

HAWK III

Instruction Manual



SPECIFICATIONS

✦ MAIN ROTOR DIAMETER	49.5 in.
✦ TAIL ROTOR DIAMETER	9.3 in.
✦ OVERALL LENGTH	46 in.
✦ HEIGHT	16.2 in.
✦ ENGINE	32 ~ 38
✦ BALL BEARINGS	29

Century Helicopter Products

Designed and Developed in USA

1st Edition October, 1999

Table of Contents

Table of Contents	1
Introduction	2
Required Items for Assembly	3
Building Guide for Hawk III kit & ARF version	4
Main Rotor Head	5
Bell Mixers & Main Rotor Grips	6
Flybar & Final Head Assembly	7
Washout Assembly & Swashplate	7
Start Shaft Assembly	8
Tail Transmission Output Shaft & Counter Gear	9
Main Gear, Main Shaft & Elevator Bellcrank	10
Upper Side Frames	11
Upper Frame Assembly	12
Collective & Aileron Levers	13
Clutch, Clutch Bell, Fan, Shroud & Engine Mount	14
Fuel Tank & Lower Frames	15
Upper & Lower Frame Assembly	16
Final Rotor Head Assembly & Muffler	17
Servo Frame - Airplane	18
Servo Frame - Helicopter	19
Landing Gear & Tail Output Shaft	20
Tail Rotor Output Assembly	21
Tail Rotor Hub & Grips	22
Tail Guide & Drive Shaft	23-24
Tail Boom, Drive & Strut	25
Pushrod Setup	26
Radio, Servo and Adjustments	27-28
Servo Setup and Pushrods	29-32
Main Blades & Canopy	33-34
ARF Supplemental Instructions	35
Radio Components & Balancing	36
Setup and Installation Gyro	37
Radio Setup - Pitch & Throttle Curve Settings	38-39
Tail Rotor Setup	40
Starting the Engine	41
Basic Hovering - Pre Flight Checkup & Log	43-44
Parts list by Bag	45
Replacement Parts List	46

Building Instructions for the HAWK III helicopter kit

Introduction

Congratulations on your purchase of Century Helicopter Product's 30 size RC helicopter model. The Hawk helicopter is ideal for beginners new to the hobby through to intermediate pilots and aircraft modelers wanting to get involved in RC helicopters. This kit will accept both airplane and helicopter radios and includes necessary hardware and instructions, be sure to check with us or your local dealer for compatible components.

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 otherwise. It is recommended that if you are doubt of your abilities, seek assistance from experienced radio control modelers and associations. As manufacturer, we assume no liability for the use of this product.

Pre-assembly Information

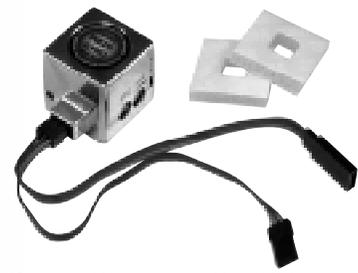
Upon opening the kit, all the major component parts are bagged and numbered for ease of assembly which correspond to the sections of the manual. Various assemblies have been pre-assembled only requiring the final assembly and installation onto the particular part, screws and nuts required for each step are packaged in the same bag as the parts. Be careful when opening each bag as not to lose any hardware. Care has been taken in filling and packing of each bag however mistakes do happen, if there is a parts shortage or missing hardware please contact us at:

Century Helicopter Products
523 Sinclair Frontage Road
Milpitas, CA 95035
408.942.9525

Necessary Items “Not Included” in the kit.



6 Channel Helicopter Radio or Equivalent.



Piezo Gyro CN2017



Glow Remote Adapter CN2222



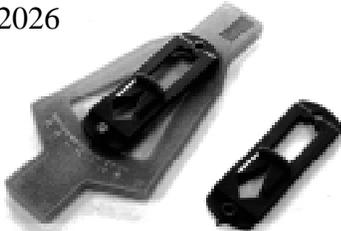
32-38 Helicopter Engine



*Optional Tune Muffler CN3033

Necessary Tools for Assembly and Adjustments

Main Blade Pitch Gauge w/Paddle Gauge CN2026



Needle Nose Plier & Cutter Pliers



15% or 30% Heli Fuel



12Volt Start Battery



5.5mm,7mm, Phillips Screw Driver



4 Way Wrench #CN2031



Fuel Line



12Volt Starter



Ball Link Plier CN2034



Metric Ruler



Glow Starter w/Charger



Electric Fuel Pump or Hand Pump



Hobby Scissors



Fuel Filter



Glow Plug



Tie-Wraps



Loctite



Allen Key Set CNBN10946



Hobby Knife



Servo Tape



Lubrication CN2024T



Hawk III Construction Manual

This manual has been written for both versions of the Hawk III helicopter: the regular 30 kit CN1000 and the 30 assembled version CN1006 & CN1007. The main portion of the manual covers the full construction of the kit, for those modelers who have purchased the Assembled kits they have only to do the final assembly along with the pushrod setup as detailed below.

Every attempt has been made to ease the assembly of your kit, at each step where there are complex instructions there are detailed written instructions to walk you through each step.

Remember to take a few minutes before each step to carefully examine each step to become familiar with the parts and assembly before beginning that step.

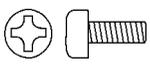
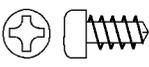
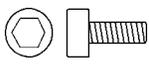
Hawk III (kit version)

Complete Steps 1 through 48.

Hawk III (assembled version)

See the ARF Supplemental Instructions
Page 33.

Symbols used to help assist you in building the kit:

	Full Scale Drawing		Repeat Steps as specified		Partially tighten		Helpful Tip
	Apply oil		Apply threadlock		Purchased Separately		Cut away Shaded Portion
	Special Attention		Apply JB Weld		Apply Grease		
Hardware Description and Identification:		M3x6 = 3x6mm and can refer to screws or ball bearings.					
 M3x6 Phillips Machine Screw M - metric 3 - diameter 6 - length		 M3x6 Self Tapping Screw M - metric 3 - diameter 6 - length		 M3x10 Socket Cap Screw M - metric 3 - diameter 6 - length		 3x7 Ball Bearing M - metric 3 - inside Ø 6 - outside Ø	

The tools and materials listed below are the minimum needed to build the helicopter:

Screwdrivers - Slotted and Phillips head.
 Long-Nosed Pliers.
 Allen Wrenches - 1.5mm, 2.0mm, 2.5mm.
 (supplied in kit) + 3.0mm
 Appropriate Socket Wrench
 (glow plug wrench for engine shaft nut)
 Scissors
 Double Sided Foam Tape (1/16" - 3/32")
 Foam Rubber (radio packing)
 JB Weld (bond clutch lining)
 Loctite (thread lock liquid).
 Hobby Grease (Super Lube)
 Oil to lubricate sliding shafts.
 "Y" Harness for Airplane Radio

Recommended Tools & Accessories

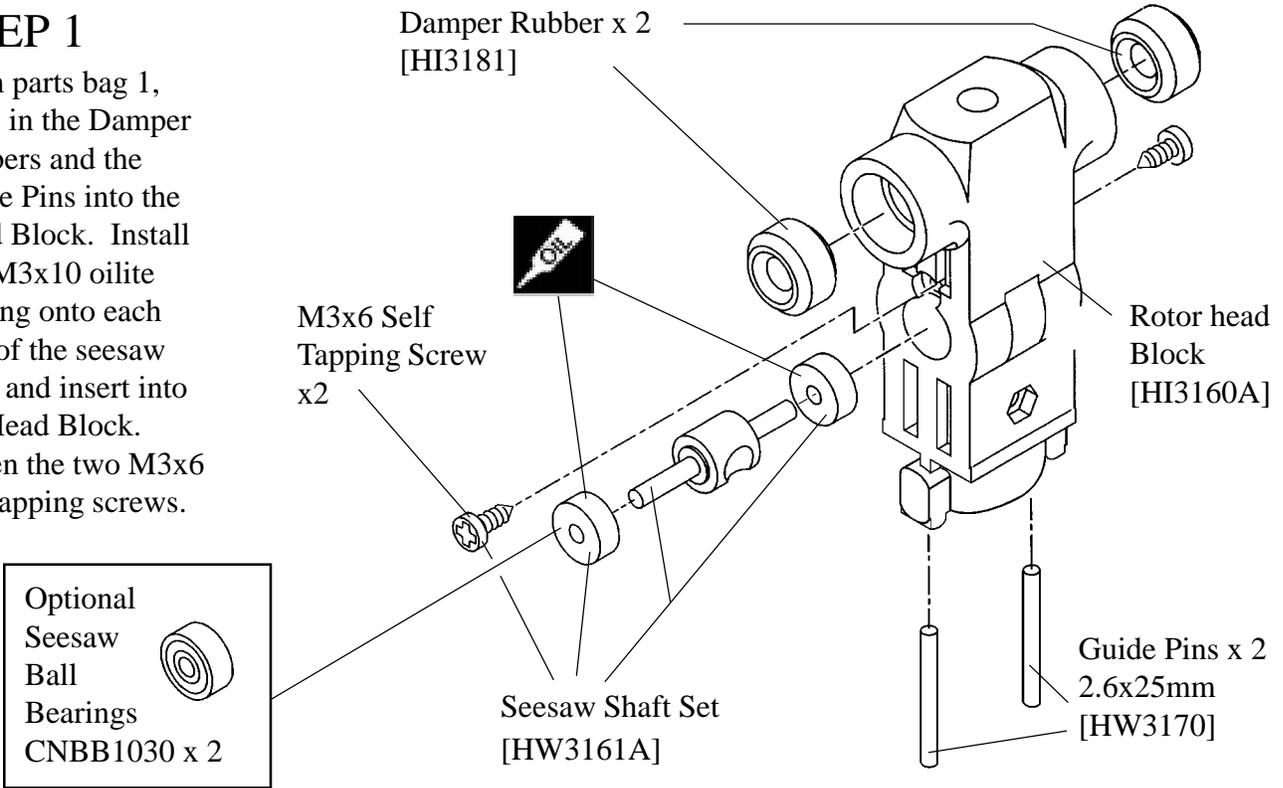
In addition, the following will make assembly and setup easier, and prove useful later in your model toolbox:

Ball link Pliers.
 Pitch Gauge.
 Main Blade Balancer.
 Hi-Point Balancer.
 Flybar Lock.
 Tail Rotor Blade Balancer.
 5.0mm Open End Wrench.
 5.5mm Open End Wrench.
 7mm Open End Wrench.

STEP 1-2 Main Rotor Head

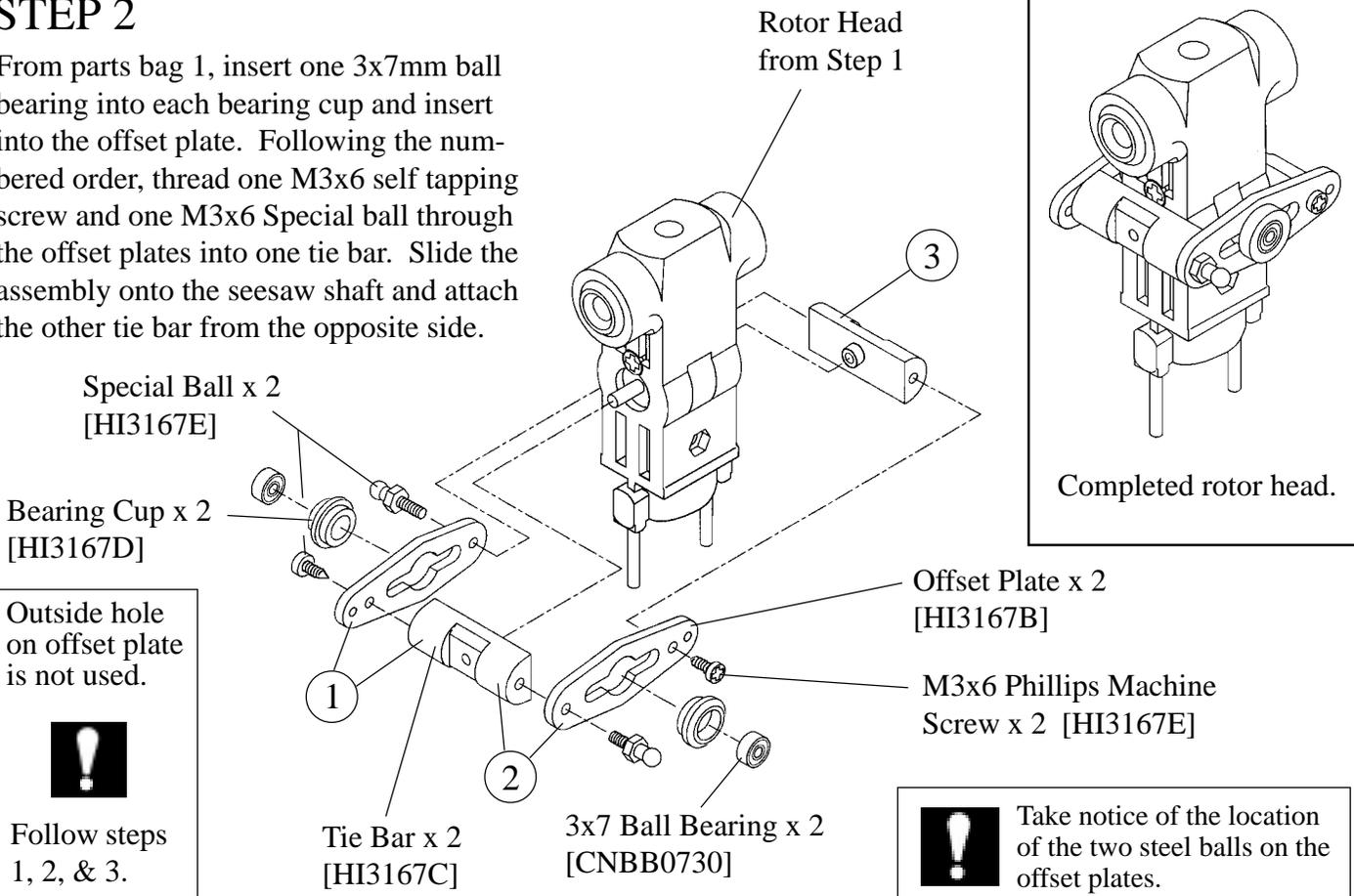
STEP 1

From parts bag 1, press in the Damper Rubbers and the Guide Pins into the Head Block. Install one M3x10 oilite bearing onto each side of the seesaw shaft and insert into the Head Block. Fasten the two M3x6 self tapping screws.



STEP 2

From parts bag 1, insert one 3x7mm ball bearing into each bearing cup and insert into the offset plate. Following the numbered order, thread one M3x6 self tapping screw and one M3x6 Special ball through the offset plates into one tie bar. Slide the assembly onto the seesaw shaft and attach the other tie bar from the opposite side.



Outside hole on offset plate is not used.



Follow steps 1, 2, & 3.



Take notice of the location of the two steel balls on the offset plates.

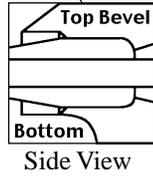
STEP 3-4 Main Blade Grip Assembly



Note, the long ball is installed pointing away from the **top** of the blade grip.

STEP 3

From parts bag 1, install one Long Ball and one Short Ball into the Bell Mixer, insert the slide tube into the bell mixer arm (**Note: the oilite bearings are pre-installed**) and secure onto the blade grip with one M3x16 Socket Cap screw and M3x7 Flat washer. Install two M5x13 Ball Bearings into both ends of the blade grip assembly. Complete the second blade grip in exactly the same way.



Main Rotor Blade Grip [HI3184]

5x13 Ball Bearing x 2 [CNBB1350]

x2 Repeat 2 Times.

Bell Mixer Arm [HI3189]

Slide Tube

Short Ball

M3x7 Flat Washer

M3x16 Socket Cap Screw

Long Ball

BF0750 x 2

Optional Ball Bearing Mixer Arm Set CN2204

STEP 4



Top of blade grip has Bevel.

From parts bag 1, insert the Feathering Shaft into the head block, slide one 5X10mm Washer on each side of the shaft. Install the blade grip (**Note the direction of the bell mixer arm and beveled edge is on top of the blade grip**) followed by one 4x10mm Washer, one 4x12mm Washer and one 4mm Locknut. Assemble Pushrod I x 2, measuring 35mm end to end following the diagram on page 26, and connect the seesaw ball to the long ball on the bell mixer.

Main Rotor Blade Grip from Step 3

M4 Locknut x 2

M4x10 Flat Washer x 2

M5x10 Flat Washer x 2

Feathering Shaft [HW3180]

M4x12 Flat Washer x 2

Short Ball

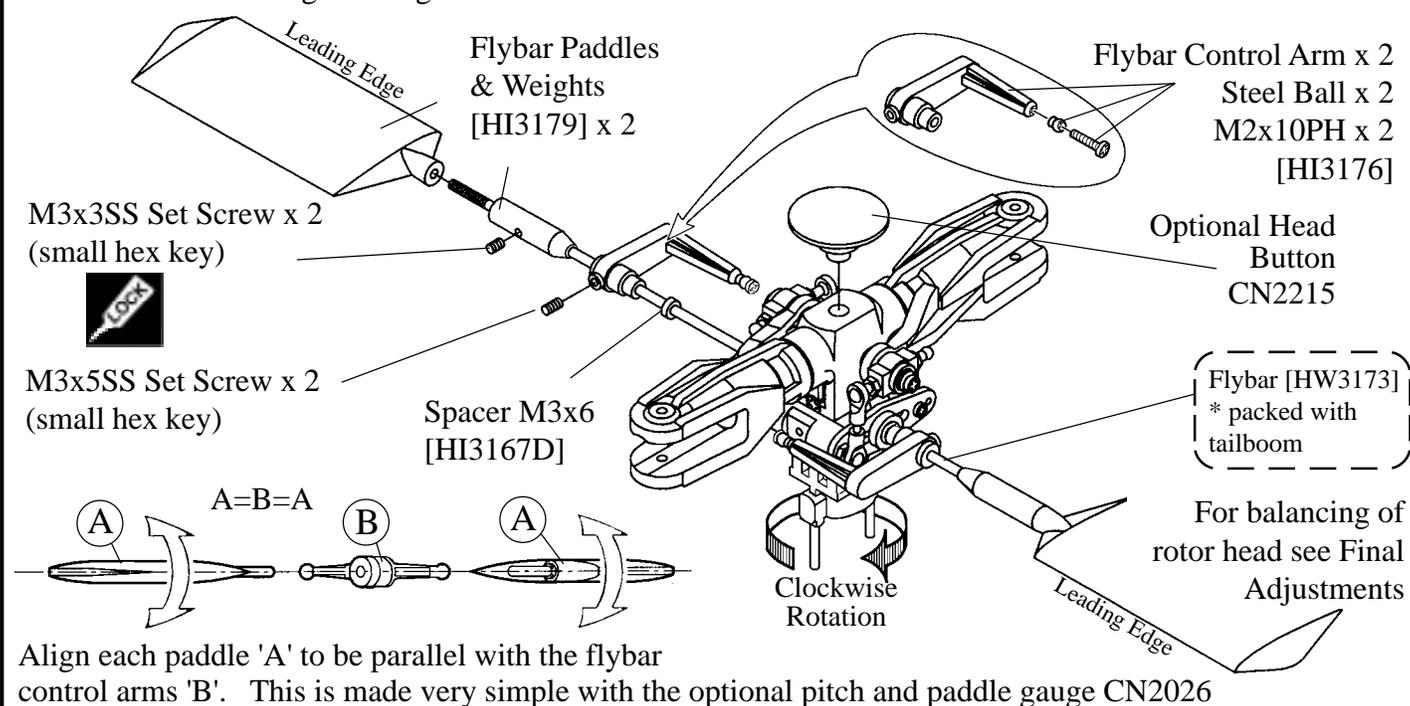
Long Ball

35mm end to end.

Pushrod (I x 2) (see page 24 for full size drawing)

STEP 5-6 Flybar, Paddles & Washout

STEP 5 From parts bag 1, slide and center the Flybar through the seesaw arm assembly. Install one Steel ball onto each flybar control arm with one 2mm screw, slide the Spacer, Flybar Control Arm on the flybar. Loosely tighten the control arms. Using a ruler, check the distance between the end of the flybar and the control arm and adjust until the lengths are the same and there is no free play between the control arms and the rotor head. Remove one set screw at a time, apply threadlock and tighten in place. Slide the Flybar Weight (**Tip:** the flat end of the weight faces the paddle) and thread on the Flybar Paddle until all the threads are covered onto the flybar and align the paddles parallel. Again using the ruler, rotate one paddle or the other to get equal distances, remember leading edge of the paddles turn clockwise. Using two 3x3mm Set Screws secure the weights using threadlock.



STEP 6

Attach two Short Balls to the Washout Mixing Arms (**Note, attach from the flat side of the arm**). Secure the semi-assembled mixing arms onto the Washout Hub using one slide tube inserted from the flat side and secured using one 3x16mm Socket Cap Screw and 3x7mm Flat Washer per arm. Press the radius link on to the inner balls on the Swashplate.

Short Silver Ball x 2

Medium Silver Ball x 2

Medium Black Ball x 3

Washout Hub Assembly [HI3152B]

Slide Tube x 2

Semi-Assembled Radius Link & M2x12 Pin [HI3152A]

Medium Black Ball x 2

Oilite bushing

M3x7 Flat Washer x 2

M3x16 Socket Cap Screw x 2

x2

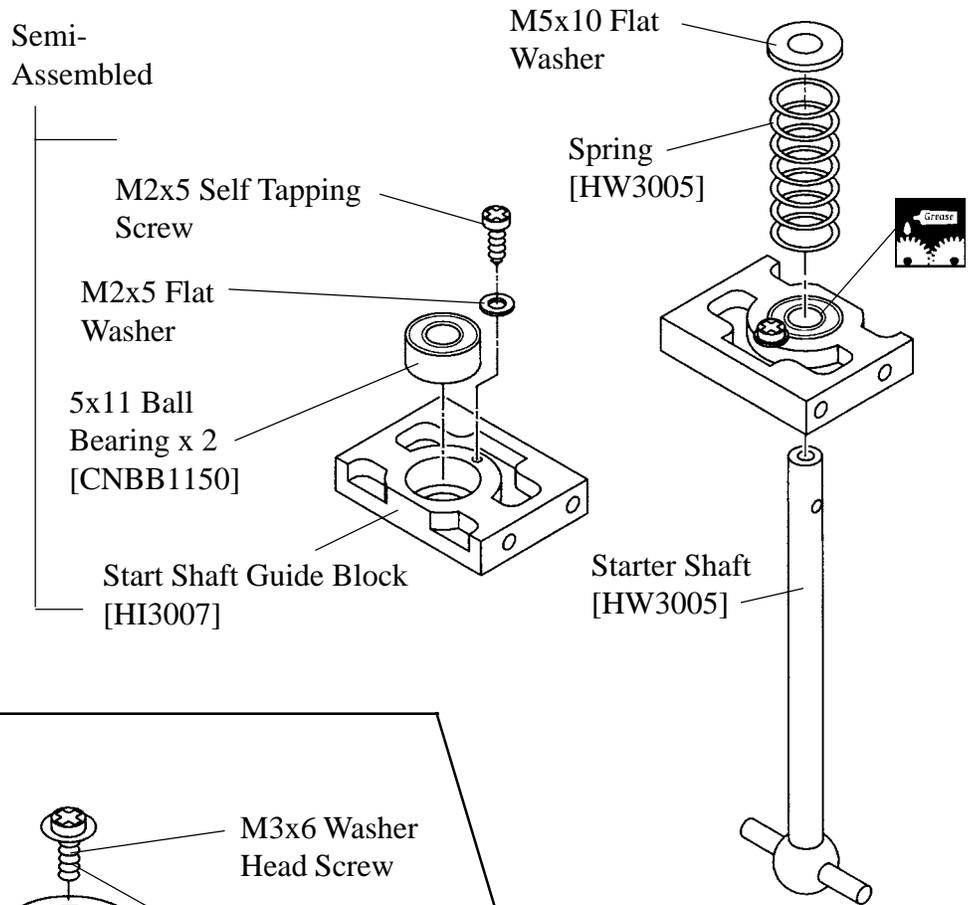
Swashplate Assembly [HI3146A]

Starting with the inside race, apply threadlock and attach two short silver balls directly across from each other, similarly attach two medium silver balls to the remaining holes. Attach the three medium black balls to the outside race. The rear location is not used.

STEP 7-8 Start Shaft

STEP 7

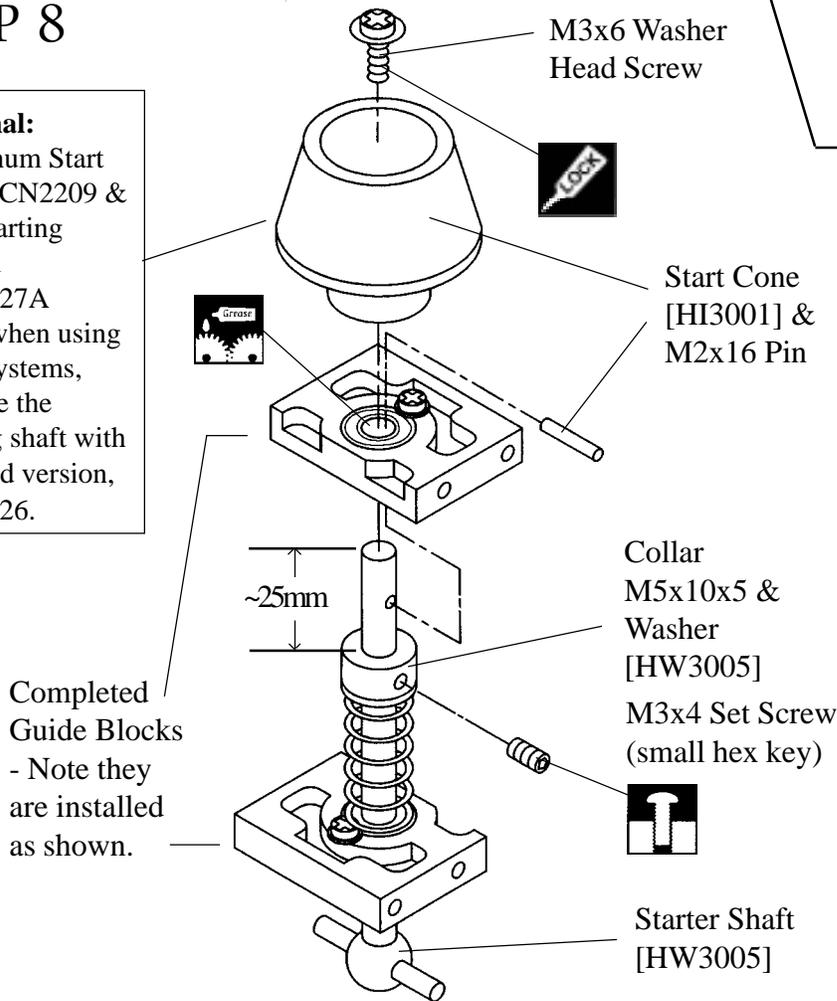
From parts bag 2, the Start Shaft Guide Blocks are pre-assembled. Slide the Starter Shaft through one of the block assemblies with the M5x11 Ball Bearing facing up and slide the spring and 5mm Washer onto the shaft.



STEP 8

Optional:

Aluminum Start Cone #CN2209 & Hex Starting System #CN0427A
 Note: when using these systems, upgrade the starting shaft with the solid version, #CN2226.

