# Hummingbird Elite 3D Pro Assem

## Assembly Kit Instruction Manual



#### **SPECIFICATIONS**

This Super-Micro R/C helicopter has the most advanced capabilities and is considered top-of-the-line. 120 degree eCCPM control, collective main and tail rotors, torque tube tail drive and brushless motor ensure top performance.

MAX MAIN ROTOR RPM 3000

RECOMMENDED MOTOR: HIMAX 4100 MAIN ROTOR DIAMETER: 520mm

LENGTH: 485mm

WEIGHT: 360-380g with electronics and battery

### **Century Helicopter Products**

Designed and Developed in USA

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# Thank You For Purchasing The Hummingbird Elite 3D Pro Helicopter Assembly Kit!

#### Introduction

Congratulations on the purchase of Century Helicopter Product's Humming-bird Elite series helicopter. The Hummingbird Elite is not only ideal for beginners new to the hobby, but also for the intermediate to expert pilot looking for the ultimate in micro electric helicopter performance. The 3D Pro requires a 6+ channel computer radio that supports 120 degree eCCPM operation. Please check with your favorite retailer or manufacturer to verify compatibility of your radio system of choice.

#### Warning!

This radio controlled model is not a toy! It is a precision machine requiring proper assembly and setup to avoid accidents. It is the responsibility of the owner to operate this product in a safe manner as it can inflict serious injury.

The helicopter is made pre-assembled and will require inspection for construction before your first flight.

As the manufacturer, we assume no liability for the use of this product.

#### REQUIRED ITEMS FOR OPERATION

Items needed to fly the Hummingbird

- 1x Radio (6 channels)
- 1x Receiver (6 channels)
- 4x Micro servos
- 1x Micro gyro
- 1x Brushless motor (4100 RPM/Volt)
- 1x Brushless speed controller
- 1x Battery (11.1V Li-Poly or Li-Ion)
- 1x Charger (Li-Poly or Li-Ion type)

#### SYMBOLS AND INDICATORS

GLUE	Use CA	Blue	Main Part
HERE	Glue	Text	Description
LOCK	Use Blue	Green	Part Detail
	Locktite	Text	Description
LUBE HERE	Use Gear		Special

#### **RULES OF R/C**

- -Always turn your transmitter on before powering the model.
- -Always turn off the model by disconnecting the helicopter battery prior to turning off the transmitter.
- -Always start the helicopter with throttle in the low position.
- -Always perform a pre-flight inspection for safe operation.
- These rules will help prevent unsafe operation.

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#### Attention!

If you purchased your Hummingbird Elite 3D Pro with the Lightning Brushless Motor the motor bolts will not be mounted. See below for details.

If you are using a motor other than the Lightning Brushless <u>DO NOT ALLOW MAIN BLADES TO EXCEED 3000 RPM</u>. The mounting of an aftermarket motor may be slightly different.

#### **HUMMINGBIRD 3D PRO MOTOR TIGHTENING PROCEDURE**

Motor is not mounted on the 3D Pro. Install the motor as shown. Align the mesh between the main motor pinion and the main gear. Note the position of the pinion gear and main gear then use those locations to tighten the screws. Once tightened the motor should not move from that position.



Using the two included silver aluminum motor standoffs (pictured). Align the motor for best possible gear mesh.



Using a Phillips head screwdriver fully tighten the motor bolts in place where the gear mesh is best.

#### **Section 1: Mast Tower Assembly**

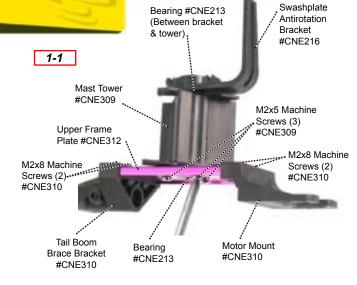
Bags Used:

CNE309, CNE310, CNE312, CNE216

Mast Tower Assembly (1-1)

- 1) Place the Mast Tower CNE309 on top of the CNE312 Upper Frame Plate and align until the Mast Tower to match the bolt pattern of the Upper Frame Plate.
- 2) Secure the *Mast Tower* with the supplied *M2x5 Machine Screws (3X)* found in CNE309 parts bag.
- 3) Identify the *Motor Mount* with CNE310 and slip it over the *Upper Frame Plate*. The *Motor Mount* should touch the lower tab of the *Mast Tower*. Then install the *Tail Boom Brace Bracket* over the opposite end of the *Upper Frame Plate*. Secure the *Tail Boom Brace Bracket* and *Motor Mount* with the supplied *M2x8 Machine Screws (4X)*.
- **4)** Open parts bag CNE216 *Antirotation Bracket* and place it on top of the *Mast Tower*, facing forward, towards the *Motor Mount*.

