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THE PREMIER PUBLICATION FOR RADIO CONTROL HELICOPTERS

# R/C ROTORY MODELER

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World's Leading Magazine For Electric & Nitro R/C Helicopters

1992 - 2008

16th ANNIVERSARY

ROTORY MODELER

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THE WORLD'S PREMIER PUBLICATION FOR RADIO CONTROL HELICOPTERS

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ALIGN'S TREX 500 PG 46

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## FEATURES



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IN SUPPORT OF OUR U.S. TROOPS

GLOBAL'S CYPHER 3D PG 6

## COLUMNS



JR'S VIBE 50 NITRO PG 18

# CHALLENGE #1:

## Bench and flight test the performance of one DSM® radio while 40 others are turned on.

# THE RESULT:

## "The most robust RF link I have ever seen."

*Cal Orr, in the sidebar of his May 2008* Fly RC *article on the JR/DSM X9303 2.4 radio.*

When Cal Orr asked for our help in testing the RF link and latency integrity of a DSM radio with 40 other DSM radios turned on, we were just a bit shocked. But after a little thought, we figured, "why not," and sent him 40 of our systems.

And besides turning all 40 radios on at the same time, he threw in every obstacle he could think of—metal barriers, various antenna orientations, etc.—in an attempt to reduce range and also to increase latency.

All of Cal's observations are detailed in the sidebar of his May 2008 Fly RC article, but here are a few more quotes: "We were able to fly both receiver systems (the R921 and AR9100) with all 40 DSM systems turned on and didn't find any evidence of a hit...there was no evidence of an increase in 'response time' or latency...the AR9100 receiver didn't lose a single frame and had zero holds."

What's more, you can expect the same kind of flawless performance with your DSM system—whether it's a JR/DSM or Spektrum brand radio.

The underlying reason for this stellar performance, is of course, Spektrum engineers' choice of Direct Sequence Spread Spektrum (DSSS), as the foundation for the DSM protocol. DSSS offers excellent protection against response slowdown when a large number of modelers are flying on 2.4GHz simultaneously. Add DuaLink® 2-channel redundancy, along with other patent-pending electronic safeguards, and DSM delivers an RF link whose robustness is absolutely unrivaled.

Oh, and before we forget—here are Cal's final words on the subject of DSM radios:

**"I want one!"**

Charlie Mitchell and Lonnie Morrison preparing for Cal's 40-radio DSM flight testing.

Photo: intouchliving.com

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SPEKTRUM DSM

JR DSM

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Carey Shurley

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layout and graphics
Mike Mas

Photo: Mike Mas performing the world's first and only hovering "Tailstand Maneuver" with his X-Cell. Do Not attempt this difficult and dangerous maneuver with your model helicopter under any conditions.

Welcome Rotory Subscribers, we have but another issue packed with new products. James Wang brings us the first exclusive look at the long awaited, JR Vibe 50 from Horizon Hobbies. Somewhat like its big brother, the 60-90 version, the Vibe 50 incorporates the latest technology in nitro-powered helicopters. If you're looking for a high-end nitro, you won't want to miss this review.

In this issue, I review the new Cypher 3D, a high-performance 3D electric from Global Hobbies. In these lean times, with the price of gas cutting into our hobby budgets, it's a welcome relief to see manufacturers offer a model helicopter that almost anyone can afford. The Cypher 3D comes 95% pre-built and even includes a good brushless motor and speed control, all for just $229. The best part of all - the machine flies great.

We'll also take a look at the T-rex 500, a new class of electric that gives us a little more tolerance for the elements and major 3D.

We have a great article on a line-up of transmitter and receiver battery chargers from Great Planes. Plus much more.

Hopefully, we'll see most of you at some of the events this season.

Best Regards - Mike Mas

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GLOBAL HOBBY

# Cypher 3D

*In this day and age of soaring fuel prices, causing most of us to cut back on our hobby spending, it's like a breath of fresh air to see R/C equipment costs go the opposite way. Yes, the Cypher 3D comes 95% built with an Outrunner brushless motor and speed control for just $229. In about an hour, you can take this heli from the box to the field. Team it up with the new Airtronics RDS 8000 2.4 Ghz system, and you'll have a low-cost, fully aerobatic R/C helicopter that will keep up with the rest of the popular 400 series of micro helicopters.*


*Mike Mas*

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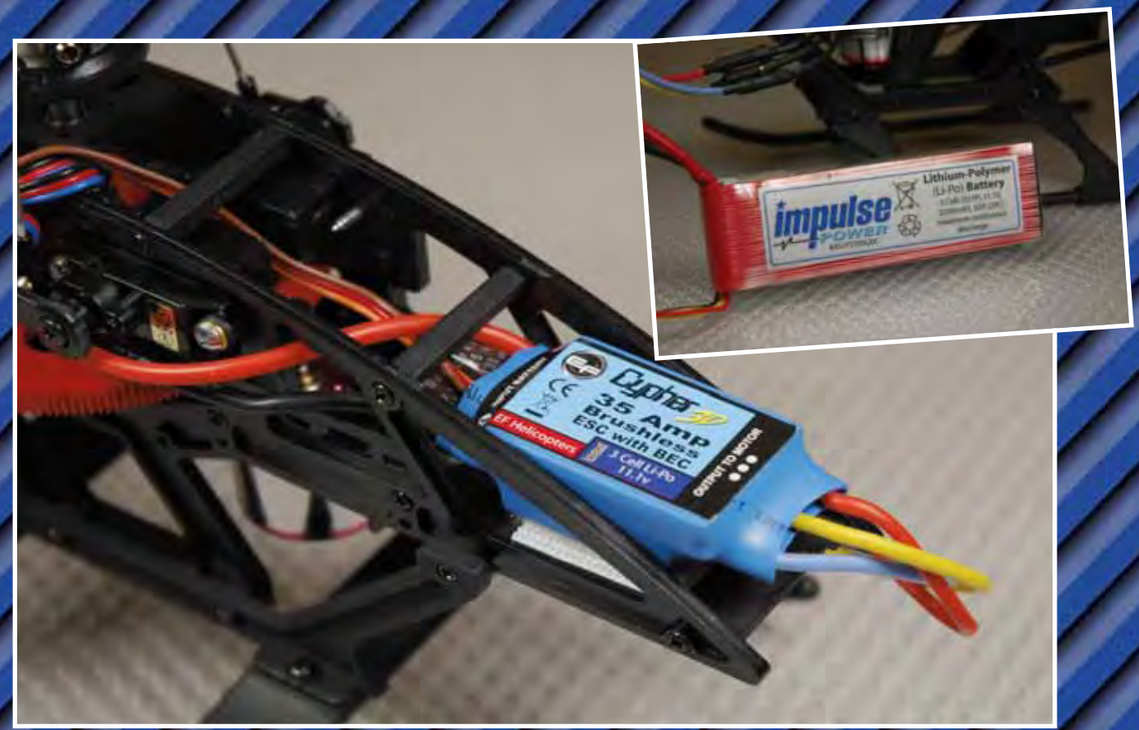



Image above shows supplied 35 Amp speed control, complete with audible throttle warning system. The speed control fits comfortably between the side frames. Inset: We used Global's Impulse Power 2500mAH 50A (20C) Li-Po cell. The battery compartment is located just under the speed control for quick change-out.


A great companion for the Cypher 3D is the Airtronics RDS8000 2.4 Ghz system. The RDS 8000 offers ample features for both the new pilot or seasoned expert.

Practically every major R/C helicopter distributor has their own lineup of R/C electrics, so not to be outdone, Global Hobby released their latest weapon to position themselves in the ever-competitive 400 class market.

Global's new machine is called the Cypher 3D, which is a descendent of the popular Shogun that surfaced a few years ago. What makes the Cypher 3D unique is the fact it has an unbelievable retail price of just $229. If that's not enough to make you head down to you LHS, or Goggle Cypher 3D on your PC - it gets better, the Cypher 3D comes in the box 95% built, it even comes packaged with a good hobby grade brushless motor and 40 amp speed controller.

My friend, Ron Lund from HeliProz South, (www.ronlund.com) turned me on to the Cypher 3D a few months ago when he advised me the Cypher was making landmark movement in the field, thanks to its unique "out of the box" 3D capability and a sober price. In most cases, the Cypher is about half of what other 400-class helis might cost with the same included options. Following Ron's lead, I contacted Michael Greenshield, the man that makes things happen at Global Hobby for some inside information on the Cypher.

Packaging – If you're one of our Rotory dealers considering adding an ARF electric to your shelves, you'll find the kit is attractively packaged with great graphics, illustrating the Cypher's top, three-quarter, and profile views. The graphics also include some "quick specs" and some performance data. Upon opening the box, regardless if you're a modeler or a sales person, the Cypher sells itself. You'll find what I would acquaint to as a completed helicopter. We're talking about a fully assembled machine with motor, speed control, composite main blades, right down to the decals already stuck on the canopy. It's a heli that you can actually buy one day and fly it that same evening.

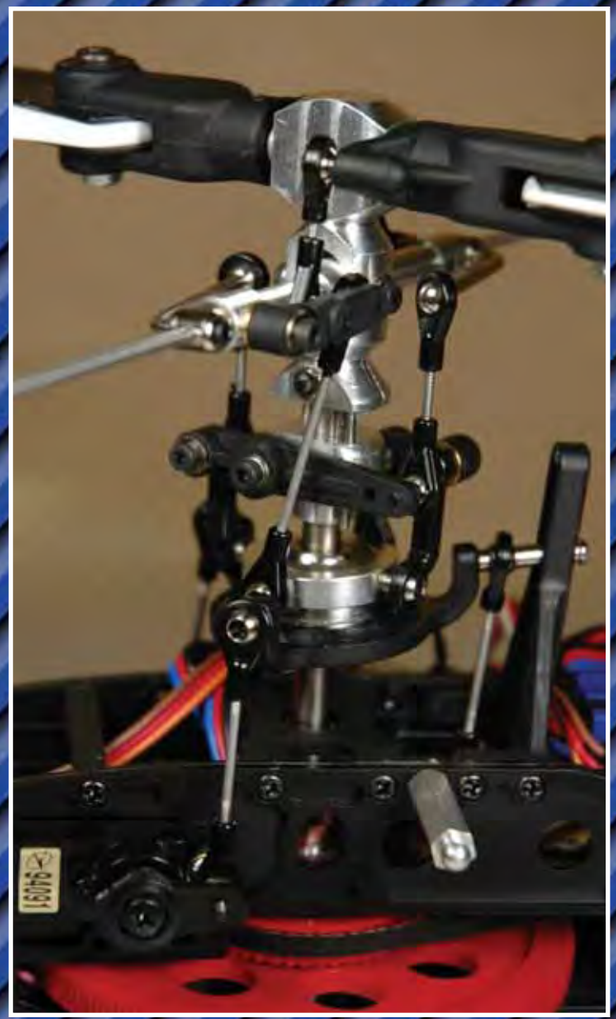
M/R Control System - The Cypher uses our familiar 120-degree CCPM main rotor control system. Control is direct and for the most part slop-free. Three micro servos are push-rod direct to a two-piece swashplate, which has a plastic lower plate for input, and a CNC machined upper plate for controlling the rotor head.

Main Rotor - The main rotor hub is CNC aluminum, which keeps things aligned and vibration-free. As an added bonus, the flybar housing and mixer block are also aluminum. The rotor head uses a conventional "single floating axle" design, with dual O-ring dampening. This means you could adjust the dampening to your own liking if you needed more aggressive cyclic or to tame things down a bit. The blade axles are secured with a multi-bearing configuration, which seems plenty adequate for almost any rpm you might decide to run the head at. For control, the Cypher 3D uses a "Bell/Hiller" control arrangement that provides an instantaneous response with the direct Bell input, which is followed with a strong Hiller bar input 180-degrees later. This makes the Cypher feel solid in hover, yet quick enough to perform most any 3D maneuver at ground level. The Hiller input ratio (or flybar deflection) is approximately "one-to-one" with the blades' axle input, so the Hiller control has a major influence on stability. The Cypher is loaded with ball bearings, so you'll find that all the mixers ride on bearings.