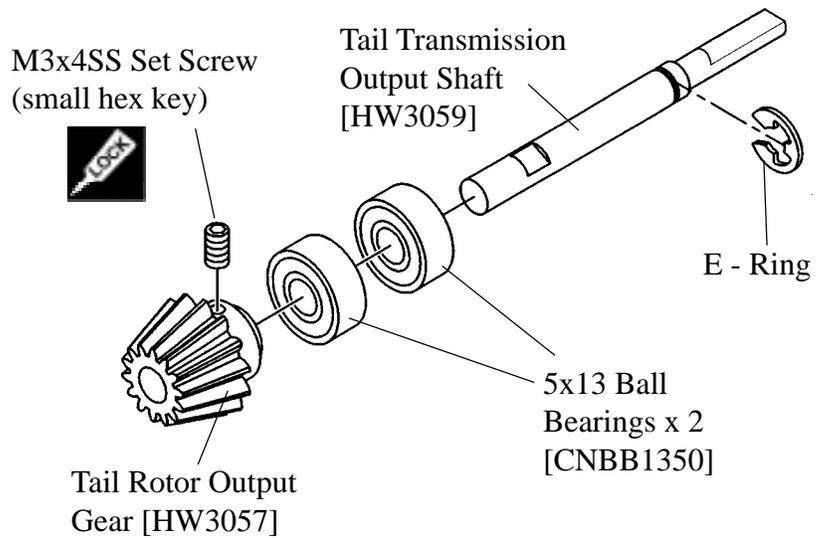


From parts in bag 2, slide the M5x10 Collar spaced approximately 25mm from the top of the start shaft and partially tighten with one M3x4 Set Screw. (After the engine assembly is installed the position on the start shaft will be adjusted to allow the starting shaft to disengage from the cooling fan.) Assemble the Starter Cone by installing the second Guide Block onto the start shaft, insert the pin through the hole in the top of the shaft and press the Start Cone over the pin, finally secure with one M3x6mm Washer Head Screw from inside the cone using threadlock. Apply some lubricant on the shaft after assembly to ensure smooth operation.

STEP 9-10 Output Shaft & Counter Gear

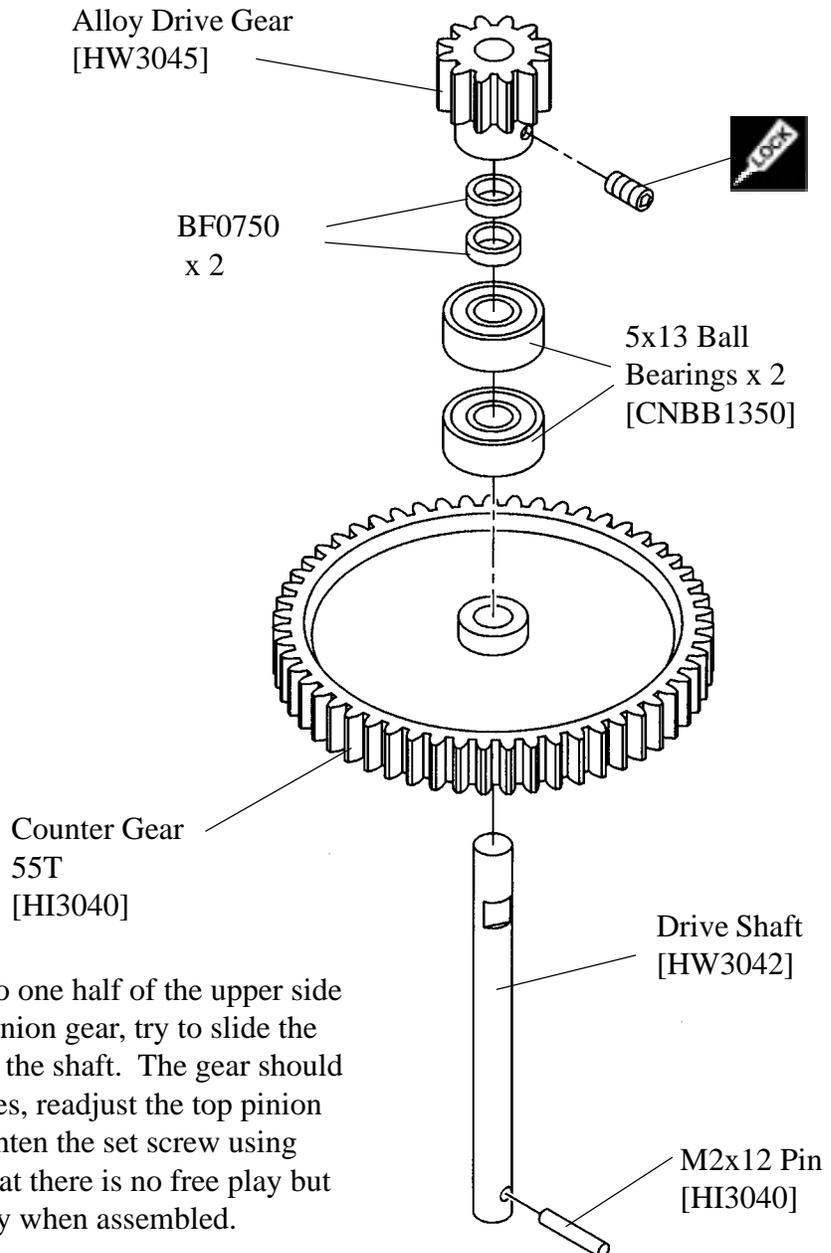
STEP 9

From parts bag 2, assemble the Tail Transmission Output Gear. Install the E-Ring then slide two Ball Bearings onto the Tail Rotor Output Shaft. Insert one 3x4mm Set Screw using threadlock into the gear, note where the flat spot is on the shaft and slide the gear on and tighten the set screw (**Make sure the set screw is positioned over the flat spot**).



STEP 10

From parts bag 2, assemble the engine drive gear assembly, start by pressing the guide pin into the hole in the end of the Drive Shaft. Insert the shaft through the Counter Gear (**make sure the pin is fully seated in the recessed side of the gear**) then slide the two M5x13 Ball Bearings followed by two oilite bearings. Insert one 3x4mm Set Screw into the Alloy Drive Gear, then slide the gear onto the shaft taking care to position the set screw over the flat spot on the shaft.



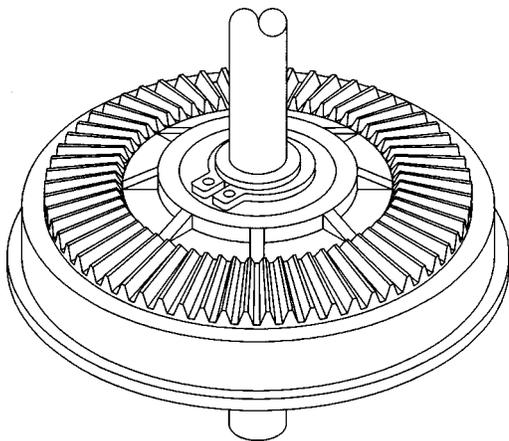
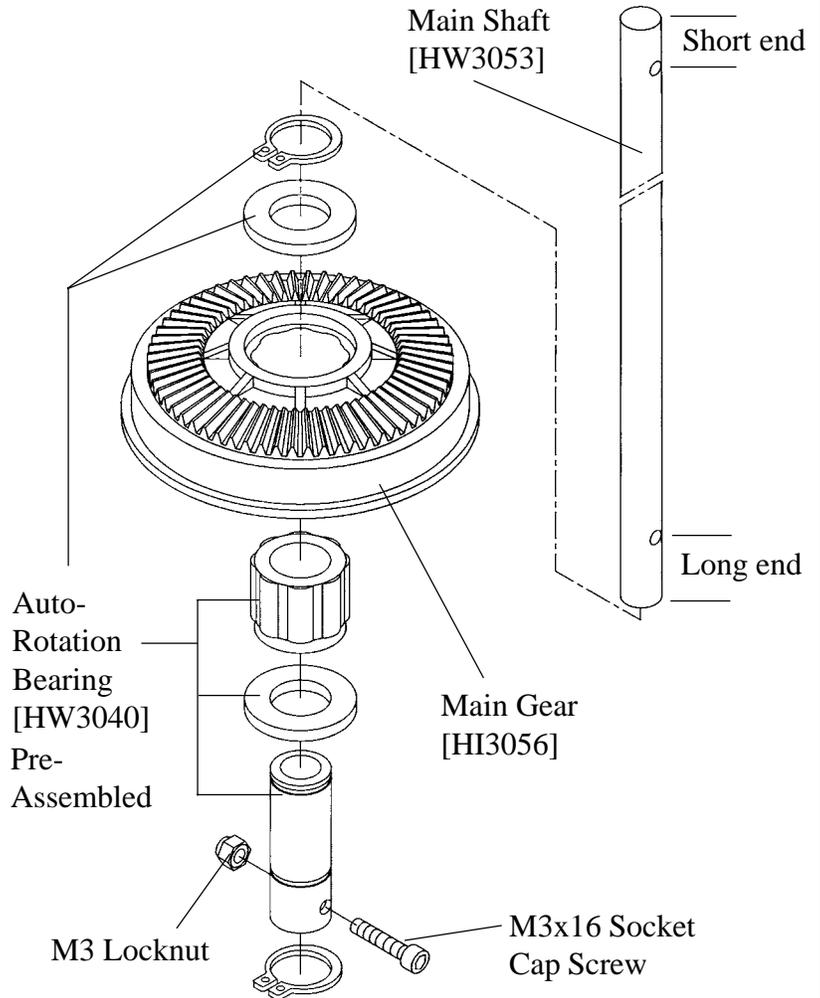
Test fit the gear assembly into one half of the upper side frames. While holding the pinion gear, try to slide the counter gear up and down on the shaft. The gear should not slide up the shaft, if it does, readjust the top pinion to remove the slop and re-tighten the set screw using threadlock. It is important that there is no free play but the bearings are turning freely when assembled.

Tip

STEP 11-12 Auto Rotation, Main Gear & Elevator Bellcrank

STEP 11

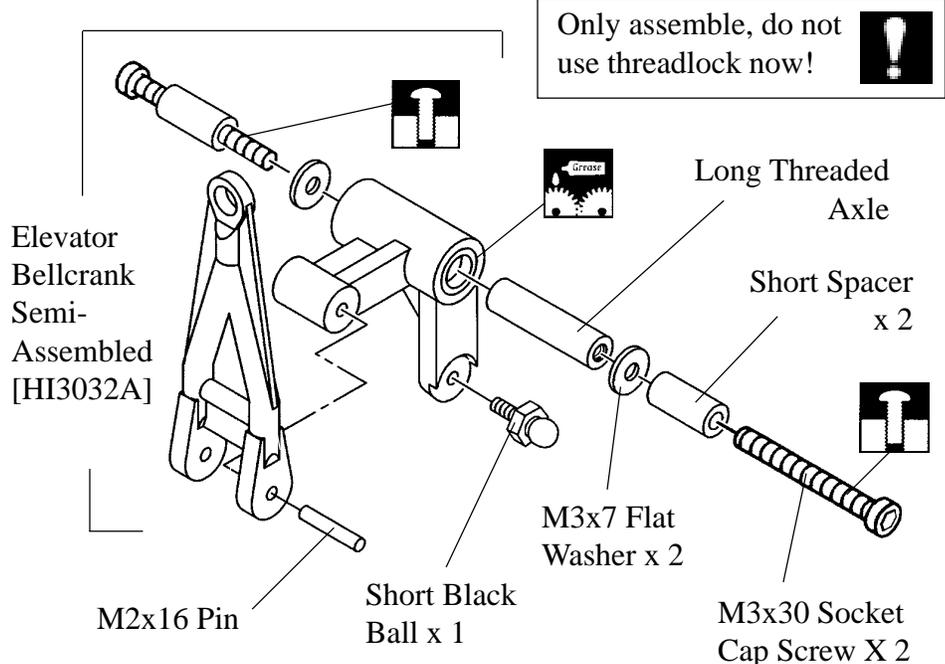
The Main Gear is pre-assembled with the Auto-Rotation Bearing installed. From parts bag 2, the Main Shaft has two holes one farther from one end of the shaft, this end is the bottom of the shaft. Insert the bottom end through the auto rotation gear assembly aligning the holes and secure the Main Shaft using one 3x16mm Socket Cap Screw and one 3mm Locknut.



Completed Main Gear & Main Shaft

STEP 12

From parts bag 2, apply a small amount of lubricant to the long threaded axle and slide through the elevator bellcrank (semi-assembled), be careful not to get grease on the threads. Slide one short spacer over one 3x30mm Socket Cap screw and one 3x7mm washer, attach to the threaded axle (**do not use threadlock here!**), repeat for other side. The 2x16mm pin is assembled, just insure the elevator radius link moves freely against the Bellcrank. Thread one short black ball into the elevator arm.



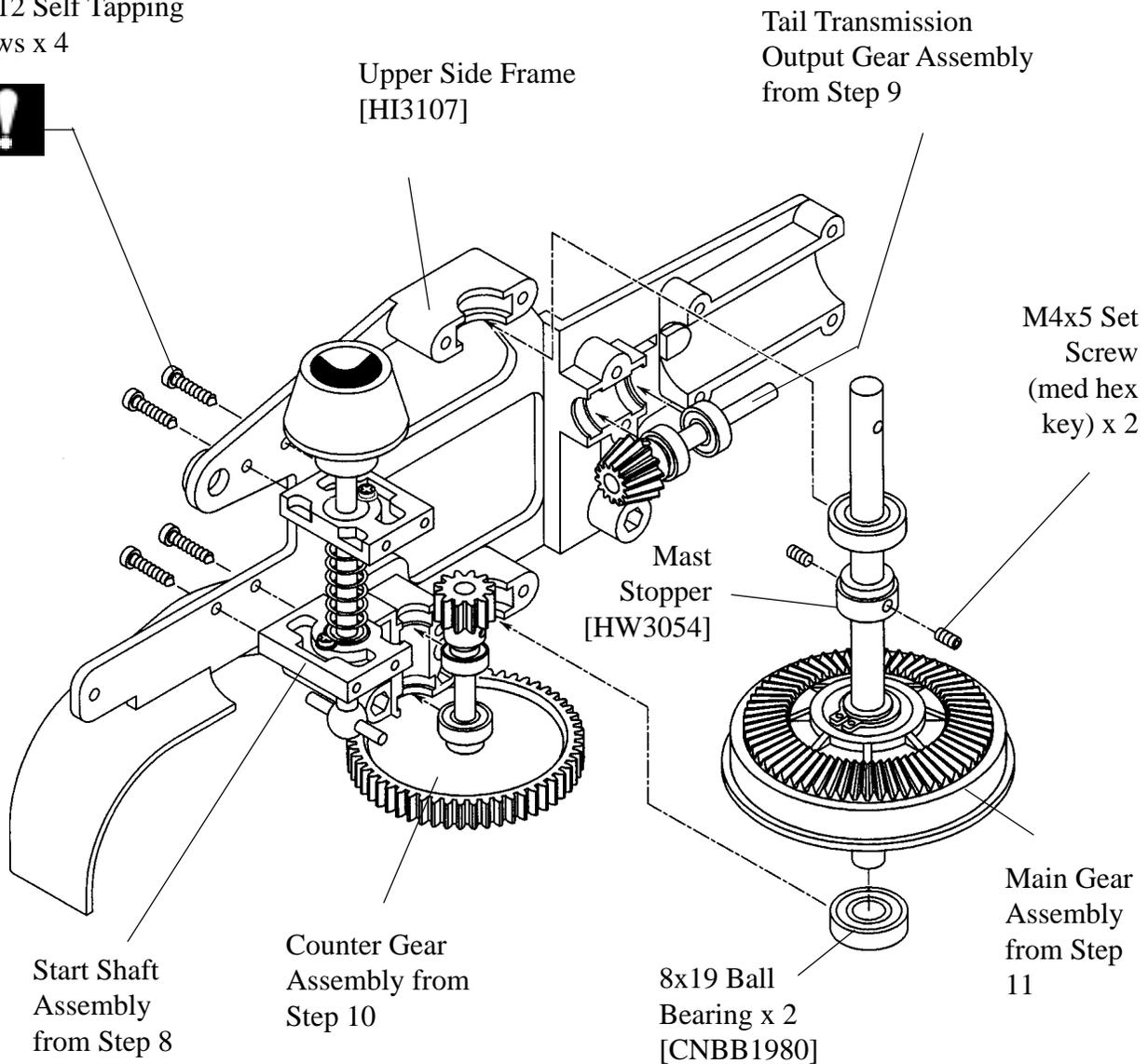
STEP 13 Upper Side Frames

STEP 13

From parts bag 2, install two 4x5mm Set Screws on the Mast Stopper then slide the mast stopper on the main shaft, only assemble at this time. Slide one M8x19 Ball Bearing on each end of the main shaft against the mast stopper and auto rotation assembly.

Attach the starter shaft assembly with four 3x12mm Self Tapping Screws¹ (**observe the correct direction of the block assemblies**). Position the auto rotation gear assembly, the counter gear assembly and the tail transmission output shaft assembly at the locations on the diagram into the upper right side frame (**Make sure the bearings are fully seated in the recesses.**)

M3x12 Self Tapping
Screws x 4



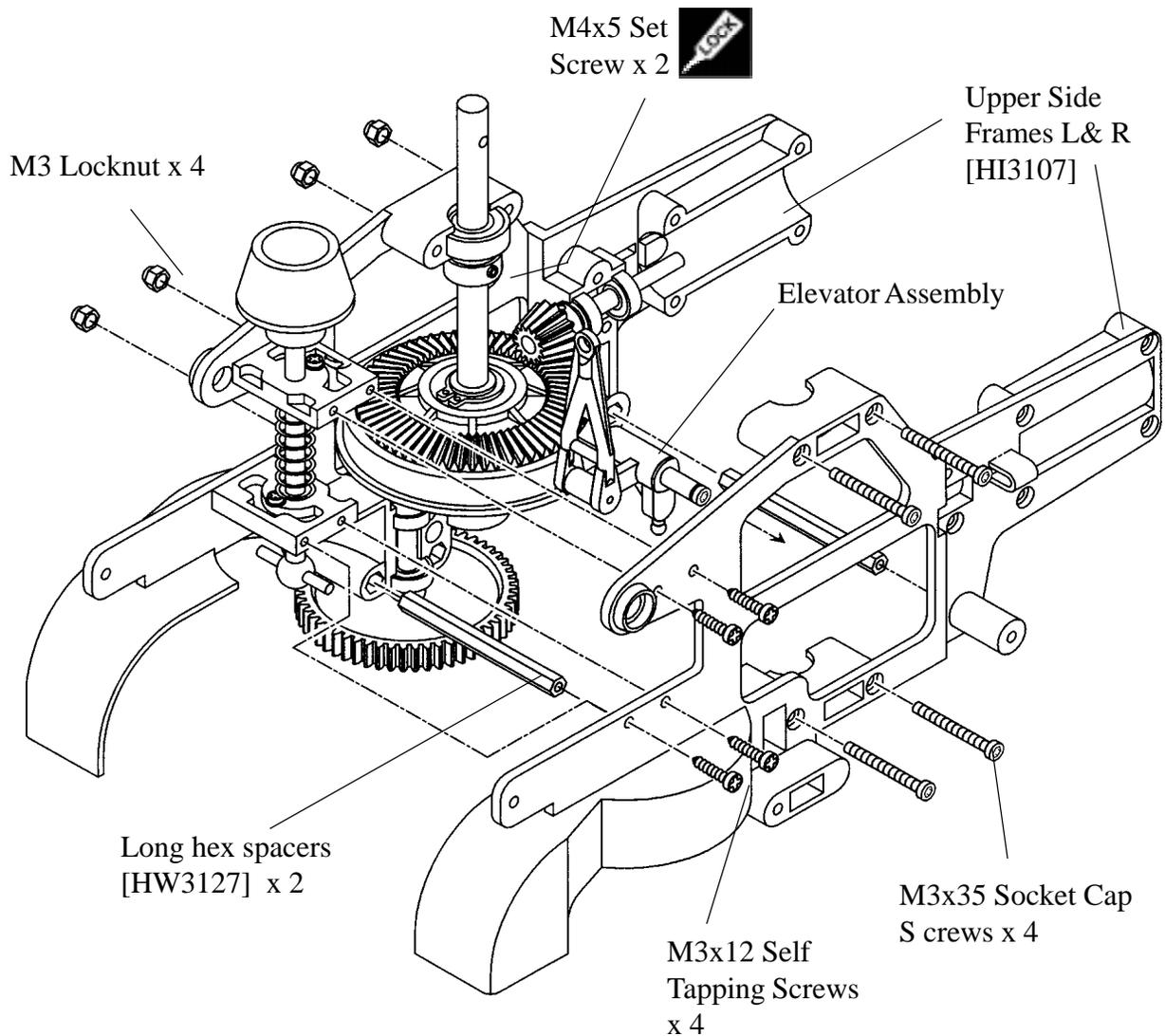
Note 1: Be careful when tightening the eight 3x12mm self tapping screws into the start shaft block assemblies as excessive force will strip out the plastic holes.

STEP 14 Upper Frame Assembly

STEP 14

From parts bag 2, insert two long Hex Spacers at the specified locations in the diagram, note that the front hex spacer is installed into the forward-most hole. Install the upper left side frame, taking care that the bearings are aligned with the mating recesses and secure the frames with four 3x35mm Socket Cap Screws through the main shaft bearing block positions and four M3 locknuts. It is advised to position the elevator assembly between the side frames at this time to reduce the amount of disassembly later.

While pulling up on the main shaft (make sure the main gear rotates), push the mast stopper against the upper ball bearing, apply threadlock to the set screws and tighten in place.



Note : The gear mesh between the main gear and the tail transmission output shaft should be a snug fit and will become smooth after a few flights, this is the normal wear in process.

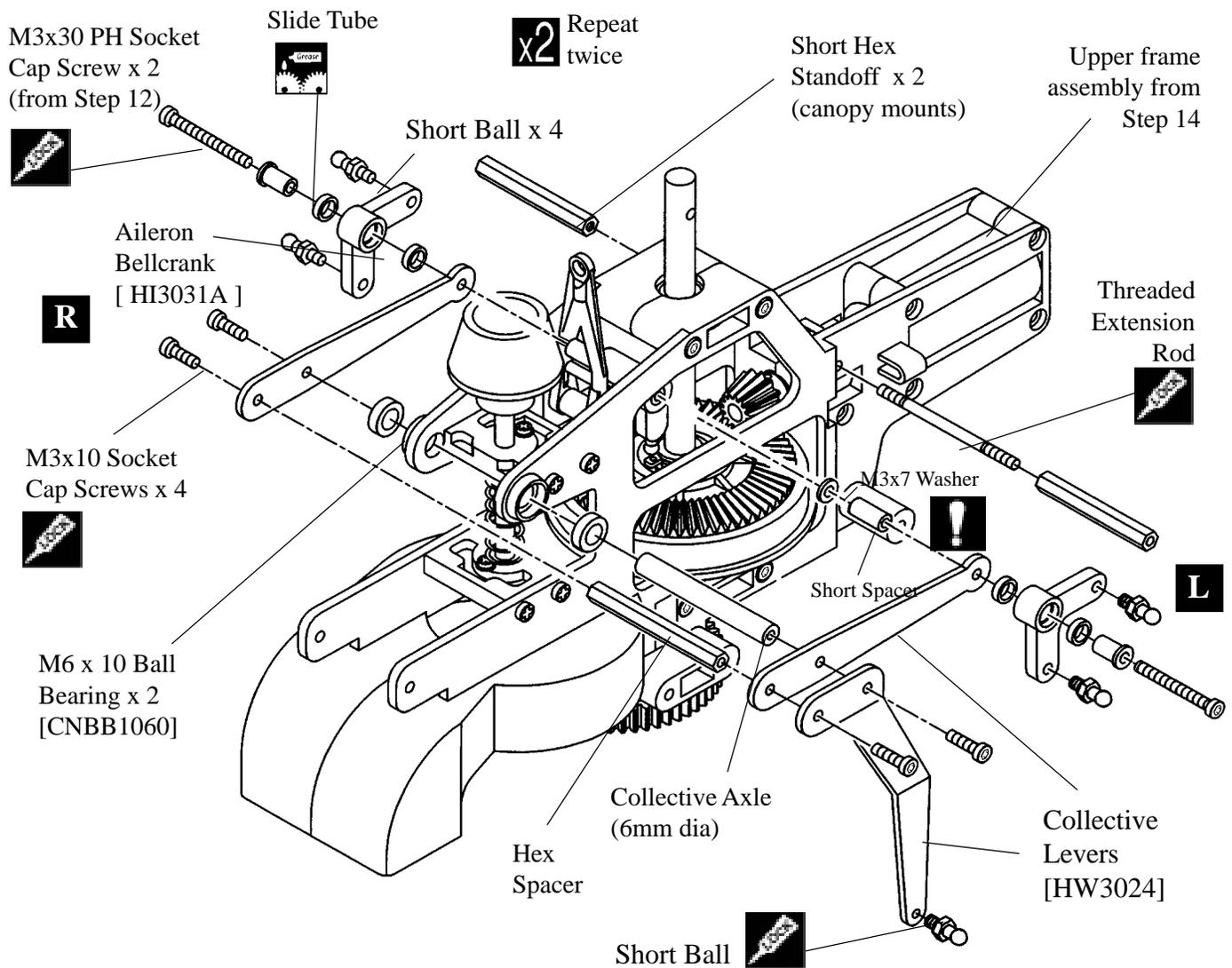
STEP 15 Collective and Aileron Levers

STEP 15

From parts bag 2, press in two M6x10 ball bearings into the front side frames for the collective axle. Attach the front Collective Arm Spacer (hex) and the Collective Axle (6mm dia) to the Right Collective arm (notice that the axle is attached at the middle hole) using two 3x10mm Socket Cap Screws using threadlock. Slide the assembly through the ball bearings in the upper frame sides from the right and attach the two Left Collective Arms with two 3x10mm Socket Cap Screws using threadlock (tighten the screws until the collective levers move freely with no side to side play.) Install one Short Ball on to the collective lever using threadlock.

The left Aileron Bellcrank has two oilite bearings pre-installed into the bellcrank, insert two Short Balls and insert the slide tube through the bellcrank using a small amount of lubricant (**the bellcrank is offset, make sure the slide tube is inserted from the flat side**). Starting on the left side, remove the 3x30mm Socket Cap Screw, short spacer and washer from the **elevator bellcrank** (previously assembled in Step 12), slide the left aileron assembly onto the screw and insert through the left collective lever. Apply threadlock to the end of the screw threads now and slide the short spacer and the 3mm washer before tightening into the elevator bellcrank axle. Repeat for the other side.

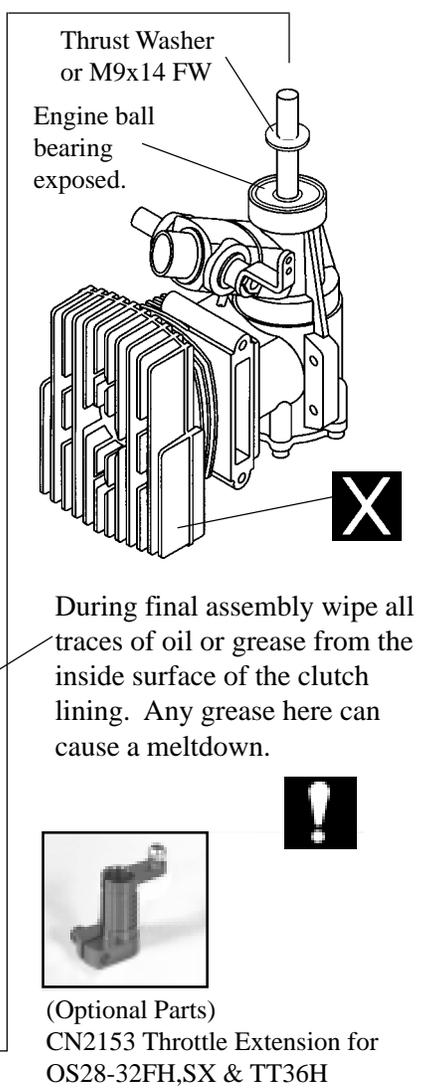
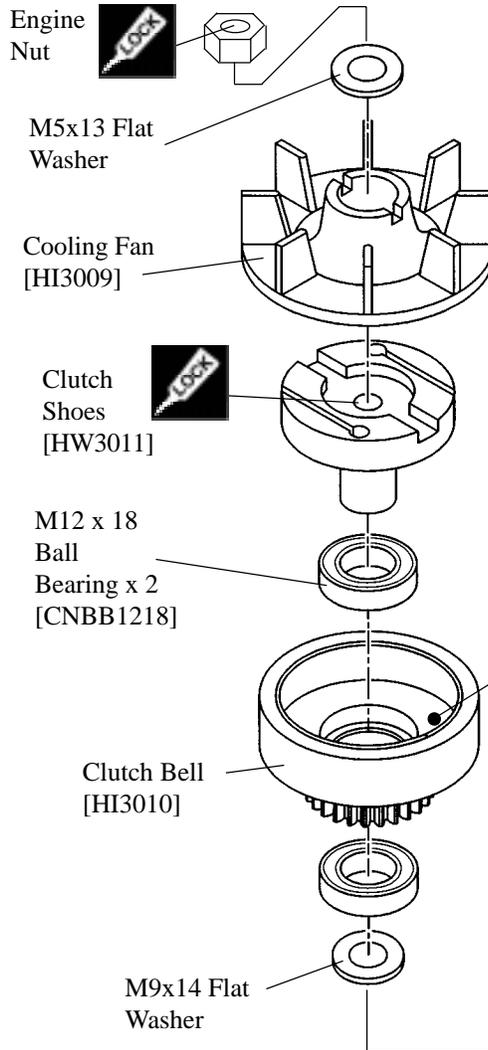
Slide one Threaded Extension Rod through the upper position of the tail output bearing recess and secure two Short Hex Standoffs (one per side) using threadlock (these are to attach the canopy).