Place this assembly aside for now, we will return to it later.



#### **Section 2: Lower Frame Plate Assembly**

Bags Used:

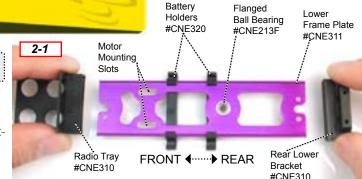
CNE311, CNE320, CNE310

Lower Frame Plate Assembly (2-1)

Get parts bag CNE311 Lower Frame Plate, CNE320 Battery Holders and the remaining Frame Holders in parts bag CNE310.

- **5)** Slip the *Battery Holders* on from the left side of the *Lower Frame Plate*.
- **6)** Slip the *Radio Tray* onto the *Lower Frame Plate* closest to the Motor Mounting Slots and the *Rear Lower Bracket* on the opposite side.

Place this assembly aside for now, we will get back to it later.



#### **Section 3: Tail Boom & Drive Shaft Assembly**

Bags Used:

CNE316, CNE315, CNE305

Tail Boom & Drive Shaft Assembly (3-1, 3-2)

Get parts bag CNE316 Tail boom, push rod and guides, CNE315 Tail drive shaft set and CNE305 Tail drive shaft gears.

7) Get the Tail Drive Shaft Bearing inside CNE315 parts bag. Drop a small amount of Tri-flow CN2024T (Optional) around the race of the bearing, coat the rubber o-ring on the outside of the Tail Drive Shaft Bearing with a film of liquid soap, so it can easily be pushed inside the center of the Tail Boom. Use a wooden dowel to insert the Tail Drive Shaft Bearing in the center of the Tail Boom.

Tail Boom #CNE316 Tail Drive Shaft Bearing Wooden dowel #CNE315 ...

Tail Boom & Drive Shaft Assembly (Fig. 3-2)

8) Using the mast tower assembly from step 4 insert the slotted side of the Tail Boom into the Tail Boom Brace Bracket. Twist until slots on the Tail Boom fit snugly in place inside the Tail Boom Brace Bracket. Secure the Tail Boom with the supplied M3x3 Set Screws found in the parts bag CNE310 (screw bag).



#### **Section 4: Tail Drive Assembly (Continued)**

Bags Used:

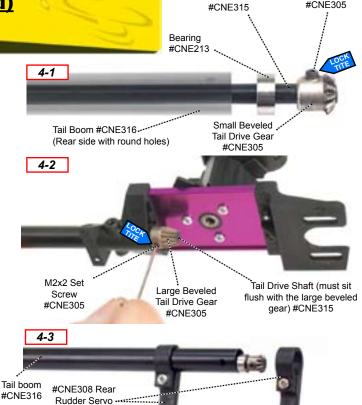
CNE308, CNE309, CNE312, CNE216

Tail Boom/Drive II (4-1, 4-2, 4-3)

- 9) Slide one of the CNE213 Bearing over the Tail Drive Shaft.
- 10) Open parts bag CNE305 Tail Drive Gear Set.

CNE305 includes a bag with 3x *M2x2 Set Screws*, put these screws into a container or open the bag when it's ready to be use.

- 11) Get the Small Beveled Gear and insert it into the rear section of the Tail Drive Shaft. Make sure that the head is flush with the tip of Tail Drive Shaft. Place a small amount of locktite on the threads of the Set Screw to secure the Small Beveled Gear on the Tail Drive Shaft (see 4-2).
- 12) Install the *Tail Drive Shaft* into the *Tail Boom* and through the *Tail Boom Bracket*. Then insert the *Large Beveled Gear* onto the *Tail Drive Shaft*. Use a small amount of locktite to secure the *Large Beveled Gear* in place by using the supplied *M2x2 Set Screw*.
- 13) Using parts bag CNE308 *Rear Rudder Servo Mounts*, insert both mounts over the *Tail Boom* (refer to 4-3 for direction). Do not tighten the screws in CNE308 at this time.



