Robinson 22HP Helicopter

Instruction Manual

FEATURES

- **GELCOAT FIBERGLASS FINISH**
- **CRYSTAL CLEAR WINDSHIELD**
- **SCALE WIRE LANDING GEAR**
- **SCALE ELEVATED TAIL BOOM**

ENGINE SIZE	**.50**
MAIN ROTOR DIAMETER	**58”**
HEIGHT	**19”**
LENGTH	**47”**

Century Helicopter Products

Designed and Developed in USA

Building Instructions for:

CN1076 Robinson 22HP ARF 50 size Helicopter

Introduction

Congratulations on your purchase of Century Helicopter Product's scale RC Robinson R22HP helicopter model. Our helicopters that are simpler to build, easier to see and look fantastic. Whether you are just beginning in helicopters, wanting to start in scale or an accomplished pilot, Century offers a wide selection of helicopters to fulfill your dreams in scale. Century has combined their world class helicopter mechanics with awesome fiberglass fuselages designed to mount directly inside with little or no modifications.

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

Pre-assembly Information

Upon opening the kit, all the major component parts are packaged in bags to correspond to specific sections of the manual, greatly facilitating assembly. Various assemblies have been pre-assembled, only requiring the final assembly and installation of the various sub-assemblies. The screws and nuts required for each step are packaged in the same bag as the parts for that step. Be careful not to lose any of the hardware when opening each bag. Care has been taken in filling and packing of each bag. However mistakes do happen, if there is a parts shortage or any hardware missing, please feel free to contact us at:

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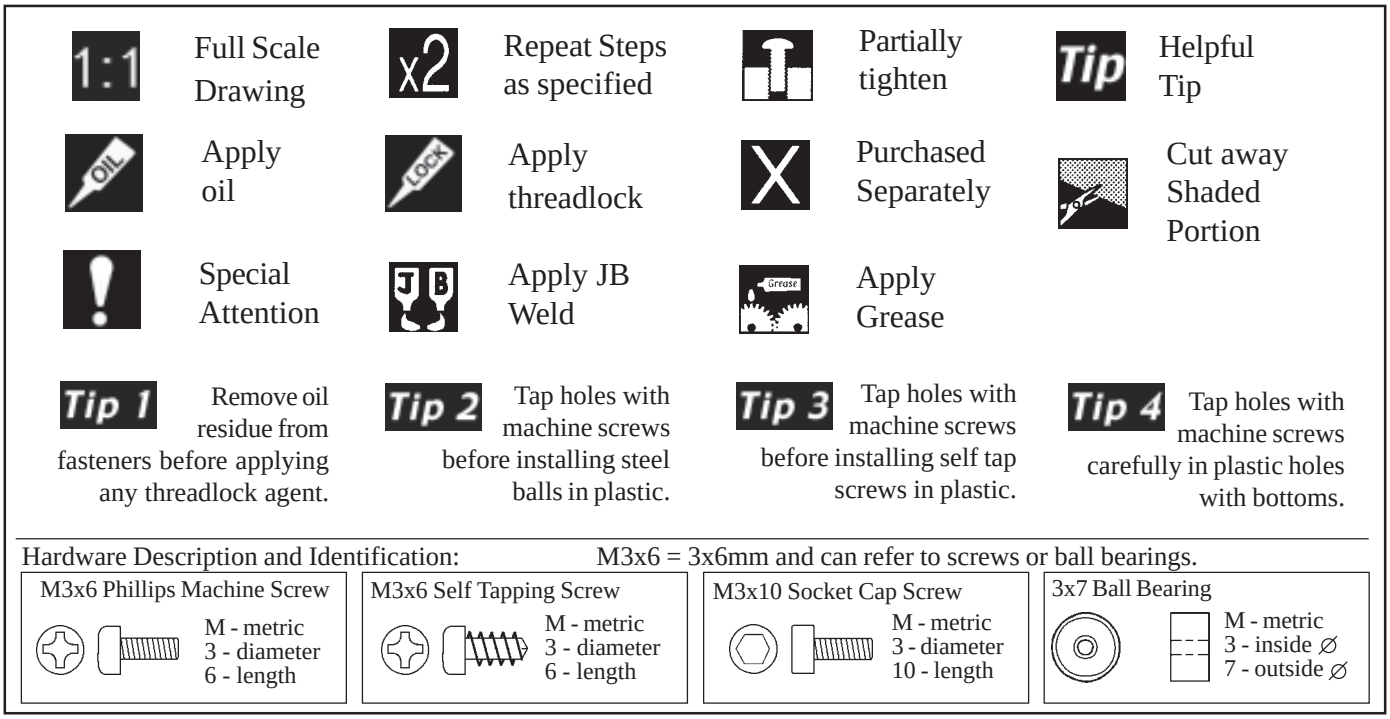
Robinson 22HP Construction Manual

This manual has been written for Century's 50 size Robinson 22HP scale helicopter. This manual should be reviewed before starting the assembly as there are a few complicated sections to attach the various fiberglass components to the mechanics.

Instructional Detail

Every attempt has been made to ease the assembly of your helicopter, at each step where there are complex assemblies, there are detailed drawings, photos and written instructions to walk you through each step. Remember to take a few minutes before each step to carefully examine the instructions in order to become familiar with the parts and assembly sequence before beginning that step.

Symbols used to help assist you in building the kit:



Recommended Tools & Accessories

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

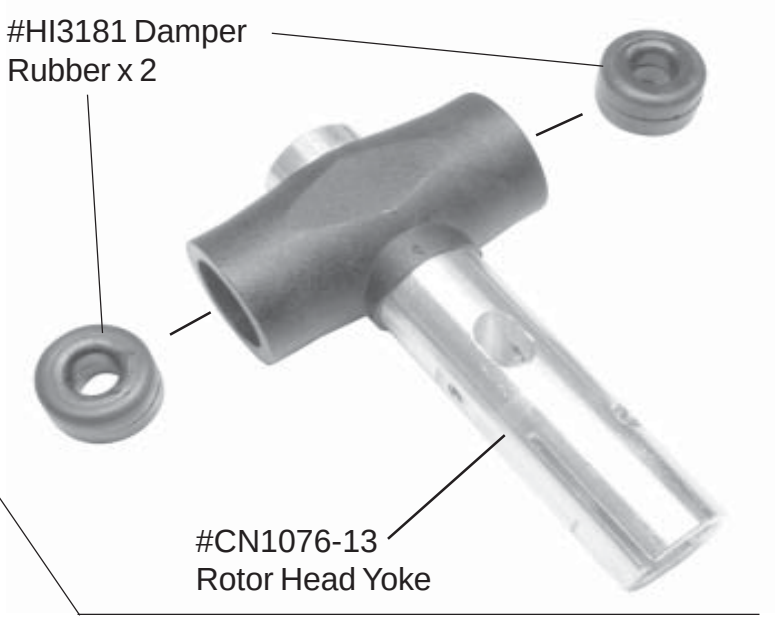
Screwdrivers - Slotted and Phillips head.
Long-Nosed Pliers, wide jaw pliers.
Allen Wrenches - 1.5mm, 2.0mm, 2.5mm.
(supplied in kit) + 3.0mm
Appropriate Socket Wrench
(glow plug wrench for engine shaft nut)
Hobby Scissors, clear tape, masking tape
Double Sided Foam Tape (1/16" - 3/32")
Foam Rubber (radio packing)
JB Weld, Goop or Zap-a-Dap-a-Goo
Thread lock liquid (e.g. Locktite)
Hobby Grease (Super Lube)
Oil to lubricate sliding shafts (Tri-Flow)

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

CN2015	Hardened Tip Hex Screw Driver Set
CN2026	Pitch Gauge with Paddle Gauge.
CN2034A	15^0 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 Guage.
CNWI26555	5.5mm Nut Driver.
CNWI26570	7.0mm Nut Driver.

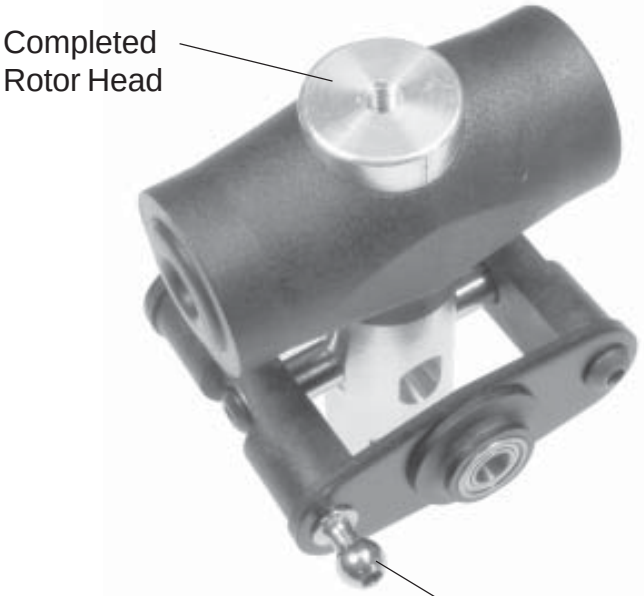
Step 1 Rotor Head Block

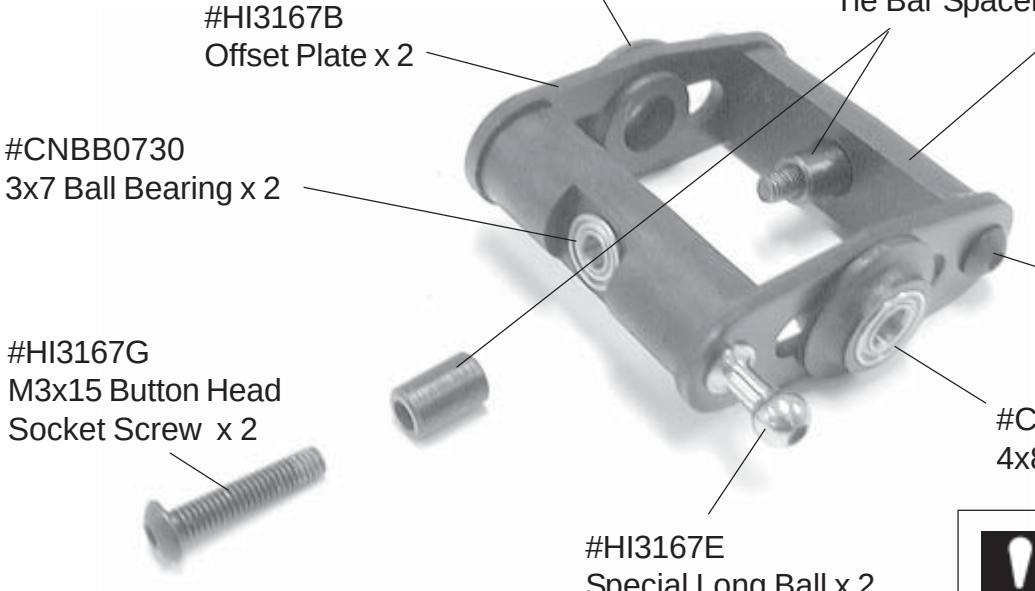
Press in the Damper Rubbers Head Block. Apply Triflow oil or similar teflon oil to the inside of the dampers. Dampers should be replaced on a yearly basis.



Step 2 Seesaw Assembly

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 <u>right side</u> hole of the 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 <u>right side</u> of the head block. Do not overtighten. Repeat for the second sub assembly. Once complete, insert one M3x7 Special ball into the left side of each offset plate to complete the assembly.

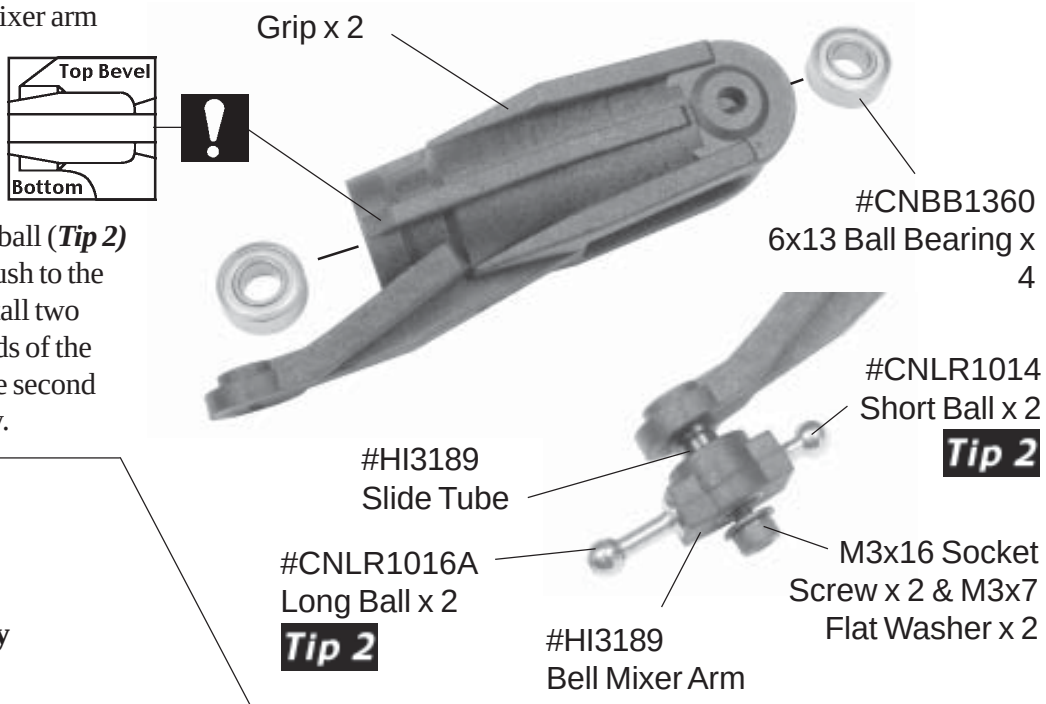




Notice that the two steel balls are on the left side of the rotor head.

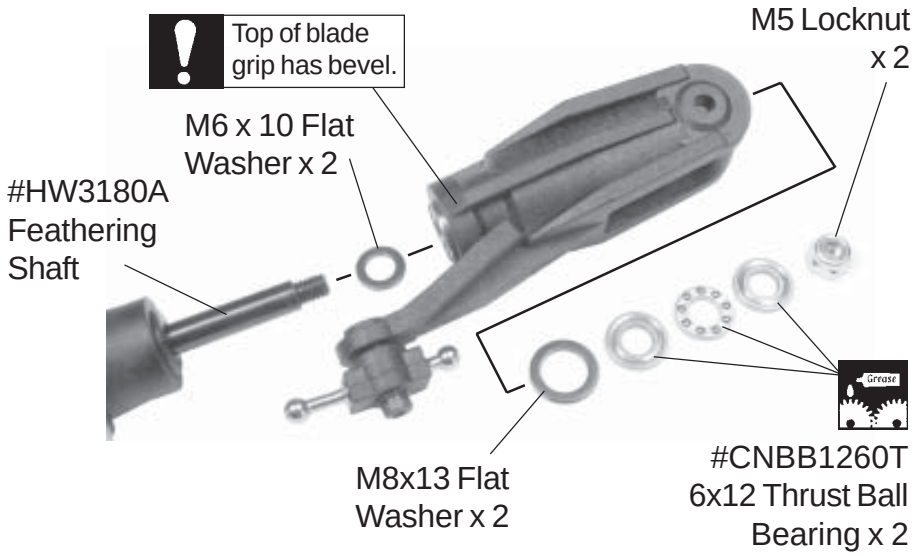
Step 3 Main Rotor Grip Assembly

Insert the slide tube into the bell mixer arm from the offset side, through the oilite bearings (installed already) and secure onto the blade grip with one M3x16 Socket Cap screw and M3x7 Flat washer. Install one long ball and one short ball (***Tip 2)*** into the Bell Mixer. File the bolt flush to the inside of the blade grip mount. Install two M6x13 Ball Bearings into both ends of the blade grip assembly. Complete the second blade grip in exactly the same way.

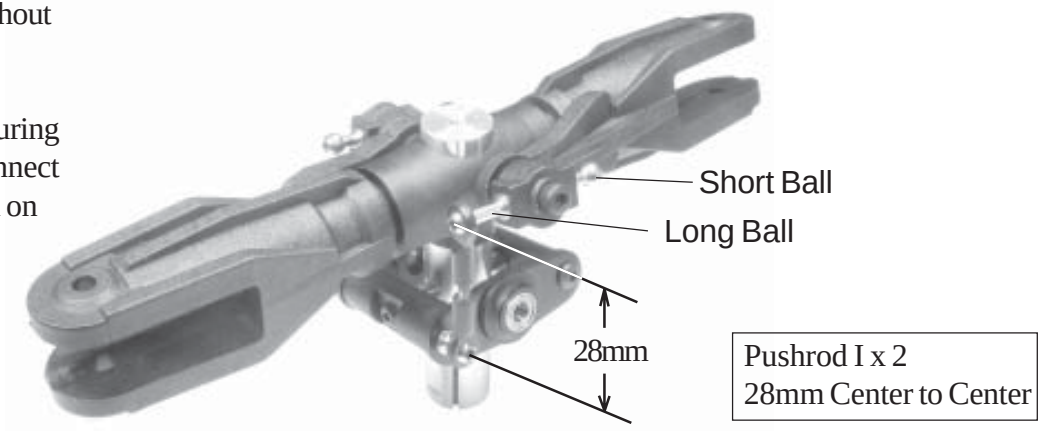


Step 4 Feathering Spindle & Blade Grip Assembly

Apply teflon oil to the rubber dampers. Insert the Feathering Shaft into through the head block, slide one M6X10 Washer on each side of the shaft. Install the blade grip, note the direction of the bell mixer arm followed by one M8x13 Washer, one M6x12 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 steel washer (smaller inside diameter)) and one M5 Locknut. Tighten the locknut, using the glow plug socket wrench on one nut while holding the other with pliers, tighten the nuts until both blade grips turn freely without any excessive end play.