STEP 16-17 Clutch, Fan & Engine Mounting

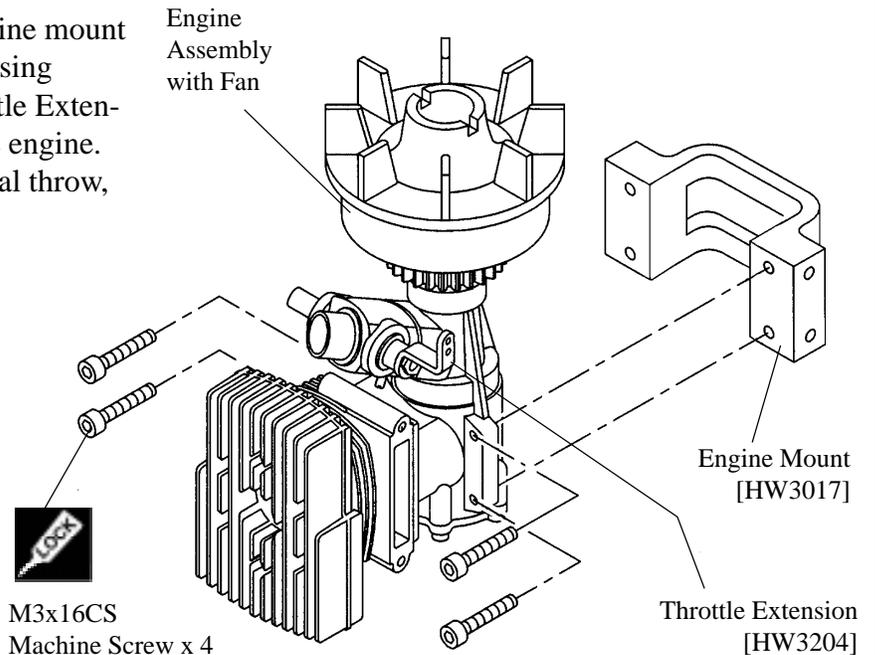
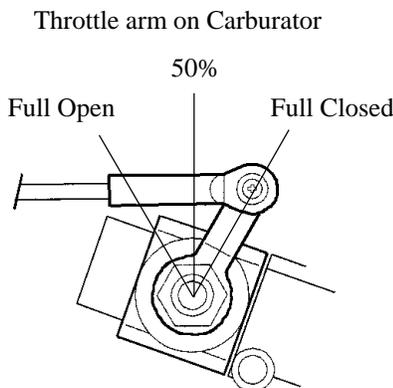
STEP 16 From parts bag 3.

Remove all parts from the engine crankshaft until you can see the front ball bearing, install the 9x14mm Flat washer (or washer provided by engine manufacturer), insert the Ball Bearings into the clutch bell assembly and place on the crankshaft. Clean the threads on the crankshaft and on the clutch, carefully apply threadlock on the engine crankshaft threads nearest the bearing (be careful not to get threadlock into the ball bearings) and on the threads in the clutch. Thread the clutch until the crankshaft can be seen and insert the fan keying it to the clutch. Wrap a cloth over the fan (provides grip to the fan without breaking the fins) and tighten until the clutch stops, torque an additional 1/16 of a turn. Using a Piston Lock [CN2155 Optional Parts] makes this easier. Secure the fan by placing one 6.5x13mm Washer and apply a liberal amount of threadlock to secure the nut that came with the engine from the inside of the fan assembly using. Again only torque the nut 1/16th more.



STEP 17

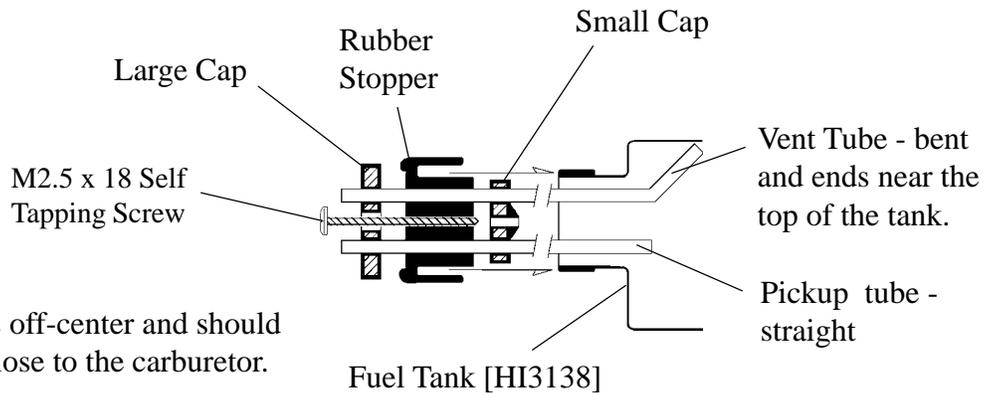
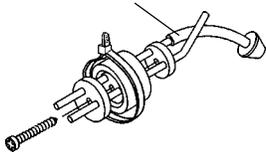
Secure the engine assembly on to the engine mount using four 3x16mm Socket Cap Screws using threadlock. From bag 4, install the Throttle Extension by removing the arm supplied on the engine. The arm has to be repositioned to get equal throw, both open and closed from 50%.



STEP 18-19 Fuel Tank & Lower Frames

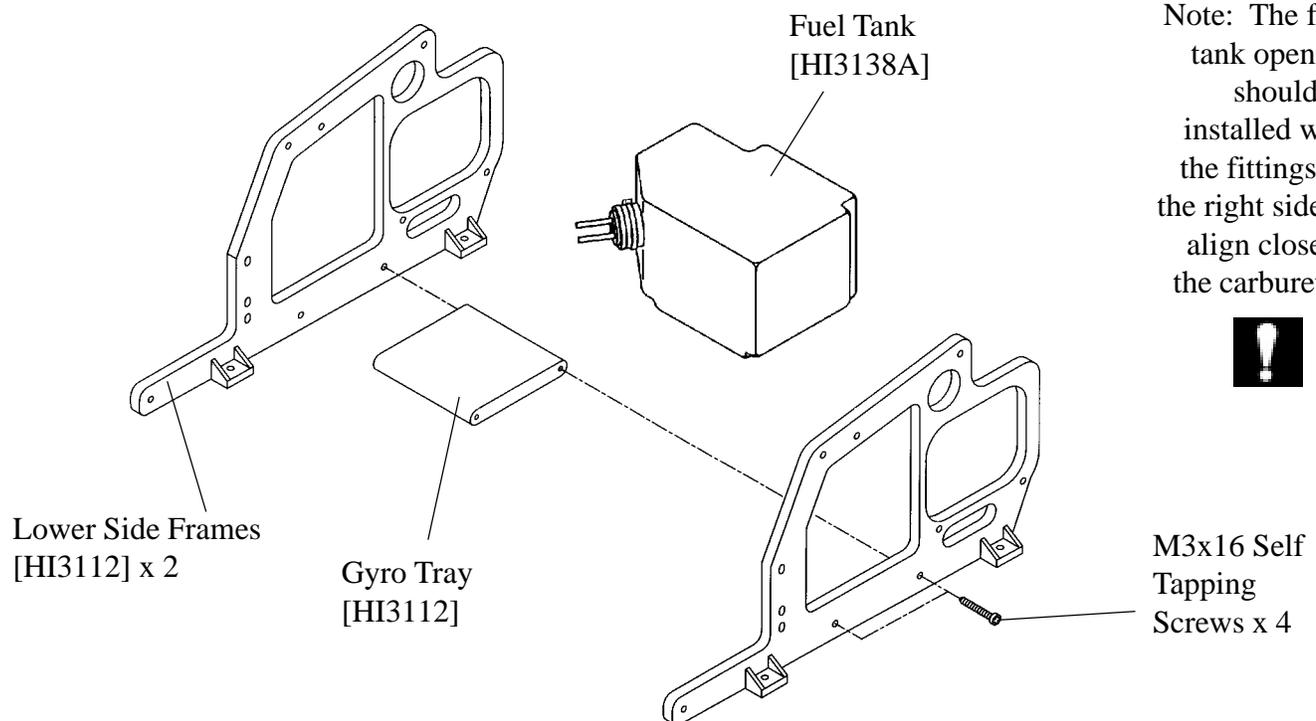
STEP 18 From parts bag 3, insert the two pieces of aluminum tubing through the large cap, rubber stopper and small cap, bend the long aluminum tube upwards (make sure the tube comes to the top of the fuel tank) and attach the short piece of fuel line and clunk to the short straight piece of tubing. Test fit the assembly into the Fuel Tank and make sure that the clunk reaches the end but moves freely and the vent tube is near the top of the tank but does not touch. Install the **included tie wrap** around the outside of the rubber cap. Finally tighten the long self tapping screw to seal the tank.

50mm Fuel line inside tank with Clunk



Note: The fuel tank opening is off-center and should be installed upwards to align close to the carburetor.

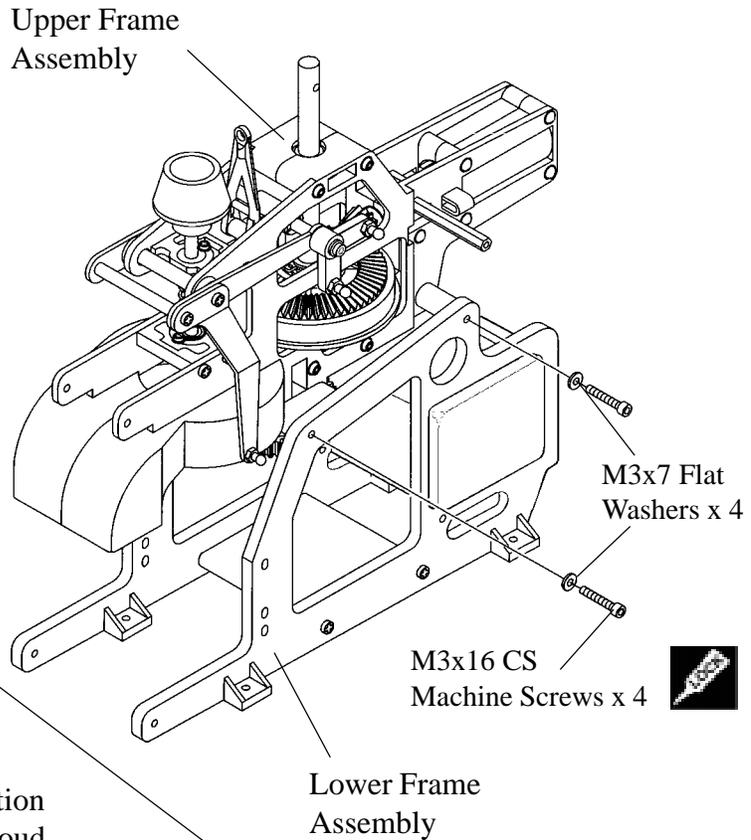
STEP 19 From parts bag 3, slide the Fuel Tank into position and assemble the Lower Frames with four 3x16mm Self Tapping Screws into the gyro plate (remember to build the sideframes on a flat surface while tightening the screws).



STEP 20-21 Upper & Lower Frames

STEP 20

Attach the lower frame assembly to the upper frame assembly with four 3x16mm Socket Cap Screws and four 3x7mm Washers using threadlock.



STEP 21

Assemble the Lower Cooling Fan Shroud over the head of the engine using parts from bag 3, assemble the two halves using five 2.6x10mm Self Tapping Screws. Install the engine assembly into the lower side frames using four 3x16mm Socket Cap Screws and four 3x7mm Large Flat Washers. Position the lower shroud overlapping the upper shroud, adjust the engine height by looking from the side, slide the engine upwards until the clutchbell gear is properly meshed with the counter gear, then threadlock the screws in place.

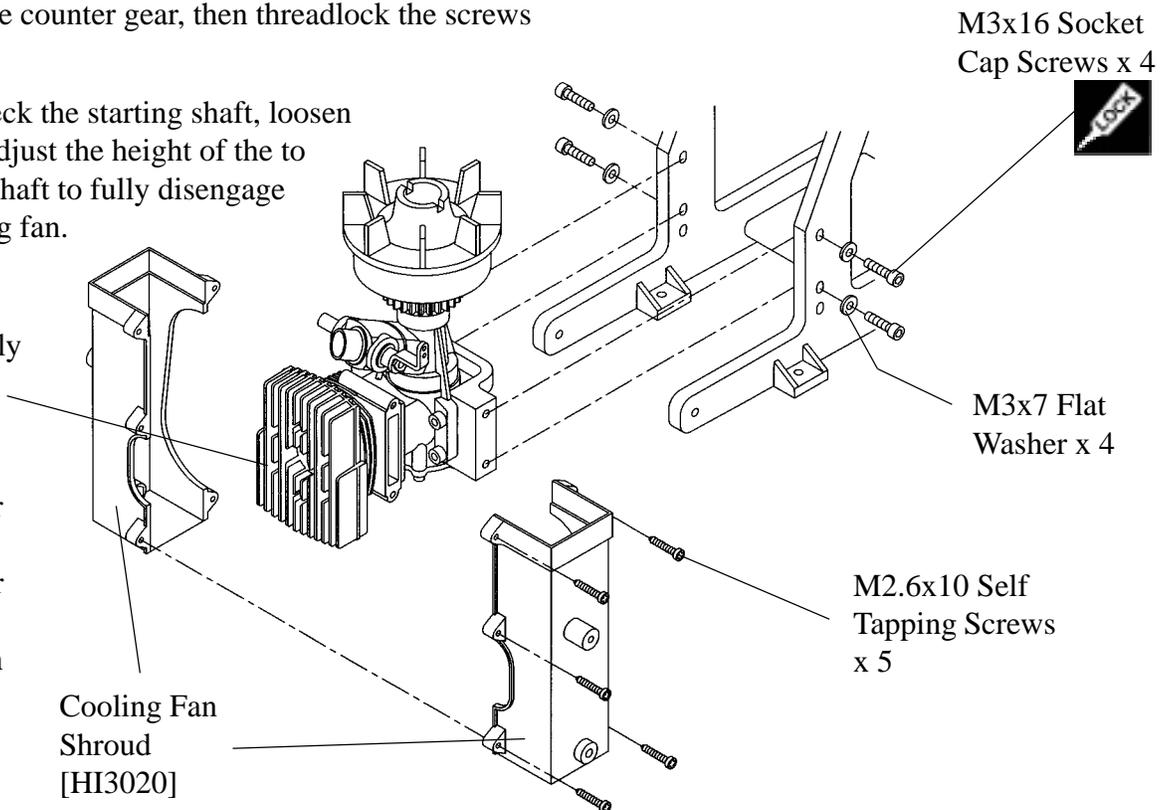
At this time check the starting shaft, loosen the collar and adjust the height of the to allow the start shaft to fully disengage from the cooling fan.

Engine Assembly installed onto mount.

For proper gear mesh, check that the counter gear has no vertical play on it's shaft.

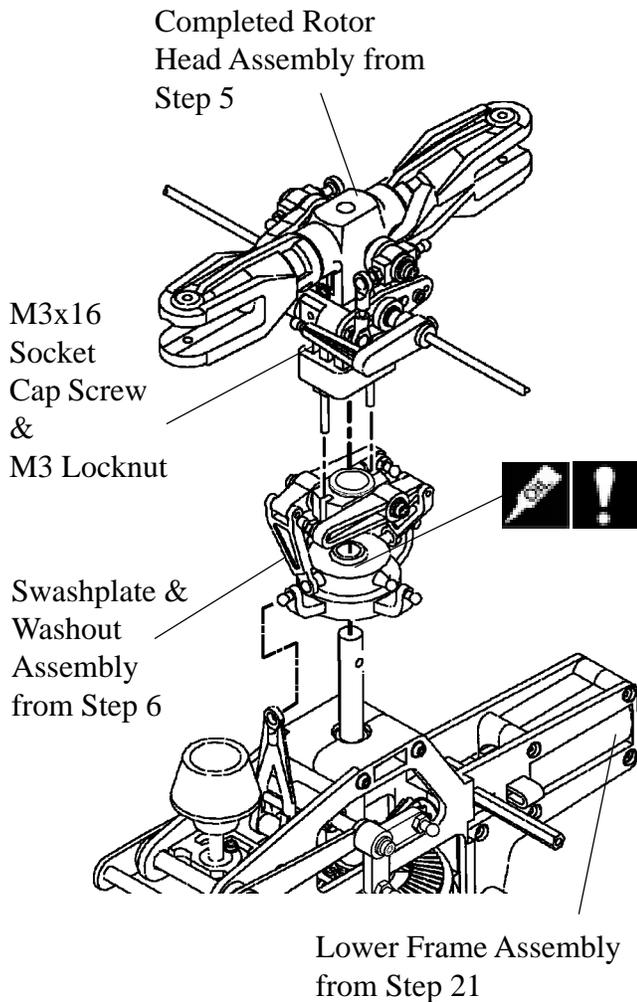


Cooling Fan Shroud [HI3020]



STEP 22-23 Final Rotor Head Assembly & Muffler

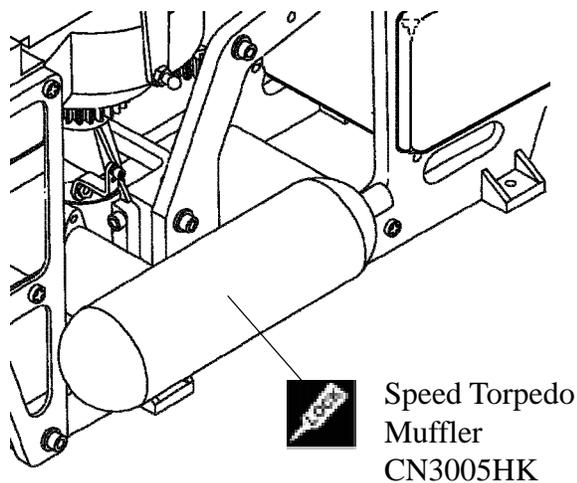
STEP 22



Slide the washout assembly from Step 6 onto the main shaft and snap the elevator lever arm onto one of the single front ball on the swashplate. Slide the completed rotor head assembly from Step 5 onto the shaft and align the hole in the head block with the hole in the top of the main shaft and insert one 3x16mm Socket Cap Screw and 3mm locknut (from Bag 2) to secure the two. **(Note: Make sure the pins in the rotor head block are aligned and inserted into the holes in the washout unit.)** Apply some oil sparingly to the washout hub assembly to insure they slide smoothly.

Following assembly, move the collective lever fore and aft to the endpoints. The swashplate and washout unit should be very smooth throughout the movement range. If not, inspect the fit of the washout guide to the pins in the rotor head, these pins can be bent slightly if binding. Also check the collective axle, the screws here may be too tight. Lastly the fit of the ball links sometimes can cause binding. These few points are the most common which will cause servo strain leading to premature wear and will appear as a jump in altitude when flying the helicopter.

STEP 23



Attach the muffler to the engine with the screws provided with the muffler using threadlock. Attach the pressure tap to the top of the muffler and the M4x6 Phillips Machine screw to the bottom hole in the muffler, remember to use threadlock on these parts.

Tip For a good seal between the muffler and the exhaust port, use a gasket made from thin aluminum, brass or use high temperature RTV engine sealant found in an automotive supply store. To properly seal the fit, after running the engine for several minutes on the first run, shut down the engine and tighten the bolts again, with the hot engine you will gain 1/4 turn on the bolts which will seal the muffler in place.

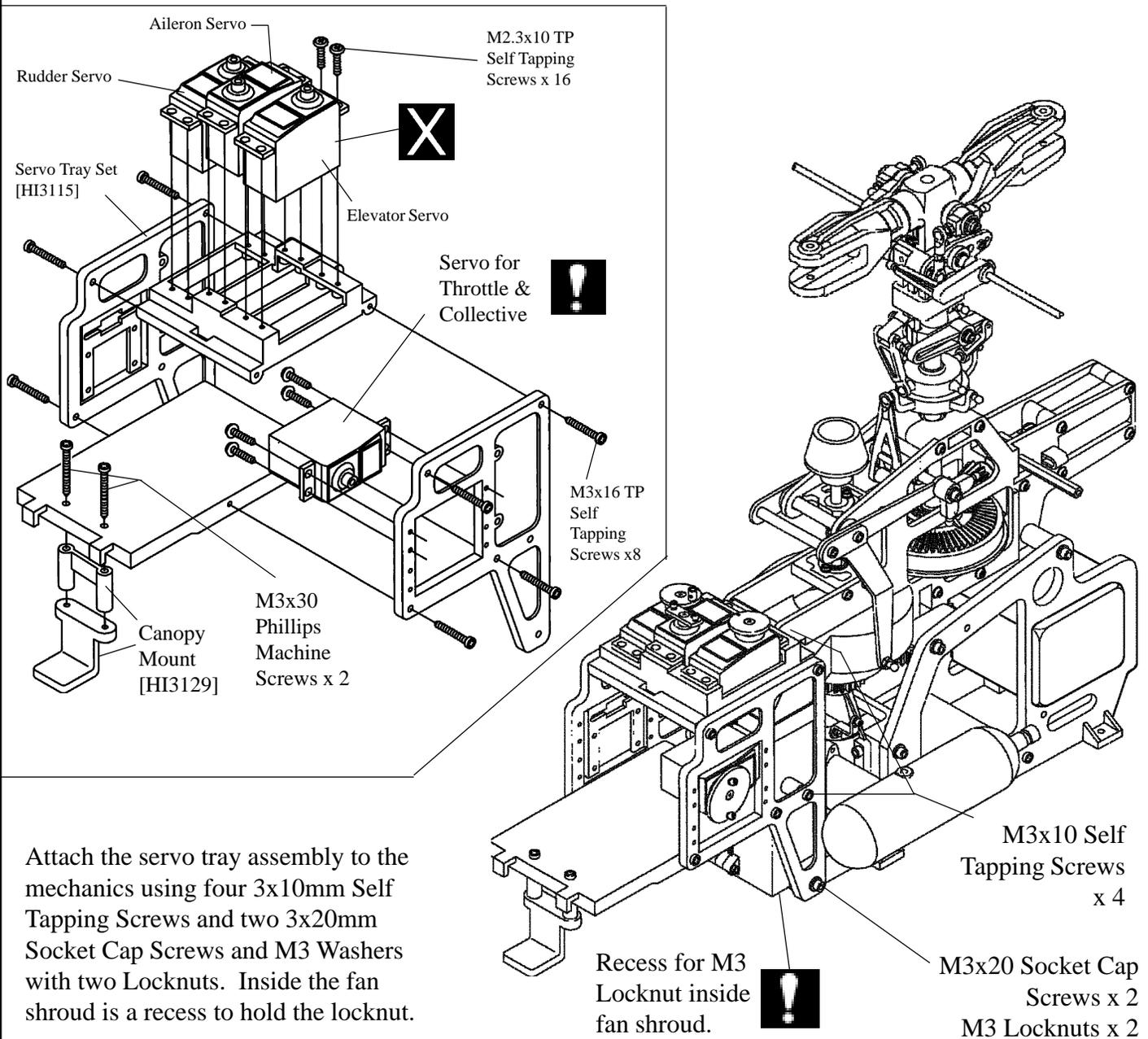
STEP 24 Servo Tray (Airplane Radio)

The Hawk helicopter is designed to operate with either a 4 channel airplane radio or a 5 channel helicopter radio. Step 24 shows the single collective/throttle servo location for an airplane radio whereas if you are using a helicopter radio skip to Step 25. Alternately for the 4-channel radio, a "Y" harness (optional) can be used with Step 25 plugged into the throttle channel on the radio (provides more torque to collective).

Airplane Radio 4 Channel Setup

STEP 24

From parts bag 5, assemble the servo tray using four 3x16mm Phillips Head Screws. This is a good time to install the collective servo which is the same servo used for the throttle on the engine from the *inside* of the left vertical support. (**Note, use the rubber grommets provided with the servos, you can use the screws that came with your servos or the screws provided in the kit**). Attach the rudder, aileron and elevator servos noticing the orientation in to top servo tray. Attach the front canopy mount using two 3x30 Phillips Head Machine Screws through the top of the servo tray, through the plastic spacer and into the canopy mount.



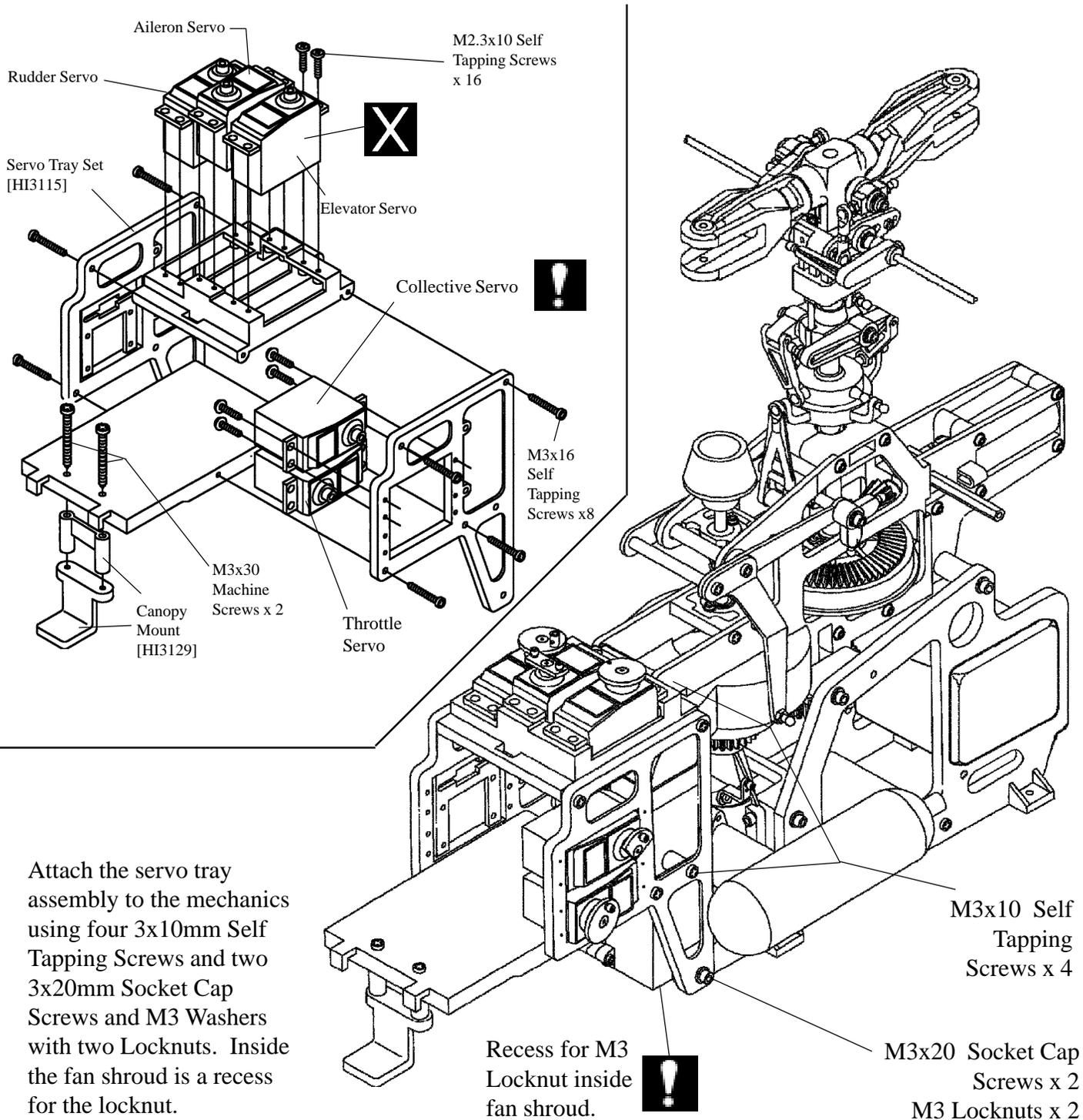
Attach the servo tray assembly to the mechanics using four 3x10mm Self Tapping Screws and two 3x20mm Socket Cap Screws and M3 Washers with two Locknuts. Inside the fan shroud is a recess to hold the locknut.

