Hawk SE V2
Falcon SE V2
Instruction Manual

SPECIFICATIONS

	30SEV2	46SEV2
⇨ MAIN ROTOR DIAMETER	49.5 in	53 in
⇨ TAIL ROTOR DIAMETER	9.7 in	9.7 in
⇨ OVERALL LENGTH	46.2 in	47.5 in
⇨ HEIGHT	15.2 in	15.2 in
⇨ BLADES	550mm	600mm
⇨ ENGINE	32 ~ 38	46-50
⇨ BALL BEARINGS	53	54

Century Helicopter Products

Designed and Developed in USA

Table of Contents

Introduction

Congratulations on your purchase of Century Helicopter Product's newest RC helicopter model. The Special Edition V2 is a new breed of helicopter, ideal for beginners new to the hobby through to intermediate and expert pilots. In order for our helicopters to improve, our approach to provide higher value for a better price needed improving. Our result is this kit you are about to start building, having the highest ball bearing count for the 30 and 50 class and includes features common to more expensive kits. This kit will exceed your expectations for precision control at an affordable price.

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 USA
Fax:408-942-9524 web: www.centuryheli.com e-mail: info@centuryheli.com

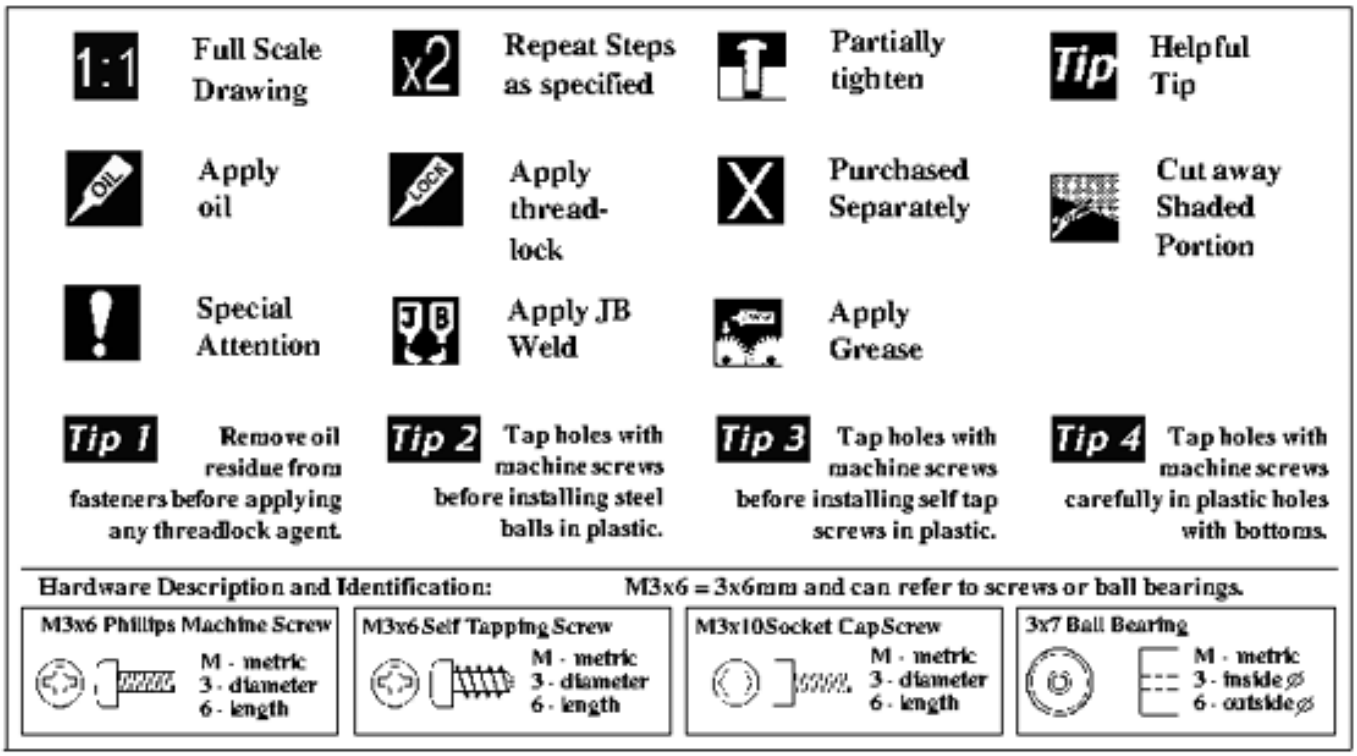
Hawk / Falcon SE V2 Construction Manual

This manual has been written for both the Hawk SE V2 helicopter CN1040A, the Falcon SE V2 helicopter CN1050A and Hawk SE V2 assembled version. The main portion of the manual covers the full construction of both kits with labeling for both 30 & 46/50 respectively.

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 familar with the parts and assembly before beginning that step.

Hawk SE V2 (kit version)	Complete Steps 1 through 49.
Hawk SE V2 ARF	Complete Appropriate Steps
Falcon SE V2 (kit version)	Complete Steps 1 through 49.

Symbols used to help assist you in building the kit:



Recommended Tools & Accessories

The tools and materials listed below are <u>the minimum needed to build the helicopter:</u>

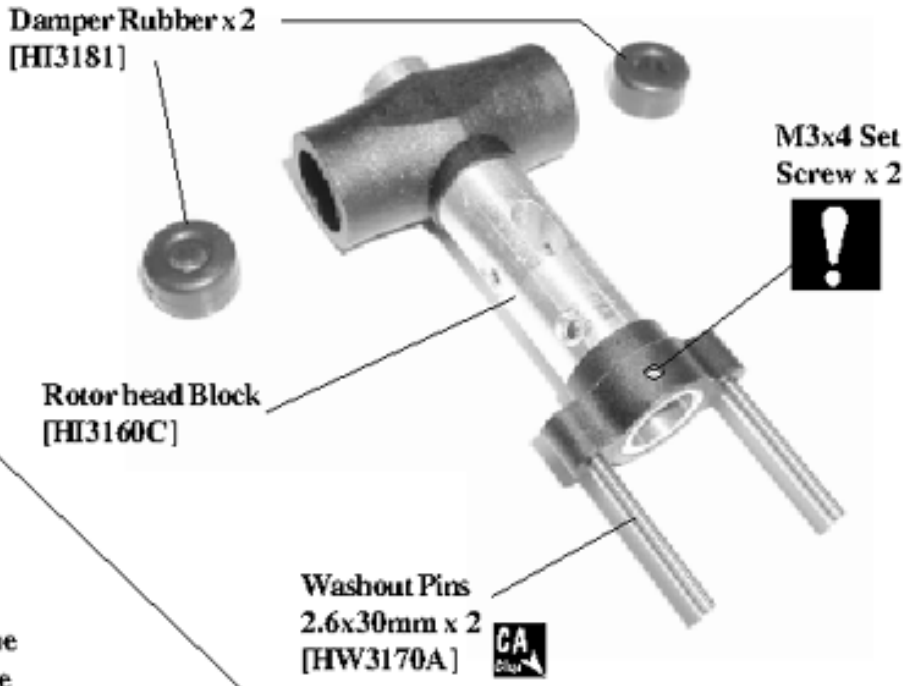
Screwdrivers - Slotted and Phillips head
Long-Nosed Pliers
Allen Wrenches - 1.5mm, 2.0mm, 2.5mm
(supplied in kit) + 3.0mm
Appropriate Socket Wrench
(glow plug wrench for engine shaft nut)
Hobby Scissors
Double Sided Foam Tape (1/16" - 3/32")
Foam Rubber (radio packing)
JB Weld (bond clutch lining)
Thread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

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

#CN2015	Hardened Tip Hex Driver Set.
#CN2026	Pitch Gauge with Paddle Gauge.
#CN2034	15° Curve Tip Ball link Pliers.
#CN2052	Main Blade Balancer.
#CN2054	Special Glow Plug Wrench Set.
#CN2055	Ball Link Sizing Tool.
#CN2070	Universal Flybar Lock.
#CN2155	Piston Locking Tool.
#CN2219	Ball Link Easy Driver.
#CN2255	Control Rod Gauge.
#CNWI26555	5.5mm Nut Driver.
#CNWI26570	7.0mm Nut Driver.

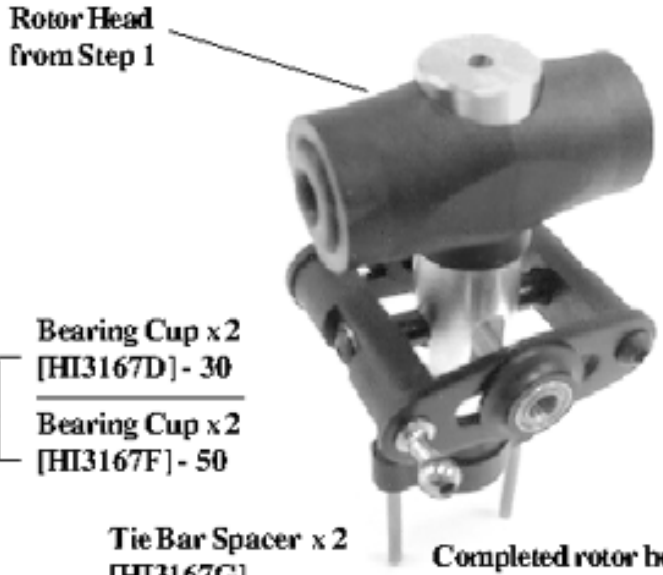
Step 1 Main Rotor Head

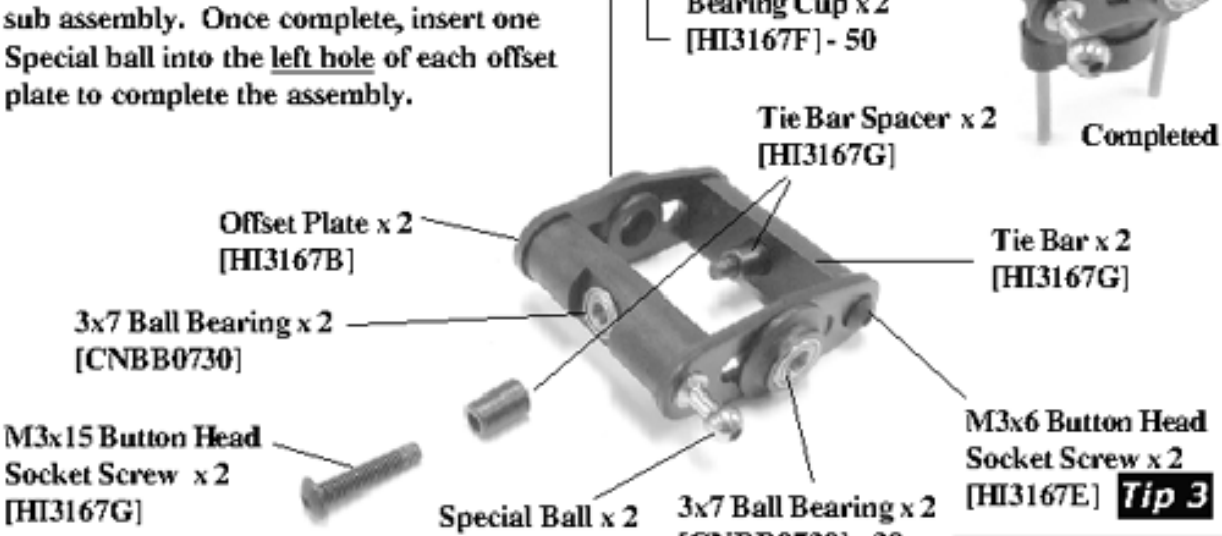
From parts bag 1: Press in the Damper Rubbers and the Washout Pins into the Head Block. Apply one drop of medium CA glue to the pin seats after the pins are fully seated. Install the two M3x4 set screws and torque evenly to maintain static tracking of the rotor blades.



Step 2 Seesaw Assembly

From parts bag 1: Insert one ball bearing into each bearing cup and insert into the offset plate. Apply one small drop of medium CA glue to the back side of the bearing cup to secure to the offset plate. Insert one ball bearing into each tie bar. Insert one M3x6 button head screw through the right side hole of offset plate into one tie bar. Make two identical sub assemblies. Note that the bearing cups face outwards from the head block. Insert one M3x15 button head screw through the tie bar bearing, slide one steel spacer and carefully apply threadlock to the exposed threads and insert into the right side of the head block. Do not overtighten. Repeat for the second sub assembly. Once complete, insert one Special ball into the left hole of each offset plate to complete the assembly.

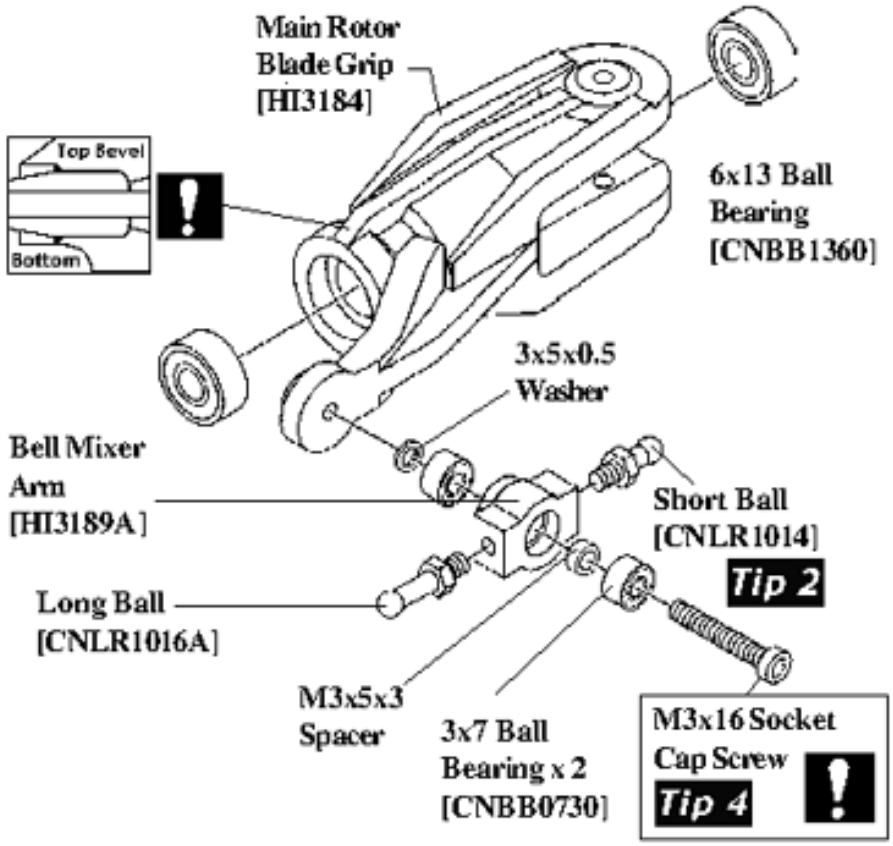




Take notice of the location of the two special steel balls on the offset plates.

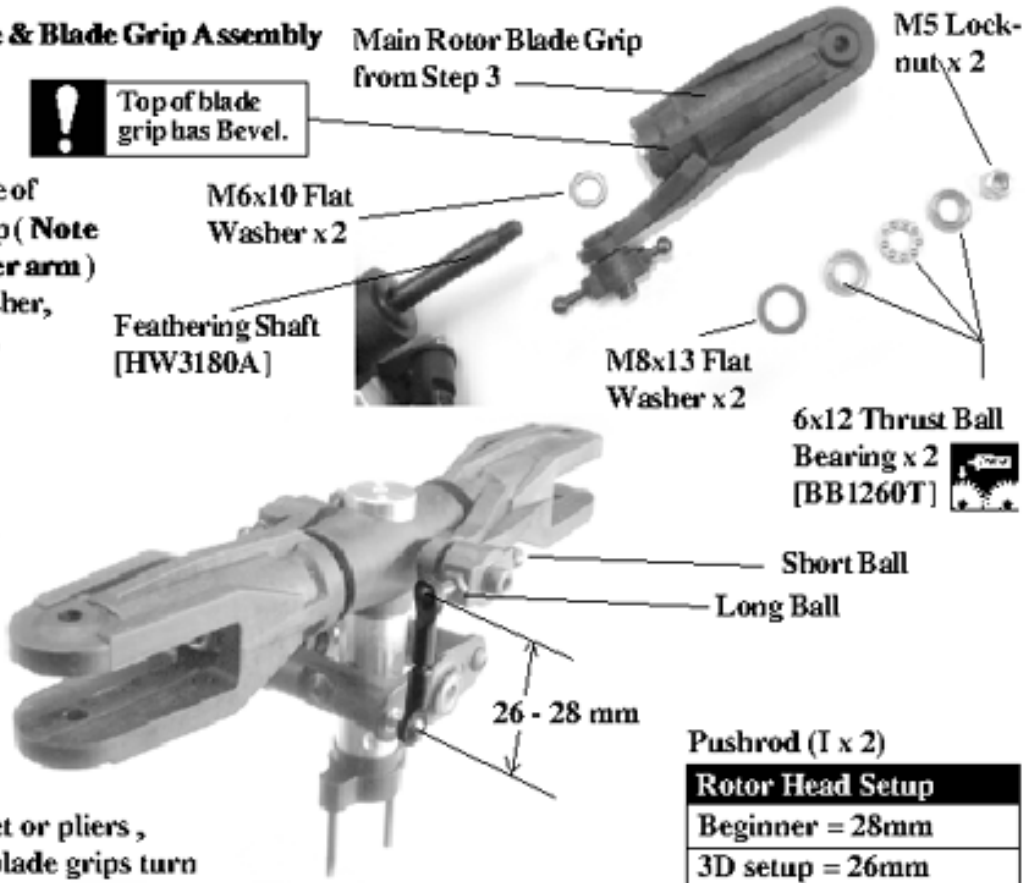
STEP 3 Main Blade Grip Assembly

From parts bag 1: Install one Long Ball and one Short Ball (***Tip 2***) into the Bell Mixer, press one 3x7mm Ball Bearing into one side followed by one 3x5mm spacer and another bearing from the opposite side. Insert one M3x16 Socket Cap Screw (***Tip 4***) through the arm (make sure the flush side faces out) with one 3x5x0.5 washer between the inner bearing and the blade grip pitch arm face. Be careful not to overtighten the screw. A small portion of the M3x16 Socket cap screw may pertrude from the back of pitch arm after assembly. Carefully file it flush to the back of the pitch arm.Install two M6x13 Ball Bearings into both ends of the blade grip assembly. Complete the second blade grip in exactly the same way.



STEP 4 Feathering Spindle & Blade Grip Assembly

From parts bag 1: Insert the Feathering Shaft into the head block, slide one 6X10mm Washer on each side of the shaft. Install the blade grip (**Note the direction of the bell mixer arm**) followed by one 8x13mm Washer, one 6x12 Thrust Ball Bearing. **Install the first steel washer (large inside diameter) followed by the ball race, remember to grease the ball race, followed by the second steelwasher (smaller inside diameter)** and one M5 Locknut. Do the same for the other blade grip. Tighten the locknuts, using the glow plug socket wrench on one nut while holding the other with an 8mm socket or pliers , Tighten the nuts until both blade grips turn freely without any excessive end play. Assemble Pushrod I x 2, to a length measuring 26mm center to center following the diagram on page 30, and connect the seesaw arm to the long ball on the bell mixer.

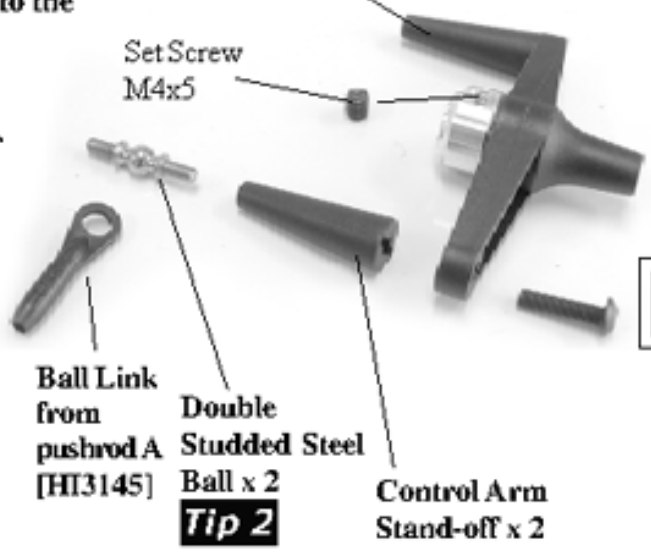


Pushrod (I x 2)

Rotor Head Setup
Beginner = 28mm
3D setup = 26mm
See page 30 for referrence.

STEP 5 Flybar Control Arm Assembly

From parts bag 1: Using an available M3x12 Button Head Screw, insert approximately half the length of the screw to form the threads into the smaller, tapered ends of the control arms and the control arm standoffs. Assemble pushrod A (two ball links and one 25mm threaded rod for a length of 47mm center to center). Press one ball link onto each double studded steel ball, **making sure that pressure is applied from the side of the ball link with the Century logo. All ball links are designed to be installed in one direction only.** While holding one flybar control arm, thread one end of the double studded steel ball into each standoff. When it becomes difficult to turn with fingers, start screwing in another control arm stand-off on the other end of the ball.



Flybar Control Arm x 2
Double Studded Steel Ball x 2
Control Arm Stand-off x 2
[HI3176B] - 30
[HI3176C] - 50

x2 Repeat 2 Times.

Pushrod (A x 2) 25mm rod

See page 30 for referrence.

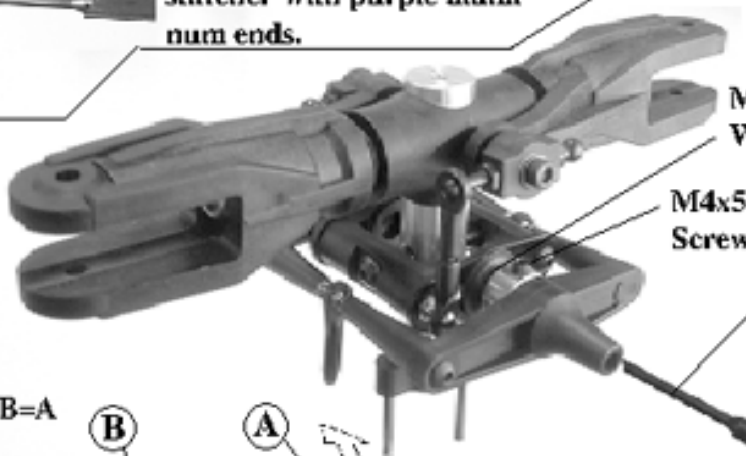
STEP 6 Flybar & Flybar Paddle Assembly

Slide and center the Flybar through the seesaw arm assembly. Carefully look at the Flybar Control Arm assemblies and notice that when installed correctly, the securing set screw is on top. **Insert one 4x6x0.5 washer against each bearing** then install the Flybar Control Arms on the flybar. Insert one M3x12mm Button Head Socket Screw into each Flybar Control Arm, securing the assembly together. Loosely tighten the M4x5 Set Screws into the round aluminum inserts. Using a ruler, check the distance between the end of the flybar and the control arm and adjust until the lengths are the same. Tighten one set screw at this time. 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 M3x3 Set Screws secure the weights using threadlock. Remove and apply threadlock to the M4x5 set screws (***Tip 1***) in the arms and tighten in place.