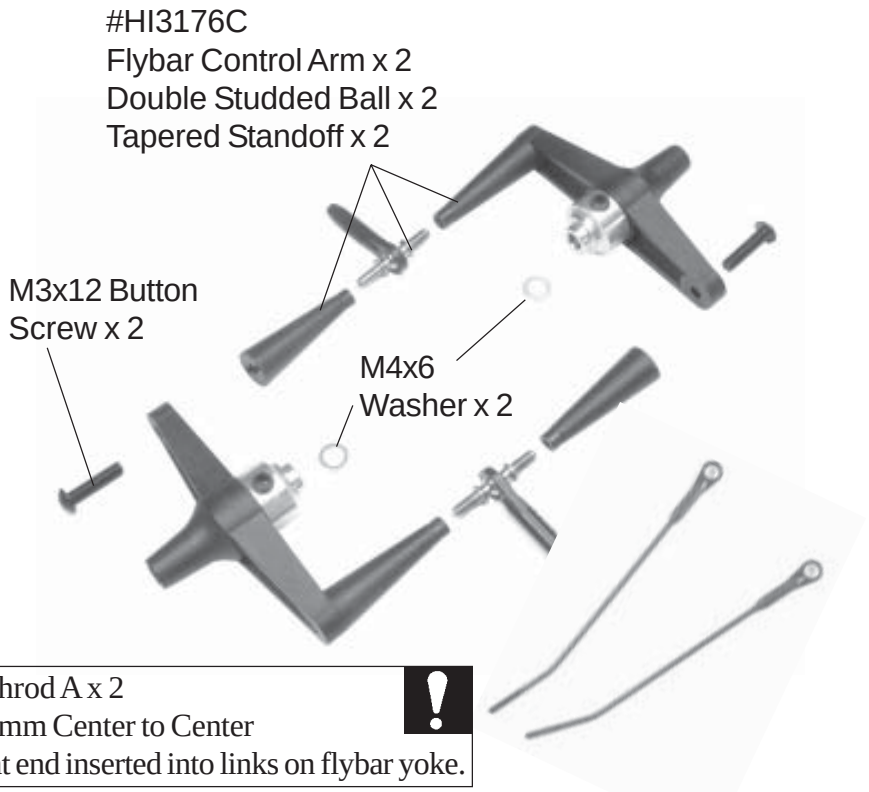


Assemble Pushrod I x 2, measuring 28mm center to center and connect the seesaw ball to the long ball on the bell mixer. Make sure both pushrods are the same length.



Step 5 Flybar Control Yoke Assembly

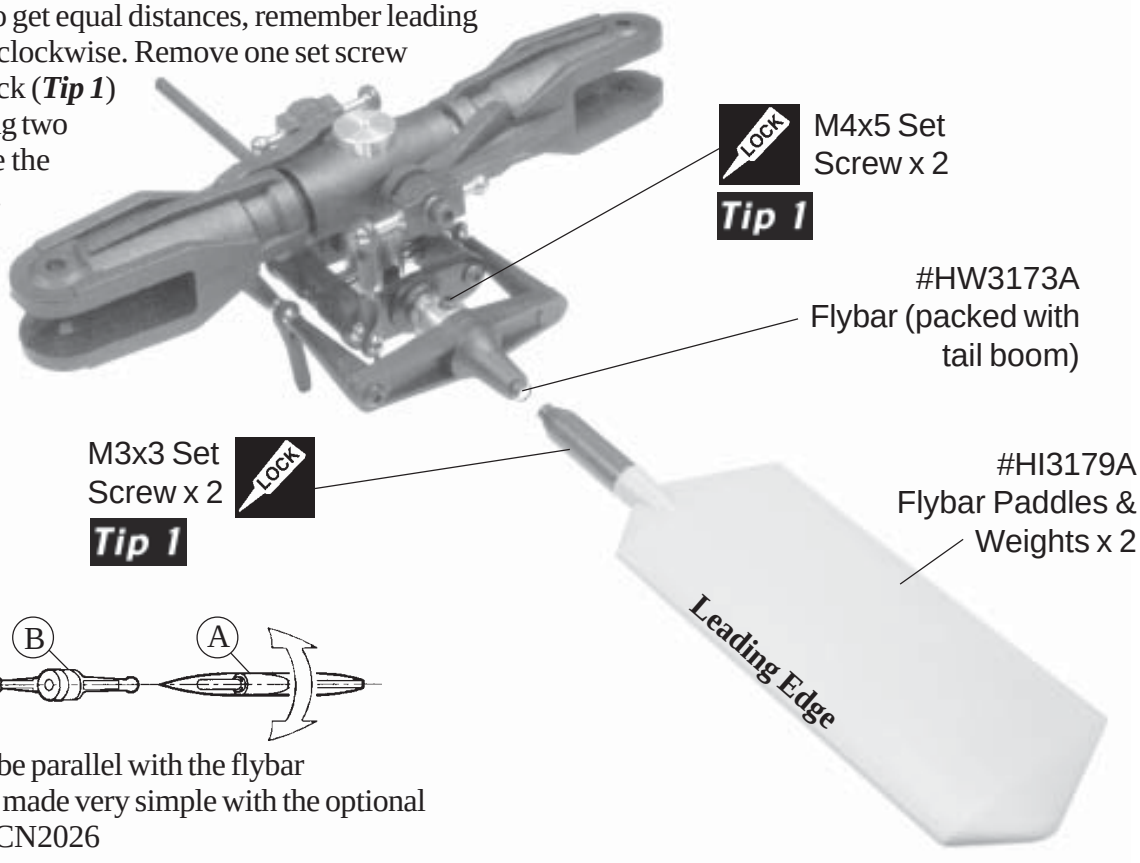
Using an available M3x12 Button Head Screw, insert approximately half the length of the screw to form threads into the smaller, tapered ends of the control arms and the control arm stand-offs. Assemble Pushrod A (115mm Center to Center) and press one ball link end (with bend in rod) onto each double studded steel ball, making sure that pressure is applied from the side of the ball link with the Century name. All ball links are designed to be installed in one direction only. While holding one flybar control arm, start threading the double studded steel ball. When it becomes difficult to turn with fingers, start the control arm stand-off and use a flat screwdrive to turn the slot in the end. Complete the second flybar control arm.



Pushrod A x 2
115mm Center to Center
Bent end inserted into links on flybar yoke.

Step 6 Flybar & Flybar Paddle Assembly

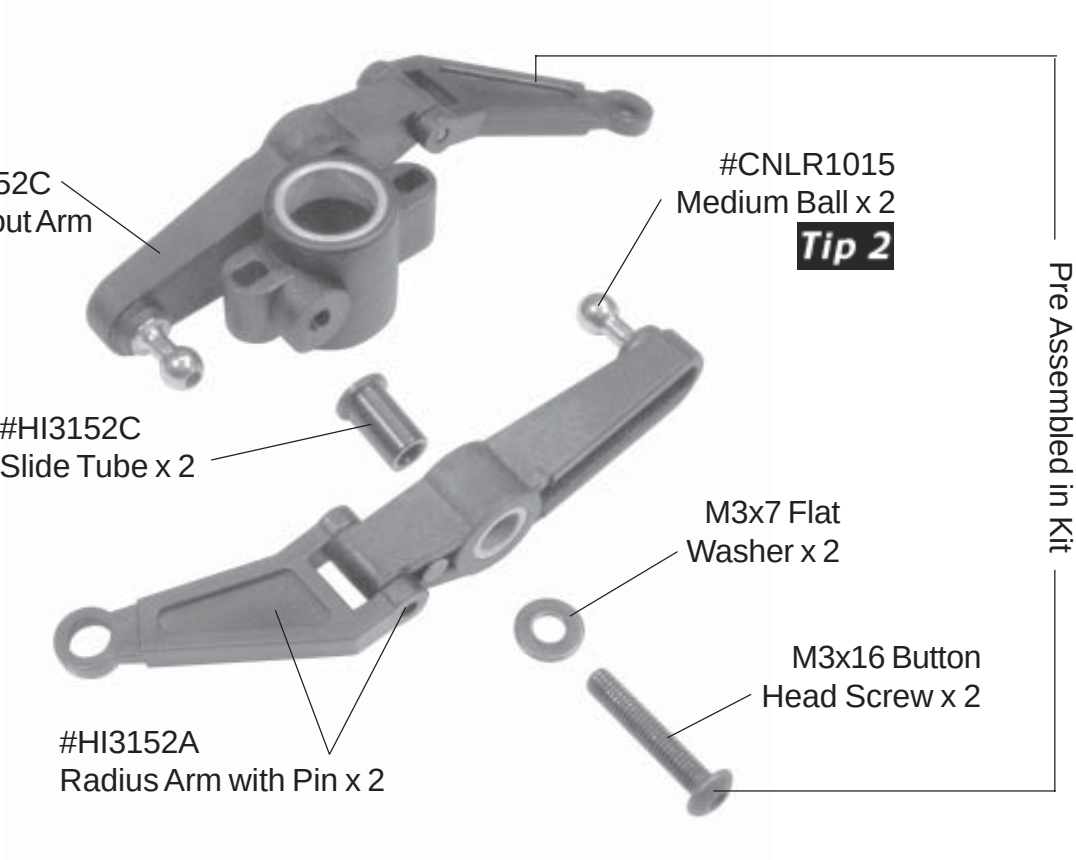
Slide and center the Flybar through the seesaw arm assembly. Carefully look at the Flybar Control Arm and notice that when installed correctly, the securing set screw is on top. Insert one 4x6x0.5 washer against each bearing then the flybar control arm. Insert one M3x12 Button Head Socket Screw into each Flybar Control Arm, securing the assembly together, the tapered standoff needs to be held with pliers while tightening the button head screw. 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. Remove each M4x5 Set Screw and locktight in place over the flat spots on the flybar. Slide the Flybar Weight (**Tip**: the flat end of the weight touches 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. Remove one set screw at a time, apply threadlock (***Tip 1***) and tighten in place. Using two M3x3 Set Screws secure the weights using threadlock.



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

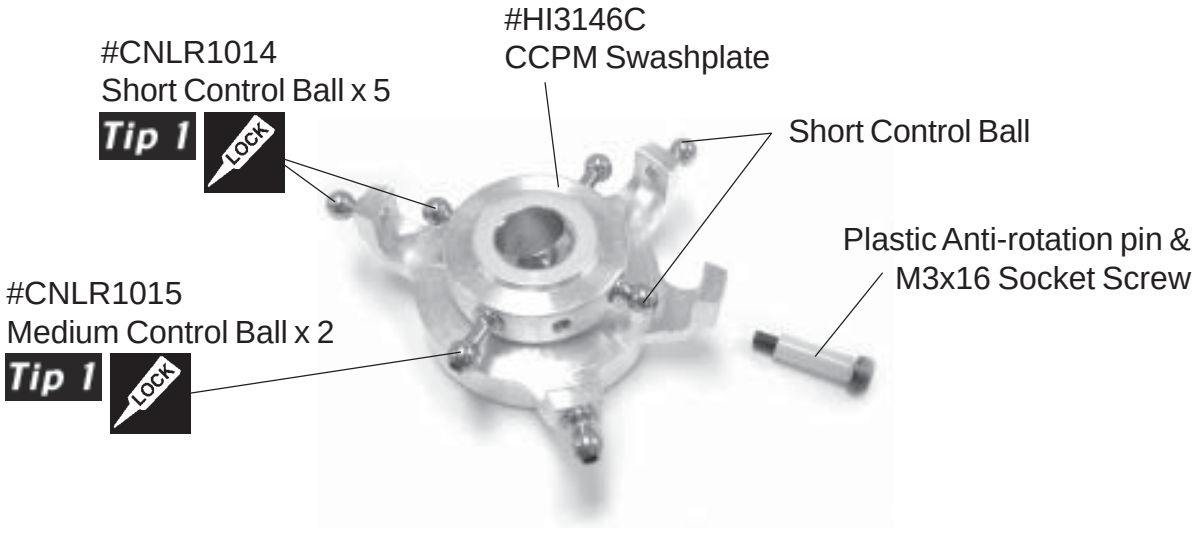
Step 7 Washout Assembly

Attach two Medium Balls (***Tip 2***) to the Washout Mixing Arms (note they are attached from the flat side of the arm). Using one slide tube inserted from the flat side, secured using one M3x16 Button Head Screw and one 3x7mm Flat Washer per arm. Do not overtighten the arm as it is threaded into the plastic washout base. Also note, the screw is attached on the left when installed later on the main shaft. Press the radius link on to the inner short balls on the swashplate.



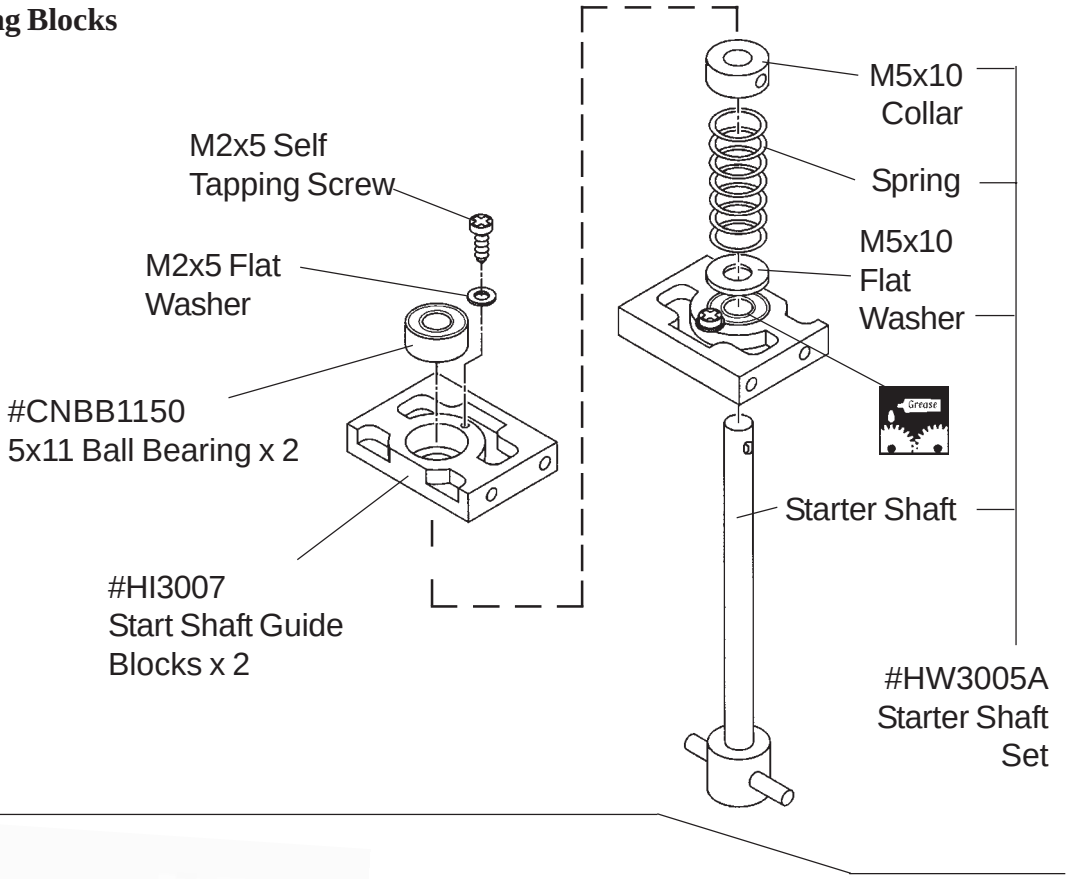
Step 8 CCPM (cyclic collective pitch mixing) Swashplate Assembly

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 three short balls (***Tip 2***) to the outside race, each 120 degrees apart. The extra location is used for the anti-rotation bracket assembled later.

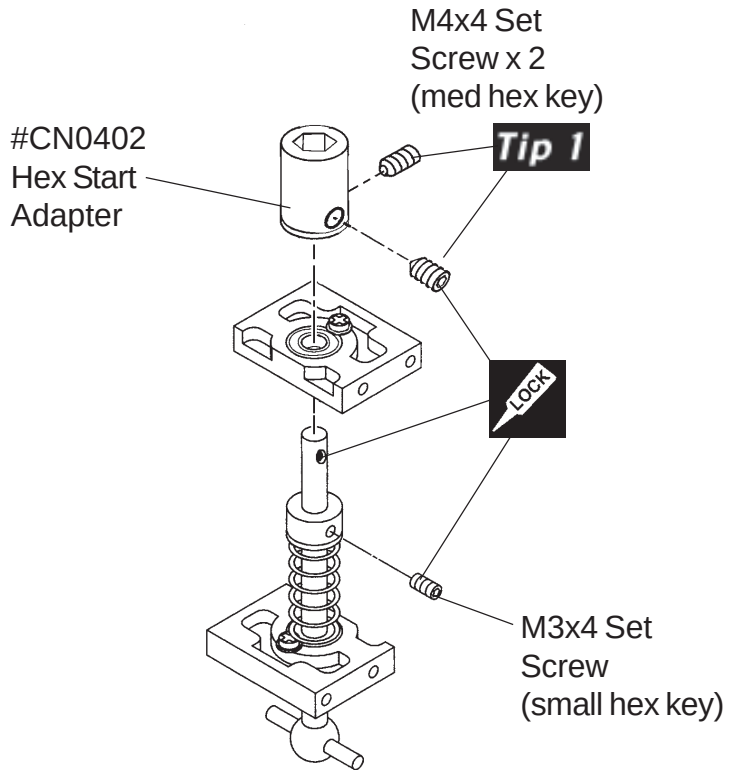


Step 9 Starting Shaft Bearing Blocks

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 the M5 Flat Washer, spring and finally the M5x10 Collar.



