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R/C Helicopters

INTREPID Magnum TAZER

This manual is for the Intrepid Magnum Tazer and Intrepid Magnum Tazer 800.

WARNING!

The radio controlled model helicopter built from this kit is not a toy and is not meant for children. It is a flying machine capable of causing property damage and serious bodily harm to both the operator/assembler and/or spectator if not built and operated correctly and responsibly. Rotating components, especially the main rotor blades, are an ever-present danger.

Model helicopters operate differently than model cars and airplanes. Helicopters by their nature are not positively stable, meaning that even if properly assembled and adjusted, helicopters will not recover from an unwanted flight attitude, nor will they hold any particular orientation without constant control inputs from the pilot.

IT IS YOUR EXCLUSIVE RESPONSIBILITY TO PROPERLY BUILD, MAINTAIN AND OPERATE THIS HELICOPTER. Bergen R/C Helicopters has spent considerable time making this product reliable and easy to build, but only the operator can insure that it is safe. Because the safe operation of this helicopter is beyond the control of the Manufacturer and distributor, the owner/operator assumes all risk of use.

Construction Manual

Acknowledgments

Bergen R/C Helicopters wishes to thank our friends and customers for their continuing support during the development of the Intrepid Helicopter.

The Instruction Manual and illustrations were completed with the input of numerous customers and staff. We wish to recognize Gary Wright, who had been the test pilot and helicopter guru in its early years. We would also like to recognize Mike DeMetz for his continuous support and knowledge in electronics and maintenance.

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The first of its kind, interchangeable modular engineered helicopter to accommodate the beginner to a FAI expert…

An idea in 1994 to manufacture an interchangeable, modular helicopter, led to the research and development in 1995. Focusing on quality, engineering details, and price, a prototype was produced. After extensive test flights and fine-tuning, the INTREPID HELICOPTER is now what you see today. The first of its kind, strength combined with simplicity for easy maintenance and flying.

Although beginners can successfully build and fly their INTREPID, the process can be made significantly easier with the help of an experienced modeler and instructor pilot. We recommend that all beginners join the Academy of Model Aeronautics (AMA). The AMA is a non-profit organization that provides services for modelers. The AMA can help you locate a model aircraft club in your area with an instructor pilot (you can also check with your local hobby shop). Membership benefits include a monthly magazine and liability insurance. Many flying clubs require an AMA modeler's license to operate a model on their flying field. For more information on the AMA contact:

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
Phone: (317) 287-1256

Consumer Warranty

IMPORTANT! Before building the **Intrepid Magnum Tazer** Helicopter kit, read and fully understand the following warranty, and review the entire Construction Manual. By building and/or flying this helicopter you indicate your acceptance of the following warranty terms and conditions, and further agree to build and operate this helicopter in safe and responsible manner.

If you find any term or condition unacceptable, or if you feel that this helicopter is just not suited to you, you may return it to your place of purchase in NEW and UNUSED condition within thirty (30) days of the date of purchase for a refund of the purchase price less shipping and handling. Partially assembled kits, and kits with opened parts packs or missing parts can not be returned for a refund.

Warranty:

1. Bergen warrants to the first consumer Purchaser that the INTREPID Magnum Tazer helicopter substantially conforms to its published description when used as intended as a hobby product, and will be free from defects in materials and workmanship for a period of 90 days after the date of purchase. Bergen R/C will repair or replace (at his option) any defective part, and supply any missing part at no charge to the Purchaser within this period. We make no warranty, express or implied. This warranty does not apply to parts damaged by improper assembly, modification, abnormal service or handling, or crashes.
2. To take advantage of this warranty, the Purchaser must provide proof of purchase, and ship any defective part (at Purchaser's cost) to Bergen R/C for repair or replacement.
3. It is the responsibility of the Purchaser to properly assemble, maintain and operate this helicopter in accordance with manufacture's instructions, AMA safety codes, local laws and ordinances, and COMMON SENSE. It is also the responsibility of the Purchaser, when operating this helicopter, never to operate it in any way, which might endanger persons or property including the Purchaser. Purchaser is advised to carry appropriate liability insurance such as that commonly provided to modelers by the AMA.
4. **THIS WARRANTY SPECIFICALLY EXCLUDES THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.** The selection of this helicopter for a particular application or use (beyond hobby/entertainment) is the sole responsibility of the Purchaser. Any advice supplied by any representative of Bergen R/C pertaining to any particular application is given freely as an opinion and is not meant to bind Bergen R/C or in any other way modify this warranty.

1. Not withstanding the paragraph above, this warranty is in addition to whatever implied warranties may be granted to the Purchaser by law. To the extent permitted by law, all implied warranties, including the warranties of merchantability and fitness for a particular purpose are limited to a period

of (1) year from the date of purchase. Some states do not allow limitations on how long an implied warranty last, so the above limitation may not apply.

2. This warranty shall be the sole and exclusive remedy available to the Purchaser. Correction of defects, in the manner and for the period of time specified above, shall constitute complete fulfillment of all liabilities and responsibilities of Bergen R/C to the Purchaser, and shall constitute full satisfaction of all claims, whether based on contract, negligence, strict liability or otherwise. Bergen R/C shall not be liable for any cost or expenses incurred in; the replacement of any effective or non-conforming parts, and **IN NO EVENT SHALL BERGEN R/C BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR ANY DAMAGES DUE TO THE USE OR INABILITY TO USE THIS PRODUCT**. Bergen R/C shall not be liable, or in any way responsible, for any damages related to modifications, repairs, attempted repairs, or crashes. **IN NO EVENT SHALL BERGEN R/C's OBLIGATIONS TO THE PURCHASER EXCEED THE ORIGINAL PURCHASE PRICE PAID BY THE PURCHASER.**
3. Some states do not allow exclusion of incidental or consequential damages, so the above exclusion may not apply. This warranty gives the Purchaser specific legal rights. The Purchaser may also have other rights, which vary, from state to state.
4. No modification or amendment to this warranty will be effective unless reduced to writing and signed by an authorized representative of Bergen R/C Management.

If you do not understand any aspect of this warranty, you may contact Bergen R/C Helicopters for clarification. **IF YOU DO NOT AGREE WITH ANY ASPECT OF THIS WARRANTY, RETURN THE UNASSEMBLED HELICOPTER TO YOUR MANUFACTURER FOR A REFUND.**

Bergen R/C Helicopters believes that information contained within its published materials is accurate as of the date of publication, and is not responsible for inadvertent errors or omissions. Bergen R/C reserves the right to make changes and improvements in its products without notice.

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Chris and Larry Bergen
Bergen R/C Helicopters

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The Bergen Intrepid Magnum Tazer

Welcome!!

You have just purchased the latest in the line of Intrepid Helicopters, **And** our first foray into E-Power.

First off, **Thank You's** are in order. We had to be pushed into this arena of E-Power, and those responsible are Larry Chapman, Darryl Sprayberry, but most of all **Greg Alderman**.

Greg is one of those rare people who can envision a future, and he envisioned the future of The Intrepid going Electric. Greg also had a partner in this vision, Clint Akins from Flightpower Ltd. Clint is the knowledge behind motor setup, gearing, and of course all things batteries. He is a tireless person who takes whatever time is needed to allow us electric neophytes to catch up.

The Magnum Helicopter is based on our Intrepid 60 mechanics, with improvements added over time, upgrading to handle the additional power of the .91 size nitros and G26 gassers and the strains placed on airframes and rotor systems from the advent of 3D style of flight.

The Tazer is the culmination of all of that **PLUS** the addition of high voltage Li-Po's and Electric motors capable of tremendous power.

With that comes some additional Warnings. Read all instructions that come with any Li-Po batteries, especially the ones concerning charging, usage, and storage of these batteries. Fires have resulted from the misuse/abuse of these high voltage devices, burning homes, vehicles, and models.

Electric motors by their very nature react instantaneously to power, meaning, if you apply power to the motor it **WILL** spin your rotors. If you are within the arc of the rotors when this happens, it will hit you, FAST and HARD. It also WILL NOT STOP until you remove the power. Read and understand the instructions that come with your ESC to prevent this from occurring.

As with any helicopter purchased from **Bergen R/C Helicopters**, if you have questions please do NOT hesitate to ask. You can find us on the Internet at http://helifreak.com/, http://bergenrc.com forum, or at our email bergenrc@verizon.net. Of course you are always welcome to call and talk to me at 269-445-2060.

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With this kit you will need some additional items. Radio gear, motor, esc, batteries, and main blades. Ancillaries include electrical connectors, shrink wrap, Velcro.

Radio gear includes Transmitter, receiver, servos, gyro, and Rx battery and switch. This heli is designed to be able to use the latest in high speed and power servos such as the 8717 from JR. With these high power servos comes the need for a LOT of battery power to keep them going and

prevent “brownout” to the Rx. Duralite offers a High Current system specifically designed to prevent this. http://duralitebatteries.com/ .

We have tested a number of motors and ESC’s, and offer different gearing setups for these motors. If you don’t see your favorite motor, contact us with its specifics such as the KV rating and what batteries and headspeeds you want to run. Very possibly we can come up with a gearing solution for you.

Main blades are not included as there are many very good blades on the market and we would not want to offend you with OUR choice of favorite blade!! ☺ With the boom included in the Magnum Tazer kit, you can run up to a 720mm blade. If you have purchased the Tazer 800 kit, then you can run 800 to 810mm blades. In either case, you will need a blade with a 14mm root and a 4mm bolt hole. I have been running the TST 690 and 710 blades from V-Blades and find them very responsive and quieter than the “smooth” blade. For the Tazer 800, we are using NHP 800mm blades for duration, or 810mm V-Blades for weight lifting.

Smaller, but no less important items that you will need are electrical connectors such as the polarized ones from Deans for battery to ESC, http://www.wsdeans.com/ and bullet connectors for ESC to motor. Shrink wrap is good to have to cover soldered joints, and Velcro is used throughout to hold down radio gear and batteries. http://veltye.com/ .

Building this kit should not be difficult, but we have NOT designed it for the beginner to R/C Helicopters. We do assume SOME knowledge in building practices. All screws that are installed into metal pieces HAVE to be secured with BLUE loctite. There are exceptions where we recommend RED loctite, and will note those in the proceeding manual. But again, any questions that you may have, please don’t hesitate to call us.

All pics in this manual are linked to a file with larger pics. Just hold the ctrl key and click on them to bring up the larger pic.

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You're kit starts out as a box of parts. You will also find some paperwork, including an inventory list and warranty registration. Complete the inventory FIRST, send us back the final sheet signed signifying that you have received everything. If you find something missing, complete the inventory, THEN call us for anything you need.

A preview of what you'll end up with!!

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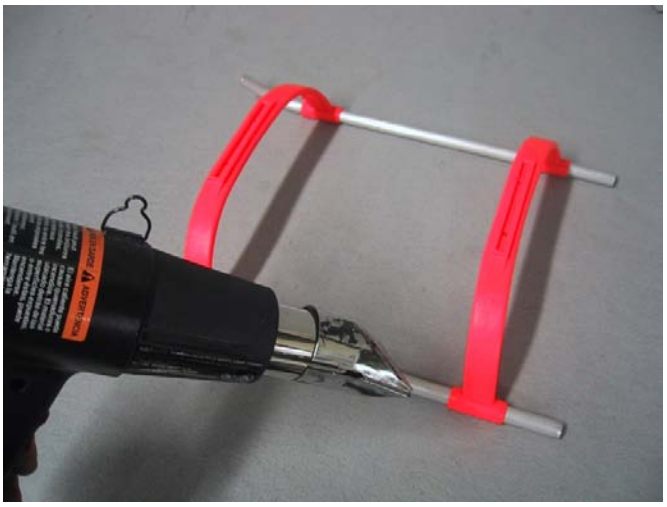
It's helpful to have all your radio gear handy while building your Tazer, especially the servos, since they are, in some cases, installed into the frames BEFORE putting the frames together. This does not mean you CAN'T do it after, it's just easier. Obviously, faster servos will make your model feel faster and more responsive, but matched servos are NOT necessary in this NON-CCPM machine.

Let's get started in Bag 1.



Slide the aluminum tubes through the plastic crossovers, using heat from a hairdryer or monokote gun to loosen up the plastic. It can take A LOT of heat to get them to slide easily, repeat the heating process as necessary. Install the end plugs, tapping them into place with a soft mallet. (Or old Rawhide hammer☺) The crossovers are angled, you have the choice of leaning them forward or aft as shown here.

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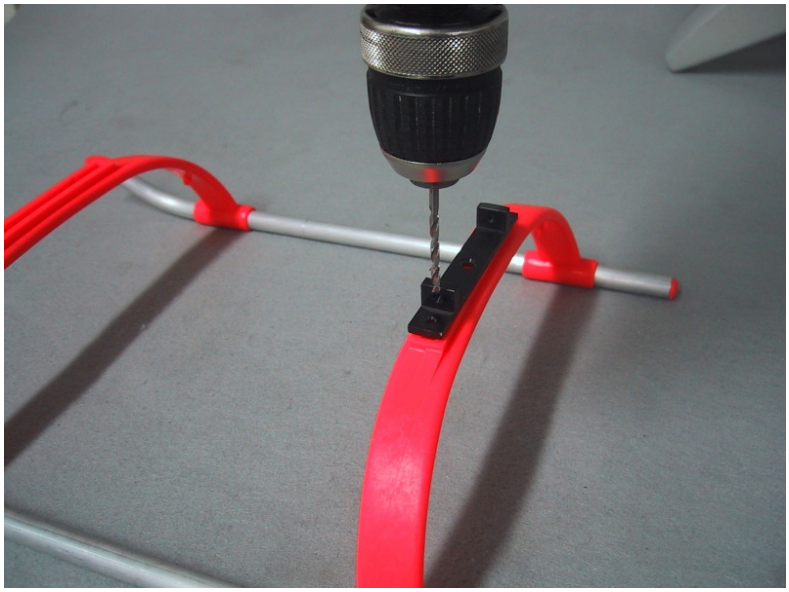
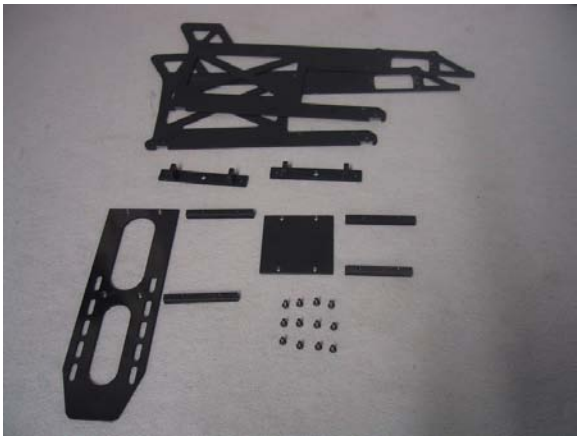


Using the skid bars from Bag 2, center them on the top of the plastic crossovers and drill a 1/8th" hole, 2 holes in each crossover. To help prevent the "squats" in the future, you can also drill a hole in the center and put an additional countersunk bolt in this location.



Building up the frames starts with Bag 2 and assembling the battery trays. Both battery trays use a ¼" square metal bar that is attached with 3X8 FHCS (Flat Head Cap Screws). The plates are countersunk for the heads of the screws. Use blue loctite. The lower frames are assembled using the 2 skid bars placed into the slots at the bottom of the frames and 4 ea 3X8 FHCS.

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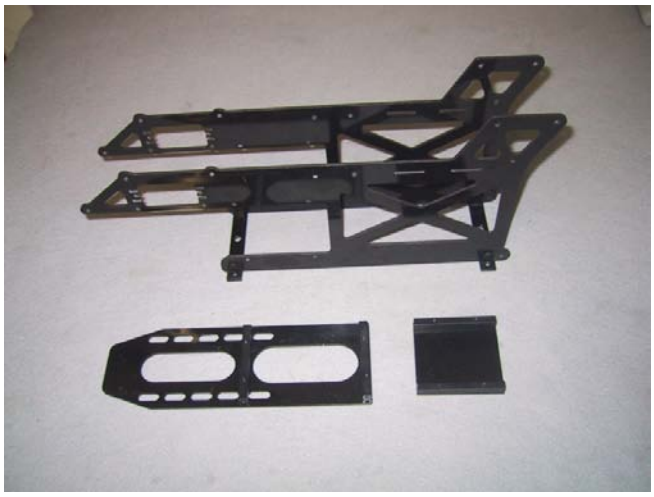
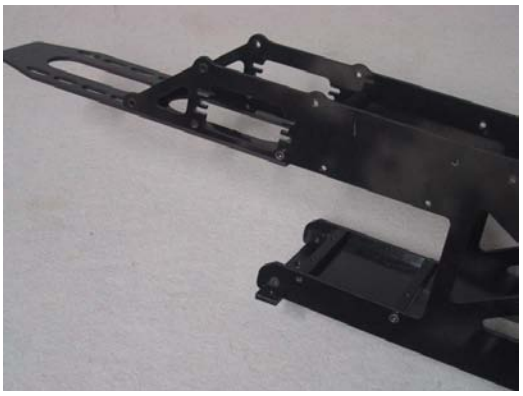


This is how all your parts should look at this point.