STEP 25 Servo Tray (Heli-Radio)

Helicopter Radio 5 Channel Setup

STEP 25

From parts bag 5, assemble the servo tray using four 3x16mm Phillips Machine Screws. This is a good time to install the collective and throttle servos from the *inside* of the left vertical support. (**Note, use the rubber grommets provided with the servos, you can use the screws that came with your servos or the screws provided in the kit**). Attach the rudder, aileron and elevator servos noticing the orientation in to top servo tray. Attach the canopy mount using two 3x30 Phillips Machine Screws through the top of the servo tray, through the plastic spacer and into the canopy mount.

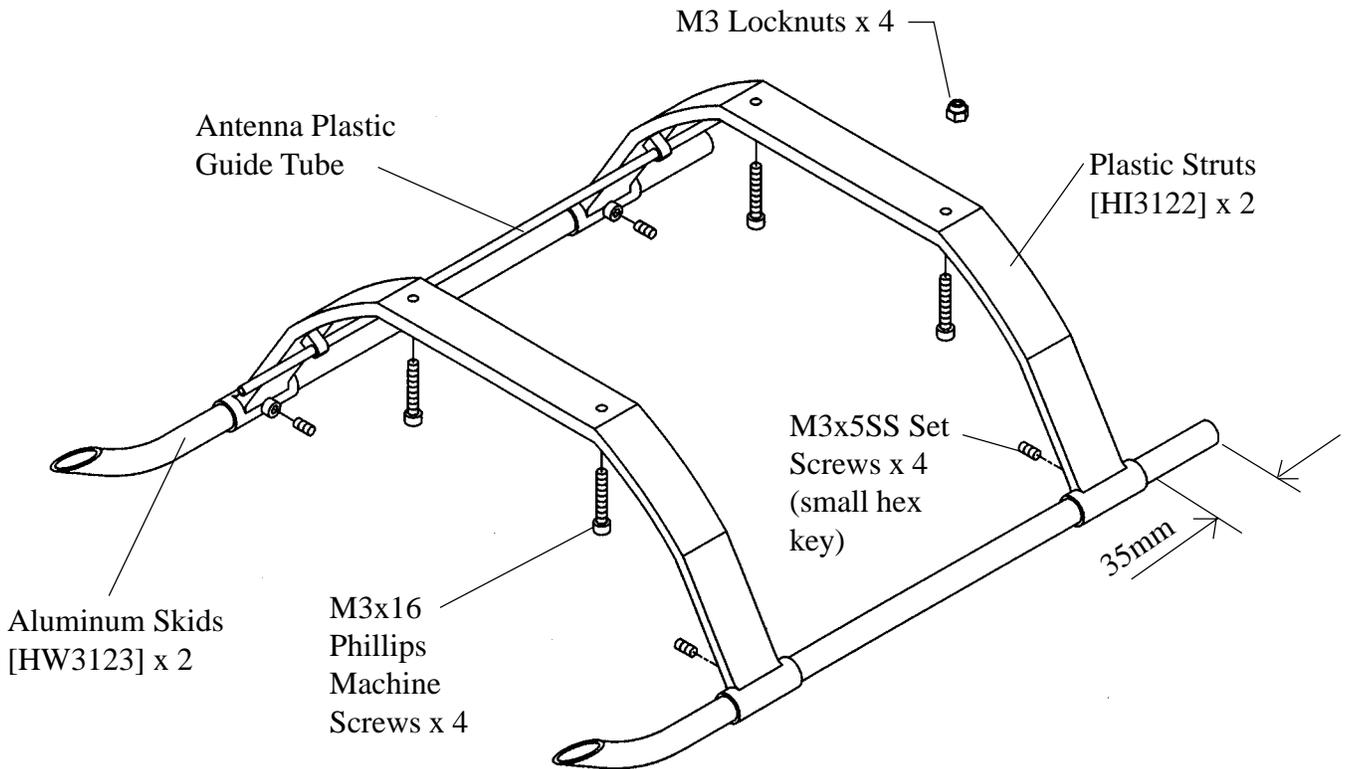


Attach the servo tray assembly to the mechanics using four 3x10mm Self Tapping Screws and two 3x20mm Socket Cap Screws and M3 Washers with two Locknuts. Inside the fan shroud is a recess for the locknut.

STEP 26-27 Landing Gear & Tail Drive Shaft

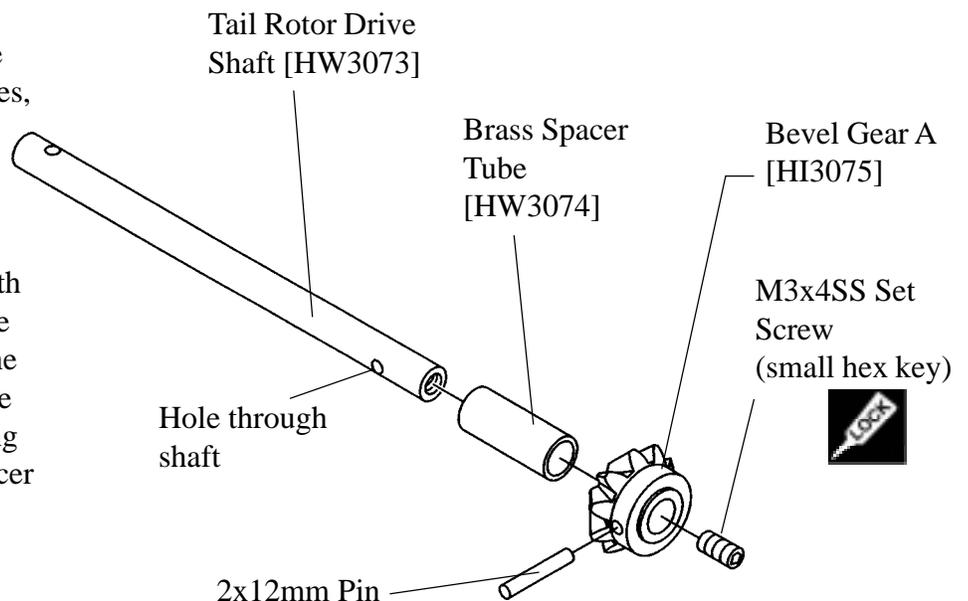
STEP 26

From parts bag 6, assemble the landing gear by attaching the Aluminum Skids through the Struts, securing them with four 3x5mm Set Screws. Set the distance from the rear of the skid to the strut at 35mm. Attach the landing gear to the main mechanics using four 3x16mm Phillips Machine Screws and locknuts.



STEP 27

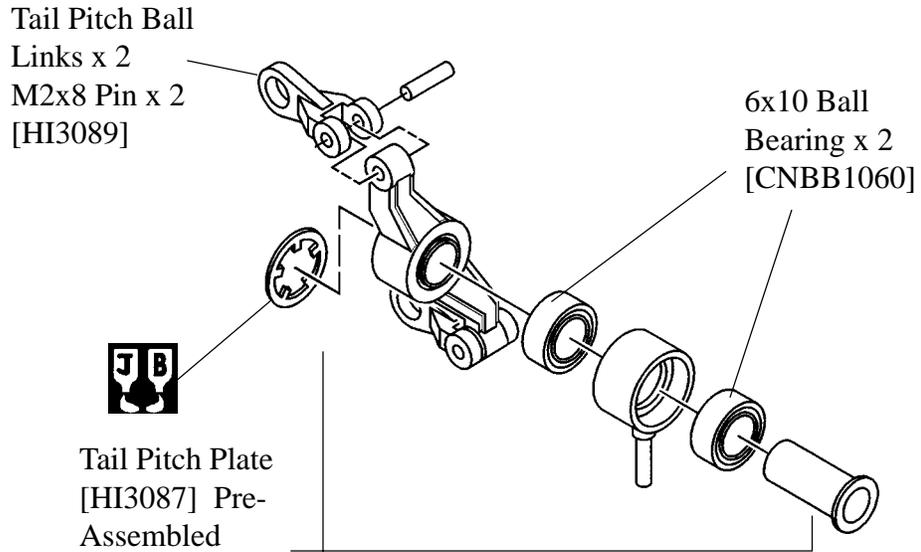
From parts bag 7, notice that the Tail Rotor Drive Shaft has 2 holes, one through the shaft and one drilled partially into the shaft. Slide the small Bevel Gear with the teeth facing the shaft from the end with the through hole and position the gear aligning the holes. Press the 2x12mm Pin through and secure with one 3x4mm Set Screw using threadlock. Slide the Brass Spacer Tube onto the shaft and position against the gear.



STEP 28-30 Tail Rotor Output Assembly

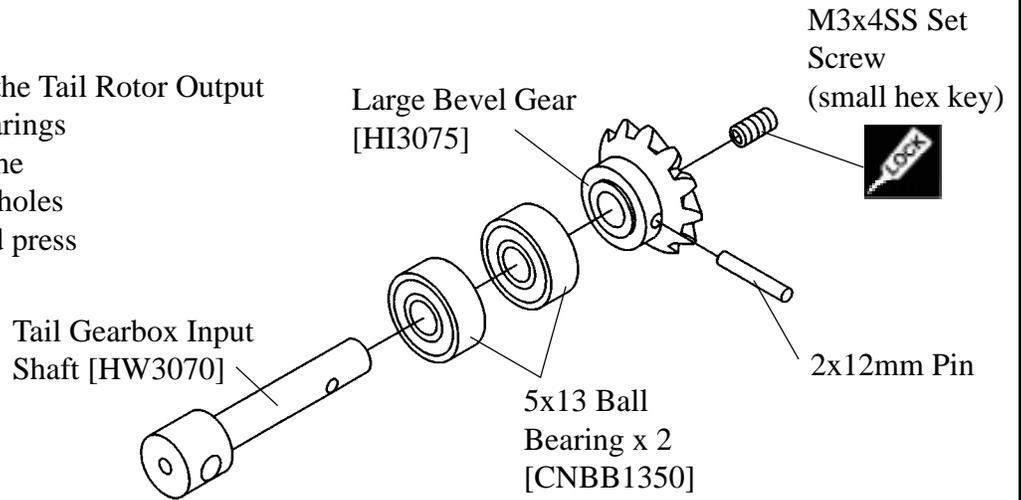
STEP 28

From parts bag 7, the Tail Pitch Plate and Tail Pitch Ball Links are pre-assembled. (**Note: apply some JB weld to the outside of the lock ring to avoid the assembly loosening.**) Put this assembly aside for now.



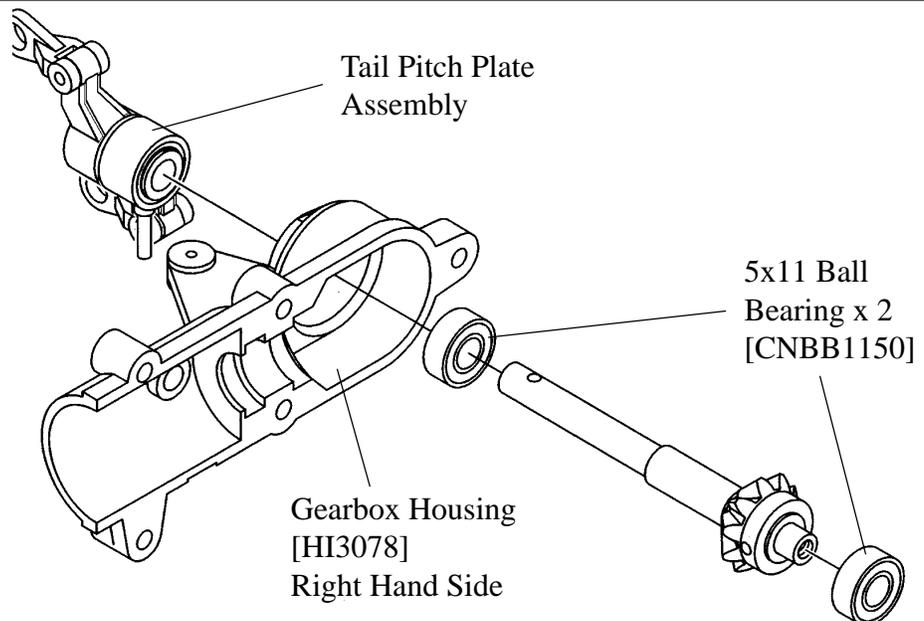
STEP 29

From parts bag 7, assemble the Tail Rotor Output Shaft by sliding two Ball Bearings on to the shaft followed by the large Bevel Gear. Align the holes on the gear with the shaft and press in one 2x12mm Pin and secure with one 3x4mm Set Screw using threadlock.



STEP 30

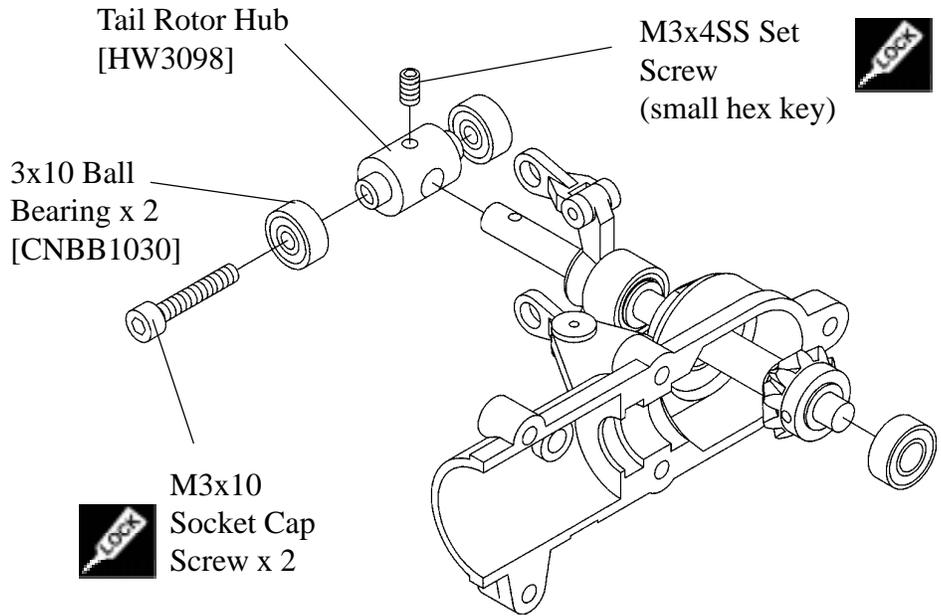
Slide two Ball Bearings on each side of the Tail Rotor Drive Shaft assembly and insert through the right side of the Tail Rotor Gearbox Housing, make sure the bearing is fully seated into the recess. Slide the tail rotor pitch plate assembly on the shaft.



STEP 31-32 Tail Rotor Hub & Tail Rotor Grips

STEP 31

From parts bag 7, install the Tail Rotor Hub on to the tail rotor drive shaft, (**position the hub so the hole is aligned over the hole in the shaft**) and secure with one 3x4 mm Set Screw using threadlock. Using one 3x16mm Socket Cap Screw, attach one Ball Bearing on each side of the hub assembly using threadlock (**apply the threadlock to the threads in the hub to avoid getting threadlock into the bearings**).

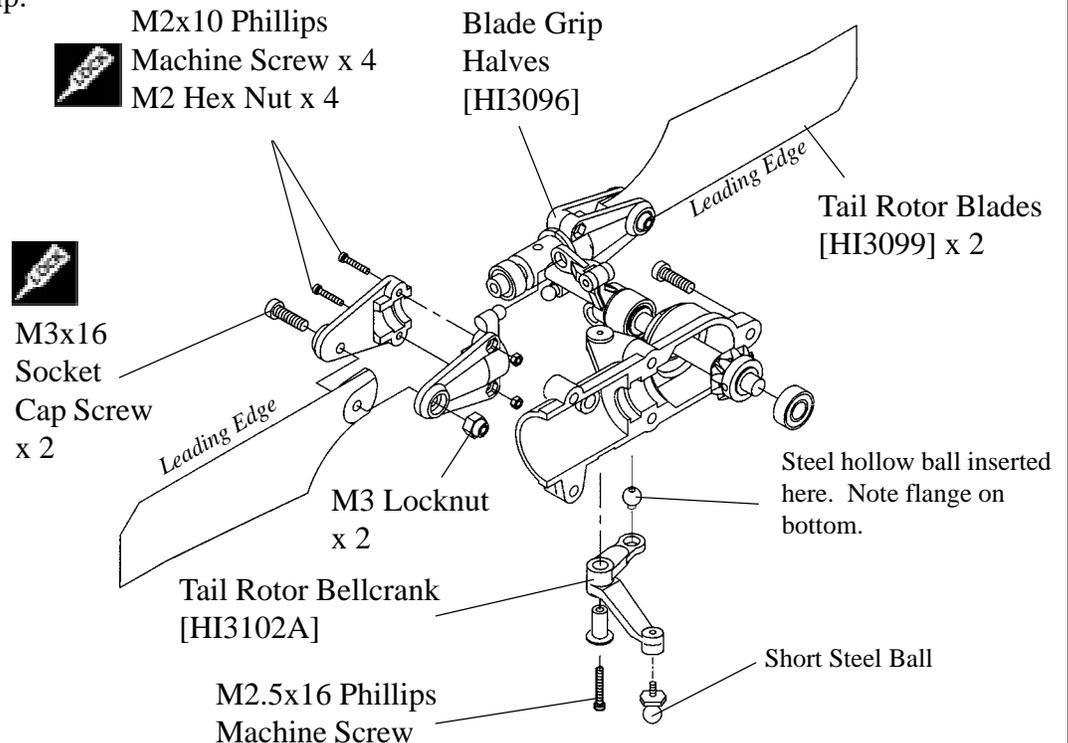


STEP 32

From parts bag 7, assemble the Blade Grip Halves over the bearings with the nuts on the gearbox side using two 2x10mm Phillips Machine Screws and 2mm Nuts using threadlock. Snap the ball on the tail rotor grip into the adjoining pitch slider link on both sides.

Install the Tail Rotor Blades using two 3x16mm Socket Cap Screws and M3 locknuts. Note the direction of the blades on the diagram, the leading straight edge of the blade should be on the same side as the ball on the blade grip.

Press a steel hollow ball with the flange on the bottom into the Tail Rotor Bellcrank, install the Steel Ball, threaded from the bottom of the bellcrank and install the tail bellcrank arm on to the tail rotor gear box with one 2.5x16mm Phillips Machine Screw, inserted through the brass bushing with the washer side on the bottom (**make sure the steel ball is engaged on the pin of the tail rotor pitch slider assembly**).



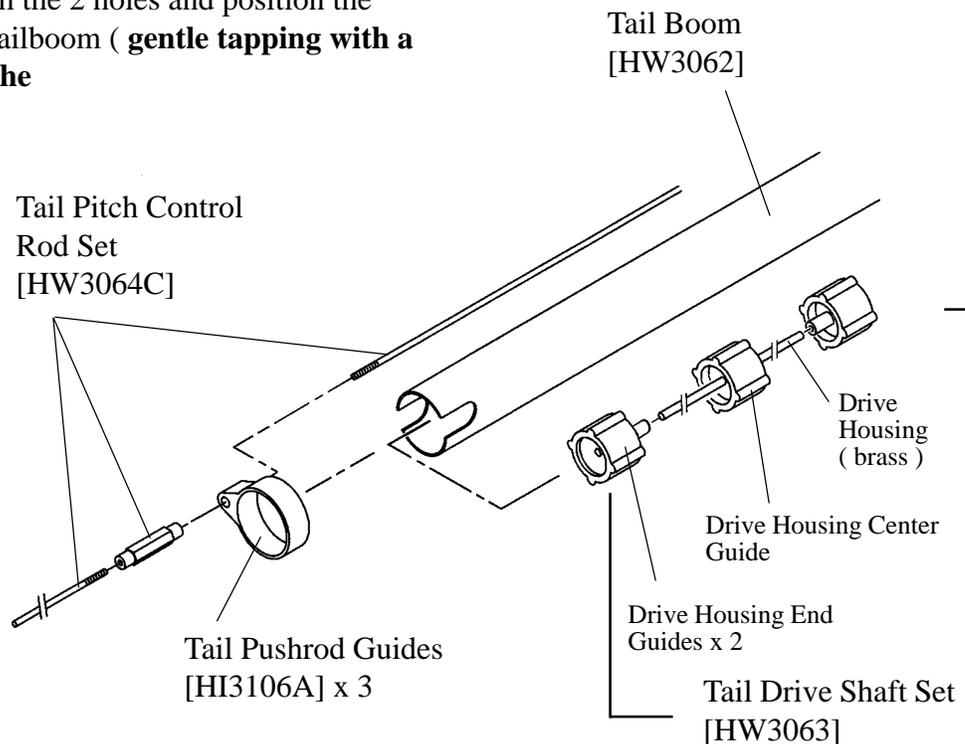
After flying the model, if a vibration is noticed on the vertical or horizontal fin, you can remove the complete tail rotor assembly with the hub and further balance it using a High Point balancer. Careful sanding of the rotor blades is all that is needed.

STEP 33-34 Tail Guide & Tail Gearbox

STEP 33

From Bag 7, insert three tail drive shaft Guides on to the Brass Tail Drive Housing, found in the bottom of the box (**Note that one guide has a larger center hole than the others, slide this one to the center of the brass tube**), add the remaining two onto the ends. Glue the guides into position using Zap Ca on the brass tube. Insert the rod guide assembly into the tailboom from the end with the 2 holes and position the assembly centered in the tailboom (**gentle tapping with a wooden dowel will ease the insertion of the guides**).

Slide the three tail pushrod guides onto the tailboom engaging tail pushrod. Thread the pushrod connector found in bag #4 onto the long pushrod, the short pushrod will be attached in Step 36.

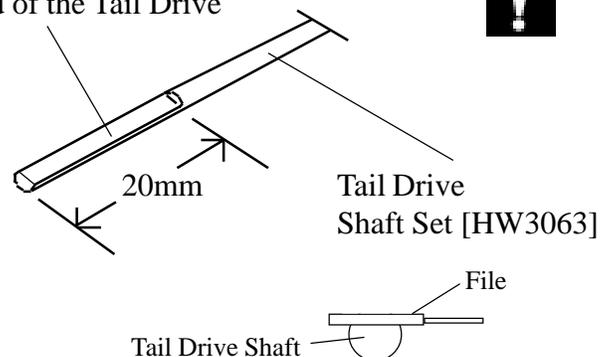


! Make sure the brass tubing is glued to the internal guides for the tail boom. Also, after radio set up is complete glue the pushrod guides using a single drop of Zap Ca. One drop will stop the pushrod from binding and still be able to remove them later.

STEP 34

The Tail Drive Shaft has one end flattened to engage into the main mechanics the other end needs to have a flat spot 20mm long filed on the round end of the shaft for the two 4x4mm Set Screws in the tail rotor input shaft. Thoroughly grease the tail drive shaft and insert the newly filed end into the tailboom end with the slots into the drive shaft housing assembly (**ensure the end with the new flat spot exits the tailboom end with the round holes**) and degrease both ends of the shaft.

Put a flat spot on the the round end of the Tail Drive Shaft.



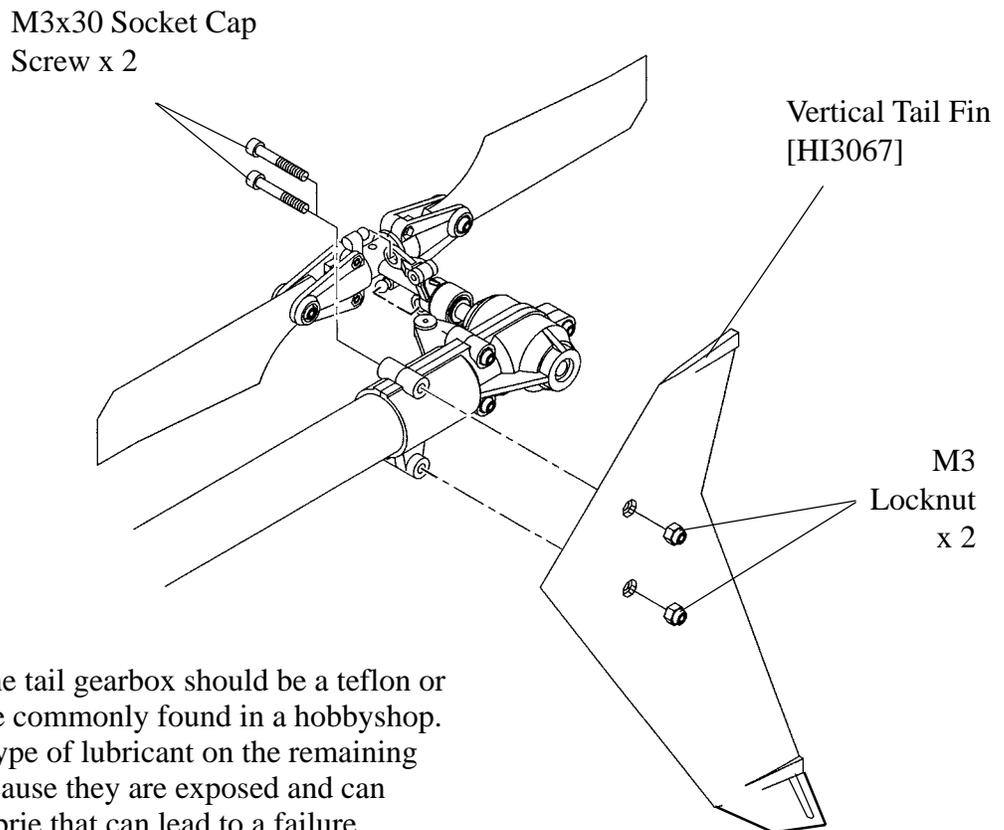
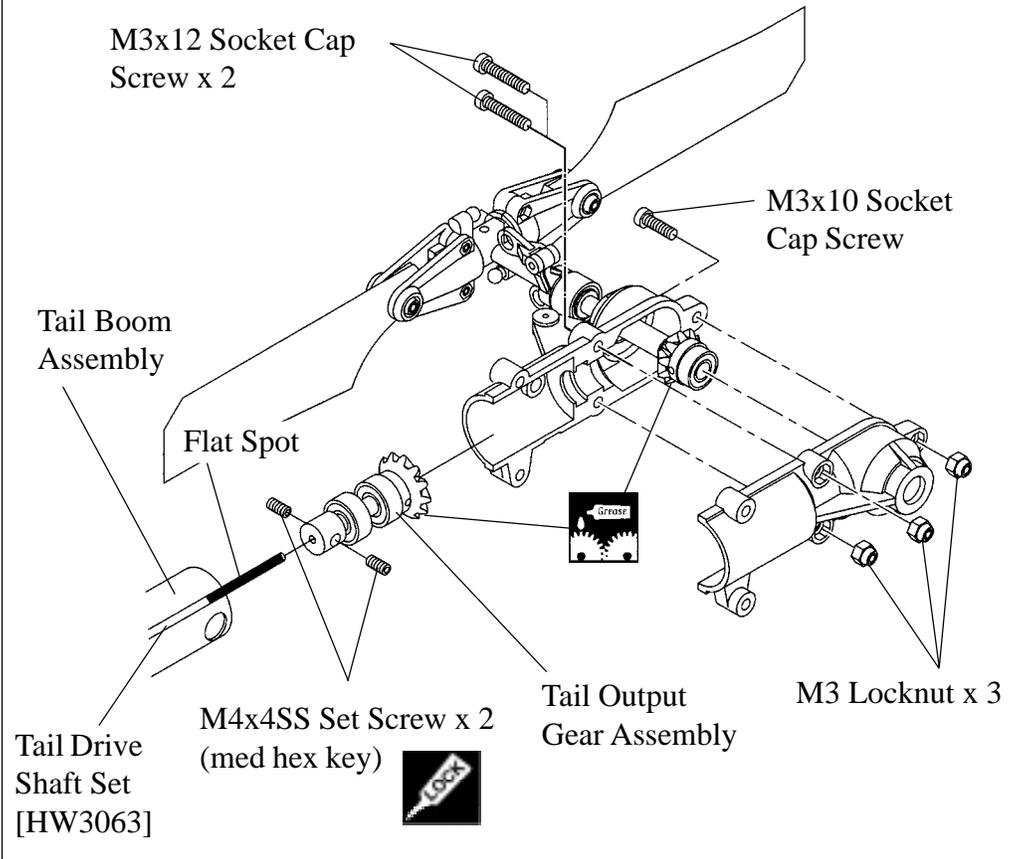
Tip

A flat file is the ideal tool for the job, alternately careful use of a Dremel Moto Tool will work. It is important that the flat be at least 1/4 of the diameter but no more than 1/3 to avoid weakening the material.