X Hex Starter Extension (Optional Part #CN0426A)



Step 10 Starting Shaft & Hex Coupler

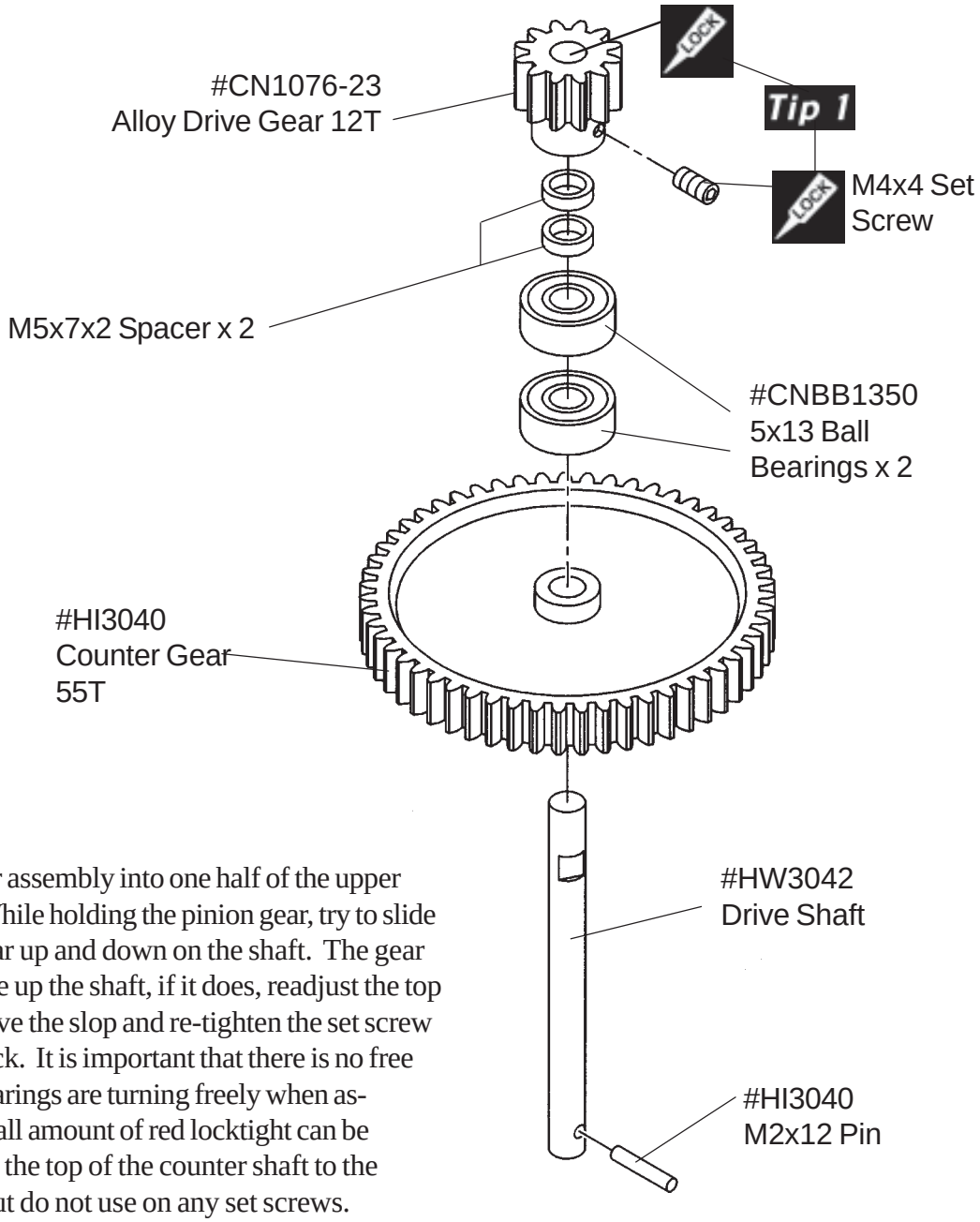
After sliding the top bearing block in place, attach the hex starter adapter CN0402 to the starting shaft using threadlock on both 4x4mm set screws. Align one set screw to fit into the machined indentation in the hardened start shaft. For added strength apply a locktight to the shaft before the hex coupler is attached. Apply some lubricant on the shaft after assembly to ensure smooth vertical movement inside the inner races of the bearings when engaging and disengaging the start system. Position the M5 collar so the end of the start shaft clears the fan, verify after installing the lower frames.

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.

Assemble the engine counter 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. **S**lide two M5x7x2 spacers onto the shaft and slide the Alloy Drive Gear onto the shaft (similarly for added strength, threadlock can be applied between the top of the shaft and the drive gear) aligning the flat spot on the shaft. Insert one M4x4 set screw (Tip1) into the Alloy Drive Gear and tighten in place using threadlock.



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. A small amount of red locktight can be applied to lock the top of the counter shaft to the pinion gear, but do not use on any set screws.

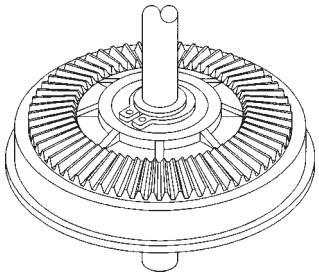
Tip 2 Expert tip, once all components are in their final position, using a needle apply one drop of blue threadlock carefully at the joint between each bearing and the shaft. **Warning**, threadlock will damage a bearing.

STEP 12 Main Gear & Shaft Assembly

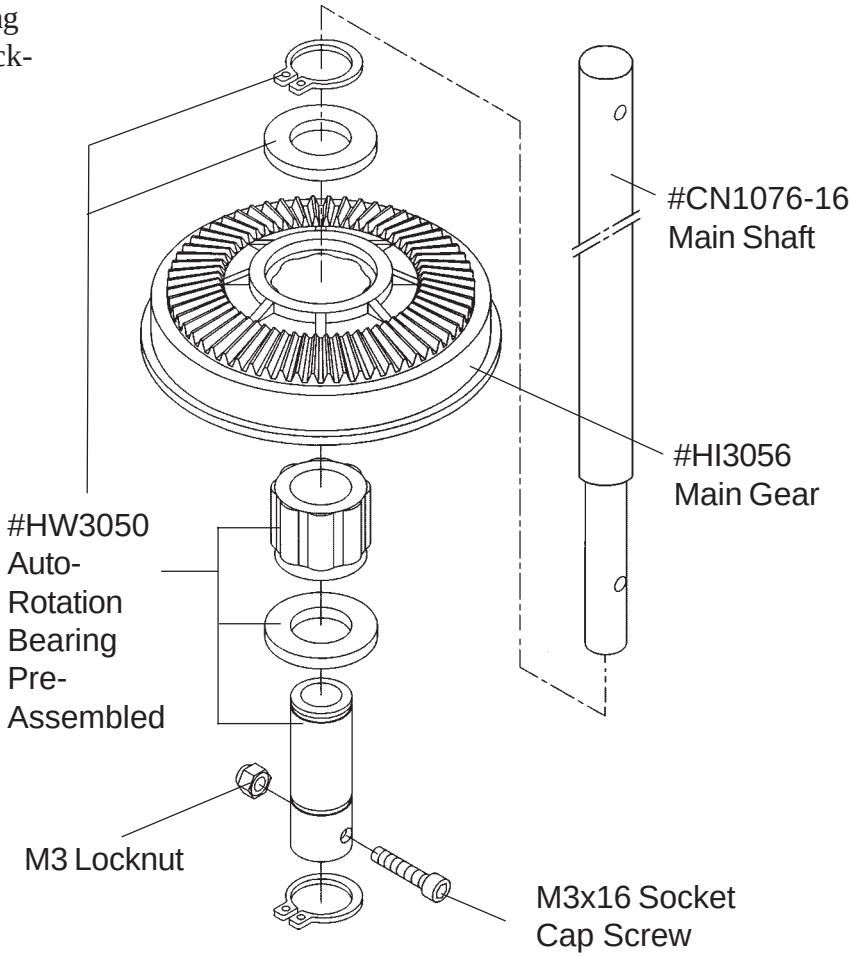
The Main Gear is pre-assembled with the Auto-Rotation Bearing installed. Insert the bottom end of the main shaft through the auto rotation gear assembly, align the holes and secure the Main Shaft using one M3x16 Socket Cap Screw and one M3 Locknut.

Tip 1

You can temporarily insert main shaft, main shaft bearing spacer & bearing, stopper and head block screw to keep them from getting lost!
* Do not apply threadlock here. *

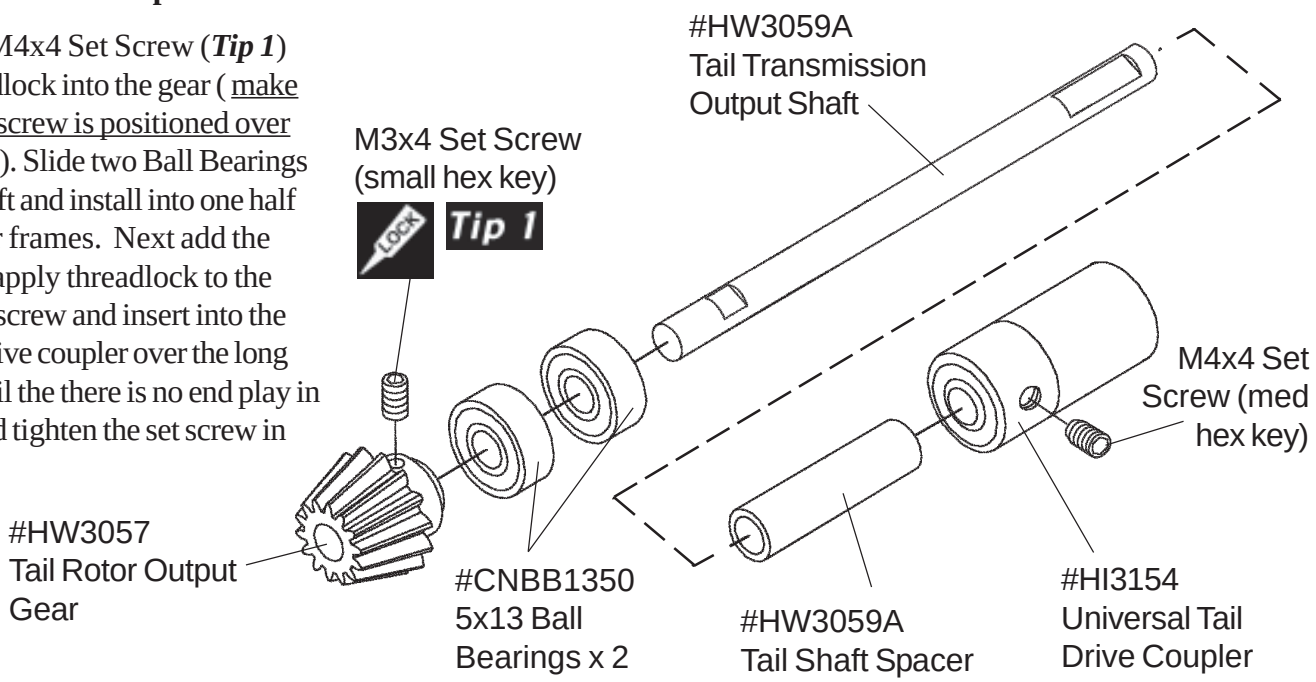


Completed Main Gear & Main Shaft



Step 13 Universal Coupler & Tail Pinion Gear

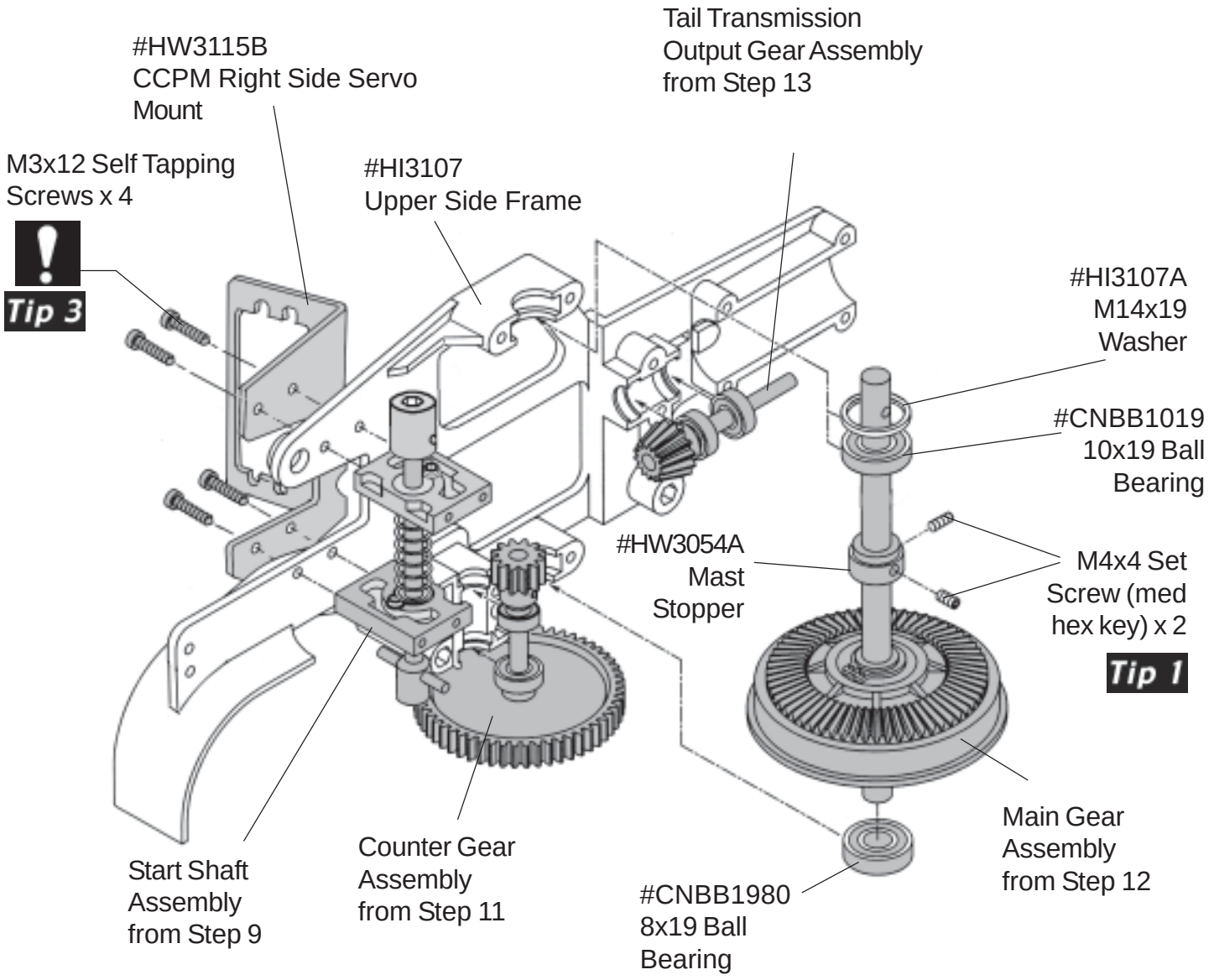
Insert one M4x4 Set Screw (***Tip 1***) using threadlock into the gear (<u>make sure the set screw is positioned over the flat spot</u>). Slide two Ball Bearings onto the shaft and install into one half of the upper frames. Next add the spacer and apply threadlock to the 4x4mm set screw and insert into the universal drive coupler over the long flat spot until the there is no end play in the shaft and tighten the set screw in place.



Install two 4x4mm Set Screws (do not apply locktight at this time) in the Mast Stopper (note the raised inner diameter must face the ball bearing) and slide the mast stopper on the main shaft followed by one M10x19 Ball Bearing and one M14x19 Spacer (the spacer must be installed on top of the bearing). Slide one M8x19 Ball Bearing onto the bottom of the main shaft.

Align the right ccpm side servo mount over the holes for the starter shaft assembly **(**observe the correct direction of the block assemblies**)** and insert four M3x12 Self Tapping Screws[1] to secure it in place. Position the main gear/main shaft assembly, (note the orientation of the mast stopper) the counter gear assembly and the tail transmission output shaft assembly in the designated locations (see diagram below) on the upper right side frame making sure the bearings are fully seated in the recesses.

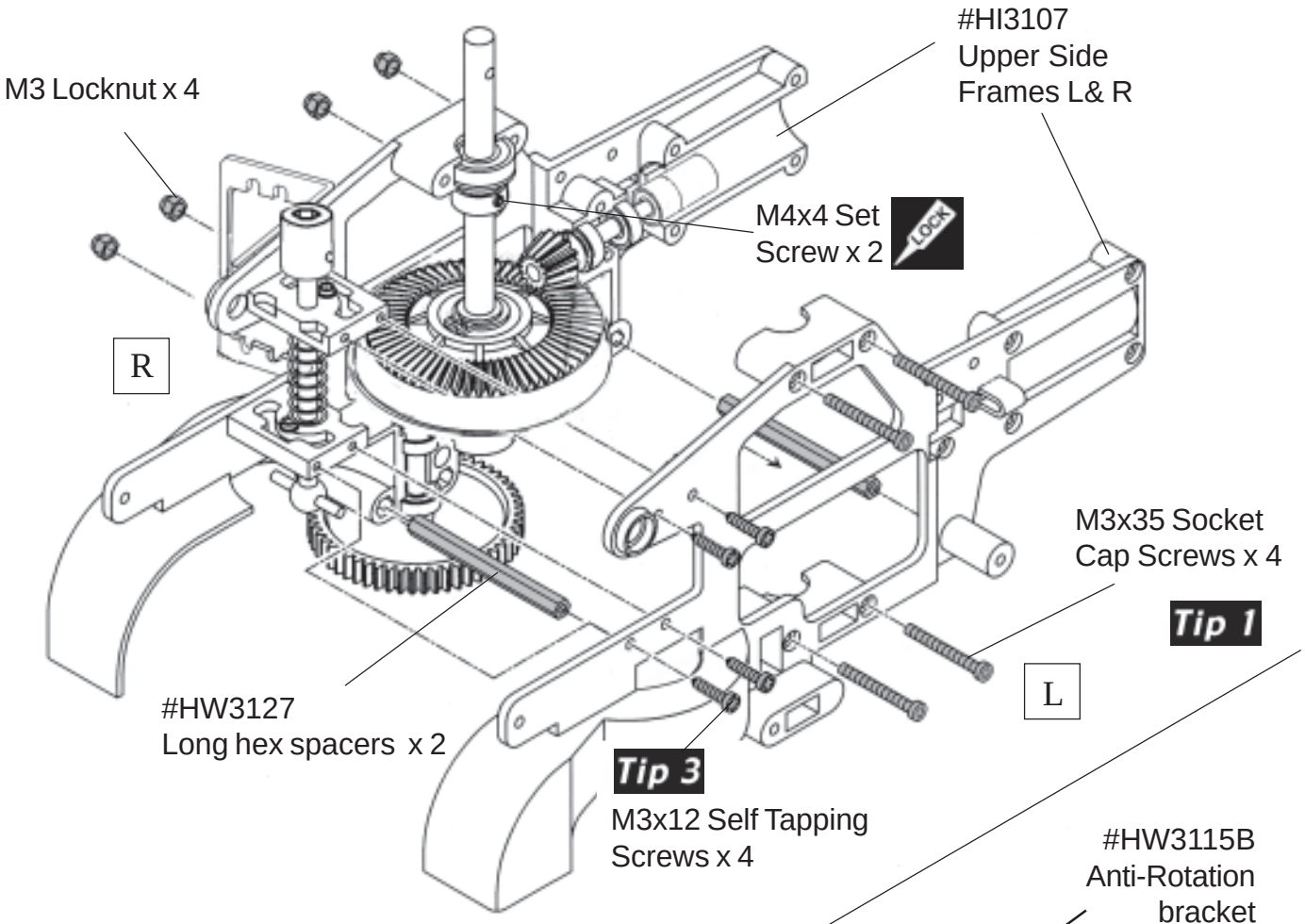
At this time prepare the servos by installing the rubber grommets provided with the radio system. Wait to install the brass eyelets until the orientation to mount the servo is known. The eyelets have a flange that should face the surface that the servo flange is being mounted against.