Main Frame – The main frames offer "wide-bay" spacing, making plenty of room to mount your gear, run wires, etc., all with your fingers - instead of tweezers. The wide frame spacing also accommodates a lot of the now common 2.4 GHZ full-size radio gear. Receivers, such as the one packaged with the Airtronics RDS8000 2.4 radio system, fits between the frames like the machine was made for it.

The frame sets have plenty of reinforcement webs, which pay off in the event of a mishap or tip-over. While we were fortunate enough not to bang one in, I would imagine the Cypher frames could take some fairly good punishment. The Cypher uses a 2-piece main-tail gear set. The main gear is driven directly by the supplied 3800kv brushless motor. Separated by a one-way clutch autorotation gear, the main gear also supports a smaller pulley that drives the "belt-driven" tailrotor. Dual idler pulleys are provided on the tail block to keep the belt aligned before plunging down the tail tube.

Tail Rotor – As previously mentioned, the Cypher uses a belt-driven tail rotor system. For the new pilot, this



system is world's ahead of a shaft-driven system since it affords the opportunity for the belt to slip in the event you should strike the ground with the tail rotor blades. The pitch change mechanism uses a "dual-arm" input and a pulley-type ring for solid pitch change control as well as some predictability for coming back to true center. The aluminum boom and boom supports have a set of plastic 3D fins, which offer minimal help in forward flight as well as help keep the tail blades off the runway. If you would like to increase your forward flight stability, I would recommend you apply some thin plastic film to the surfaces.

The tail rotor servo control is quick and direct, thanks to a boom mounted tail rotor servo. Make sure you align the servo so the push-rod has a straight line back to the T/R gearbox linkage.

The Cypher's landing gear rocks! First, you'll find some beefy "wide" struts, which will prove worthy for the new pilot on some hard autos. Second, the gear is angled back, giving the Cypher a great look as well as help support the machine to keep the tail out of the grass during auto's.

Installation – What can I say, in less than a few hours we had the machine ready to fly. As quick as you can mount the gear - you're ready to go. We choose to use the Airtronics RDS8000 2.4 GHz radio system for control. We also used the Airtronics 94091Z Super Micro servos, which put out 18-23 oz.

Above: The Cypher 3D uses a typical floating axle design. The rotor head has a nice CNC hub block, which keeps things aligned and vibration-free. The upper ring on the swash and slider is also machined.


Right: Tail rotor control is direct and quick, thanks to a boom mounted tail rotor servo configuration. We used both the GY240 and GY401 Futaba gyros with excellent results. There's plenty of room for the gyro either on top or bottom of the tail boom support.


Above: The Cypher 3D and the Airtronics RDS 8000 make a great cost-effective pair. The RDS 8000 has plenty of "high-end" capability for your future needs should you decide to go with a 50-90 size machine.

Left & Below: The pitch change mechanism on the Cypher 3D works great - it uses a pulley type slider that evenly applies pitch to the T/R blades. The Cypher comes with 3D tail surfaces. If forward flight is your thing - you can easily apply plastic film to close off the surfaces for improved forward flight capabilities.

Above: The Airtronics RDS 8000 miniature receiver fits perfectly between the main frames over the tail support block. Even though it's best not to run the dual antennas by the metal supports, I had more than ample range and experienced no problems, what so ever.

of torque. These servos weigh out at just .32 oz., and make for nice crisp control.

Flying – In a matter of just hours, the Cypher went from the box to my private flying field. First try, with light winds at 5-10, the Cypher lifted off in a good solid hover. While it does move around a bit in the wind, it remains fully in control. The little machine locked in great with virtually no trim adjustments. As I mentioned, the cyclic has a lot of power.

With an average head speed of 26-2700 rpm, using my Mas Tech set-up of +10/0/-10, the Cypher is just as happy upstairs as it is in hover. Flips, tumbles, or just about anything you want to do is easily accomplished. In forward flight, you have to respect "speed verses angle" or like any micro, you can stand it on its tail in forward flight. If you want to make it a bit more stable in forward flight, you can apply some sticky film to close off the tail surfaces, this makes it track better in forward flight. On my second flight, I added around 35% expo to the cyclic; this gave the Cypher a nice soft feel at center stick, yet she became quite aggressive when I moved off the center stick position.

Flight time, like most micros is dependant on what you do with the machine. On a cold start, with a 2500mAH pack (20c), I could get up to 8-minutes - with about 6 being the norm.


Above: We used the Airtronics 9491Z Super Micro servos on cyclic with 18-23 oz/in of torque.

Below: The Cypher has a stout landing gear strut set, which slants back for good looks and functionality.



# Cypher 3D

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The only thing that needed some attention on our kit was the boom. It needed to be loosened and pulled back a bit to obtain the correct tension. Even if yours is correct, you should check the belt tension after 5-10 flights, since the belt will seat in a bit and require adjustment. When it's set correct, you should be able to make the belt slip if you hold the tail rotor and exert some turning force on the main rotor head. This will prevent damage should you strike the ground on a landing or auto.

Also important is the main blade tension. While hardly ever mentioned, the blades should be tight enough to where they will not move during a quick "spin-up" on the ground, yet loose enough to where they can seek their own center as you spool up the head. If they're too tight, and your flying off a hard surface, you could get some severe oscillation that may boom-strike the machine.

Conclusion – With the unbelievable popularity of the 400 series of electrics, I wouldn't be the least bit surprised to find a fair share of these pups at flying events this year. With a phenomenal price of just $229, for a built-up helicopter with composite blades, motor, and speed control, and backed by a major player like Global Hobbies, you have a winning combination. RM

***Features:***

***95% Factory-Assembled***
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***120° CCPM Main Rotor Control System***
***Belt-Drive Tail Rotor w/ Ball Bearing Tensioners***
***Aluminum Center Hub w/Metal Operating Arms***
***Extensive Ball Bearings***
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***One-Way (autorotation) Main Gear***
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***Fiberglass Main Blades***

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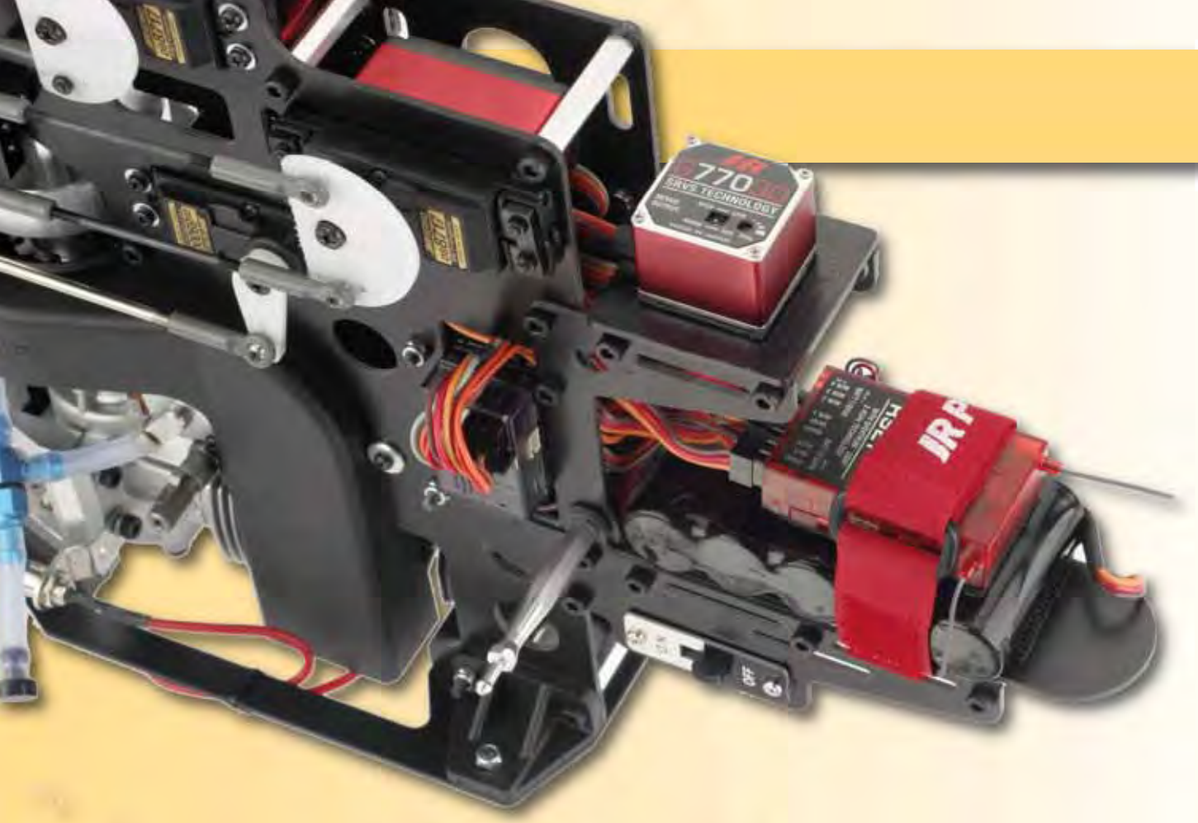
# JR Vibe 50

Rotary Exclusive Review

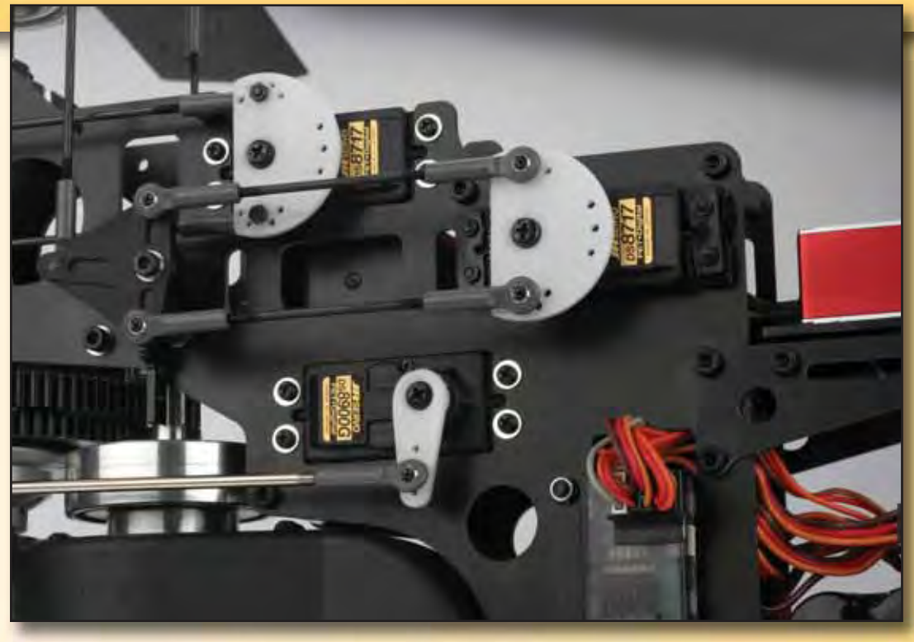
James Wang

***The Vibe 50** is the newest 50-size helicopter on the market and it was just released around the world in May 2008. The Vibe 50 bears a strong resemblance to its big brother, the JR Vibe 90. The Vibe 50 features two flat G-10 sideframes and strong aluminum bearing blocks sandwiched between the frames. The 10mm main rotor shaft is supported by a bearing block above and below the main bull gear. This produces an exceptionally rigid structure for aggressive 3D. Some drive train parts are common between the Vibe 90 and Vibe 50, which is an added advantage for Vibe owners. The layout permits using an OS 50 Hyper, YS 50 pump, or new Thunder Tiger 53H Redline engine. The user-friendly layout permits fast removal of the engine by dropping the motor from underneath the main frames. Like the Vibe 90, which pioneered 140-degree eCCPM control, the Vibe 50 retains a choice of 120 or 140-degree eCCPM for the builder.*




Right: Push-Pull for all three eCCPM control servos.

Below: The new JR 8900 high-speed digital super servo is excellent for tail rotor control.