CN2122 3mm (30)
CN2123 4mm (50)

Optional Carbon fiber flybar stiffener with purple aluminum ends.

For balancing of rotor head see Final Adjustments

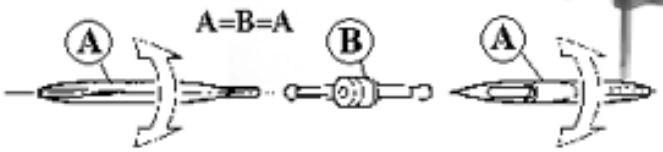


M4x6x0.5 Washer x 2

M4x5 Set Screw x 2

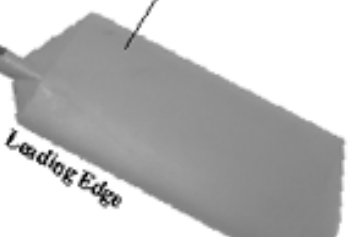
Flybar [HW3173] - 30
& [HW3173A] - 50
* packed with tailboom

Flybar Paddles & Weights x 2
[HI3179] - SE30 (Black)
[HI3179A] - SE50 (Gray)



Align each paddle 'A' to be parallel with the flybar control arms 'B'. This is made very simple with the optional pitch and paddle gauge CN2026

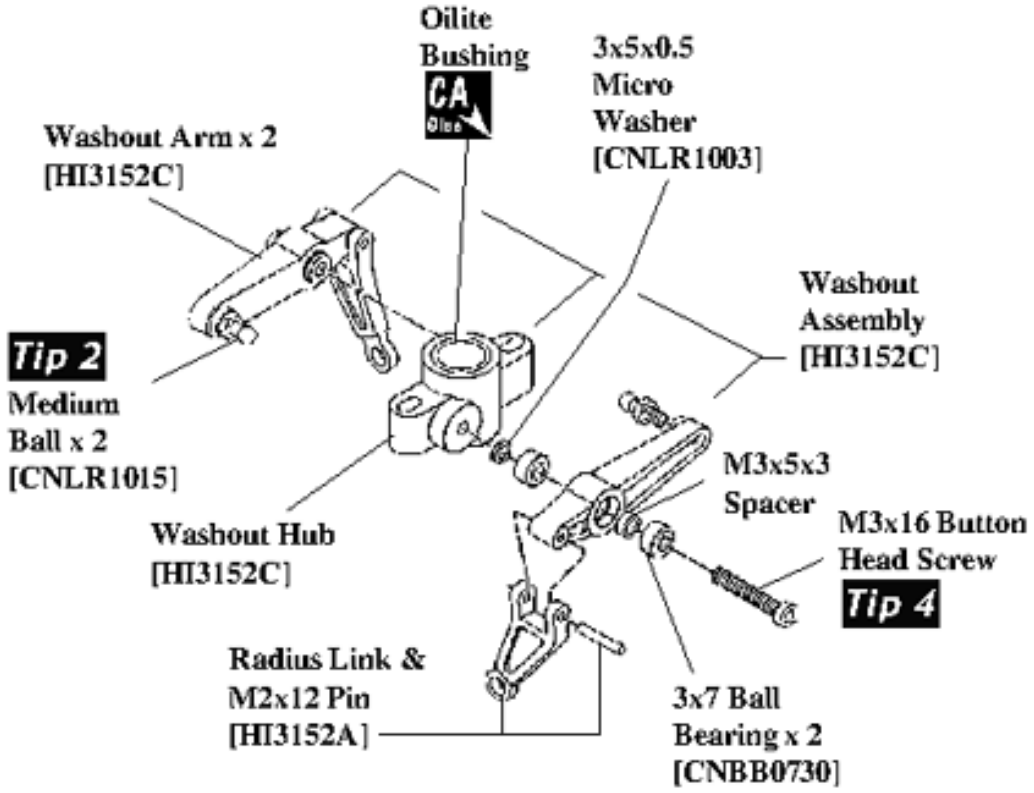
M3x3 Set Screw x 2 (small hex key)

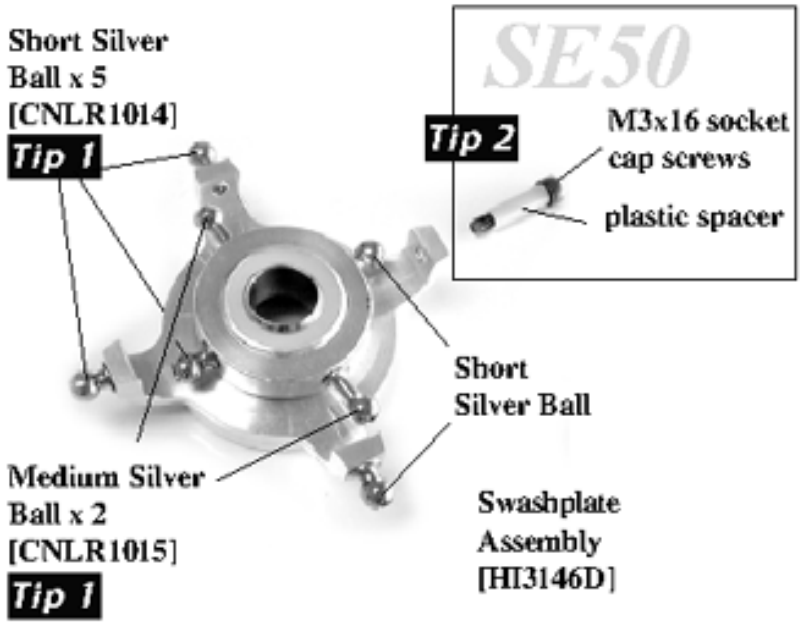


STEP 7 Washout Assembly

Before starting, carefully apply two or three drops of CA to the seam between the top and bottom oilite bushings and the plastic washout hub. Do not get any adhesive on the inside surfaces that will slide against the main shaft. Let dry completely.

Attach two Medium Balls (***Tip 2***) to the Washout Mixing Arms (**Note, attach from the flat side of the arm**). Press one 3x7mm Ball Bearing into one side followed by one 3x5mm spacer and one more bearing from the opposite side. Slide one M3x16 Button Head Screw through the bearings in the arm and slide one 3x5x0.5 washer between the bearing before tightening into the washout hub. Tighten until there is no end play but do not overtighten the screw into the washout unit, ***Tip 4***. Note, the screw is attached on the left. Press the radius link on to the inner short balls on the Swashplate.



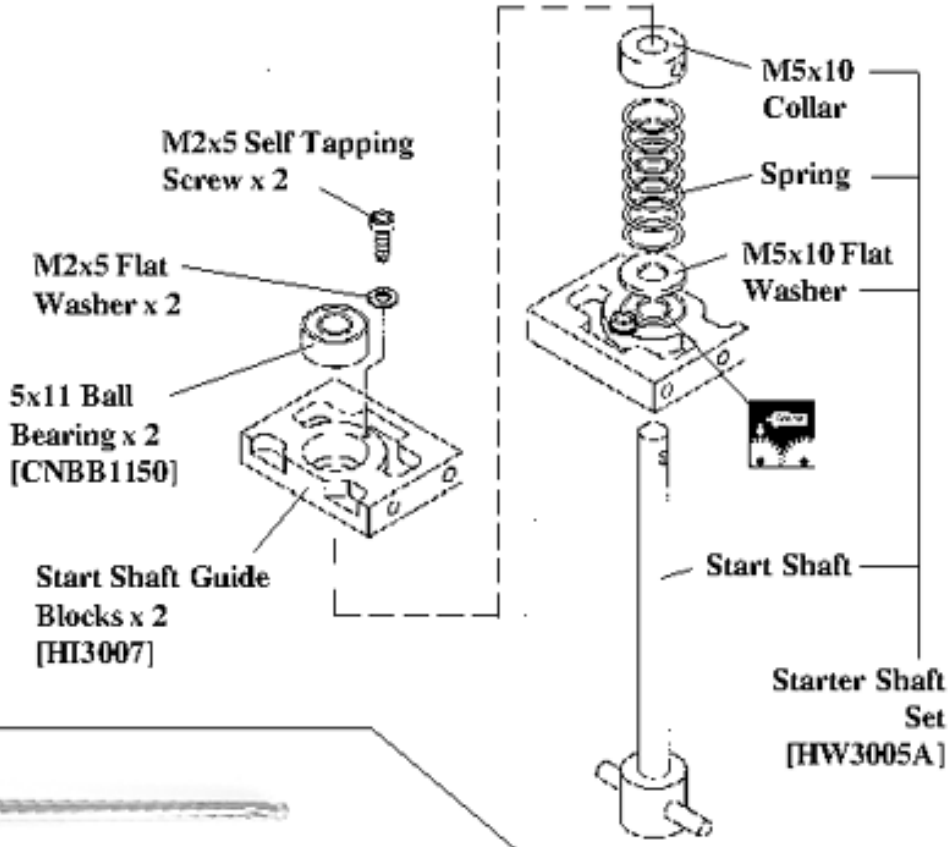


Step 8 Swashplate Assembly

Starting with the inside race, apply threadlock and attach two short balls (***Tip 1***) directly across from each other, similarly attach two medium balls to the remaining holes. Attach the three short balls to the outside race. The rear location is used for the anti-rotation pin on the Falcon SEV2 kit and is an option upgrade on the Hawk SEV2.

Step 9
Starting Shaft Bearing Blocks

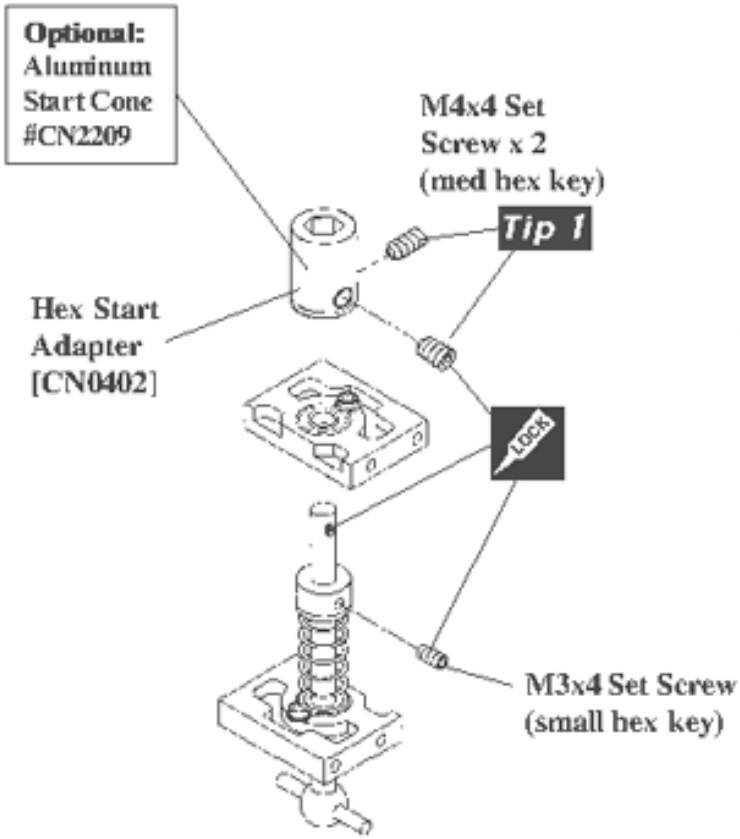
From parts bag 2: The Start Shaft Guide Blocks are pre-assembled. Slide the Starter Shaft through one of the block assemblies with the M5x11 Ball Bearing facing up then slide M5 Flat Washer, the spring and M5 Collar onto the shaft.



X Hex Starter Extension (Optional Part #CN0426A)

Step 10 Starting Shaft & Hex Coupler

From parts in bag 2: After sliding the top bearing block in place, attach the hex starter adapter CN0402 to the starting shaft using threadlock on both M4x4 set screws. Align one set screw to fit into the machined indentation in the hardened start shaft. For added strength apply locktight to the shaft before the hex coupler is attached. Apply some lubricant on the shaft after assembly to ensure smooth operation. 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.



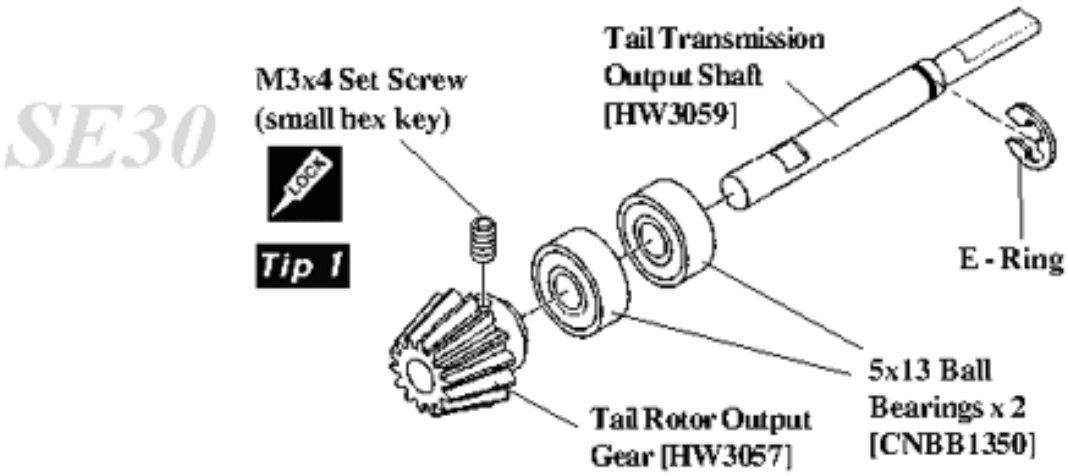
Engine Start Procedure with Hex Coupler

When removing the hex start extension after the engine has started, it is recommended that you use a two step procedure.

Step #1: Lift the hex extension upwards just enough to disengage the start shaft while keeping the extension inserted in the hex coupler (CN0402).
Step #2: After the coupler has stopped turning, then remove the extension completely.

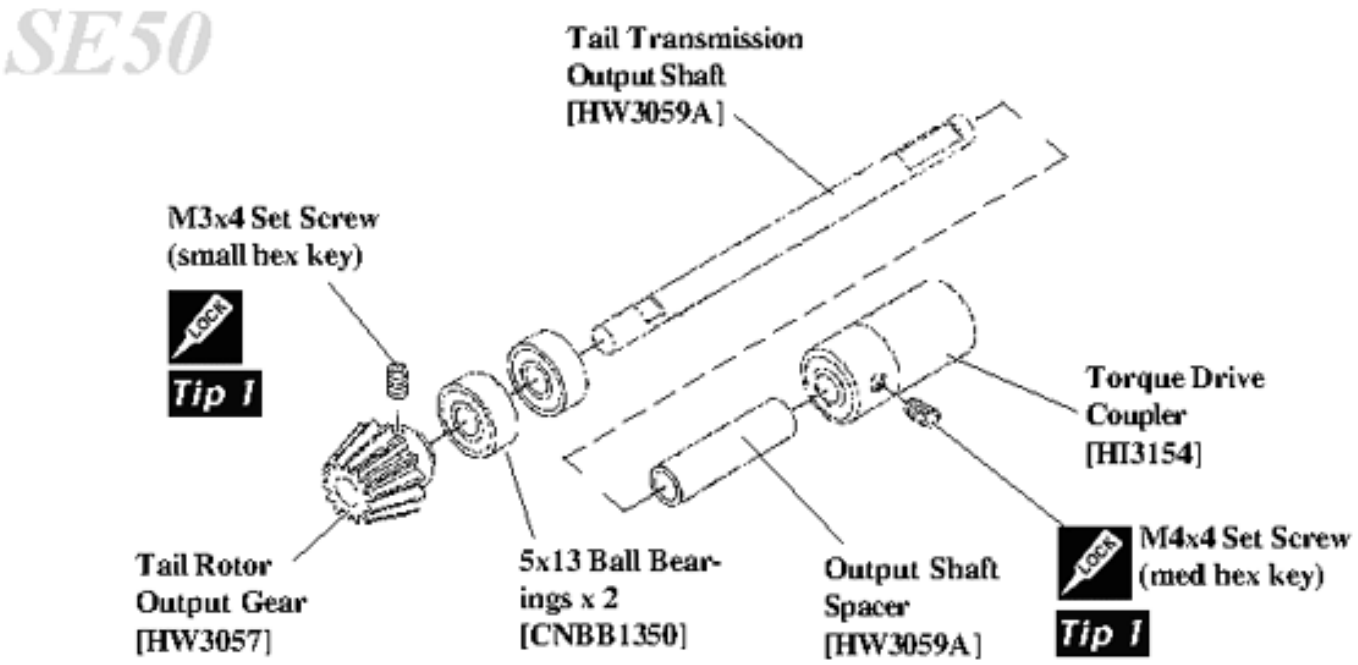
Step 11A Wire Drive Pinion Gear 30

From parts bag 2: Assemble the Tail Transmission Output Gear. Install the E-Ring then slide two Ball Bearings onto the Tail Transmission Output Shaft. Using threadlock, insert one 3x4mm Set Screw (***Tip 1***) into the gear, note where the flat spot is on the shaft and slide the gear on and tighten (**make sure the set screw is positioned over the flat spot**) the set screw.



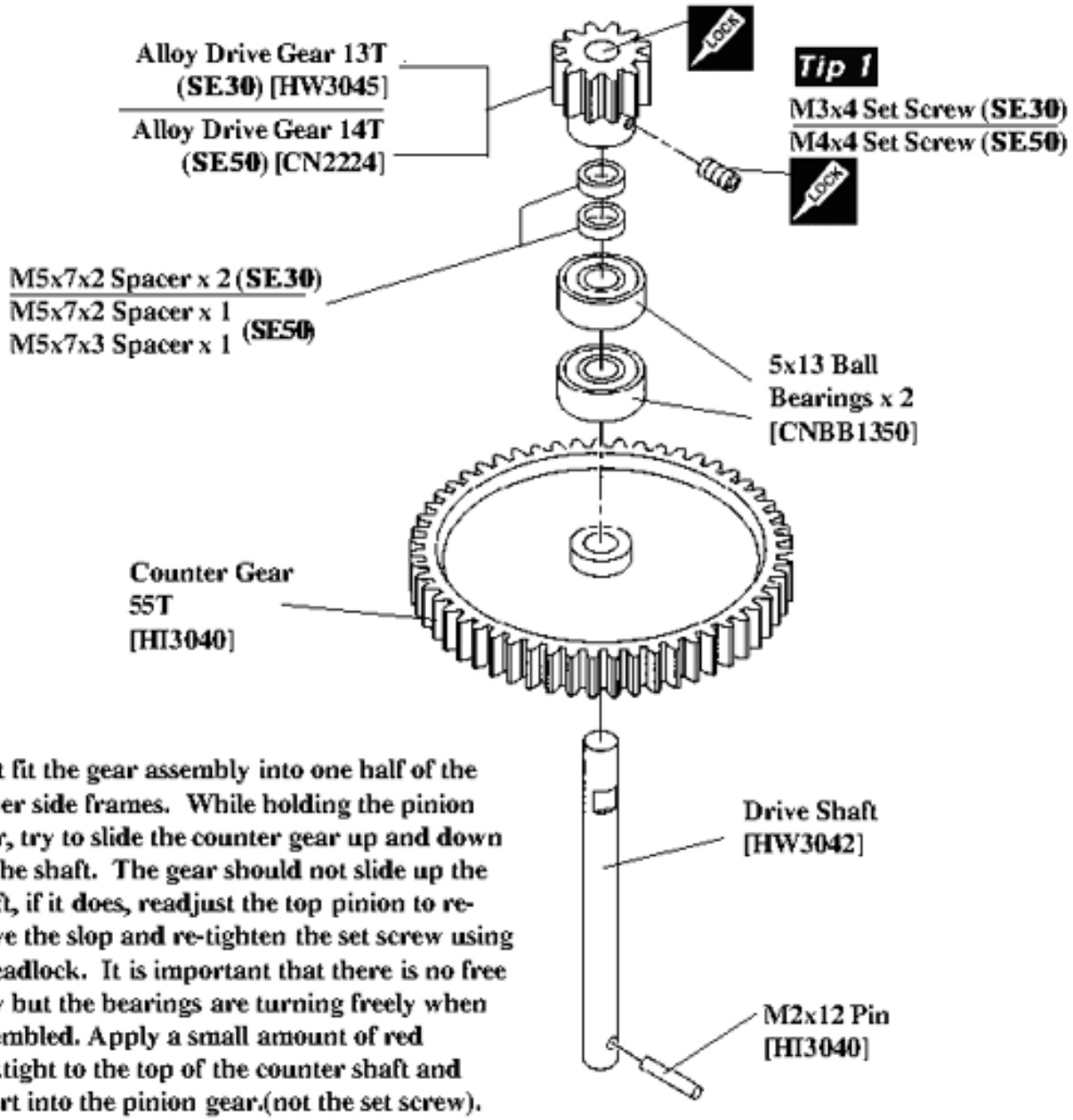
Step 11B Torque Drive Pinion Gear 50

From parts bag 2: Using threadlock, insert one M3x4 Set Screw (***Tip 1***) into the gear, note where the flat spot is on the shaft and slide the gear on and tighten (**make sure the set screw is positioned over the flat spot**) the set screw. Slide two Ball Bearings onto the shaft and install into one half of the upper frames. Next add the spacer, apply threadlock to the M4x4 set screw and insert into the torque drive coupler. Slide the drive coupler over the long flat spot until the there is no end play in the shaft and tighten the set screw in place.