STEP 35 Tail Gearbox

STEP 35

Attach the tail output gear assembly on to the drive shaft with two 4x4mm Set Screws (**make sure the flat spot is aligned with one of the set screws**) using threadlock. Position the output gear assembly into the right gear box half (**insure the 2 bevel gears are meshed properly and the ball bearings are fully seated in their recesses**) and liberally grease the gears before closing the gearbox. Position the gear box halves over the holes in the end of the tail boom and secure with one 3x10mm Socket Cap Screw and M3 locknut at the end of the gearbox and two 3x12mm Socket Cap Screws with M3 locknuts at the center of the gearbox. Install the Vertical Fin with two 3x30mm Socket Cap Screws and M3 locknuts through the mounts in the front end of the tail rotor gearbox.



Tip

Grease to be used inside the tail gearbox should be a teflon or light lithium type of grease commonly found in a hobbyshop. Do not use grease or any type of lubricant on the remaining gears on the helicopter because they are exposed and can actually attract dirt and debris that can lead to a failure.

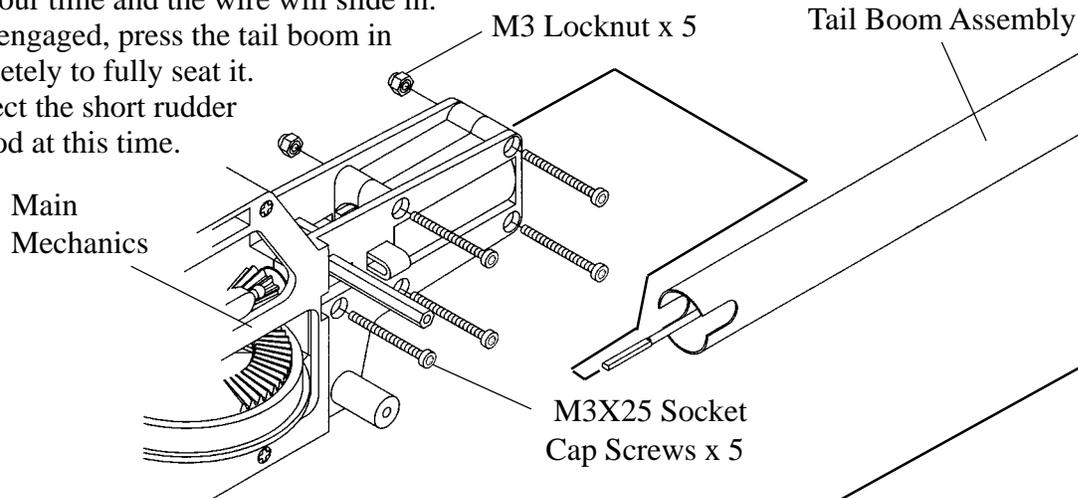
STEP 36-37 Tailboom & Horizontal Fin

STEP 36

Attach the tail boom assembly to the main mechanics by sliding the tailboom tube into the hole in the rear of the upper frame using five 3x25mm Socket Cap Screws and M3 Locknuts, slowly press the tailboom in, being careful to engage the drive wire the flattened end into the tail rotor output gear shaft. The slots on the end of the tailboom will self align with molded pins inside the upper side frame.

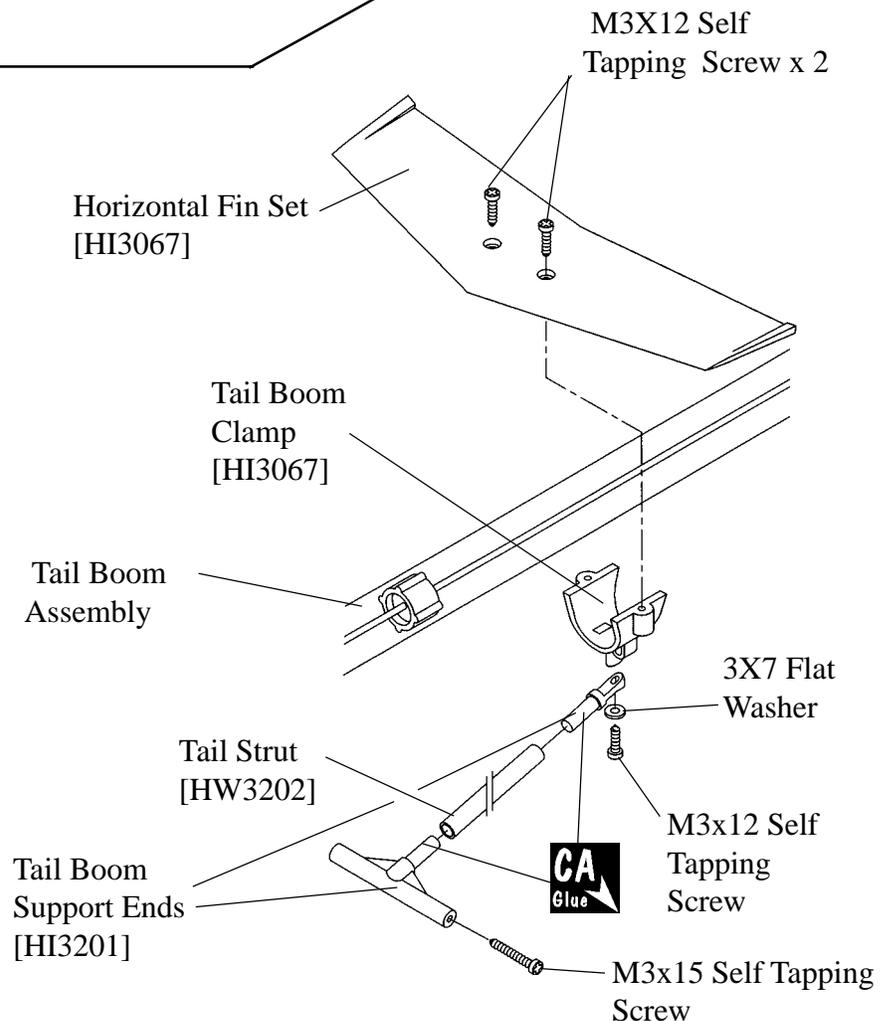
As the upper frame is assembled at this point, just take your time and the wire will slide in.

Once engaged, press the tail boom in completely to fully seat it. Connect the short rudder pushrod at this time.



STEP 37

Insert the two tailboom Strut Fittings into the aluminum strut. Position two of the pushrod guides in front of the horizontal fin and one behind. Attach the Horizontal Fin on the tailboom using two 3x12mm Self Tapping Screws into the Tailboom Clamp and space the fin along the tailboom at the position where the Tail Boom support & Tail Strut is attached. **Note: the mount for the strut is angled, test fit the strut to position the clamp in the correct direction**) then secure the strut one 3x12mm Self Tapping Screw and one 3mm Washer. Attach the lower fitting to the lower frame assembly using two 3x15mm Self Tapping Screws. Finally apply some Zap Ca glue to the fittings onto the strut. Referring to Step 38, install the long rudder pushrod inserting into the three guides along the tailboom.



STEP 38 Pushrod Setup and Adjustments

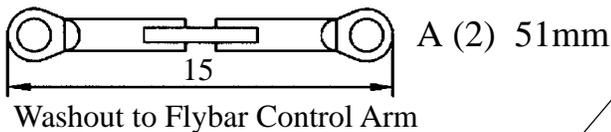
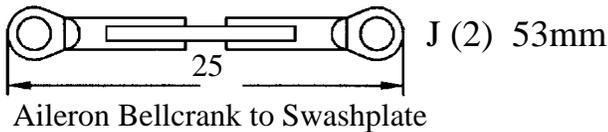
STEP 38 Make up all the control pushrods according to the specified lengths shown in the drawing. These are full scale drawings so you can easily match each pushrod to the page. Please note that these dimensions listed from end to end of the plastic rod-ends are to be taken as correct. Fine tuning may be required as the picture size may change when printed. Also some servos offer different horn placements for fine tuning. The numbers in the center of the pushrod drawings are the actual length of the rods to help select the correct pushrod for each control surface.

Setup for the 5 Channel Helicopter radio, there will be one extra 105mm.

Setup for the 4 Channel Airplane radio, requires one of the 105mm pushrods to be shortened by 12mm, 6mm per end for use as the Collective Arm Pushrod.

Note: It is very important that before you install the pushrod linkages that you first charge your radio then remove all the servo horns from the servos and center all the mechanical or electronic trims on the radio.

Due to printing, the overall lengths of the pushrods on the right are to be taken as correct.



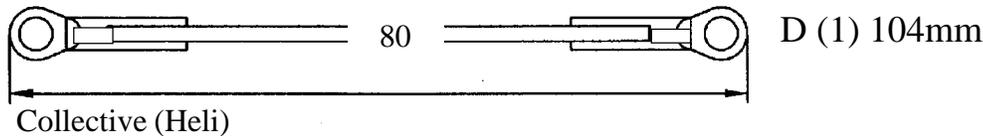
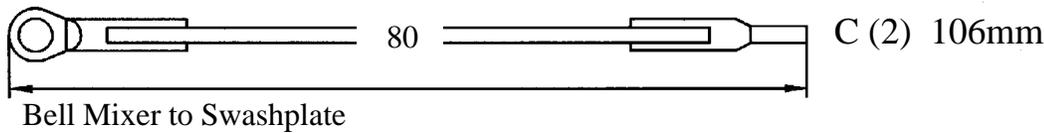
Pushrod Set
[HW3192]

1:1

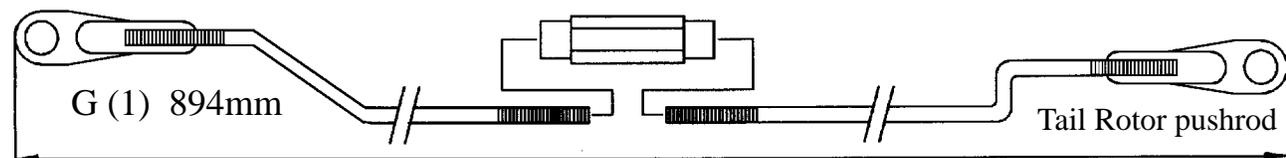
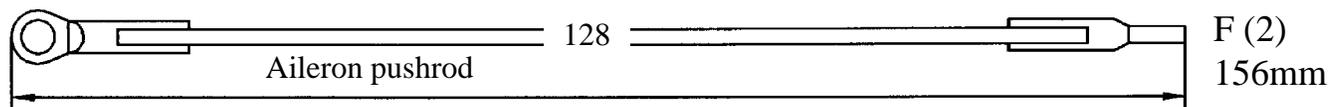
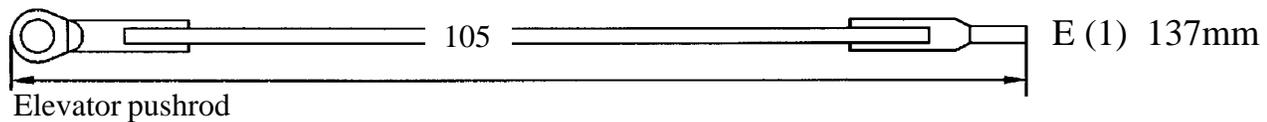
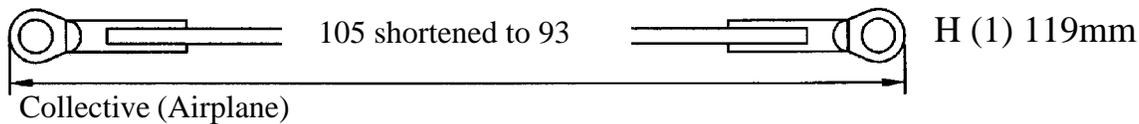
All pushrods are shown full size.



Ball Link Set
[HI3145]



Measurements are tip to tip on the ball link.



Initial Radio Setup

There are various different radios on the market, each having its own special setup requirements, we have picked the top three brands to give you the basic setup parameters for the computer class radios. Not all features are available on all radios, use values for functions that do apply. For those that are using either the airplane version or an analog radio some of the following information will still apply.

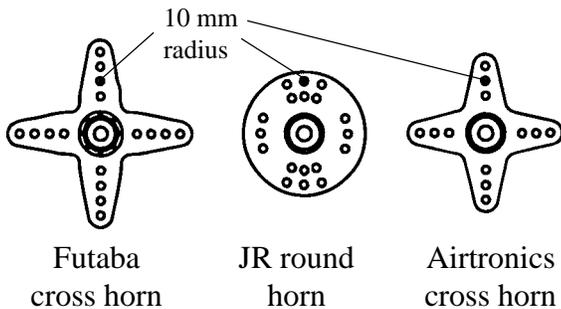
JR	THR	AILE	ELEV	RUDD	GEAR	PITCH	AUX2	AUX3	
Channel #	1	2	3	4	5	6	7	8	PG-01T Piezo Gyro Direction R Gain 50% General The parameters here are based on JR servos and to be used as a guide in programming your JR radio. Note 1, revolution mixing values based on PG-01T gyro, actual values may vary depending on gyro used. Note 2, Throttle position "S" is for stunt setup & 3D flying only. Strongly not recommended for beginners.
Servo Reverse	R	N	N	N	N	N	N	N	
Travel (ATV) H	95%	95%	115%	100%	100%	100%			
L	95%	95%	115%	100%	100%	100%			
Subtrim	(after test flying, adjust the individual pushrods to bring the mechanical trims back to center)								
D/R & Pos 0		90%	90%	Throttle Hold		(set 5% above idle position)			
Exp		20%	20%	Revo Mix ¹		Up 30%	Down 20%		
Pos 1		100%	100%						
		0%	0%						
Trim Offset	(store trim positions after test flying)			Pitch Curve		L	2	H	
Throttle Curve	L	2	H		Pos N	-2°	5.5°	10°	
Pos N	0%	50%	100%		Pos S	-5°	5.5°	10°	
Pos S ²	40%	50%	100%		Pos H	-5°	5.5°	12°	

Futaba	THR	AILE	ELEV	RUDD	GEAR	PITCH	SPARE	SPARE	
Channel #	3	1	2	4	5	6	7	8	PG-01T Piezo Gyro Direction N Gain 50% General The parameters here are based on Futaba servos and to be used as a guide in programming your Futaba radio. Note 1, revolution mixing values based on PG-01T gyro, actual values may vary depending on gyro used. Note 2, Throttle position "IDLE-UP" is for stunt setup & 3D flying only. Strongly not recommended for beginners.
Servo Reverse	R	N	N	N	N	N	N	N	
Travel (ATV) H	100%	95%	95%	100%	100%	90%			
L	85%	95%	95%	100%	100%	90%			
STRIM	(after test flying, adjust the individual pushrods to bring the mechanical trims back to center)								
D/R & Pos 0		90%	90%	TH-HLD		(set 5% above idle position)			
Exp		20%	20%	REVO ¹		Up 30%	Down 20%		
IDLE-UP		100%	100%	TH-CUT (Throttle Cut)		-20%			
		0%	0%						
Trim Offset	(store trim positions after test flying)			P-AT~PI-CRV		1	3	5	
HV-T~TH-CRV	1	3	5		Pos N	-2°	5.5°	10°	
(Throttle Pos N	0%	50%	100%	(Pitch Curve)	Pos S	-5°	5.5°	10°	
Curve) IDLE-UP ²	40%	50%	100%		Pos H	-5°	5.5°	12°	

Airtronics	THR	AILE	ELEV	RUDD	GEAR	PITCH	7/B		
Channel #	3	2	1	4	5	6	7	PG-01T Piezo Gyro Direction R Gain 50% General The parameters here are based on Airtronics servos and to be used as a guide in programming your Airtronics radio. Note 1, revolution mixing values based on PG-01T gyro, actual values may vary depending on gyro used. Note 2, Throttle position "1" is for stunt setup & 3D flying only. Strongly not recommended for beginners.	
Reverse (SW-R)	R	N	N	N	N	N	N		
Travel (EPA) H	95%	95%	100%	100%	100%	95%			
L	95%	95%	100%	100%	100%	95%			
TRIM (Sub Trim)	(after test flying, adjust the individual pushrods to bring the mechanical trims back to center)								
D/R & Pos 0		90%	90%	Throttle HOLD		(set 5% above idle position)			
Exp		20%	20%	RVH ¹ (Revo Mixing)		Up 30%	Down 20%		
Pos 1		100%	100%	T-CUT (Throttle Cut)		-20%			
		0%	0%						
Trim Offset	(store trim positions after test flying)			P-F~CU-PL,2,PH		PL	P2		PH
TH~CU-PL,2,PH	PL	P2	PH		Pos N	-2°	5.5°	10°	
(Throttle Pos N	0%	50%	100%	(Pitch Curve)	Pos 1	-5°	5.5°	10°	
Curve) Pos 1 ²	40%	50%	100%		Pos 2	-5°	5.5°	12°	

Servo Setup & Adjustments

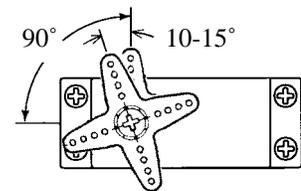
In the steps 37 through 42 over the next few pages the pushrod hardware will be mounted to the servos horns and ultimately the pushrods themselves. Each step is well described but lets take a few moments to cover a few basic points on setting up individual servos. By this time the radio will have been charged overnight. Recheck that all the servo trims are centered. Each radio manufacturer makes servo horns in different shapes: round, in a cross and sometimes a star, each giving a selection of hole patterns to choose from.



Choosing the correct servo horn only involves whether the particular arm or wheel has the correct hole at the recommended distance measured from servo center to hole center, off by 1/2mm is ok. When using cross horns, many times the remaining arms need to be trimmed off to avoid binding on another servo like throttle and collective. When two pushrods need to be on the same horn but each at an angle, the round wheels are best suited. For wheels that are not predrilled for offsets, measure and drill your own holes. Remember to originally set the wheels or arms centered on the servo.

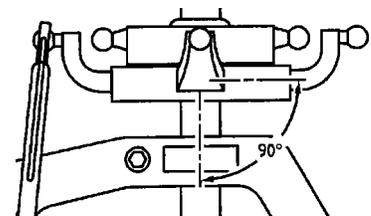
What we are looking for is equal travel both in the left and right rotation of the servo, this becomes complicated by pushrods attaching to the servo at an angle. To correct this we recommend an angle for the hole location. For elevator and collective, we suggest 10-15 degrees to allow for this "linear" geometry to be set up. A range is given to make it easier for you to just choose an available angle, if this is not possible, simply lift the servo horn off the servo and press into place one "notch" back (counter-clockwise).

We strive to have all the control surfaces setup linearly, this means that as the control stick is moved an equal distance from center that the servo will move a corresponding equal amount of travel. Although this is not clear now, this will become very clear when adjusting the throttle and collective servos movements, commonly called the throttle and pitch curves. At this time it is worth mentioning the danger of the ATV function, Adjustable Travel Volume has solved many setup problems while at the same time has created new ones. Most commonly used for throttle to easily keep the servo from binding, the thing to remember is to keep the upper and lower values should have the same. If the final values are different by more that 10 points then a mistake was made in setting the mechanical limits. Time to go back and recheck.



Servo horn shown offset one notch back on the output shaft.

The goal in the end after all the servos are mounted is to have the swashplate sit level or at 90 degrees to the main shaft and have the swashplate move equally fore, aft and side to side. The swashplate will also travel up and down as the collective servo is moved, it is important that in the upper position the washout hub does not contact the rotor head block while at the same time the swashplate remains above the top of the frames to avoid cyclic interference.



Don't use the pitch gauge until you have installed all the servo horns and pushrods. Pitch settings usually are the last step in completing the basic setup for the helicopter just prior to making the first test flights.

After installing the aileron and elevator pushrods, the swashplate should sit level.

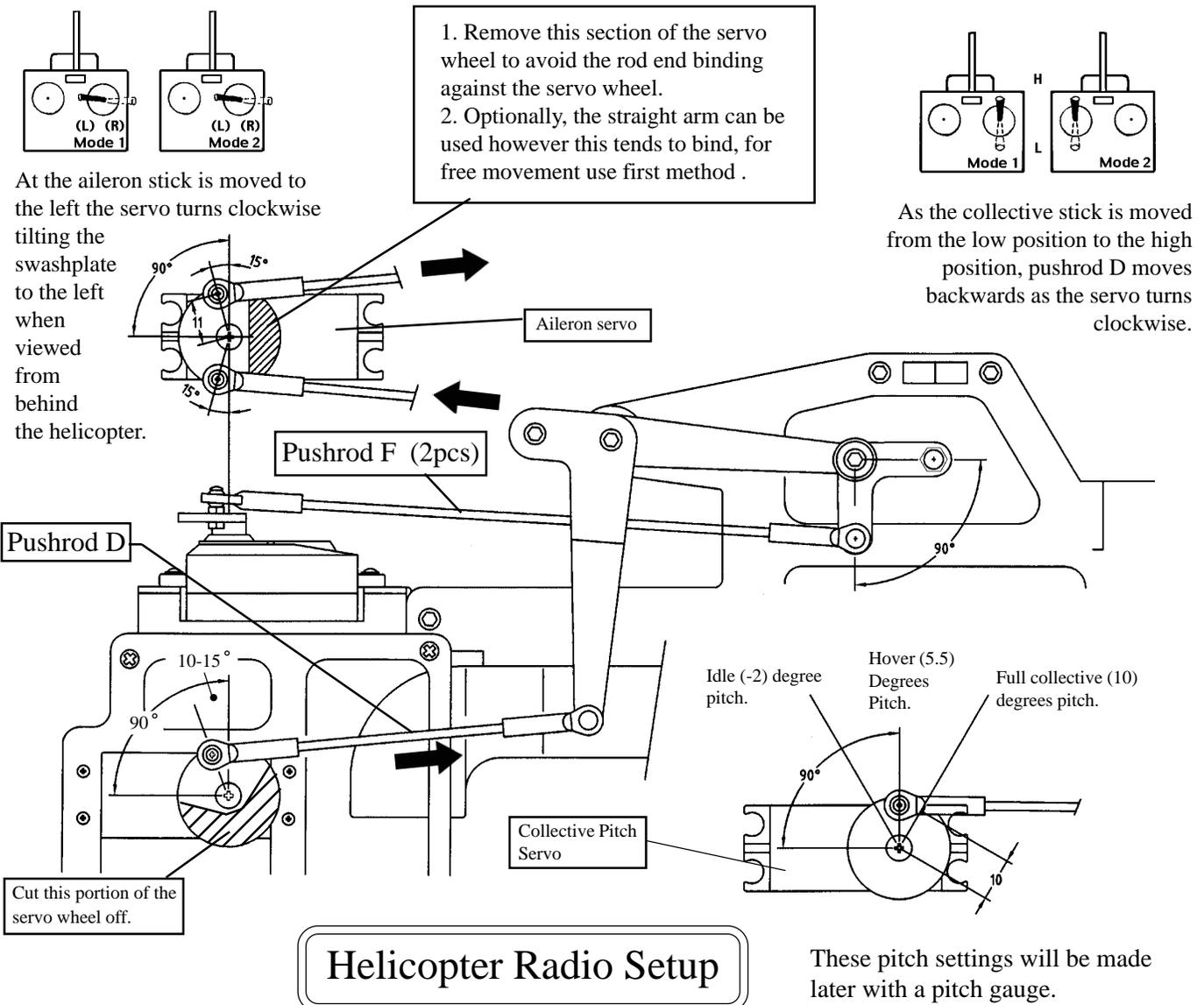
STEP 39 Aileron & Collective Linkage (Helicopter Radio)

STEP 39

The Aileron linkage controls the side to side tilt of the swashplate which in turn causes the helicopter to pitch to the left or right (hence roll cyclic pitch).

Attach two steel balls with two 2mm nuts at a distance of 10-11mm from the center of the servo (this range may vary depending on your particular radio) and 12-15 degrees ahead of the center of the servo using threadlock. The angle offset will eliminate any stress (wear) on the servo. With the radio turned on and the trim centered, attach the servo horn and Aileron Bellcrank Pushrods (F), some slight adjustment maybe necessary to have the swashplate sit level or 90 degrees to the main shaft when viewed from front or back. Move the Aileron stick completely in both directions to insure that there is no binding in the linkages.

For the Collective Servo, attach one steel ball with one 2mm nut to the servo horn at a distance of 10-12mm from the center of the servo using threadlock. With the Collective/Throttle stick on the radio in the center press the servo horn onto the collective servo so the ball is at 75-80 degrees to the servo as shown. Attach the Collective Arm Pushrod (D) and move the Collective stick completely in both directions to insure that there is no binding in the linkages.



STEP 40 Aileron & Collective/Throttle Linkage (Airplane Radio)

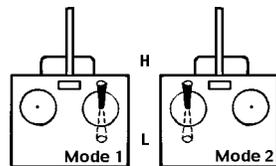
STEP 40

The Airplane setup for the Aileron servo is exactly the same as the Helicopter setup, use the same settings as in Step 34.

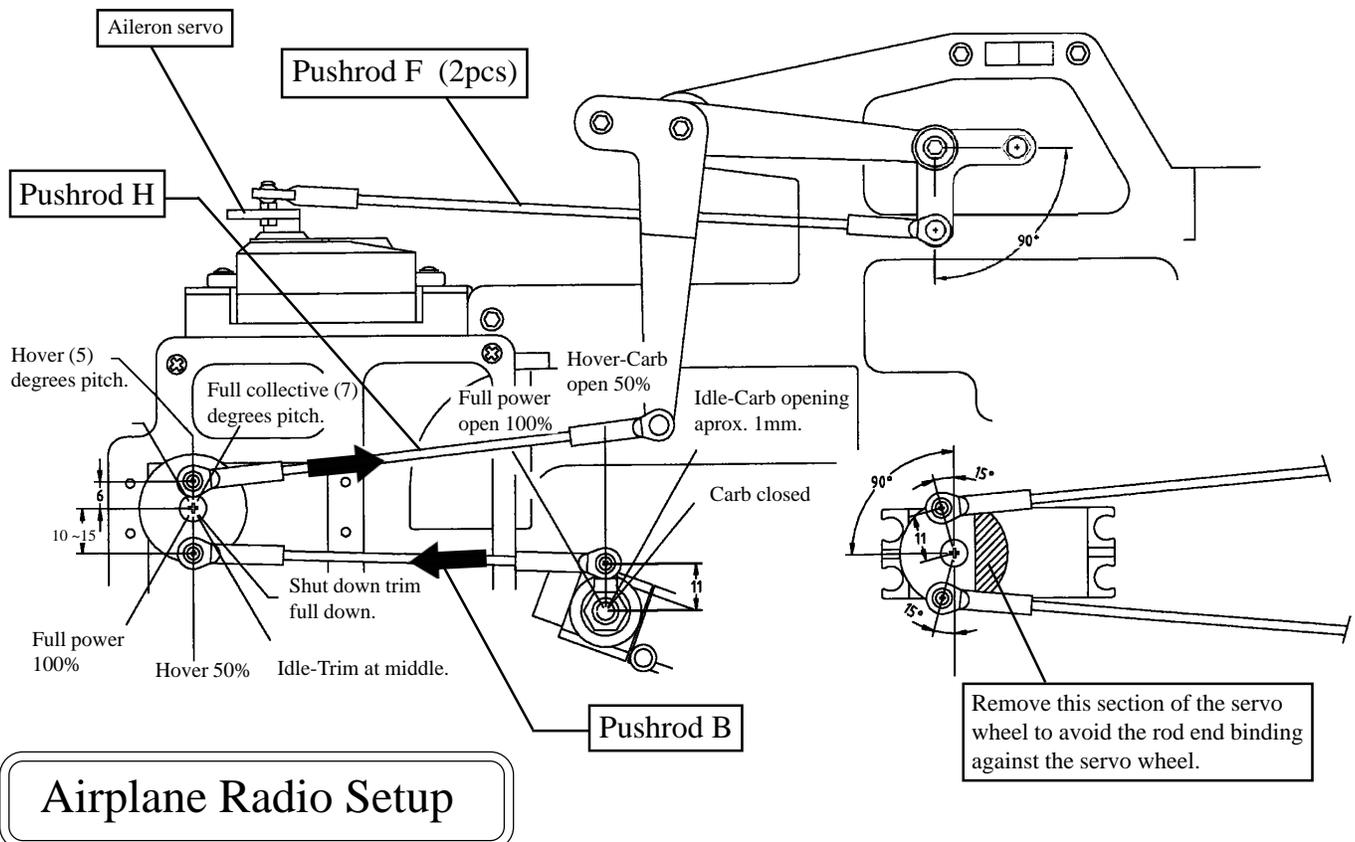
The Collective linkage slides the swashplate up and down causing the blades to increase or decrease in pitch causing the helicopter to go up or down.

For the Collective/Throttle using an Airplane radio, the two controls are made by the same servo. Install two steel balls and two 2mm nuts using threadlock at the locations shown below. The steel ball for the Collective Pushrod should be installed between 5-6 mm from the center of the servo whereas the ball for the Throttle Pushrod should be 10-15 mm. Install one steel ball and one 2mm nut on the Throttle Extension on the engine (**check to see that the carburetor is at half throttle or half way open when the arm is pointed straight up, the nut holding the arm may need to be loosened and the arm repositioned**) in the outermost hole using threadlock.

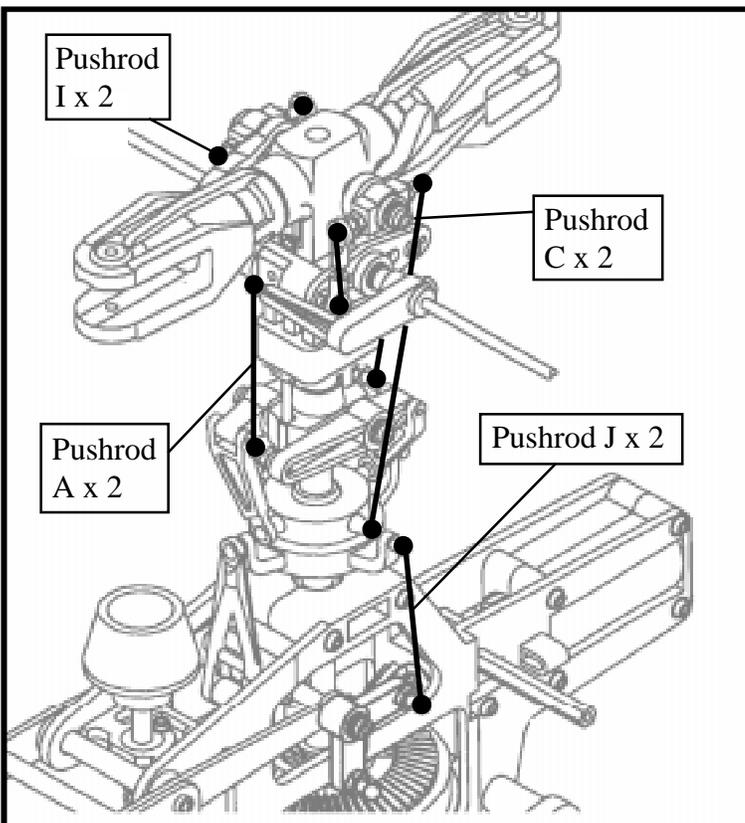
Assemble the Collective Pushrod by threading the two ball-ends onto the previously shortened pushrod (105mm shortened to 93mm) to a total length of 119mm tip to tip. Move the collective/throttle stick on the radio to the center and center the trim on the radio, attach the collective/throttle servo horn to the servo so the balls are at 90 degrees to the servo and then snap on the Collective Pushrod (H) and Throttle Pushrod. Move the stick completely in both directions to insure there is no binding in the linkages.



As the collective/ throttle stick is moved from the low position to the high position, the collective pushrod (H) moves backwards and the throttle pushrod (b) moves forwards as the servo turns clockwise.



STEP 41-43 Rotor Head Linkages & Elevator Linkage

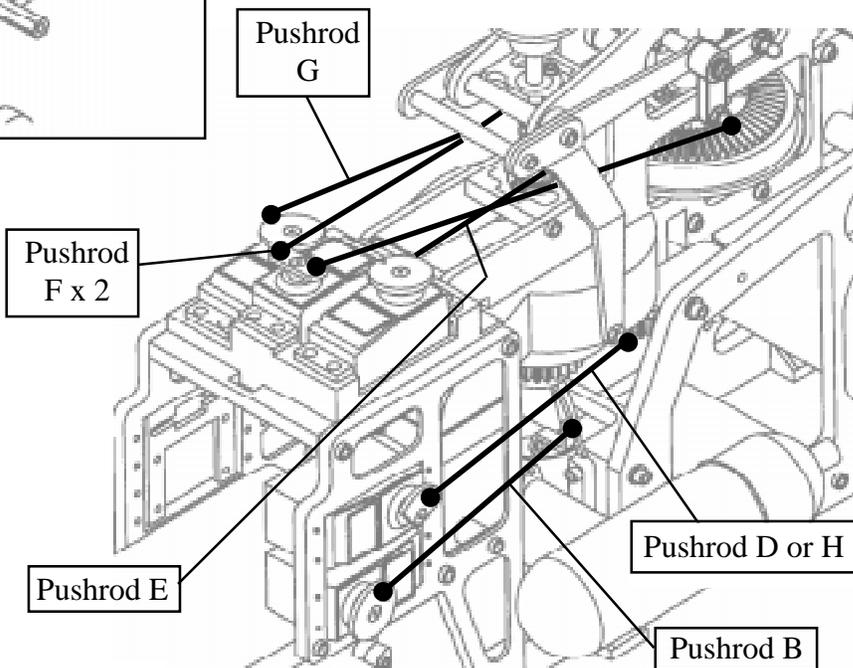


Step 41

When attaching all pushrods, make sure same length pushrods are actually the same length from the beginning otherwise it will be difficult later to figure out where the linkage problems are coming from. The entire rotor head is set up the same way for both types of radios. Attach the two Pitch Arm to Washout pushrods (A), the two Bell Mixer to Inner Swashplate pushrods (C) and the Aileron Bellcrank Swashplate pushrods (J). Pushrod (I) was previously installed in Step 4.

Step 42

The lower linkages (helicopter radio) are shown here to illustrate the general setup and layout of the servo linkages to the respective control surfaces.



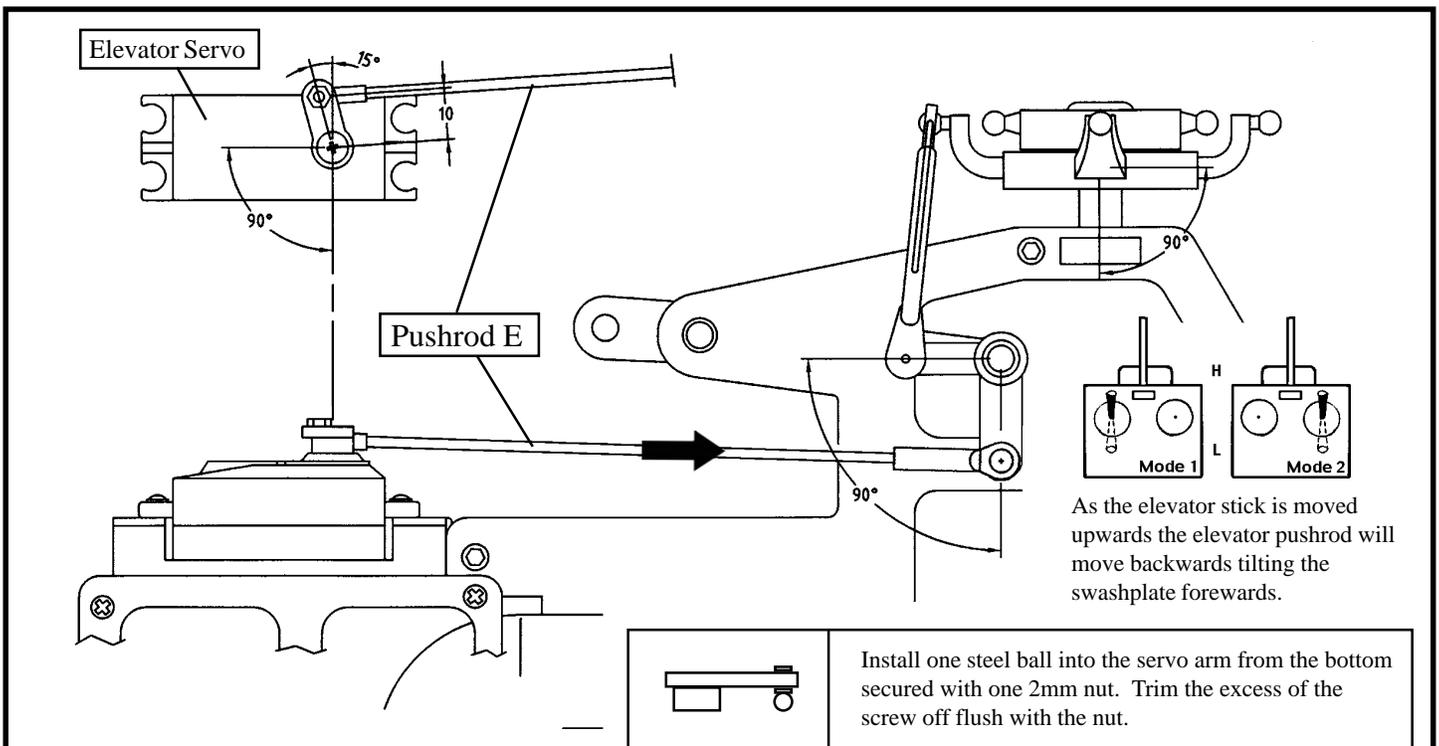
Step 43

The Elevator linkage is set up the same for both Helicopter and Airplane radios, the elevator pushrod controls the tilt of the swashplate forward and backward which causes the helicopter to pitch forward or backward (hence fore-aft cyclic pitch).

Use a servo horn in the shape of a cross and trim the 3 of the 4 arms off. Install one steel ball and one 2mm nut at a distance of 10mm from the center of the servo (**mount the ball directly against the bottom of the servo arm and tighten the nut on top, trim off the screw level with the nut to avoid hitting the Aileron pushrods**), remember to use threadlock. With the radio on and the elevator trim set at the center, attach the elevator pushrod (E) to the elevator bellcrank, then attach the servo horn at an angle of 10-15 degrees behind center of the servo (the offset enables an equal throw of the swashplate). **It is important that the swashplate sit at 90 degrees to the main shaft.**

Note, for Airtronics servos, the ball needs to be installed on the top of the servo horn requiring the aileron servo to be moved up. This can simply be done with 1/4" thick (6mm) spacer make from wood or plastic with the appropriate holes drilled.

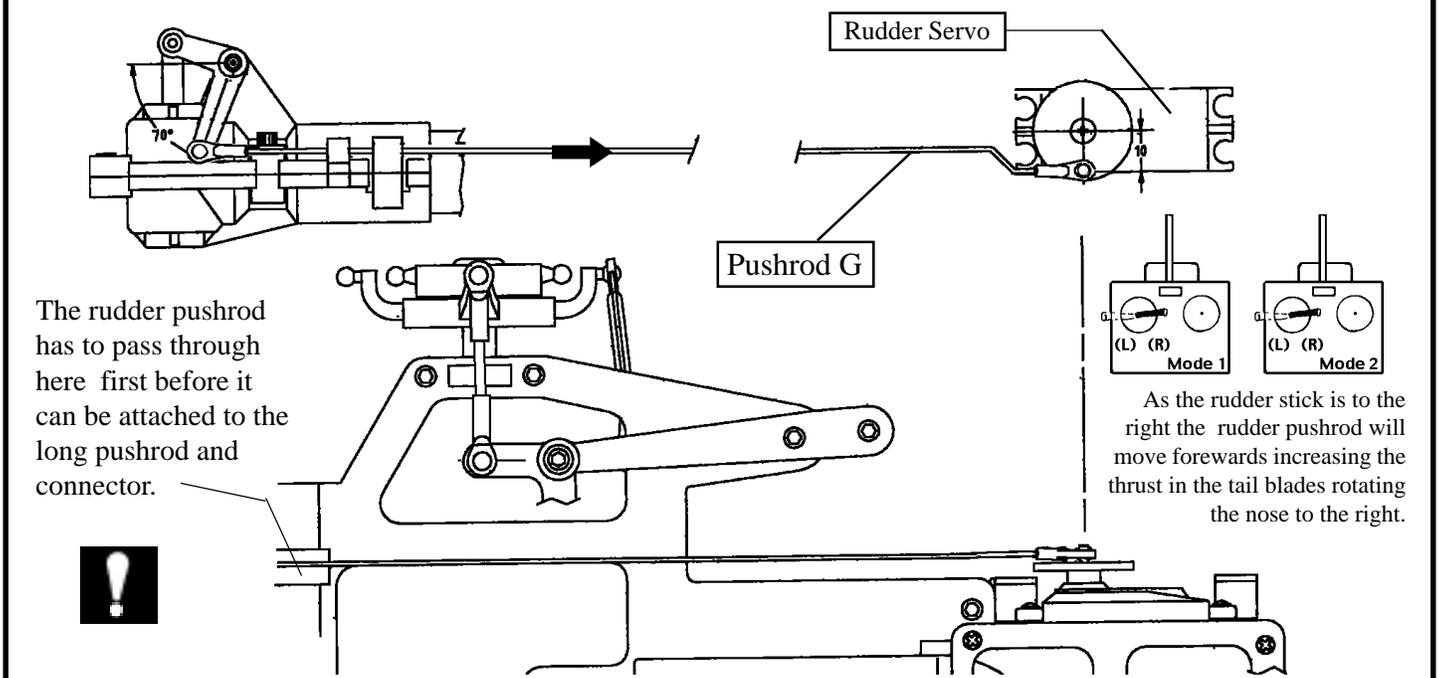
STEP 44 Elevator & Rudder Linkage (Helicopter & Airplane radio)



Step 44

The Rudder linkage for the tail rotor is set up the same for both Helicopter and Airplane radios, the pushrod changes the pitch of the tail rotor blades to increase or decrease the torque compensation to rotate the nose of the helicopter about the main shaft.

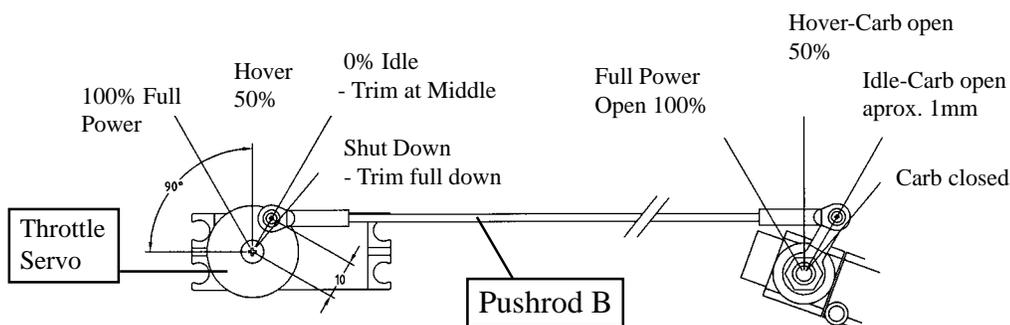
Use a servo horn in the shape of a cross and trim the 3 of the 4 arms off. Install one steel ball and one 2mm nut at a distance of 10mm from the center of the servo remember to use threadlock. The Rudder Pushrod (G) will at this point be installed up to the upper frames, holding the pushrod hex connector thread the short rudder pushrod and attach the ball link to the servo end. Having the radio on and the rudder trim centered press on the servo horn onto the servo set at 90 degrees to the servo and align the rudder bellcrank to 70 degrees as shown in the diagram.



STEP 42-43 Throttle Linkage & Main Blades

Step 42

From Bag 4, attach one steel ball one 2mm nut, to both the Throttle servo horn and the Throttle Extension from Step 17 using threadlock. Position the ball at 10mm from the center of the servo and in the outermost hole on the metal throttle arm. With the radio on, and the throttle stick centered and the trim in the center, press the servo horn onto the servo so the ball is at 90 degrees to the servo (the hovering position). Move the throttle stick to the low/idle position and press the Throttle Pushrod (B) onto the steel balls. Check that in the low position the carburetor has about a 1mm wide opening for idling and finally as the trim is moved fully down the carburetor closes completely to shut the engine off. Also check that in the high position the carburetor is fully open. The throttle extension nut may have to be loosened and the lever repositioned to operate as recommended.

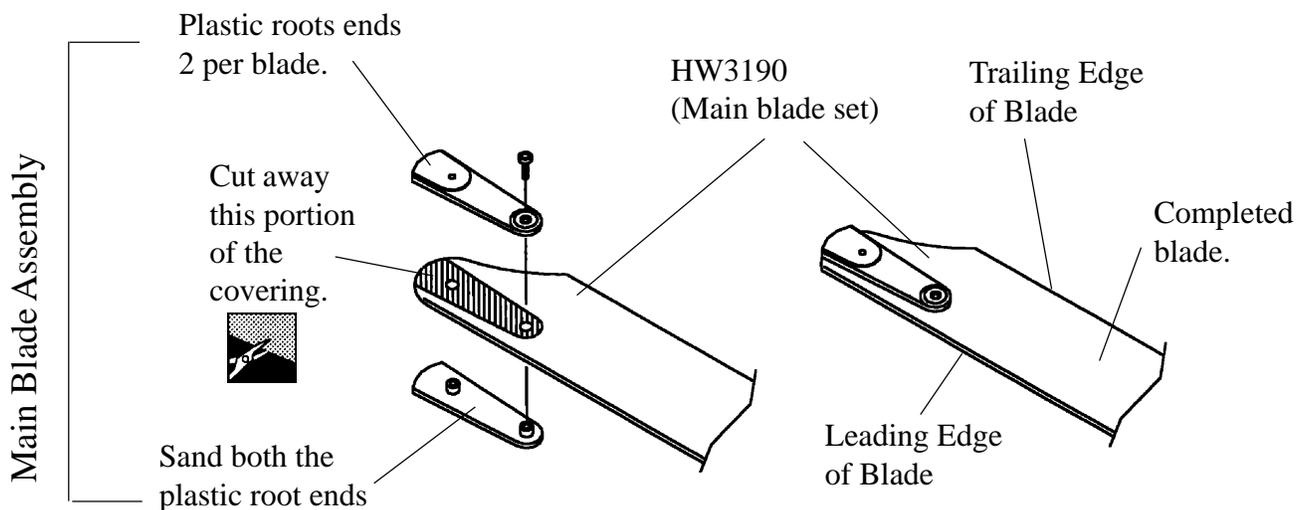


Airplane Radio Setup

The only change is to install the steel ball on the servo horn at a distance of 11-15mm from the center of the servo.

Step 43

The Main Rotor Blades in the Hawk kit are pre-built and balanced, the only work required is to glue the blade grip root ends to the blades (**Please note that this step is to avoid the blades separating from the helicopter during flight!!**). Temporarily install the root ends (see note) onto the blades by cutting the covering over the holes and mark with a pencil, the outline of the plastic parts on the covering, remove the root ends and mark a second line about 3mm inside the first and trim away this internal portion of the covering with a knife. Using some sandpaper roughen the plastic root ends and glue them in place with Slo CA glue. Install the blades onto the rotor head to dry to make sure the thickness is perfect when finished.



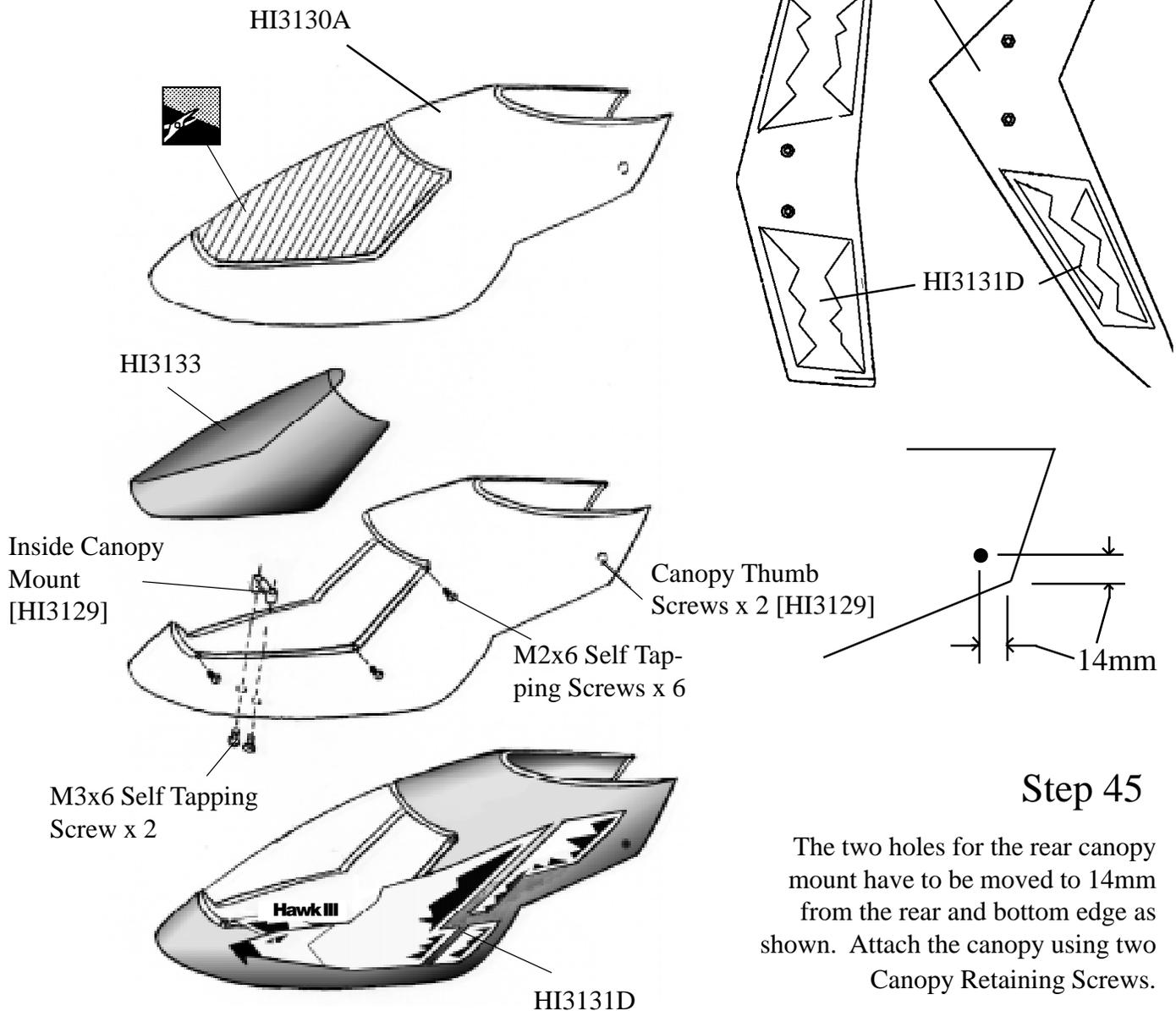
Note: The plastic blade grips have a top and a bottom which are different when viewed from the large end. Test fit the parts to be sure that the total thickness of the blades are 14mm.

STEP 44-45 Canopy & Decals

The Canopy has a line molded into the plastic to follow when trimming the windshield part out, be careful, trim the innermost line leaving the 6mm band for attaching the windshield. Using a sharp hobby knife carefully scribe a line several times into the plastic until you cut through the material. Similarly trim the clear windshield along the provided line, to make it easier to see the line, use a non-permanent marker and trace the line, any extra ink can be removed with rubbing alcohol. Test fit the canopy together by taping it to the canopy, some additional trimming maybe necessary to get a good fit. From Bag 5, the inside canopy mount can be installed (**note the direction of the mount**) with two 3x6mm Self Tapping Screws,(**note: the location for the mount has to be moved 8mm forward of the marked location on the bottom of the canopy**). The clear windshield can be attached using six 2x6mm Self Tapping Screws in Bag 4, drill six 1mm holes at the locations shown.

To improve the adhesion of the decals to the body, peel the decal off the backing and apply one coat of spray adhesive (spray glue) to the sticky side, commonly found in your hobbyshop. For those who would prefer to paint the canopy, we offer a complete line of colors that will bond to the plastic.

Step 44



Step 45

The two holes for the rear canopy mount have to be moved to 14mm from the rear and bottom edge as shown. Attach the canopy using two Canopy Retaining Screws.

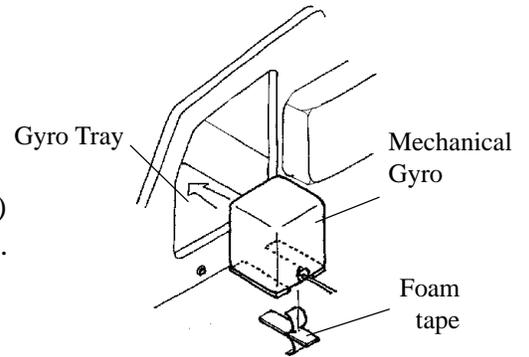
Radio Components & Balancing

Gyro Having completed all the assembly for the helicopter, all that remains is mounting the radio receiver, receiver battery and the gyro.

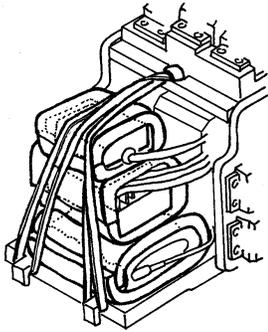
For mechanical gyros: mount below the main shaft on the gyro tray

For piezo gyros: mount inside the canopy

Install the gyro using double sided foam tape (supplied with gyro) put a full strip along the bottom of the gyro unit and press onto the surface. For a good bond make sure both surfaces are clean and dry. For further installation of the PG-01T gyro, see the next page.



Note: the gyro tray in the behind the engine is for mounting the mechanical style gyro, not for the piezo type.

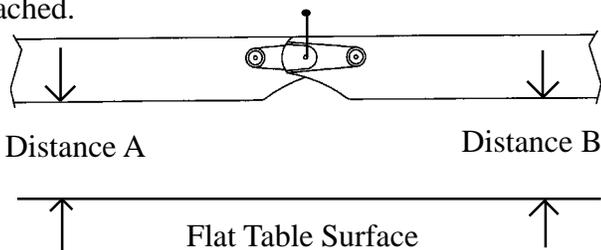


Receiver, Battery Pack and Gyro Controller

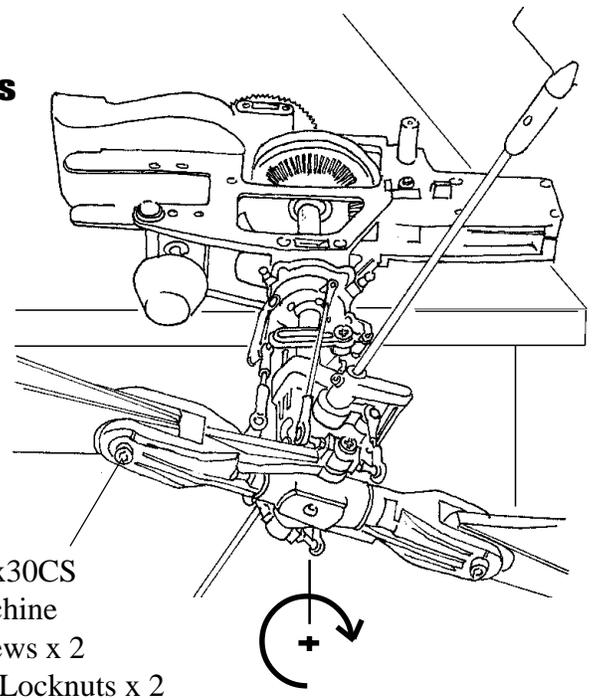
Using the foam rubber, wrap the battery pack, receiver and gyro controller(mechanical type) separately, allowing wires to be collected and tied together. Using two elastics looped through the front of the top servo tray, secure the components to the two hooks on the lower servo tray. Depending on your equipment, the gyro controller and switch can be mounted on the provided bracket.

Balancing the Rotor Head & Attaching Main Blades

Balance is the most important part in maintaining a safe and reliable helicopter. First check the blades for balance, this can be done on a balancer but can be done directly on the helicopter by tipping the helicopter on its side at the edge of a table and attaching the blades with two 4x30mm Socket Head Cap Screws and 4mm locknuts. Temporarily remove the bolt to secure the autorotation bearing so the head spins free (remember to replace this bolt!!). If one blade stops at the same spot add some tape to the lighter blade to balance the rotorhead. The same procedure can be used to balance the flybar without the main blades attached.



Bolt the blades together and support by the ends of the bolt off a flat surface. If one blade tips to one side add small pieces of tracking tape until both blades hang an equal distance from the table (Distance A = B). Attach the Main Blades to the helicopter using two 4x30mm Socket Head Cap Screws and M4 Locknuts.



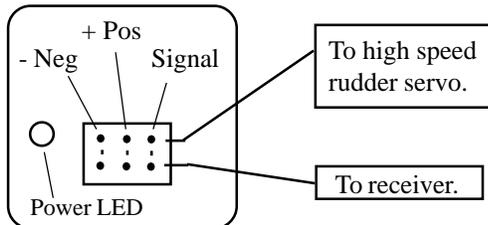
When attaching the main blades, the direction of rotation is clockwise, when looking on top of the helicopter.

**Blade Bolt tension on main blades should be set by starting from loose blades, tighten the bolts a little at a time until the blades will hold straight as the helicopter is tipped on its side. Slightly tighter is good. Too tight and a vibration will occur, too loose and a boom strike can happen. Tail blades can be set the same way.

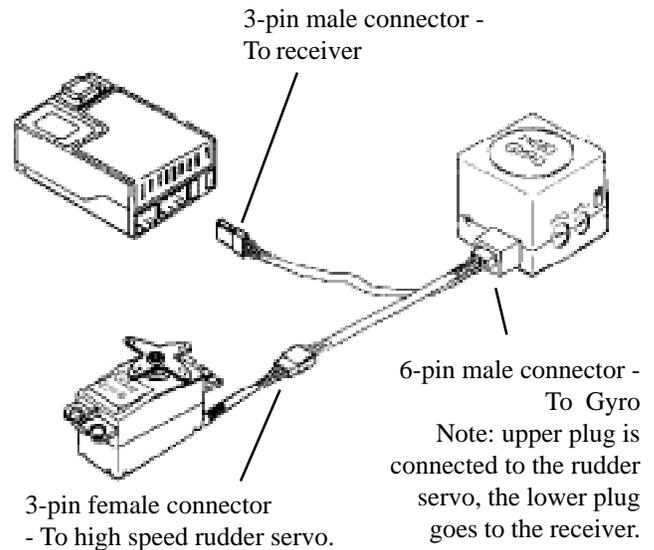
Setup and Installation of PG-01T Gyro (purchased separately)

Installation

1. First of all, please connect the rudder servo to your receiver. Turn on the transmitter and receiver. It is particularly important that the rudder trim (mechanical and electronic) are set to the neutral position and the servo horn is installed in the neutral position on the helicopter. Recheck the neutral position again as this a vital point in the correct calibration of the PG-01T unit. Otherwise, it can cause setting changes later.
2. Turn your transmitter and receiver's power off. Disconnect the rudder servo from the Receiver and connect the wiring harness. The harness has a 6-pin male plug at one end and a 3-pin female plug and a 3-pin male plug on the other end.



Warning, if any radio system is used other than JR or Futaba make sure same polarity is maintained otherwise you will damage the PG-01T.



3. Mount PG-01T using one layer of 1/4" soft double-sided adhesive tape to absorb the vibration which is caused by the engine and mechanical set-up (two are supplied). Most helicopter kits have a recommended location for the gyro, this location is for *mechanical* gyros. This does not apply to the PG-01T piezo gyro. Mount the PG-01T inside the canopy to keep the gyro clean and is subjected to less engine vibration. The gyro should be mounted so the case of the gyro **does not contact the helicopter frame or other radio components or wiring.**

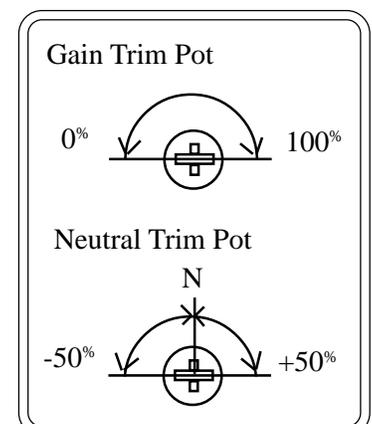
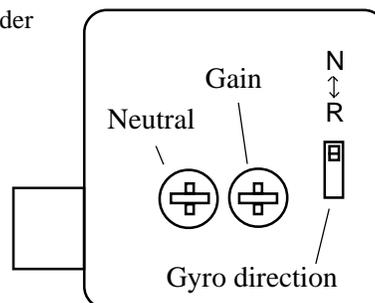
Setup & Adjustment

4. Turn on your transmitter and receiver, the red Power LED remain on while the PG-01T is working
5. Check that the gyro is installed correctly by watching the rudder servo. While holding the rotor head move the rudder stick to the right and observe the direction the servo arm moves. Now quickly rotate the nose to the left, the servo horn should move in the same direction. If the rudder servo horn moves in the opposite direction reverse the gyro direction. Using a small flat screw driver change the switch direction on the gyro.
6. The PG-01T neutral adjustment is factory set however check that after the radio is turned on with the gyro connected, the rudder servo is still at the exact same neutral setting as observed in Step 1. If the this neutral setting has changed, using a plastic screw driver adjust the NEUTRAL trim pot to return the rudder servo horn to the neutral position.
7. Turn the **GAIN** trim pot Clock-wise to the right at 100%. This will change the neutral position, tune the **NEUTRAL** trim pot slightly to return the servo to the neutral position. Return the GAIN trim pot to 50%. After the above adjustment, we would like to suggest you to put on a sticker to cover the **NEUTRAL** trim pot as no further adjustment is required.
8. The tail rotor pitch settings should be setup so the tail should have no tendency to rotate when hovering. Do not make radio trim adjustments but shorten or lengthen the tail rotor pushrod. The initial **GAIN** setting should be 30-50%, bring the helicopter to a hover, keep increasing the **GAIN** until the tail starts to oscillate (hunt). At this point reduce the **GAIN** slightly (5-10%).

- A. If hunting occurs at less than 65% in hover - then move the rudder pushrod connection one hole inwards on the servo.
- B. If no hunting occurs at 100% in hover - move the rudder pushrod connection one hole outward on the servo.

9. Adjustment of Gain.

BEGINNER	EXPERT FLIER
PG-01T	30% - 80%
30% - 60%	



Final Adjustments - Radio Setup

Now that the servo installation into the helicopter is finished the following pages should be reviewed. As various types of radios can be used to setup the helicopter, some of the following information may not apply.

Servo Direction (Servo Reversing)

Check that all servos move in the correct directions, see the diagram on pg 36.

Dual Rates

For beginners (using the flybar weights) the dual rate values should be set at 100% for both switch positions until hovering has been mastered.

Normal position: (high rate) 100%
Switch position 1: (low rate) 75%

Exponential

The exponential function allows adjustment of how sensitive the cyclic controls are when the machine is hovering. This should be left at 0% (linear) until all trimming is complete.

Sub Trims

The sub trims on the outside of your transmitter are used to fine tune the servo center positions while testing or in-flight. If the trim has to be moved more than 2-3 divisions then readjust the linkage length to set the trim back in the center.

Travel Adjustment (endpoints)

Using endpoints to adjust to the limits of how far the servo is allowed to move is very convenient for fast set-up. If binding occurs simply reduce the travel in that direction. ** Note: by changing one side only (high or low stick) the servo travel is no longer linear which will tend to make that control surface unstable. It is better to set the high/low adjustments the same, or make actual pushrod adjustments.

Pitch & Throttle Curve Adjustments

The ultimate goal for adjusting the curves on your helicopter is to reduce how much the tail rotor moves during flight and aerobatics. This leads to maintaining a consistent main rotor RPM which can only be achieved through adjusting the individual values which control the pitch and throttle at a given stick position.

Pitch Curve Adjustment

The following chart shows the values for the collective pitch measured in degrees which are made on the helicopter using a pitch gauge. The Travel Adjustment function (if available makes these settings easy). For the beginner it is recommended to set the low stick position to 0 degrees to avoid damaging the helicopter while reducing the power during the first few flights. These settings will need slight adjustment to keep the helicopter at a consistent height at mid stick.

Pitch Curve Values

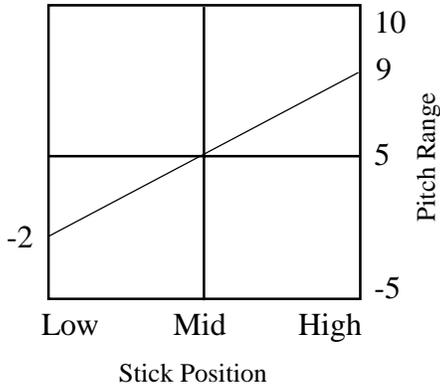
Flight Mode	Setup Method	Low Pitch (low stick)	Hovering (mid stick)	High Pitch (high stick)
N	Beginner	0	5	9
N	Hovering	-2	5	9
1	Stunt & Aerobatics	-5	5	8
2	3D**	-7	0	10
H	Autorotation	-5	5	12

(N - Normal flight mode, 1 - Stunt mode one, 2 - Stunt mode two, H - Throttle hold-autorotation)

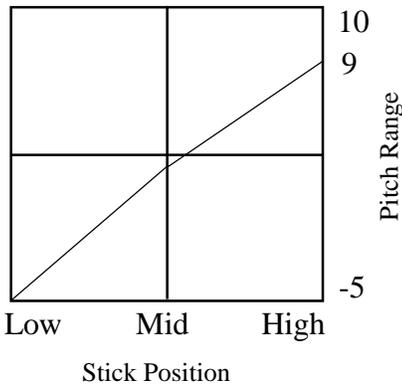
Note** In order to avoid binding at high pitch angles the flybar control arms need to be reset at an angle of 10-15 degrees down from parallel.

Pitch Curve

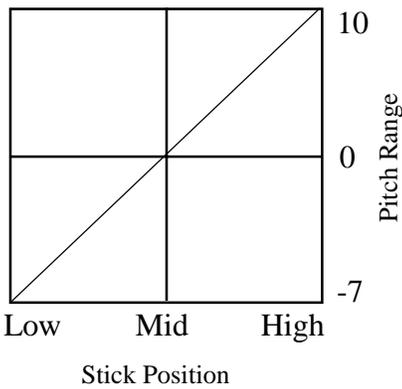
Hovering - (linear) Normal Flight Mode



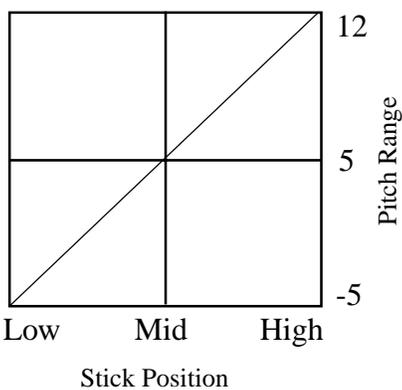
Aerobatic Flying - Flight Mode 1



3D Flying - Flight Mode 2



Autorotation - Throttle Hold

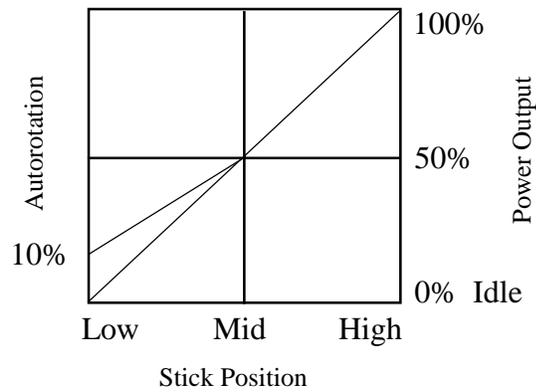


Throttle Curve Adjustments

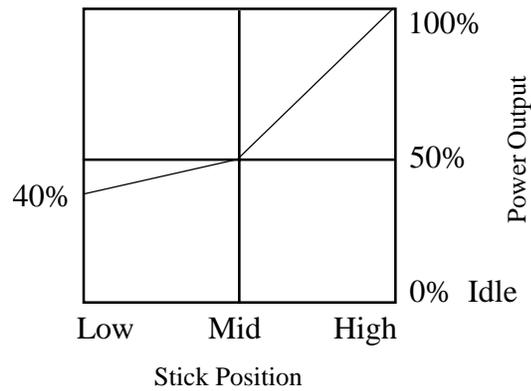
After several tanks of fuel the engine will be run-in, at this time you can modify throttle settings but remember that the smoother the engine the less adjustment required. Not all engine / muffler / fuel combinations are the same which will shift some of the values shown below.

Throttle Curve

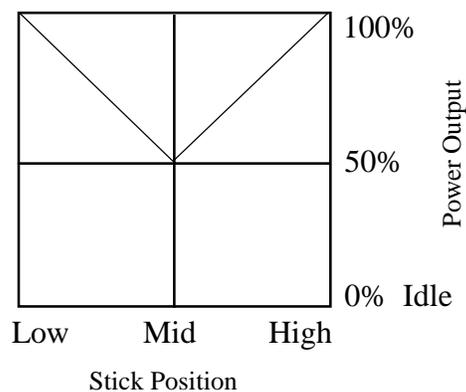
Hovering - (linear) Normal Flight Mode



Aerobatic Flying - Flight Mode 1



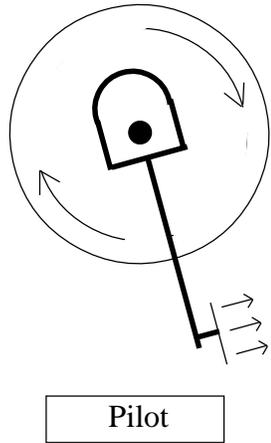
3D Flying - Flight Mode 2



Tail Rotor Setup

What separates airplane radio equipment from the helicopter version is in the control of the individual curves discussed earlier and in the Revo-mixing.

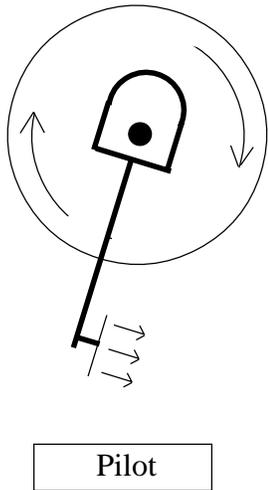
Take a moment to consider the helicopter hovering in front of you.



1 Nose rotates left at hover.

Problem: Not enough pitch in tail rotor to match torque setting of engine.

Action: Increase pitch by shortening the rudder pushrod.



2 Nose rotates right at hover.

Problem: Too much pitch in tail rotor to match torque setting of engine.

Action: Decrease pitch by lengthening the rudder pushrod.

Once the tail rudder pushrod is adjusted correctly so the tail does not rotate (don't consider wind now) the revolution mixing can be adjusted.

Revolution Mixing

The revolution mixing function allows the helicopter to climb or descend without the tail rotating. There is a high & low setting on the helicopter radio.

The values shown will vary depending on engine, blade pitch and fuel but provide a starting point for the beginner.

For each flight mode setting, there will be different Revo-mixing amounts. For forward flight the settings will be lower than hovering due to the aerodynamic forces effecting the helicopter. Here is a starting point for revo values:

High Stick Setting:	40	Normal Flight
Low Stick Setting:	20	Mode

These values correspond to the total travel for the tail rotor pitch. To adjust the high setting, hold the helicopter at hover and increase the throttle so the helicopter climbs steadily. Notice the direction the nose rotates:

	Nose rotates	
High	left	increase revo value to increase tail pitch.
&		
Low	right	decrease revo value to decrease tail pitch.

To adjust the low setting, start from a high hover and decrease the throttle to descend, notice which direction the helicopter rotates.

Gyro Gain Adjustment

The gyro assists in holding the tail rotor, actually compensating for changes in wind direction or quick movements.

First check that the gyro is installed correctly by watching the rudder servo. While holding the rotor head move the rudder stick to the right and observe the direction the servo arm moves. Now quickly rotate the nose to the left, the servo horn should move in the same direction. If the rudder servo horn moves in the opposite direction reverse the gyro direction.

Generally the starting setting for the gyro gain is 60%, keep increasing the gain setting until the tail starts oscillating back and forth, then reduce the setting slightly.

Problem: Tail rotor makes sudden uncontrolled rotations.

Solution: The gyro direction is possibly set in the wrong direction.

Before Flying your Hawk 30 Helicopter

Before each flight, check that all bolts and screws are tight. Simply flying your helicopter, will loosen any screws which are not threadlocked or secured with a lock nut.

First Flights For the beginner pilot, a training pod is strongly recommended to assist in learning to hover the helicopter with substantially reduced risk of crashing. These systems provide an on ground training capability to allow pilots to become familiar with the helicopter before actually leaving the ground.

Starting Your Engine

Fuel 15-30% Helicopter fuel is recommended containing more oil. Use a fuel filter between the fuel gallon and the heli to remove any dirt that could stall the engine. Fuel the helicopter by removing the fuel line from the carburator and replace when finished.

Needle Valve Following the engine manufacturer's instructions, turn the main needle valve until closed and open to the setting the instructions call for. Different engines will have different settings.

Radio Always turn the transmitter on first, then the helicopter & gyro and reverse when finished, turn off the heli & gyro first then the transmitter. If the radio acts erratically or intermittent, find the problem before starting the engine.

Glow Plugs Using a glow plug connector, remove the canopy or optionally use a remote glow plug connector to heat the glow plug. Warning!! glow plugs operate at 1.5V not 12V.

Engine Before starting the engine, check the correct direction of rotation and make sure the electric starter is turning the same direction.

Starting Start the engine from low throttle with the trim centered. Holding the rotor head in one hand, angle the starter and press down slightly to engage the starting shaft into the fan. Start the electric starter until the engine starts. If the engine does not start recheck all previous points. The main blades will not turn until the engine RPM is above idle.

Stopping To stop the engine, with the throttle stick in the low position, move the trim all the way to the low position.

If the Engine Does Not Start

Q. The engine does not turn easily with the starter.
A. The starter battery may be too weak or the engine is flooded. For flooding, remove the glow plug and turn the engine over several times to clear the combustion chamber of fuel and retry.

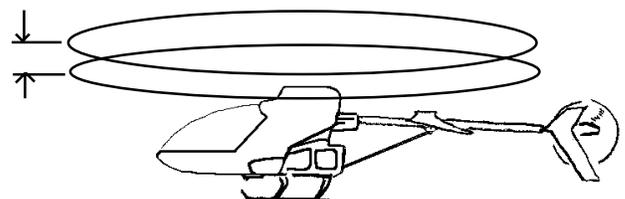
Q. The engine rotates and tries to start but doesn't.
A. The glow plug may be getting old. The glow plug batteries are weak. The starter may be turning the wrong direction.

Q. The engine just does not start.
A. The glow plug may be burned out. Fuel may not be getting to the engine, check for a clogged fuel line, dirt in the carburator or the main needle needs to be opened out slightly.

Q. The engine starts but immediately stops.
A. There is a clog in the fuel line, the carburator is not open enough at idle- open the throttle trim by 1-2 clicks. Helicopter engines have a low speed needle which is factory set, beginners should not adjust it!!

Adjusting the Blade Tracking

Pitch In steps 34-35 you setup the pitch range using a pitch gauge and setting the pushrods on the servo horns at specific distances. Once the helicopter is flying the pitch setting have to be fine tuned. Using appropriate training gear, increase the throttle until just before the helicopter lifts off and sight the rotor disk from 15' back. If there appears to be 2 rotor disks then adjust Pushrod C until only one disk appears. Using colored tape mark one blade so you can adjust the correct blade.

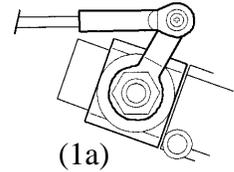


Starting the engine for the first time.

The model engine is the single most difficult part of model helicopters to the beginner, second only to learning to fly. For this reason we have taken the time to go through starting the engine the first time with you to help you to understand the basic operation and tuning of the engine.

Items to recheck:

1) Servo direction for the throttle channel. Turn on the transmitter switch, then the switch on the helicopter, move the throttle/collective stick to the low position, the carburetor arm should look exactly like the diagram (1a). Watch the throttle servo. As you raise (increase) the left stick the throttle pushrod will move towards the front of the helicopter, all carburetors work the same, as the throttle arm is rotated by the throttle pushrod, the barrel of the carburetor rotates counter-clockwise as it opens. If this does not happen you need to reverse the servo direction and reset the throttle arm in Step 17. Starting the engine at full power will possibly damage the engine and will damaged clutch components on the helicopter.



2) Fueling the engine. Open the gallon of fuel and insert draw line from the fuel pump into the fuel, remove the fuel line at the carburetor inlet and connect to the fueling line of the fuel pump. Fill the tank until you start to see bubbles moving in the pressure line to the muffler. Reverse the pump for 1 second and disconnect the lines starting with the fueling line and reconnect to the carburetor. Recap the fuel to keep moisture out. Only fuel the model when you are setup and actually ready to start the engine, it is common for the carburetor to fill with fuel while sitting on the bench over a brief period of time. More common is the engine flooding while trying to start. This the case as you are starting with an electric starter the engine initially turns easily but soon slows down.

3) Last pre-flight checks. Make sure that both the radio Tx and Rx have been charged overnight and the glow starter (if rechargeable). Do a range check, walk away from your helicopter with the antenna fully collapsed to 30 paces and have someone verify that all control surfaces are operating. If you do not make this distance have an experienced modeler check over your setup, do not fly until then.

4) Cranking the engine over. When a brand new engine does not start there are only three major possibilities: a) the glow plug is not hot enough or already burned out or b) fuel is not getting to the carburetor or c) too much fuel is entering the carburetor. This is assuming you have gone through step 1 in this page. Connect the starter to a 12Volt source and verify that the starter will turn the starting cone counter-clockwise. Connect the glow starter connector to a 1.5Volt source or use a rechargeable glow starter. Do not connect yet.

- Move the throttle stick to the low position with the trim in the center.
- Look at the fuel line entering the carburetor, is there fuel in the line, if not pull the fuel line off and check.
- If there is no fuel in the line, reconnect and push down on the start cone and turn the engine by hand until you see fuel entering the carb. make one more revolution. Putting a finger over the exhaust hole will help.
- Connect the glow starter to the glow plug, place one hand firmly on the rotor head, **absolutely** at all times keep your hand on the rotor head, should the engine start anywhere above idle you will only have a few seconds to put the starter down and pull the fuel line off the carburetor line going to the engine. It is a good idea to make sure you are standing/kneeling on the fuel line side.
- Place the starter on the starting cone and push down, before you start, rotate the cone with the engine engaged backwards (clock wise) until you feel the compression increase.
- Press the button on the electric starter, there will be an initial popping sound as the engine turns over and within a few seconds the engine should start. If it does, while holding the rotor head put down the electric starter and move the throttle trim down until the engine continues to run at the lowest speed without quitting. If the engine starts to die simply move the trim up one or two clicks. Do not move the throttle stick from the low position.

5) The engine does not start. Do not continue to crank the engine over if it does not start.

- a) Remove and check the glow plug, is the glow plug dry or wet? Connect to the glow starter or the glow connector and verify that the element glows a bright orange to a white color, if you get an orange glow then your glow starter is not supplying enough power to the glow plug.
- b) If the glow plug is wet, then the engine is receiving fuel. If the glow plug is dry, no fuel is reaching the engine. Try re-priming the engine, point #3 step 4. Again verify that the engine is receiving fuel.
- c) Is the engine very difficult to turn over, to the point that the electric starter is unable to turn the cone? If yes, you have successfully filled the engine and carburetor with fuel, do not force the starter as you can damage the starter and prematurely wear out the starting cone and ultimately the starting shaft will fail. First, disconnect the glow starter and pickup the helicopter and tip forwards and backwards with the muffler side down. This will drain the muffler of raw fuel. Next turn the cone until the half past the highest compression point, here the exhaust port will open and again drain through the muffler. Try to start again. Same problem, remove the glow plug and spin the engine (without) plug and any excess fuel will be expelled, replace glow plug and try again.

If the engine still doesn't start, contact an experience modeler to help you with starting the engine, the problem maybe very simple.

Basic Hovering

Hovering When all is set, ready and checked, attach your training gear/pod and start the engine.

- (1) Place the helicopter pointing into the wind and stand behind the model about 15' away.
- (2) Always watch the nose of the helicopter, move the rudder left and the nose will move left.
- (3) Start by increasing the throttle slowly until the helicopter rises 2-6 inches off the ground then set it back down.
- (4) Repeat this process until you become comfortable with the holding the model in the same spot for a few seconds then land it.

After some time at this you can increase the height slightly up to 1 foot (be very carefull not to get too high) as you are practising taking off and landing. This is the most basic but required skill for the beginner to learn.

Beyond Hovering

It cannot be stressed enough that mastering the hovering skill is crucial to becoming a good helicopter pilot. As you progress in your learning, always practise hovering until you are completely comfortable in holding the helicopter in any direction at any altitude. Perfecting hovering enables you to learn all the types and styles of helicopter flying, forward flight, loops and rolls, 3D (aerobatic flying) and anything you want to do with your Hawk helicopter as it can be set up for beginner through to expert. Lastly, have fun!!

Pre-Flight Checklist

1. After turning radio on, move each servo separately, looking for unusual or excessive movement.
2. Lubricate the main shaft above the swashplate and the pitch slider on the tail output shaft with oil.
3. Inspect the main and tail rotor grips for play or binding.
4. Turn the main gear in both directions to feel if a problem is developing in the drive train.
5. Check the glow plug and fuel lines for signs of wear.