JR's Vibe 50 was designed to provide outrageous 3D flight, but in a smaller, more affordable package. "The Vibe 50 flies light and responsive," says John Adams. John added, "With the stock paddles, the flip rate is crazy – so fast, that for the first time, it was dialed down a bit. And yet the hover is rock solid."

THE VIBE 50 KIT - The model is packed in a large and colorful box, which is typical of all JR helicopters. The main reason is to protect the factory finished fiberglass canopy. The canopy is light and beautiful and the shape streamline, to cut down drag. The windshield is painted in glossy jet black. One simply adds colorful decals to make it flight ready. All parts are packaged in bags according to assembly steps. There were no parts missing and it was easy to put the model together. In total, it took 20 hours to assemble, install the radio, and perform final setup and checkout. Programming the transmitter was simple for me because I was able to copy the program from my Vibe 90 to use as the foundation for my Vibe 50 program. With the Vibe 50, I have switched to the new JR 9303 2.4 GHz spread spectrum technology radio system because it is glitch proof and the odds of being shot down by other pilots turning on their radios is lessoned.

With the Vibe 90 I had been using my old JR 9303 FM system for 4 years, and the new JR 9303 2.4 GHz transmitter has identical programming features as the old JR 9303 FM system, hence, it was easy to simply copy the settings from my Vibe 90. The 9303 is extremely easy to program and now with the added 2.4 GHz capability, the JR 9303 2.4 GHz system has become one of the most popular 9-channel heli radios for pilots. In this article of the Vibe 50 review, I will only go over the mechanics and flying qualities. In Part 2, I will go over how to program the 9303 and set up the new JR 770 3D gyro for the Vibe 50. Since the Vibe 50 uses the standard 120/140-degree eCCPM control system, what I explain regarding how to set up the Vibe 50 in Part 2 will also be applicable to other eCCPM helicopters, like the T-Rex 600 Nitro, Fury, and T-Rex 500, etc.


Continued On Page 24 . . .

# When I heard a top pro like Henry Caldwell had switched to JR's G770 3D gyro, I'd heard enough.



When Henry uses a product, you know it's gotta be good. And now that I'm flying more aggressive 3D, I wouldn't consider anything *but* a 770 3D.

First off, it's so small it'll fit into any of my performance helis—smaller ones included.

And with only a single component to deal with, it's real easy to hook up. Then, when you get it dialed in, the 770 is absolutely tops.

It holds like the heli was on rails. I like to do tailslides right into a pirouetting flip. And even though my airspeed's real high, the 770 keeps the piro rate absolutely constant.

Fact is, none of my other gyros could touch this baby.

So if you haven't tried a 770, take my—and Henry's—word for it. Head for your favorite JR® heli dealer's and grab a G770 3D right now.

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## Get the best out of your G770 3D with these great JR tail servo combos.

**THE DS8900G COMBO**
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**THE SPORT DS890G COMBO**
If you're not flying backwards at high speeds yet, here's an affordable, .09 second-fast, super accurate, standard-size sport tail servo to go with your 770 3D gyro. And it'll even handle 50-size or larger helis.

NEW!

**THE MINI S3500G COMBO**
It wasn't easy to improve on the 3400G servo with a 770 3D gyro for T-REX-type helis, but JR engineers have done it. The new S3500G boasts— get this—.06 second transit time along with big-servo precision.



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*First Ever "Inverted Landing"*

These difficult maneuvers were performed by a professional pilot for demonstration purposes only and should not be attempted.

Vibe 50 Continued From Page 21 . . .

Vibe 50 with the tail gearbox cover removed to reveal the hefty gears inside.

Precise tail rotor control achieved by using a pitchfork, which grabs the pitch slider above and below. Dual ball bearings inside each tail blade grip.

The Vibe 50 uses simple flat sideframes and it is very easy to align the frames and bearing blocks to get a square geometry. The holes on the frames are drilled accurately and all bearing blocks line up perfectly against the frame bolt holes. The Vibe 50 uses a split main gear design with a shaft driven tail rotor, like the Vibe 90. The gear mesh between the clutch pinion and the upper main gear, and between the tail pickup pinion and the lower main gear, and inside the tail gearbox, are nearly perfect right after assembly. It was not necessary to add shims on the shaft. The drive train is one of the smoothest spinning systems of all models. This enhances learning aerobatic autorotations by saving rotor inertia energy.

THE CONTROL SETUP - The kit permits choosing 120 or 140-degree eCCPM control by changing the length of two steel ball studs on the swashplate. I chose 140-degree eCCPM by using longer ball studs. JR high-end radios have built-in software allowing 120 or 140-degree eCCPM. It is very difficult to feel any flight differences between 120 or 140-degree eCCPM. I have tried both on my Vibe 90. The bottom line - when high-speed servos are used, it almost make no difference. I am using three JR 8717 super high-speed digital servos for cyclic. The JR 8717 servos are some of the fastest servos on the market. They have a transient speed of .06 second for 60-degrees travel arc. These servos also have an abundance of torque and they are designed for use in ultra high performance 90-size 3D helicopters. The 8717 servos may cost just over $100 a piece, but it is worth it, and they are housed in a heat dissipating red aluminum casing.

In the T-Rex 500 review, in this issue, we show its swashplate is connected directly to three eCCPM servos by using only a single pushrod between the servo and the swashplate. In that case, the advantage is it saves weight and reduces complexity. But the drawback is vibratory and stead loads from the main rotor blades can easily transfer directly to the servo gear train and harm the servo. Usually, in a crash, the shock of the blades can cause the servo gears to break teeth. With the Vibe 50 and Vibe 90, they use a push-pull lever in between the servo and the



JR Vibe 50 with factory finished fiberglass canopy.



swashplate. The disadvantage is extra complexity and weight, but the advantage of using a push-pull lever reduces direct feedback loading from the blades to the servos because the loads must go through the bellcrank. Furthermore, using push-pull gives more precise flight control because it provides even torque loading on the servo output shaft. With medium to large size helicopters, it is always more desirable to have push-pull. Small electric helicopters typically nix the push-pull to save weight and complexity.

The Vibe 50 is constructed just like the Vibe 90: using a full metal swashplate and the sliding washout uses a metal center block, and a metal center hub for the main rotor head. The metal swashplate has no freeplay. A metal washout slider is important because it usually has less freeplay than a plastic sliding block. The washout arms are plastic, but they are each supported by two ball bearings, so there is no play or wobble for the washout arms. A metal center hub for the main rotor head is very important because it prevents the main rotor head from wobbling on the 10mm diameter main rotor shaft. When there is no freeplay in the entire control system that runs from the servo to the main rotor blade pitch arm, then we can be assured the helicopter will obey every tiny input we tell it to. The Vibe 50 is stable in hover and feels very precise in cyclic and collective control. This is the reason why it commands a $600 price tag – quality is important.

THE MAIN ROTOR - The solid aluminum main rotor head block is very nice because it does not wobble on the rotor shaft and it sits true. The head bock is the key to solid handling. The spindle runs through the center of the aluminum head block and is supported by rubber O-rings.

Two radial bearings and one thrust bearing support each blade grip. The Bell-Hiller mixing arm is mounted on the blade pitch arm. Since the pivoting point of the Bell-Hiller mixing arm is inline with the main rotor shaft, and directly above the flybar, it therefore has zero degree Delta-3 angle. Zero Delta-3 provides no pitch-flap coupling, and some designers and pilots prefer keeping the rotor geometry at pure zero coupling angle to give uncoupled kinematics. While other designers prefer tweaking the layout to fine tune handling. I suggest leaving the helicopter as is and not modifying anything because the designers have tested their machines for optimum performance already.

In an under slung rotor design, the flybar control arm and seesaw lie below the main rotor head. The plastic flybar control arm forms a rectangular cage and is a very popular design, which is also used in all T-Rex models and in Hirobo Evo 50 and 90 models. A large hole is cut out in the aluminum head block to let the flybar tilt freely up and down, and this is why it is called a high-tilt flybar system. During flight, the flybar will probably never require that much tilting range, but at least you can rest assure the seesaw will never bump against the head block.

The little pushrod between the flybar control arm and the washout arm is a one-piece molded unit, which requires zero adjustment. The main rotor is simple and straightforward. Small details can be found in many places; for example, little retaining clips are pressed onto the pins for the washout arm links.

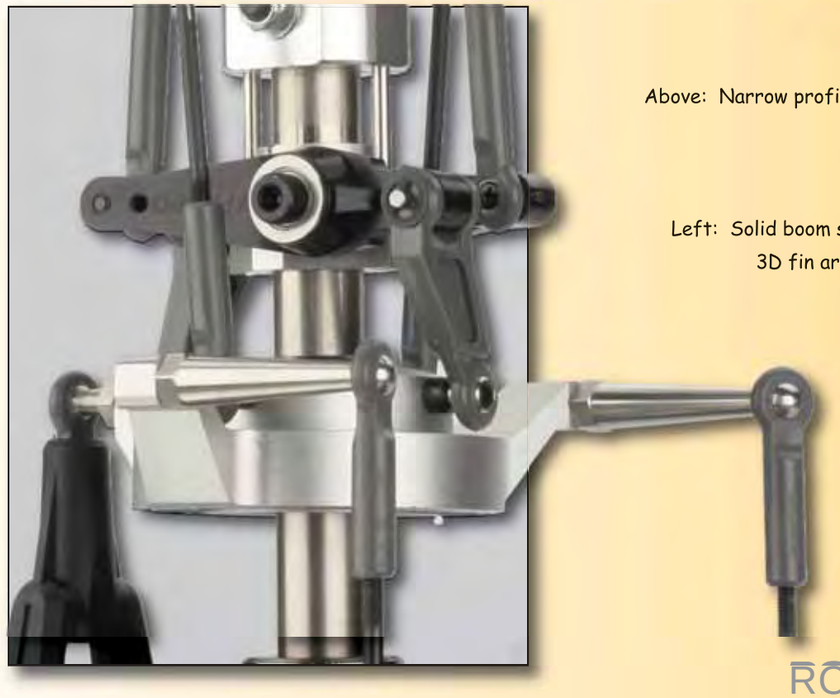
FLYING - This is where the rubber meets the road. After 20-hours of assembly and bench setup, the model hovered perfectly on its first flight. I strongly recommend spending time up front when building to save many hours of headaches later on. If everything was lined up properly during building and set up, the blades should track perfectly and require no pitch curve change. In Part 2, I explain how to do the bench setup to get a perfect first flight that requires no trim adjustments.

The engine I used was an already broken-in 50 engine from another helicopter, so after validating there was absolutely no vibration and no tracking issues, and the control sensitivity felt just right, immediately on the second flight I was able to get into aerobatic flying. The first flight was just hovering and gentle forward flight circuits to ensure everything behaved normally and there were no mechanical issues. On the second flight, the model performed loops, rolls, and some tick-tock maneuvers. On the third flight, I was doing Chaos' and Piro Flips. The control sensitivity was perfect right from the start because once you have built and set up many RC helicopters, you learn how to use similar transmitter settings for all models. I always use 25% to 30% Expo on cyclic, and +11 to -11 degrees of collective, and about +/- 30% of Hiller paddle control angle. The settings I use on the Vibe 90 translated very well to the Vive 50. The Vibe 50 with lower inertia actually felt more nimble than the Vibe 90. The Vibe 50 is almost more fun to play with, and at half the price of a Vibe 90 kit it is less intimidating to try new 3D routines. The light Hiller paddles and stiff flapping main rotor design provides very agile handling and with plenty of engine power, it is even possible to climb during a Chaos. When one has plenty reserve power, it is less fearful to bring the Chaos down to lower altitudes.

High-speed forward flight is another routine test to check for pitch-up. The model moves at a very fast pace and even after a dive with some aft cyclic stick applied, the model did not pitch up. A good set of blades is also important. The test blades used were the new 600mm Torsion Blades produced by Petr Novotny of the Czech Republic. Petr has been a European 3D Champion and his new Torsion blades are extremely stiff because they have a wood spar inside, but the chord-wise CG is kept 27% forward. These blades just became available in Europe and they will soon be available in the US. A night blade version will also become available.

The next test was some FAI type axial rolls and large loops to check cross coupling. Axial rolls were easily done without much control correction and loops required no lateral cyclic corrections. That was followed by some vertical tailslides. The JR 770 3D gyro held the tail





Above: Narrow profile canopy reduces drag.

Left: Solid boom support and skeleton 3D fin are standard.

## Key Features

- Dual stage main gear
- CNC machined aluminum head block
- Push-pull control on all cyclic servos
- Forward mount engine
- 120 or 140 CCPM control system
- Pre-painted fiberglass canopy
- Accepts 600-620mm blades
- High tilt flybar
- Pre-drilled clutch for governor magnets
- Break-away body mounts
- High-efficiency two-piece fan housing
- Hi-cyclic head for extreme cyclic response
- Driven tail - free-floating aluminum shaft
- Robust clutch, drive train from Vibe 90
- Easily removed, vibration-isolated tank
- Weight adjustable flybar paddle design
- Dual yoke T/R actuator
- FRP canopy with decals

## Equipment Used

- Helicopter kit: JR Vibe 50 glow powered 3D Pro Heli kit
- Engine: OS 50 Hyper
- Glow Plug: OS Number 8
- Fuel: Powermaster 30% nitro synthetic lube Heli fuel
- Muffler: Muscle Pipe MP5
- Transmitter: JR 9303 2.4 GHz
- Receiver: JR 9-channel 2.4 GHz spread spectrum
- eCCPM Servos: Three JR 8717 super high-speed digital
- Throttle Servo: JR 8311 digital servo
- Tail Servo: JR 8900 high-speed digital tail
- Gyro: JR 770 3D gyro
- Receiver Battery: 1500 mAh 4.8 volt
- Main Rotor Blade: 600mm Torsion Carbon Blades

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steady and the model did not weathervane. The tail rotor pushrod was mounted 17mms from the servo arm center shaft. I did have to reduce the gyro gain to avoid wagging at high rotor rpm during dives. I did not use an engine governor, so the model was hovering at around 1500 in Normal Throttle Mode, and spinning at 1880 in Idle-Up. But it over-revved to 2000 when the blade pitch was unloaded during a vertical dive. After lowering the center point of the U-shaped Idle-Up throttle curve, the rotorspeed locked itself between 1850 and 1900 throughout any throttle collective combination. At 1870 rpm, the controls are not overly sensitive. Experienced pilots may try spooling up to 2000 rpm to get some very crisp handling. When doing the rolling tick-tock, I like it to rev at about 1900 rpm. The new Muscle Pipe MP5 also helps steady the engine rpm and it is surprisingly quiet.

If you have always wanted to get a Curtis Vibe 90, but could never lay down the one grand for the kit, then the Vibe 50 would be a good alternative. It has a similar feel and look but costs less and drinks less fuel. We will continue next issue with a more detailed look at how to tweak the radio setup to achieve that "locked-on" control feel in hover and 3D. RM

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[Duncan **Osbourn**]

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# In Scale

## Cockpit Details

*When building a scale model for competition, or just for yourself, most follow the AMA 518 Rules as a building guideline. The majority of sport-type scale builders try to make the model look like the full-size by just painting the body. If you want to incorporate more detail, you'll want to use the basic static scoring 518 rules, which are broken down into these categories: cockpit, fuselage, landing gear, rotor systems, craftsmanship, finish, and markings. In this segment we'll look at detailing the interior to mimic the full-scale heli as close as possible.*

*Expert Scale Modeler - Bob Harris*

Author poses with his Bell 412, Hirobo N3 Dauphin, OH-23 Raven Hiller, and Blue Thunder.

"One good thing about detailing a cockpit is that you can use the weight of the parts to keep the center of gravity (CG) in check.

The CG of most scale helicopters is just a little in front of the main shaft."

Let's start with the cockpit. Once you perform the initial fit for the mechanics, you should then figure out how your cockpit will fit around your mechanics. You may have to change where your radio equipment (receiver, gyro, battery, etc.) will have to be moved to or hidden within the cockpit area.

One good thing about detailing a cockpit is that you can use the weight of the parts to keep the center of gravity (CG) in check. The CG of most scale helicopters is just a little in front of the main shaft. I use a small spring scale (chatillon) to both weigh the model and keep the CG correct while I am building. From time to time, during building, I hang the model from the head bolthole on the main shaft, leaving the rotor head off until the end of the build. In doing this, I can keep track of the weight and CG.

You will find that most scale bodies are tail heavy. And most of us use lead to compensate for this. A finished cockpit with a pilot is enough to bring the model into correct CG, most of the time. For those of you who do not know how to check the CG of a model, it's very simple. Hang the model by the main shaft. The rear of the skids or main landing gear should be about 1/4 to 3/8 of an inch off the table. Remember the CG is just forward of the main shaft.

Now some building tips for your cockpit. First of all, you should try to get as many photos of the full-size model as possible. Let's start with the instrument panel. Aircraft instruments are made many different ways. I will look at two of the most common type of gauges. Some mount from the front going into the panel, and some go in from the back. Both types have a flange to bolt the instrument to the panel. A front mount instrument has a body size mounting hole and a screw holds the instrument in with a nut on the backside of the panel. When installed, the flange will show on the outside of the panel.

When mounting the instrument from the back of the panel, the flange will have a tapped (threaded) hole so the flange is behind the panel. The instrument is then secured with a screw through the panel and into the threaded flange. I use mostly Vario and J'Tec scale instrument gauges. If you can obtain a photo of the instrument panel, you can make your own. We'll use the OH-23 panel as an example.

First, you need to make the panel to scale size. I used Plexiglas to make the whole panel. It is easy to cut and finish, and it can also be used as a light pipe if you want to light up your instruments. I will go into lighting in another article. Now take the photo of the gauges and cut out each gauge and glue them onto the panel in the proper location. Take a piece of thin .020 clear plastic and lay it over the panel. Cut to fit

the outside of the panel and then mark over each instrument. I use a Jiffy circle template #823 and with a fine line Sharpie I outline around each gauge.

Now take a short 2x4 and put it into a vice with the grain up. Lay the clear plastic on the wood and use a punch set. I use a VIM 79-P Hollow punch set. Find the hole-punch to fit the gauge circle and punch out the hole. Do this until all holes are cut to fit over all gauges.

You can now paint the plastic that you have just punched the holes into flat black and glue it onto the panel. If you want the instruments to have a glass face, then put another thin piece of plastic between the black painted panel and the main panel.

To make the switches and knobs I use Micro Fasteners for my small parts: like the miniature rivets for knobs, hex head bolts and many other things they sell. I use different size plastic hairbrush bristles – the kind that has a small blob on the end of each bristle, for toggle switches. When you buy a new shirt, the pins that are used to hold the shirt in shape are also good for switches.

I use all sorts of plastic to build different things in the cockpit. It is easy to cut, bend, shape and paint. CA (cyanoacrylate) will glue most plastic except Lexan, which is a polycarbonate. I also use birch plywood and ABS plastic. You can get all sorts of these type materials from Lone Star Balsa.

Another product I use for different things such as cockpit flooring and firewall is Evergreen Scale Models sheet styrene. You can find this at your local model shop if they sell model railroad products. They have a long list of different types of styrene used to make model railroad buildings and other layout items. This styrene comes in all sorts of patterns such as grooved, squares, diamond, etc.

For lightweight building parts, another source of material I use is vacuum formed plastic you get on a lot of products we use every day. This sometimes drives my wife, Barney, nuts because I ask her to save them for me. Sometimes these things sit around the house until I remember to take them to the shop. When you need a certain size and shape, you can go through your bag of plastic and maybe find a shape you can use. One example is on my Blue Thunder; in the cockpit there are two computer stations. I turned these plastic formed pieces on their side, cut off the lower side, glued in a flat face, and went to my AOPA magazine and found some avionic photos. I cut them out of the magazine and glued them on the flat face to look like a computer screen.

Seats can be made of plastic, foam balsa, or plywood. Some kits come with pre-molded seats. I cover my seats with material that looks like the full-size stuff, and if it isn't the right color I spray paint them. On my Bell 412, I made the seats out of plastic from Lone Star, put in some foam inserts to give them a cushioned look and for the terry cloth covers I took a pair of athletic socks, turned them inside out and glued them to the foam.

The next time you are at your local hobby shop, pick up some aluminum and brass round and square tubing. This comes in handy for making small parts such as rudder pedals and cyclic and collective sticks. Buy as many different sizes as you can find. One size fits inside of the next larger size. Also at the hobby shop, get some rubber boots for model car CV joints to use on things that need a rubber boot.

You can buy, from Vario and others, many plastic molded cockpit parts that you can add to all the things I have mentioned above. Cockpits are fun to make and add so much to the finish of your model. It should also help with the CG.

Size does matter . . . make it scale! RM

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Story by - James Wang

# Trex 500


## High Performance Electric

## NEW 500 CLASS ELECTRIC

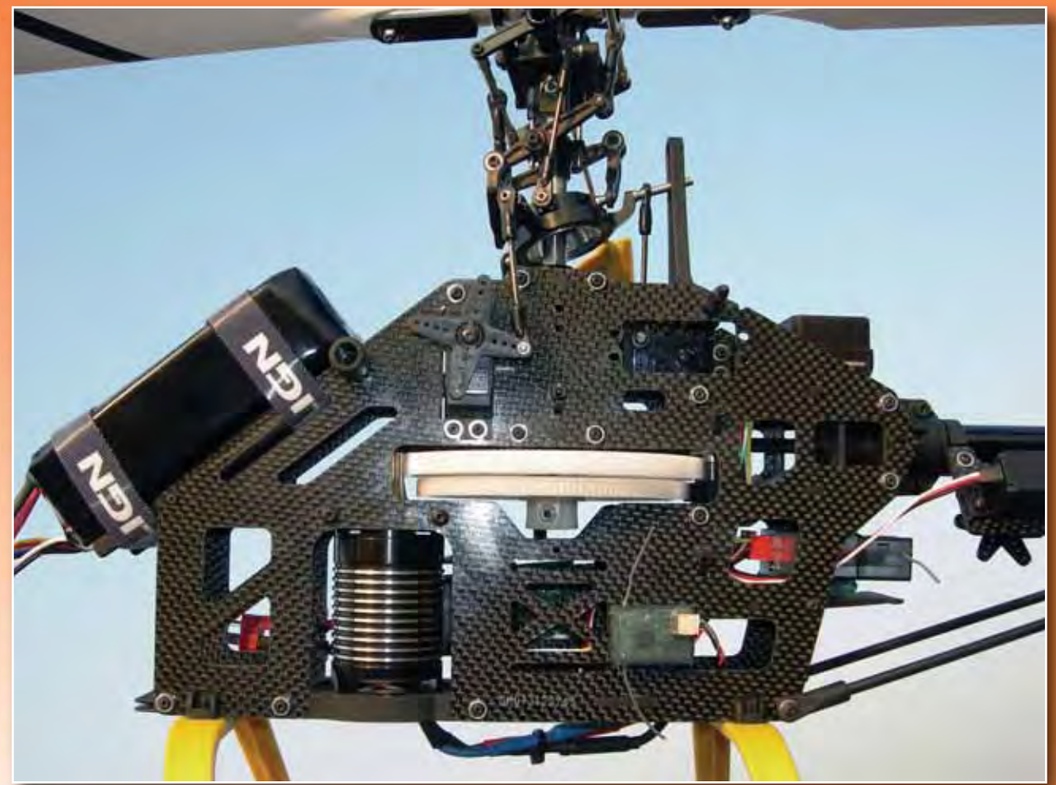
**The T-Rex 500 EP CF** is a high-end electric helicopter capable of very high-performance when powered by a 2500-mAh 6S Lithium-polymer battery pack. It comes with carbon side frames, belt drive tail rotor system, a metal swashplate and a metal main rotor head. The full CF (carbon fiber) version reviewed here includes a 500-size brushless motor and a 60 amp ESC (electronic speed controller) with a built-in BEC (battery eliminator circuit) that provides a constant 5-volt power supply to power the receiver, servos, and gyro. The street price of this kit with a pair of Align carbon main rotor blades is around $550, which is similar to the T-Rex 450SE V2, but the 500CF is about 30% bigger and heavier than the 450SE. The 500 CF uses 425mm length main rotor blades while the T-Rex 450SE uses 325mm length blades. The 500 CF has more performance than the 450SE mostly due to the 6S (22.2 volt) Li-Po battery - while the 450SE uses a 3S (11.1 volt) Li-Po battery. Many pilots enjoy the new 500 class electric helicopter because its slightly larger size makes it easier to see, handle gusty wind better, and gives more "presence" when performing 3D. The T-Rex 500 EP CF has only been out for a few months but it has already proven itself to be a top seller and top performer.

Why the new trend in 500 class helicopters? Electric helicopters first became popular with the introduction of the Kalt Whisper and Kyosho Concept EP in 1987, and the Ikarus Eco 8 in 1991. These three models had a rotor diameter of about 1 meter, which is exactly what the T-Rex 500 has. Back in the 1980's and 90's, lithium-polymer batteries were not available, so we used eight NiCd cells (total 9.6 volts) to power our electric helicopters. NiCd's have only 1/3 the energy density of Li-Po batteries, which means they have the same voltage and amp hour storage capacity, the NiCd is three times heavier than Li-Po's. Therefore, the electric helicopter must be very light and fragile to compensate for the


Left: A very complete kit. It's available with or without the Align 425mm carbon blades.

Right: The swashplate and washout geometry are also borrowed from the proven T-Rex family.


Left: The FlightPower 2500 mAh 6S Evo25 or EvoLite batteries are the perfect pack and shape for the T-Rex 500. They provide approximately 5 minutes of 3D flight time.



With the Horizon JR 2.4 Hz spread spectrum radio system, there were no radio glitches experienced, even on a carbon framed electric helicopter.

heavy battery, and the flight performance was very limited. Then came the Logo 10 in 2002, which also had a main rotor diameter of about one meter and it used 10 to 12 NiMH cells. The flight performance of the Logo 10 was slightly better because NiMH cells have about 30% more energy density than NiCd's and brushless motors became popular for R/C aircraft use, so the Logo performed better due to advancements in motor and battery technology.

Then, in 2005, Hirobo introduced the Lepton, which became the first high performance 500-class electric helicopter. The Lepton was powered by a 3S or a 4S 4000 mAh Li-Po battery pack combined with a modern brushless motor, that gave the Lepton superbly better flight performance and longer flight time than ever before in a one-meter size electric helicopter. The Lepton is a very high-end model and has carbon frames and a metal rotor head but it has a $650 price tag. Pilots that want affordable electric models generally stay with the smaller 400-class helis, such as the T-Rex 450, Mini Titan, and Gazaur Mars and Poseidon. The 400-class models do not have the presence and pilots treat them as fun novelty helis. While the bigger 600-class electric models, such as T-Rex 600, Raptor 620E and 550E, Logo 14 and Hanseleit MP offer superior flight performance but they require a much bigger and more expensive motor, ESC, and battery pack. One brushless motor, ESC, and a Li-Po pack for a 600-size helicopter can cost $400 to $500. And the equipment cost for much bigger machines like the Miniature Aircraft Ion and Minicopter Jokers are even higher. Therefore, the 500-class electric helicopter is a good compromise between the toy like mini 400-size electric helicopters and the bigger machines.

Align was very prudent to seize the opportunity to be the first to introduce a high-performance 500-class helicopter at a reasonable price. Rather than go cheap and make the entire T-Rex 500 plastic, Align prudently uses a combination of plastic parts at non-critical locations, and judiciously mixed them with metal components for strength and looks, and incorporated carbon frames to reduce weight. The T-Rex 500 also minimized technology risks by using a traditional, proven mechanical layout. The main rotor head is a shrunk down or an enlarged version of the T-Rex 600 and T-Rex 450 floating

axle main rotor head. Two plate side frames are used and the servos are mounted directly to the frames to reduce parts count and add simplicity. The standard 120-eCCPM control system is used. It does not have push-pull - instead it has a single pushrod connected between each servo and the swashplate, which gives a very direct and straightforward linkage system. It uses a single motor pinion with a split main gear and a toothed belt for main and tail rotor power transfer. This strategy ensured the T-Rex 500 could be quickly introduced with minimal bugs. The results are a straightforward model that is uncomplicated and flies well. The smart decision Align made was to jump straight to using a smaller capacity, but higher voltage, 6S Li-Po battery to obtain rocket like performance. The 2500 mAh battery delivers a shorter flight time, but the 6S (22.2 volt) battery gives fantastic acceleration and 2400 rpm to the main rotor for fast cyclic and transient collective response. If one uses a 6S 2500 mAh Li-Po battery on the Lepton instead of a 4S 4000-mAh battery, then the Lepton will have a rocket like performance, too. Since the T-Rex 500 is relatively compact and taut, the model can handle the 2400 rpm rotorspeed and 3D loads very well. Since there is plenty of power, the model was built like a miniature Sumo wrestler, quite sturdy.

All 600-class electric helicopters use regular size servos. The mini 400-class electric helicopters use mini servos. The T-Rex 500 requires medium size servos. The cutout in the carbon frame permits using servos with a length approximately 1.4 inches long and 0.6 inch wide. A standard size tail rotor servo will fit on the tail boom, so it is very easy to use a regular gyro, such as the Futaba GY400 with the 9254 servo or the new JR 770 gyro with a JR 8900 servo. Most electric helicopters require more careful arrangement of receiver and radio components and motor wirings to avoid glitches. Always keep the receiver, gyro, and antenna as far away from the motor, ESC, and battery wires as possible. Always keep these high-power wire lengths as short as possible. Use a good battery connector, such as Dean's Ultra plugs. The new 2.4 GHz spread spectrum radio systems are especially great for electric helicopters because they are in a higher frequency range and are less susceptible to motor and ESC noise. For high-power electric helicopters, I use either the JR or Horizon Spektrum radio and receiver system instead of a traditional 72 MHz system. The receiver antenna for a 2.4 GHz system is much shorter, which eliminates trying to route a long antenna.

The first time I saw a T-Rex 500 CF fly, it was in the hands of Lukas Riva: a top ranking 3D Master pilot. Lukas is only 17 years old, but he has hundreds of hours of experience with Align helicopters because he is one of the top Align sponsored pilots. Lukas lives near Lucarno, Switzerland, but he travels around the world from Las Vegas to England to Taiwan to compete in 3D. He does beautiful, and just as aggressive, 3D with his electric T-Rex 500 CF as with his nitro-powered T-Rex 600. Usually, the Rainbow maneuver requires a tremendous power-to-weight ratio and is usually performed using a powerful helicopter like a strong 90 or 50-size nitro model. But Lukas does the Rainbow with his T-Rex 500 effortlessly. After watching his demo, I decided to try out a T-Rex 500 CF to see if it really flies that good or if Lukas had some secret, modified motor.

I use the stock Align brushless motor and 60 amp ESC that came with the T-Rex 500 CF kit. The battery I chose was the brand new FlightPower Evo Lite 2500-mAh 6S and the FlightPower Evo 25 2500-mAh 6S Li-Po batteries. The performance is indeed impressive. With a fully charged 2500 mAh 6S battery pack, I can obtain 5-minutes of hardcore 3D flight. I strongly recommend the FlightPower Li-Po battery pack because a high-quality battery can make a big difference in flight performance for any electric helicopter. A good Li-Po battery allows large current draw. There can be as much as 20% to 30% in flight performance difference between using a very high-quality Li-Po battery pack, such as FlightPower, versus a low quality or an old Li-Po battery. If you want ultimate performance for any electric helicopter, then it is worthwhile to invest in good Li-Po battery. A good 2500 mAh 3S Li-Po, such as the FlightPower Evo Lite, Evo 25 or Evo 30 series costs around $70 to $80 per pack. A 2500 mAh 6S pack is double the cost. This may sound expensive, but with care, a high quality pack can take about 80 to 100 charges before the performance degrades significantly. Usually, after 50 charges, the battery capacity will reduce by 5% to 10%. After 80 to 100 flights, the capacity will reduce by another 10% to 15%. This is assuming the battery has not been abused, nor over-drained, and has been balanced every 5 to 10 flights. (In the January 2008 issue of Rotory Modeler, I explained the characteristics of Li-Po cells and how to take good care of them.)

For all-out 3D flying I recommend getting the Evo 25 or Evo 30 series Li-Po battery for the T-Rex 500 CF because these two batteries are designed to handle 25C and 30C continuous discharge current. For example; 25C means 25 times the 2500 mAh capacity rating, which means 25 times 2.5 amp hour equals 62.5 amps of continuous current draw. That is a lot of current. The Align ESC that comes with the T-Rex 500 CF kit is rated at 60 amps continuous only. Even during 3D with collective and cyclics maxed out abruptly, the

The T-Rex 500 main rotor head is near identical to the bigger T-Rex 600 and smaller than the T-Rex 450 design.


Straightforward tail rotor gearbox with a toothed belt inside.

# Trex 500



T-Rex 500 only draws about 50 amps. The FlightPower Evo Lite series is rated at 17C to 18C, which is more than enough for 3D flying and the advantage of using Evo Lite, is the battery is about 10% lighter and smaller volume than the Evo 25 and Evo 30 series batteries. The Evo Lite is a little less expensive. So for most flying I use the Evo Lite because with lighter weight, you also get longer flight times. If just cruising along in circles at half throttle then it is possible to get 8 to 9 minutes of flight with a 6S 2500 mAh Evo Lite battery pack. I also strongly recommend getting a FlightPower Li-Po balancer to balance the battery after every five flights, while charging the battery.

I tested a new set of 425 mm V-Blades that are specifically designed for the T-Rex 500, and they performed with excellent results. Any rotor blade that Vic Campbell has designed always performs flawlessly. In conclusion, you will be delighted by the flight performance of this little rocket ship. The parts quality is excellent and the price is reasonable. The best thing is it comes with a gorgeous pre-painted fiberglass canopy. The canopy shown in the picture is exactly how it comes from the factory. The T-Rex 500 fits perfectly between the low cost mini electric helicopters and the lofty bigger electric models. The T-Rex 500 is compact but the flight performance is comparable to any good 50-size nitro helicopter. It can Tick-Tock non-stop, and perform low level Chaos maneuvers with plenty of power margin to easily bail out in the event of an emergency. I bet there will be a flood of new 500-size electric helicopters on the market next year. See you next month. RM

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*ALAN SZABO JR.*



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# FOR STARTERS

## Going It Alone . . .

**Tony Iannucelli**

***Just about everything*** says, don't! It's too difficult. It's too complicated. It's too expensive, frustrating, and time-consuming. Learning to build and fly model helicopters can be all of those things - if you go it alone. That's the usual story. But not necessarily, not anymore.

After a couple of attempts over the past 20 years, I decided to try helicopters, one more time. It seemed everything was getting more sophisticated in our hobby, and the internet was a great source of information that we never had before. An occasional magazine article is often very helpful, pales by comparison with the thousands of pages available on the web. So let's see - here is what you can do . . .

Step One - Get a flight simulator. I actually have three. It started with a little stick figure heli, and it said I could learn to hover with it. I did. Next, I wanted to get a better simulator. The figure on the screen looked and sounded like a heli now.

Step Two - Read everything. Get Rotory, get some back issues, get on the web, join the forums. Listen, read, and compare.

Step Three - Buy the equipment. Go with a 450-size electric or 30-size nitro. They fly well, they are easier and faster to repair, you can use standard non-digital servos and cheap gyros. It's almost a no-brainer. And they all seem to fly well and hover easily.

Step Four - Put it all together. Helis are really easier than airplanes, if you think about it. No sanding. No painting, unless you want to. No covering. Finished in a few days.

Step Five - Setup. A little more complicated, but do one thing at a time. Aileron, elevator, and throttle - pretty much the same as an airplane. Collective, well just follow the book that came with the heli, it will all make sense. Gyro...er...ah, re-read that one a few times, but keep it simple and get a heading hold gyro if you can afford one.

Step Six - Take it to the field. Bring a fiend. Maybe even just the soccer field at first, or a big backyard. Try to reach a small goal each flying session. Five second hover - 10 second hover. A little more each time out. Ninety degree hover, nose-in, fly-arounds, keep it going, and take your time.

Step Seven - Try to get better at it. Keep flying, the more often, the better. When it rains or if it's too cold to fly, use the simulator. And that's where I am now. Twenty years later, I can now hover and fly helis comfortably .

If you can't find a local flying field or a heli partner, don't let that discourage you. Not only can you do it alone, you can be successful at it, as well. In addition, you need to build your own helis to understand how they work, and learn how each part functions. You need to start your own engine, and program your own radio. Flying is a skill that can be developed and it can be developed painlessly on a flight simulator. When you change the parameters on a simulator, and watch what happens to the helicopter without breaking it, you learn. To be proficient in any skill, you have to practice. All aspects require practice, not just the time on the sticks. Do it yourself, it is far more rewarding, informative, and fun. Best of all, the sense of self-accomplishment is a reward in itself. RM

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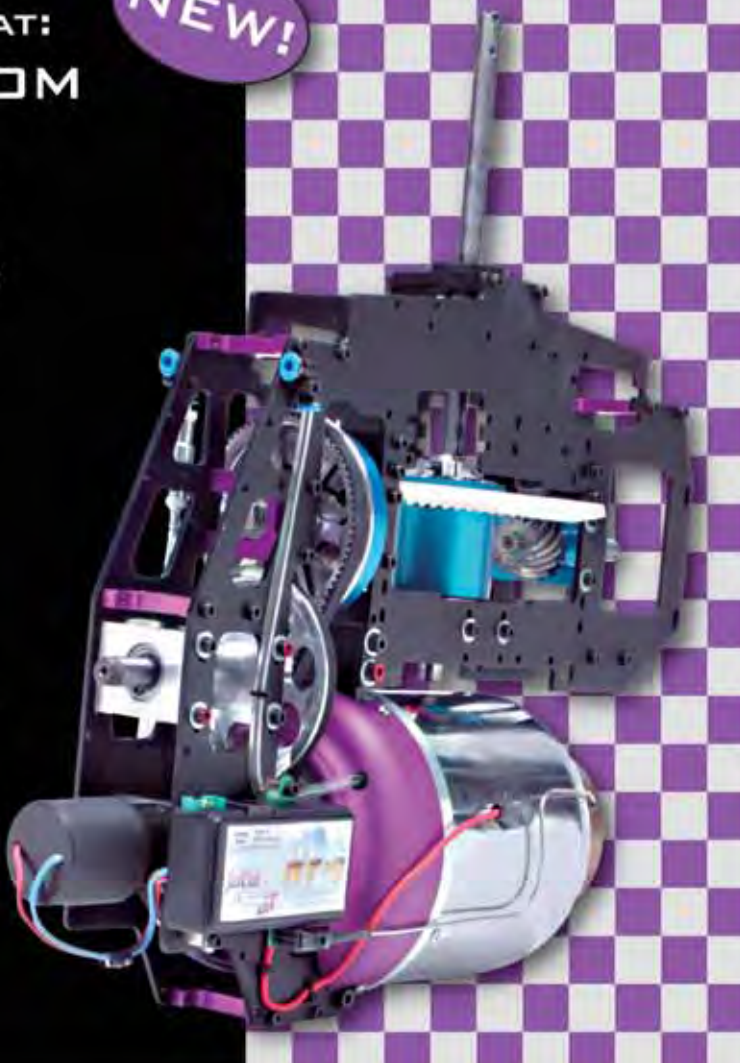

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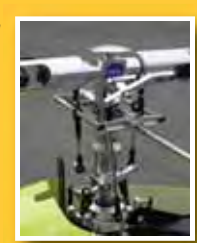

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| | |
|---|---|
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| Bore: | 22.5 mm |
| Stroke: | 21.8 mm |
| RPM: | 2k-21k |
| Output: | 2.1 bhp |
| Weight: | 13.40 oz. |

3 YEAR Limited Warranty

Your engine is guaranteed to be free from defects in materials and workmanship. Furthermore, warranty does not cover normal wear and tear, crash damage, and or improper use. Warranty is non-transferable, only original purchaser can obtain service. Purchase must be made from a Ace dealer subject to verification.

ACEAD0603K3

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RL- Hi-Flow » TTR9722

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Rotory Debut

# A Main Hobbies ProTek R/C 6S Li-Poly 30C Battery Pack (22.2V/2200mAh)

This is the ProTek R/C 6S 2200mAh, 30C Lithium Polymer battery pack. This pack has no connectors installed and comes with a 4-pin Align/E-Flite style balance connector. This powerful Li-Polymer battery pack has a powerful punch with 22.2V and 2200mAh run time at a constant discharge rate of 30C!

This lightweight Li-Poly 30C battery pack is designed to fit radio controlled planes and helicopters that require a 6S 2200-2500mAh battery pack, such as the Align T-Rex 500. These batteries are a true 30C battery pack and weigh only 360 grams. With a full 30C discharge capacity and lightweight, these batteries are a power house for the T-Rex 500 helicopter!

Unlike most other Lithium Polymer batteries, these batteries can be charged at up to 2-times the rated current, or 2C! If your charger is capable, you can charge these batteries at up 4.4A!

CRASH Protection Guarantee!

This battery pack is covered by the ProTek R/C manufacturer "Crash Protection Guarantee"! If you crash your vehicle, helicopter or airplane badly enough to damage the battery pack, you can send the damaged battery pack back to A Main Hobbies and purchase a replacement battery for 50% off the regular sale price!

For more information Visit:
www.amainhobbies.com

## With Crash Protection Guarantee!

Specifications:

* Type: Lithium Polymer
* Capacity: 2200 mAh
* Voltage: 22.2V nominal
* Connector Type: None (12 GA Wire)
* Balancer Type: Align/E-Flite compatible
* Number of Cells: 6
* Weight: 360g
* Configuration: 6S1P
* Dimensions (WxLxH): 45 x 117 x 36mm
* Maximum Charge Rate: 2C (4.4A)!
* Maximum Continuous Discharge 30C (66A)
* Maximum Burst Discharge: 60C (132A) for 3 seconds


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# Ace / Thunder Tiger
# TG 6000 Heading Lock Gyro
# C0915 High Speed Micro Servo

The TG-6000 is a high performance heading lock gyro. Use of the latest Piezoelectric Vibrating Gyroscope sensor eliminates the need for rudder trim changes in flight and provides unmatched performance. It is perfect for micro electric powered R/C helicopters. For beginner, it will greatly reduce the learning process; for experts, it will provide the performance you require. Included with the TG6000 gyro is a high speed Ace R/C C0915 micro servo. Transit time at 4.8V (sec/60°) is .095. TG6000 comes individually or as a set. Gyro with servo (ACE8073), or individually as TG6000 Heading Lock Gyro (ACE8072) or C0915 high-speed servo (ACE8131).


Features:

- Heading lock mode and normal mode
- Piezoelectric Vibrating Gyroscope
- Remote-controlled gain
- Analog/Digital servo compatible
- End point adjustment
- Simple wire connector for easy installation
- Small and light weight

Specifications:

| | |
|---|---|
| Item | ACE8072 |
| Product Name | TG6000 Heading Lock Gyro |
| Control | Digital Proportional Integration Control |
| Sensor | Piezoelectric Vibrating Gyroscope |
| Voltage | DC 4.8~6.V |
| Operation Temp. | -10 ~ 45°C |
| Dimension (mm) | 25.9x24.9x7 |
| Weight (g) | 13.5 |

| | |
|---|---|
| Item | ACE8131 |
| Product Name | C0915 High Speed Servo |
| Bearing | 1BB |
| Dim. LxWxH (mm) | 22.1x11.4x23.6 |
| Weight | .32oz. |
| Torque | 20.8oz. |
| Voltage Range | DC 4.8~6V |

**ACE8073**
TG6000 Heading Lock Gyro w/C0915 High Speed Servo

MAP: $72.99

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## www.acehobby.com

# Phazor 600

## An Electric That Delivers .90 Performance

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Break-a-way Canopy Tabs

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## Phazor features

• Dual Stage Main Drive (DSMD). The DSMD gives you flexible high resolution gearing allowing you to balance power and flight time. With this drive line you can run any brushless motor from 300kV up to 2000kV and set it up on any battery configuration from 6S to 12S. Thus the Phazor 600 is a flexible platform allowing you to optimize today's and tomorrow's battery, ESC and motor technology.

• Modular Composite Frames and 7075 Aluminum Screws. The Phazor 600 frames are beefy; available in Carbon Fiber and G10. Our competitors skimp on frame thickness to save weight, but sacrifice crash durability in the process. Instead, we chose to use 2mm thick frames. To reduce weight, we used 7075 aluminum caps screws throughout the frame assembly. The result is a very durable frame set that will stand up to the demands of serious 3D pilots. Also the Phazor 600 frames are modular which will allow for future conversion to other power plants such as Nitro.

• Breakaway Skid Pads and Canopy Standoff Tabs. These inexpensive components are designed to give way during a crash in order to reduce or even eliminate damage to more expensive components.

• High Center of Gravity. We've mounted the motor with the shaft pointing down. The servos are mounted in a well protected area above the boom and the battery is mounted vertically in the front. The result is a high center-of-gravity that makes for smooth transitions between maneuvers.

• 120 Degree CCPM Aluminum Swashplate with push/pull servo linkages.

• Aluminum Bearing Blocks

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- One-Piece Metal Tail Case for added strength
- Dual bearing autorotation unit
- Fully ball raced (33)
- Optimized CCPM Geometry for precise control
- High quality carbon enhanced FRP main blade

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Beam Heli KIT

Direct Drive tail drive pulley system for reduced noise and drag

Main Rotor Head

CNC Aluminum Rotor Head assembly complete with High-G 3D thrust bearings and dampeners.

Tail Drive System

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Main Blade

High quality carbon enhanced FPR main blade

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(KITS INCLUDE FIBERGLASS GEL COATED CANOPY)

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(29.6V) ran in series

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## Quick Bat 50 Nitro

Kits starting at $449.99

## Quick Bat 70 Nitro

(Not pictured)

Kits starting at $549.99

## Quick Octane Bat 20cc V2

Kits starting at $649.99

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Tahmazo

# PRODUCT SHOWCASE

## Tahmazo T15 Power Up AC/DC charger $149.99

The Tahmazo T15 Power Up AC/DC charger is the most advanced charger available today. With the versatility of its AC/DC power interface and its internal cell balancing technology high performance battery charging has never been easier.

The T15 AC/DC can be powered with DC 11-15v or AC100-240v* wall outlet. The T15 will charge Nicad,NiMh, Lithium Polymer, Lithium Ion and Lead-acid batteries up to a maximum current of 5amps.

The features of the T15 AC/DC Power Up charger are:

- Input power from 12v lead acid battery, DC11-15v power supply or AC100-240v wall outlet
- Capable of charging 1-14 Nicad/NiMh cells, 1-6 Lithium cells, 2-12v lead-acid batteries
- Adjustable charge (0.1-5.0A) and discharge current (0.1-1.0A)
- Easy to program with advanced microprocessor controlled charging and discharging system
- Programmable cycle mode (charge to discharge/discharge to charge) up to 5 cycles for Nicad/NiMh batteries
- LCD with backlight
- Audible function alarm
- Built-in safety features
- Capable of displaying charging data such as individual cell voltage when interfaced with Tahmazo T6B Active Balancer

* Power Cable not included


Rotor Debut

*Dealer Inquiries Welcome*

# Transmitter / Receiver Battery

## Charger - Analyzer Conditioners

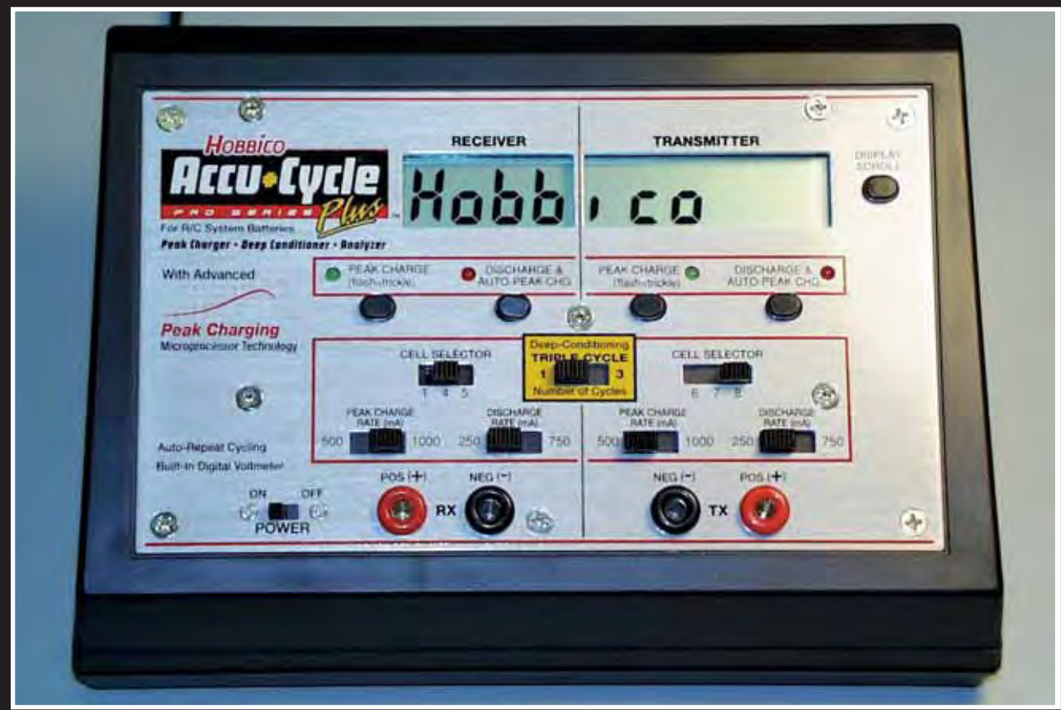
Mike Mas


**Nicad Batteries**, for the most part, are one of the most dependable components of the radio system. However, internal problems with Ni-Cad batteries may develop from lack of, or improper use. When your model sits for weeks or months - it self-discharges, at times to a point too low for the cell(s) to fully recover. Another problem is when you only fly one or two tanks then recharge the cells for another 15 hours, bringing your battery to an overcharged state.

If safety and longevity of your model is important, you should seriously consider a good Charger/Cycler for your support equipment. Look at it this way; if it saves you one crash, it pays for itself and you don't have to rebuild the model.

Prior to Charger/Cyclers coming about, I made my own. I used a standard television set, a comfortable couch, and my model. I had an l.e.d. battery monitor, which would blink when the battery needed recharging. I would turn on the TV, and as I watched my favorite show for an hour, I would "wiggle" the sticks of the transmitter to "cycle" the batteries down and check just how long they would last.

Hobbico




When I began to fly for manufacturers, I changed my entire manner of flying. While I won't get into all the details of my "Change of Life," I made drastic changes in the way I flew helicopters, as well as the way I cared for them. Right about that time, I purchased my first "Charger/Cycler." The security of my batteries was now more important than ever since I was flying in public areas where I had little control of the environment.

In this article we'll talk about and discuss a number of different units available and their capabilities. My focus in this article will deal with the vast assortment of Charger/Cyclers available thru Hobbico. Keep in mind that there are numerous other units available from other manufacturers. We will look at those in upcoming issues.

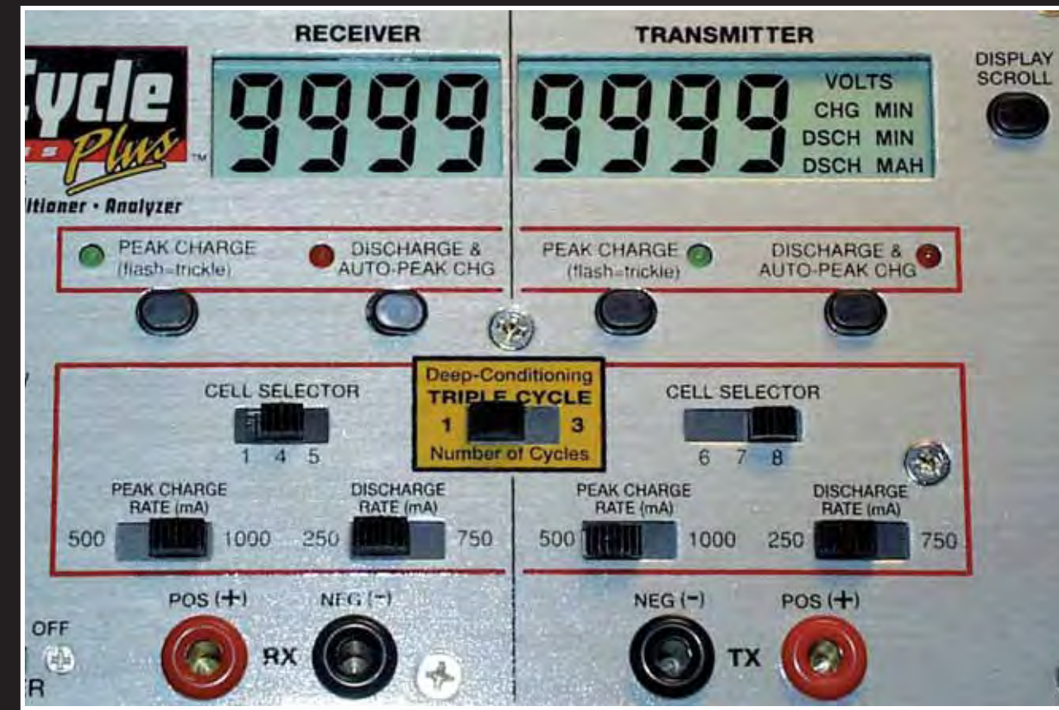
I would like to start with the top of the line Accu-Cycle Plus, from Hobbico. Accu-Cycle Plus comes with an external 110V AC power adapter. Also available, and shown in this review, is a optional DC Power Converter, which allows for portable operation when AC power is not available.

The Accu-Cycle Plus is a high performance digital battery charger/conditioner/analyzer designed for nickel-cadmium (NiCd) radio control transmitter and receiver packs and single-cell batteries. Accu-Cycle Plus offers two completely separate analyzers in one package. It can independently peak charge, discharge, or cycle receiver and/or transmitter batteries at the same time. Accu-Cycle Plus provides valuable information about the condition of each battery through two easy-to-read liquid crystal displays (LCD). The display includes battery voltage, charge time, discharge time, and discharge capacity.

I found the Accu-Cycle Plus user-friendly. Within minutes you're in complete control of your battery maintenance. The Accu-Cycle Plus uses standard banana jacks for easy connection to charge leads. You can make your own by cutting the wires on an old charger and connecting them to the banana plugs, or you can purchase a "ready to use" lead set from Hobbico. If you're not into wiring and electronics, I recommend the made up lead sets. I have listed them in this article.

Accu-Cycle Plus utilizes the "-deltaV" method for detecting peak charge. Using this method, the cycler monitors battery voltage during charge, noting when the maximum battery voltage occurs and then terminates the fast charge.






Once a NiCd battery has reached peak charge, or maximum total voltage, the voltage will then begin to decrease if left in charge mode. The "-deltaV" method of detecting peak charge is accomplished when the system notes when this decrease in voltage occurs and terminates peak charge when the voltage per cell decreases by 32mV. If a condition exists causing peak charge to be undetectable, such as a defective battery pack, Accu-Cycle Plus has two safety features, which will terminate the fast charge. They are: If the voltage of the battery reaches the equivalent of 1.74V PER CELL, fast charge will terminate. Also, if after 120 minutes, peak charge has not been detected, fast charge will terminate.

Accu-Cycle Plus provides two peak charge rate selections, 500 and 1000mA for quick-charging transmitter and receiver batteries. As mentioned, using the "-deltaV" to detect when a battery's voltage has reached peak charge, the Accu-Cycle Plus automatically switches down to trickle charge after peak has been detected, so your batteries always receive a full charge.

Accu-Cycle Plus provides two discharge rate selections, 250 and 750mA for both the transmitter and receiver batteries. Accu-Cycle Plus automatically terminates discharge mode when your battery voltage drops to a predetermined value. After discharge is complete, Accu-Cycle Plus will automatically switch back to peak charge mode, again charging your batteries so they are ready for use.

All your battery's discharge data will remain on the display after discharge is complete for your convenience. Accu-Cycle Plus provides two options for cycling your batteries. You can set the cycler to perform just one complete cycle, as is normally done when evaluating regularly used batteries. Or you can choose to use the Deep-Conditioning "Triple Cycle" feature, whereby the unit will automatically cycle your batteries three times in succession, displaying on-screen the data from the last cycle. This is helpful for reviving old batteries or breaking-in new ones, as they can sometimes require multiple cycles to increase storage capacity to come back up to safe operating condition.

Cycling is the process of charging and discharging batteries to precise specifications, to gain maximum effectiveness out of your batteries. Cycling NiCd batteries at least once a month can help them achieve

# Accu-Cycle


The Hobbico Pro Series "Accu-Cycle", like the "Accu-Cycle Plus", is a digital battery charger conditioner analyzer designed for nickel-cadmium (NiCd) and nickel-metal hydride (NiMH) radio control transmitter, receiver, and individual batteries. It too can independently charge, discharge, or cycle receiver and transmitter batteries at the same time.

The Accu-Cycle provides information about the condition of each battery through two easy-to-read liquid crystal displays (LCD). Unlike the Accu-Cycle Plus unit, the Accu-Cycle is not processor controlled. It does not offer the digital volt meter, nor the ability to display "charge minutes." In addition, the Accu-Cycle is a "one cycle" system unlike the Accu-Cycle Plus which will cycle three times, automatically.

CYCLING BATTERIES

Cycling with the Accu-Cycle is accomplished by fully charging batteries, then discharging them down to a predetermined cut-off voltage to determine the discharge mAh. After discharge is complete, the Accu-Cycle will automatically switch back to the charge mode, recharging your batteries so they are ready for use. Your battery's discharge data will remain on the display after discharge is complete, for your convenience.

Unlike the Accu-Cycle Plus, which uses the "-deltaV" method of detecting peak charge to switch over to a "trickle charge", the Accu-Cycle just uses an internal timer to automatically switch from a constant charge rate over to trickle charge after 15 hours.

The display on the Accu-Cycle allows you to view your battery's elapsed discharge time in minutes (to tenths of minutes) and the actual battery capacity provided in milliamp-hours (mAh). Simular to the Accu-Cycle Plus, you can use the time data to determine the total minutes of use your batteries can supply under typical applications. The 250mA discharge rate will most accurately determine the length of time your batteries will power your system. If your battery provides less than 70% of its rated capacity after a complete cycle, a problem may exist with that battery.

Charge Rate (mA) x Charge Time (hours) = Input Energy (mAh)
Example: 125 (mA) x 7.25 (hours) = 906 (mAh)

Fast Charge Termination: 15 Hour Timer Output Connections:
Transmitter Charge Rates: 50, 125 mA
Receiver Charge Rates: 25, 50, 125 mA
Discharge Rates: 250, 500 mA
LCD Readout: Milliamp-hours and elapsed time in minutes

Part # HCAP0260



## Accu-Cycle Plus - 12 Volt Supply


Shown is the Accu-Cycle Plus 12-volt power supply to enable the use of the Accu-Cycle Plus at the flying field.

their maximum rated capacity and life span. If unused for a long period of time, rechargeable batteries may develop a condition where they will not adequately accept or hold a charge. Occasionally, a battery with this condition may be revived after several cycles, but not always. New batteries often require a short break-in period prior to use before they will perform to their rated capacity. This is not unusual. Cycling is the best way to break-in or revive a battery pack. This is where the Accu-Cycle Plus really shines because you can triple cycle your batteries totally unattended.

To properly cycle your batteries, you need to remove any existing charge that may remain on your batteries. This is accomplished by simply pressing the "Discharge & Auto Peak" button. After discharge is complete, your batteries will be switched automatically to the quick-rate peak charge mode, and become fully charged. After charge mode ends, if you chose to do only a single cycle, you will have to manually place your batteries back on discharge again by pressing the "Discharge & Auto Peak" button. If you chose to use the deep conditioning triple cycle feature, Accu-Cycle Plus will handle all operations automatically. After discharge cycle or cycles ends, the complete cycle data for your batteries will be displayed on the LCDs.

Accu-Cycle Plus will display data at all times during operation and hold the data on-screen after cycling is complete. When the TRIPLE CYCLE switch is in the "3" position however, data gathered during each cycle will be displayed during each respective cycle, but only data from the final cycle will be held on the display after cycling is complete.

Accu-Cycle Plus' display is split into two screens; the left side is for receiver batteries, the right for transmitter batteries. The displays allow you to monitor your battery's voltage, charge time, discharge time, and discharge capacity. Pressing the "Display Scroll" button anytime allows you to view any one of the four available display selections on the LCDs:

VOLTAGE: Active when "VOLTS" is visible on the LCD. Two on-board digital voltmeters, one each for the Rx and Tx sides, display the voltage of each battery. Keep in mind that when in peak charge mode, the voltage values on the display will be slightly higher than the actual voltage of the batteries.

CHARGE MINUTES: Active when "CHG MIN" is visible on the LCD. Accu-Cycle Plus will track the time in minutes in which your battery is in fast charge mode (to tenths-of-minutes). The up-timer begins when the respective Peak Charge button is pressed, and ends when peak charge is

# R/C Multi-Charger


The Hobbico Multi-Charger (#HCAP0100) is an all around charger that may be used for many applications. Due to the Multi-Chargers numerous Millamp charge settings, the unit offers "Quick Charging" capabilities as well as extended "trickle" charging.

Two of the four separate charging stations offer the selection of 10-25-50 mA settings, which are great if you would like to just leave the charger on at all times to make the model "ready-to-fly". I recommend that as you plug in the chargers, you first use the 50mA setting. Once the batteries are charged (10-15 hrs), you switch it over to the 10mA setting for continued charging.

Standard chargers supplied with radio systems offer 50-100 mA output, which if left on charge in excess of 10-15 hours may actually damage the cells by overcharging.

The Multi-Charger also has two quick charge settings that offer up to 500ma for quick 1-2 hour charge times. Also, without unhooking the charging leads you can simply change the charge rates.

In addition to airborne battery packs, the Multi-Charger may also be used for charging up your ni-cad glow batteries. Any combination from 1-10 batteries may be charged on the Multi-Charger.

Hobbico Ready-To-Use Charge Leads

HCAP0101.....Futaba J Tx and Rx leads, except 9VAP
HCAP0102.....Futaba J Tx and Rx charge leads, 9VAP only
HCAP0104.....Airtronics/Sanwa Tx and Rx charge leads
HCAP0105.....JR Tx and Rx charge leads
HCAP0106.....Hitec Tx and Rx charge leads
HCAP0108.....Charge leads, banana plugs to alligator clips
HCAP0110 .....9V-style Tx, Futaba-J Rx charge lead
HCAP0310.....Banana Plugs (3 pair)
HCAP0320.....Heavy Duty Banana Plugs (2 pair)



detected and charge is terminated. This feature can allow you to get a feel for how long it normally takes to fast charge your batteries after normal use. If the charge time is substantially different than what you normally get, you should be alerted that perhaps something unusual is occurring with your battery or something prevented it from receiving a full charge. You might try cycling the battery again to verify its condition prior to use.

DISCHARGE MINUTES: A count-up timer is used to track how many minutes it took to discharge your battery, active when "Dsch Min" is visible on the LCD (to tenths-of-minutes). Once the respective Discharge & Auto Peak Chg button has been pressed, the timer will begin to track the time until the proper discharge cutoff value has been reached, where discharge will terminate and the timer will cease count.

After a full charge has been given to your batteries, followed by a discharge, you can use the "DSCH MIN" data to determine the total number of minutes that your batteries can supply power during typical applications. Many transmitters and receivers will discharge batteries at approximately 250mA. Therefore, using the 250mA discharge rate selection will provide the most realistic length of time your batteries may power your equipment during normal operation. Also, after batteries have been partially used in your transmitter or receiver, you can determine the operational time remaining in your battery by discharging them at 250mA and noting the "DSCH MIN" displayed after discharge is complete. This can help you get a feel for how much energy your batteries use at the field during the day.

The Accu-Cycle Plus also incorporates a 750mA discharge rate designed to simply provide a faster method for discharging your batteries. This is great to just knock the charge out of the batteries so you can proceed with the normal cycling. Keep in mind that very few transmitters will discharge at such a high rate. So, discharging at 750mA will cause the "DSCH MIN" time to be much lower than what you will likely see with your radio.

DISCHARGE mAh: Active when "DSCH MAH" is visible on the LCD. Accu-Cycle Plus can show the actual discharge capacity in milli-Amp-hours (mAh) supplied by your battery. Once the respective Discharge and Auto Peak Chg button is pressed, Accu-Cycle Plus will track the discharge capacity provided by your battery. Once the pre-set discharge cutoff voltage for your battery is achieved, discharge will terminate and the discharge mAh data will remain on the screen.

All batteries are rated by their manufacturer for the amount of charge they can hold, rated in mAh. You can compare the "DSCH MAH" data displayed by Accu-Cycle Plus to the mAh rating of your battery (usually printed on the battery) to determine the condition of your battery. If the LCD shows your battery provided less than 70% of its rated capacity after a complete cycle, a problem may exist with that battery. To determine the 70% capacity mark for your battery, simply multiply its rated capacity by 0.7. In other words, if you have a 1000 mah battery, the cycler should show at least 700 mah in the Discharge mah display.

It's important that you select the proper number of cells for the Accu-Cycle Plus to work properly. I have provided a simple chart to determine the number of cells in your pack.

1.2V battery = 1 cell
4.8V battery = 4 cells
6.0V battery = 5 cells
7.2V battery = 6 cells
8.4V battery = 7 cells
9.6V battery = 8 cells

Accu-Cycle Plus' discharge circuits will discharge your batteries down until a voltage equivalent to 1.05 volts per cell is reached. This corresponds to cutoff values established by many major NiCd cell manufacturers. It's also important to note that some transmitters may contain a diode in their charge circuitry, which will not allow you to discharge the batteries while they are connected to the transmitter. If you have such an occurrence, the best option is to remove the battery from the transmitter and connect it directly to Accu-Cycle Plus.

Due to the higher discharge and charge rates used by Accu-Cycle Plus, the batteries become slightly warmer than usual while being cycled. A short cool down period has been designed into the Accu-Cycle Plus software to help keep your batteries as cool as possible. This cool down time of 10 minutes will occur between discharge and peak charge periods, beginning when discharge has

# Quick Field Chargers


The Hobbico "Quick Peak" charger is one of my favorites for field use since I almost never run down the transmitter batteries. Therefore, a single small package like this unit is ideal.

The Quick Peak" has an output of 750 Ma, so in most cases airborne pack recovery is less than an hour since the cell should still have a fair charge when you recharge.

The "Quick Peak" charger, like its big brother ACCU-Cycle Plus charger, uses a "-delta V" peak sensing circuitry so you won't have to worry about overcharging the cells. In addition, should something be wrong with the cells, the charger will automatically switch over to a trickle charge after 90-minutes, regardless of what the cell voltage is.

The "Quick Peak" charger has a power on LCD as well as a fast charge & trickle LCD (flashes).

Part# HCAM3005

The Hobbico Pro Series "Quick Field Charger" (#HCAM3000) uses state-of-the-art electronics to provide numerous features for a field charger. The Quick Field Charger allows you to fast charge partially or fully discharged 4.8-6.0 volt receiver (Rx) and 9.6 volt transmitter (Tx) nickel-cadmium (NiCd) batteries in about an hour. The charger uses Negative Delta Peak Sensing to determine when a battery has reached full charge to terminate fast charge and automatically go to trickle charge. During fast charge, the battery voltage increases slowly until it reaches full charge. At this time, the battery voltage begins to drop. The Quick Field Charger senses this and automatically shuts down the fast charge circuit to return to a safe trickle charge mode. A second level of protection is provided to automatically discontinue charging after 90-minutes should peak charge not be detected. The Quick Field Charger may also be removed from its case and mounted directly to a flight box. In addition, you can monitor the charge voltage of your transmitter and receiver batteries through the voltmeter monitor jacks with any voltmeter such as the Hobbico Digital Voltmeter Mk II (HCAP0355).


## Nickel-Cadmium (NiCd) vs. Nickel-Metal Hydride (NiMH) Batteries

The Accu-Cycle and the Accu-Cycle Plus may be used to cycle NiCd or NiMH batteries. These two battery types are quite different in chemical composition and have different charge and discharge requirements. NiMH batteries cannot handle the high rate charges or discharges that many NiCd batteries can. Many modelers use high rate, peak detection or time-controlled chargers to charge NiCd batteries. Such chargers are NOT recommended for NiMH batteries. NiMH batteries also have approximately twice the self discharge rate of NiCd batteries when in an unused state. It is recommended that when charging and discharging Nickel-Metal Hydride batteries that you use a low charge and discharge rate.

## ACCU-CYCLE PLUS CYCLER SPECIFICATIONS

Physical dimensions: 8.0 x 5.0 x 3.4"
Compatible Batteries: nickel-cadmium only (NiCd)
Number of Rx Cells: 1, 4 or 5 / Tx cells = 6, 7 or 8
Battery Capacity Range: 250-2000mAh
Charge Termination Method: "-delta V" peak detection
Secondary Charge Termination Methods: maximum 1.74volts per cell, maximum 120 min. peak charge time
Peak Charge Current Rates: 500 or 1000mA 24 hour
Trickle Charge Rate: 5% of peak charge currents
Extended Trickle Chg. 24 hrs.: 2% of peak chg. currents
Cool-Off Between Discharge & Charge: 10 minutes

Discharge Current Rates: 250 or 750mA
Display Type: 2 x 4 digital custom LCDs
Digital Voltmeter Resolution: 00.05V Fuse type: 5A
AC Adapter Specifications:
Input: 120V AC ~ 60Hz Output: 16V AC ~ 3000mA
Physical Dimensions: 4.5 x 3.2 x 2.7"

Please Note: Once NiCd batteries no longer perform adequately, they should be discarded at your local recycling center. Or, call 1-800-8-BATTERY for information.

terminated, and Accu-Cycle Plus indicates this function is operational by flashing "Cool" on the LCD. Accu-Cycle Plus will automatically enter the peak charge mode after the cool down period has terminated.

Generally, it is a good idea to discharge your batteries on Accu-Cycle Plus before charging. A NiCd battery will typically reach 100% full charge when using lower charge rates, such as those provided by the charger supplied with your radio system, but that usually takes 10-15 hrs. to complete. Accu-Cycle Plus' charge rates are higher than those provided by your radio's charger to provide you the advantage of charging the batteries quicker, so they are ready for use in a shorter amount of time. As a result of these faster charge rates, the peak detection circuitry may terminate fast charge just short of the 100% full capacity mark, but typically no earlier than 95% of the full charge level. For this reason, you may want to leave your batteries connected to Accu-Cycle Plus for a few minutes after peak charge has terminated to "top-off" your battery while in trickle charge mode.

When discharge is complete, your battery's discharge data will remain on-screen until you initiate another discharge command, or turn off the power switch. Pressing the discharge button while your battery is already in discharge mode will not effect the cycler in any way.

Regardless of your needs, battery maintenance in our models is vitally important. While you can get away without monitoring your ni-cads performance, sooner or later you could destroy your machine or even worse, just have it fly off into the wild blue yonder. Considering the fact you can purchase a Charger/Conditioner for around $100, it's an inexpensive insurance policy for your $1000+ investment. RM

For Further Information:
www.hobbico.com

## Kong Power Canopy :

T-REX 450
T-REX 450 V2
T-REX 600
T-REX 600N

Thunder Tiger
Raptor 50
Synergy(N9)

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TP-style header block

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