Step 12 Counter Gear Assembly

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. **SE30** slide two M5x7x2 spacers onto the shaft and slide the Alloy Drive Gear onto the shaft aligning the flat spot on the shaft. Insert one M3x4 set screw (Tip1) into the Alloy Drive Gear and tighten in place. **SE50** slide one M5x7x2 and one M5x7x3 spacer onto the shaft and slide the Alloy Drive Gear onto the shaft aligning the flat spot on the shaft. Insert one M4x4 set screw (Tip1) into the Alloy Drive Gear and tighten in place.



Tip 1 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. Apply a small amount of red locktight to the top of the counter shaft and insert into the pinion gear.(not the set screw).

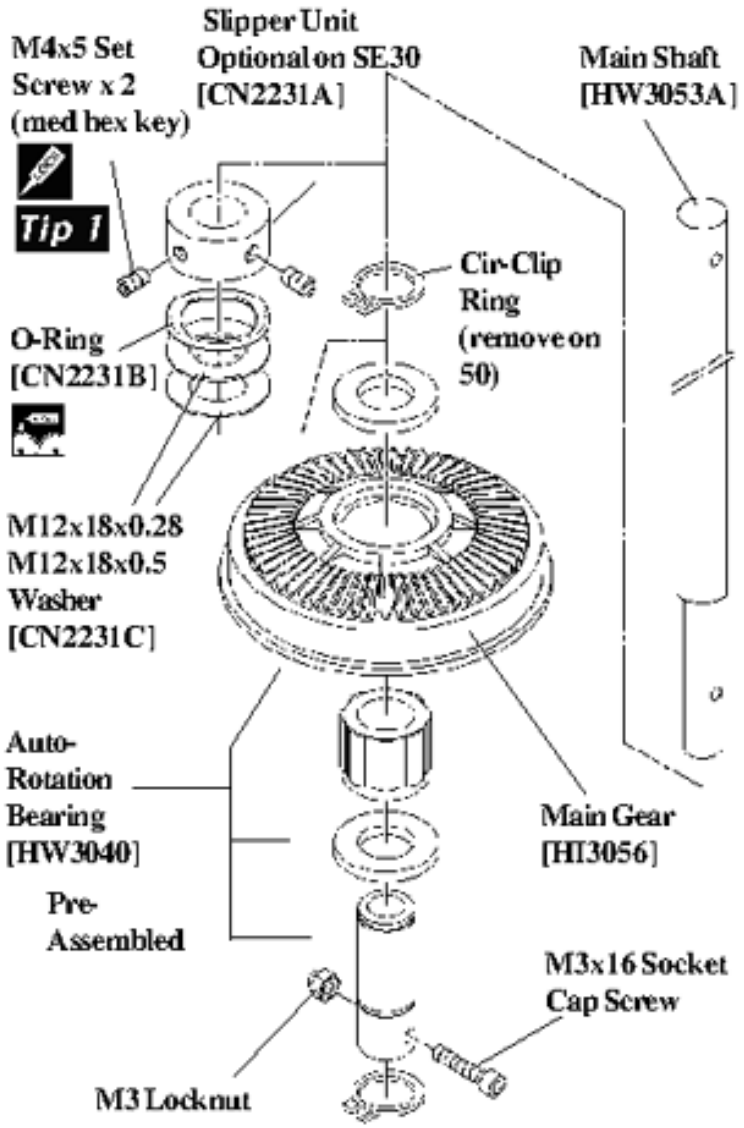
Tip 2 Expert tip, once all components are in their final position, using a needle apply one drop of blue threadlock carefully at the joint between each bearing and the shaft. **Warning,** threadlock will damage a bearing.

Step 13 Main Gear Assembly

The Main Gear is **pre-assembled with the Auto-Rotation Bearing installed.** From parts bag 2, the Main Shaft has a step in the end of the shaft that is inserted through the auto-rotation assembly. 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.

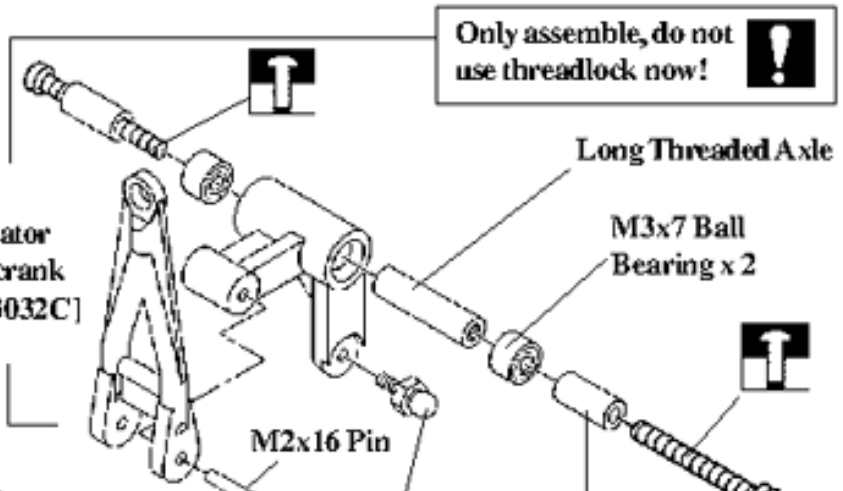
Step 13A Slipper Assembly -
SE50 - Standard equipment
SE30 - Optional

The slipper drive unit will continue to turn the tail rotor blades in the event of an auto-rotation. Before installing the main shaft the Cir-Clip must be removed from the top of the main gear assembly, use Cir-Clip pliers that have special tips to spread the clip (very useful when changing the main gear). Slide the thin washer followed by the thick washer, grease the o-ring and set in place. Install two set screws (***Tip 1***) and slide against the o-ring, apply just enough pressure that when the main shaft is turned the main gear rotates. Remove and apply threadlock to one set screw at a time.



Step 14 Elevator Bellcrank Assembly

From parts bag 2, insert the long threaded axle and one M3x7 ball bearing from each end of the bellcrank. Slide one short spacer over one 3x30mm Socket Cap screw and attach to the threaded axle (**do not use threadlock here at this time**), 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 eleva-



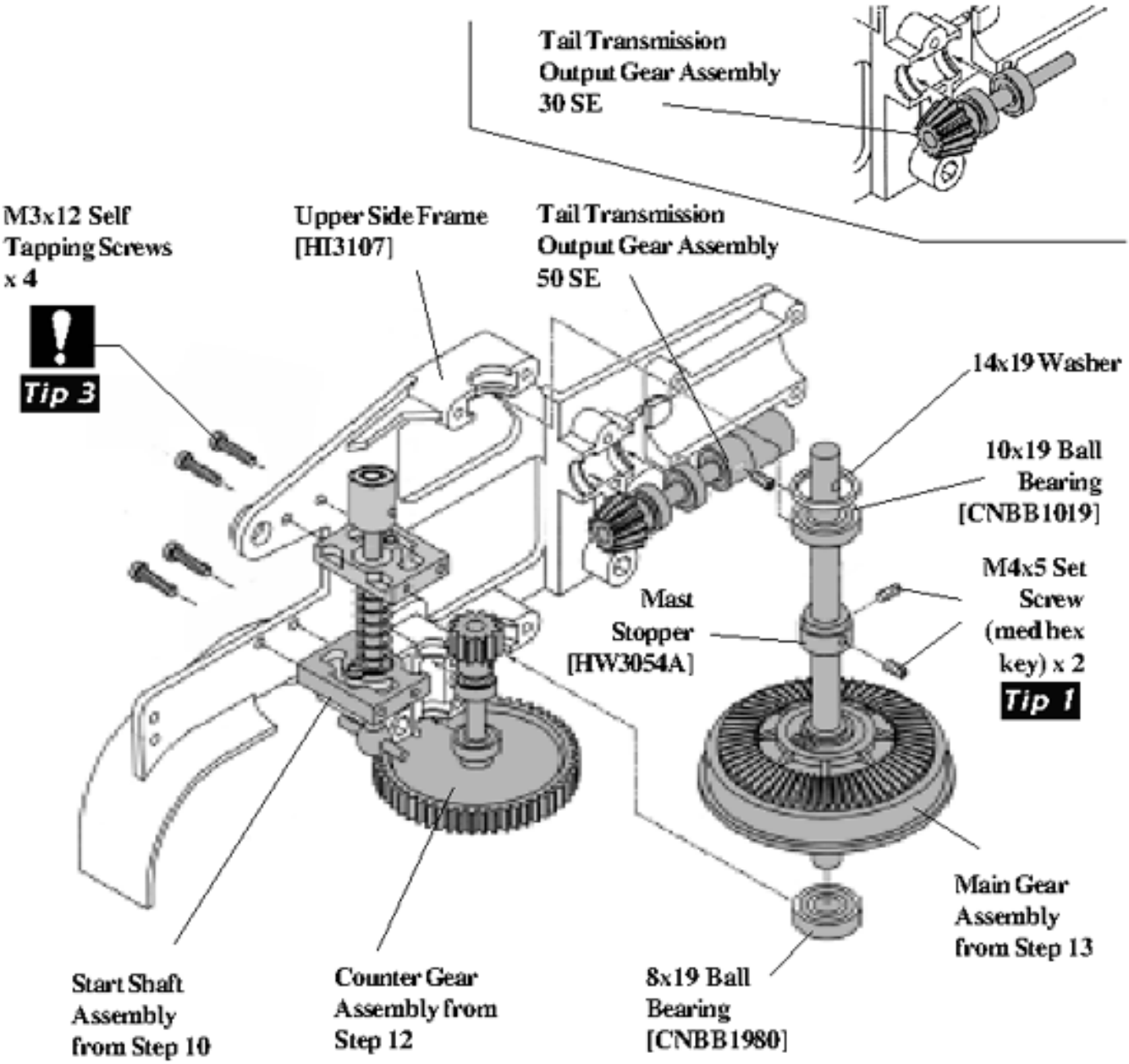
CNQSC04
Optional machined ball bearing elevator arm w/ adjustable ball link.

On the 50SE kit the bellcrank needs to be modified as shown to avoid binding at high cyclic while inverted. Use a file to remove a bevel as shown.

Step 15 Upper Side Frames

From parts bag 2, install two 4x5mm Set Screws (***Tip 1***) on the Mast Stopper then slide the mast stopper on the main shaft (insure the side of the mast stopper with the machined inner ring is facing up) followed by one 14x19mm washer. Only assemble at this time. Slide one M8x19 Ball Bearing on the bottom of the main shaft and one M10x19 Ball bearing from the top.

Attach the starter shaft assembly to the right upper frame with four 3x12mm Self Tapping Screws. (***Tip3-* 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.**)

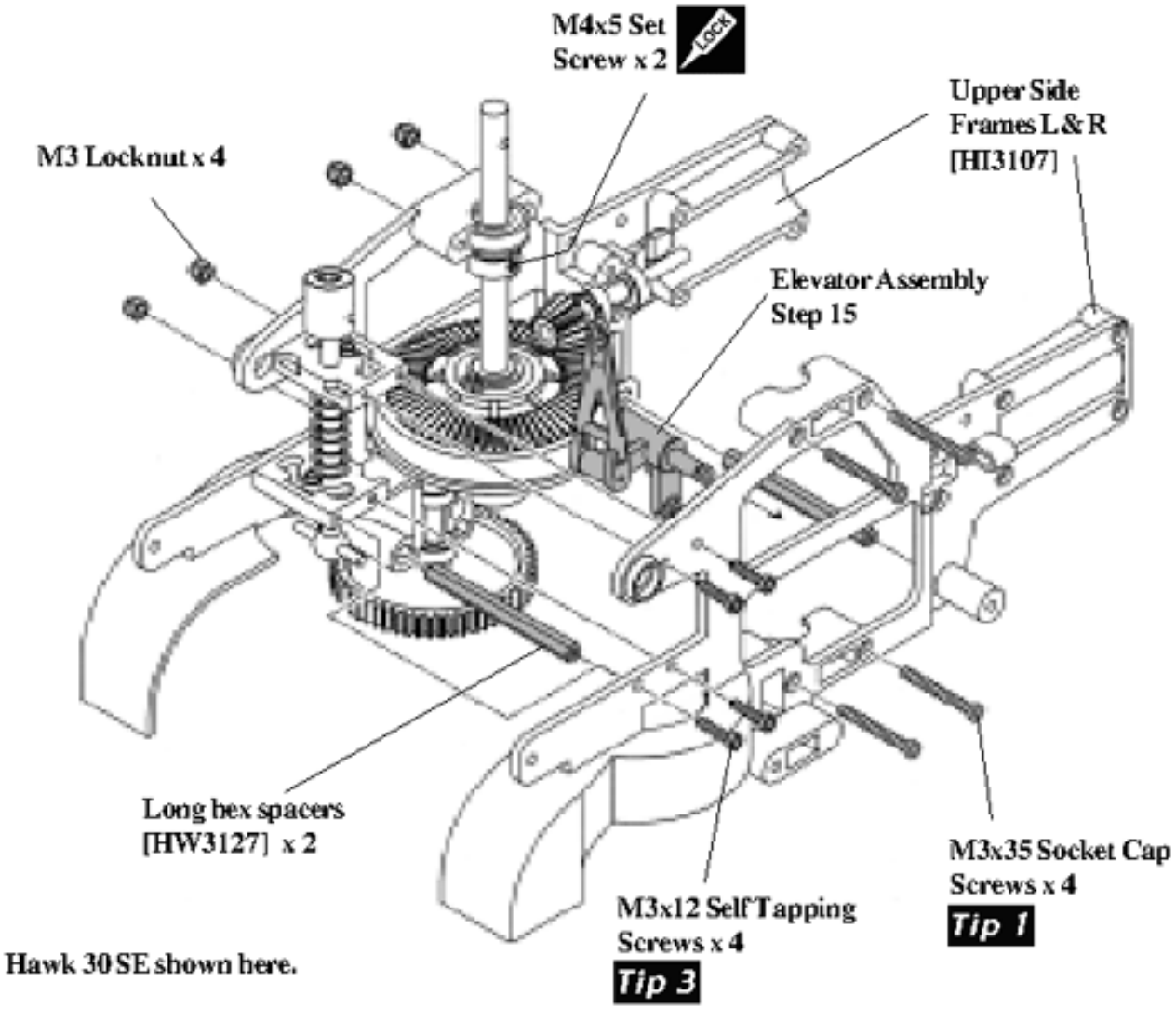


Note 1: Be careful when tightening the eight 3x12mm self tapping screws into the start shaft block assemblies as excessive force will strip out the plastic holes.

Step 16 Upper Frame Assembly

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 (***Tip 1***) 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. Attach the remaining four 3x12mm Self Tapping Screws (***Tip 3***) to the starting shaft blocks.



Hawk 30 SE shown here.

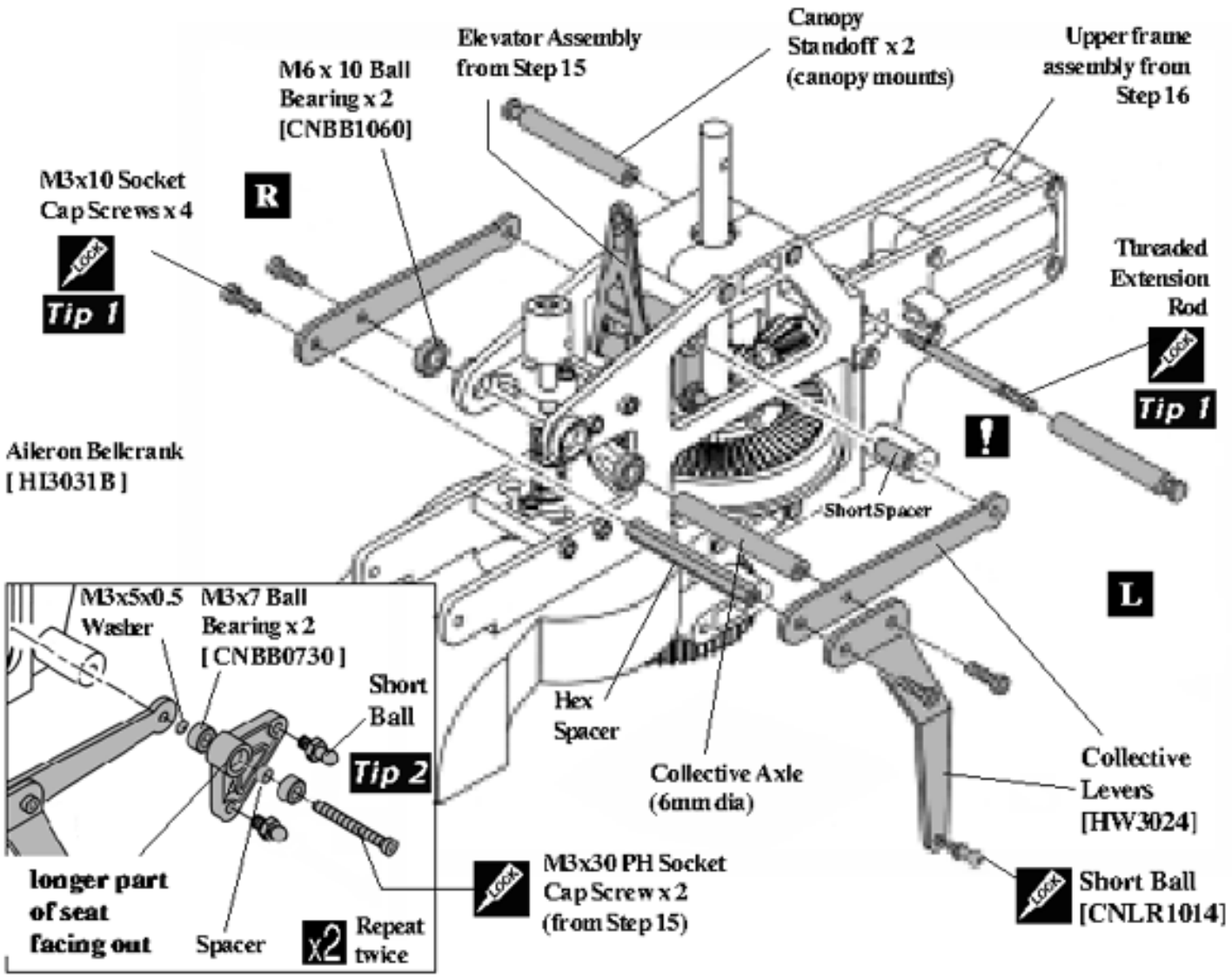
Note: The gear mesh between the main gear and the tail transmission output shaft may be a snug fit and will become smooth after a few flights, this is the normal wear in process.

Step 17 Collective and Aileron Levers

From parts bag 2, press in two M6x10 ball bearings into the front side frames for the collective axle. Using threadlock, 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) with the two M3x7 washers and the two 3x10mm Socket Cap Screws. Slide the assembly through the ball bearings in the upper frame sides from the right and attach the two Left Collective Arms with threadlock (**Tip 1**)on the two 3x10mm Socket Cap Screws. Tighten the screws until the collective levers move freely with no side to side play. Using threadlock, install one Short Ball on to the collective lever.

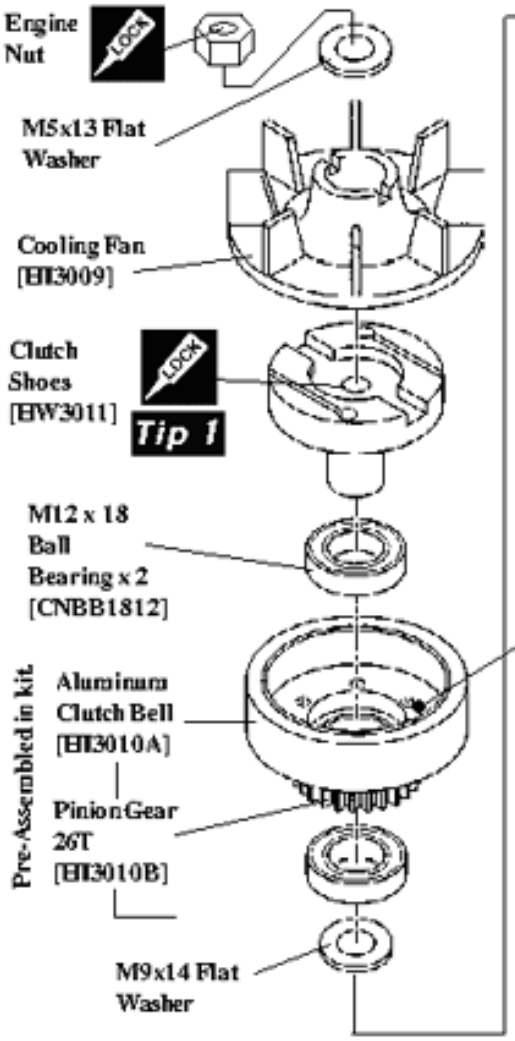
Make two aileron/roll bellcranks. Press one 3x7mm Ball Bearing into one side followed by the 3x5mm spacer and the one more bearing from the opposite side. Install the two short balls as shown on the side of the bellcrank **with the longer part of the bearing seat.** (***see Tip2***). Starting on the left side, remove the 3x30mm Socket Cap Screw and short spacer from the **elevator bellcrank** (previously assembled in Step 15), slide the left aileron bellcrank onto the screw and slide one 3x5x0.5 washer before inserting through the left collective lever. Apply threadlock to the end of the screw threads now and slide onto the short spacer and tighten into the elevator bellcrank axle. Repeat for the other side.

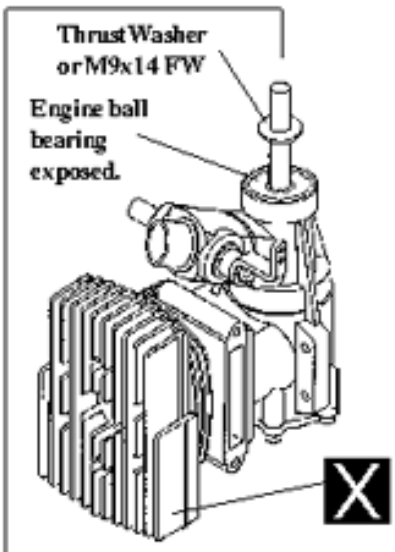
Slide one Threaded Extension Rod through the upper position of the tail output bearing recess and secure two canopy standoffs (one per side) using threadlock (***Tip1*** - these are to attach the canopy).



Step 18 Clutch, Fan & Engine Mounting

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 (***Tip 1***) on the crankshaft, engine nut and 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 through the inside center of the fan assembly. Again only torque the nut 1/16th more.