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.

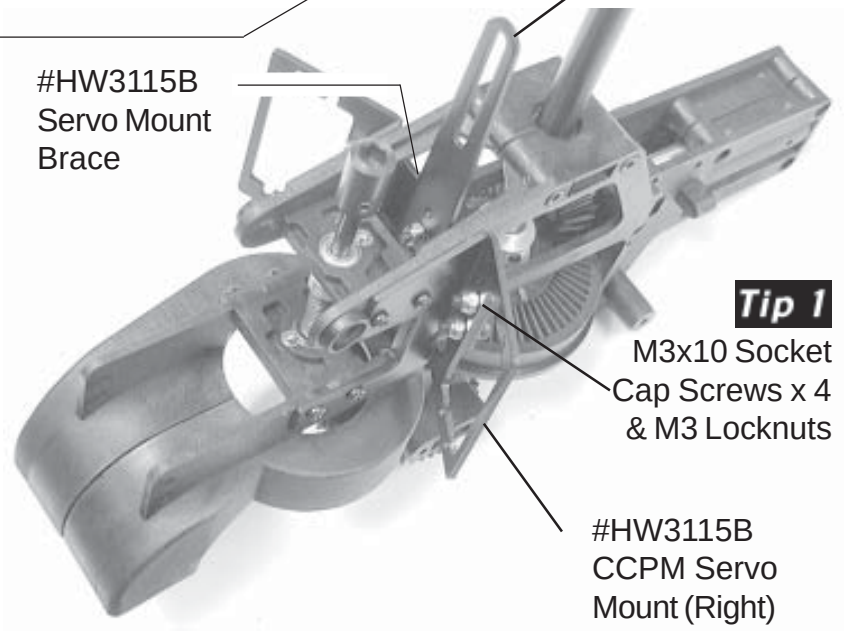
Step 15 Upper Frame Assembly & Front CCPM Servo Mounts

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. Attach the left side CCPM Servo Mount using four M3x12 Self Tapping Screws (Tip3) into the starting shaft blocks. Install the upper left side frame, taking care that the bearings are aligned with the mating recesses and secure the frames with four M3x35 Socket Cap Screws (Tip1) through the main shaft bearing block positions and four M3 locknuts. While pushing DOWN 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.



Step 16 CCPM Servo Mounts & Anti-Rotation Bracket

Attach the servo mount brace using four M3x10 Socket Cap Screws and M3 Locknuts through the holes on the CCPM Servo Mounts. Look at the servo mount brace and notice the two tabs when properly installed face forward. Attach the anti-rotation bracket to the front of the brace with one M3x10 Socket Cap Screw and a M3 Locknut (hold the locknut with pliers and tighten the bolt with the provided hex key).



Step 17 Front CCPM Servo Mounts

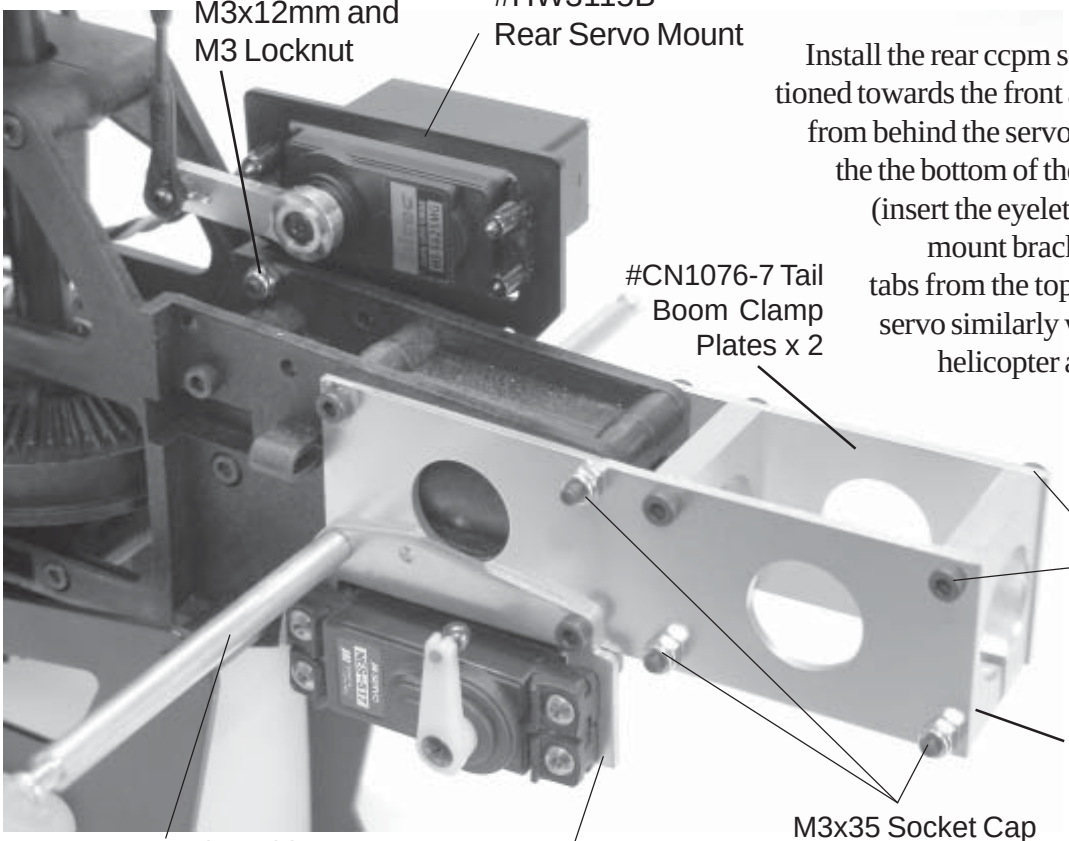
Install both CCPM front servos at this time, with the output shaft of the servos positioned upwards and the servo flange inserted from behind the servo mount. Using the screws provided, insert the screws from the servo top through the grommets (insert the eyelets between the grommet and the mount bracket) and attach the servo mount tabs from the bottom of the servo.

Step 18 Tail Boom Mount Plates & Clamps

Assemble the tail boom clamp plates overlapping the rear of the main mechanics with an upward slope. Starting from the mechanics, insert one M3x35 socket cap screws through the mount plate and insert into the rearmost upper hole in the right side of the mechanics. Slide the second mount plate onto the screw from the left and secure using one M3 locknut. Insert one M3x35 socket screw through the rudder mount, then into the rear-most lower hole and secure with one M3 locknut from the other side. Insert one M3x12 socket cap screw through the front hole in the ccpm servo mount with the knotch keyed to the upper side frames, slide three M3x7 flat washers then insert through the upper side frames, securing with one M3 locknut. Insert one M3x35 socket cap screw through the frontmost upper hole in the tail boom clamps, then through the center hole of the ccpm servo mount and insert secure with one locknut on the other side. Attach the tail boom clamps using four M3x8 socket screws inserted into the top holes of the mounts using threadlock. The M3x35 socket screws at the lower position can be inserted but should be left loose. Install the cabin mounts by threading the M3x40 threaded rod into one cabin mount then threading through the mechanics and attaching the other mount through the lower forwardmost hole. Install only, do not threadlock in place until after the cabin is mounted.

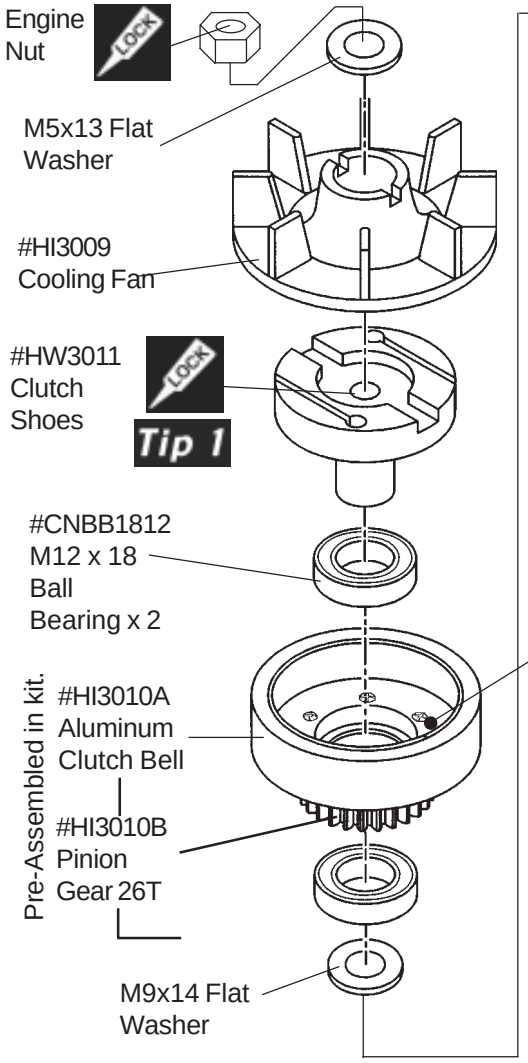
Step 19 Rudder and Rear Servo

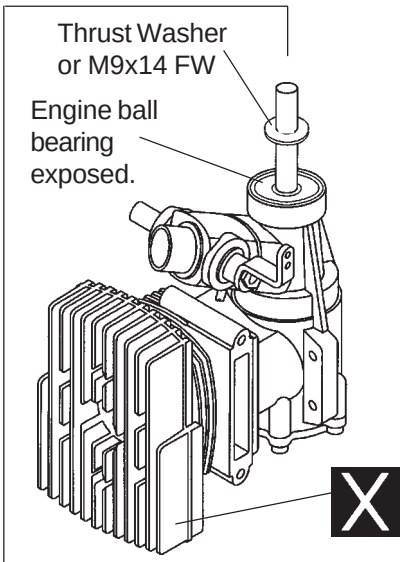
Install the rear ccpm servo with the output shaft positioned towards the front and the servo flange positioned from behind the servo mount. Insert the screws from the the bottom of the grommets, through the mount (insert the eyelets between the grommet and the mount bracket) and attach the servo mount tabs from the top of the servo. Install the rudder servo similarly with the output to the rear of the helicopter and the flange on the left side of the mount with the tabs on the bottom of the servo.



Step 20 Clutch, Fan & Engine Mounting

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 thread-lock 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 Part] 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. Again only torque the nut 1/16th more.



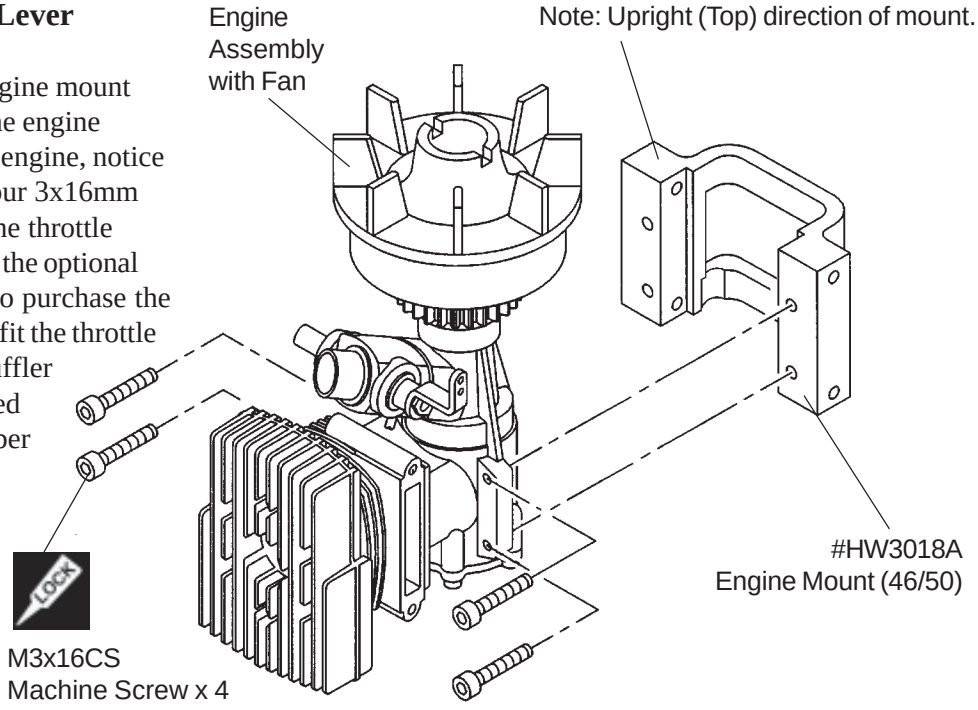


During final assembly wipe all traces of oil or grease from the inside surface of the clutch lining. Any grease here can cause a meltdown.

(Optional Parts)
CN2153 Throttle Extension for OS50SX-H

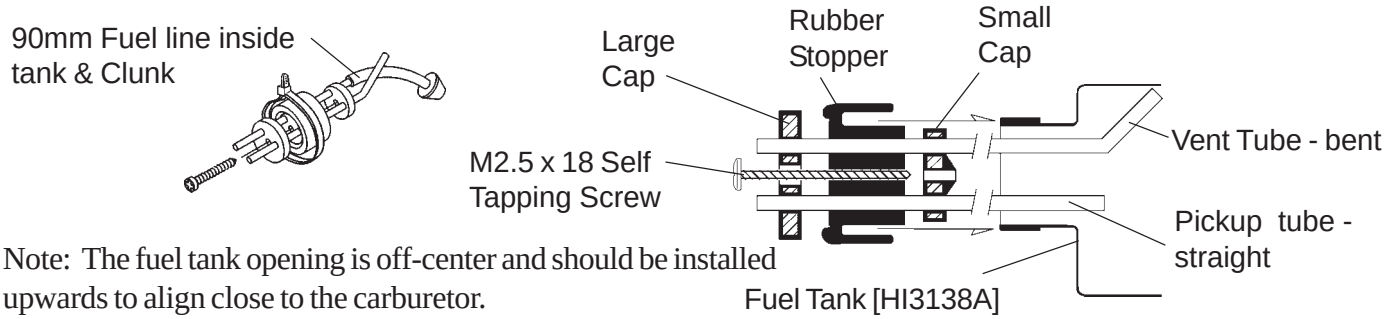
Step 21 Engine Mount & Throttle Lever

Secure the engine assembly on to the engine mount (make sure the mount is installed with the engine mount holes closest to the bottom of the engine, notice it is recessed for the crankcase) using four 3x16mm Socket Cap Screws using threadlock. The throttle extension included will not work if using the optional CN3059 Scale Muffler. It is necessary to purchase the optional CN2153 throttle extension is to fit the throttle linkage behind the muffer. If another muffler is use, then the throttle extension provided by the manufacturer will work. Remember to set the carburator travel to get equal through from full power to idle, leaving another 10 percent to shut down the engine.