Mounts

Tail Drive Shaft

M2x2 Set Screw

#### **Section 5: Landing Gear & Tail Supports**

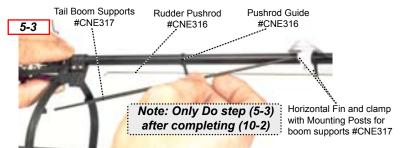
Bags Used: CNE326, CNE310, CNE317, CNE316

Landing gear assembly (5-1, 5-2, 5-3)

- 14) Open CNE326 *Landing Gear Set*. Note that there are mounting posts on the inside of the curved portion of the *Landing Struts*. Also notice that there are holes in these posts. When you attach the *Landing Gear Set*, make sure that all of the holes are pointing to the rear.
- 15) Use the supplied M2x11.5 Machine Screws found in CNE310 to mount one of the Landing Struts to the Radio Tray. The other Landing Strut connects to the Rear Lower Bracket.
- 16) Insert one Pushrod Guide first and then the Horizontal Fin from CNE317 3D fins bag. Install the Horizontal Fin onto the CNE316 Tail Boom between the Push Rod Guides.
- 17) (This step is related to the assembly in this section but cannot be completed until 10-2 has been completed). Insert the carbon fiber *Tail Boom Support* to the Mounting Posts and in to *Horizontal Fin Mounting Posts*. Use the supplied M2x8 Machine Screw to secure the Horizontal Fin.
- 18) Use the Rudder Pushrod from bag CNE316 connecting it to the indentations in the Push Rod Guides.







#### **Section 6: Main Rotor Hub**

Bags Used: CNE303, CNE313

Main Rotor Head Assembly (6-1, 6-2)

Get parts bag CNE303 CNC Rotor Hub and rotor hub collar and Part bag CNE313 Main Shaft, spacers and main shaft collar.

Place not used here in a container to avoid losing them.

19) Insert CNE313 Main Shaft into the CNC Rotor Hub. Take note that the Main Shaft has three holes. Mount the CNC Rotor Hub onto the end of the Main Shaft where the hole is closest to the tip of the Main Shaft (least material between the hole in the shaft and the end of the shaft). Put the Plastic Link Stabilizer over the bottom of the CNC Rotor Hub.

Note, that there is a hole in the middle base of the CNC Rotor Hub. Align the holes from the Plastic Link Stabilizer to the CNC Rotor Hub, hold it up to a lamp, you should be able to see light through the hole (if the lamp is **ON**).

20) Insert the 11mm *Jesus Pin* through the assembly. Tap or press the *Jesus Pin* in place using hobby pliers.



CNC Rotor Hub #CNE303

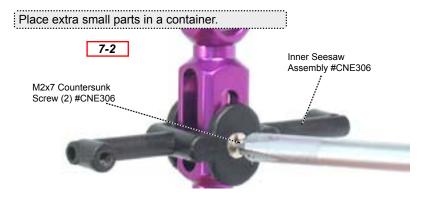
#### **Section 7: Seesaw & Rotor Hub Collar**

Bags Used: CNE306, CNE313

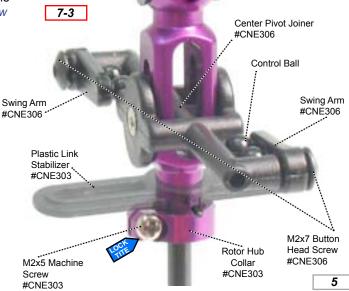
Seesaw & Rotor Hub Collar (7-1, 7-2, 7-3)

Open parts bag CNE306 seesaw assembly.

- 21) Place the *Center Pivot Joiner* inside the *CNC Rotor Hub* (long ends of the *Center Pivot Joiner* will protrude from the large slots of the *CNC Rotor Hub* Short ends will protrude from the small slots).
- 22) Remove the Head Button from on top of the CNC Rotor Hub and insert the Inner Seesaw Assembly and align it with the Center Pivot Joiner. Attach the Inner Seesaw Assembly to the Center Pivot Joiner using the supplied M2x7 Countersunk Screws from bag CNE306. Once completed, replace the Head Button onto the CNC Rotor Hub.
- 23) Attach the *Swing Arms* using the supplied *M2x7 Button Head Screws* to the *Inner Seesaw Assembly* with the two control balls facing the *Inner Seesaw Assembly* (7-3).
- 24) Start the supplied M2x5 Machine Screw into the Rotor Hub Collar and insert it over the CNC Rotor Hub until it is flush with the Plastic Link Stabilizer. Apply locktite to screw and tighten.