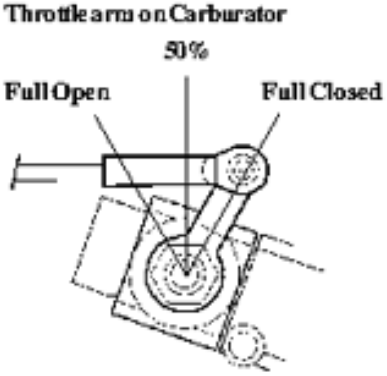
During final assembly wipe all traces of oil or grease from the inside surface of the clutch lining. Any grease here can cause a meltdown.

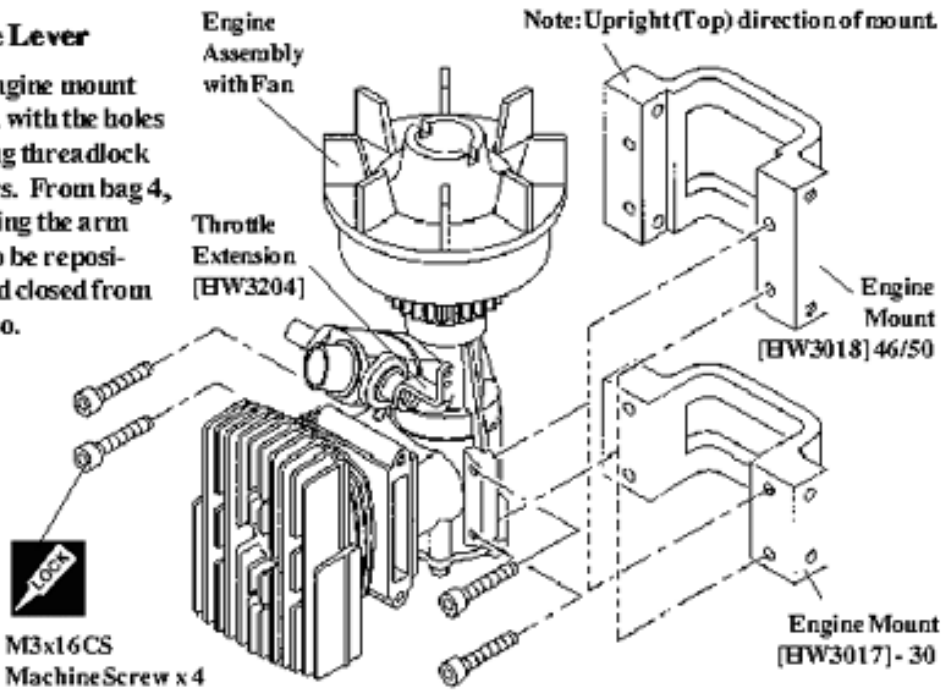
Machined Throttle Extensions

(Optional Parts)
CN2153 for OS32SX & TT36H
CN2154 for OS50SX-H

Step 19 Engine Mount & Throttle Lever

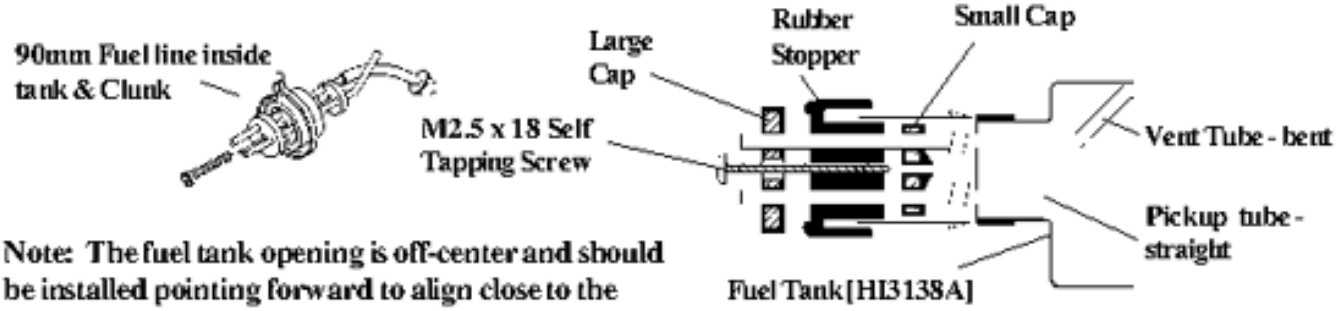
Secure the engine assembly on to the engine mount (46SE make sure the mount is installed with the holes closest to the bottom of the engine) using threadlock on the four 3x16mm Socket Cap Screws. From bag 4, install the Throttle Extension by removing the arm supplied on the engine. The arm has to be repositioned to get equal throw, both open and closed from 50 %. Be sure to use threadlock here also.





Step 20 Fuel Tank Assembly

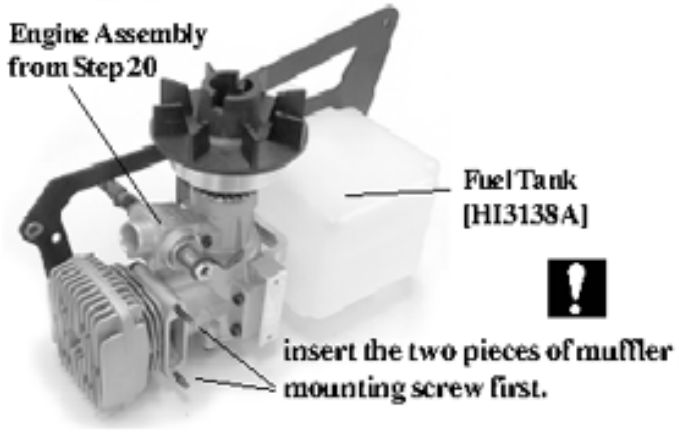
From parts bag 3, insert the two pieces of aluminum tubing through the large cap, rubber stopper and small cap, bend the long aluminum tube upwards and attach the short piece of fuel line and clunk to the short straight piece of tubing. Test fit the assembly into the Fuel Tank and make sure that the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

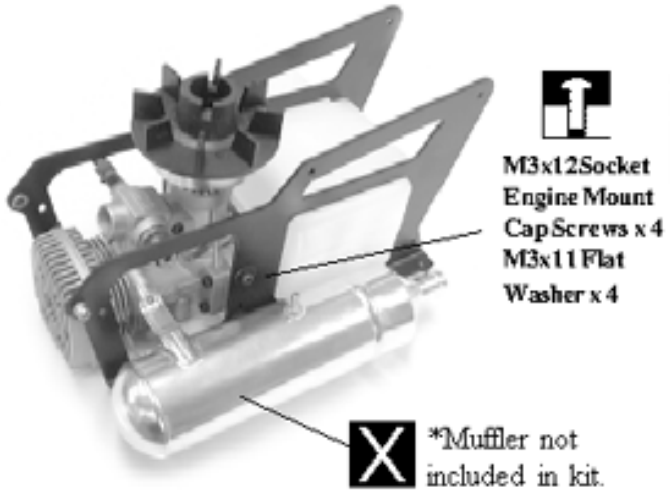


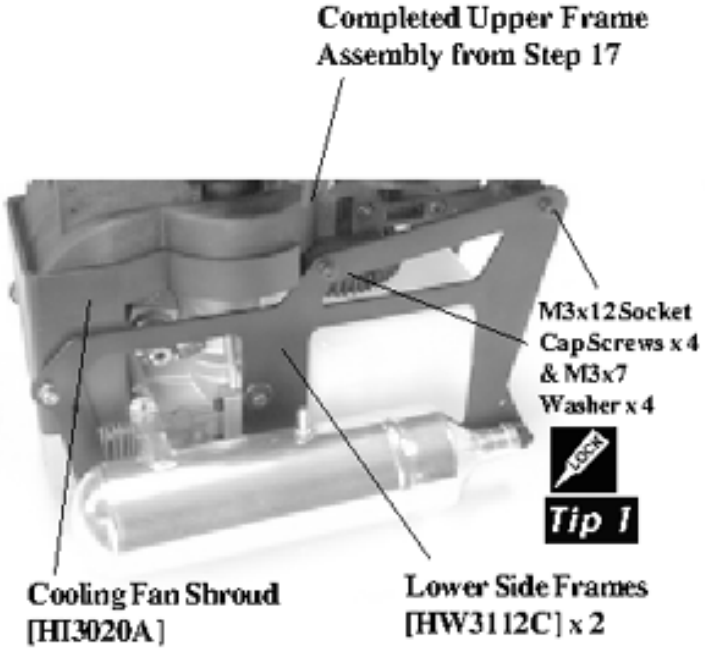
Note: The fuel tank opening is off-center and should be installed pointing forward to align close to the carburetor.

Step 21 Lower Frame Assembly

Attach the right lower frame (R) to the upper frame assembly using threadlock with two M3 x 7 washers and 3x12mm Socket Cap Screws (***Tip 1***). Slide the cooling Fan Shroud over the engine head and position the engine assembly into the upper frames while attaching the engine mount using threadlock and two M3 x 11 flat washers and M3x12 Socket Cap Screws, through the R side frame (leave these loose for now). Install the muffler screws at this time as it is not possible when the side frames are attached. Slide the fuel tank assembly through the frame and attach the left lower side frame (L) to the upper side frames using threadlock with two M3x7 washers and two M3x12 Socket Cap Screws. Attach two M3x12 Socket Cap Screws and two M3x11 Flat Washers to the engine mount on the L side, loosely for now.

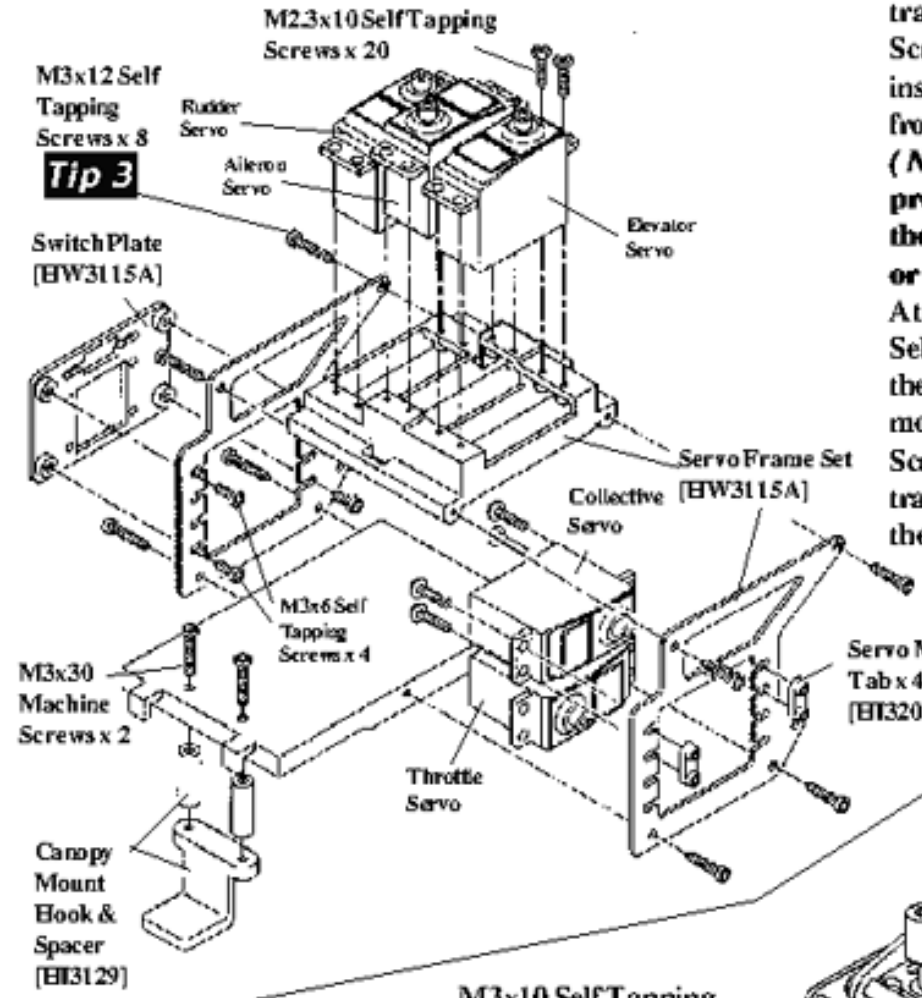


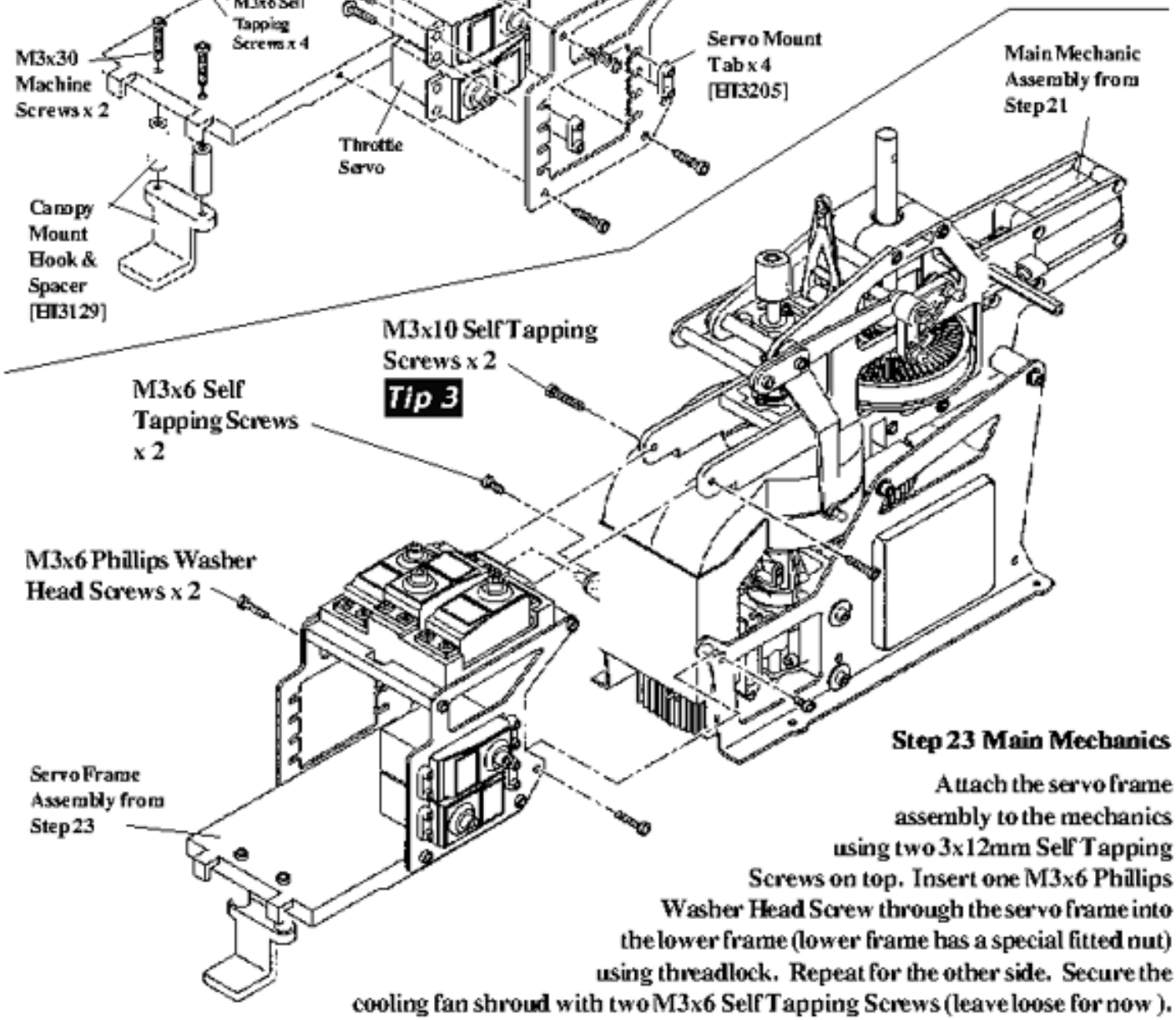




Step 22 Servo Frame Assembly

From parts bag 5, assemble the servo tray using four 3x12mm Self Tapping Screws (***Tip 3***). This is a good time to install the collective and throttle servos from the **inside of the 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 switch mount using four 3x6 Self tapping screws from the inside of the vertical support and the canopy mount using two 3x30 Phillips Machine Screws through the top of the battery tray, through the plastic spacer and into the canopy mount hook.





Step 23 Main Mechanics

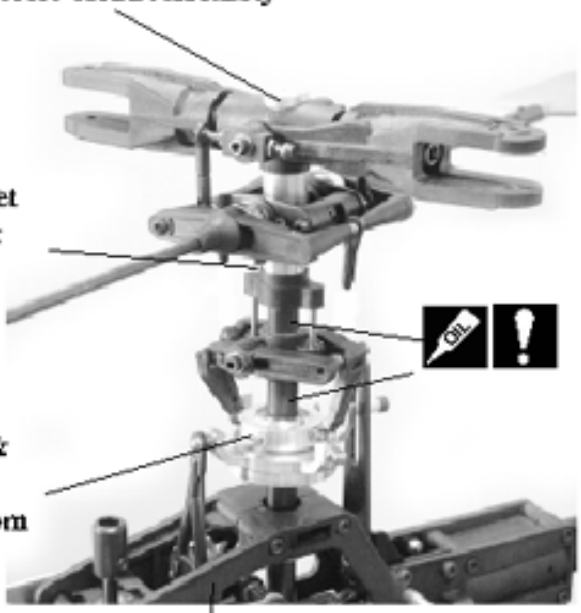
Attach the servo frame assembly to the mechanics using two 3x12mm Self Tapping Screws on top. Insert one M3x6 Phillips Washer Head Screw through the servo frame into the lower frame (lower frame has a special fitted nut) using threadlock. Repeat for the other side. Secure the cooling fan shroud with two M3x6 Self Tapping Screws (leave loose for now).

Step 24 Final Rotor Head Assembly

Completed Rotor Head Assembly from Step 6

M3x16 Socket Cap Screw & M3 Locknut

Swashplate & Washout Assembly from Step 8



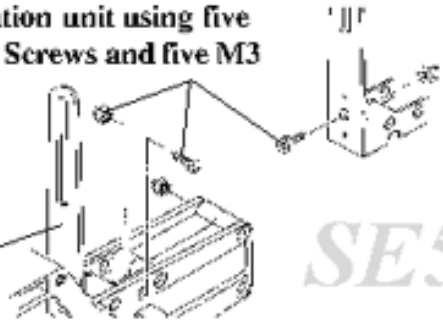
Main Mechanic Assembly from Step 23

Slide the washout assembly from Step 6 onto the main shaft and snap the elevator lever arm onto the 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. Secure with one 3x16mm Socket Cap Screw and 3mm locknut (from Bag 2). **(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 causes of any resistance to free movement which will cause servo strain leading to premature wear and will appear as a jump in altitude when flying the helicopter.

Install the anti-rotation unit using five M3x10 Socket Cap Screws and five M3 locknuts.

Antirotation Bracket SE-50 [CN2208B]



Step 25 Attaching Muffler

Attach the muffler to the engine with the screws provided with the muffler (***Tip 1***). Attach the pressure tap to the top of the muffler and the M4x6 Phillips Machine screw to the bottom hole in the muffler.

Optional
CN3033 - 30SE
CN3033B - 50SE
Speed Torpedo
HV Muffler

Not Included

Tip 1

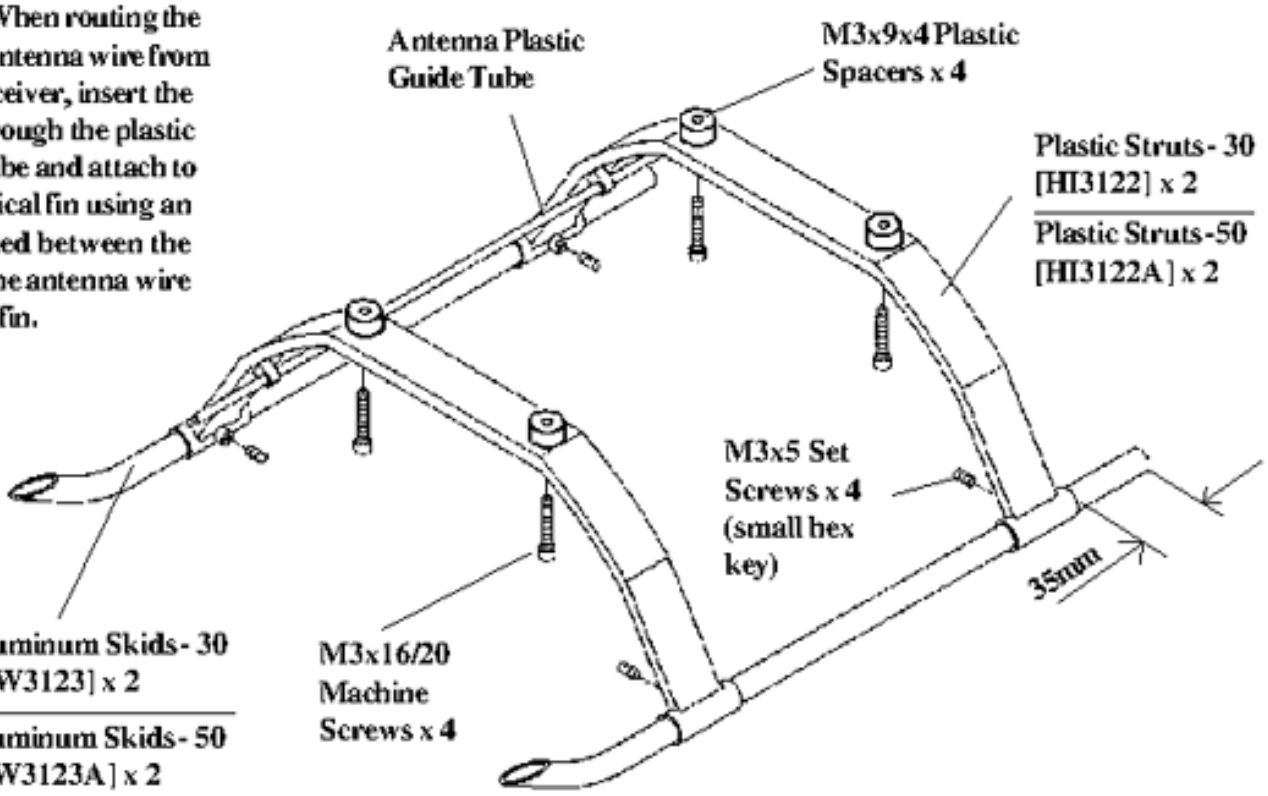
Tip

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 26 Landing Gear Assembly

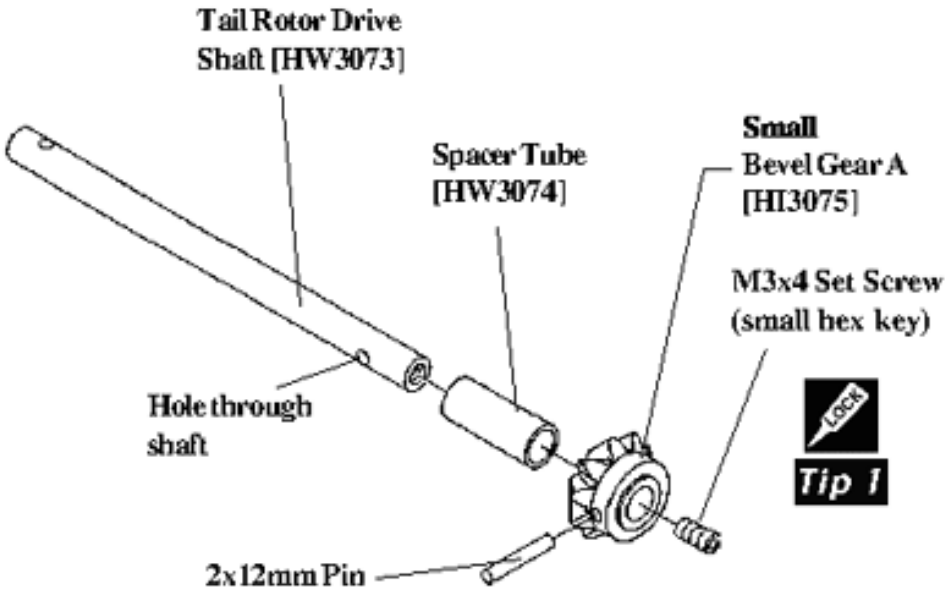
From parts bag 6, assemble the landing gear by attaching the Aluminum Skids through the Struts, securing them with four 3x5mm Set Screws. Set the distance from the rear of the skid to the strut at 35mm. Attach the landing gear to the main mechanics using four 3x16mm(30) or 3x20mm(50) Machine Screws inserted from the bottom of the struts and through the M3x9 plastic spacers into the lower side frames and secure with four M3 locknuts.