Step 22 Fuel Tank Assembly

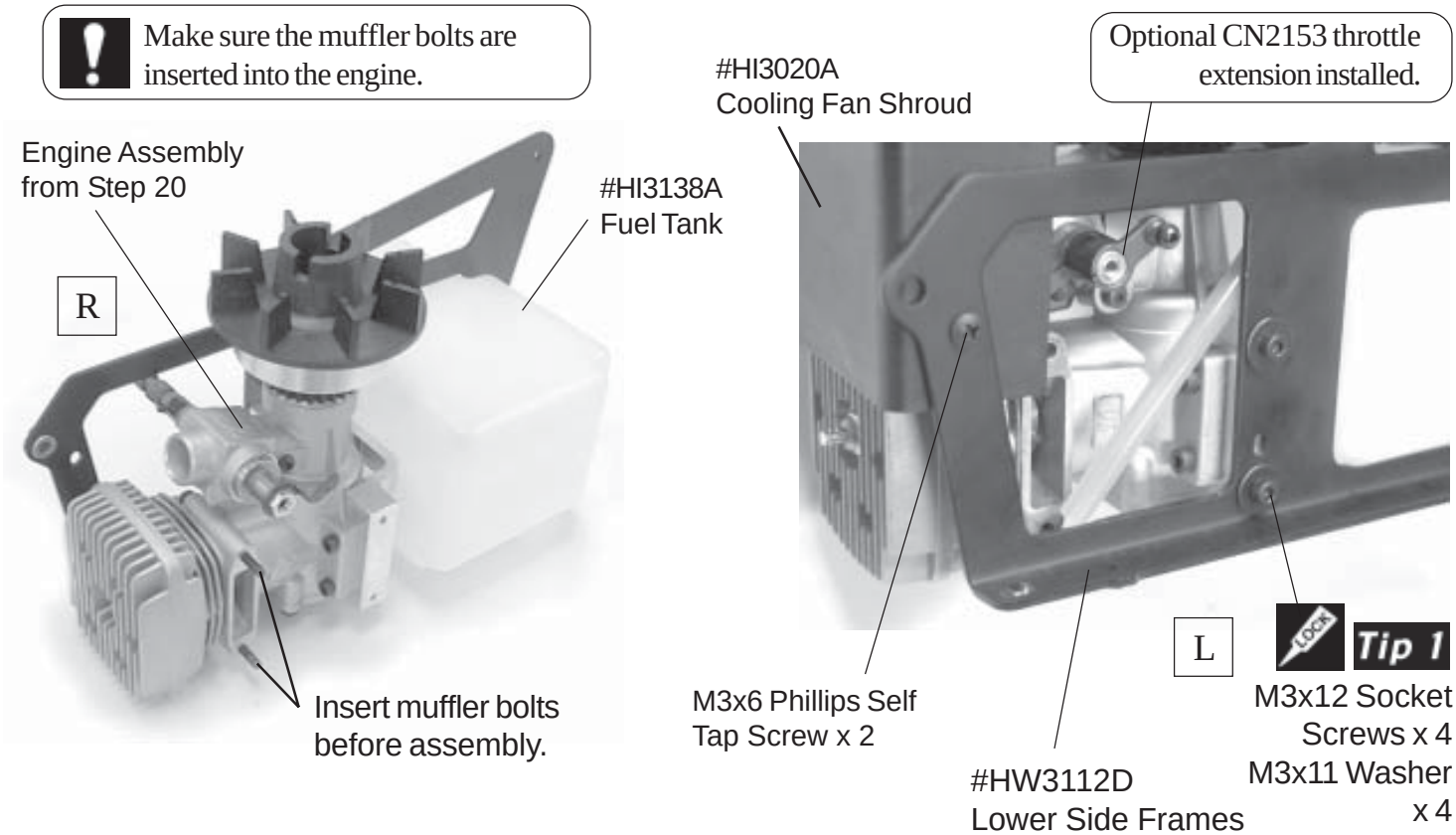
Insert the two pieces of aluminum tubing through the large cap, rubber stopper and small cap, bend the long aluminum tube upwards and attach the short piece of fuel line and clunk to the short straight piece of tubing. Test fit the assembly into the Fuel Tank and make sure that the clunk reaches the 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 upwards to align close to the carburetor.

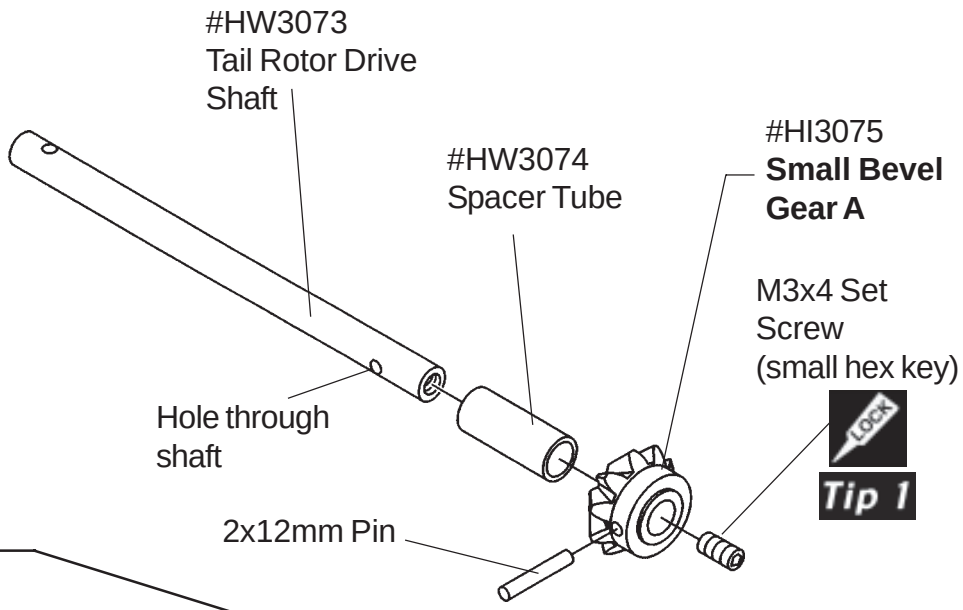
Step 23 Lower Frame Assembly

Attach the right lower frame (R) to the upper frame assembly with two M3x12 Socket Cap Screws (***Tip 1***) and M3 Washers using threadlock. Slide the cooling Fan Shroud over the engine head and position the engine assembly into the upper frames while attaching the two M3x12 Socket Cap Screws and large M3x11 Washers through the (R) side frame (leave these loose for now) into the engine mount. Make sure the muffler bolts are inserted into the engine. Slide the fuel tank assembly through the frame and attach the left lower side frame (L) to the upper side frames using two M3x12 Socket Cap Screws and M3x7 Washers using threadlock. Attach the remaining two M3x12 Socket Cap Screws and two M3x11 Flat Washers to the engine mount. Position the engine assembly and tighten the engine mount bolts when there is a 1mm vertical gap between the clutch bell and the counter gear. Remove each bolt and apply threadlock to these screws now. After the engine in bolted in position, insert one M3x6 Phillips self tapping screw to secure the cooling fan shroud, be carefull not to overtighten these screws to avoid stressing the lower side frames.



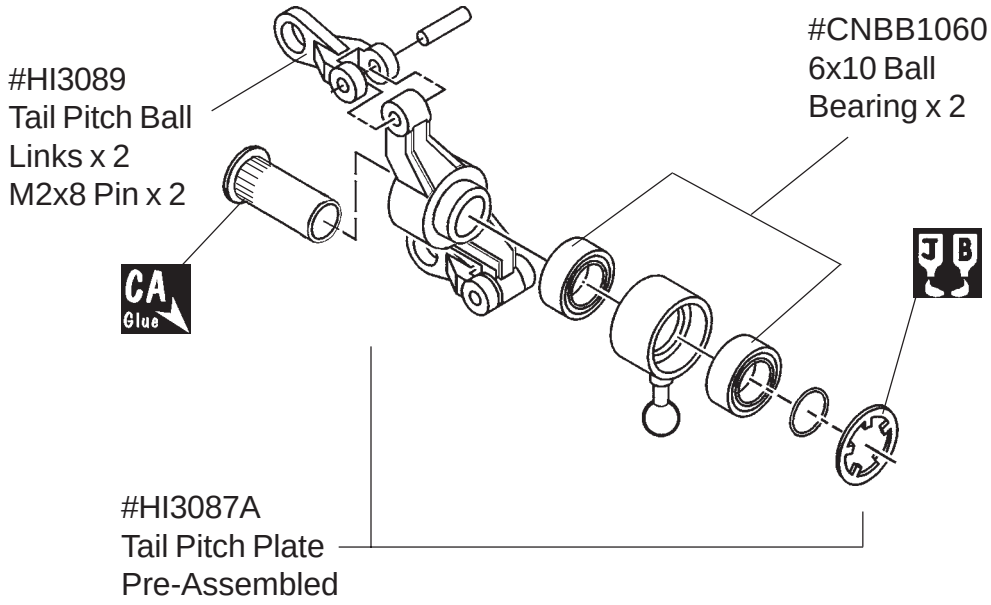
Step 24 Tail Output Shaft Assembly

Notice that the tail rotor output drive shaft has 2 holes, one through the shaft and one drilled partially into the shaft. Slide the small bevel gear (A) with the teeth facing the shaft from the end with the through hole and position the gear aligning the holes. Press the M2x12 steel pin through and secure with one M3x4 Set Screw (***Tip 1***) inserted from the end of the shaft using threadlock. Slide the Spacer Tube onto the shaft and position against the gear.



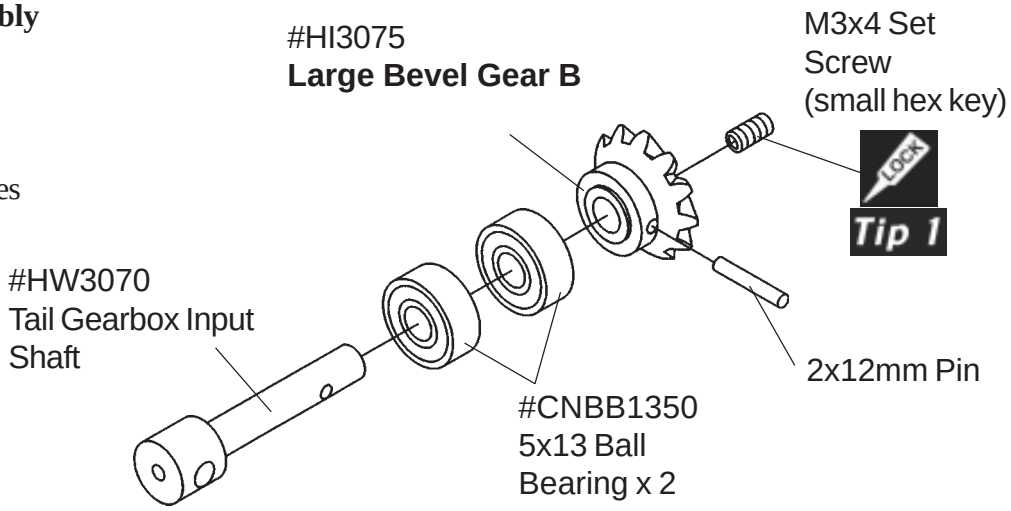
Step 25 Tail Pitch Plate Assembly

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 plate. Put this assembly aside for now.



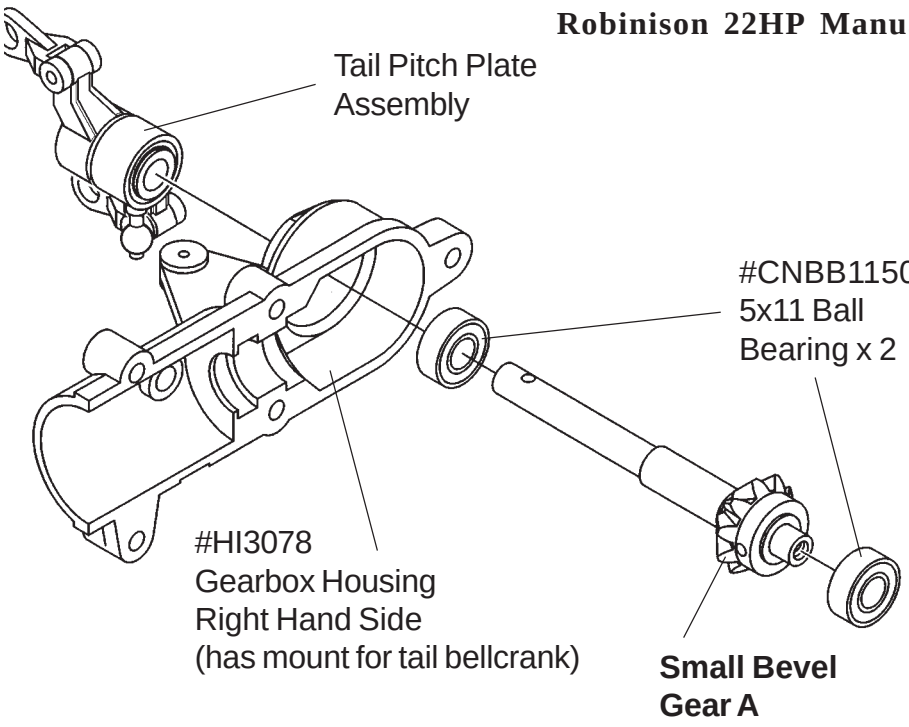
Step 26 Tail Input Shaft Assembly

Assemble the tail rotor input shaft by sliding two Ball Bearings on to the shaft followed by the large Bevel Gear (B). Align the holes on the gear with the hole in the shaft and press in one M2x12 pin and secure with one M3x4 Set Screw (***Tip 1***) using threadlock.



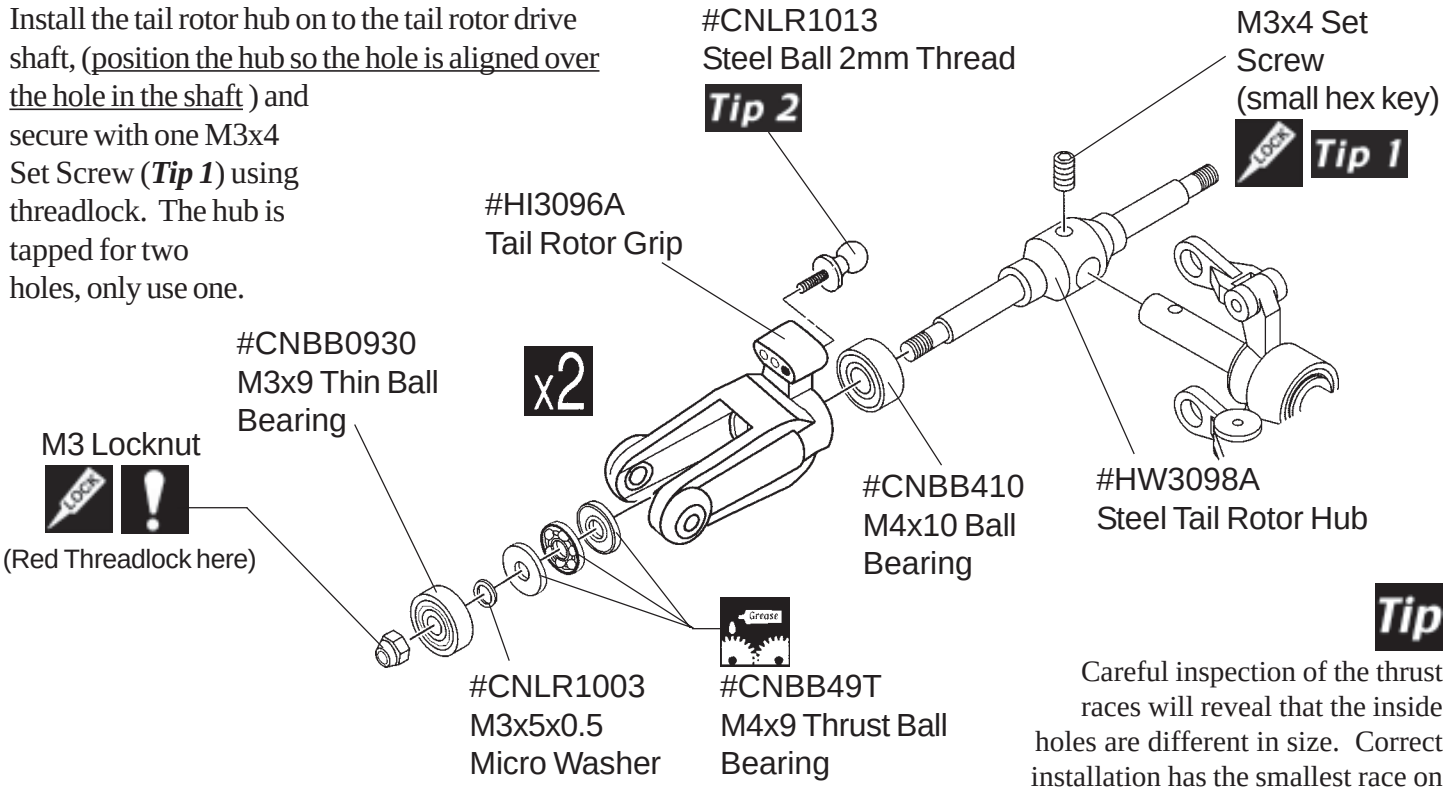
Step 27 Tail Gearbox Assembly

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 28 Tail Rotor Grip Assembly

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 M3x4 Set Screw (***Tip 1***) using threadlock. The hub is tapped for two holes, only use one.



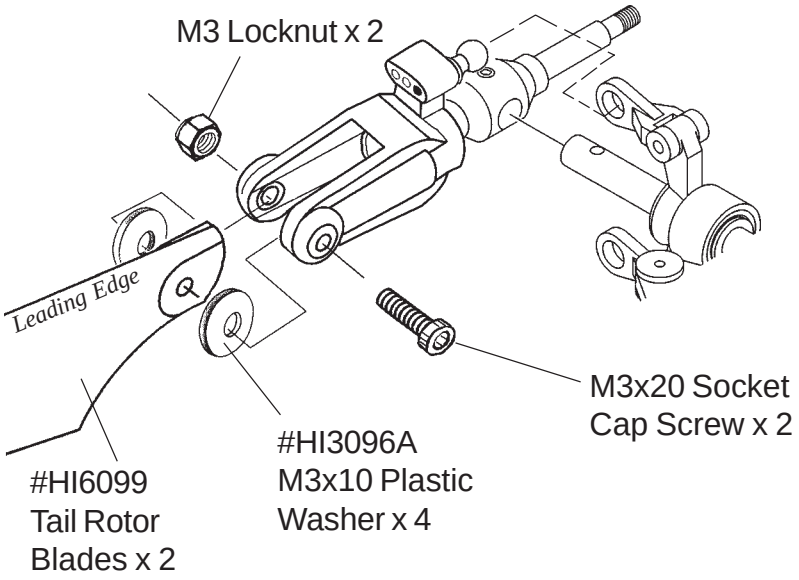
Tip

Careful inspection of the thrust races will reveal that the inside holes are different in size. Correct installation has the smallest race on the outside.

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 slide one M4x9 Thrust Ball Bearing (install the first steel washer (larger inside diameter) followed by the ball race, remember to grease the ball race, followed by the second steel washer (smaller inside diameter) followed by one M3x5x0.5 micro washer and finally one M3x9 Thin Ball Bearing. Important, apply red threadlock to the threads in the M3 locknut (to avoid getting threadlock into the bearings) before threading onto the hub. Tighten the locknut slowly until there is no end play and the grip rotates smoothly.