The front battery tray is installed using 2 ea 3X8 SHCS in the rear battery tray spacer only, and the same with the lower tray, 2 ea 3x8 SHCS in the rear only.

Using the short front canopy standoffs (16mm) and the 12mm setscrews, install the setscrew into the front battery tray spacer, securing it with loctite.

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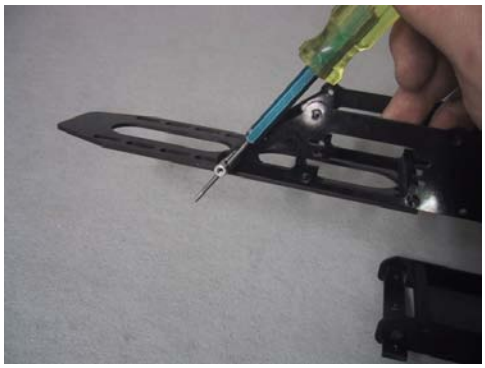
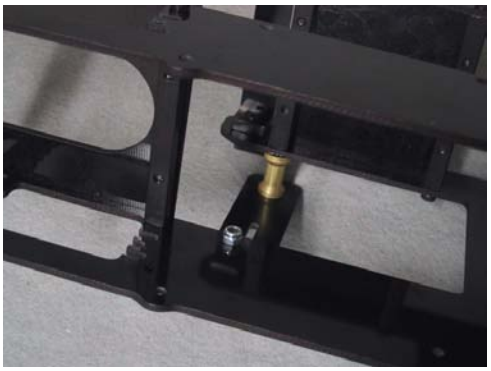


Install the canopy mount, holding the setscrew with your driver to prevent it from turning, then tighten securely using the crosshole.

Looking at the canopy mount, you will see one side is flat; the other side has the hole countersunk slightly to aid in installing the canopy thumbscrew. This countersunk side should be installed outward.

Assemble the battery restraints next, using 4 ea 3X30 SHCS, 4 ea frame spacers, and 2 ea 3M locknuts.



The lower bolt for the battery restraints go into the lower tray front tray spacer, and a locknut secures the upper bolt. Repeat for other side. Depending on how you plan to mount your batteries, you may use washers in place of the frame spacers, or nothing at all.

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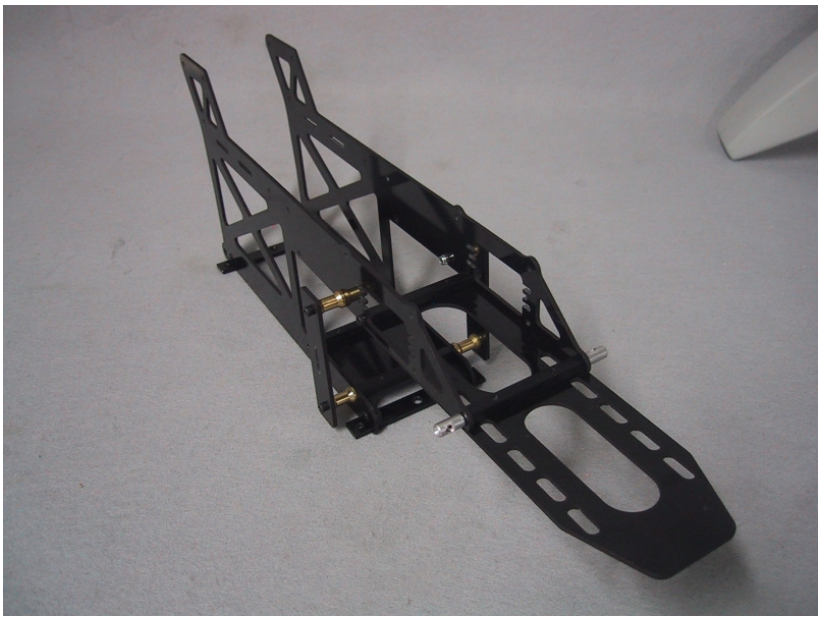
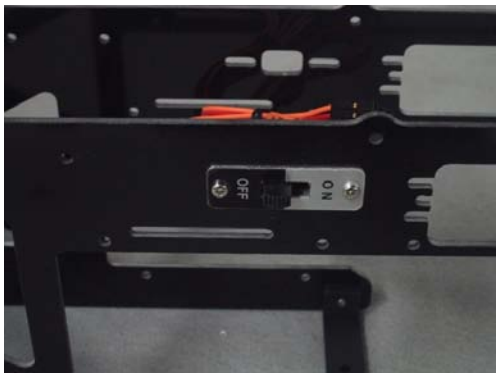


Here's where we are now.



Install your favorite switch into the switch plate provided. Make sure it is centered for proper on and off operation.

Locate your elevator servo and install the rubber grommets that come with it. In bag 9, locate 2 ea plastic servo mount tabs.

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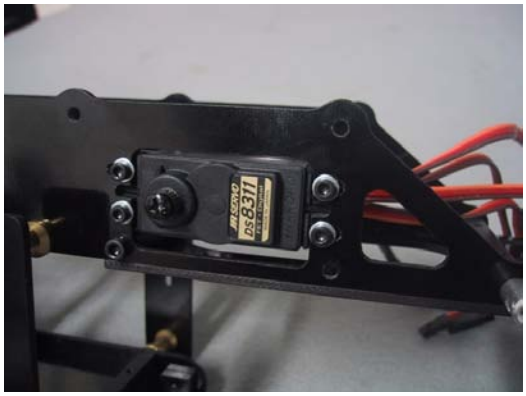
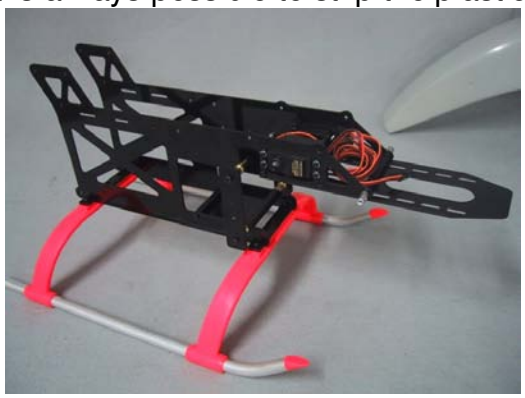
Press the servo mount tabs into the rubber grommets from the bottom, putting the long leg of the tab into the grommet. Install the servo from inside the frames, with the output spline to the rear. If using JR servos, you can use the screws that came with the servo, threading them into the plastic servo mount tab.



Alternatively, or if using Futaba servos, you can use 2.5X10 SHCS and 2.5 washers, available from us separately when needed. The Plastic servo mount tabs are used INSTEAD of the brass eyelets, preventing over compressing of the rubber grommets. There is no need to over torque these screws, it is always possible to strip the plastic tabs…☹



Set your framework onto the landing gear, securing with 4 ea 3X18 SHCS and 4 ea 3M locknuts. If you need to reposition the plastic crossovers, heat them up with the hairdryer.

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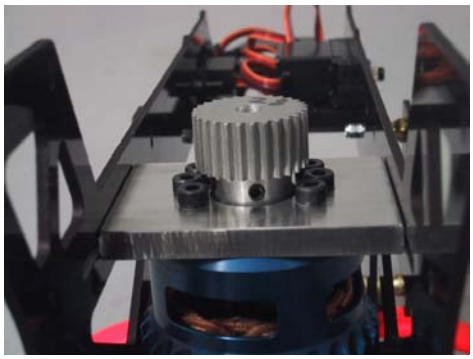
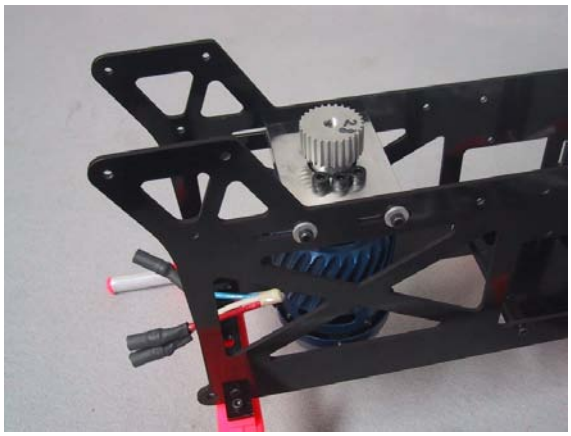
From Bag 3, The motor mount plate shown is for the Plettenburg 370, your motor mount may differ if using a different motor such as the Neu Motor, or an Actro. For a list of suggested motors, check out the Bergen Forum.



Bolt the motor to the plate with the supplied bolts whether they are 4mm in this case or 3mm for the other motors. Install the proper pinion for your particular setup, keeping the pinion as low as possible without hitting the bolts securing the motor to the plate. If the motor shaft has a flat, ensure that one of the setscrews is seated on the flat. If your motor does not have a flat, you may want to consider grinding one on yourself.



Install the motor and plate into the frames using 4 ea 3X10 SHCS and 231B special washers, used for extra holding power. Do not loctite these just yet. It is suggested to orient the motor so the wires point out the rear.

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The pinion pulley shaft is supported top and bottom by high-speed bearings, and flats are located on the shaft for pulley and pinion placement. There are also 3 collars with setscrews to secure the shaft at the proper height. Your pulley may differ, depending on your motor choice.

Orient the shaft so that the long end is to the top. Install the pinion onto the shaft, setting the setscrew into the flat on the shaft. Install the large flanged pulley from the bottom of the shaft, again setting one of the setscrews into the flat. Very important here to use loctite on these setscrews.

On top of the pinion, install one of the collars, loctiting and tightening the setscrews. Install the bearing block onto the shaft with the bearing side facing away from the pinion. Install another of the collars above the bearing, but do not loctite it at this time.

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Install the shaft into the bearing in the pulley plate; noting the bearing is on the topside of the plate. Install the third collar with 3X3 setscrews, not loctiting it at this time. Place the whole assy into the frames, forward of the motor mount plate, using 4 ea 3X10 SHCS and 4 ea 231B special washers. Leave the assy loose in the frames for now.

Place the drive belt over the pulleys at this time, but do NOT set the tension just yet.

Locate the upper frames bag 4, which include the elevator yoke, rudder servo mount, and a hardware bag. In the hardware bag, find 4 ea flanged bearings…

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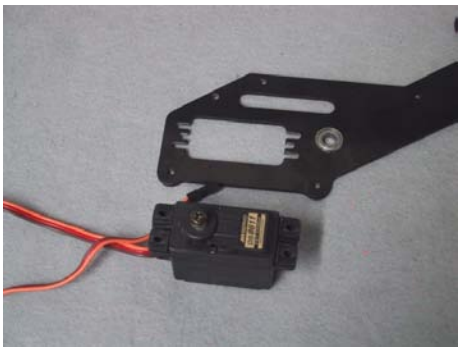
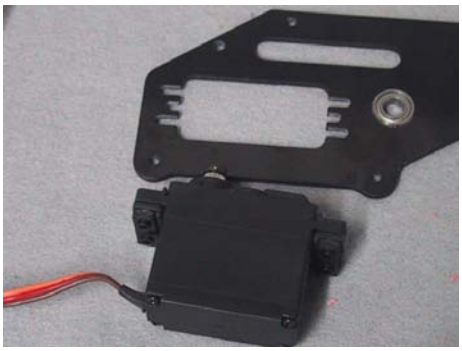
Install 2 ea bearings into ea upper side frame. You're going to make a right and a left frame with the flange of the bearings on the insides of the frames. A suggestion is to CA the bearings into the G10 frames to help ensure a long lasting, slop free system.





Gather your collective servo; with grommets installed, and install 2 more of the plastic servo mount tabs from the rear of the servo.

Install the collective servo in the left hand frame with the spline to the front of the heli, using either the JR screws or 2.5mm SHCS. In the hardware bag, locate 2 ea collective axles, and place them into the flanged bearings.

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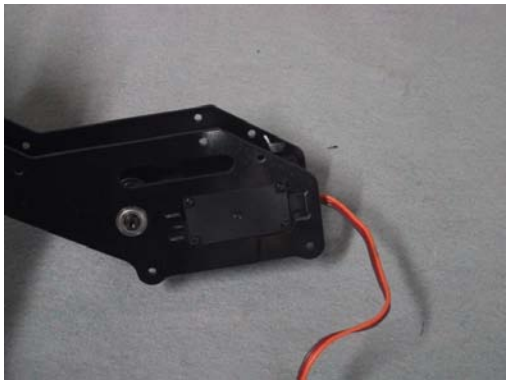

Place the other frame half over the collective axles. It is suggested to relieve the right hand frame area where the collective servo wire exits.

Assemble the elevator yoke next, note the long and short shaft with flats milled onto them. The flats fit into the broached holes of the yoke and are secured with 3X4 SHCS and 3m washers.

Install the opposite shaft the same way, then insert the yoke into the upper frames so the LONG shaft is to the right.

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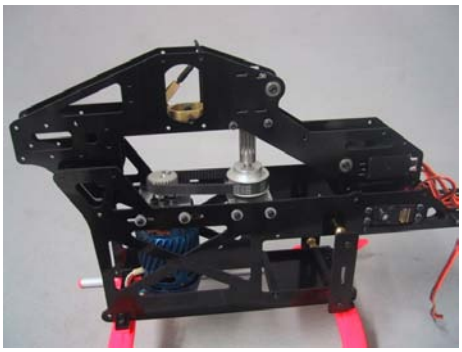
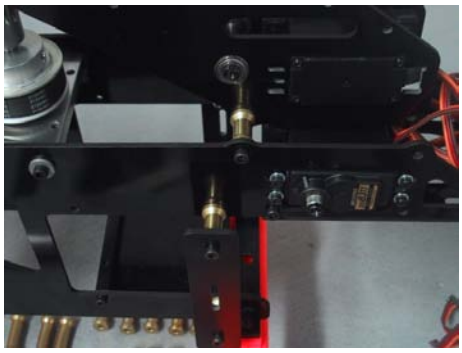
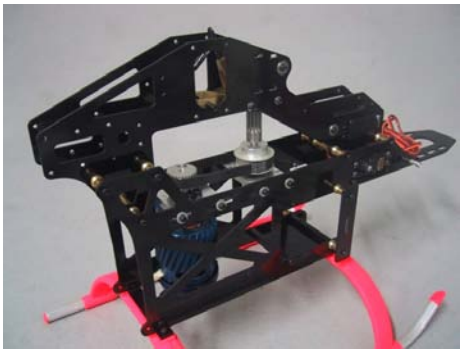
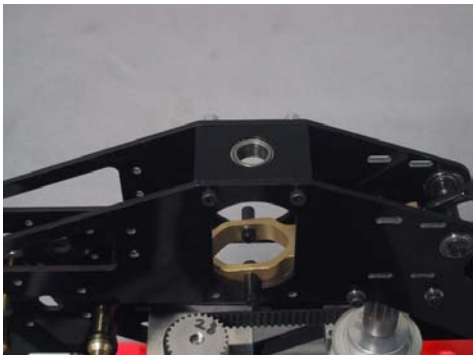


Place the upper frames on the lowers, installing 2 ea 3X35 SHCS through the upper pinion shaft bearing block to hold the frames in place. Locate the frame spacers, 5 ea threaded 26mm wide and 10 ea 16.5mm wide, and 10 ea 3X30SHCS.





It's best to install the most difficult spacer first, the one behind the collective servo. Install the threaded spacers in between the upper frames, the 16.5mm ones between the upper and lowers and securing with the 3X30 SHCS, working your way around the heli. Install the bolts loose initially, then go back and tighten them all adding loctite as you go.



Install the upper mainshaft bearing block with 2 ea 3X35 SHCS and 2 ea 3M locknuts. Do not tighten just yet. Note the orientation of the bearing.
Build the tail transmission assy next.

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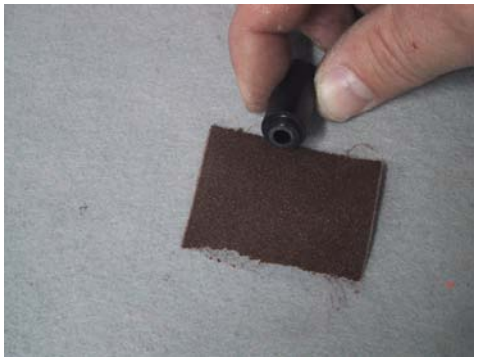
Look at the ears on the tail pinion cage. You'll notice the vertical slots that allow for adjustment of the tail pinion mesh to the main gear. In the shaft you will see a through hole and a divot. Slide the shaft through the rear bearing with the divot to the front. Slide the brass spacer onto the shaft inside the cage.

Install the pinion onto the shaft inside the cage, sliding the shaft forward into the front bearing. Line up one of the threaded holes in the pinion with the divot on the shaft. Install a 3X3 mm setscrew with loctite into this hole. It is not necessary to install a setscrew in the other hole, but it won't hurt either.