#### **Section 8: Main Rotor Head Assembly**

Bags Used:

CNE303, CNE313, CNE201, CNE302, CNE304, CNE207

Main rotor head assembly (8-1, 8-2, 8-3, 8-4, 8-5)

25) Place the two *Rubber Dampeners* in the circular openings of the *CNC Rotor Hub*. Insert the *Head Axle* inside the *Rubber Dampeners*.

Note: The *Head Axle* has a hole in the center which must align with the *CNC Rotor Hub*. Hold it up to the light you should be able to see through the holes and insert the *Jesus Pin*.

- 26) Insert the supplied Jesus Pin into the CNC Rotor Hub to secure the Head Axle. Tap or press with hobby pliers. Insert one of the Large Black Washers from parts bag CNE201 followed by a Small Brass Washer onto the Head Axle. Repeat the process on the other side of the CNC Rotor Hub.
- 27) Open parts bag CNE302 Main Blade Grips. Install each grip over the Head Axle using the M2x5 Machine Screws found in CNE201. Check for tightness in the pre-installed bearings by moving the Main Blade Grips. If the movement is rough then the screws are in too tight. Once smooth, place small drop of locktite onto the threads of the screws completing the Main Blade Grip assembly.
- Insert the Outer Seesaw Assembly over the Inner Seesaw Assembly.

Note: The set screws installed on the *Outer Seesaw Assembly* should be oriented upright.

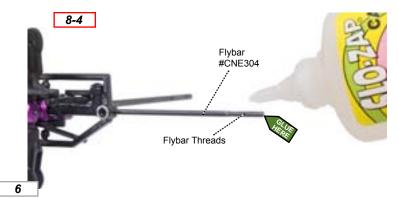
- 29) Align the Center Pivot Joiner, Inner Seesaw Assembly and Outer Seesaw Assembly in order to insert CNE304 Flybar through the Seesaw Assembly. Insert Flybar through all of the above.
- 30) Measure the length of the Flybar. Flybar must be even in length on both sides of the CNC Rotor Hub. Secure the Flybar in place by tightening the M3x3 Set Screws in each side of the Seesaw Assembly. Do not over-tighten the Set Screws here to avoid causing damage to the Outer Seesaw Assembly.
- 31) Put a "Dab" of medium CA to the thread on each end of the *Flybar*. Thread the CNE207 *Flybar Paddles* onto the *Flybar* flush to the end of the *Flybar* Thread. Check the length of the completed *Flybar* with *Flybar Paddles* installed ensuring each side is equal.
- 32) Align the Flybar Paddles to the Seesaw Assembly (8-5).

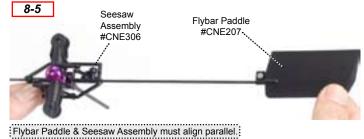
Note: The Seesaw Assembly will act as your paddle pitch gauge, this method will enable you to find the correct (zero) pitch for the Flybar Paddles. Place small loose parts in a container for future use.











#### **Section 9: Main Gear Train Assembly**

Bags Used: CNE313, CNE314, CNE319, CNE250

Main rotor head assembly (9-1, 9-2, 9-3, 9-4, 9-5)
Using the built Upper Main Frame and the built Rotor Head Assembly. Most of the remaining items from bag CNE313 will be needed here.

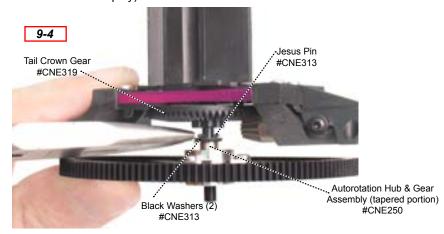
33) Insert CNE314 Swashplate to the Main Shaft directly under the Rotor Hub Collar. There are three control balls on the Swashplate outer arms and one straight guide. Insert the Straight Guide of the swashplate to the Antirotation Bracket.