Step 29 Tail Blade Assembly

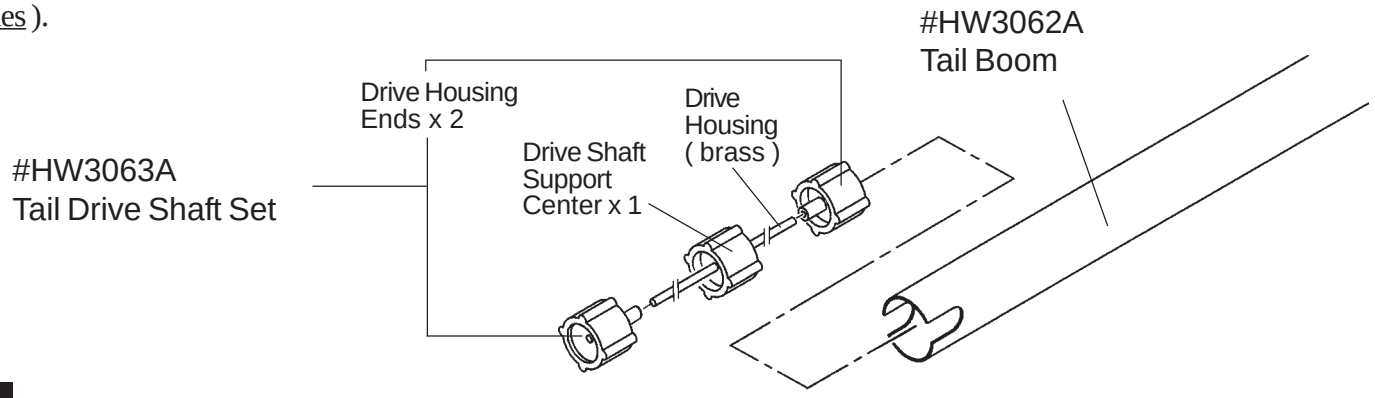
Snap the ball on the tail rotor grip into the adjoining pitch slider link on both sides. Install the tail rotor blades shimmed with M3x10 plastic washers on both sides using two M3x20 socket cap screws and M3 locknuts. Note the direction of the blades on the diagram, the leading straight edge of the blade should be on the same side as the ball on the blade grip. To tension the blade bolt, start loose and tighten until the blade holds horizontal but pivots freely when moved.



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 30 Tail Drive Shaft & Pushrod Guides

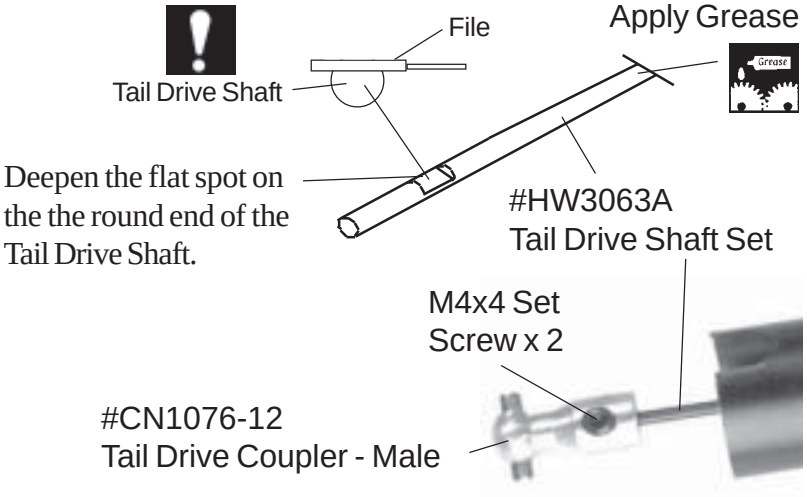
Insert three tail drive shaft guides on to the brass tail drive housing (note that one guide has a larger center hole than the others, slide this one to the center of the brass tube), add the remaining two onto the ends. Glue the guides into position using Zap Ca on the brass tube. Insert the tail shaft 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 plastic guides inside the tail boom.

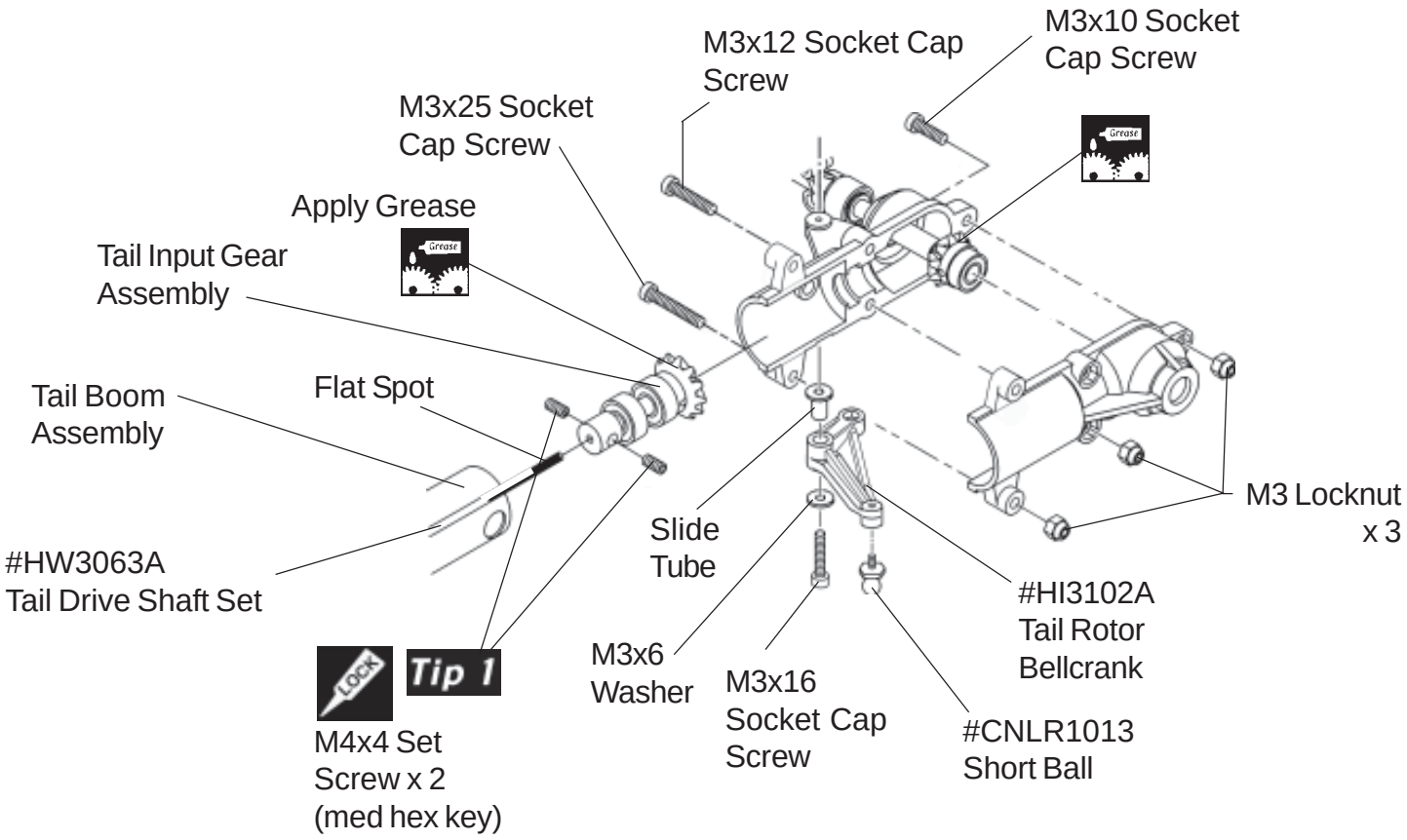
Step 31 Tail Drive Shaft

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. Attach the universal tail drive coupler using two M4x4 set screws using locktight.



Step 32 Tail Gearbox Assembly

Attach the tail input gear assembly on to the drive shaft with two M4x4 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 other screws because it is permanently bonded in place. 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 M3x10 socket cap screw and M3 locknut at the end of the gearbox, one M3x12 socket cap screw with M3 locknuts at the lower-center of the gearbox and one M3x25 socket cap screw at the front-lower position securing with one M3 locknut. The other two locations are left empy until the horizontal and vertical fins are attached.



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 33 CCPM Radio Review & Setup

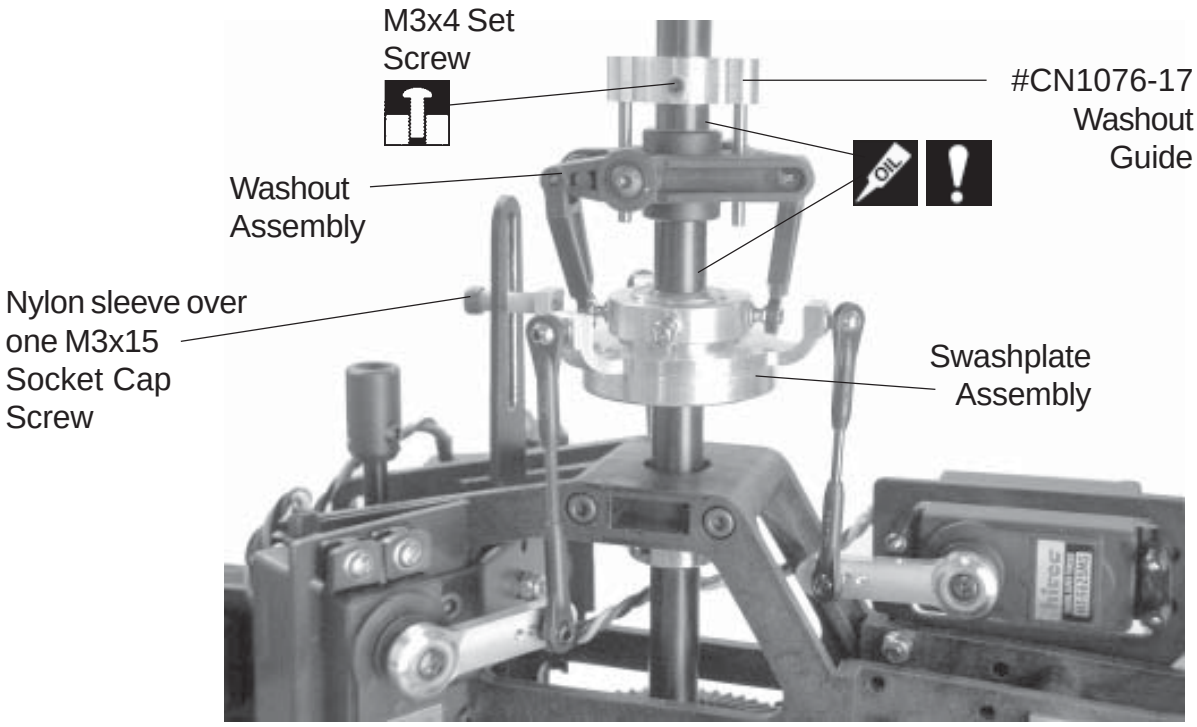
The next section covers setting the pushrods and servos that will control the helicopter. It is important at this time that you review the instructions provided with your radio that controls the ccpm mixing for the 3 cyclic servos. Reviewing the radio instructions will assist you in becoming familiar with the functions that affect the individual servos and affect the interaction of the three servos working together to control the swashplate.

Radio Setup Procedure

1. It is best to choose a new model memory (if available) and use the Reset feature to remove any previous settings or mixes, remember this usually also returns the radio configuration to single servo.
2. Locate and activate the swashplate mixing for 120^0 ccpm (most manufacturers set radios to single servo version by default and when the data reset feature is used).
3. Return both the aileron and elevator subtrims to neutral along with any hover pitch knobs to neutral.
4. Adjust the servo reversing switch to make sure the servos are moving in the correct direction, together as the collective stick is raised. If the servo reversing does not correct the movement of a servo, there is always a travel adjustment function inside the swashplate mixing menu. Change the default setting to be opposite, for example, if set to +60 then change to -60 and change any servos that are affected.
5. After each servo horn is mounted, it is critical that the horn be 90 degrees to the respective pushrod.

Step 34 Swashplate, Washout and Washout Guide

Slide the swashplate over the main shaft. Slide the nylon sleeve over the M3x15 socket cap screw and insert it through the anti-rotation bracket to the extra hole in the front of the swashplate and secure in place using threadlock. Do not overtighten this screw as it will deform the nylon sleeve. Next slide the washout assembly (make sure the pivot screw is positioned on the left side of the main shaft) onto the main shaft and attach the radius arms (also note that when properly installed the number 1 is on the inside of the radius arm) to the short steel balls on the inside race of the swashplate. Slide the radius guide onto the main shaft and align to the slots in the washout unit. Insert the M3x4 set screw into only one side of the washout guide but do NOT tighten at this time. This will be tightened after the rotor head has been installed because the exact position of the guide depends on the rotor head.



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 ball ends (this has changed from earlier manuals). Depending on the servo brand, the servo horn offers different patterns for fine tuning.

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 centers of the control balls or ball ends.

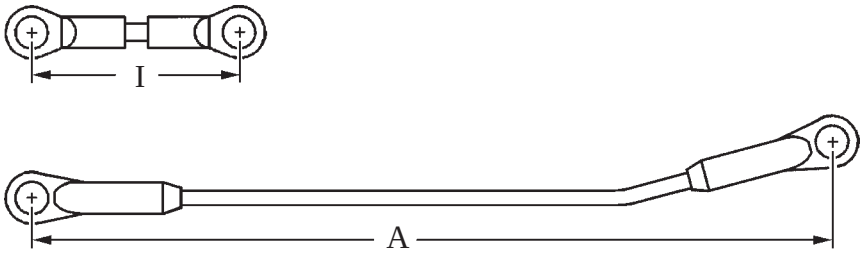
#HI3145
Ball Link Set

#HW3192A
Pushrod Set CCPM

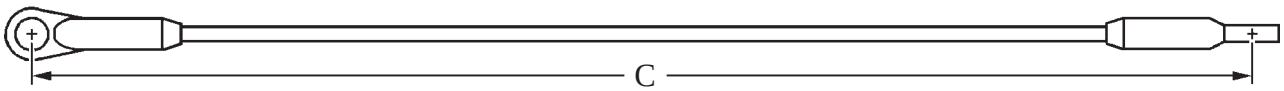
#CN1076-21
Long Rotor Head
Pushrod Set

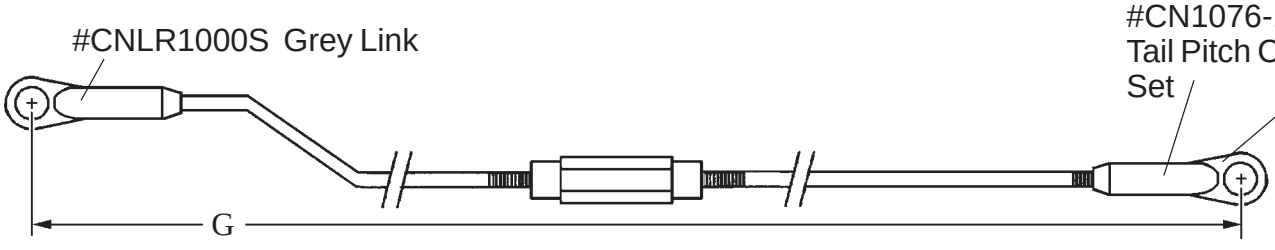
Due to the different types of radio and servos that are chosen to install into the helicopter, match each pushrod to the lengths in the table for optimum setup.

Location	ID	Rod	Length
Washout to flybar - bent (2)	A	94	115
Throttle servo	B	60	90
Bell mixer to SWP (2)	C	150	167
Front CCPM servo (2)	D	25	53
Rear CCPM servo	E	25	48
Bell mixer to seesaw (2)	I	15	28
Tail rotor pushrod	G	104+641	755



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



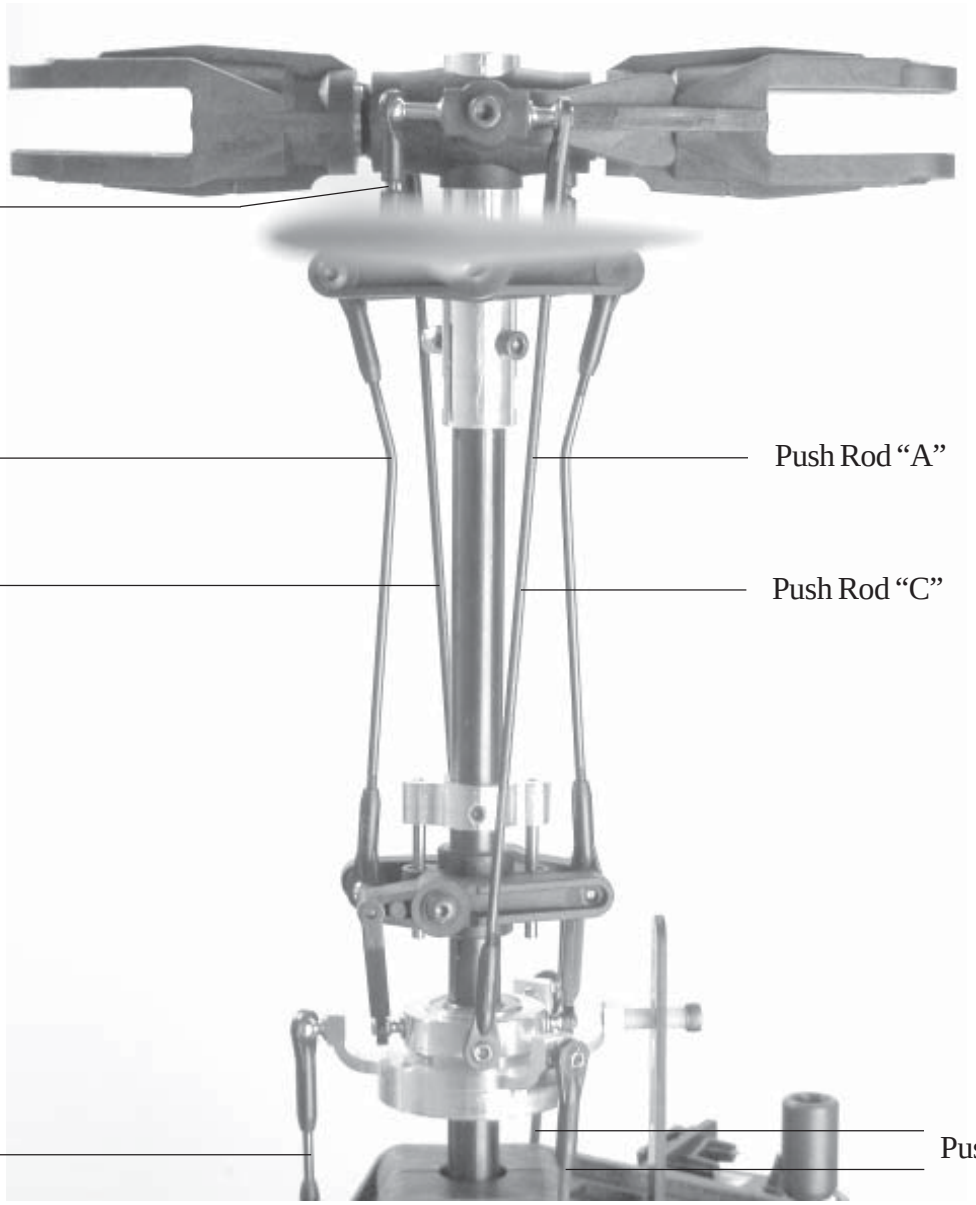


Step 36 Rotorhead Pushrod Attachment

After completing the pushrods, attach the pushrods to the rotor head without the cabin or shroud installed on the helicopter mechanics. At this point the helicopter should be setup, ready to fly, except for the tail rotor and throttle linkages before the fiberglass cabin and tail boom are installed.