Slide the delrin coupler on to the shaft from the rear.



Using your 1.5mm allen driver, line up the hole in the delrin coupler with the hole in the shaft. If it's a little tight, very carefully sand the front of the delrin coupler, it won't take much.

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Install the 10mm cross pin to secure the delrin coupler, setting it flush to the outside.

Secure the cross pin with a 3X4 setscrew installed into the end of the shaft inside the delrin coupler. Use loctite to secure this screw, ensuring it's contact with the pin by trying to push the pin out after tightening the setscrew.

Before installing the transmission assy into the frames, test the fit of the bearing block into the ears on the cage. You can see how they fit together and see how the slots allow for mesh adjustment. The through hole in the block should line up with the slots. The block should be tight within the ears so when the bolt is installed and tightened it clamps everything together, securing your mesh.

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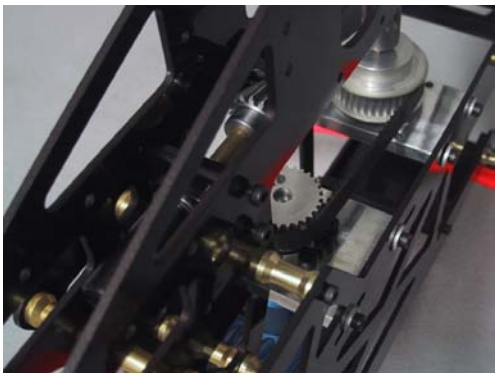
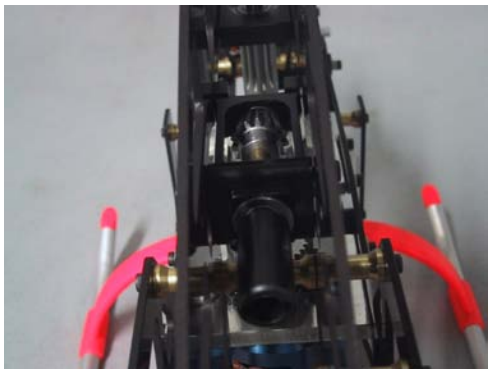
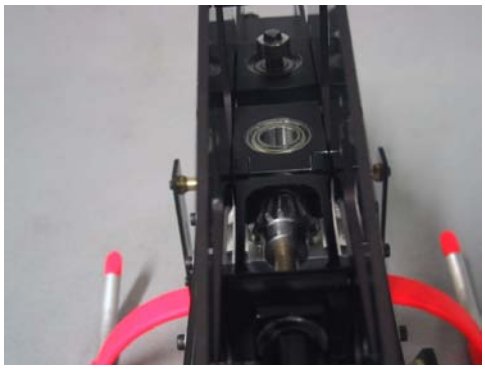
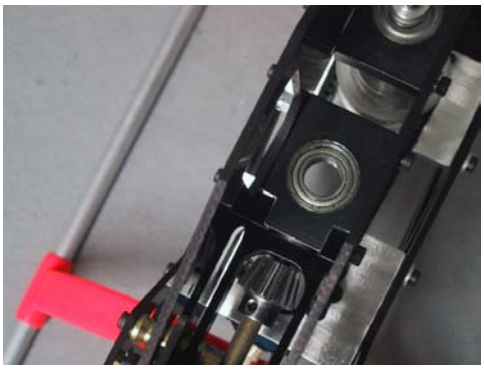


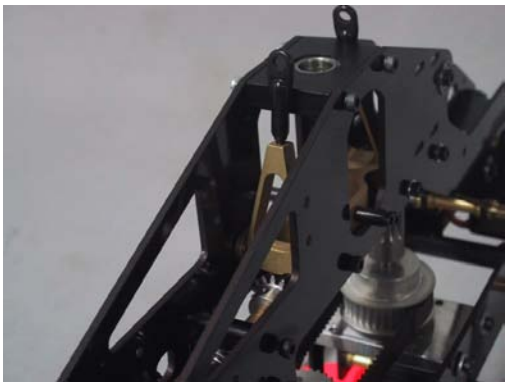


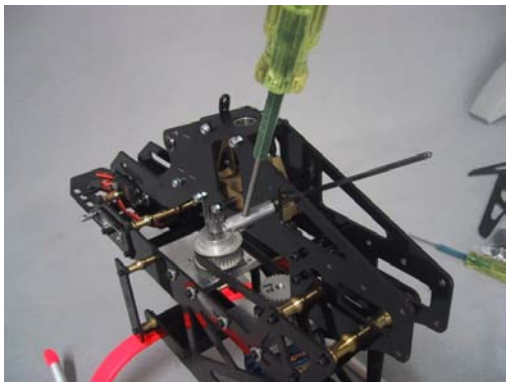
Install the transmission assy into the upper frames, from the rear is easiest, with 4 ea 3X8 SHCS, installed loosely for now. The following pics have the upper bearing block and elevator yoke removed for clarity.





Install the lower mainshaft bearing block, bearing side up, dovetailing it into the transmission cage. Install 2 ea 3X35 SHCS through the frames and bearing block with 2 ea 3M locknuts installed loosely for now.





Here is what your bird should look like at this point. Install the rear canopy mounts into the lower of the two holes behind the mainshaft, with 2 ea 3X8 SHCS and loctite. You can use the crosshole to tighten the mount.

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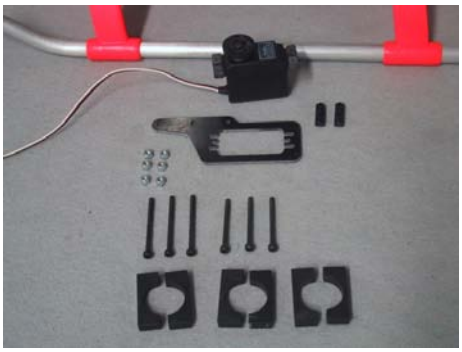
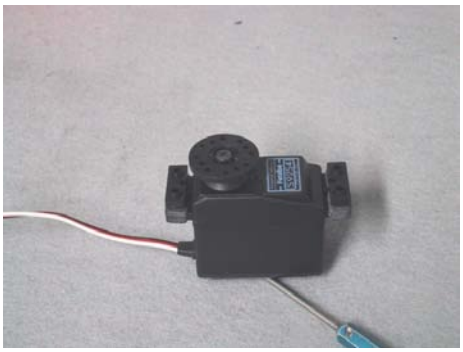
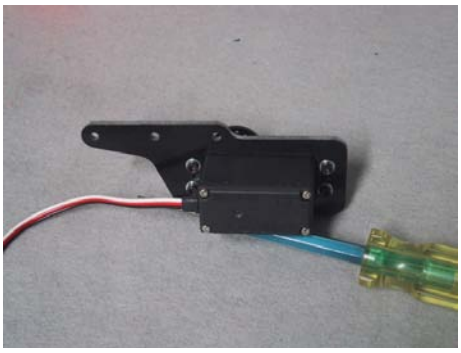
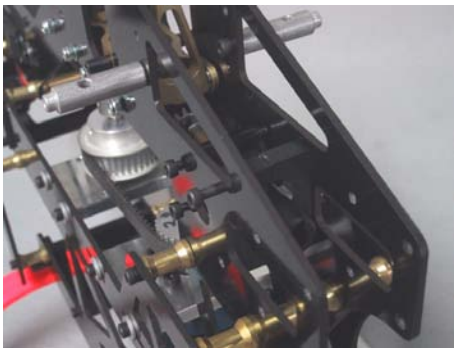


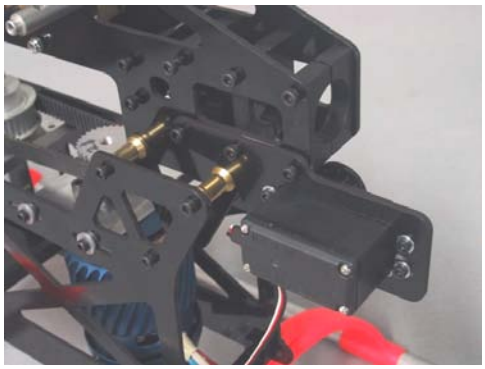


Assemble your tail servo components and install the plastic servo mount tabs in from the top side of the servo.





Install the servo in from the right side with the wheel to the front as shown, using your servo screws or 2.5X10 SHCS and washers.
Begin installing the boom clamps, as pairs, starting with the front one by installing a 3X35 SHCS through the top hole, through the boom clamp set, and through the other frame,



continuing with the 2 other sets of clamps. Now install the tail servo mount with servo, using 3 ea 3X40 SHCS with the bolts through the bottom of the boom clamps. Do not tighten these 6 bolts just yet, wait until you install the boom!

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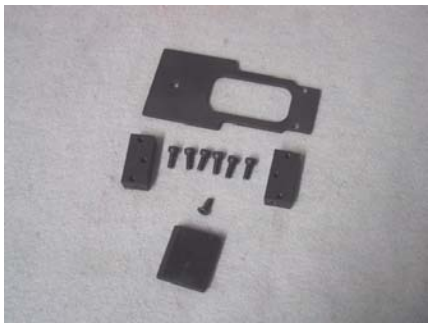
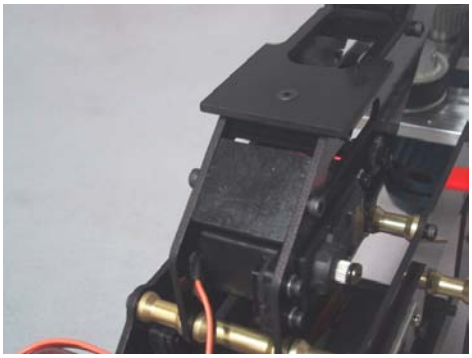
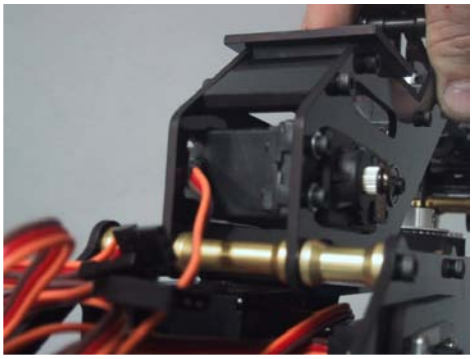


The gyro mount and front slope block are next. The gyro mount is attached using 2 ea delrin blocks with 3 holes in the top. Not the orientation of the holes.

Use 2 ea 3X8 SHCS and 1 ea 3X8 FHCS to attach the block to the gyro mount, leaving them slightly loose. Now place the assy into the frames, attaching it with 4 ea 3x8 SHCS. Now go back and tighten the bolts on top. Bear in mind that all of these bolts are going into delrin and do NOT require tremendous torque to hold. If you desire, a drop of CA glue on the bolts can be used as a form of loctite.





Install the front slope plate with 2 ea 3X8 SHCS and a drop of CA glue as loctite, noting the chamfered edge in underneath and forward. This chamfered edge will allow servo wires to be fed through this space.

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The constant driven tail system in bag 5 consists of 2 aluminum hubs, 2 machined delrin gears, the autorotation hub and main shaft.

Look at the 2 sides of the main gear. One side is chamfered, this is the top, the other side has a sharp edge, this is the side that the large hub sits inside of.

Install the hub into the gear using 10 ea 2X8 SHCS, installing all of them loosely then tightening each one a little bit at time to prevent warping the gear. The crown gear and hub are assembled with 6 ea 3X8 FHCS.

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Install 2 of the screws opposite each other, loosely for now, then install the remainder, snugging them down slowly a little at a time to again prevent warping the gear.

Thread the 2 ea 3X10 SHCS into the two sides of the hub, but do not tighten them.

Install the autohub into the main gear hub using 4 ea lowhead 3X8 SHCS. Notice one end of the autohub is longer, this is the top, and is inserted into the gear hub from the bottom.

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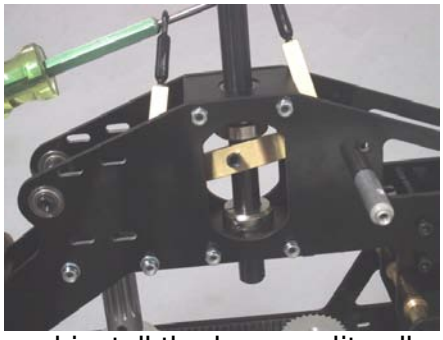
Put a dab of grease in the underside of the crown gear hub, place the 10X16X1 washer in it, then dab a little more grease onto the washer. During an autorotation the crown gear hub is turning while the autohub is not, this grease is just a little lubrication to help with that interface.

Looking at the mainshaft, you will see a hole at each end and a divot near one end. This is the bottom of the shaft. The main shaft collar uses a 4X40 SAE bolt, NOT a metric.
Install the main shaft from the top. After going through the upper bearing, place the upper split collar on the shaft with the stepped side up toward the bearing.



Push the main shaft down further and install the lower split collar below the elevator yoke, with the stepped side down, toward the lower bearing. Push the mainshaft through the lower bearing, but not too far.

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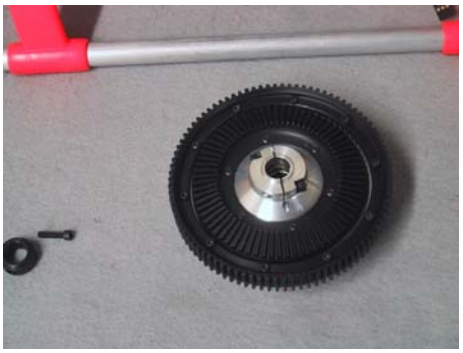
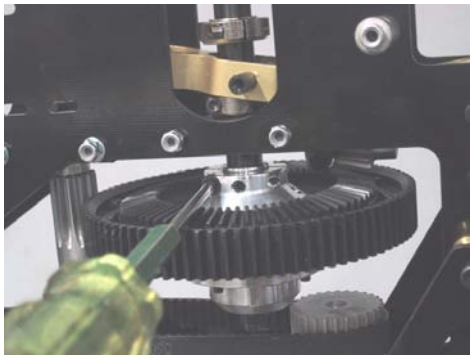


Place the crown gear and hub onto the auto hub, slide the assembly into place under the lower main shaft bearing block and drop the mainshaft through the crown gear hub and the autohub. This next task may require a flashlight….Locate the divot on the main shaft through the setscrew hole in the crown gear hub. Install a 4X6 setscrew, setting the tip into the divot on the mainshaft. Just barely snug it at this point; it is only to locate the hub to the shaft.



Tighten the 2 ea pinch bolts in the crown gear hub, a little at a time, switching sides. This will ensure a true running hub. Once they are tight, you can go back and tighten the 4X6 setscrew, using loctite, but only enough to prevent it from coming out.
Install the lower mainshaft collar with 4-40 bolt (yes it is a standard bolt, NOT metric), through the hole in the bottom of the mainshaft. You will notice a step on one side of the collar. Install it with the step to the top as shown. Now try to move the main gear up and down. It should move very slightly up and down between the crown gear hub and the autohub. If NOT, then turn the lower mainshaft collar up side down, with the step down, to allow this movement.

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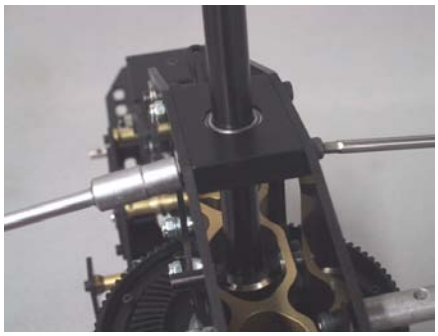
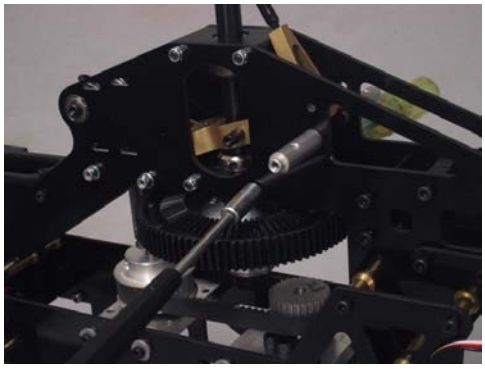


With the mainshaft in place to align the upper and lower bearing blocks, go ahead and tighten them now.

Pull up on the mainshaft, seating the crown gear hub against the lower mainshaft bearing. Push down on the lower split collar and tighten, using your hardened Allen driver to prevent stripping the screw head. Try to move the mainshaft up and down; there should be no play.
Push up on the upper split collar, against the upper mainshaft bearing, and tighten, again using your allen driver. Note that we did NOT use loctite on these screws. The pinching action of the design secures them just fine without the need for loctite, which can make removal of these particular screws difficult in the future.



Setting the tail gear mesh is very important, and not that difficult, but it is commonly not done correctly. Start by making sure the bolt through the mainshaft bearing block and front of the tail transmission cage is loose.