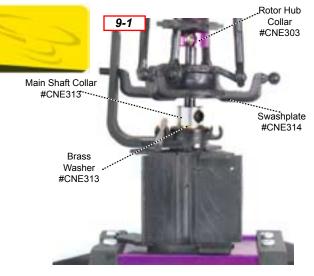
There are two *Brass Washers*, two *Black Washers* and one 11.70mm *Jesus Pin* in parts bag CNE313.

- 34) Insert the Swashplate to the Main Shaft followed by the Main Shaft Collar and Brass Washer below the Main Shaft Collar. Start the M3x3 Set Screw into the Main Shaft Collar (do not tighten until 9-5).
- 35) Insert the *Main Shaft* into the *Mast Tower*, sliding it through flush to the bottom of the *Upper Frame Plate* & ball bearing.
- 36) Open parts bag CNE319 *Tail Crown Gear*. Insert it between the *Upper Frame Plate* and the *Large Beveled Gear* to allow the gear teeth to mesh (9-2).

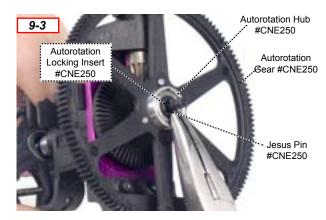
Teeth of the Tail Crown Gear should be facing away from the Upper Frame Plate.

- 37) Insert the Main Shaft through the Tail Crown Gear. Slide the two Black Washers in CNE313 onto the Main Shaft below the Tail Crown Gear. Open parts bag CNE250 Autorotation Hub & Gear. Insert the black Autorotation Locking Insert into the gear into the one-way bearing with the opening facing outward. Slide the Autorotation Hub & Gear onto the Main Shaft to allow the tapered aluminum portion of the Autorotation Hub to touch one of the Black Washers.
- 38) Expose the bottom hole of the *Main Shaft*. Insert the supplied 4.70mm *Jesus Pin* into the bottom hole in the *Main Shaft*, align the *Jesus Pin* to the opening in the *Autorotation Locking Insert* and pull upward on the rotor head to lock the *Jesus Pin* in place.
- 39) Insert 7.80mm Jesus Pin found in CNE313 into the Main Shaft above the two Black Washers. Use long nose pliers to guide the Jesus Pin through the lowermiddle hole of the Main Shaft.
- 40) Align the *Jesus Pin* to the opening in the *Tail Crown Gear* and pull the shaft assembly upward locking the *Jesus Pin* in place.
- 41) (Both lower *Jesus Pins* are now aligned and the gear train is flush to the bottom *Bearing* of the *Upper Frame Plate*). Move the *Main Shaft Collar* to the lowest position on the *Main Shaft* pressing the *Brass Washer* against the upper *Bearing* inside the *Mast Tower*. Locktite and tighten the *M3x3 Set Screw* to complete the assembly (the gear train at this time should have virtually no vertical movement / play).









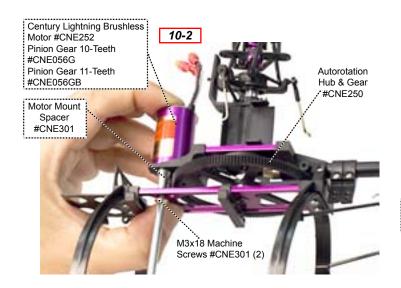


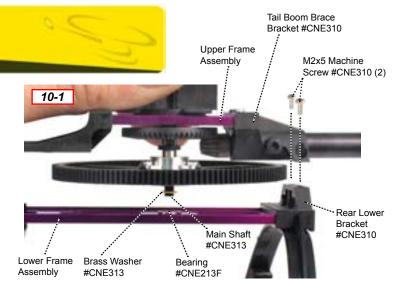
#### **Section 10: Combining Major Assemblies**

Bags Used: CNE313, CNE301

Combining Major Assemblies (10-1, 10-2)

- 42) Install the *Brass Washer* from bag CNE313 onto the *Main Shaft* located in the Upper Frame Assembly. Align the *Main Shaft* with the opening on the flanged portion of the *Bearing* in the Lower Frame Assembly.
- 43) Align the bolt holes in the *Tail Boom Brace Bracket* with the *Rear Lower Bracket* and attach them using the two *M2x5 Machine Screws*.