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.

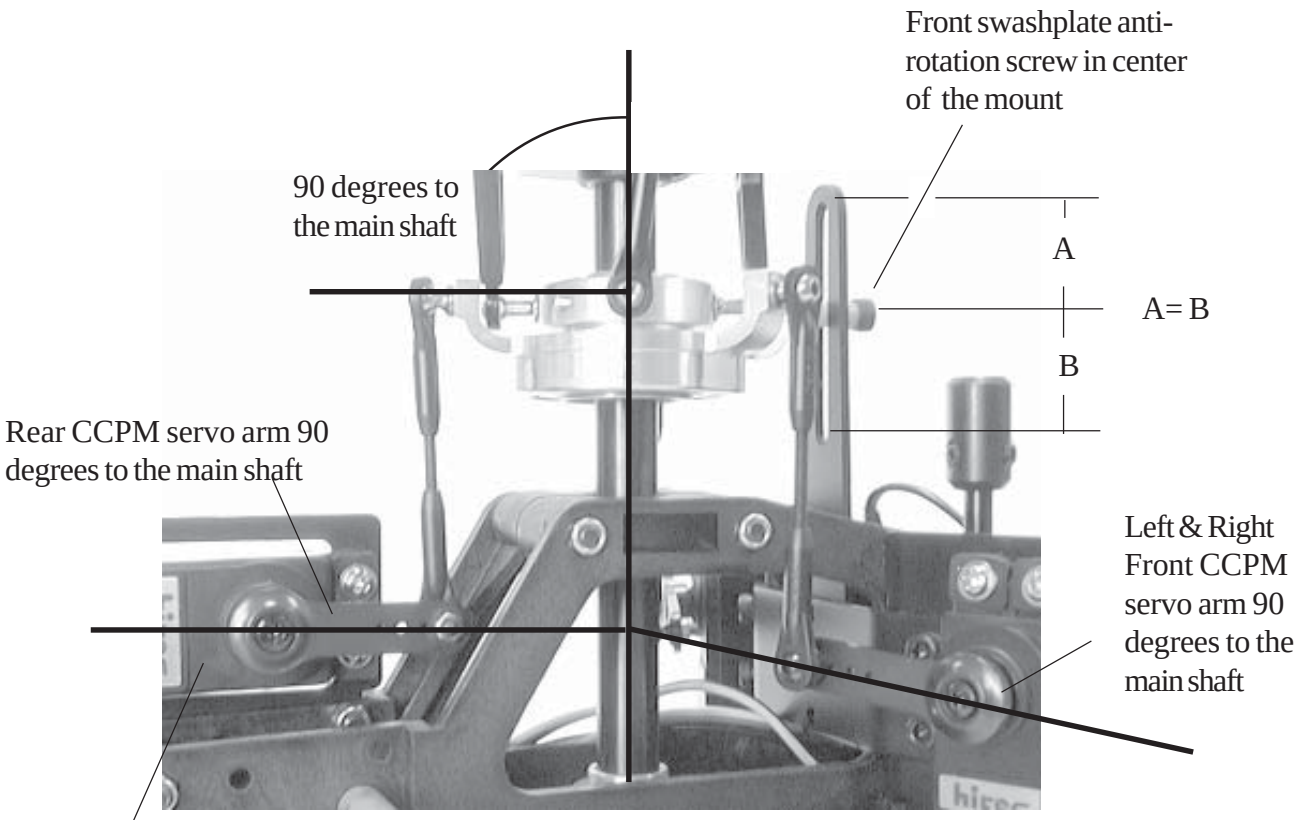
After the rotor head pitch curves are setup, tighten the single M3x4 set screw that holds the metal washout guide in place so that there is a 1mm space between the top edge of the washout hub and the guide when the collective/throttle stick is in the top position. Make sure that the guide is installed with the washout pins parallel to the feathering spindle in the main rotor head.



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.

CCPM Servo Guidelines

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 three servos work together. This will result if the items in Step 33 have been followed and the ATV function for the three ccpm servos has been set very, very accurately to eliminate pitch change when moving the aileron or elevator sticks. This will become obvious in the next steps.



After installing the three cyclic pushrods, the swashplate should sit level.

Note, photo shows rear CCPM servo mounted incorrectly, but this does not change the setup procedure. Please use Step 19 as the correct orientation.

Step 37 CCPM Swashplate Linkage

Three servos are mounted on the front and rear servo brackets. They work together to tilt the swashplate producing the collective pitch, roll cyclic pitch (aileron control) and the fore-aft cyclic pitch (elevator control). The servo horns provided in the radio will not be long enough to achieve the full collective range, the control ball is required to be mounted at a distance of 25-26mm from the center of the servo. It is recommended to use Century's **optional** metal servo arms as follows:

(CN2189 - Futaba, CN2185 - JR/Airt, CN2181 - Hitec) for all standard plastic output shaft servos.

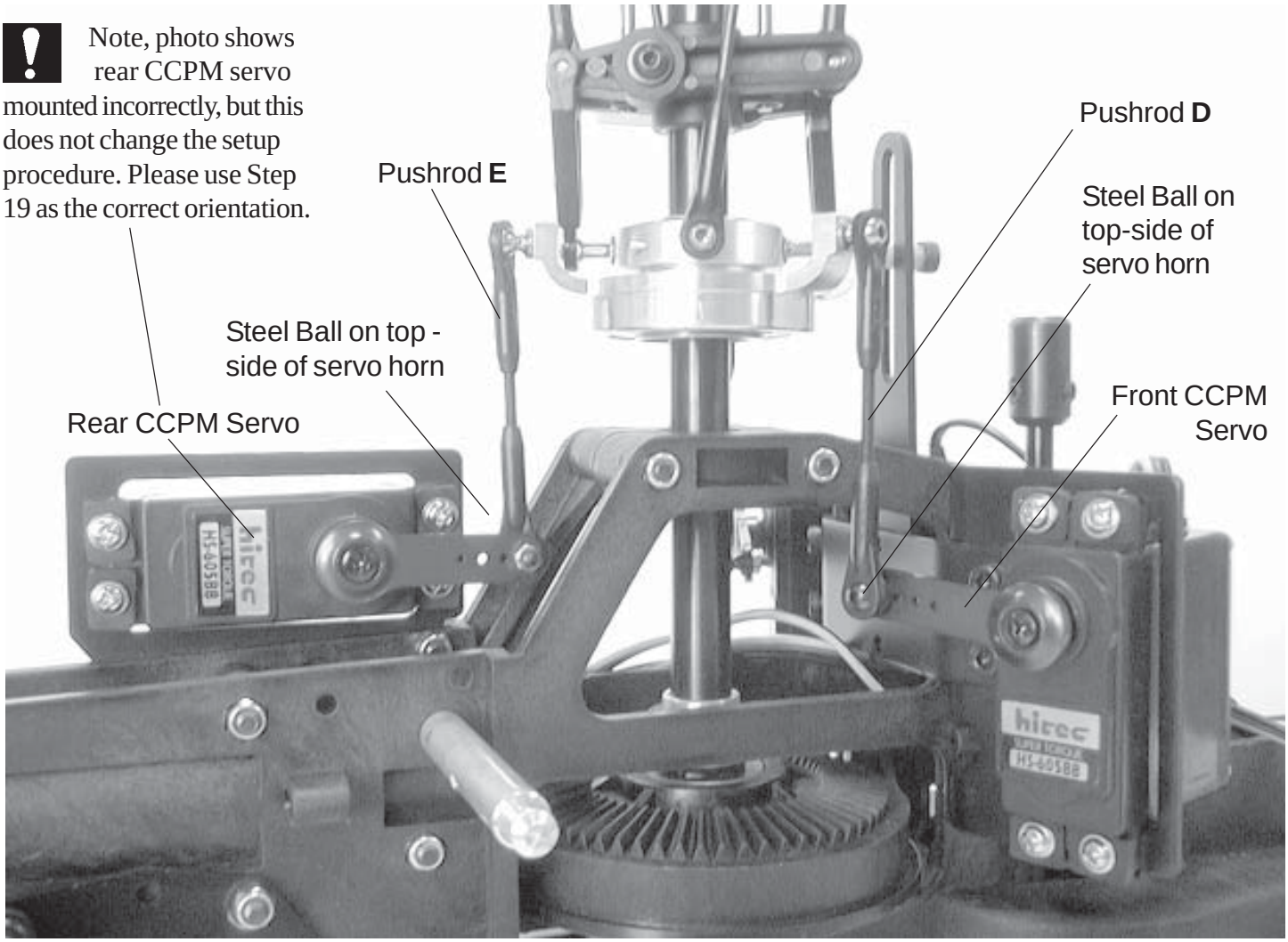
(CN2279FM - Futaba, CN2279JM - JR, CN2279HM - Hitec) for all metal gear output shaft servos.

Attach one steel ball with one 2mm nut to the top-side of the rear servo horn and to the top-side of the two horns for the front servos using threadlock. With the radio turned on and the trims centered, attach the rear servo horn parallel to the body of the servo and the CCPM Rear (**E**) Pushrod. Similarly, attach the front servo horns mounted 90 degrees to the servo with the CCPM Front (**D**) Pushrods.

Move the collective stick to its maximum position and watch for any roll (aileron) or pitch (elevator) inputs. If an input is found, the problem will be one of the following in the table. The table describes the symptom and the steps to correct them.

Symptom	Corrective Solution
metal control ball distance	move ball location to match other servos, or carefully use ATV
angle of horn & servo not 90^0	use subtrims to set exactly at 90 degrees
angle of horn & linkage not 90^0	use subtrims to set exacly at 90 degrees, noticeable at extremes
swashplate not level	adjust pushrod length to level

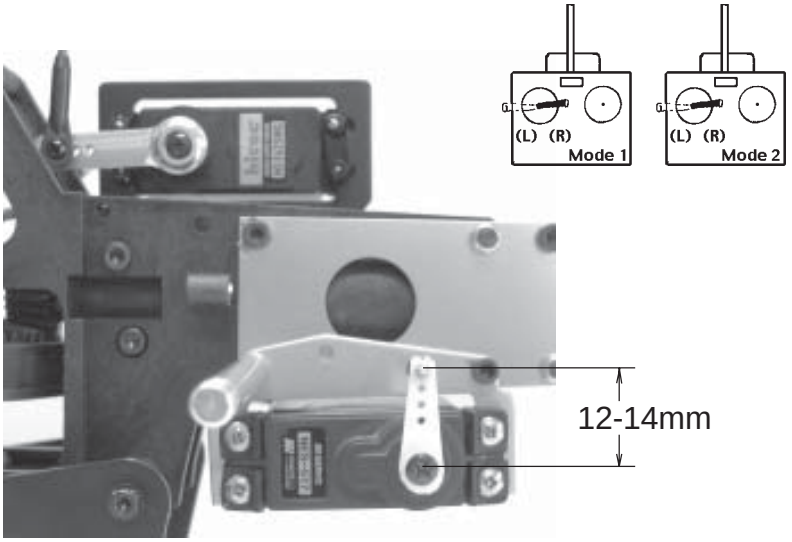
Note, photo shows rear CCPM servo mounted incorrectly, but this does not change the setup procedure. Please use Step 19 as the correct orientation.



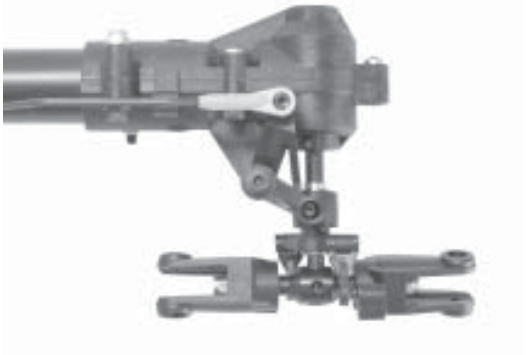
The Rudder linkage changes the pitch of the tail rotor blades to increase or decrease the torque compensation to rotate the nose of the helicopter about the main shaft. Use a servo horn in the shape of a cross and find the correct arm that will sit at 90 degrees to the length of the servo by lightly pressing the servo horn over the output shaft on the servo. After the appropriate arm is found, use the subtrim function in the radio to accomplish a perfect 90 degree setting. Remove the arm and trim the 3 of the 4 arms off. Install one steel ball and one 2mm nut at a distance of 12-14mm from the center of the servo on the bottom of the servo horn and remember to use threadlock.

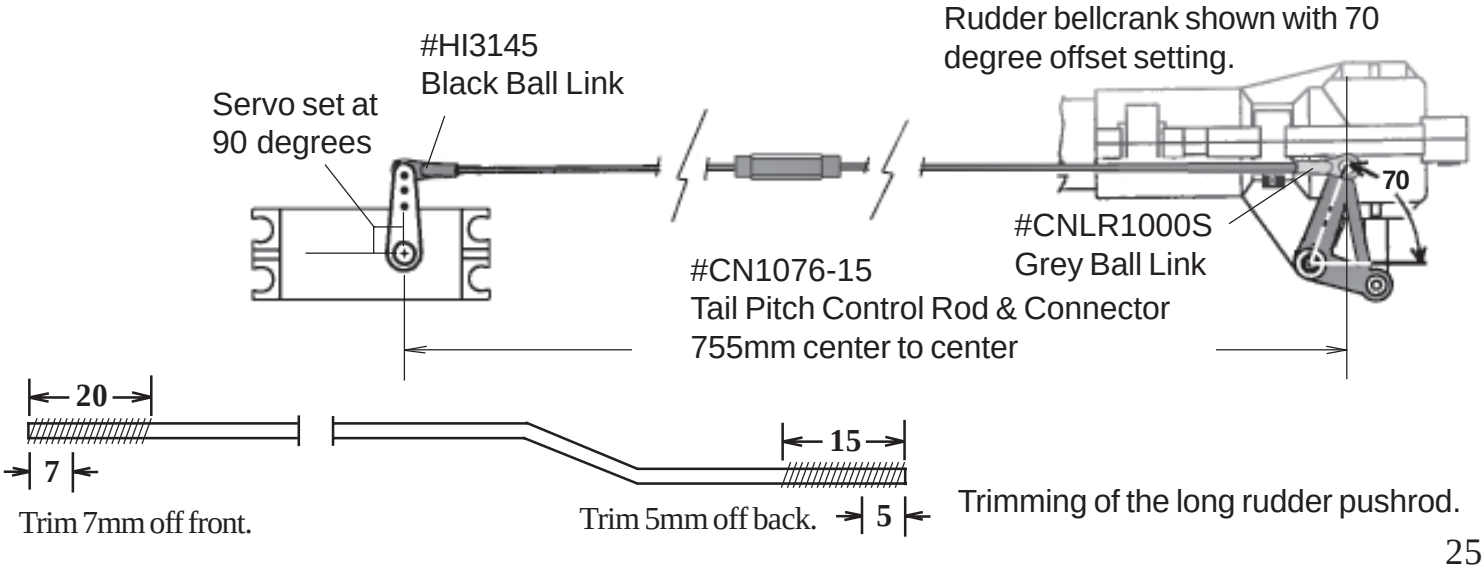
The longer rudder pushrod (**G**) of the two needs to be shorted by 12mm, we recommend that 7mm be cut from the straight end of the rudder pushrod and 5mm cut from the "z-bend" end. Be careful not to damage the remaining threads. At this time only assemble the tail pushrod for testing. Attach one grey ball link to the "z-bend" end of the long pushrod and thread the rudder pushrod connector onto the straight end. Next thread the 105mm pushrod into the connector and attach one black ball link to the end. Position the tail pushrod guides to allow for a very smooth rudder pushrod alignment, you should be able to move the pushrod very easily. Connect the ball links and reduce the ATV or EPA settings in the radio to avoid binding the pitch plate against the gearbox or the tail pitch links from hitting the tail pitch lever mount.

Finally align the rudder bellcrank to 70 degrees as shown in the diagram. The 755mm length is a starting point, different servos and different positioning of the tail pushrod guides will change this length, but it will get you close to the final setting within the trim range of the rudder stick. If a rate mode gyro is to be used, it will need to adjusted during flight testing.



As the rudder stick is moved to the right, the rudder pushrod will move backward (R22 & Schweitzer) increasing the thrust in the tail blades rotating the nose to the right.