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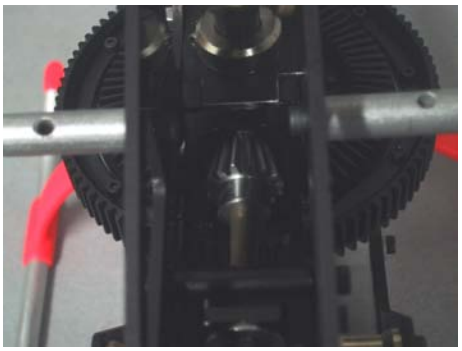
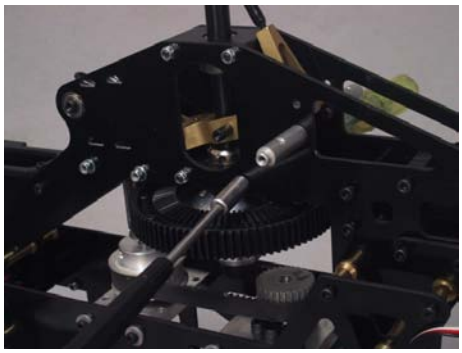
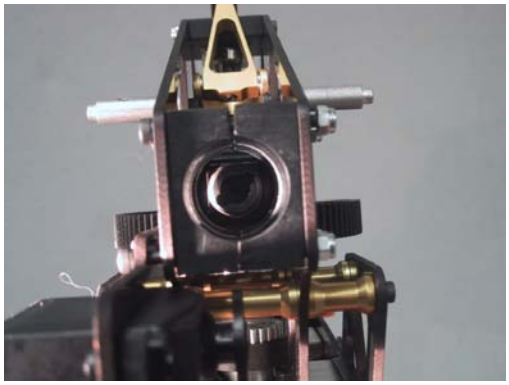
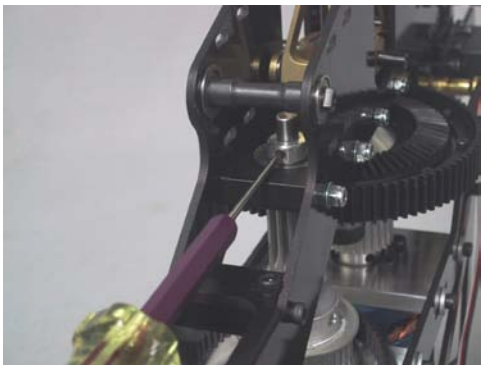




Push down on the pinion/cage, tightening the mesh until you have ZERO backlash AND the system runs smooth. Pushing down on the cage may require some tamping with an allen driver as the frames are tight against the cage, but it will move and will tighten up the mesh.
Now tighten the bolt going through the bearing block and cage.



Peer through the boom clamps at the delrin coupler, ensuring it is centered up and down. Loctite and tighten the 4 3X8 SHCS holding the rear of the cage to the upper frames



Set the pinion height to the main gear, loosening the upper shaft collar, pushing up on the shaft/pinion assy while pushing down on the collar. Loctite and tighten the setscrews. The top of the pinion should be at least as high as the main gear.

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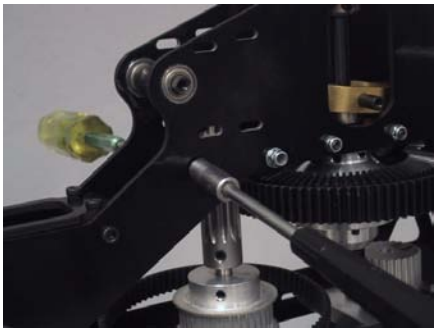
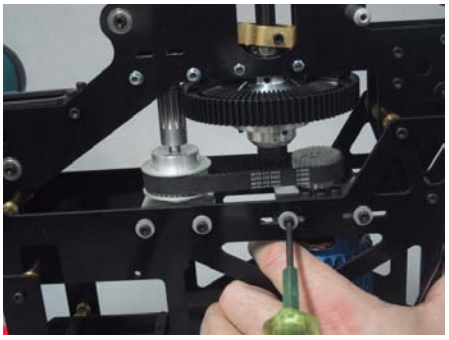
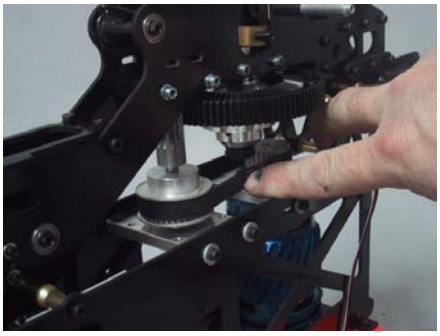


Push the pinion towards the main gear and tighten the upper bolts securing the bearing block. You're looking for a tight, no backlash mesh, but the system should still spin freely. Tighten the bolts securing the pinion plate to the frames, again ensuring that the gear mesh is nice and tight, but freely spinning. Remove each bolt, one at a time, apply loctite and reinstall.





Slip the belt over the motor pulley and push the motor to the rear, tightening the belt. While holding the motor to the rear, tighten the 4 bolts securing the motor plate to the frames. The belt deflection should be between 1/8" to ¼". Remove each bolt, one at a time, apply loctite and reinstall. Spin the main gear ensuring that the belt doesn't roll off of the motor pulley, the belt does not have to be centered on the flanged pulley, but it should not be trying to ride up on the flange either. It may be necessary to raise or lower the pulley on the motor, or raise or lower the shaft through the pinion plate by adjusting the collars on top and bottom.

Build the swashplate next from bag 6, start with the outer ring, installing short balls into each leg, with loctite.

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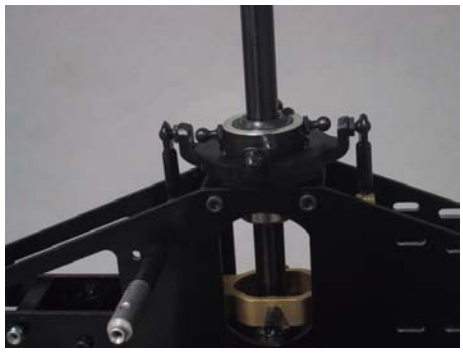

Install 4 ea medium balls onto the inner ring, again with loctite. While doing this, ensure that the eyeball bearing in the center remains free to turn and twist. Slide the completed swashplate onto the mainshaft and snap the elevator yoke ball links onto two of the outer balls.

The washout unit assembly starts with the washout arms. Install 2 ea 3X7X3 flanged bearings into each arm, then install the radius links with a pin and secure with a 3X3 setscrew and loctite. Use the radius links marked (L) for left hand. This gives you ”retarded” swashplate timing for stability in a hover.

Install a short ball on the opposite end, with loctite, noting the orientation. With a 3X12 w 6mm shoulder, and a brass washer as a spacer install the arm onto the washout unit, again noting the orientation. Tighten the bolt until the arm is free of slop, but not so tight that the bearings get “notchy”. It should be able to spin freely. Secure the bolt with a 3X3 setscrew inserted into the hole on the opposite side, tightening it against the bolt. Check for slop and free play, readjust the tightness of the bolt if needed and resecure with the setscrew. Repeat for opposite arm.

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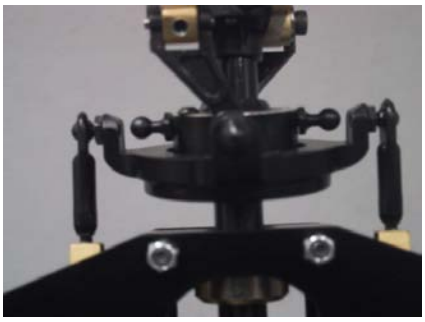
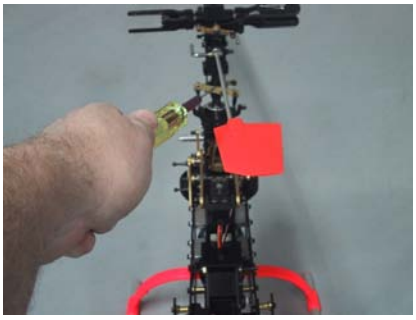
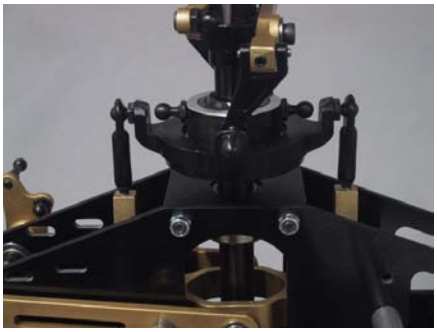
If necessary to space the arm away from the hub, place 2 brass washers on the bolt between the bearing and the hub. Slide the washout unit on to the mainshaft and snap the radius links onto 2 of the balls on the inner swashplate.





Now the explanation of the alternate links.

Line up the balls that you snapped the radius links onto with the outer balls of the swashplate, preferably the ones to the sides. Look at the flybar, noting the angle, that it is NOT pointing straight out away from the heli. This is the "retarded" setting, and in general, gives you a more stable hover and less cyclic action.



If you opt to use the other links, then your assy will look like this. Note the washout arms are flipped over and the bolt is installed in the other hole. Now if you line up the swashplate balls and look at the flybar.

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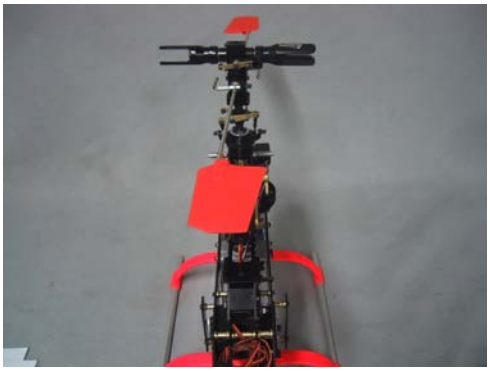

The angle is now "advanced". This gives a less stable hover, but more cyclic action. The porkchops are handed, meaning they only snap onto the ball in one direction, seen in the photo. All of this is also called swashplate timing, and in the higher end radios can be adjusted electronically in a specific mode or by mixing in some aileron with elevator, and elevator with aileron.
If you prefer to have your swashplate timing set to 0 and have pure aileron and elevator movement, then use the first, suggested setup and mix it out in your radio.

Assemble the control arms, from bag 7, starting with the “Popsicle sticks”, by installing a short ball on each one. For maximum collective, install it in the innermost hole.

Install short balls, 1 in the triple bellcrank, one in the single bellcrank, and 2 in the elevator arm. Install 2 ea long balls in the triple bellcrank, and in the elevator “X” arm. Take a close note of the orientation on the “X” arm and where the balls go!

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Install 2 ea short balls in the “X” arm, on the opposite side from the long balls. Install 2 ea short balls in each aileron bellcrank, noting that you are making a right and a left.

Another view of the aileron bellcranks. Install the 5 X 8 X 2.5 Flanged bearings, one in each “Popsicle stick” 2 in each aileron bellcrank, and 2 in the “X” arm.

Insert the studs through the bearings, from the “boss” side, then thread a SHCS through the Studs. The “X” arm gets a 3 X 20; the aileron bellcranks get 3 X16’s.

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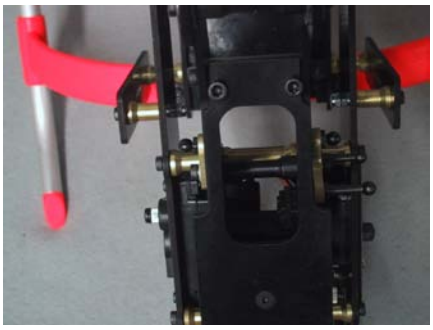
Using loctite, thread the bolt into the popsicle stick, then tighten the jamnut against the popsicle stick. By loosening the jamnut and tightening or loosening the bolt, you can adjust the tension on the bearing, giving a free spinning AND slop free bellcrank. Then again tighten the jamnut. Repeat for other side.



Install the triple bellcrank on the collective axle behind the collective servo on the left side.
Install the single bellcrank on the same axle, but on the right side.
Secure them with a 3X8 SHCS and 3M washers with loctite. It may be necessary to use the bolts to “draw” the bellcrank onto the axle.
Make sure the short balls on each bellcrank are pointing to the rear.

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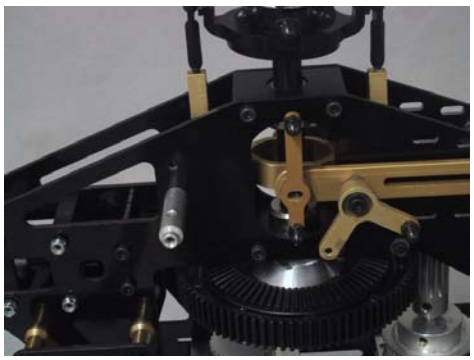
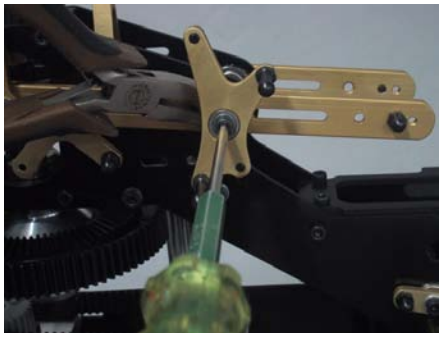
Install the left Popsicle stick onto the upper collective axle, sliding the bearing onto the elevator yoke short shaft. Install a 3X4 SHCS into this short shaft, securing the rear of the popsicle stick. Install a 3X8 SHCS and 3M washer into the collective axle. Use loctite on both screws.



Install the right Popsicle stick onto the upper collective axle and slide the bearing onto the elevator yoke long shaft. Install the elevator arm onto the long shaft, with the long leg “UP” and the balls pointing outward.



Secure the elevator arm with a 3X4 SHCS and 3M washer, using loctite.
Install the “X” arm assembly by threading the 3X20 SHCS into the collective axle, with loctite.

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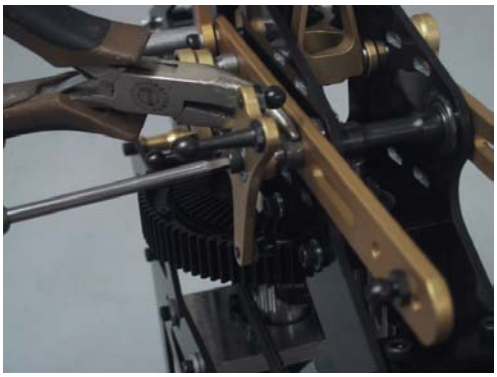

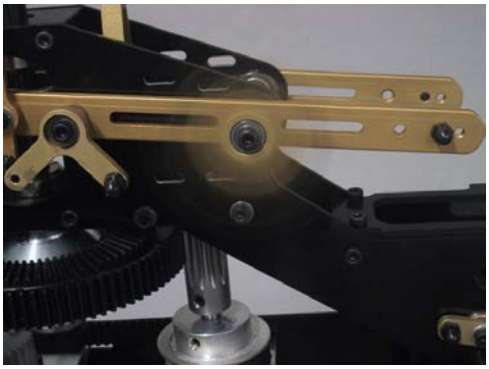

Set the bearing tension by holding the jamnut and tightening or loosening the bolt, then tighten the jamnut against the Popsicle stick. The “X” arm should spin freely with no slop.

Install the aileron servo into the Aileron servo mount. Install the rubber grommets and eyelets that come with the servo from the bottom side. This is the only servo to use these eyelets.

Snap the plastic servo mount tabs into the aileron servo mount, from the bottom. Slide the servo into the mount so that the “ears” fit into the cutout area of the mount. Also note the servo output shaft is forward, or towards the curved front of the servo mount.

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Secure the servo with the JR self-tapping screws or 2.5X10 mm SHCS and 2.5 washers. Install the aileron servo assy in between the popsicle sticks and secure with 4 ea 3X8 SHCS threading into the servo mount. It is only necessary to put washers under the rear bolts. Instead of loctite, we suggest using CA (superglue) to secure these bolts.

Build the rotor head next, out of bag 8, starting with the head axle. Note the “heim” ball in the center.

Insert the axle into the head then slide the one piece dampeners onto the axle, seating them into the head. This may require a little lubrication. The dampeners will NOT sit flush with the head. Center the assy as best you can, it will make the next steps a little easier.

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The shim set includes 2 ea of .008, 2 ea of .015, 2 ea of .040, and 2 ea snap rings. If you want to fly hard 3D, then install one of each size shim on to the head axle. For softer flying, such as a camera ship, then try just the .040 and the .008 shim on each side. As a minimum, you MUST use the .040 shim.

Look closely at the snap ring. You will see one side has a sharp edge, the other side is somewhat rounded. This is from the stamping process when it is made. You want the SHARP edge facing outward when installed on the head axle. This will aid in keeping the snap rings in the grooves on the head axle. Use a set of snap ring pliers to aid in installation, available at any automotive parts store.

A tool to make getting the snap rings seated easier is a piece of metal tube, say from a piece of broken landing gear, long enough to allow the head axle bolt to press the snap ring to the groove in the head axle.

You may also be able to press the snap rings into place using the blade grips if only using the “soft” setup.

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There are 2 sizes of bearings associated with the seesaw tube. The 4X10X4 bearing (4mm ID) goes into the end of the tube.

Using the 3X10X4 bearings (3mm ID) make 2 assemblies of a 3X8 SHCS and 2 3mm brass washers.

Insert the seesaw into the head with the milled slot facing the direction shown in the picture.

with a drop of loctite on the bolt, Insert the bearing assy into the head, threading the bolt into the seesaw and drawing the bearing into the head. Once seated, tap the assy in below flush to aid in getting the opposite bearing installed.

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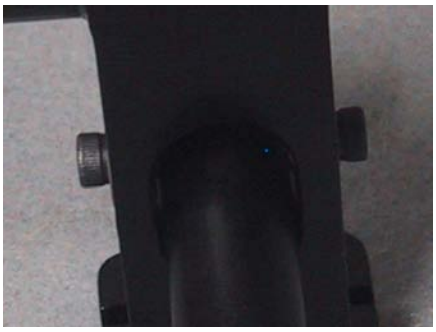

Install the opposite side bearing assy in the same manner, drawing it in while tightening the bolt. Now tap it in flush, effectively setting both sides flush with the headblock.

Install 2 ea 3X5 panhead screws, with loctite, just above each bearing as a retainer. When both screws are tight, the seesaw should rotate freely.

The seesaw endcaps are installed flush with the end of the seesaw, and secured with 3X3 setscrews and loctite in the short leg. The setscrew sits in the milled groove of the seesaw tube to prevent the endcap from rotating.

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Install a short ball on the long leg of each endcap, with loctite.

Slide a blade grip with radial bearings installed onto each side of the head axle. Locate the 3 piece thrust bearings and 2 ea 5X16 SHCS and “Special” washer.

Grease the ballcage of the thrust bearing set, then install the thrust washer with the LARGE ID first, grooved side outward.

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Install the ballcage with the open face inwards, then install the thrust washer with the SMALL ID, grooved side inward.

Install both 5X16 SHCS bolts and washer with loctite and tighten, using 2 allen wrenches tightening against each other. Ensure the blade grips spin freely.

Assemble the Bell/Hiller mixer with 2 ea 3X7X3 bearings, a “special” 3X12mm bolt w 6mm shank, brass washer as a spacer, and the blade grip pitch arm.

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Install the assembled bell/hiller mixer by threading the bolt into the middle hole on the pitch arm (recommended). This hole gives a 0 Delta offset, the other two holes give a positive or negative delta offset for those so inclined to experiment. Set the tension on the bearings, tightening the bolt to give a free spinning yet slop free movement, then tighten the nut on the back. Check the movement and readjust as necessary. Repeat for the second pitch arm.

Notice that one side of the bell mixer arm is longer than the other. You also have 2 holes on either side to attach the short control balls. These adjustments offer how much effect the flybar has on your rotor system. These adjustments will be discussed later in the manual. For a standard configuration we suggest the setup as shown. You will want to install the balls before attaching the pitch arm to the blade grip.

Attach the pitch arm to the blade grip using 2 ea 3X6 SHCS and loctite. Make sure the pitch arm is square and straight to the blade grip. The milled area of the pitch arm will help maintain this relationship. Repeat for opposite blade grip.

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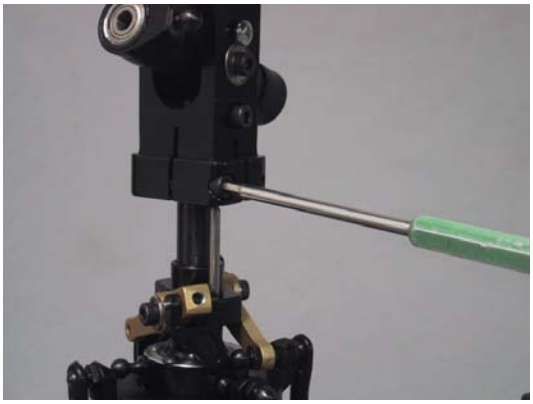
Your completed head should look like this.



Place the rotorhead onto the mainshaft, locating it with the 3X20 SHCS as a “jesus” bolt. Do NOT tighten this bolt just yet… tighten the 2 ea 3X16 SHCS pinch bolts, alternating sides, tightening a bit at a time. These bolts are what actually hold the head to the mainshaft, the “jesus” bolt is strictly for location. Now go back and tighten the “jesus” bolt.

Insert the flybar from bag 10B through the seesaw bearings, then install a “special” washer as a spacer before installing the flybar arms, one on each side of course.

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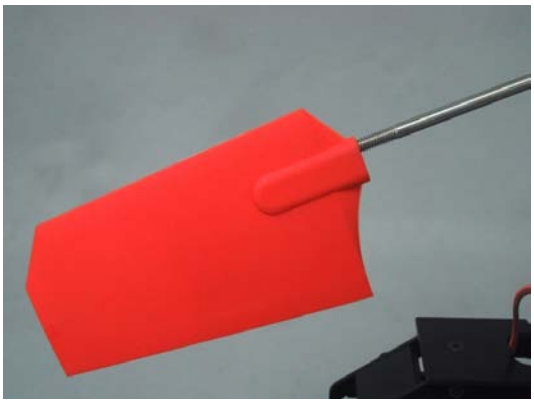
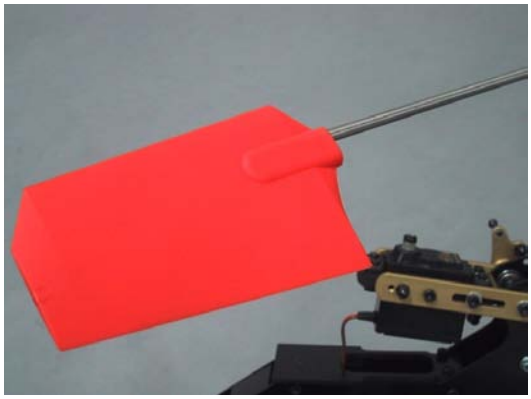
Roughly center the flybar in the seesaw and lightly tighten the flybar arms with 3X3 setscrews, while leveling the flybar arms to each other by sighting across the head.

Measure both sides of the flybar, ensuring they are EXACTLY the same, moving it in and out as necessary. We do NOT put flats on the fly bar to prevent a stress riser, meaning this would typically be where the flybar would BREAK in flight…When you are happy with the measurement AND the flybar arms are level to each other, then go back and loctite the setscrews, one at a time, holding the flybar arms in place.





Install the flybar paddles, using the front hole, and count 19-21 turns onto the flybar. This will ensure proper thread length into the paddle.

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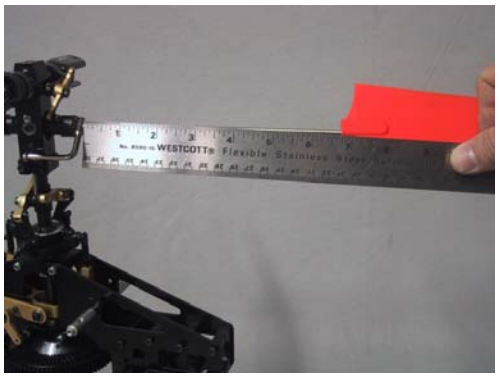
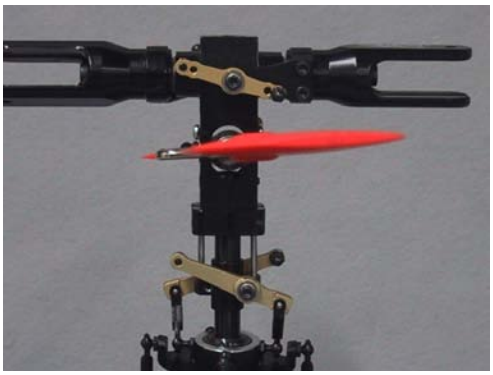
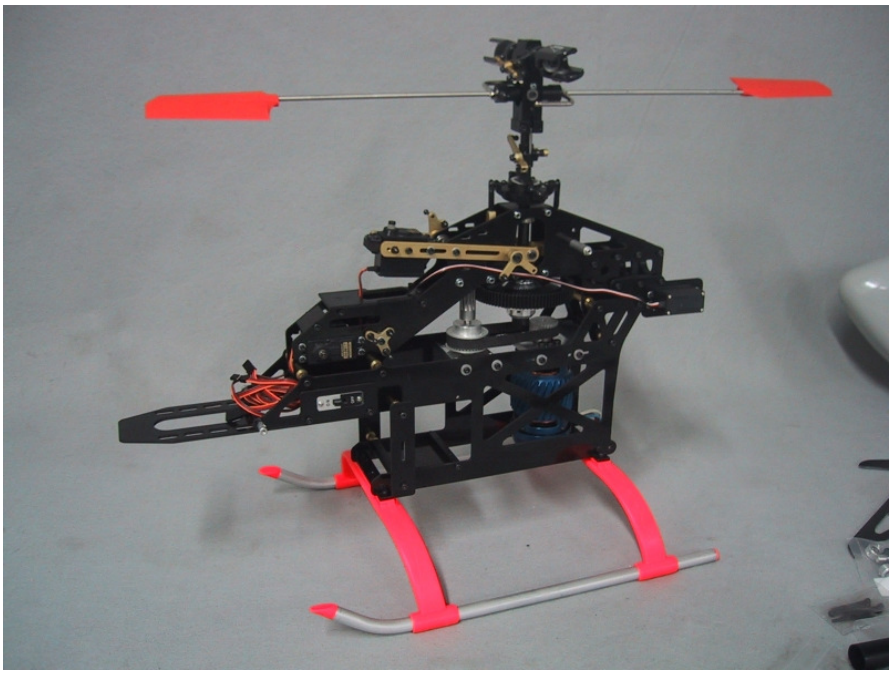




Measure the distance between the flybar arm and the paddles, making sure both sides are identical. Also ensure that the paddles are level to the flybar arms AND to each other by sighting across the head.



This is how your heli should look at this point, But we still have a ways to go yet…☺

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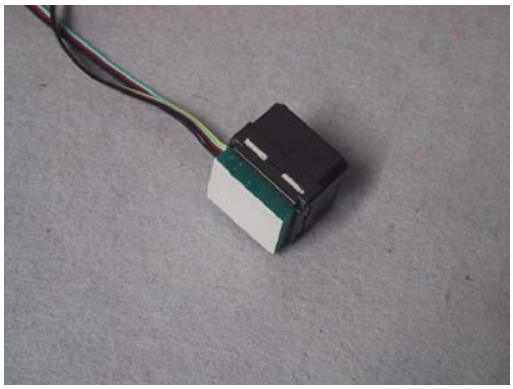
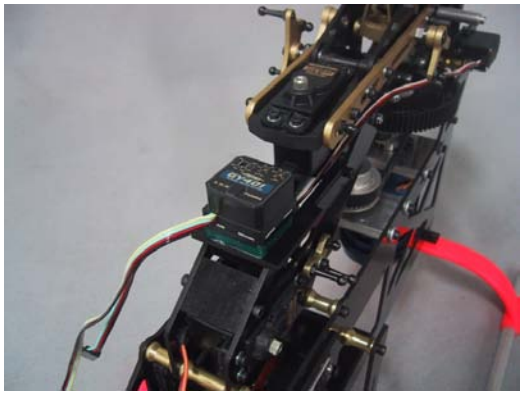
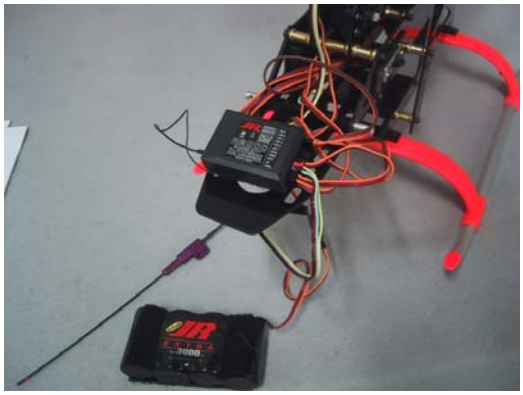


Now's a good time to mount your gyro, we suggest the use of Zeal tape over the stock double sided tape for enhanced vibration dampening. Zeal tape is available from us at Bergen R/C. cut a small square just a bit smaller than the gyro sensor and stick it securely to the gyro.



Mount the gyro sensor on the flat plate fwd of the aileron servo.



Hook up your servos and gyro to your receiver per the radio manufacturers instructions. Hook up a battery and switch so you can put power to the servos.

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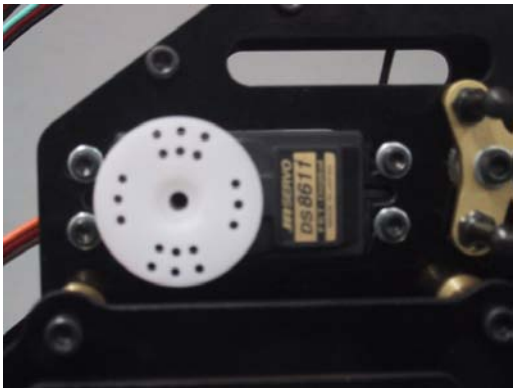
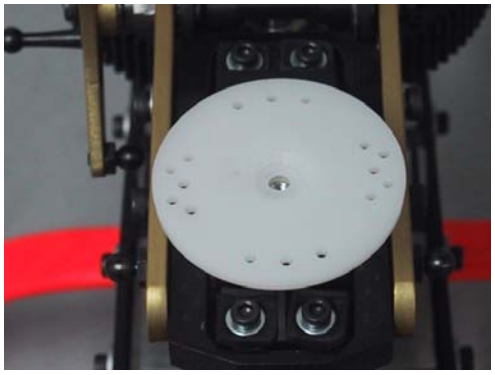
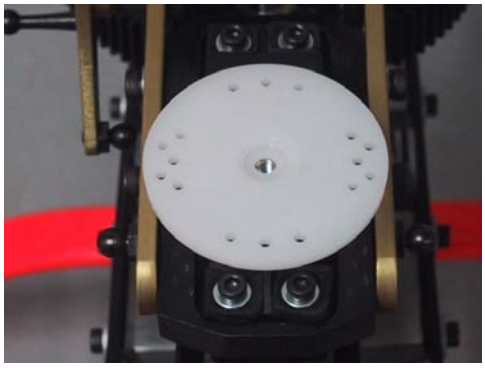
Setting up your helicopter begins in your RADIO. With our Pure Mechanical, single servo system, we use NO mixes. So to begin, set your radio to an S-1, H-1, or single servo swashplate function. Make sure all subtrims are at 0, all mixes are turned OFF. ATV's or travel adjusts should be set as follows;

Pitch 100%
Aileron 100%
Elevator 100%
Rudder 80% for now
Throttle 100% for now



Make sure your pitch curve in the radio is set for a 0,50,100 curve, meaning a straight line from 0 at the bottom to 100 at the top. With the radio and helicopter on, set your throttle/pitch stick at **EXACTLY** half. Place a small servo wheel onto the collective servo, positioning it so that the "6 pack" of holes is at top and bottom. What we're looking for is that the holes are exactly straight up and down. If not, then rotate the wheel 180 degrees, and try again. If it's still not perfect, try another wheel. JR makes different numbered wheels (the number is on the back and very faint), 1, 2, 3, 4, and "M".





Use a Large wheel on the aileron servo, again centering it **EXACTLY**. The first pic shows it slightly off, the second pic has the wheel rotated 180 degrees and perfectly centered.

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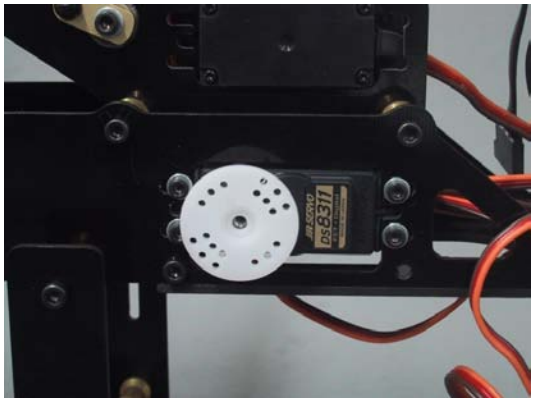
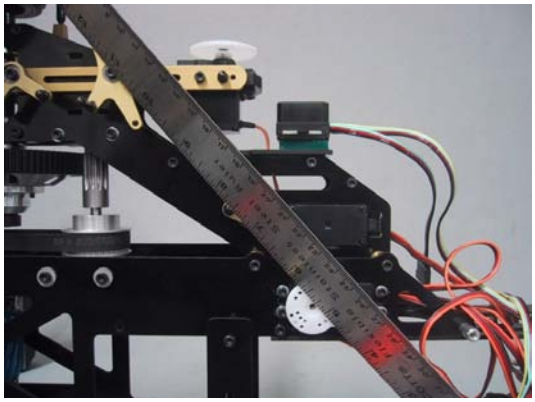
Here you can see the numbers (Blackened with a sharpie).