43) Mount the *Motor* using the *Motor Mount Spacers* and *M3x18 Machine Screws* provided in CNE301. Align so that the *Pinion Gear* of the *Motor* meshes smoothly with the large *Autorotation Hub & Gear*.

If using any motor other than CNE252 Lightning Brushless Motor, other third-party motor mounting hardware may be needed.

#### Section 11: Rotor Head Linkage

Bags Used: CNE307

Rotor Head Linkage (11-1, 11-2)

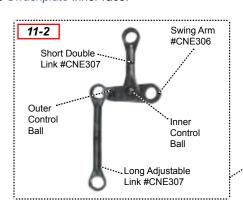
There are 3 different sets of links in CNE307.

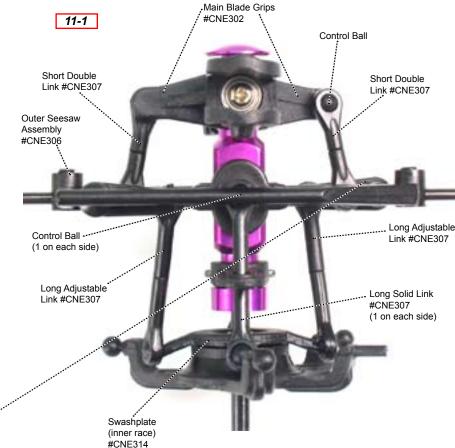
2x Short Double Links

2x Long Adjustable Links

2x Long Solid Links

- 44) Snap on the Short Double Links to the Control Balls on the Main Blade Grips and to the Inner Control Balls of the Swing Arm.
- 45) Snap on Long Adjustable Links to the Outer Control Balls of the Swing Arms and to the Control Balls on the inner race of Swashplate.
- 46) Insert the Long Solid Links through the Plastic Link Stabilizer and attach to the Inner Control Balls of the Outer Seesaw Assembly and to the Control Balls on the Swashplate inner race.





#### **Section 12: Tail Gearbox Assembly**

Bags Used:

CNE318, CNE325, CNE321, CNE317, CNE324, CNE322

Tail gearbox assembly (12-1, 12-2, 12-3, 12-4)
Open parts bag CNE318 Tail Output Shaft Assembly, CNE321 Tail Pitch Lever, Tail Pitch Slider and CNE325 Tail Gearbox.

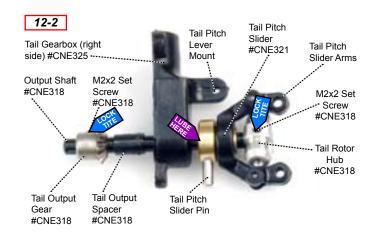
Place small parts in a container.

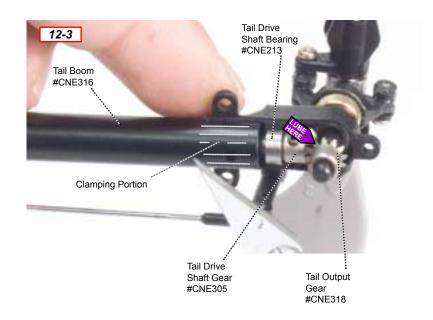
- 47) The Tail Output Shaft has three indentations. One end has two indentations opposite to one another. Locate the Tail Rotor Hub and align it one of the two indentations. Use the supplied M2x2 Set Screw and locktite to secure the Tail Rotor Hub in place. Insert the Tail Pitch Slider onto the Tail Output Shaft with the plastic Tail Pitch Slider Arms pointing toward the Tail Rotor Hub.
- 48) The Tail Gearbox consists of two halves: left and right. Use an hobby knife to create parallel shallow grooves (for glue) on the inside Clamping Portion as pictured (12-1) for both sides of the Tail Gearbox. The right half of the Tail Gearbox has a plastic Tail Pitch Lever Mount. Slide the Tail Output Shaft through the Bearing installed in the right half of the Tail Gearbox from the outside.
- 49) With the Tail Gearbox attached slide the Tail Output Spacer onto the Tail Output Shaft.
- 50) Align the Tail Output Gear onto the Tail Output Shaft with the teeth facing the right side of the Tail Gearbox. Use the supplied M2x2 Set Screw and locktite to secure the Tail Output Gear in place.