Tip When routing the antenna wire from your receiver, insert the wire through the plastic guide tube and attach to the vertical fin using an elastic tied between the end of the antenna wire and the fin.



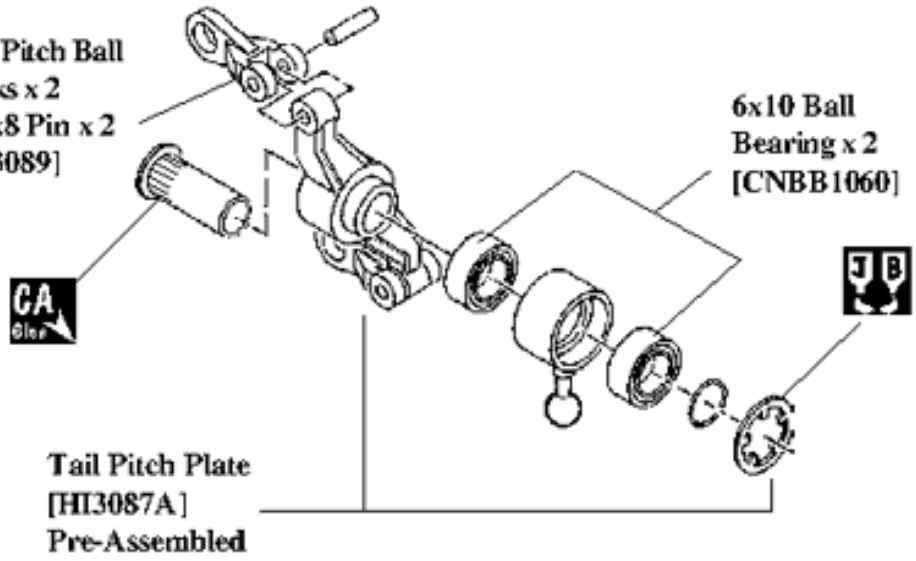
Step 27 Tail Output Shaft Assembly

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 (***Tip 1***) using threadlock. Slide the Spacer Tube onto the shaft and position against the gear.



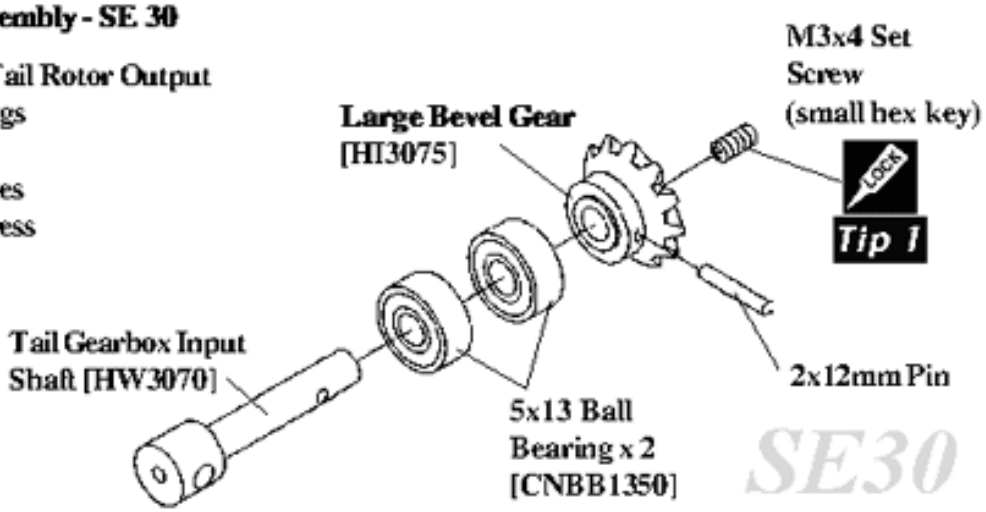
Step 28 Tail Pitch Plate Assembly

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.**) Apply a drop of CA glue between the edge of the brass tube and the plastic pitch plage. Put this assembly aside for now.



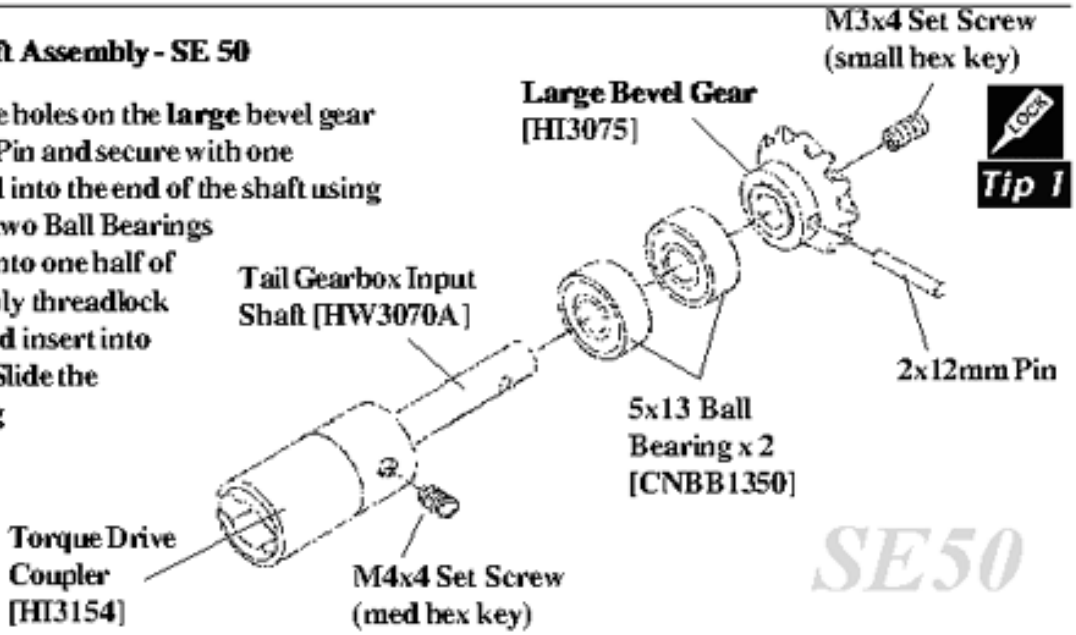
Step 29A Tail Input Shaft Assembly - SE 30

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 (***Tip 1***) using threadlock.



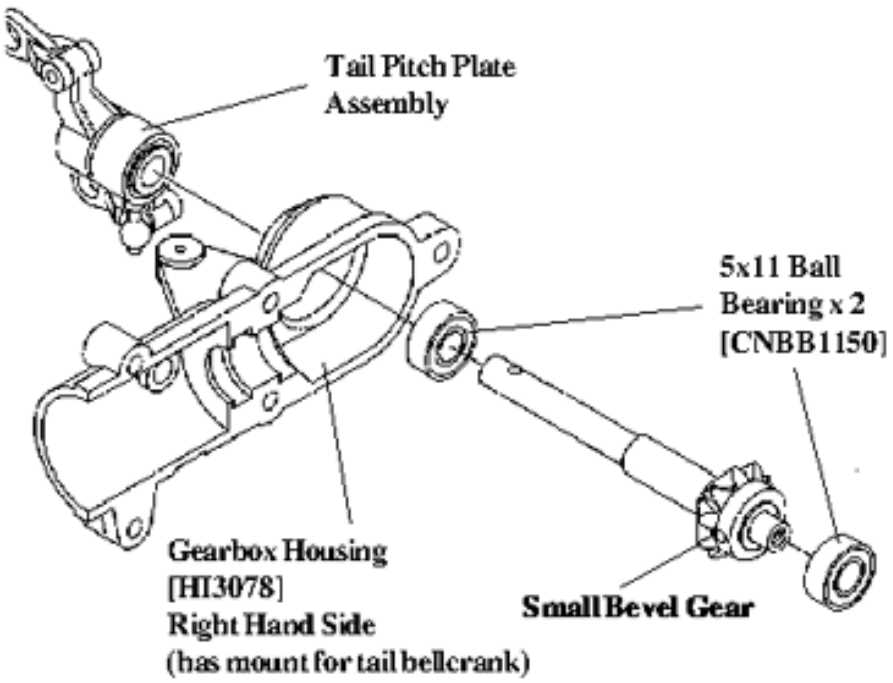
Step 29B Tail Input Shaft Assembly - SE 50

From parts bag 7, align the holes on the **large** bevel gear and press in one 2x12mm Pin and secure with one 3x4mm Set Screw inserted into the end of the shaft using threadlock. Slide (***Tip 1***) two Ball Bearings onto the shaft and install into one half of the tail gear box. Next apply threadlock to the 4x4mm set screw and insert into the torque drive coupler. Slide the drive coupler over the long flat spot until the there is no end play in the shaft and tighten the set screw in place.



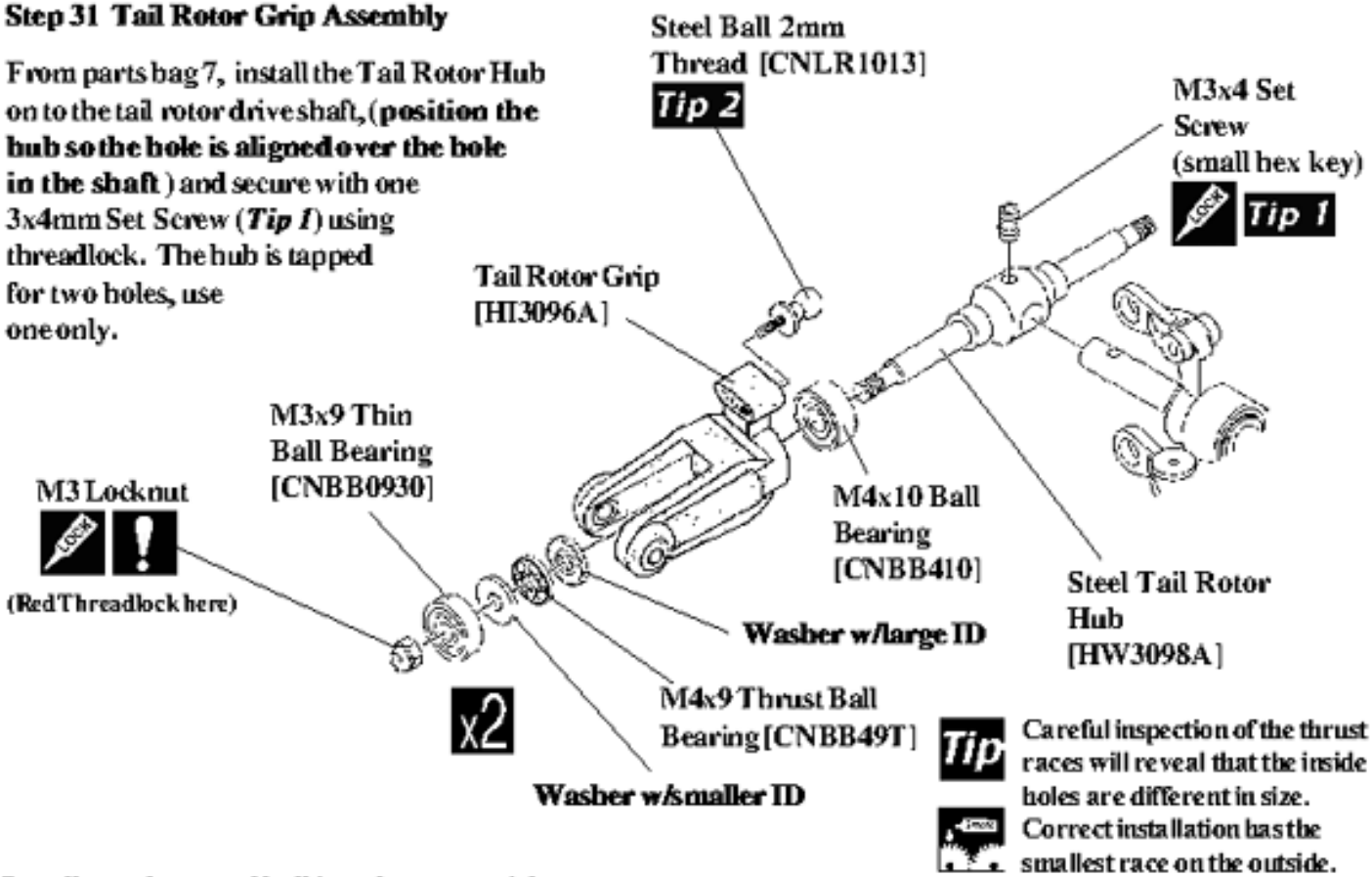
Step 30 Tail Gearbox Assembly

From parts bag 7: Slide two Ball Bearings on each side of the Tail Rotor Output 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 Tail Rotor Grip Assembly

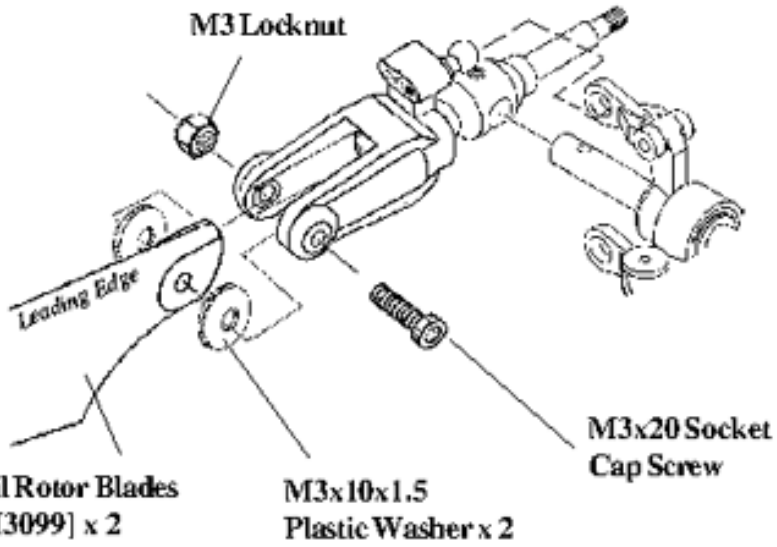
From parts bag 7, install the Tail Rotor Hub on to the tail rotor drive shaft, (**position the hub so the hole is aligned over the hole in the shaft**) and secure with one 3x4mm Set Screw (***Tip 1***) using threadlock. The hub is tapped for two holes, use one only.



Install one short steel ball into the upper right hole in the tail rotor grip (***Tip 2***). Insert one M4x10 Ball Bearing into the blade grip on the ball side (make sure the bearing is fully seated flush into the grip). Slide the grip onto the tail hub and install the first steel washer (**larger inside diameter**) followed by the thrust ball race (remember to grease the ball race), followed by the second steel washer (**smaller inside diameter**). Next insert the M3x5x.05 washer and the M3x9 Thin Ball Bearing. Tighten the locknut slowly until there is no end play and the grip rotates smoothly.

Step 32 Tail Blades Assembly

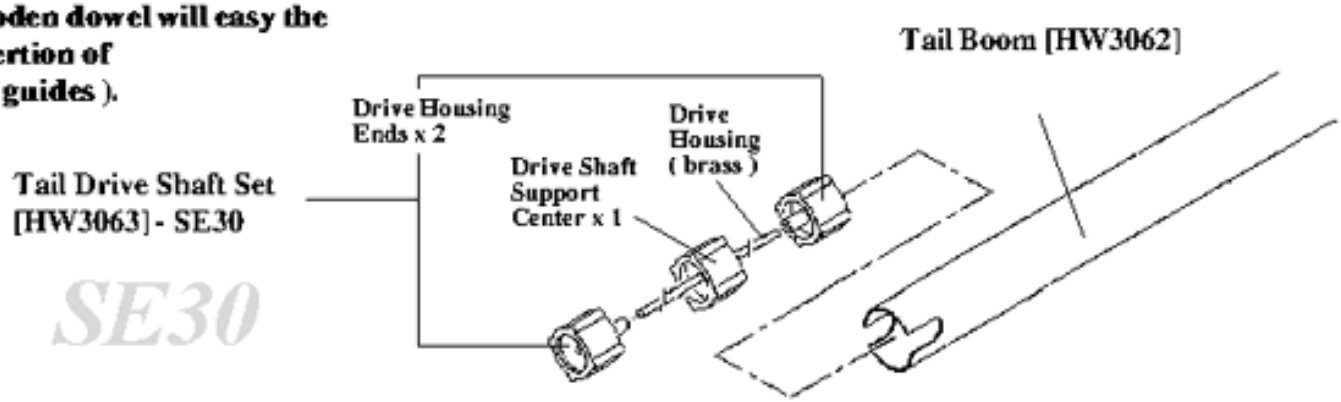
Snap the ball on the tail rotor grip into the adjoining pitch slider link on both sides. Install the Tail Rotor Blades shimmed with 3x10mm plastic washers on both sides using two 3x20mm Socket Cap Screws and M3 locknuts. Note the direction of the blades on the diagram, the straight leading edge of the blade should be on the same side as the ball on the blade grip. To tension the blade bolt, start loose and tighten until the blade holds horizontal but pivots freely when shaken.



Tip After flying the model, if a vibration is noticed on the 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 Tail Drive Shaft & Pushrod Guides - SE30

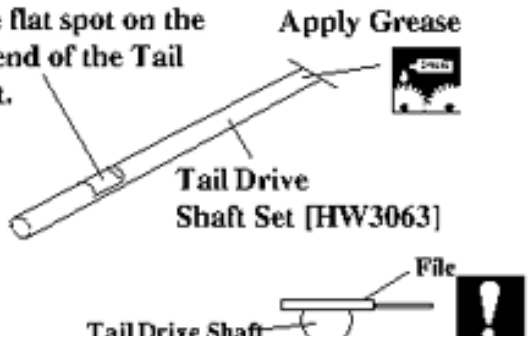
From Bag 7: Insert three tail drive shaft Guides on to the Brass Tail Drive Housing, found in the bottom of the box (**Note that one guide has a larger center hole than the others, slide this one to the center of the brass tube**), add the remaining two onto the ends. Glue the guides into position using 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 easy the insertion of the guides**).



! 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.

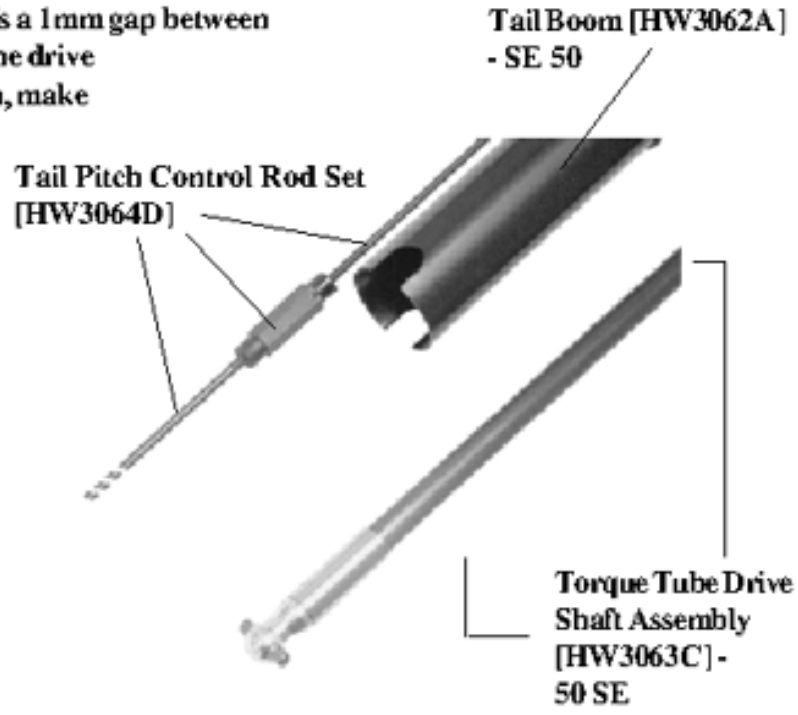
Step 34A Tail Drive Shaft - SE30

For extra security, continue filing until the flat spot is 1/3rd the thickness of the shaft. Thoroughly grease the tail drive shaft ***(Tip 1)*** 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. The long flattened end engages the main mechanics.



Step 34B Torque Tube Drive Shaft Assembly & Pushrod Guides - Falcon 50 SE V2

Packaged with the tailboom is the carbon torque tube drive shaft assembly. This is a complete assembly ready to be installed into the helicopter. Using a light oil, apply a few drops to the ball bearing inside the tailboom guide. This should be done every 20 hours of flight or 3 month intervals. Insert the drive shaft assembly into the tailboom from the end with the 2 holes and position the assembly approximately centered in the tailboom (**apply a little liquid hand soap to ease the insertion of the o-ring guides**). Using one half of the tail gearbox assembly with the tail input shaft installed, continue to insert the drive shaft assembly until there is a 1mm gap between the end of the drive shaft and the bottom of the drive coupler. This is simple with the gearbox open, make sure the tailboom is properly keyed into the tail gearbox. Slide the three tail pushrod guides onto the tailboom inserting the straight end of the long section of the tail pushrod through all three from the back. Thread the pushrod coupler onto the straight end of the long pushrod. The shorter section will be threaded into the coupler later when connecting to the rudder servo.

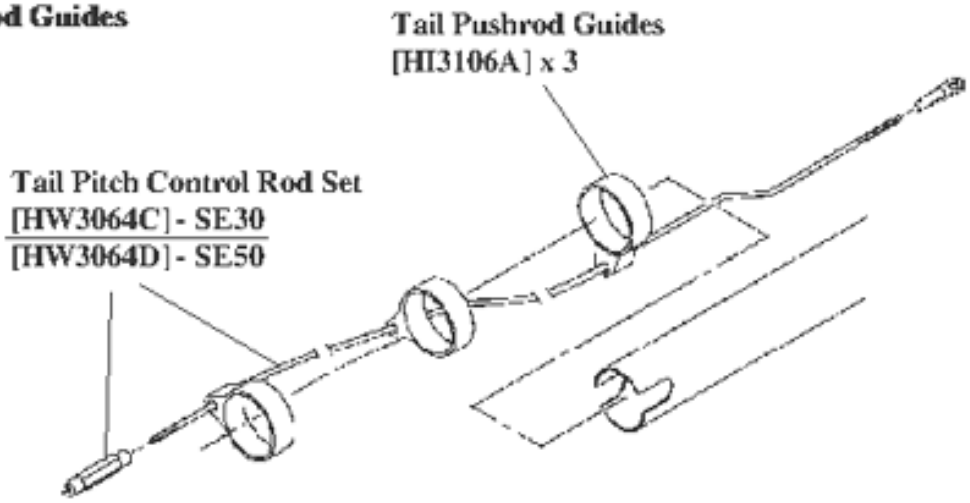


SE50

Having taken time to properly fit the tail gearbox joint will make the front transmission assembly very simple. 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 removable later.

Step 34C Tail Rudder Pushrod Guides

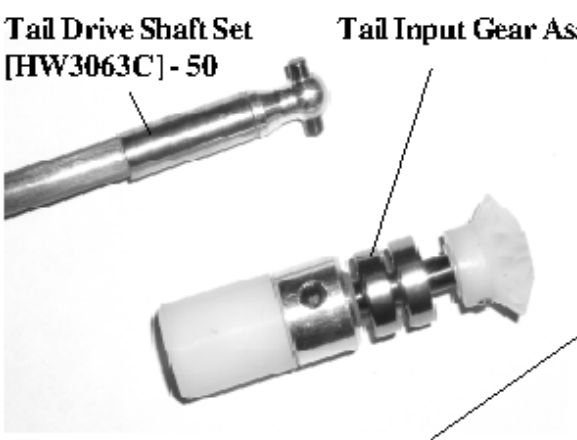
If not already done, slide the three tail pushrod guides onto the tailboom engaging tail pushrod. Attach the pushrod connector and the short pushrod. Align the guides as illustrated in the picture until the pushrod can be moved very smoothly by hand. Once satisfied bond in place with a single drop of Zap Ca. (one drop will allow easy removal later).



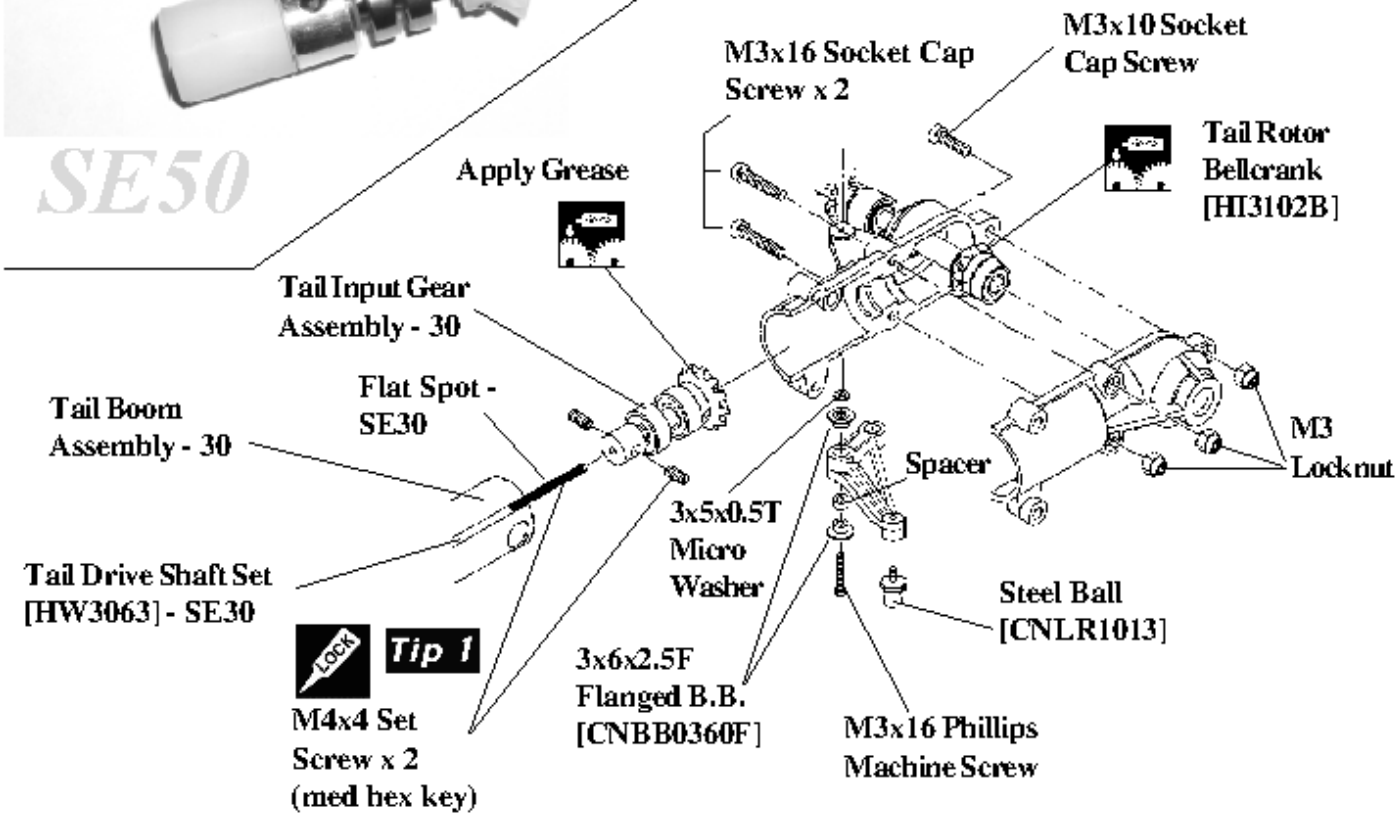
Reminder, after radio set up is complete, glue the pushrod guides using a single drop of Zap Ca. One drop will stop the pushrod from binding and still be able to remove them later.

Step 35B Tail Gearbox Assembly - SE50 V2

When building the SE 50, Part 1 in Step 35A has been completed already. Only follow Part 2 and Part 3 to complete the tail gear box assembly.



Step 35A Tail Gearbox Assembly - SE30 & 50



Part1. Attach the tail input gear assembly on to the drive shaft with two 4x4mm Set Screws (***Tip 1***) **(make sure the flat spot is aligned with one of the set screws and only use ONLY blue locktite here)** apply red locktite to the drive shaft end and insert into the gearbox input shaft. **Warning, do not use red locktite on ANY screw as it is permanently booded in place.**

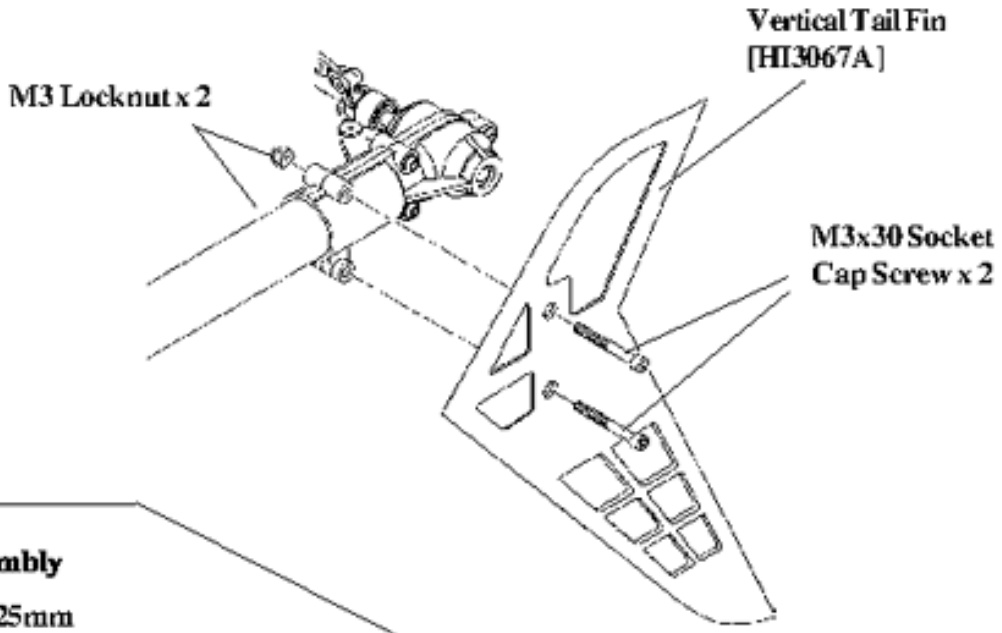
Part 2. Position the output gear assembly into the right gear box half (**insure the 2 bevel gears are meshed properly and the ball bearings are fully seated in their recesses**) and liberally grease the gears before closing the gearbox. Position the gear box halves over the holes in the end of the tail 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.

Part 3. While holding the tail bellcrank, thread in one short steel ball. Insert one ball bearing from one side, then insert the spacer followed by the second ball bearing. Insert one 3x16mm Phillips Machine Screw through the bellcrank assembly (from the bottom) and add one 3x5x0.5mm micro washer that will fit between the bellcrank and flange on the gearbox. As the screw is tightened, **make sure** the steel ball is engaged in the hole on the bellcrank and the bellcrank turns freely without binding.

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 Vertical Tail Fin Assembly

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.



Step 37 Tail boom Final Assembly

From parts bag 2, insert one 3x25mm Socket Cap Screw into the lower position of the tail output bearing recess and secure with a locknut from the other side.

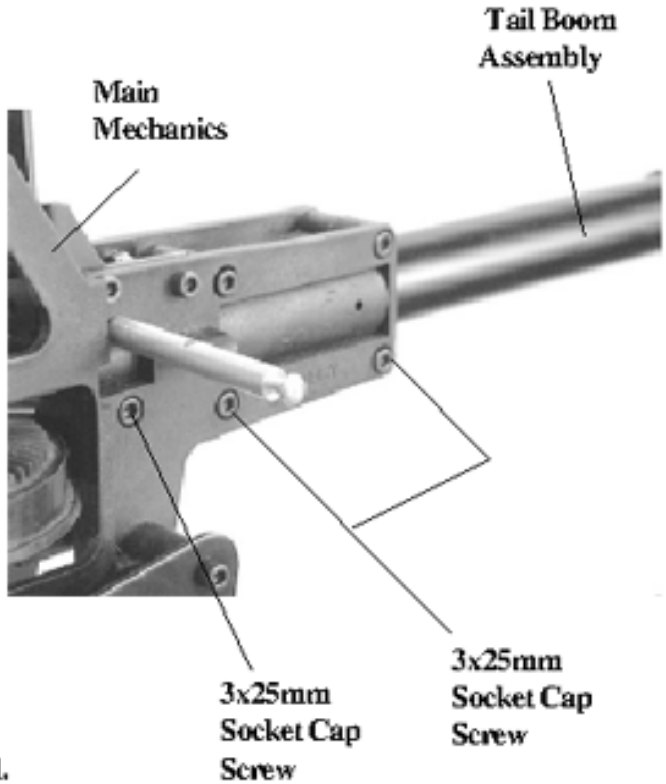
Attach the tail boom assembly to the main mechanics by sliding the tailboom tube into the hole in the rear of the upper frame.

SE30

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.

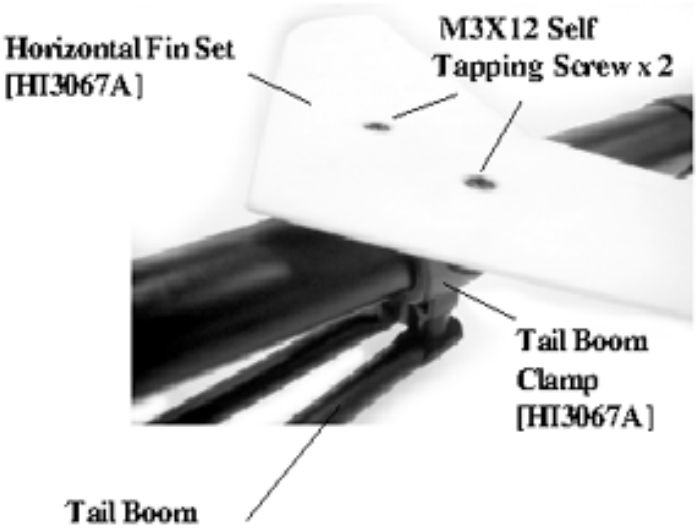
SE50

Slowly press the tailboom in, once the end of the torque tube drive shaft first touches the drive coupler, slowly rotate the tail blades while applying a small forward pressure. As soon as the two are aligned the tailboom will slide until fully seated. Tighten all four Socket Cap Screws firmly to secure the tailboom.

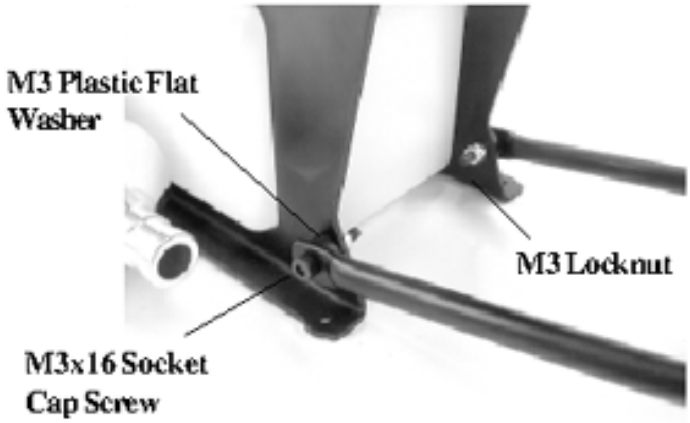


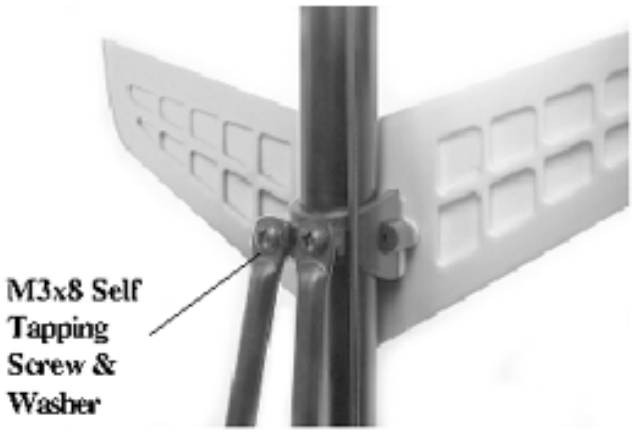
Step 38 Tail Fins & Support Struts

Position two of the pushrod guides infront 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 supports intersect the tailboom.. **Note: the mount for the strut is angled, test fit the strut to position the clamp in the correct direction.** Secure each strut one at a time using one 3x8mm Self Tapping Screw and washer through the strut hole and into the horizontal fin clamp. Attach the lower end to the outside of the lower frame assembly using one 3x16mm Socket Cap Screw inserted through the hole in the strut, then add one 3mm plastic flat washer and finally through the hole in the lower side frames. Secure with a 3mm Locknut from the inside.



Tail Boom
Support Struts
[HW3202B] - SE30
[HW3202C] - SE50





Ball links can be attached to both ends of the rudder pushrod and the pushrod guides can be adjusted in position to get smooth actuation from the rudder servo to the tail rotor bellcrank. Once the pushrod moves smoothly, apply a few drops of medium CA glue to bond the pushrod guides in place. It is extremely important that the guides are bonded, as a loose pushrod guide will move, continually changing the center or neutral position of the rudder channel. This will affect all other setup adjustmenst and make flying the helicopter difficult to impossible.

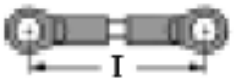
Step 39 Pushrod Setup and Adjustments

Make up all the control pushrods according to the specified lengths shown in the table. Please note that the dimensions listed are from center to center of the plastic rod-ends (this has changed from earlier manuals). Fine tuning is required depending on the servo brand and the horn style chosen.

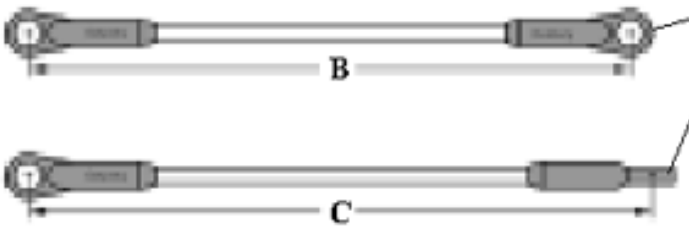
After attaching the pushrods to the helicopter, the washout arms will be level at 0° collective for 3D flying. Beginners should follow the setup steps and pitch curves for Hovering in the final adjustments.
Note: It is very important that before you install the pushrod linkages that you first charge your radio then remove all the servo horns from the servos and center all the mechanical or electronic trims on the radio.

Note: All dimensions are in millimeters and are measured from the center of the control balls or ball ends.

Pushrod Set [HW3192] **Ball Link Set [HI3145]**

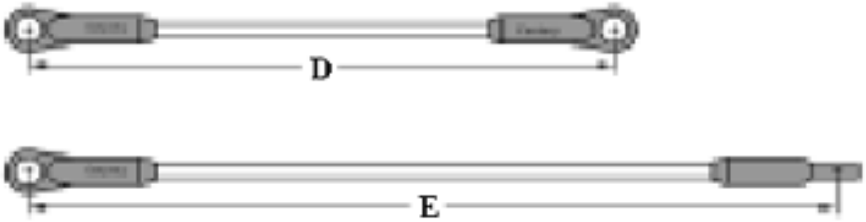


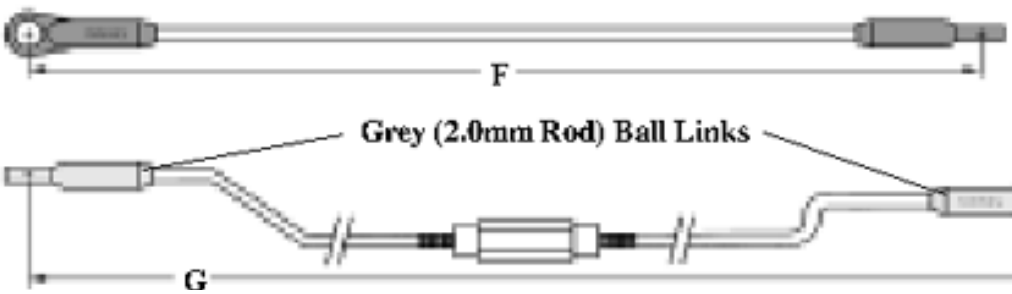
Location	ID	Rod	Sport	3D
Washout to flybar (2)	A	25	44	47
Throttle servo 30	B	75	96	96
Throttle servo 50	B	75	92	92
Bell mixer to SWP (2)	C	80	97	99
Collective pushrod	D	75	95	93
Elevator pushrod	E	105	128	128
Aileron pushrod (2)	F	128	151	151
Bell mixer to seesaw (2)	I	15	28	26
Tail rotor pushrod 30	G		763	763
Tail rotor pushrod 50	G		823	823



Black (2.2mm Rod) Ball Links

(Optional Part)
CN2255 Control Rod Setup Gauge - Easily duplicates pushrods by attaching a master pushrod and match new pushrods as they are assembled. Gauge has millimeter scale for accurate lengths center to center.



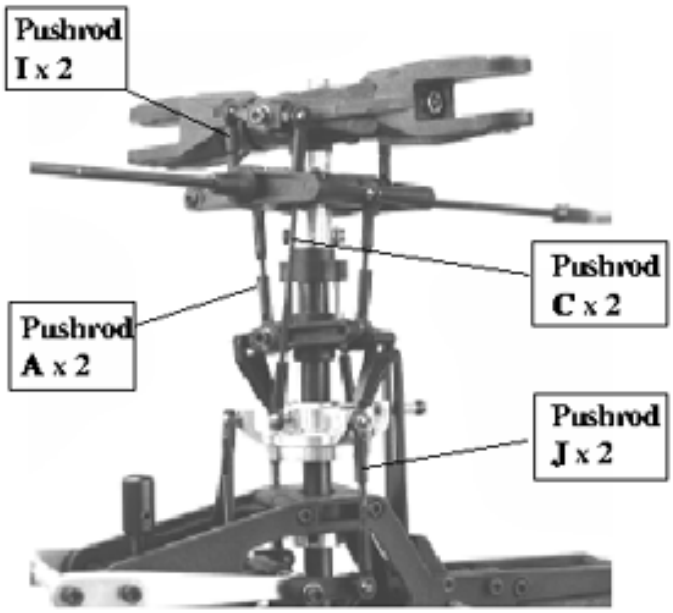


Tail Pitch Control Rod & Connector
[HW3064C] - SE30
[HW3064D] - SE50

Step 40 Rotor Head Linkage

When attaching all pushrods, make sure that all same length pushrods are actually the same length from the beginning, otherwise it will be difficult later to figure out where the binding or mixing problems are coming from. Attach the following:

2	Flybar to Washout pushrods	(A)
2	Bell Mixer to Seesaw pushrods	(I)
2	Bell Mixer to Inner Swashplate pushrods	(C)
2	Aileron Bellcrank to Outer Swashplate	(J)



Tip

When removing the rotor head, simply remove the pushrods that attach to the outer ring of the swashplate. After removing the bottom M3x16 Socket Cap Screw from the autorotation unit and loosening the mast stopper set screws, the entire rotor head can be removed.