The elevator servo wheel is set up slightly different in that you want to center it from the “X” arm using a straight edge. Using a small wheel, see how the straightedge passes through the center of the “3 pack”, the servo screw hole AND the center of the “X” arm bolt.

Do the same with the tail servo wheel, rotating it until one set of holes is exactly straight up and down.

We HIGHLY recommend the use of the plastic servo WHEELS vs. metal wheels or the plastic stars or crosses. The plastic wheels are strong enough with our push pull system, but will break in the event of a crash, saving the GEARS in your servo. A metal wheel will cause you to replace gears when you crash…☺

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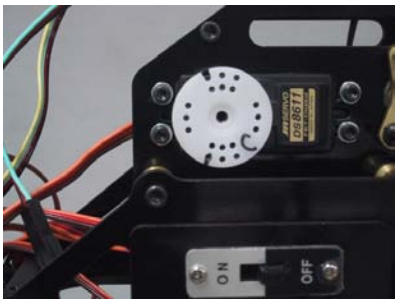
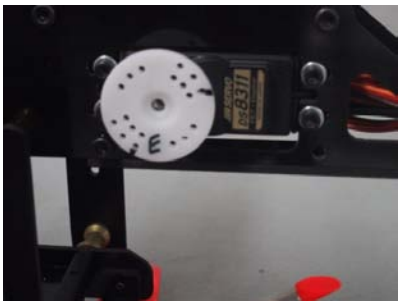
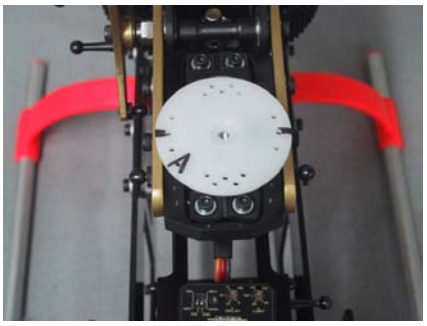




The black tic marks on the servo wheels show which holes we suggest using for proper setup in a true push pull system. Notice that they are OFFSET slightly from straight vertical, or in the case of the elevator, the angle from the “X” arm.



On the aileron servo large wheel we ARE going straight across….

From bag 9, make up 7 ea control ball assy’s using a 2X10 PHS, ball with hole, and 2mm nut. Install these control balls into each servo wheel at the marked holes and secure with another 2mm nut on the opposite side, with loctite.

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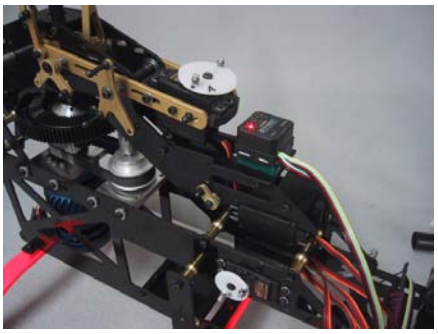
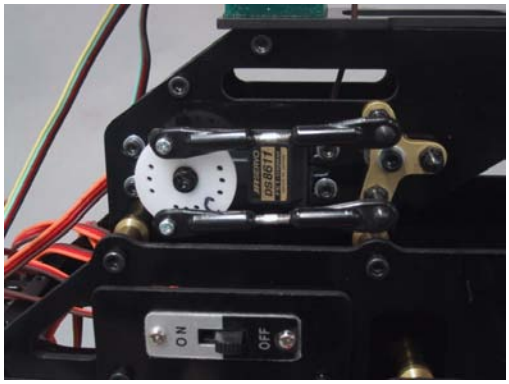


With power turned back on, reinstall the servo wheels onto the servos, ensuring they are on straight again, and secure with the servo wheel screw. If the output gear of your servo is metal, then it is HIGHLY recommended to use loctite on this screw.

Next up are all the pushrods for the control system. Yes there are quite a few of them but with a few simple rules, it's NOT that complicated. The plastic links are what are normally referred to as "Rocket City" links, considered by many to be the best in the industry, for their durability and for the fact that you can do half turn adjustments to fine tune your controls and tracking.



Start off with the collective servo to triple bellcrank using the 30mm rods, making the linkages 51mm from center to center or 58mm from end to end. These dimensions are appx; you may need one turn either way to get the setup perfect, with the idea that both links are IDENTICAL in length. Note that the Servo wheel balls AND the balls on the triple bellcrank are both straight up and down.

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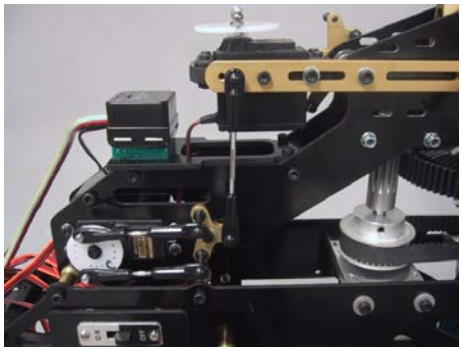
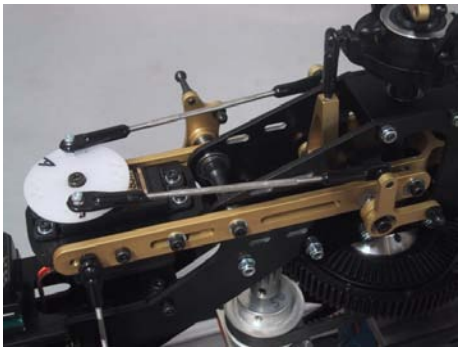
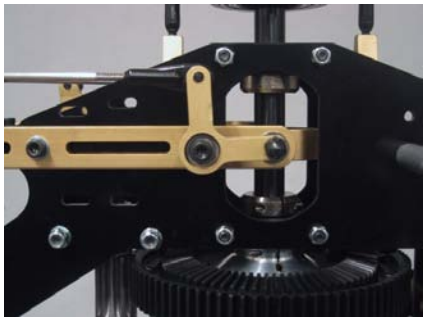
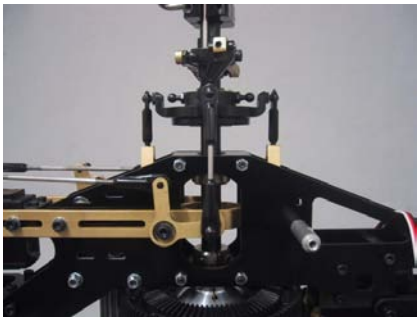


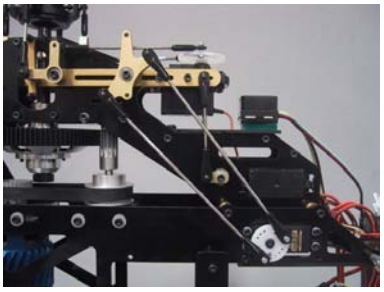


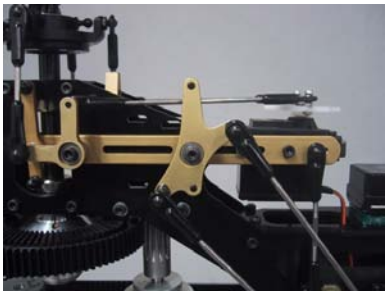
The linkage from the triple AND single bellcrank on the opposite side to the popsicle sticks use the 40mm rod and are 70mm long center to center or 77mm end to end. Make sure the Popsicle sticks are exactly horizontal with power on and collective at exactly half.
The aileron servo to aileron bellcrank rods use the 85mm rod and are 101mm center to center or 108mm end to end.





Make slight adjustments to the length of the rod so that the ball on the outside of the aileron bellcrank lines up EXACTLY over the bolt going to the elevator yoke axle. This is done with power ON to ensure the servo is centered…
Then use the 40mm long rod to make the linkage from the aileron bellcrank to the swashplate 57mm long center to center or 64mm long end to end.





Elevator servo to “X” arm linkage is made from the 130mm long rod and is 148mm long center to center or 155mm long end to end. Note the orientation of the “X” arm with the LONG leg straight up. With power on, adjust the rods as needed to get this leg to point straight up.

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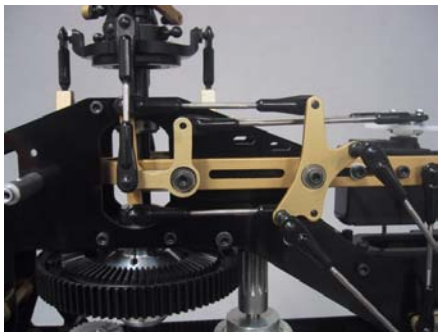
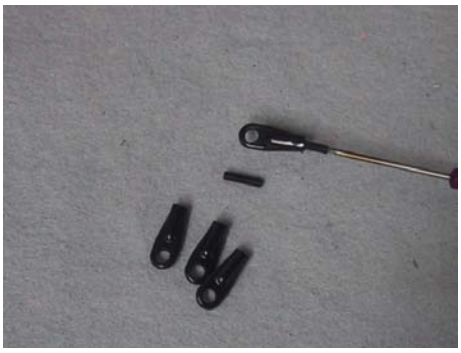


From the “X” arm to the elevator arm use rods 50mm long, making them 70mm center to center or 77mm end to end. This arm should also be exactly straight up and down. From the washout arms to the Flybar arms, use the rods 30mm long, making them 47mm center to center or 54mm end to end. The washout arms should exactly horizontal.

From the swashplate to the bell/hiller mixer use 75mm long rods, making them 97mm center to center or 104mm end to end. For the linkages from the seesaw to the bell mixer, you need to break out your x-acto knife and cut 4 ball links to make them 18mm long.



Thread these links onto 2 ea 3 X12 SS, making them 30mm center to center or 37mm end to end, with a half twist and install them. With both of the rods attached to the bell/hiller mixer, they should also be exactly level.

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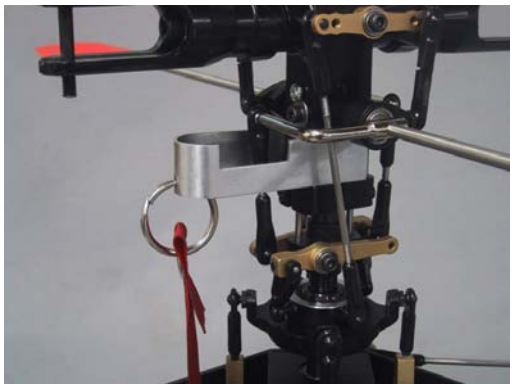
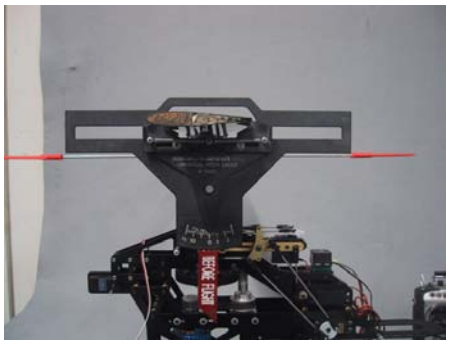
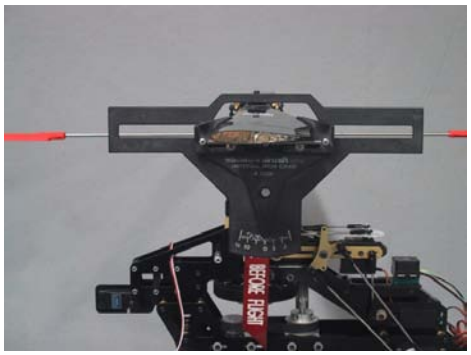


For Pitch setup purposes we offer a flybar lock w/flag to lock the flybar level to the rotor head.



Which is used in conjunction with a pitch gauge, such as this one available from Miniature Aircraft USA.



With the collective stick at half, verify that the pitch on the blades is at 0 degrees. If not, go back and find which bellcrank is NOT exactly level, horizontal, or vertical. You should also be able to achieve +- 12 degrees of pitch at top and bottom stick. This may require increasing the pitch ATV or travel adjust in the radio.

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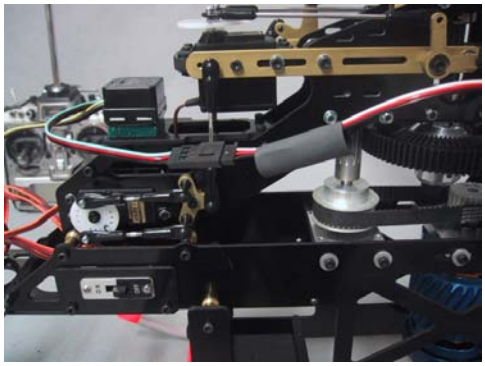
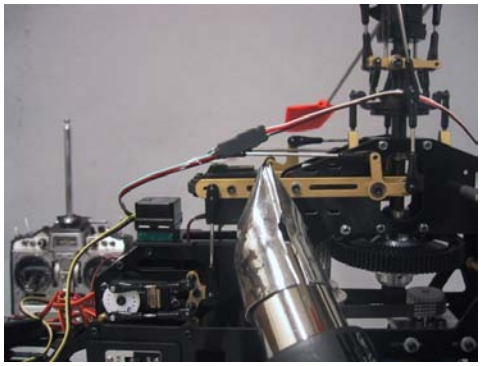
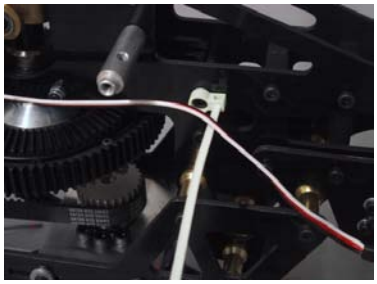
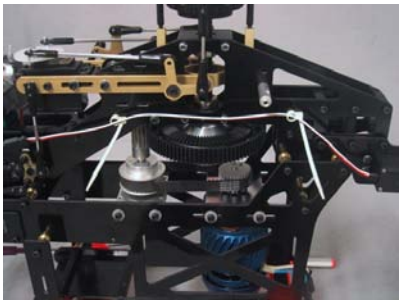
A head button is available and is installed using 2 ea 3X12 SHCS and loctite.





For any wire connection such as the one with a Futaba 401 gyro system, we recommend using heat shrink tubing to secure the connection.





Included in your kit are some “special” tye wraps, used to secure the tail servo wire above the main gear as shown.

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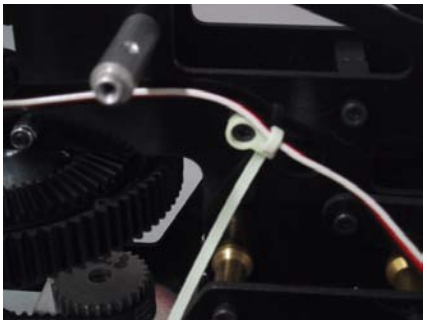
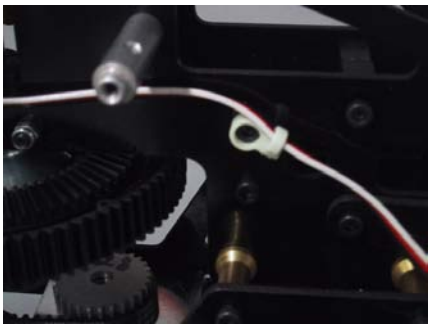
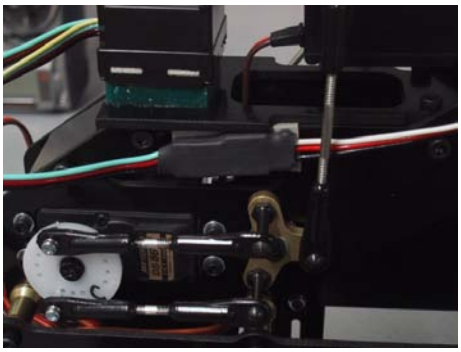
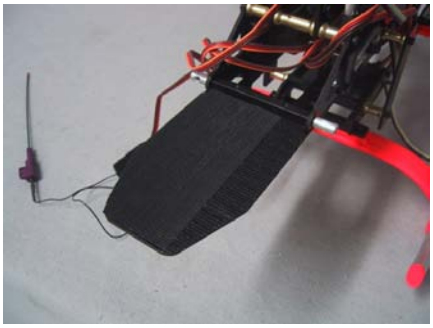


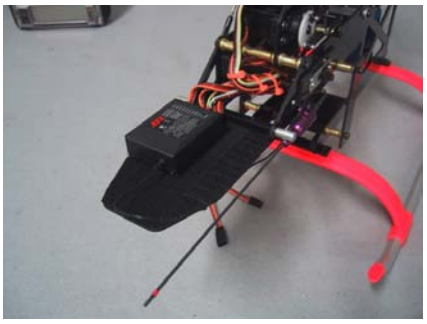


It may be necessary to CA (super glue) the tye wrap to the head of the bolt, then wrap it around the wire and trim the tail off.



Secure the connection to the frames with a piece of double sided tape.





There's plenty of room on the battery tray for radio gear and battery, I used sticky backed Velcro small tye wraps from FMP for nice clean wiring setup.

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Next step is to build the tail, from bag 10A and 10B. These instructions are for the Tazer 800 using a longer boom, etc. Look for the Standard Tazer tail instructions in the next step.

Look closely at the ends of the TT shafts; you will find a silver dot. Mark and cut off 1" off of each end of both arrow shafts. This is necessary as during the manufacturing process of the shafts, the very ends may NOT be of the proper inner diameter, which is necessary for our purposes.

Now measure and cut one of the shafts to 17", the other to 16 ¼". The difference in lengths is to prevent a harmonic "whipping" of the shaft inside the boom. Use the shorter of the 2 shafts as the forward one when assembling the TT drive train.

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The “Dogbone” is the very front of the shaft, and plugs into the delrin coupler of the front xmsn. Slide the cross pin into the ball end of the dogbone and secure with a 3X4 setscrew from ***INSIDE*** the dogbone as shown, with loctite. Try to press the cross pin out to ensure the setscrew has engaged it.

Slide the dogbone into one end of the shorter TT shaft and secure in place with a collar and ONE 3X3 setscrew for now. Slide the aluminum coupler into the opposite end and again secure with a collar and ONE 3X3 setscrew.

Slide the bearing carrier over the aluminum coupler then slide the longer TT shaft onto the coupler, again securing with a collar and ONE 3X3 setscrew.

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Slide the tail gearbox input shaft into the end of the long TT shaft and secure with a collar and ONE 3X3 setscrew. You now have a complete TT assy, however the next steps are VERY important to a reliable TT drive.

Using a #46 drill bit (small enough to not damage the threads in the collar), pick ONE setscrew hole in EACH collar (4 places) and drill through the shaft going deep enough to create a divot in the shaft inside. The pic shows what the divot should look like.

At each point that you drilled, install a 3X3 setscrew with loctite, ensuring that the setscrew sits down into the divot. Install 3X3 setscrews into the remaining threaded holes, not forgetting to remove and loctite the ones installed initially. Your TT shaft is now complete!!

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Remove the 2 ea 3X4 SHCS bolts from the sides of the tail gearbox, and lubricate the o'rings of the bearing carrier.

Locate the end of the tail boom with the 2 drilled holes and insert the TT drive system into the boom, pushing it ALL the way in and lining up the holes in the tail boom with the threaded holes in the tail gearbox.

Reinstall the 2 ea 3X4 SHCS with loctite. These bolts do NOT require excessive torque, just tighten them down. Now is a good time to slide the horizontal fin clamp onto the boom, as it will be difficult to do later….

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Building the Standard or Tazer 700 tail system will require a couple of additional tools, a 12" ruler and a wooden dowel 3/8" dia and 33" long. Windex is needed to install the Torque Tube bearing carriers. We use as it makes a good lubricant THEN totally evaporates, locking the bearing carriers into place in the boom.
Mark your wooden dowel at 10", this is for the fwd bearing carrier.

Mark it again 12" farther back or a total of 22". This is for the rear bearing carrier. We're going to install the bearing carriers from the FRONT end of the boom, the end WITHOUT holes. Also install the bearing carriers with the delrin insert towards the front.

Spray a little bit of Windex onto the o-rings, and press the bearing carrier into the boom.

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Use the dowel to push the bearing carrier all the way into the boom to the rear or 22” mark. Lubricate the fwd bearing carrier with Windex and install it into the boom as well.

Push this bearing carrier in up to the 10” or front mark. While working on the next step, the Windex will evaporate, allowing the rubber o-rings to secure the bearing carriers in place in the Boom. If you ever need to remove the bearing carriers, squirt more Windex into the boom and push them out with the wooden dowel.

Cut 1” off of one end of the arrow shaft. This is important to get rid of the end of the arrow shaft that is NOT formed to the correct size. Now measure and cut the arrow shaft at 31”

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Assemble the dogbone by inserting the pin, centering it, and securing it with a 3X4 SS and loctite, installed from inside the dogbone.

Insert the dogbone into one end of the arrow shaft, and slide one collar over both pieces. Install 2 ea 3X3 SS, leaving one hole open.

Using a #46 drill bit, In the hole left open in the collar, drill THROUGH the arrow shaft and INTO the dogbone, leaving a divot. Disassemble the joint and inspect your divot. You want it deep enough that the setscrew will sit into it when assembled.

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Reassemble and install a 3X3 ss with loctite in the hole with the divot, seating the setscrew in the divot. Remove the other 2 setscrews, loctite, and reinstall in the collar.

Insert the TT in from the front end of the boom and through the bearing carriers. Push the TT all the way through until the rear off the TT sticks out the back of the boom.

Slide the remaining Collar over the TT, the insert the input shaft of the tail gearbox in the TT. Again secure it with 2 ea 3X3 SS.

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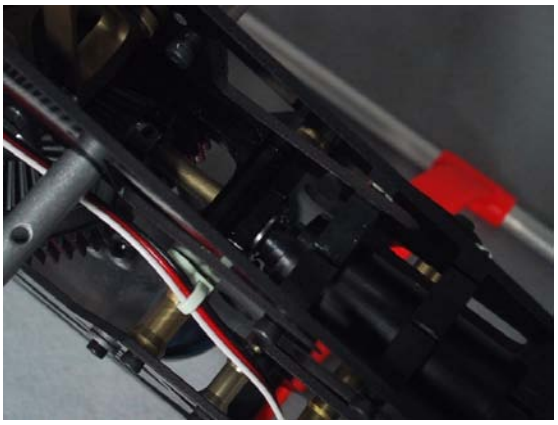
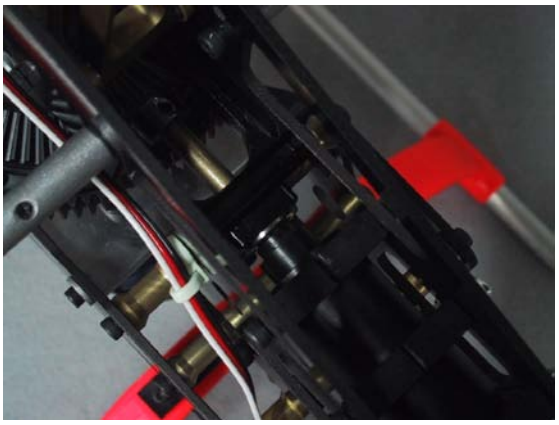
Again using the open hole in the collar, drill through the TT and into the input shaft with the #46 drill bit, creating a divot. Again disassemble and inspect the divot to ensure it's deep enough for the setscrew to set into it.

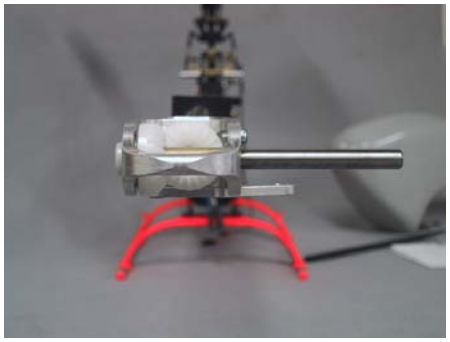
Reassemble the parts, and loctite a 3X3 setscrew into the hole with the divot, then the remaining 2 setscrews. Remove the 2 ea 3X4 SHCS from the gearbox then slide it into the tail boom, lining up the holes for the Bolts. If they don't quite line up, rotate the gearbox 180 degrees and try again.

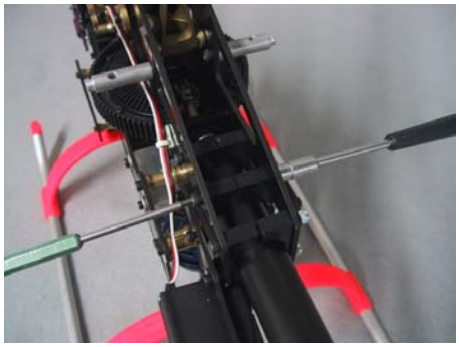
Loctite and start BOTH 3X4 SHCS into the gearbox, then tighten both of them. These bolts do NOT require gorilla torque; all that will accomplish is pulling the threads out. If that happens, we can helicoil the gearbox. Slide the horizontal fin clamp onto the boom.



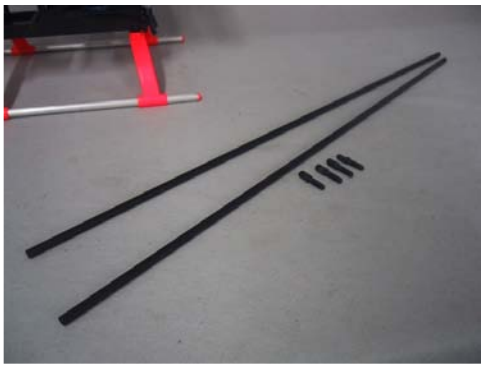


Insert the tail boom into the boom clamps at the rear of the heli; pushing it ALL the way in, ensuring the dogbone has engaged the delrin coupler. The end of the boom should go past the most forward boom clamp. Now pull the boom BACK out by 1mm. This is important to remove any rearward pressure on the tt drive system.





Level the gearbox by rotating the complete tail boom assy and tighten the 6 nuts and bolts going through the boom clamps. It is NOT necessary to close the gap on the clamps, nor is it necessary to put tape, sandpaper, or screws into the boom to hold it in place.



Assemble the boom supports, noting that the plastic ends are threaded into the aluminum supports.

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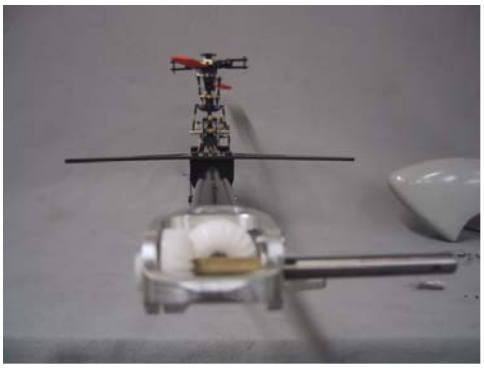
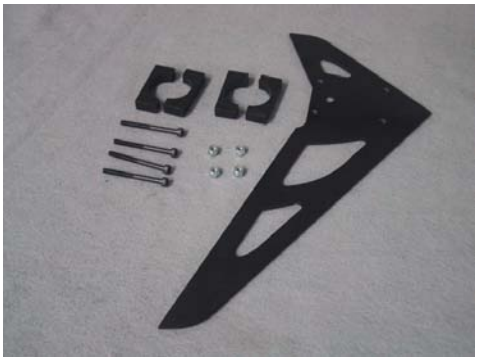
Use JB weld to glue the ends into the boom supports. Ensure that the ends are parallel to each other. Secure one end to the bottom rear of the lower frames with 2ea 3X12 SHCS, 3m washers, and 3m Locknuts.

Secure the rear of the boom supports with a 3X35 SHCS, 2 ea 3m washers, and a 3m locknut, but don't tighten the bolt just yet. Install the horizontal fin onto the clamp with 2 ea 3X8 SHCS. Use CA (superglue) as a loctite on these 2 bolts.





Level the horizontal fin, then tighten the bolt securing the clamp and boom supports. Gather up the vertical fin components, 4 ea 3X30 SHCS, 4 ea 3m locknuts, and 2 sets of boom clamps.

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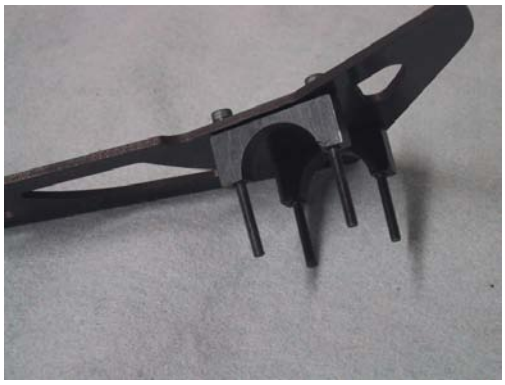

Note the orientation of the fin, place the 4 bolts in the 4 holes and slide 2 of the boom clamps onto the bolts. Place the fin and clamps onto the boom and slide the remaining 2 clamps onto the bolts.

Make sure the vertical fin is exactly vertical and tighten the 4 ea 3m locknuts onto the bolts. Again, it is NOT necessary to close the gap between the clamps, only to tighten them.

Assemble the tail pitch bellcrank by installing 2 ea 3X7X3 flanged bearings with a spacer in between the bearings.

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The bearings should sit down in the bellcrank with only the flange above the surface. It may be necessary to sand the spacer down slightly to achieve this. Install the special bolt, a 3X12 w 6mm shoulder then place 2 ea brass washers on the bolt.

Install a medium ball on to the bellcrank, for most gyro applications, the inner hole gives the proper travel amount. Install the bellcrank onto the tail gearbox, threading the bolt into the bellcrank arm.

Set the tension on the bearings by tightening the bolt, then locking it in place with a 3m locknut. The bellcrank should spin freely with no notchyness and no slop.

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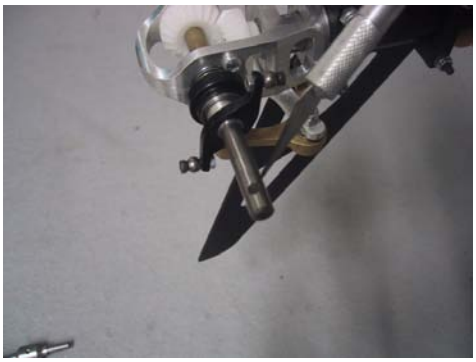
The tail pitch slider is a preassembled unit; slide it onto the output shaft, making sure to insert the ball into the delrin cup. Operate the mechanism by moving the bellcrank by hand making sure the operation is smooth and free. The shaft may have a coating on it from the precision grinding process, and can be cleaned off with formula 409. A drop of oil on the shaft will also help. Check the fit of the ball into the delrin cup and ream as necessary. Proper operation here will greatly affect how well your tail rotor/gyro/servo system works.



The tail rotor hub is borrowed from our Industrial birds, capable of swinging 130mm tail blades with NO problem. Note the divot on the tail output shaft.

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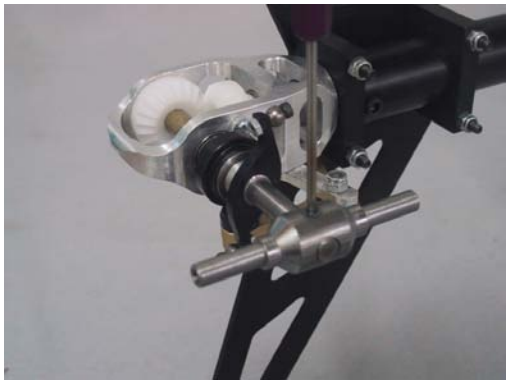

Install the tail hub onto the tail output shaft with ONE, and only ONE 3X4 setscrew and loctite. The tip of the setscrew MUST sit into the divot on the output shaft. Only one setscrew IS more secure than 2 setscrews 180 degrees apart in this application.

The aluminum tail blade grips already have the radial bearings installed, so begin by inserting the 4X4 stainless shoulder bolt in the eyelet. A drop of oil here is also a good idea.

Place a small drop of loctite on the threads of the shoulder bolt and screw into the horn on the tail blade grip, being VERY careful NOT to get loctite into the joint. This will make the joint stiff and your tail rotor system will NOT function properly, causing servos to overheat, tail wags, sticking, etc.

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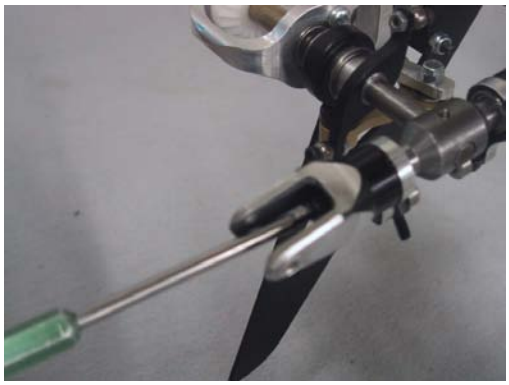
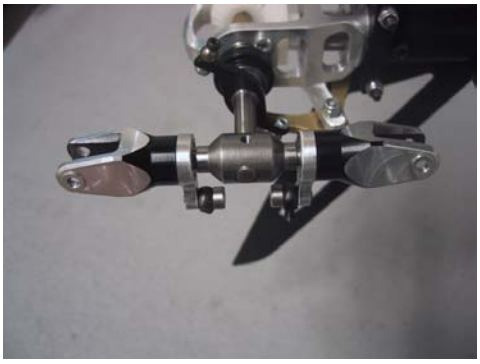
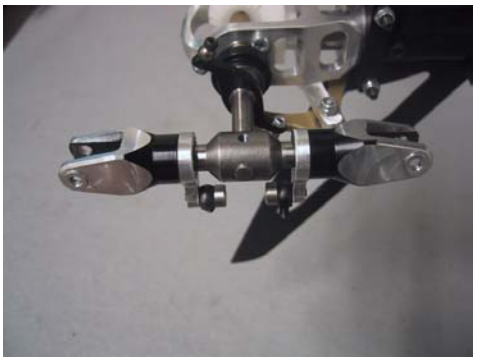
The tail blades grips and associated hardware must be installed in the proper order for proper operation, not the 10mm spacer installed BEFORE the thrust bearings. Also be sure to grease the ball cage of the thrust bearings. One of the thrust bearing washers has a smaller inner diameter than the other, you can identify it by placing them onto the tail rotor hub, noting which one has more play.