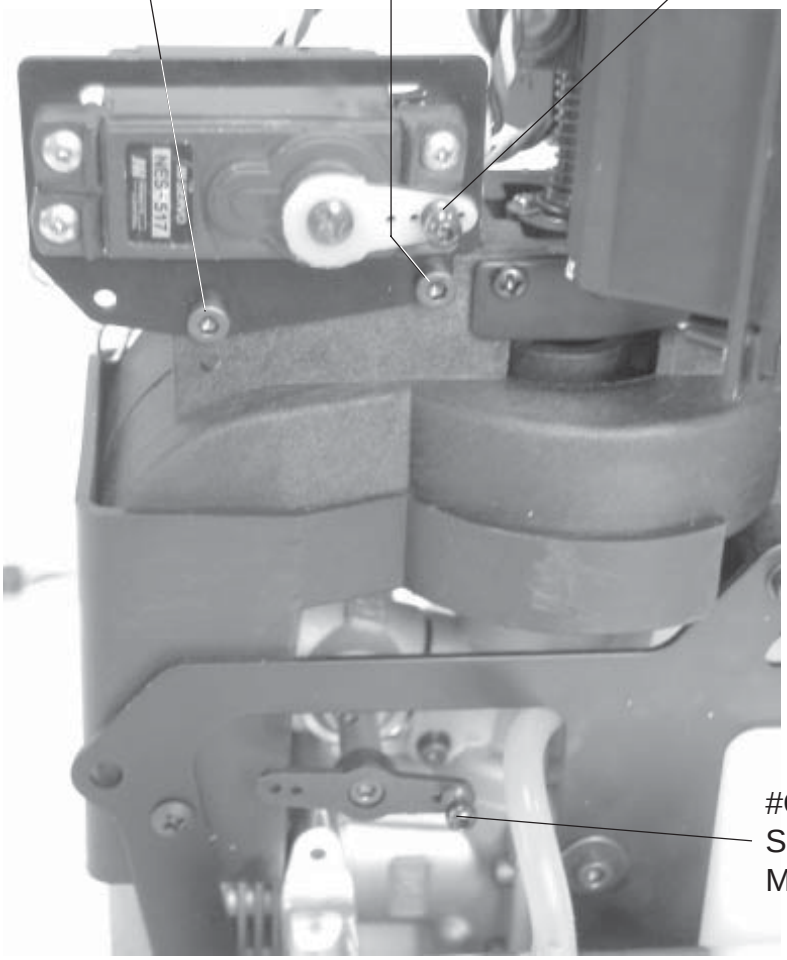
Step 39 Throttle Linkage

Attach the throttle mount to the left side of the front mechanics with the knotch towards the starting shaft using two M3x10 socket cap screws in the front, threaded into one M3x30 hex spacer and one M3x8 socket cap screw and M3 locknut on the inside of the frames. Attach one steel ball and one 2mm nut, to both the throttle arm and servo horn using threadlock. Position the ball at 13.5mm from the center of the servo and in the outermost hole on the plastic carburetor 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. If necessary, use the ATV or EPA adjustment to limit the servo travel to avoid binding the linkage at the full open and full closed positions.

M3x30 Hex Spacer & M3x10 Socket Cap Screw x 2

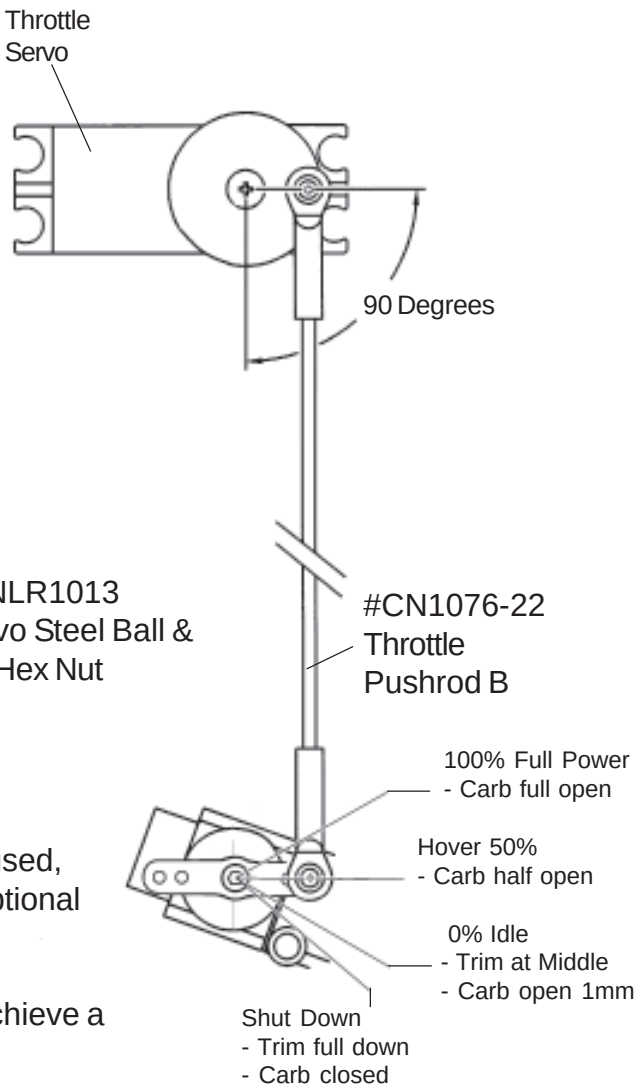
M3x8 Socket Cap Screw & M3 Locknut

#CNLR1013 Servo Steel Ball & M2 Hex Nut



#CNLR1013 Servo Steel Ball & M2 Hex Nut

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.

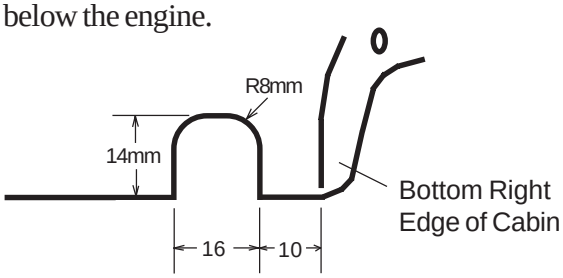


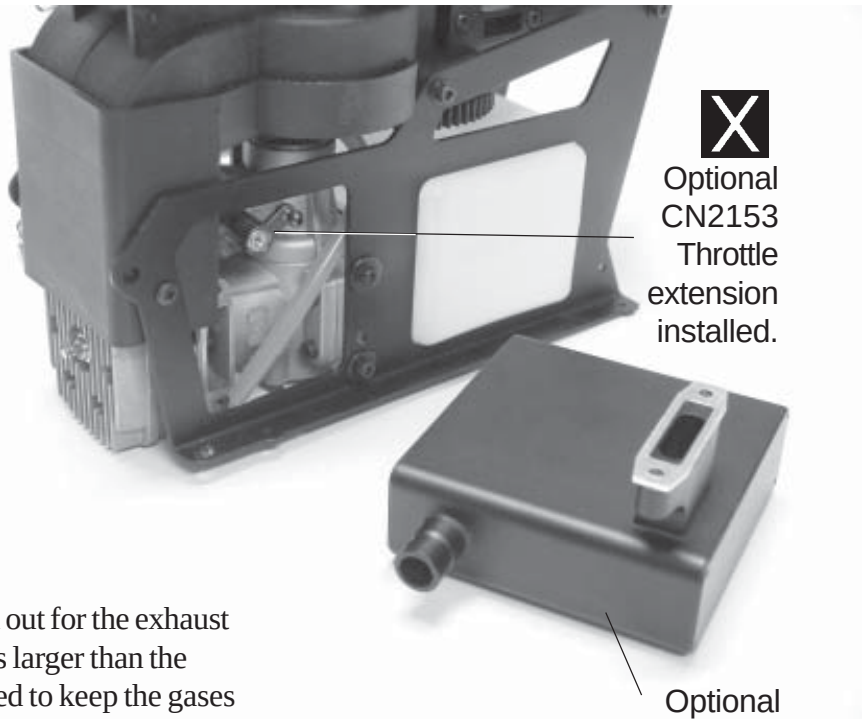
Tip If the Optional CN3059 Scale Muffler is going to be used, the stock plastic carburetor arm will not fit and the Optional CN2153 throttle extension needs to be used.

Also, position the carburetor arm on OS50SXH to achieve a linear throttle response from idle to full power.

Step 40 Muffler Attachment

With the narrow space between the mechanics and the fuselage, it is recommended to install the scale muffler Century has designed for scale fuselages. Attach the muffler to the engine with the screws provided with the muffler (***Tip 1***- using hi-temp threadlock). Attach the pressure tap to the top of the muffler, remember to use hi-temp RTV sealer or threadlock on these parts. Route the return fuel line below the engine.





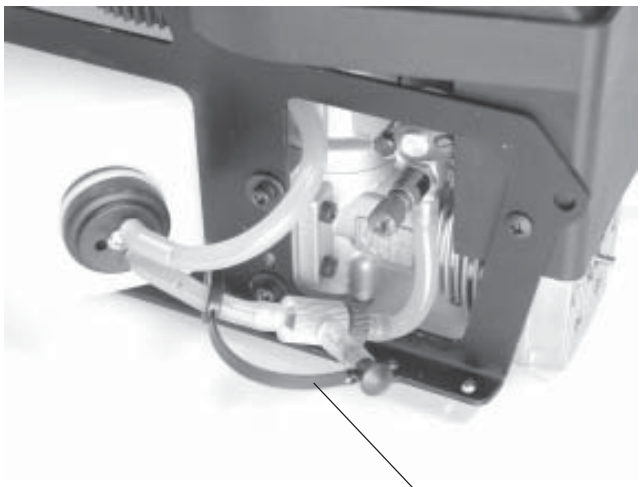
The left side of the fiberglass cabin needs to be ground out for the exhaust pipe to clear the body. We have listed a hole size that is larger than the tube as we also suggest that an exhaust deflector is used to keep the gases away from the inside of the cabin.

Tip For a good seal between the muffler and the exhaust port, use a gasket made from thin aluminum, brass or exhaust gasket material. To properly seal the fit, after running the engine for several minutes on the first run, shut down the engine and re-tighten the bolts, while the engine is still hot. The extra 1/8 to1/4 turn on the bolts will seat the muffler in place. Do not strip the holes!

Step 41 Fuel Filter & Cutoff

If you have not completed the fuel lines, do so now and connect the pickup line (with clunk attached inside fuel tank) to a fuel filter (optional) and then connect the filter to the carburetor fuel inlet just below the needle valve. Connect the vent line (tube to top of fuel tank) to the pressure fitting on the muffler and route the vent line through the frames without touching any gears.

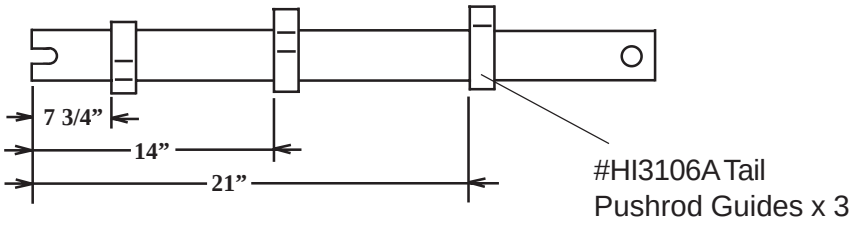
To make fueling easier inside the cabin, we recommend Century's #CN2286, which includes the 3 way fuel filter, the fuel line cutoff and plug and the fuel filter mount. This simple and convenient optional accessory will allow you to close the fuel line to the carb to pump fuel in the fuel tank. Once full, close the fueling line and when you are ready to start the engine, open the cutoff, restoring fuel the carburetor.



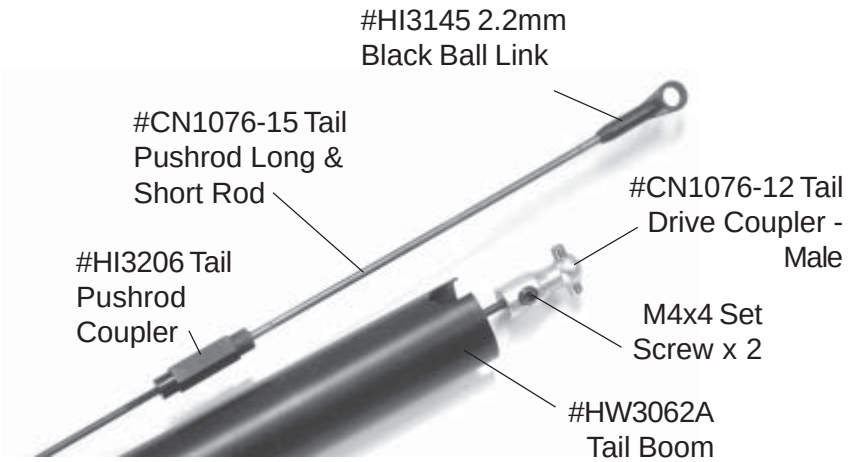
Tip The fuel filter has fuel flow direction that is correctly installed when the oring is closest to the carburetor. This ensures that the filter screen stops any particles of dirt from entering the carburetor. It is also recommended to use a filter on the pickup line inside the gallon of fuel.

STEP 42 Tail Pushrod Guide Positioning

Insert three rudder pushrod guides positioned 7 3/4", 14" and 21" from the front of the tail boom. Do not bond them at this time until the tail boom has been test fitted with the fiberglass tail boom. Connect the long rudder pushrod to the pushrod coupler and attach the 104mm pushrod. Note, the long pushrod uses the Grey colored 2.0mm ball link but the 104mm pushrod uses the Black 2.2mm ball link.

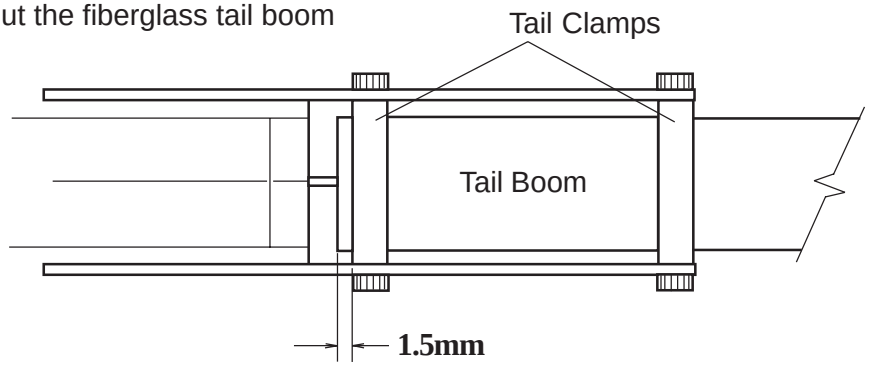


STEP 43 Bonding Tail Guides



To set the rudder pushrod guides, attach the tail boom assembly to the main mechanics without the fiberglass tail boom until the tail drive coupler is seated into the female coupler on the main mechanics or the tail boom extends 1.5mm past the second tail boom clamp. Tighten the lower screws until the tail boom will not rotate in the clamps but do not overtighten the clamps. Attach both ball links. Rotate the guides until the pushrod moves very smooth at the distances listed, then bond the guides in place with a few drops of CA adhesive. Let completely dry.

Tail boom positioned 1.5mm past the 2nd tail boom clamp without the fiberglass tail boom installed.



Completed Mechanics

At this point, the various sub assemblies should be complete and flight ready to be fitted with the fiberglass components. We do recommend that the engine be broken in at this time and get the basic mechanics trimmed for hovering. While this can be done after the fiberglass components are installed, access to items like the rudder pushrod and rotor head pushrods are severly limited and making adjustments are difficult or impossible. Add the landing gear and temporarily add weight to the nose to balance the helicopter during testing. After testing, some disassembly is necessary.

Step 44 Preparing and painting the kit version.

This section is written to cover painting and detailing of fiberglass components using in Century's scale helicopter kits. Some included references may describe components of different kits, not exclusive to this instruction manual.

Flexibility

A wonderful attribute of fiberglass is in its flexibility. Century takes care and pride in craftsmanship that goes into every fuselage. However, fiberglass parts will migrate while inside the shipping box. When two mating components are brought together and they do not align or mate, the culprit is a warped part. Many become upset and wish to lay blame but dealing with this is very simple when explained a simple procedure. Using a heat gun set at the high setting at a distance of 1-2 feet away, evenly heat the warped part until the outside surface is hot to the touch and the part has become pliable (flexible). Using adhesive tape, mate the two fiberglass parts together and let both parts sit until both parts have reached room temperature. Remove the tape and now both parts are stable and match one another. In some instances, depending on the location of the warp, the part may need to be held in an overextended position to achieve the proper shape when the part is finished.

Working with Fiberglass

Difficult to work with, we disagree. Fiberglass is easier to repair than you think. Using today's CA type of adhesives, a severe crack in a fuselage can be simply fixed and the repaired section is much stronger than in its original state. Add touchup paint and no one would ever know I had been damaged. There is a limit to this type of thinking where purchasing the replacement fiberglass part is simply cheaper and less work than performing major reconstructive surgery.

The Paint Job.

There is no magic to a good paint job, the true secret is time, patience and common sense. A beginner who thinks that they can throw paint onto a fuselage Friday night before flying on Sunday is dreaming, the helicopter would be flyable but even that is a stretch. The average beginner will spend the better part of a month to apply a good clean paint job.

Preparing the fuselage for painting.

After opening the fuselage, examine all the fiberglass components to see where work needs to be done to allow a simple "bring up" of the fuselage. "Bring up" describes the necessary steps to complete all the jobs in order to start priming the fiberglass parts. Typical work that is done at this stage is rough sanding on seams and jointed components, filling of surface imperfections, adding panel lines and rivets, cutting required holes and preparation for priming.

1. Start by thoroughly washing all fiberglass parts in mild detergent and water, this will remove any residue remaining from the molding process. Next wipe down all the parts with Acetone (from the hardware store). The Acetone will remove all traces of oil or grease that will affect the adhesion of two fiberglass parts or between the paint and the fiberglass. Now using steel wool or an abrasive pad commonly used for scrubbing dishes, scuff all surfaces that will be joined or receiving paint. What is important to note here is that we are breaking through the topmost resin surface and creating the best surface for adhesive or primer to adhere to. The prepared finish will have very fine score marks usually seen when the part is held to the light at a slight angle.

2. This is the time to rough sand any accessories or small parts, using the 320 grip sandpaper, that will be assembled and attached at different positions on the fuselage. These can be marking lights, engine exhausts, scale fuel tanks, horizontal and vertical stabilizers, guns, antenna or any scale details being bonded to the fuselage. These accessories should be test assembled to make sure that all parts are prepared, and you will be able to see any problems that may arise in trying to paint these parts. Some thought should be put into how to hold the part as it is being painted. