 29.92 in.
WIND SPEED: 10 mph
VISIBILITY: 10 miles
ALTITUDE: 500 feet

PITCH CURVES

NORMAL: -5, 0, 10
IDLE-UP 1: -10, 0, 10

REQUIRED TO FLY

Radio transmitter, receiver, three matching cyclic servos, gyro, tail servo, motor, speed control, battery, and battery charger.

WHO'S IT FOR?

The Swift NX is a good docile helicopter for the beginner pilot. The size and ease of an electric helicopter make this a good first time project. The overall build is easy and will get you in the air in less than a day.

SCORECARD

SCALE RATING: 1=POOR 5=EXCELLENT

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

THE GOOD

- Easy to build
- Docile, easy flying helicopter
- Good Manual

THE BAD

- Links seem a bit loose
- Boom support screws need to be longer

POST FLIGHT INSPECTION • Going over the helicopter after flight testing some key sections I noticed were not performing very well. The tail boom supports were coming loose due to the size of the screws used to hold them in place. I added larger screws and placed a piece of tape around the boom where the horizontal fin attached. This added some extra support to the boom and allowed the screws to be secured more. I also noticed that some of the ball links in the head were easily pulled off, but the direction they face is towards the outside of the centrifugal force. Keeping an eye on these links to make sure they do not come off the balls is a must, or replace the links when wearing occurs.

Rating: 3.5

CONCLUSION

Overall the Swift NX is a great beginner helicopter that will allow the new pilot to experience the sensation of RC flight, and keep him on his toes when it comes to maintenance. The helicopter flies well and is very predictable. The price of the parts and ease of access make this helicopter a good trainer for the new pilot and will hold its value and fun factor all the way up to rolls and loops. **TFL**



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CONTROL THEORY

Fundamentals to Remote Control

WORDS: Art Koral | ILLUSTRATIONS: Dave Palacios

CONTROL IS FUNDAMENTAL TO “REMOTE CONTROL.” A helicopter employs many internal control systems to accomplish flight, including servo position and centering, RPM governors, heading hold gyros, and flybarless stability. In this Heli IQ we will dive into the world of control, explaining the types of control systems, their fundamental components, along with the most common algorithms (PID) to manager controller response.

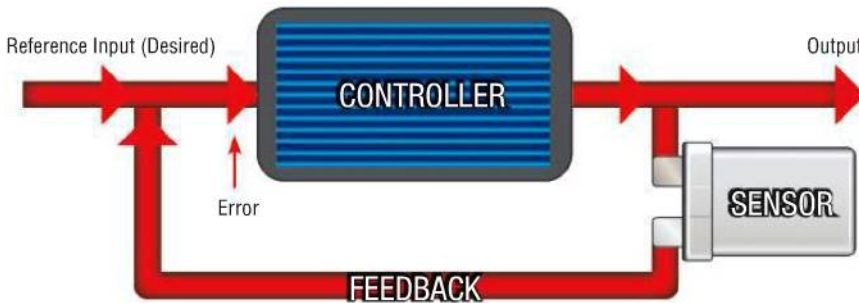
» REMOTE BASICS

Do you remember the first time you ever flew an airplane or helicopter? If your experience was like most beginners, you probably porpoised on your first flight—pitching up and down until you learned just the right amount of correction. Gaining control was not a trivial matter. You had to notice the pitch-up with your eyes, process the error with your brain, and input just the right amount of correction with your fingers. You repeated this cycle over and over again until the pitching stopped. Eventually, you learned how to do this within fractions of a second until it became second nature. Our body is an example of an adaptive control system using our senses (providing feedback) to see the pitch attitude (output), our minds (controller) to calculate the error between the current attitude and the desired attitude (set point), and also provide a response solution to our fingers to affect a new pitch attitude (updated output). This cycle is repeated several times until the desired output is maintained. Our learning process allows us to adapt and improve our response as we gain more experience.

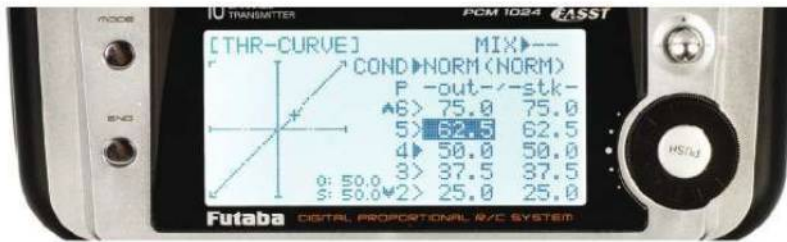


CLOSED VS OPEN-LOOP CONTROL SYSTEM

Fundamental to control are the two basic types of control systems: Closed & Open loop. In an open loop control system, a control input is initiated without any adjustment of the output. In a closed loop system, the output is observed and compared to a reference set point where a controller adjusts the response in an attempt to decrease the error between output and reference as quickly as possible.

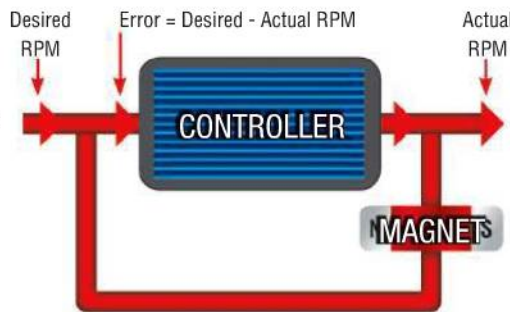


An example of an Open Loop system would be using throttle curves to set head speed. Rotor RPM would simply fluctuate depending on the actual loading of the rotor head.



Setting throttle curves for rotor RPM is an example of an open loop control system.

In contrast, an example of a closed loop system is an RPM governor. Rotor RPM is governed to a preset reference value. A sensor picks up an optical, magnetic, or pulse width signal to detect each revolution, then a controller/governor determines the RPM. The governor compares the output observed by the sensor to a user created set point and calculates an error. Based on this error, a correction is initiated to increase or decrease the RPM. This cycle is repeated infinitely, keeping the error as small as possible.



An RPM Governor is an example of a Closed Loop Controller

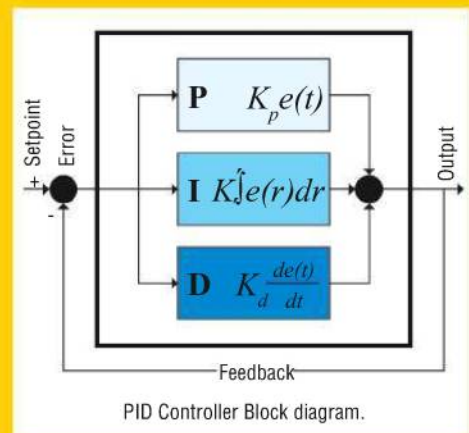
FEED FORWARD CONTROL SYSTEM

Some controllers are a combination of both open and closed loop design. “Feed forward” is often used when a known disturbance consistently acts against the controller and the controller on its own cannot counteract the disturbance adequately. An example of a feed forward control system would be mixing in a small rudder input to aid the tail gyro in maintaining heading during high torque maneuvers such as a hard climb out. If the servos weren't fast enough to react to the high torque, a feed forward input would aid in maintaining heading hold.

Better than warm milk.

MANAGING SYSTEM RESPONSE

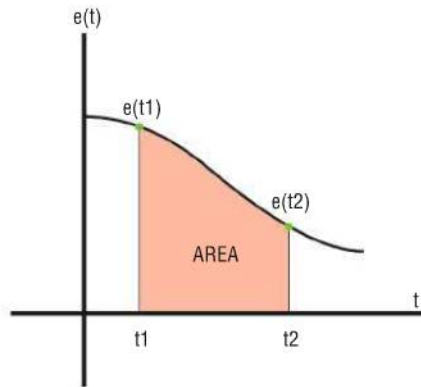
Fundamental to a closed loop control system is managing the way the system will respond to the error signal. Remember that first flight—you had to train your mind and fingers on how to respond to the observed pitching (error). At first you overcorrected, which caused the porpoising (oscillation). In response to this, you probably started to under control the aircraft (Over Damping), taking a long time to return to the proper pitch angle. Eventually, you trained your mind and body to put in just the right amount of correction to achieve the proper pitch angle in the shortest period of time. This was a learning process. Though learning control systems are becoming more commonplace, probably the most common control system response method is by PID or Proportional, Integral, and Derivative (PID) algorithms. PID is the way the controller interprets and subsequently responds to the error signal. Each factor—P, I, and D—apply a specific algorithm for calculating the response. The magnitude of that response is tuned by a factor K (gain) and summed in combination with each other to achieve the response that can reach that desired output as quickly as possible.



PROPORTIONAL, INTEGRAL, DERIVATIVE EXPLAINED

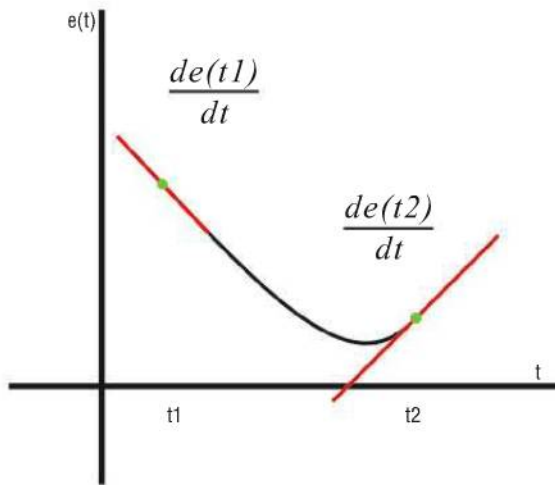
PROPORTIONAL RESPONSE: In Proportional response the controller feeds an input that is directly proportional to the present error $K_p e(t)$. **Note: K_p , K_i , K_d are gain factors that adjust the magnitude of the PID response and are tuned based on the dynamics of the system under control.** So if the present error signal ranges from 0 to 10 volts, a signal of 10 volts would feed a maximum response where an error signal of 0 volts would result in the minimum response.

INTEGRAL RESPONSE: Integral response is obtained by measuring the sum of recent past errors over time. If, in recent past, a larger error is summed, even if a small error is most recently detected the response would still be large. **Note: In calculus this is known as integration and symbolized by an integral equation: $\int_{t1}^{t2} dt$.** It is the area under the curve of a given function in the range from the first point in time ($t1$) to the second point in time ($t2$). In the case of controller it is the area under the curve of the error function. $KI \int_{t1}^{t2} e(t) dt$.



In the error response curve $e(t)$ above, though the error is decreasing. The entire area under the curve is used as the basis for the response.

DERIVATIVE RESPONSE: Derivative response is obtained by measuring the rate of change of the current error with respect to time $(e(t1)-e(t2))/(t1-t2)$. It is a predictive method that anticipates what the error will be based on a trajectory (Slope). In calculus this is an instantaneous measurement known as a derivative: $de(t)/dt$. If the error trend (Slope) is increasing, the response would be proportionally greater.



Even though the error at $t1$ is greater than the error at $t2$ the derivative response would be greater at $t2$ because the slope of the error signal is greater.

CONTROLLER TUNING

Each tuning parameter— K_p , K_i and K_d —have a unique impact on system response and change as a function of each other. Large proportional gain adjustments usually equate to faster response. Too high a gain setting and the system will overshoot and maintain a steady oscillating error. We see this when the gain is set too high on our tail gyro, causing it to oscillate. The integral adjustment usually determines how quickly the system would reach a desired set point. Too high of an integral gain setting and the system can overshoot, also resulting in oscillations. Integral gain is usually the heading hold component of a tail gyro. Integral gain corrects for the error to set point that occurs with proportional gain and helps reduce the amount of proportional gain required creating a more stable control system. The derivative adjustment is used to prevent overshoot with too high of a setting, resulting in slow controller response.