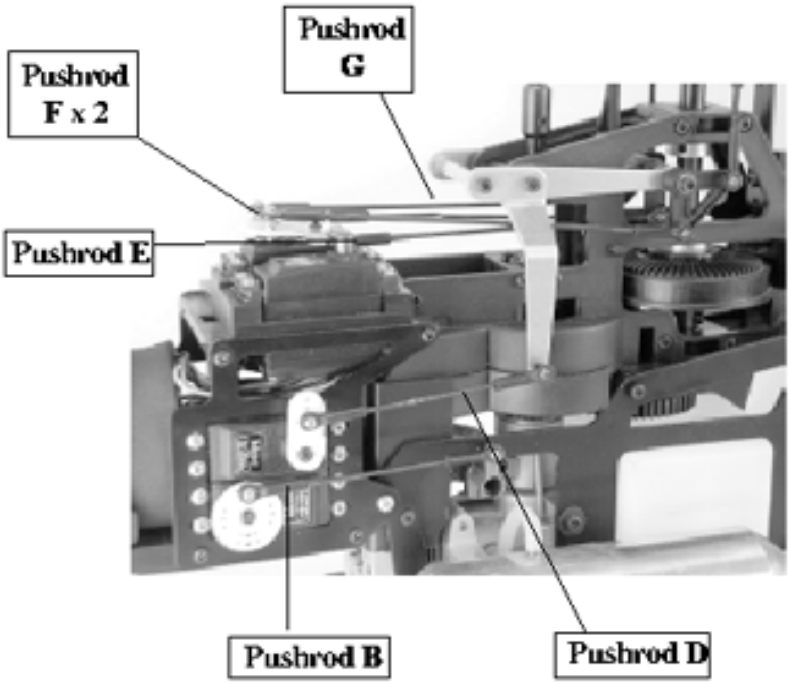
Step 41 Roll, Elevator, Collective, Rudder & Throttle Linkage

1	Tail rotor pushrod	(G)
2	Roll (aileron) pushrods	(F)
1	Fore/Aft (elevator) pushrod	(E)
1	Collective pitch pushrod	(D)
1	Throttle pushrod	(B)

! Note: the elevator linkage (E) is now located on top of the elevator servo horn, not as shown in the photo.

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

It is important that the next few steps be studied carfully and tested in regards to moving the left and right limits to verify that the servo is not biniding anywhre in its travel. Also, a common mistake is to mount the collective and throttle servos from the outside (having the gromments and eylets on the outside) of the servo frames. The problem is not noticeable until the canopy is attached and these pusrods rub against it.

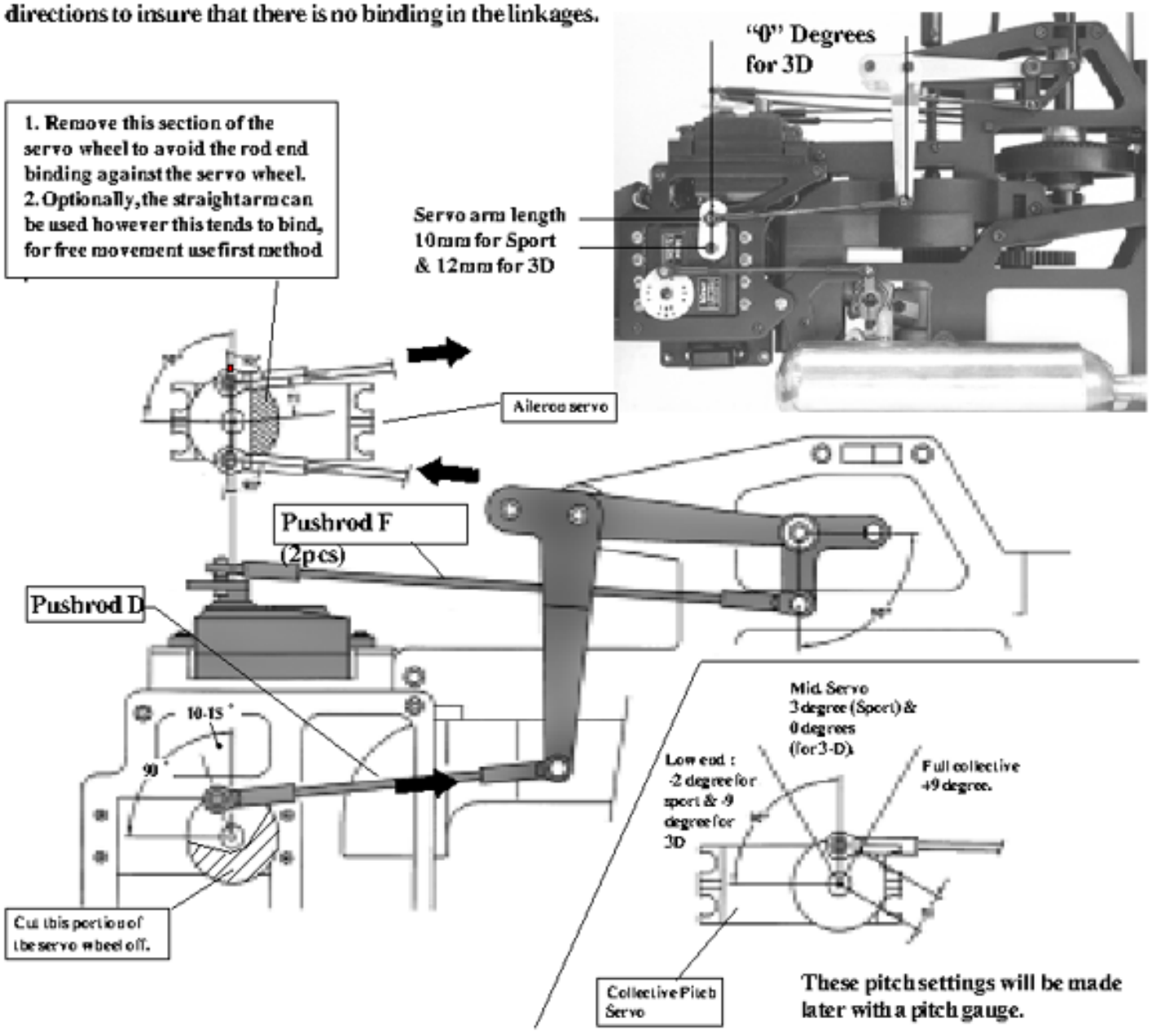


Step 42 Collective & Roll Setup

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

Using threadlock, attach two steel balls with two 2mm nuts to a round servo arm at a distance of 10 to 11mm from the center of the servo (this range may vary depending on your particular servo) and few degrees ahead of the center of the servo. You are trying to get a 90 degree angle between the line described by the pushrods and the line described between the center of the servo and the ball joint on the servo wheel. This will eliminate any stress (wear) on the servo and any undesired collective/cyclic mix. With the radio turned on and the trim centered, attach the servo horn and the Aileron Bellcrank Pushrods (F). Some slight adjustment may be necessary to have the swashplate sit level or 90 degrees to the main shaft when viewed from the the 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, use threadlock to attach one steel ball with one 2mm nut to the servo horn at a distance of 10mm for a sport set up (12mm for 3D) from the center of the servo. With the Collective/Throttle stick on the radio in the center press the servo horn onto the collective servo so the ball is at 90 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.



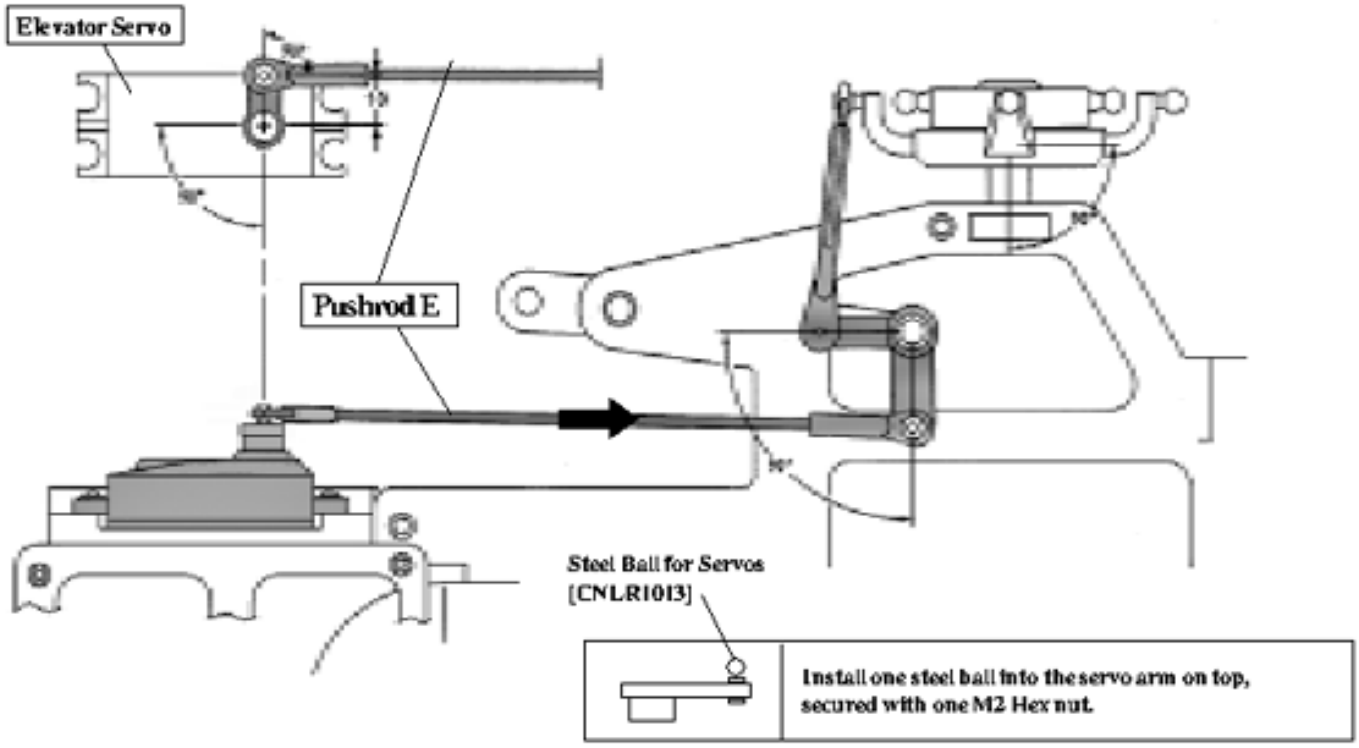
Step 43 Elevator Linkage

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).

From Bag 4: 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 10-11mm from the center of the servo, 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 for a 90 degree angle between the control rod and the servo arm. **It is important that the swashplate sit at 90 degrees to the main shaft.** The elevator bellcrank should align with the two roll bellcranks at mid servo travel of the collective servo.

Tip When trimming the helicopter for stable and stationary hovering using the electronic sub-trim on the transmitter, typically the elevator servo is labeled backwards. Conventions typically use U for up and D for down. Intuition tells you that if the helicopter is moving backwards then a litle U-up trim is needed. Be careful, as in reality to trim the elevator to stop the backwards movement, the value for D-down needs to be increased.

Tip We have repeated mentioned to only use threadlock on the nut only for the steel control balls for the servo horns. The reason is the plastic used in the servo horns becomes very brittle when regular locktite is used, it is better to make sure it does not contact the plastic.



Step 44 Rudder Linkage

The linkage for the tail rotor, changes the pitch of the tail rotor blades to increase or decrease the torque compensation and to rotate the nose of the helicopter about the main shaft.

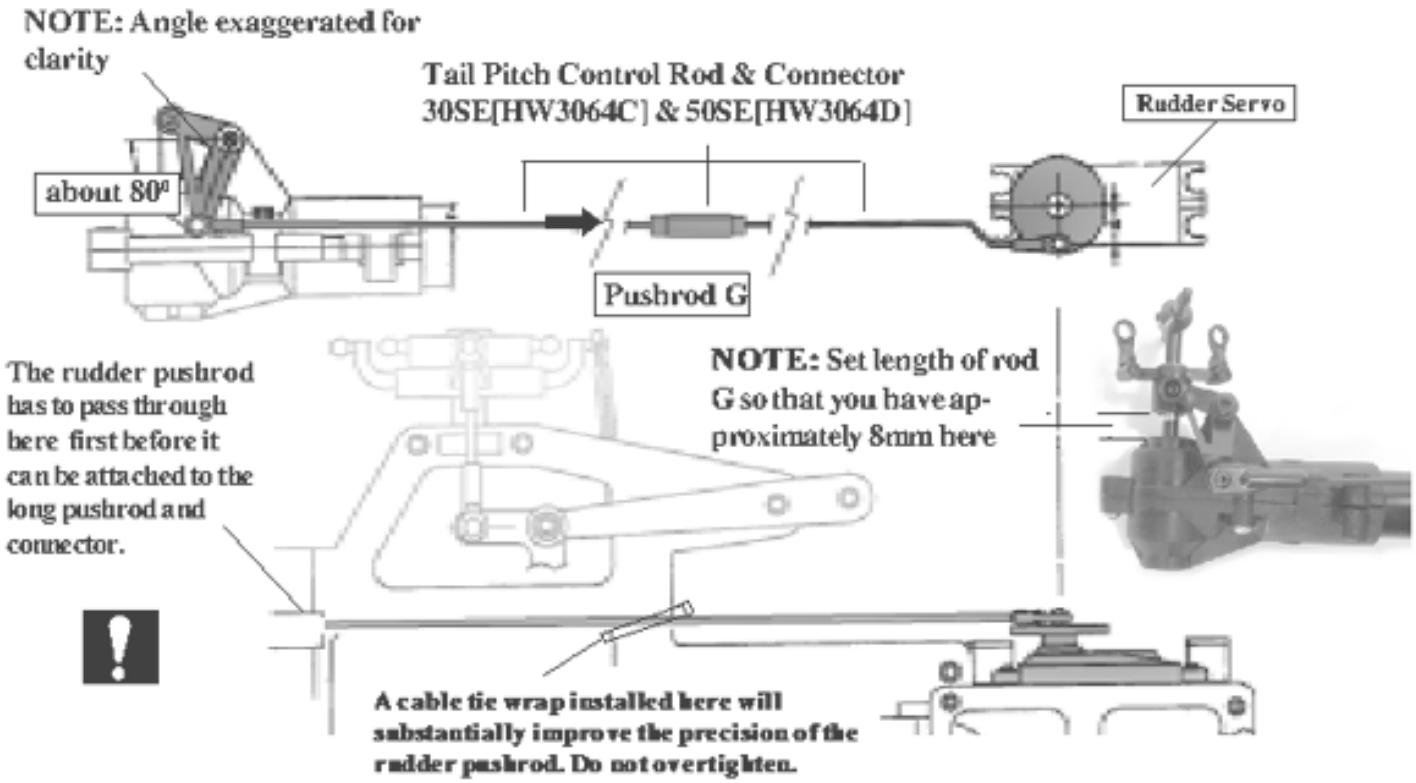
Use a servo horn in the shape of a cross and trim 3 of the 4 arms off. Using threadlock, install one steel ball and one 2mm nut at a distance of 10mm from the center of the servo. Thread the front part of the tail rotor control pushrod (the short part) (G) through the guide in the upper frames. Thread the rear end of it into the hex connector and attach the ball link to the servo end. Having the radio on and the rudder trim centered, press the servo horn onto the servo set at 90 degrees to the servo and align the rudder bellcrank so that there is approximately an 8mm space between the bearing in the housing and the side of the pitch slider.

Tip

The accuracy of the rudder pushrod really comes down to the type of gyro that will be installed in the helicopter. From a beginner standpoint, a *heading-lock* or *rate* gyro are good choices however, if the *heading-lock* type of gyro is selected make sure that the rudder servo speed is within the range specified by the gyro manufacturer. Choosing a *heading-lock* gyro and using a regular servo will lead to premature failure of the servo, crashing the helicopter.

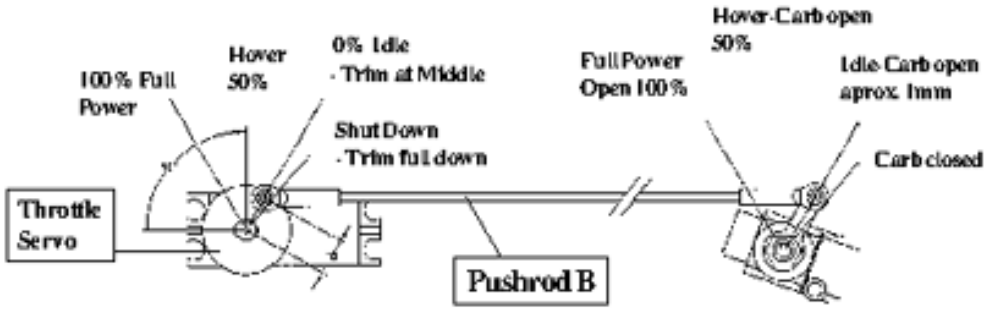
Our general recommendation is to get a piezo rate gyro but if *heading-lock* is desired, get one with both modes.

We recommend that a cable tie wrap be installed to better support the rudder pushrod in the front section of the mechanics. This is not provided but is a simple way to allow a higher gain setting on the gyro.



Step 45 Throttle Linkage

From Bag 4: Using threadlock, attach one steel ball and one 2mm nut, to both the Throttle servo horn and the Throttle Extension from Step 19. 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 approximate 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. Be sure there is no servo binding at low and high throttle.



Tip

Pushrod B will vary in length slightly as the position of the carburetor is different for each engine manufacturer. Following the above instructions will allow you to get the carburetor setup correctly.

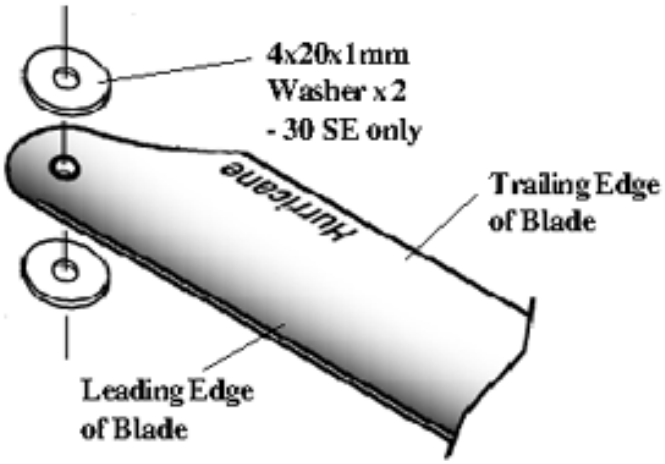
Step 46 Care and installation of Hurricane Carbon Blades

The Main Rotor Blades included in the kit are pre-finished and balanced fiberglass and carbon fiber composite rotor blades. Care must be taken in handling composite blades to keep them in excellent condition. Do not compress any portion of the blade from the trailing edge to the center spar as it is hollow. In the event of a crash-landing discard rotor blades, scuffs or marks on the blade tips maybe the only visible damage however there is no method for inspecting the internal structure of the rotor blades for stress cracks which can cause total blade failure at an unpredictable time. Also, do not store rotor blades indoors in direct sunlight or near heat sources for any period of time, as this can cause the blades to warp. Simply wipe blades clean after flying.

To install blades on the 30SE, (**press out the brass bushing from the blade bolt hole**) place one 4x20mm washer on top and bottom of the 30SE blade before sliding into the rotor grip. To install both blades, insert one 4x30mm Socket Cap Screw through the top grip and secure using one 4mm Locknut. Repeat for opposite rotor blade. Blade bolt tension will affect how the blades perform. To set proper tension, start from loose blades (bolt is loose enough for the blade to pivot freely from the grip) and tighten the bolts a little at a time until the blades will hold straight as the helicotper is tipped on its side. Slightly tighter is good. Too tight and a vibration will occur, too loose and a tail boom strike can happen. Tail blades can be set the same way.

CN2400 Hurricane
Symmetrical 550mm - 30SE

CN2412 Hurricane
Symmetrical 600mm - 50SE



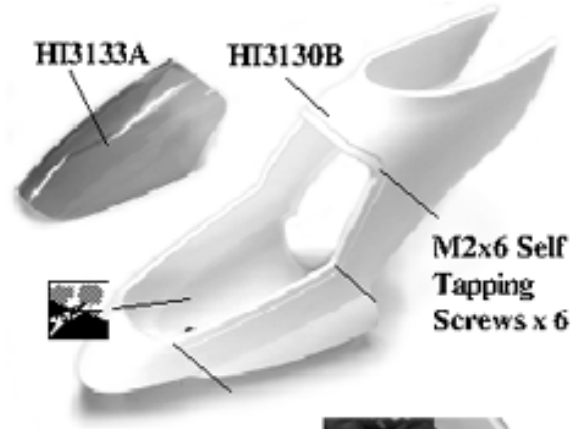
Each kit contains symmetrical rotor blades for sport and aerobatic flying. For your convienence you can also use semi-symmetrical for smooth aerobatics and scale flying.

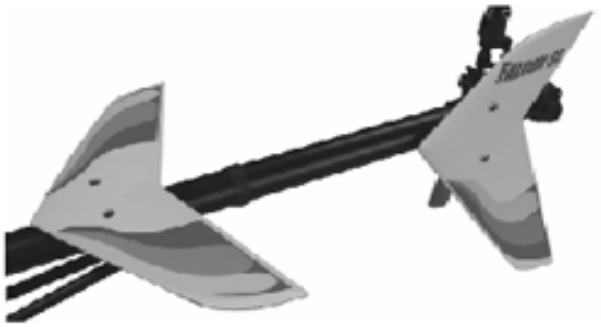
Step 47 Canopy & Decals

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 windshield by taping it to the canopy,. Some additional trimming may be necessary to get a good neat fit. From Bag 5, the inside canopy mount can be installed (**note the direction of the mount, the flairing faces the rear**) with two 3x6mm Self Tapping Screws approximately 134mm from the bottom rear. The clear windshield can be attached using six 2x6mm Self Tapping Screws in Bag **4**, drill six 1mm holes at the locations shown.