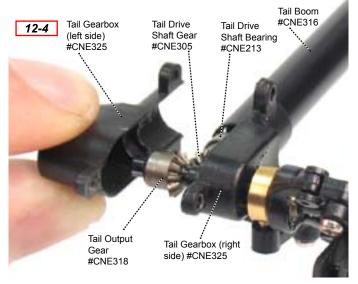
When removing this assembly in the future use heat from a soldering iron place it on top of the M2x2 Set Screw to heat away the locktite.

51) Use an hobby knife to create shallow parallel grooves in the Clamping Portion of the Tail Boom. Attach the Tail Gearbox to the Tail Boom. Use a thin layer of medium strength CA glue on the Outer Rim of both sides of the Tail Gearbox. Also use CA glue on Clamping Portions of both the Tail Boom and Tail Gearbox. Place the Tail Drive Shaft Bearing into the Bearing Housing in the right side of the Tail Gearbox and join the two halves together (Use an gear oil for the two gears inside the Tail Gearbox before joining glued halves).









#### **Section 13: Tail Rotor Assembly**

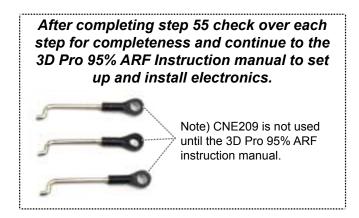
Bags Used:

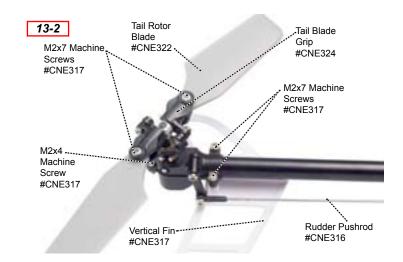
CNE321, CNE317, CNE324, CNE322

Tail gearbox assembly (13-1, 13-2)

- 52) Attach CNE317 *Vertical Fin* to the *Tail Gearbox* left side using the included *M2x7.5 Self Tapping Screws*. Finish assembling the *Tail Gearbox* by installing the *M2x7 Machine Screw* found in parts bag CNE321 to the back end of the *Tail Gearbox*.
- 53) Attach the long arm of the *Tail Pitch Lever* to *The Rudder Pushrod* using the *M2x4 Machine Screw*. Attach the short arm to the *Tail Pitch Slider* Pin on the *Tail Pitch Slider*. Attach the center to the *Tail Pitch Lever Mount* on the *Tail Gearbox*.
- 54) Assemble CNE324 *Tail Blade Grips* to the *Tail Rotor Hub*. Use locktite on the included *M2x6 Machine Screws* to attach the *Tail Blade Grips* into place. Attach the *Tail Blade Grip Arms* to the *Tail Pitch Slider Arms* using the provided *M2x6 Machine Screws*.
- 55) Install CNE322 *Tail Rotor Blades* to the *Tail Blade Grips* using the provided *M2x7 Machine Screws*. The curved (leading edge) portion of the *Tail Rotor Blades* must turn clockwise when viewing the helicopter from the right side.