To obtain the perfect response, the controller must be tuned based on the dynamics of the system under control. The servos can be slower or faster, some sensors might not detect small changes as well as other sensors, or the inertia and mass moments can be larger from one helicopter to the other. This is why many controllers provide the user with the ability to tune them. Some systems, such as the Gyrobot, offer guidelines on how to set each gain factor based on flight characteristics. Other controllers, such as the 401 gyro, offer one simple gain adjustment that might affect several tuning parameters at once.

A single gain adjustment is used to control system response.



CONCLUSION

The next time you fly your heli, you will have a greater appreciation and understanding of the elegance of control and all the different controllers that are working together to give you the remote control experience. The tail gyro, RPM governor, flybarless stability system, mixture controller, voltage regulator, battery charging system, and transmitter/receiver are all controllers used in this hobby. Each control mechanism is either open or closed loop, or a combination of both when feed forward is employed. Some of those controllers might use tuned PID algorithms for their response method, even though the user interface simplifies the PID tuning to one overall gain adjustment. Other controllers simplify tuning with only one adjustment. The most advanced controllers (such as our minds) are adaptive, tuning the response automatically through the experience of each new flight. [TTL](#)

We'd better not hear any complaints about not being "technical" enough.



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SAN DIEGO Fun Fly

WORDS: Brandon Updike | PHOTOS: Sean Williams & Tommy Larson

The San Diego Fun Fly is one of those yearly events with a lot of history to it. The event has been held at the Palomar RC field in Fallbrook, California for the last decade. Numerous professional pilots have come to the event over the years and performed memorable flights. It's hosted by the Palomar RC Flyers Club and is organized by Ray Nemovi. It has been my home field for the last five years, so it's an easy event for me to attend. The turnout is usually good and this year was no exception with around 60 registered pilots enjoying the weekend. I made it down on Saturday to catch up with some friends and do some flying.

San Diego is German.

The ATMOSPHERE

THE PALOMAR RC FLYING FIELD IS A LARGE FIELD THAT IS SEPARATED IN TWO PARTS. There is an airplane area with a runway and overhang and there is a helicopter area that has its own landing pads. Historically, the Fun Fly has been held at the airplane area, but this year both fields were utilized. The helicopter area was used for the scale guys to fly and mingle. The field is about an hour north of San Diego in the small town of Fallbrook, right off the 15 freeway. It's a large area surrounded by hills, which makes it a perfect setting for a Fun Fly.





The EVENT

I ARRIVED SATURDAY MORNING A LITTLE LATER THAN USUAL AND FOUND THE FIELD ALREADY PACKED WITH PILOTS. There were five flight stations and each one was filled with pilots enjoying their flights. I made my rounds and caught up with a lot of familiar faces. The West Coast events usually bring out the same core group of guys, making a good heli community. Not having been to the field for a while, I was happy to catch up with some of the Palomar regulars and see how they were doing. Locals Don White, Mike Rapp, and his son Alex were all present, helping out and enjoying the day flying.

As usual, there were a good number of pros representing their respective companies. Team Mikado was well represented with Kyle Dahl and Jesse Kavros. We all have seen Kyle Dahl progress from a local pilot to a solid XFC competitor. He flew multiple flights in true, smooth Mikado fashion. He also put on a good night fly demonstration. Jesse Kavros is a young, talented pilot who is making a name for himself lately. He also

You know what it means? Don't make us say it.



has a large, smooth flying style. He is the son of 3D pioneer Perry Kavros who was also on hand throughout the weekend.

Andy Yu and Jason Krause also made the trip. Jason didn't fly much, but he was willing to help anyone and show his support of Align products. He did, however, manage to win the autorotation contest, which is something he has always been good at.

Team Avant was there to show off the new electric Aurora 90. Jason Bell and Justin Barry also call Palomar their home field, so they were in their element as they flew throughout the day. Shawn Williams made his rounds, taking some nice shots as usual and he also flew a few good flights. He had a mishap with his receiver that caused an unfortunate crash.

Southern California native Tim Jones made an appearance with the Castle Creations 90 Electric. It's a 13 horsepower powerhouse that has a tendency to strip main gears because of its immense power. Regardless, it's a sight to see.

Fun Fly favorite Danny Szabo made the trip from Vegas with his new helicopter, the Gaui X5. It looked impressive with Danny behind the sticks, and he performed several good flights. The X5 seems to be a stout electric and with Danny behind the project its future looks bright.

MTA hobbies made the trip with a large stock of heli supplies. They usually make it to all the West Coast events and it's always nice to see them out supporting the pilots. Alek from Fun Fly hobby also set up a booth of his own. Alek opened up Fun Fly hobby in Riverside a couple years back and has really seen it take off since opening. He has now moved into a larger shop and I look forward to checking it out.

Brandons last fun fly before he goes into the military.



The CONCLUSION

Overall, this San Diego Fun Fly was a success; there was a good turnout and a lot of good flying. The weather was good even though there was a little wind in the afternoon. Even though I had a tail servo problem that limited my flying for the day, I enjoyed seeing everyone and had a good weekend. This is an event that I look forward to attending every year. *TBL*



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-noun

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



Fun, Learning, Friendship and Mutual Respect



Can you tell whose T-REX that is?



SOMETHING IN THE AIR

In the foreground Danny Szabo puts the new Gaii X5 through its paces.

Photo:Sean Williams



Yes, Danny is now Team Gauli.



LOW LEVEL FLIGHT

How low can you go?

WORDS: Brandon Updike

WITH THE ADVANCEMENT OF TECHNOLOGY AND INCREASING SKILL LEVELS, PILOTS HAVE BEGUN TO REALLY PUSH THE FLYING ENVELOPE. Around five years ago, pilots were able to wow the crowd by merely performing low flips a few feet off the ground. Good flying has become so commonplace that it takes a little more effort to wow the audience. This is where low flying comes into play. Not only does it get spectators excited, but it's also guaranteed to get your heart pumping during your flight. Skeptics will pass off low flying as "showboating" or something that doesn't take much skill. In reality, flying low requires greater focus and good technique in order to pull off without crashing. In this Pilot Skills we'll give some tips to help improve your low level flying.

WHAT'S THE POINT?

SOME PEOPLE MIGHT ASK THE QUESTION, "WHAT'S THE POINT OF FLYING YOUR HELICOPTER LOW TO THE GROUND?" If you think about it, there's really no point to any type of flying except self-satisfaction. Flying low is just another dynamic style that makes flying helicopters fun and exciting. Some of the most memorable flights in this hobby were due in large part to impressive low-level flying. Go to any fun fly and watch how much interest is generated when show stopping pilots like Tareq Al-Asadi, Lukas Riva, and Marcus Kim take center stage. If you want to win over a crowd, this is a sure fire way to do it.

ERRATIC VS. **CONTROLLED**

Even though low level flying is impressive, it comes with a great amount of risk to not only your equipment but also to personal safety. If at any point you question your skills during a flight, you should not be thinking about flying lower. Flying low requires complete control of your helicopter and total concentration. I've encountered numerous pilots over the years who rushed into "smackdown" style flying when they can barely hover. The flight usually looks erratic and can result in possible dangerous situations. Whatever you do, always keep safety foremost in your mind and pace yourself so that you don't put yourself in dangerous situations. The best way to lower your flying is by taking baby steps. You'll also want to keep your helicopter at a safe distance from yourself and the pits to give yourself time to recover in case something goes wrong. Crashes will happen, so be willing to accept the inevitable.



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.

TIPS AND TRICKS:

■ **THE MOST IMPORTANT THING** to have when flying low is confidence. Not only will you need confidence in your abilities, but you'll also need confidence in your machine. You need to know all of the tendencies of your helicopter and really be able to feel it through all the maneuvers. One bad judgment call can end in disaster, so you'll need to be able

to make quick decisions on the spot. You never want to be stuck in a position where you think, "What do I do now?". If you ever watch a pilot fly a demo, you'll notice that everything seems effortless and flows together well. You need to be able to do this to the point where flying maneuvers becomes second nature. If you have good flow, you'll be able to fly low with confidence.

HOW DO YOU DO THIS?

■ **THE FIRST THING** to understand is gaining proficiency in maneuvers at high altitude. Practicing maneuvers up high leaves greater room for error and doesn't require the same level of accuracy. This is where taking your baby steps come into play. After you perfect your set of maneuvers and can confidently piece together a nice routine at a safe altitude, then you'll be ready to bring it lower. Work your way down; you don't have to fly inches off the ground immediately. Get used to the orientation changes when changing altitude.

When you're ready to really bring it low, the best way to get accustomed is by performing a maneuver where you

have supreme confidence. For example, start off by performing low flips in a controlled manner to help you break through the mental barrier. Start piecing your routine together until you're able to fly at a low altitude while maintaining complete confidence and control.

THINGS TO WATCH FOR:

■ **WHEN FLYING LOW**, it's best to keep an eye on two things: your blade disc and your tail rotor. Focus on keeping those two components out of the ground. You'll want to watch your blade disc on rolling moves and your tail rotor during vertical moves such as Tic-tocks and flips. Understand the rate that your helicopter falls during descending maneuvers - you'll want to time your saves before it hits the ground. Know how quickly you can level off before attempting to do it off the ground. For example, when performing a back flip, know exactly how your helicopter reacts when you level it off so that you can time it perfectly. Be confident in all orientations so that if you do find yourself in trouble, you'll be able to save your helicopter.

This is Brandon's last flight school.

CONCLUSION

Remember to go at your own pace; flying low will be pretty scary at first. After you build some confidence, you'll begin to feel more comfortable and it'll become easier. Just be sure to stay focused and always keep safety in mind. *ATL*



BIG AIR FLYING

Go big or go home

WORDS: Brandon Updike

AFTER WRITING ABOUT LOW LEVEL FLYING, IT'S ONLY NATURAL TO COVER "BIG AIR" FLYING TO COMPLIMENT YOUR ROUTINE. The best way to improve your routine is to integrate several different flying styles into one. A flight that will consist of nothing but low level flying will get tiresome and be boring for the spectators. Taking up large amounts of airspace takes a different set of skills.

Flying with precision may look easy at first glance, but I can assure you that it's very challenging. This is why F3C flying is held in high regard among heli enthusiasts. As flying is evolving, we are beginning to see the best pilots perform many big, precise maneuvers throughout their routines.

BENEFITS OF **FLYING BIG**

THE MAIN BENEFIT OF USING A LARGE AMOUNT OF AIRSPACE IS THAT THE POSSIBILITIES ARE ENDLESS. You can do just about anything when you're high in the sky. While flying low to the ground doesn't leave much room for error, flying high gives you time to react in case you get into trouble. When pilots get some altitude they'll tend to do greater variations in their moves. Flying big maneuvers also has an impressive look to it, especially when flying at higher speeds. It can give you just as big of a rush as flying inches off the deck. Additionally, big flying isn't only limited to 3D, but is also one of the main components to F3C competition flying. F3C flying is judged primarily on how precisely the pilot is able to fly patterns. Practicing big maneuvers will give you a greater control over your helicopter.

STARTING OFF

Before you start flipping your helicopter, it's always best to master all of your orientations. One of the fundamental building blocks of "big air" flying is the ability to fly a precise "circuit", or a back-and-forth pattern from one end of the field to the other. Working on flying your circuits centered over the runway while being able to fly straight lines without much corrections. If your helicopter is set up well, you won't have to make that many mid-course corrections. Your helicopter will practically fly itself through turns and keep its line fairly easily.

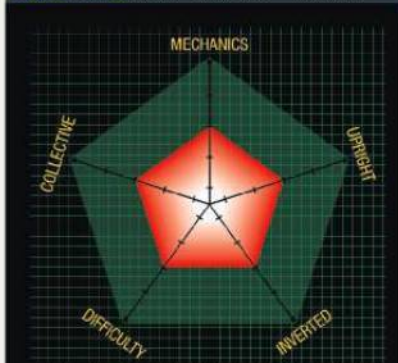
As you progress, practice flying around at both fast and slow speeds. This will give you a good comfort zone no matter where your helicopter maybe located. It's important to break yourself out of your comfort zone. Be comfortable with flying your helicopter in all the different orientations or you can develop bad habits. You'll quickly find out how not having comfort in some areas of flight will come back and haunt you when trying to progress, so it's best to start early when working on taking up some airspace.



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.

THE THINGS YOU CAN DO:

- **IF YOU WATCH ROUTINES** from pilots like Jamie Robertson or Nick Maxwell, you'll see that they don't waste any airspace when they fly. Generally, it's well-received in competition flying if the entire field is in consistent use. Not only that, but it is also quite enjoyable when performing large swooping maneuvers. The most widely seen maneuver in big flying is looping maneuvers. These are usually entered during forward or backwards flight. Most pilots like to throw in a pirouette while looping back towards the ground. There are an endless amount of looping maneuvers, such as half loops or loops that have transitional maneuvers tied into them.
- **FAST FLIGHT IS THE KEY** when doing moves that take up a great distance. You'll need to be comfortable

with flying your helicopter at higher speeds. Especially during high altitude maneuvers, your descent will usually gain high amounts of speed. It's important to never panic, and to remember to ease your helicopter back into a comfortable flying mode.

- **FALLING MANEUVERS ARE ALSO VERY POPULAR**, such as the tail slide or a slide with maneuvers incorporated into it. For example, while descending back towards the ground you can perform a couple of half sideways flips and throw in a pirouette for some flair. Just remember to keep everything centered and be easy on the corrections. When flying at high speed, corrections can easily be noticed if the inputs are too abrupt. Remember to make minimal inputs for smooth transitions unless the maneuver calls for an abrupt change.

AKA extended maneuvers.

CONCLUSION

Learning multiple flight styles will help you become a better pilot. It will prevent you from being a one-dimensional pilot, no matter what type of flying you enjoy. The best pilots are the ones who can incorporate all styles of flight in their routines. Even though "smackdown" flying has hit its peak, most of the pro pilots today also fly impressive big maneuvers. It's a healthy trend. **TRFL**

We need a few workhorses around here.



Piasecki H-21 WORKHORSE/SHAWNEE

The Banana Boat Heli

WORDS: Brandon Updike

BACKGROUND

Tandem rotor helicopters have proven to be effective in military use. The CH-47 is an example that's widely used for troop transport. Before the CH-47 became a legendary helicopter in its own right, there was the H-21. The H-21 was not the first helicopter of its kind, as it was developed from the Navy's HRP-2.

Each branch of the military needs a helicopter designed for different purposes. The Air Force's version was designated the H-21A. They bought 18 helicopters for evaluation and liked the way that they performed. The Air Force wanted a transportation and Search and Rescue role. After testing, the Air Force decided to purchase production versions of the B variant. The Navy also used the H-21B, as it was designed with carrier performance in mind. It was a little heavier due to minor airframe changes. It also had greater troop capacity for a better tactical role. This variant also had autopilot capabilities and auxiliary

fuel tanks. The Army variant was the C version and had the highest production rate. It shared all of the same features as the B but had a belly sling hook that was capable of hoisting 4000 pounds.

The helicopter proved itself in Vietnam, as it was the first American helicopter to enter the country in large numbers. It played an important role in the early 60's before the conflict fully escalated. It was the first helicopter that had door mounted machine guns on the sides. It remained the primary troop transport helicopter in South Vietnam until the iconic UH-1 replaced it in 1964. The helicopter was retired not long after that.

FEATURES

The H-21 had a very distinctive look and was often dubbed the "Flying Banana" by those who operated it. It was shaped like a banana to prevent the blades from hitting each other when flying. Each rotor head was a 3-bladed, counter-rotating design. The fuselage was able

SPECS

CREW: 3-5 (Pilot, co-pilot, crew chief and one or two gunners in Vietnam)

CAPACITY:

- 20 troops or
- 12 stretchers

LENGTH: 52 ft 6 in (16.01 m)

ROTOR DIAMETER: 44 ft 0 in (13.41 m)

HEIGHT: 15 ft 9 in (4.80 m)

DISC AREA: 3,041 ft² (282.6 m²)

EMPTY WEIGHT: 8,950 lb (4,058 kg)

LOADED WEIGHT: 15,200 lb (6,893 kg)

MAX TAKEOFF WEIGHT: 15,200 lb (6,609 kg)

POWERPLANT: 1 × Wright R-1820-103 radial engine, 1,425 hp (1,063 kW) driving 2 rotors

PERFORMANCE

■ **MAXIMUM SPEED:** 127 mph (110 knot, 204 km/h)

■ **CRUISE SPEED:** 98 mph (85 knots, 158 km/h)

■ **RANGE:** 265 mi (230 nmi, 427 km)

■ **SERVICE CEILING:** 9,450 ft (2,880 m)

■ **DISC LOADING:** 5 lb/ft² (24 kg/m²)

■ **POWER/MASS:** 0.09 hp/lb (150 W/kg)

to transport 12-16 individual troops depending on the variant. There was also room for 12 stretchers and other medical equipment. The H-21 used a basic landing gear design that was attached to the fuselage with large aluminum rods. It also had a rear stabilizer for added control.

CONCLUSION

Even though the H-21 was phased out when the Vietnam conflict escalated, it was still a significant aircraft. It also helped the design of future transport helicopters such as the CH-47 still used today. The H-21 was truly a "Workhorse." **THE**



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SPECIFICATION

Model No: NE R/C 312 A
Rotor Diameter: 7.40"(188mm)
Overall Length: 8.39"(213mm)
Weight: 1.27oz(36g)
Power System: Φ 6mm Motor X 2pcs
Battery: 1-cell 3.7V 110mAh Li-PO

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SOLO PRO

INDOOR AND OUTDOOR FLYING

27g [0.95oz]

ULTRA-MICRO SIZE



Model No: NE R/C 260 A
Rotor Diameter: 190mm
Overall Length: 207mm
Weight: 0.95oz(27g)
Power System: Motor X 2pcs
Battery: 1-cell 3.7V 120mAh Li-PO



BALANCE SYSTEM FOR REMOTE CONTROL HELICOPTER
1. Invention patent No: 200710170488.2
2. Utility Model Patent No: 200720076261.7

CONTROL SYSTEM FOR SINGLE BLADE REMOTE CONTROL HELICOPTER
1. Invention patent No: 200810036355.0
2. Utility Model Patent No: 200820057528.2

PCT patent of "SINGLE ROTOR MODEL HELICOPTER WITH IMPROVED STABILITY BEHAVIOR".
PCT No is: WO/2009/062407

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LENGTH: 7.5 in (190mm)
HEIGHT: 3.5 in (90mm)
FLYING WEIGHT: 1.0 oz (28 g)
ROTOR DIAMETER: 7.0 in (180mm)
MAIN MOTOR: Brushed Coreless (installed)
TAIL MOTOR: Brushed Micro Coreless (installed)
ON-BOARD ELECTRONICS: 5-in-1 receiver/servos/mixer/ESCs/gyro (installed)
BATTERY: 1S 3.7V 120mAh Li-Po (2 included)
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BLADE

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HORIZON

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