Slide a tail blade grip onto the tail rotor hub, then install the 10mm spacer, the larger ID thrust bearing washer, the greased ball cage, then the small inner diameter thrust bearing washer. Secure the assy with a 3X6 SHCS and 3m washer, with loctite. Do not over torque this bolt, it is not necessary. Repeat for opposite blade grip.





You will notice about 1mm of in and out play, this is normal and necessary, do NOT add shims to remove it.

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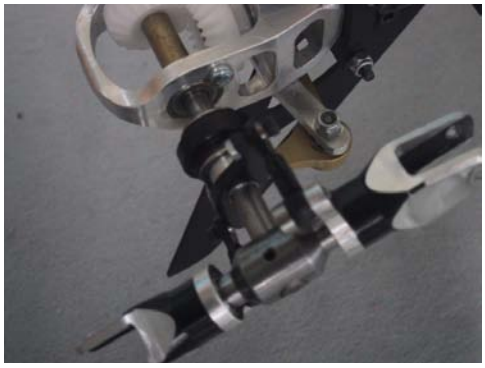
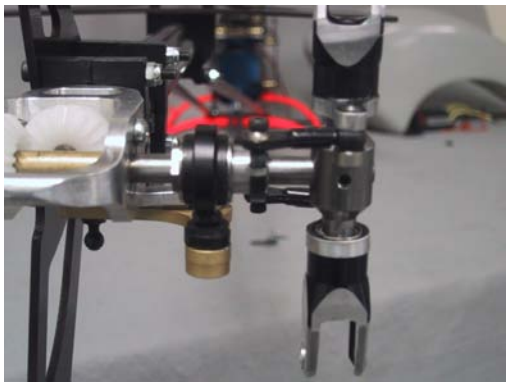
Locate the “special” tail links. These do require a slight modification in trimming off the ribs off of each side and cutting them down to 17mm long.





Thread the links all the way onto the eyelets, then snap the ends onto the balls installed on the pitch slider. Note the direction of the blade grips in the pics.

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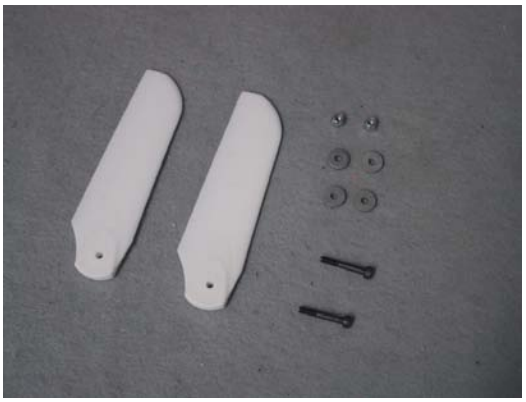
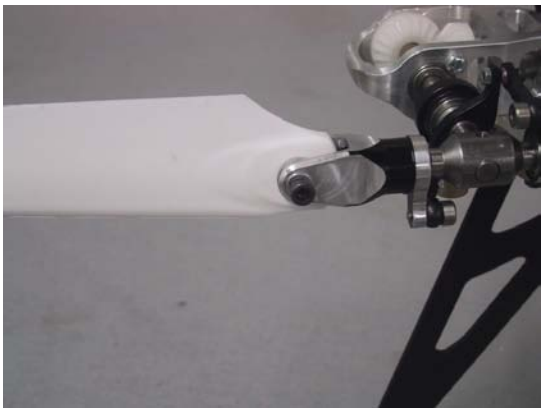


The tail blades included in your kit are from KB Dream designs and may vary slightly in design and color from the picture. The tail blades are installed with a 1mm washer on both sides. It maybe a tight fit, that's OK!



Install tail blade grip bolt and secure with 3m locknut. Only tighten enough to barely hold the blades in place. Not the direction of the tail blades leading edge.

The tail pushrod is made from a carbon fiber rod. Assemble the aluminum ends with a 3X18 SHCS, 3m locknut and ball links. Install the bolt from INSIDE the end, securing with a nut.

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Tighten the nut sufficiently to prevent the bolt from turning and thread the ball link onto the stud.

Assemble the other end the same way, then glue ONE end on to the carbon fiber rod.

Snap this end onto the tail servo wheel ball, making sure the ball is pointed straight down with power on. Snap the loose push rod end onto the medium ball on the tail pitch bellcrank. Mark the point on the carbon fiber rod where it needs cutting so it fits into the push rod end assy. When measuring for this, make sure the tail pitch bell crank is at 90 degrees and the tail pitch slider is centered on the output shaft. Glue the end onto the cut carbon fiber rod and let dry overnight.

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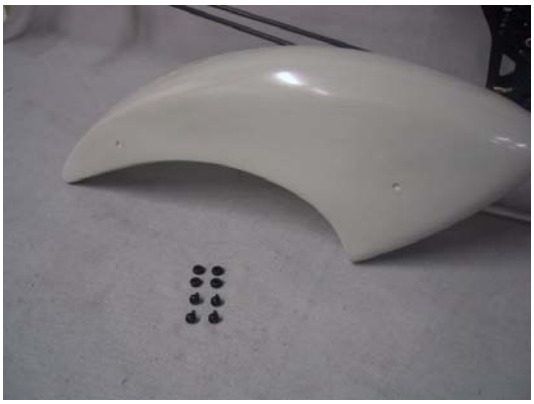

The fiberglass canopy is the last thing that needs “building”. We do suggest painting it prior to cutting, as the ears may be too fragile for a lot of sanding pressure. On the top of the canopy you should be able to find a slightly raised area showing the area to be cut out.

Also mark around the inside perimeter, leaving only a ¼” or less of a lip. Rough cut out the area with a dremel tool cut off disk.

Then use a large sanding drum to finish the cutout areas. The “ears” on the top are required to clear the pushrods going up to the swashplate.

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Depending on the size of battery you intend to use, the dimples in your canopy may NOT match the standoffs. Using 2 ea 6s2p packs side by side in the frames for instance will not allow the canopy to sit back far enough. In this case, locate the canopy as far back as possible and find the new holes in the canopy.
With the batteries side by side, you may need to trim the inside lip of the canopy to clear them as well. The point is, trim and fit the canopy however needed for easy on and off use.

Solder deans connectors or whatever your favorite choice is per the manufacturers instructions, putting the female plugs on the batteries,

and building a “Y” harness out of 2 males and 1 female plug.

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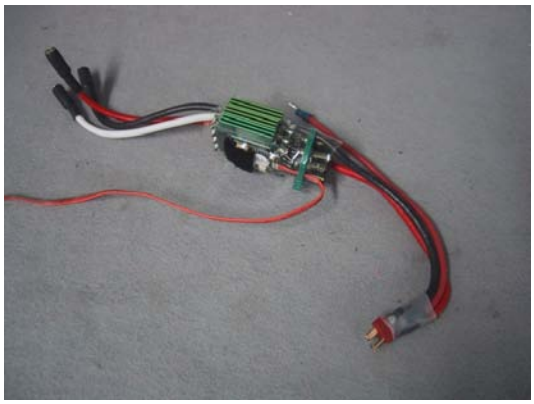

This is a high powered heli, running either 10s or 12s, so you'll need an electronic speed controller (ESC) that can handle the power. The CC HV110 shown can handle up to 12s.

On the battery side, install your connector, being sure to get the correct polarity, and install a bonding strap to the negative or black side of the plug. Install an eyelet that a 3mm bolt can fit through. Solder female "bullet" connectors to the 3 wires on the motor side of the ESC, using heatshrink to keep the connectors separated.

If you haven't already, install the male "bullet" connectors to the motor wires and heatshrink.

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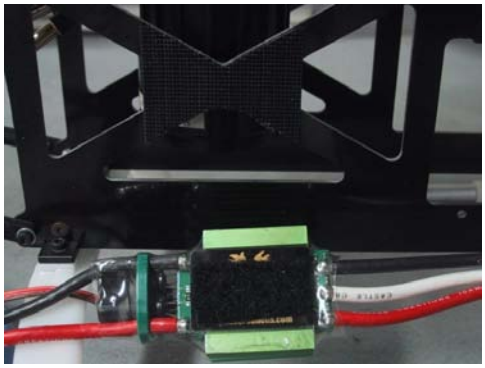
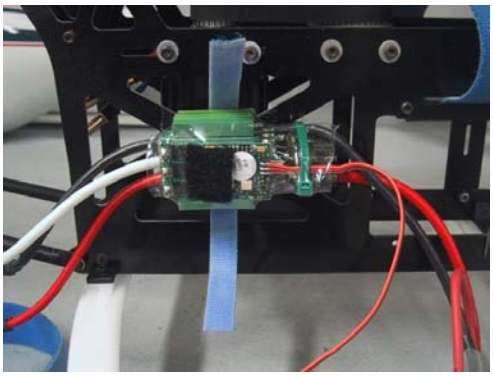
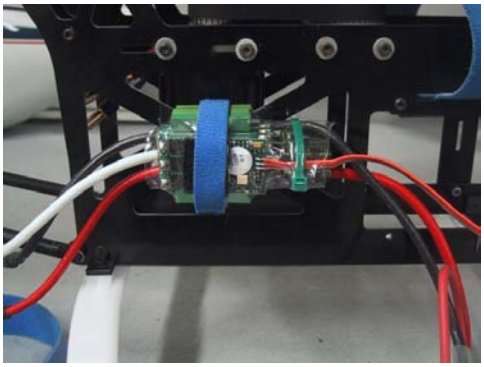
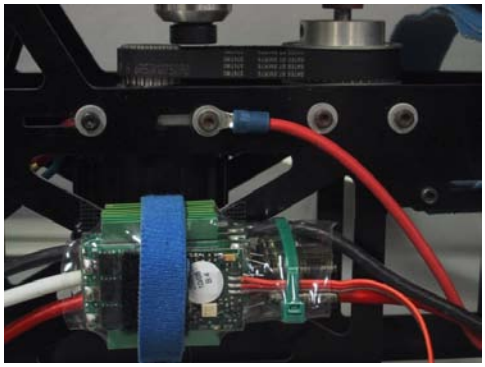


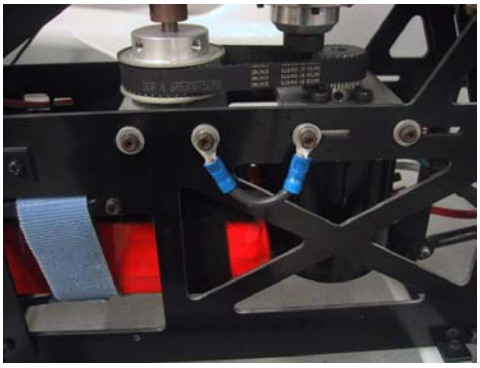


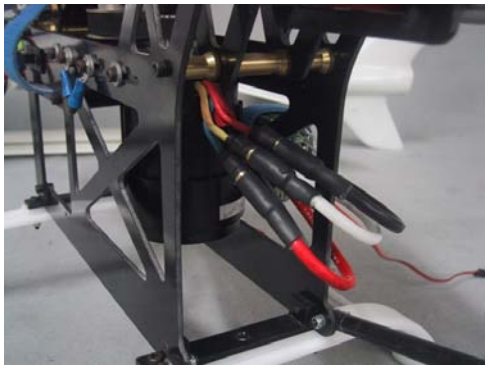
We chose to mount the ESC to the outside lower frames, making it easy to access and to aid in cooling for the high powered system. Use some sticky backed Velcro in the center of the "X" and on the inside and outside of the ESC. Use a short wrap of Velcro to secure to the frame.





Connect the bonding wire to one of the bolts going into either of the aluminum plates.

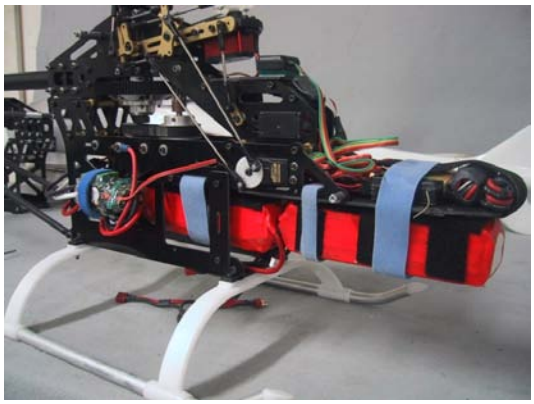


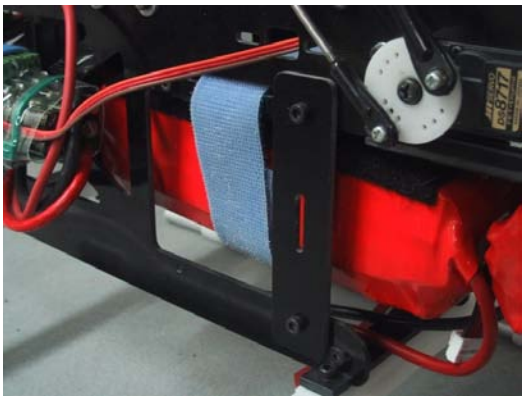


Make a short bonding wire to connect the two aluminum plates together. This is necessary to prevent any static buildup and discharge from the belt drive system. Connect the ESC to the motor with the bullet connectors. At this point it really does not matter which wire hooks to which. When you first attempt to spool up the heli, if the motor runs backwards, switch any 2 wires to reverse the direction.

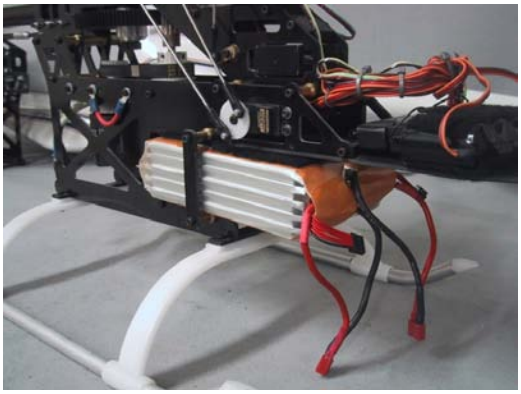
BERGEN

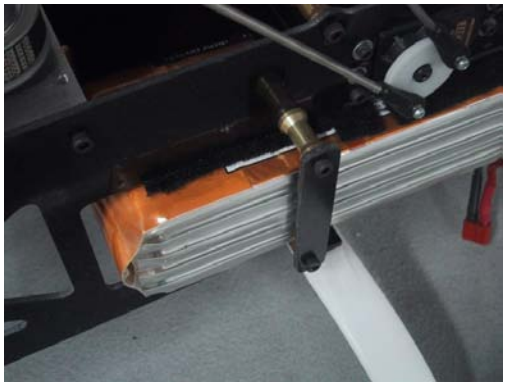
R/C Helicopters



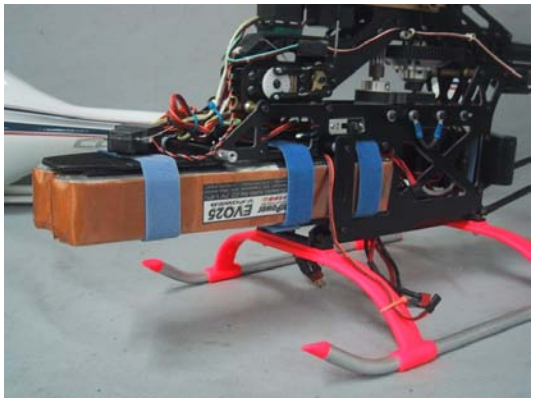


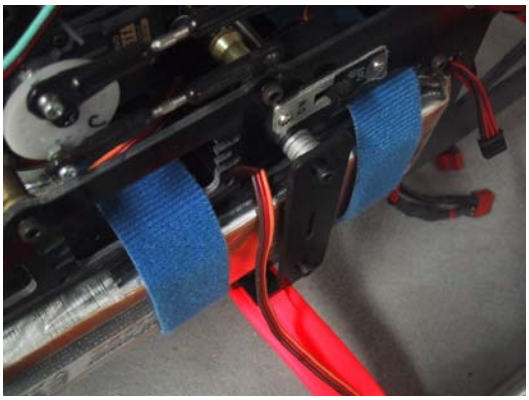
Your battery configuration will determine how you install the battery restraints. If you choose to run the batteries Butt to butt as shown, then use NO spacers under the restraints.





If you want to run the batteries side by side, then use the additional supplied frame spacers to make the retainers wide enough to allow the batteries to slide in.





The final option, with large 6s2p packs, side by side, is to use washers under the retainers. The idea is to have a nice snug fit to keep the batteries in place.