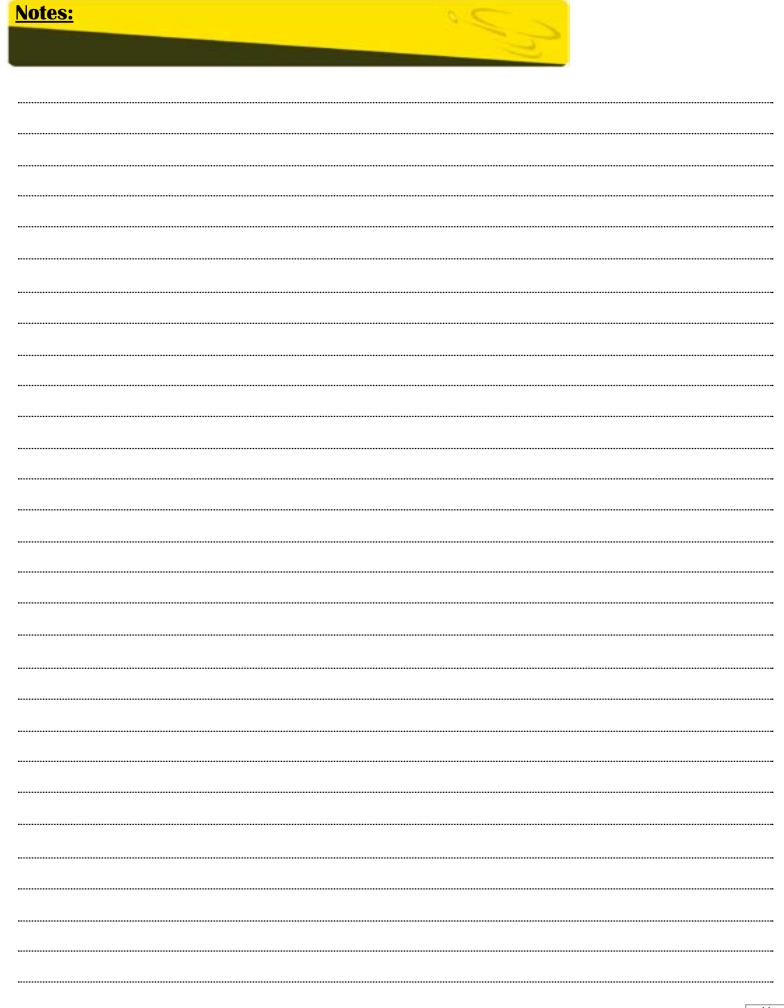






#### WARRANTY INFORMATION

Your new equipment is warranted to the original purchaser against manufacturer defects in material and workmanship for 30 days from the date of purchase. During this period, Century Helicopter Products will repair or replace, at our discretion, any component that is found to be factory defective at no cost to the purchaser. This warranty is limited to the original purchaser and is not transferable. This warranty does not apply to any unit which has been improperly installed, mishandled, abused, or damaged in a crash, or to any unit which has been repaired or altered by any unauthorized agencies. Under no circumstances will the buyer be entitled to consequential or incidental damages. This limited warranty gives you specific legal rights. You also have other rights which may vary from state to state.



#### **Replacement & Option Parts**



CNE201 Head Axle & Dampeners



**CNE207** Flybar Paddles



**CNE216 Antirotation Bracket** 



**CNE250** Auto Rotation Hub & Gear



**CNF213** Main Shaft Bearings (3x6mm -2pc-)



CNE209A Swashplate Links



CNE213F **Bottom Plate Flanged** Bearing (Flanged 3x6mm -1pc-)



**CNE301** Motor Mount



**CNE302** 3D Pro Main Blade Grips



**CNE303** CNC Rotor Hub & Collar



**CNE304** Metal Flybar (2)



CNE305 Tail Drive Shaft Gears



**CNE306** Seesaw Assembly



**CNE307** 3D Pro Head links



**CNE308** Rear Rudder Servo Mounts



**CNE309** Mast Tower



**CNE310** Frame Holders



CNE311 **Bottom Frame Plate** 



**CNE312** Top Motor Plate



**CNE313** Main Shaft, Spacers & Collar



CNE314 3D Pro Swashplate



**CNE315** Tail Drive Shaft Set



**CNE316** Tail boom, Pushrod & Guides



**CNE317** 3D Fins & Boom Supports



**CNE318** Tail Rotor Shaft Assembly



**CNE319** Inner tail Crown Gear



**CNE320** Battery Holders



**CNE321** Tail Pitch Lever & Slider



**CNE322** Tail Rotor Blades



**CNE323** Main Rotor Blades



CNE324 Tail Blade Grip Set with Bearings



**CNE325** Tail Gear Box Set



**CNE326** Landing Gear Set



**CNE327** Canopy & Decal



CNE252 Lightning Brushless Main Motor **CNE361** Brushless Motor Heatsink



CNE328 Hardware Pack

#### **Optional Items**



**CNE258** Machined Metal Main Rotor Blade Grips (adjustable)



**CNE259** Machined Metal Swashplate



CNE327C

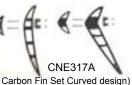


CNE307A Clear Canopy & Decal Adjustable Head Link Set



**CNE330** Micro 3D Pro Blade Holder





CNE317B Rear Gyro Mounting Plate Carbon Fin Set (Angular design)



CNE324A Precision CNC Tail Blade Grip Set w/ Bearings



**CNC Flybar Control** 

Arm Set

CNE359-1 Steel Control Ball Set (5) (for machined swashplate) CNE258-1 Steel Control Ball Set (5) (for machined blade grips)



Paddles





Carbon Fiber

Tail Blades