PRE-FLIGHT CHECK UP & TRIM ADJUSTMENTS

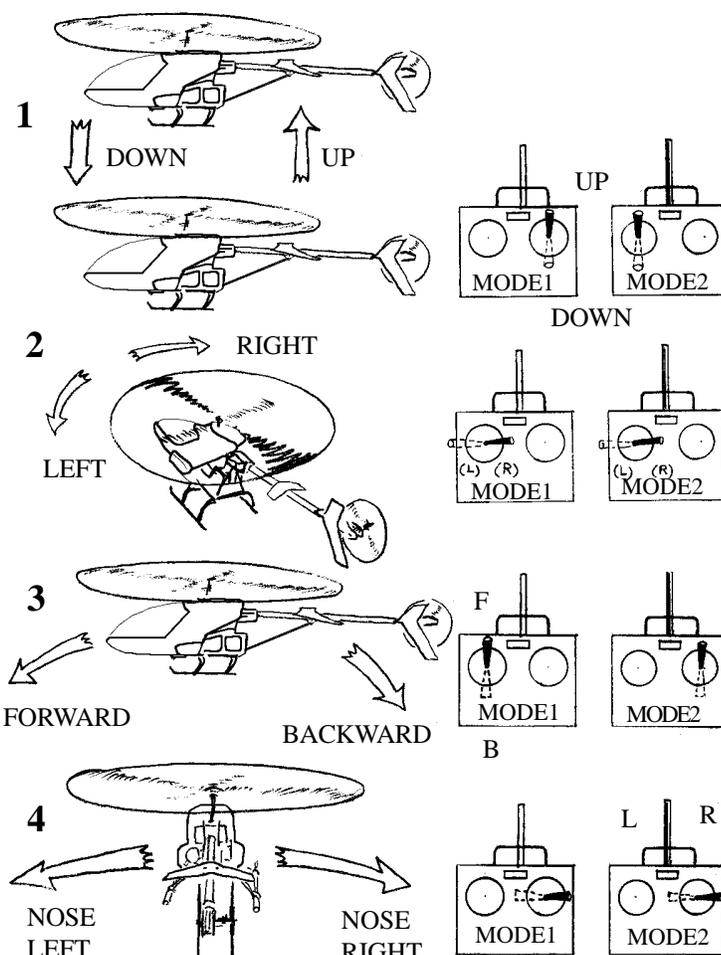
All trim adjustments are to allow you to lift the helicopter straight up and can be made one click or detent at a time on the radio.

(1) **Collective & Throttle:** Slowly raise the throttle stick, the helicopter should lift off at half stick. If it tends not to lift off increase the hover pitch on the radio or increase the throttle trim. If the helicopter lifts off before mid stick decrease these settings.

(2) **Rudder:** When the helicopter is ready to take off, make a correction trim first then use the rudder stick to control the Left & Right. Note, now is a good time to make a final adjustment on the gyro, see gyro manual.

(3) **Elevator:** If at hover the helicopter tends to move forward, move the trim down, if it moves backward move the trim upwards Use the elevator stick to control the Forward & Backward.

(4) **Roll (Aileron):** If at hover the helicopter tends to move left, move the trim right, if the helicopter moves to the right move the trim left. Move the Aileron stick to control the slide of the helicopter to the Right & Left.



Hawk III Bag Parts List

Bag 1	Washout Arm Assembly	2	
Rotorhead Block	1	Slide Tube	2
Offset Plate	2	Short Ball	2
Tie Bar	2	M3x16 Socket Cap Screw	2
Center Hub	1	M3x7 Flat Washer	2
Bearing Holder	2	Swashplate	1
Spacer M3x6x1.5	2	Short Silver Ball	2
Ball Bearing M3x7x3	2	Medium Silver Ball	3
Oilite Bearing M3x10x4	2	Medium Black Ball	2
M3x6 Self Tapping Screw	2	Feathering Shaft	1
M3x6 Phillips Mach Screw	2	Damper	2
Special Ball M3x6	2	Bearing M5x13x4	4
Main Blade Grip	2	M4 Locknut	2
Bell Mixer	2	M2.5x25 Pin	2
Slide Tube	2	M5x10 Flat Washer	2
Short Ball	2	M4x10 Flat Washer	2
Long Ball	2	M4x12 Flat Washer	2
M3x16 Socket Cap Screw	2	Flybar Control Arms	2
M3x7 Flat Washer	2	Short Steel Ball	2
Flybar Paddles	2	Rod M2x15	4
Flybar Weights	2	Long Ball Link	4
M3x4 Set Screw	2	Short Ball Link	4
Washout Hub	1	M3x5 Set Screw	2

Bag 3	Left Fan Shroud	1	
Gyro Tray	1	Right Fan Shroud	1
M3x15 Self Tapping Screw	4	M2.5x10 Self Tapping Screw	5
Clutch Shoe	1	M3x12 Self Tapping Screw	2
Clutch Bell w/Gear	1	M3x7 Flat Washer	2
Ball Bearing M12x18x3	2	M3x20 Socket Cap Screw	2
Cooling Fan	1	M3 Locknut	2
Engine Mount	1	Fuel Tank	1
M3x16 Socket Cap Screw	8	Fuel Line 56mm	1
M3x11 Flat Washer	4	Long Vent Tube	1
M5x13 Flat Washer	1	Short Pickup Tube	1
M9x14 Flat Washer	1	Rubber Stopper	1
Lower Sideframe	2	Large Cap	1
		Small Cap	1
		Clunk	1
		M2.5x18 Self Tapping Screw	1
		Cable Tie Wrap	1

Bag 7	M3x16 Socket Cap Screw	2	
Tail Rotor Blade	2	M3x16 Socket Cap Screw	2
Tail Gearbox (R)	1	M3x10 Socket Cap Screw	1
Tail Gearbox (L)	1	M3 Locknut	5
Horizontal Fin	1	Large Bevel Gear	1
Vertical Fin	1	Small Bevel Gear	1
Tail Rotor Grip Half w/Ball	2	Tail Rotor Input Shaft	1
Tail Rotor Grip Half	2	M2x12 Pin	2
Tail Rotor Hub	1	M4x4 Set Screw	2
M3x4 Set Screw	1	M3x5 Set Screw	2
M3x10 Socket Cap Screw	2	Bearing M5x13x4	2
M2x8 Phillips Mach Screw	4	Bearing M5x11x4	2
M2 Hex Nut	4	Tail Output Shaft	1
Bearing M3x10x3	2	Spacer Tube	1
Pitch Slider Assembly	1	Frame Strut Fitting	1
M2x8 Pin	2	Fin Strut Fitting	1
Tail Pitch Ball Link	2	Horizontal Fin Mount	1
Tail Pitch Bellcrank	1	Drive Shaft Guide - Center	1
M2.5x16 Phillips Mach Screw	1	Drive Shaft Guide - End	2
M5x2 Steel Ball	1	Pushrod Guide	3
Short Steel Ball	1	M3x30 Socket Cap Screw	2
Tube M3x8	1	M3 Locknut	2
		M3x15 Self Tapping Screw	2
		M3x12 Self Tapping Screw	3
		M3x7 Flat Washer	1

Bag 2	Mast Stopper	1	
Left Upper Sideframe	1	Bearing M8x19x6	2
Right Upper Sideframe	1	M3x16 Socket Cap Screw	5
Main Gear Assembly	1	M3x20 Socket Cap Screw	1
Main Shaft	1	M3 Locknut	6
Tail Rotor Output Gear	1	M4x4 Set Screw	2
Tail Trans. Output Shaft	1	Long Hex Spacer	2
Bearing M5x13x4	4	Short Hex Spacer	2
E-ring	1	Canopy Thumb Screws	2
M3x4 Set Screw	2	M3x40 Threaded Stud	1
Counter Gear	1	M3x35 Socket Cap Screw	4
Alloy Drive Gear	1	M3x7 Flat Washer	4
Oilite Bearing M5x7x2	2	Start Cone	1
Primary Drive Shaft	1	Start Shaft	1
M2x12 Pin	2	Collar M5x10x5	1
Ball Links	4	M3x4 Set Screw	1
M2.3x25 Pushrod	2	Start Shaft Block Assembly	2
Short Steel Ball	5	Spring	1
Roll Cyclic Bellcrank	2	M2x16 Pin	1
Slide Tube	2	M5x10 Flat Washer	1
Collective Shaft 6mm ø	1	M3x12 Self Tapping Screw	8
Collective Hex Spacer	1	M3x6 Washer Head Screw	1
Collective Lever	1	Fore Aft Cyclic Lever Ass.	1
Collective Arm	2	Short Spacer	2
Ball Bearing M6x10x3	2	M3x7 Flat Washer	2
Short Ball	1	Long Threaded Axle	1
M3x10 Socket Cap Screw	4	M3x30 Socket Cap Screw	2

Bag 4	Fuel Line	1	
Rod - Aileron M2.3x128	2	Rod - Elevator M2.3x105	2
Rod - Coll/Swash M2.3x80	3	Rod - Throttle M2.3x75	1
M4x30 Socket Cap Screw	2	M4 Locknut	2
M2.3x10 Servo Screw	20	M3x25 Socket Cap Screw	5
M3 Locknut	5	M2x6 Self Tapping Screw	6
Hex Key M1.5	1	Hex Key M2.0	1
Hex Key M2.5	1	Long Ball Link	14
Throttle Extension	1	Steel Ball w/2mm Thread	7
M2 Hex Nut	14		

Bag 5	Servo Tray Top	1	
Servo Tray Left	1	Servo Tray Right	1
Battery Tray	1	Inside Canopy Mount	1
Canopy Mount Hook	1	Canopy Mount Spacer	1
M3x30 Phillips Mach Screw	2	M3x6 Self Tapping Screw	2
M3x15 Self Tapping Screw	8	M3x12 Self Tapping Screw	2
M3x7 Flat Washer	2		

Bag 6	Landing Struts - Plastic	2	
Landing Skids - Metal	2	M3x4 Set Screws	4
M3x16 Phillips Mach Screw	4		

In Tailboom	Tail Boom	1	
Flybar	1	Tail Drive Shaft	1
Tail Drive Housing	1	Antenna Plastic Tube	1
Short Rudder Pushrod	1	Long Rudder Pushrod	1
Tailboom Strut	1		

In Box	Instruction Manual	1	
Registration Card	1	Canopy	1
Windshield	1	Decal Sheet	1
Main Rotor Blades	1		

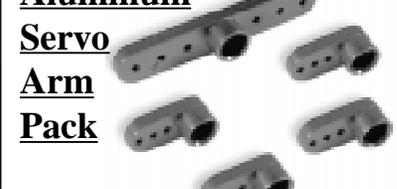
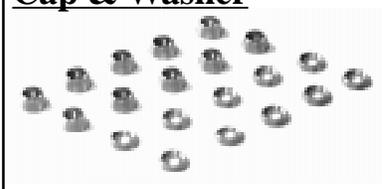
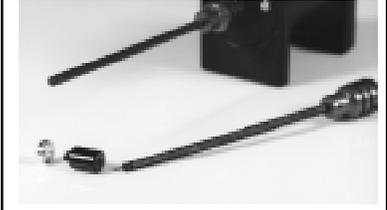
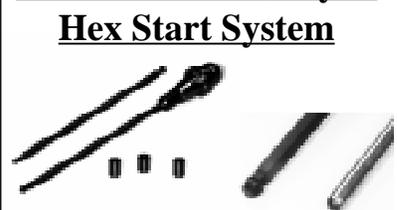
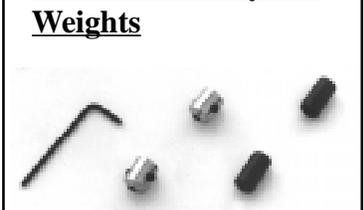
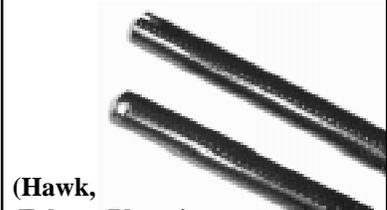
Hawk III Replacement Parts

CN2230H	CRASH KIT -(Main Blades, Main Shaft, Tail Boom, Feathering Shaft and Flybar)	1	HW3123	LANDING SKIDS (ALLOY)	1
HW3000	HARDWARE PACK	1	HW3127	HEX FRAME SPACERS	1
HI3001	STARTER CONE SET	1	HI3129	CANOPYMOUNT & HARDWARE	1
HW3005	STARTER SHAFT SET	1	HI3130A	CANOPY	1
HI3007	STARTER SHAFT BEARING BLOCKS	1	HI3131D	HAWK III DECAL SET	1
HI3009	COOLING FAN	1	HI3132C	HAWK III INSTRUCTION MANUAL	1
HI3010	CLUTCH BELL & LINING	1	HI3133	WINSHIELD (for HI3130A)	1
HW3011	CLUTCH SHOES	1	HI3138A	FUEL TANK	1
HW3017	ENGINE MOUNT	1	HI3145	BALL LINKS (16 L, 6 S)	1
HI3020	COOLING FAN SHROUD	1	HI3146A	SWASHPLATE SET	1
HW3024	COLLECTIVE PITCH LEVER SET	1	HI3152B	WASHOUT SET	1
HI3031A	AILERON BELLCRANKS (L&R CYCLIC)	2	HI3152A	RADIUS LINK WITH PIN	1
HI3032A	ELEVATOR LEVER SET	1	HI3160A	ROTOR HEAD BLOCK	1
HI3035A	ADJUSTABLE CYCLIC PUSHROD LINKS	2	HW3161A	FLYBAR SEESAW SHAFT SET	1
HI3040	COUNTER DRIVE GEAR	1	HI3167A	FLYBAR SEESAW	1
HW3042	PRIMARY DRIVE SHAFT	1	HI3167B	SEESAW OFF SET PLATE	2
HW3045	ALLOY DRIVE SHAFT	1	HI3167C	SEESAW TIE BAR	2
HW3050	AUTOROTATION ONE WAY BB SET	1	HI3167D	SEESAW BEARING CUP	2
HW3053	MAIN SHAFT	1	HI3167E	SPECIAL BALL M3X6	2
HW3054	MAIN SHAFT LOCK RING	1	HW3170	WASHOUT PINS	2
HI3056	MAIN GEAR	1	HW3173	FLYBAR	1
HW3057	TAIL DRIVE BEVEL GEAR	1	HI3176	STABILIZER CONTROL ARM	2
HW3059	TAIL DRIVE PRIMARY SHAFT	1	HI3179	FLYBAR PADDLES	2
HW3062	TAIL BOOM	1	HW3180	FEATHERING SHAFT	1
HW3063	TAIL DRIVE SHAFT SET	1	HI3181	DAMPING RUBBERS	2
HW3064C	TAIL PITCH CONTROL ROD & CONNECTOR	1	HI3184	ROTOR BLADE GRIP	1
HI3067	TAIL FIN SET	1	HI3189	MIXING ARM SET	1
HW3070	TAIL GEARBOX INPUT SHAFT	1	HW3190	MAIN ROTOR BLADES(PAIR)	1
HW3073	TAIL GEARBOX OUTPUT SHAFT	1	HW3192	LINKAGE SET (11 RODS)	1
HI3074	BRASS SPACER TUBE	1	HI3201	T/B SUPPORT FITTINGS	1
HI3075	TAIL GEAR SET	1	HW3202	T/B SUPPORT STRUT	1
HI3078	TAIL GEARBOX L&R	1	HW3203	BRASS BEARING SET	1
HI3087	TAIL PITCH SLIDER SET	1	HW3204	THROTTLE EXTENSION	1
HI3089	TAIL PITCH BALL LINKS	2			
HI3096	TAIL BLADE GRIP SET	1		Ball Bearings	
HW3098	TAIL ROTOR HUB	1	BB1030	BALL BEARING 3X10X4 (OP)	2
HI3099	TAIL ROTOR BLADES (PAIR)	1	BB0730	BALL BEARING 3X7X3 (OP)	2
HI3102A	TAIL PITCH LEVER SET	1	BB1350	BALL BEARING 5X13X4	2
HI3106	TAIL CONTROL ROD CLAMPS	3	BB1060	BALL BEARING 6X10X3 (OP)	2
HI3107	UPPER SIDE FRAMES	2	BB1980	BALL BEARING 8X19X6	2
HI3112	LOWER SIDE FRAMES	2	BB1812	BALL BEARING 12X18X4 (OP)	2
HI3115	SERVO MOUNT FRAME SET	2	BB1150	BALL BEARING 5X11X4	2
HI3122	LANDING STRUTS (PLASTIC)	1	BB1812A	BALL BEARING 12X18X16	2

Hawk & Hawk III Upgrade Parts

CN0427A	Hex start system w/hex adapter - 5mm		CN2206	CNC Machined Flybar Control Arms (2)	
CN0402	Hex start adapter only - 5mm - black		CN2207	CNC Machined Washout Mixing Arms (2)	
CN0520	Carbon torque tube tail drive 2 B.B		CN2208B	Metal Swashplate Anti-rotation Bracket - black	
CN2007	Trainer Pod 30-46 w/4 Legs		CN2208P	Metal Swashplate Anti-rotation Bracket - purple	
CN2008	Trainer Pod 60-Gas w/6 Legs		CN2209	Machined Aluminum Start Cone- purple	
CN2015	Hardened Tip Hex Wrench Set (4 piece ground tips)		CN2210	Canopy Quick Mount(2) - purple	
CN2016	4.8V Battery Monitor/Alarm		CN2211	Tool Steel Feathering Spindle w/ Thrust Bearings	
CN2017	PG-01T Piezo Gyro- Heat Isolated White		CN2212P	Aluminum Tail Rotor Grips(2) - purple	
CN2028E	7" Aluminum Starter Extension (must use with#2209)		CN2212G	Aluminum Tail Rotor Grips(2) - Gold	
CN2046	Basic Heli Setup Tool Kit (pitch gauge, blade balancer & pliers)		CN2212B	Aluminum Tail Rotor Grips(2) - black	
CN2052	Accuratech Blade Balancer - blue		CN2213	2oz Header Tank w/ Machined Mount Bracket - purple	
CN2056	CNC Machined Aluminum Swashplate		CN2214B	Air Filter (OS32-46, TT36-46)	
CN2079R	Fast 3-D Hot dog fly bar paddles (R red, O orange, Y yellow)		CN2215B	Machined Head Button (TM) - black	
CN2122	Carbon fiber flybar stiffeners 30		CN2215P	Machined Head Button (TM) - purple	
CN2137	2 oz Header Tank w/ Universal Bracket - purple		CN2216	Rear Rudder Servo Mount Set	
CN2155	Piston Locking Tool - purple		CN2217P	Machined Color Caps - purple	
CN2153	Machined Throttle Extension - OS32SX,46FX, TT36H - purple		CN2218P	Machined Color Washers - purple	
CN2176	CNC machined servo arm pack (5 pcs. Futaba purple)		CN2126H	Ultra Light Carbon Graphite Tail Boom	
CN2177	CNC machined servo arm pack (5 pcs. JR purple)		CN2127A	Ultra Light Carbon Graphite Tail Fin Set	
CN2179H	CNC machined servo arm pack (5 pcs. Hitec purple)		CN2128	Ultra Light Carbon Graphite Tail Boom Supports	
CN2202	Aluminum Turbo cooling fan - purple		CN2400	Hurricane Carbon fiber Blades - 550mm Fully Sym	
CN2203	Ball Bearing Washout Mixing Arm Set with B.B		CN2501	Vortex Carbon fiber Blades - 550mm Fully Sym 3D Pro	
CN2204	Ball Bearing Bell Mixer Arm Set with B.B		CN3005HK	Torpedo 28-32 Speed Muffler - Polished Aluminum	
CN2205	Ball Bearing Aileron Bellcranks Set with B.B		CN3033	Speed torpedo 30 HV Muffler - Polished Aluminum	
			CN3055	Millennium Pipe - Polished Aluminum	

Century Optional Upgrades

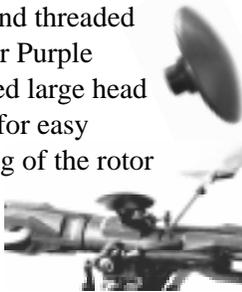
<p>Carbon Graphite Whip Antenna</p>  <p>Don't ever need to cut your receiver antenna anymore, kit comes with a hollow fiber tube and CNC base mount. allows you to insert antenna into the tube. Antenna will be better protected and look so cool too!</p> <p>CN2124 Antenna</p>	<p>CNC Machined Aluminum Servo Arm Pack</p>  <p>(Hawk, Falcon & Phoenix) To completely eliminate slop on control surfaces.(purple)</p> <p>CN2176 (Fut) Arm set CN2177 (JR/Air) Arm set</p>	<p>CNC Machined Finish Cap & Washer</p>  <p>Boy! these caps and washers make you look like a "PRO" (colors: Silver, Red, Blue, Gold, Purple, green, black 10pcs/pack)</p> <p>CN2217 (screw cap) CN2218 (nut washer)</p>	<p>Dual Ball Bearing Tail Blade Grips & One Piece Steel Hub</p>  <p>Hawk Falcon</p> <p>Heavy duty dual B.B tail grip permits solid precise control. One piece steel hub for long-lasting precision and durability.</p> <p>CN2120 Dual B.B tail assembly</p>
<p>Hex Start Systems</p>  <p>Adapts to starter shaft or push into rubber insert. For 4, 5 and 6mm start shafts.(come with adapter).</p> <p>CN0426 Hex extension only CN0402 Adap. only 5mm,</p>	<p>Reversible One Way & Hex Start System</p>  <p>Adapts to starter shaft push into rubber insert. For Hawk,Phoenix & Falcon.(come with adapter).Extension adapts to most starters.</p> <p>CN0427 One way hex start ext w/adapt. CN0427A 5mm adapt</p>	<p>Aluminum Tail Blade Grips</p>  <p>(Hawk , Falcon & all 30-60 heli)</p> <p>Aluminum C.N.C machined grips, color anodized use double B.B or thrust B.B (ball bearing Extra)</p> <p>CN2212P Purple w/ball end CN2212G Gold w/ball end CN2212B Black w/ball end CNBB1030 Bearing(2)(3x10x4)</p>	<p>FAI C.G. Correct Flybar Paddles</p>  <p>Pilots who don't care about 3D. don't know how to fly inverted, just regular sport flyers will love these paddles, smooth and precise control.</p> <p>CN2114(Hawk,Phoenix & Falcon)</p>
<p>Neon Glow Color Hot Dog Paddles</p>  <p>3D switchless inverted pilots must try out these lightning quick paddles!</p> <p>CN2079Y (Neon Yellow) CN2079R (Glow Red) CN2079O (Glow Orange)</p>	<p>Hot Dog Flybar Paddle w/ Weights</p>  <p>3D Hot Dog pilot can't miss this thin and light paddle set, weighs only 17g!</p> <p>CN2079 (all 30)</p>	<p>Hot Dog Main Shaft Thrust B.B. Kit</p>  <p>Hawk, Falcon, Phoenix</p> <p>Any pilot moving into 3D or aerobatics should miss this item. Transfers all loading from the regular radial bearings to the thrust bearing.</p> <p>CN2220 Thrust Kit</p>	<p>3mm & 4mm Fly Bar Weights</p>  <p>The only way to balance fly bar and eliminate excess vibration caused by out-of-balance paddles.</p> <p>CN2029A 3mm weights (30-46)..7.95</p>
<p>Carbon Fiber Tail Boom</p>  <p>(Hawk, Falcon, Phoenix) 3D flying has high demands from your helicopter, a carbon tail boom exceeds all standards for strength and stiffness.</p> <p>CN2126H Carbon fiber tail boom Hawk CN2126F Carbon fiber tail boom Falcon</p>	<p>O.S. Throttle Extension</p>  <p>Aluminum C.N.C. machined throttle extension (purple andized)</p> <p>CN2153 32SXH, 46FXH & TT36H</p>	<p>Carbon Graphite Tail Fin Set</p>  <p>Extremely light weight, high gloss carbon fiber fins.</p> <p>CN2127A Hawk,Phoenix & Falcon</p>	<p>Carbon Graphite Tail Boom Support</p>  <p>Super high quality, extremely light weight and ready to install dual tail boom support kit.</p> <p>CN2128 Hawk,Phoenix & Falcon</p>

Century Hawk Upgrades

Head Button

(Hawk, Falcon & Phoenix)

Left hand threaded black or Purple anodized large head button for easy stopping of the rotor head.



CN2215B Black
CN2215P Purple

Metal Rotor Head

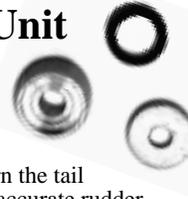
(Hawk, Falcon & Phoenix with wash out base)



CN2076D Hawk, Falcon

Autorotation Slipper Unit

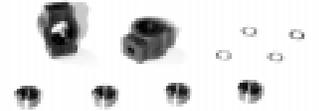
Getting started into auto-rotations? The slipper unit will continuously turn the tail rotor providing accurate rudder control while descending and landing. Adjustable for amount of slip through compressing the o-ring against the stainless plate.



A must for backwards flying !
CN2231 Slipper autorotation

Ball Bearing Bell Mixer Kit

(Hawk, Falcon & Phoenix)



Improving the performance is possible by upgrading to ball bearing type bell mixers.

CN2204 Bell Mixer kit

Ball Bearing Aileron Bellcranks Kit

(Hawk, Falcon & Phoenix)



Get more Precision aileron movement and improved 3D maneuverability

CN2205 BB Bellcranks

Ball Bearing Wash out Arm Kit

(Hawk, Falcon & Phoenix)



Ball Bearing Precision arms improving acrobatic & 3D maneuverability

CN2203 Washout kit

Fly Bar Stiffener



Carbon fiber flybar stiffener with purple aluminum ends.

CN2122 (30/46)

Swash Plate Anti-rotation Bracket



Improves swash plate precision control (purple & black)

CN2208P Anti-Rotation kit Purple
CN2208B Anti-Rotation kit Black

Canopy Quick Mounts

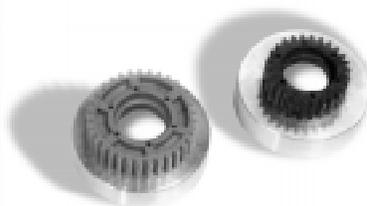
(Hawk, Falcon & Phoenix)



Fast "ON and OFF" your canopy and never lose canopy screws again. (purple)

CN2210 Quick Mounts

Metal Clutch Bell



CN2225 Clutchbell w/gear
HI3010A Bell only
HI3010B 2-Stroke Gear (26T)
HI3010C 4-Stroke Gear (33T)
CN2020L Clutch lining (2)

30 Size Metal Swash-plate

(Hawk 30)

Look!



This beautiful CNC precision machined aluminum swashplate will increase acrobatic & 3D maneuverability. (black)

CN2056 Metal swash plate 8mm

6 mm Head Axle w/ Thrust B.B conversion for Hawk

Tough harden steel makes this shaft almost unbendable as it can be.



CN2221 thrust spindle

Aluminum Cone Start Systems

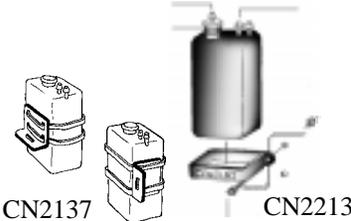
(Hawk, Falcon & Phoenix)



Adapts to Hawk, Falcon and most 5mm shaft helicopters. Extension fits most starter and works for all X-Cell, 7" long.

CN2226 Hardened s. shaft
CN2028E (Extension Purple)
CN2209 (Cone Purple)

2oz Header Tank w/ CNC Machined Mount or Die-cut Mount



CN2137 CN2213

CN2213 Machined Mount
CN2137 Die Cut Mount

Aluminum Turbo Cooling Fan

(Hawk, Falcon & Phoenix)



Increased 15% air flow, lower engine drag and smoother high speed operation.

CN2202 Turbo cooling fan

CENTURY

HELICOPTER PRODUCTS

Century Helicopter Products

523 Sinclair Frontage Rd.
Milpitas, CA 95035
Tel: (408) 942-9525
Fax: (408) 942-9524

Web: www.centuryheli.com

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher, Century Helicopter Products.