Step 48 Canopy Mounts

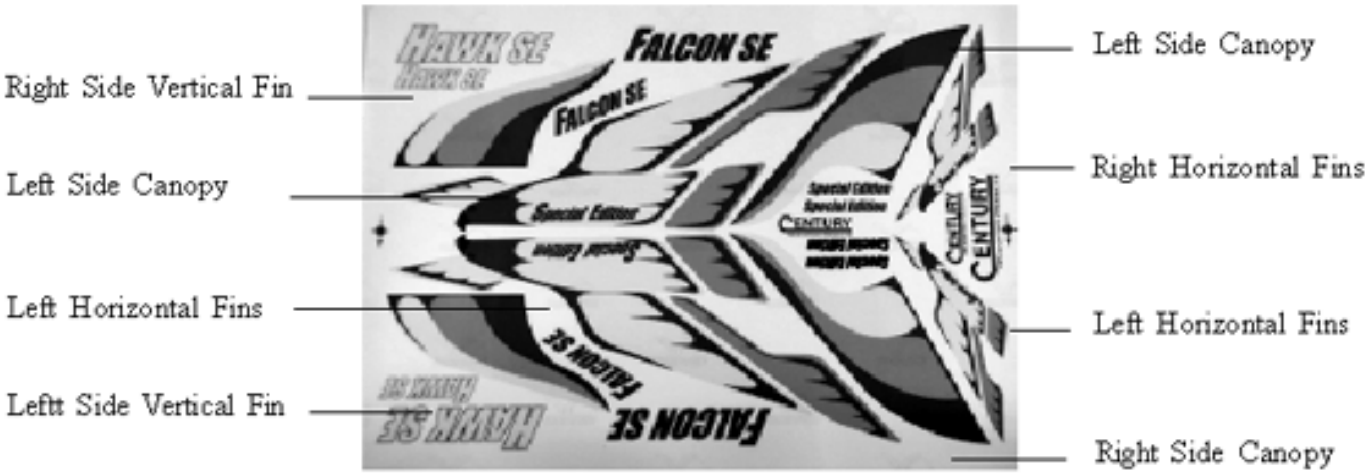
The canopy should be test fitted before the two holes for the rear canopy mount are marked and drilled. Insure the canopy and windshield clears all control rods, radio gear and muffler. Then mark and drill the location of the rear mounting holes and insert the two rubber grommets.





To inprove 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.

Hawk SE30 & Falcon SE50 decal [HI3131K]



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 diagrams on pg 28-31.

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.

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 (by degrees)

Flight Mode	Setup Method	Low Pitch (low stick)	Hovering (mid stick)	High Pitch (high stick)
N	Beginner	0	5	9
N	Hovering	-2	5.5	9
1	Stunt & Aerobatics	-4	5.5	10
2	3D**	-10	0	10
H	Autorotation	-5	5	12

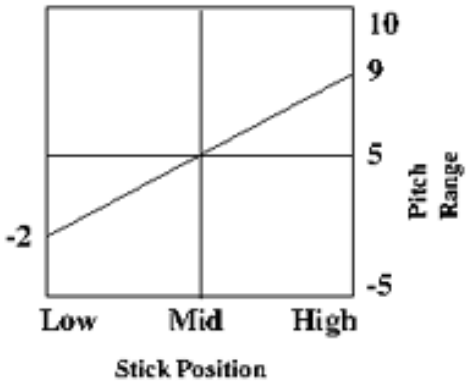
(N - Normal flight mode, 1 - Stunt mode one, 2 - Stunt mode two, H - Throttle hold-autorotation)

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.

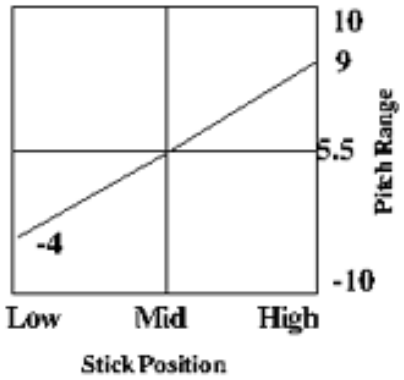
Travel Adjustment (endpoints)
Using endpoints to adjust to the limits of how far the servo is allowed to move is very convenient for fast set-up. If binding occurs simply reduce the travel in that direction. ** Note: by changing one side only (high or low stick) the servo travel is no longer linear which 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 Curve

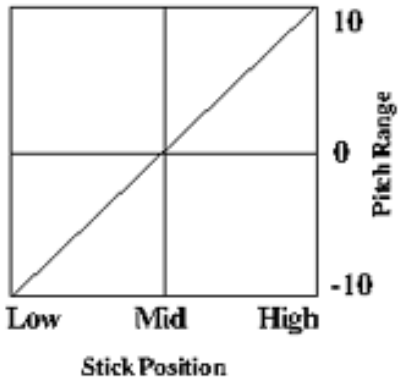
Hovering - (linear) Normal Flight Mode



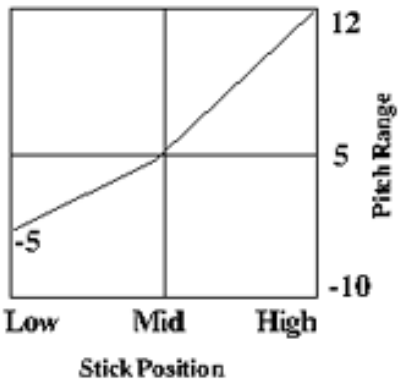
Aerobatic Flying - Flight Mode 1



3D Flying - Flight Mode 2



Autorotation - Throttle Hold

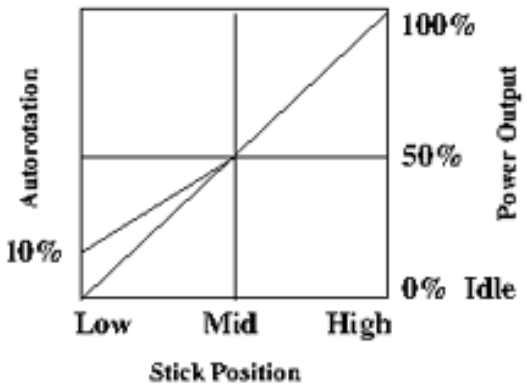


Throttle Curve Adjustments

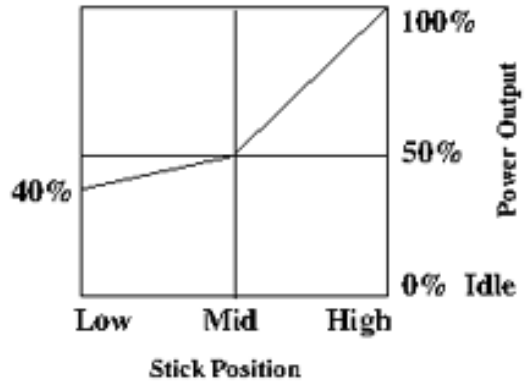
After several tanks of fuel the engine will be run-in, at this time you can modify throttle settings but remember that the smoother the engine the less adjustment required. Not all engine / muffler / fuel combinations are the same which will shift some of the values shown below.

Throttle Curve

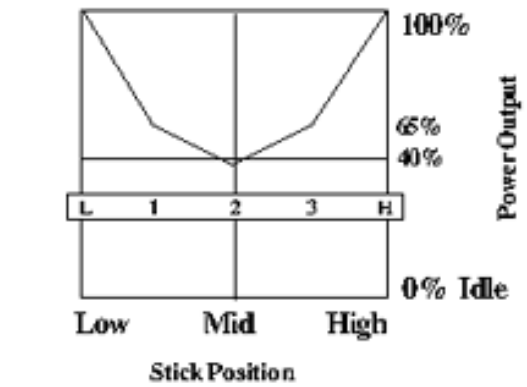
Hovering - (linear) Normal Flight Mode



Aerobatic Flying - Flight Mode 1



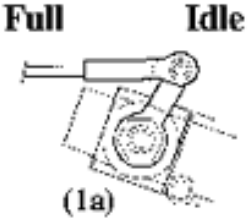
3D Flying - Flight Mode 2



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 for you This should help you to understand the basic operation and tuning of the engine.

Items to recheck:



(1a)

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, 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 can 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. Remove the pressure line from the muffler. Fill the tank until you start to see fuel in the pressure line. Reverse the pump for 1 second and reattach the pressure line to the muffler. Disconnect the lines starting with the fueling line and reconnect to the line 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. In this 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. Be sure the throttle control stick is set to the idle position.

4) Cranking the engine over.

- Prime the engine by moving throttle stick to half **(insure the glow plug driver is not connected to the engine)** and crank the engine over for 10 to 15 seconds until you can see fuel come up the fuel line and into your carburator. Then keep it turning over for another few seconds to insure the fuel has entered the cumbustion chamber. If fuel does not rise into the carb then check for blockage, proper needle valve opening and proper carburator barrel opening (approximately 1/16 of an inch).
- Move the throttle stick to the low position with the trim in the center.
- **NOW** connect the glow plug to the 1.5V glow driver battery
- Place one hand firmly on the rotor head. **You must always hold onto the rotor head during start up.** 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 important to make sure you are standing/kneeling on the fuel line side to facilitate this.
- Place the start wand into the hex coupler and push down. Before you start, rotate the coupler counter clockwise until you feel the compression increase. Rotate the shaft past that point to insure the engine isn't flooded.
- Press the button on the electric starter to turn the engine over. There will be an initial popping sound as the engine turns over and within a few seconds the engine should start. When it does, continue to hold the rotor head, disengage the start wand as in structed on page 8 and put down the electric starter. Disconect the glow driver and move the throttle trim down or up 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 at this time.

5) If the engine does not start. Do not continue to crank the engine over if it does not start after a few attemps. 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 b) not enough fuel is getting to the carburetor c) too much fuel is entering the carburetor. Assuming you have gone through step 1 on this page. Connect the starter to a 12Volt source and verify that the starter will turn the starting hex coupler counter-clockwise.

a) Remove and check the glow plug, is the glow plug dry or wet? Connect the glow driver to the glow plug and verify that the element glows a bright orange color, If you get a dull orange glow then your glow starter is not supplying enough power to the glow plug or your plug is no good.

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 #1 step 4. Again verify that the engine is receiving fuel.

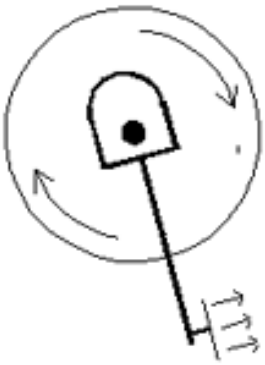
c) Is the engine is very difficult to turn over, to the point that the electric starter has difficulty to turn the engine? If yes, you have filled the engine and carburetor with too much fuel. Do not force the starter as you can damage the starter or engine. This will lead to the stripping of the hex coupler on the start shaft. First, disconnect the glow starter, and pickup the helicopter. Pinch off the muffler pressure line and tip forwards and backwards with the muffler side down. This will drain the muffler of any raw fuel that may have collected there. Next turn the coupler to 90 degrees past the highest compression point. This will open the exhaust port and drain any excess raw fuel from the crankcase into the muffler. Clear the muffler and try to start again. If you have the 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 may be very simple.

Tail Rotor Setup

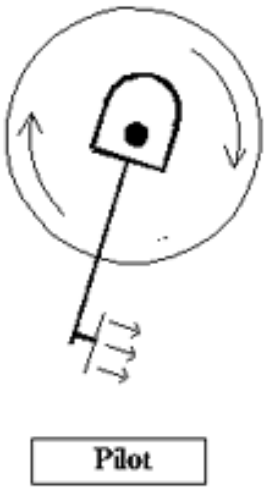
What separates airplane radio equipment from the helicopter version is in the control of the individual curves discussed earlier and in the Revo-mixing*.

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. These setting are set when using regular piezo rate gyros, if using a Heading Hold gyro remove all tail mixing. 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

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 & Low	left	increase revo value to increase tail pitch.
	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.

Hawk 30SE & Falcon 50SE Replacement Part List

CN2230HS	30 SE Crash Kit-(Wooden Main Blades, Main Shaft, Tail Boom, Feathering Shaft and Flybar)	1
CN2230FS	50 SE Crash Kit-(Wooden Main Blades, Main Shaft, Tail Boom, Feathering Shaft and Flybar)	1
HW3000	Hardware Pack	1
HW3005A	Starter Shaft Set	1
H13007	Starter Shaft Bearing Blocks	1
H13009	Cooling Fan	1
H13010A	Machined Clutch Bell & Lining	1
H13010B	Clutch Gear Only 26T	1
HW3011	Clutch Shoe	1
HW3017	Engine Mount - 30	1
HW3018	Engine Mount - 46/50	1
H13020A	Cooling Fan Shroud	1
HW3024	Collective Pitch Lever Set	1
H13031B	Aileron Bellcranks (L&R Cyclic)	2
H13032B	Elevator Lever Set	1
H13035A	Adjustable Cyclic Pushrod Links	2
H13040	Counter Drive Gear	1
HW3042	Primary Drive Shaft	1
HW3045	Alloy Drive Gear 13T - 30SE	1
HW3045A	Alloy Drive Gear 14T - 50SE	1
HW3050	Autorotation One Way BB Set	1
HW3053A	Main Shaft - 10mm	1
HW3054A	Main Shaft Lock Ring - 10mm	1
H13056	Main Gear	1
HW3057	Tail Drive Bevel Gear	1
HW3059	Tail Drive Primary Shaft - Wire	1
HW3059A	Tail Drive Primary Shaft w/Spacer - Torque	1
HW3062	Tail Boom - 30	1
HW3062A	Tail Boom - 46/50	1
HW3063	Tail Drive Shaft Set - 30SE Wire	1
HW3063C	Tail Drive Shaft Set - 50SE Torque	1
HW3064C	Tail Pitch Control Rod & Connector - 30SE	1
HW3064D	Tail Pitch Control Rod & Connector - 50SE	1
H13067A	Tail Pin Set	1
HW3070	Tail Gearbox Input Shaft	1
HW3070A	Tail Gearbox Input Shaft - 50SE Torque	1
HW3073	Tail Gearbox Output Shaft	1
H13074	Spacer Tube	1
H13075	Tail Gear Set	1
H13078	Tail Gearbox L&R	1
H13087A	Tail Pitch Plate Set	1
H13089	Tail Pitch Ball Links	2
H13096A	Tail Blade Grip Set (1 piece/3 BB type)	2
HW3098A	Tail Rotor Hub - 1 piece steel	1
H13099	Tail Rotor Blades (Pair)	1
H13102A	Tail Pitch Lever Set - 30SE	1
H13102B	Tail Pitch Lever Set - 50SE BB type	1
H13106A	Tail Pushrod Guide Set	3
H13107	Upper Side Frames	2
H13107A	10mm Bearing Spacer 14x19x1	2
HW3112C	Lower Side Frames	2
HW3115A	Servo Frame Set	1
H13122	Landing Struts (Plastic)	2
H13122	Landing Struts, Low Profile (Plastic) - 50SE	2
HW3123	Landing Skids (Alloy)	2
HW3123	Landing Skids (Alloy) - 50SE	2
HW3127A	Hex Frame Spacers, Extension Rod & Canopy Mounts	1
H13129B	Canopy Mount & Hardware	1
H13130B	Canopy Only	1
H13131K	Hawk & Falcon SE II Decal Set	1
H13132G	Hawk & Falcon SE Instruction Manual	1
H13133A	Windshield (for H13130B)	1
H13138A	Fuel Tank w/ Fittings	1
H13145	Ball Links (16 L, 6 S)	1
H13146D	Swashplate Set - 10mm	1
H13152C	Washout Set - 10mm	1
H13152A	Radius Link With Pin Set	2
H13160C	Rotor Head Block - 10mm	1
H13167B	Seesaw Off Set Plate	2
H13167D	Seesaw Bearing Cup - 30SE	2
H13167E	Special Ball M3X6	2
H13167F	Seesaw Bearing Cup - 50SE	2
H13167G	Seesaw Tie Bars, Screws & Spacers	2
HW3170A	Washout Pins 2.6x30mm	2
HW3173	Flybar - 30SE (3mm)	1
HW3173A	Flybar - 50SE (4mm)	1
H13176	Stabilizer Control Arm - 30SE (3mm)	2
H13176A	Stabilizer Control Arm - 50SE (4mm)	2
H13179	Flybar Paddles - 30SE (3mm)	2
H13179A	Flybar Paddles - 50SE (4mm)	2
HW3180A	Feathering Shaft - 6mm	1
H13181	Damping Rubbers	2
H13184	Rotor Blade Grip	2
H13189A	Bell Mixing Arm Set - BB type	2
HW3192	Linkage Set (11 Rods)	1
HW3202B	Dual Tail Boom Support Struts - 30SE	2
HW3202C	Dual Tail Boom Support Struts - 50SE	2
HW3204	Throttle Extension	1
H13205	Servo Mounting Tab Set	10
H13206	Tail Pushrod Coupler	1
CN0402	Hex Coupler	1
CNLR1003	Micro Washer 3x5x0.5T	10
CNLR1013	Black M2 Steel Ball - Short (servos)	2
CNLR1014	Stainless M3 Steel Ball - Short (tail bellcrank)	2
CNLR1015	Stainless M3 Steel Ball - Med (washout arms)	2
CNLR1016A	Stainless M3 Steel Ball - Long (bell mixer)	2
CNLR1017	Stainless M3 Steel Ball - Special Long Thread (seesaw)	2
CN2208B/P	Anti-Rotation Bracket (B Black/ P Purple)	1
CN2231A	Slipper Auto-Rotation Unit Complete	1
CN2231B	Replacement O-Ring	1
CN2231C	Steel Washer Set (Thick & Thin)	2
Ball Bearings		
CNBB0360F	Ball Bearing 3x6x2.5 Flanged (Tail Lever)	2
CNBB49T	Ball Bearing 4x9x4 Thrust (Tail Grips)	1
CNBB0730	Ball Bearing 3x7x3 (Flybar, Mixing arms)	2
CNBB0840	Ball Bearing 4x8x3 (Flybar 50SE)	2
CNBB0930	Ball Bearing 3x9x2.5 (Tail Grips)	2
CNBB1030	Ball Bearing 3x10x4 (Seesaw Shaft, Tail Grips)	2
CNBB1150	Ball Bearing 5x11x4 (Start Shaft, Tail Output Shaft)	2
CNBB1350	Ball Bearing 5x13x4 (Counter Shaft, Input Tail Shaft)	2
CNBB1360	Ball Bearing 6x13x5 (Main Blade Grip)	2
CNBB1260T	Ball Bearing 6x13x4 Thrust (Main Blade Grip)	2
CNBB1060	Ball Bearing 6x10x3 (Collective Axle, Pitch Plate)	2
CNBB1980	Ball Bearing 8x19x6 (Lower Main Shaft)	2
CNBB1019	Ball Bearing 10x19x5 (Upper Main Shaft)	1
CNBB1812	Ball Bearing 12x18x4 (Clutch Bell)	2

Hawk 30SE & Falcon 50SE Upgrades

CN0427A	Hex start system w/hex adapter - 5mm
CN0402	Hex start adapter only - 5mm - **black**
CN0520	Carbon torque tube tail drive system - 30SE
CN2007A	Trainer Pod 30-46 w/4 Legs
CN2008A	Trainer Pod 60-Gas w/6 Legs
CN2015	Hardened Tip Hex Wrench Set (4 piece ground tips)
CN2016	4.8V Battery Monitor/Alarm
CN2018	PG2000 II Remote Gain Piezo Rate Gyro
CN2028E	7" Aluminum Starter Extension (must use with #2209)
CN2046	Basic Heli Setup Tool Kit (pitch gauge, blade balancer & pliers)
CN2052	Accuratech Blade Balancer - **blue**
CN2079R	Fast 3-D Hot dog fly bar paddles (R red, O orange, Y yellow) 30SE
CN2079RA	Fast 3-D Hot dog fly bar paddles (R red, O orange, Y yellow) 46SE
CN2122	Carbon fiber flybar stiffeners 30SE
CN2123	Carbon fiber flybar stiffeners 50SE
CN2137	2 oz Header Tank w/ Universal Bracket - **purple**
CN2155	Piston Locking Tool - **purple**
CN2153	Machined Throttle Extension - OS32SX,46FX, TT36H - **purple**
CN2154	Machined Throttle Extension - OS50 - **purple**
CN2176	CNC machined servo arm pack (5 pcs. Futaba **purple**)
CN2177	CNC machined servo arm pack (5 pcs. JR **purple**)
CN2179H	CNC machined servo arm pack (5 pcs. Hitec **purple**)
CN2202	Aluminum Turbo cooling fan - **purple**
CN2208B	Metal Swashplate Anti-rotation Bracket - **black - 30SE**
CN2208P	Metal Swashplate Anti-rotation Bracket - **purple - 30SE**
CN2209	Machined Aluminum Start Cone - **purple**
CN2213	2oz Header Tank w/Machined Mount Bracket - **purple**
CN2214B	Air Filter (OS32-46, TT36-46)
CN2215A	Machined Head Button (TYP) - **silver**
CN2215AB	Machined Head Button (TYP) - **black**
CN2215AP	Machined Head Button (TYP) - **purple**
CN2216	Rear Rudder Servo Mount Set
CN2217P	Machined Color Caps - **purple**
CN2218P	Machined Color Washers - **purple**
CN2240H	Carbon Tail Pin Set
CN2263	Constant Tail Drive Unit - 30SE
CN2263A	Constant Tail Drive Unit - 50SE
CN2126H	Ultra Light Carbon Graphite Tail Boom - 30SE
CN2126F	Ultra Light Carbon Graphite Tail Boom - 46SE
CN2127A	Ultra Light Carbon Graphite Tail Pin Set
CN2128	Ultra Light Carbon Graphite Tail Boom Supports
CN3033	Speed torpedo 30 HV Muffler - **Polished Aluminum**
CN3033B	Speed torpedo 50 HV Muffler - **Polished Aluminum**
CN3055H	Millennium Pipe 30SE - **Polished Aluminum**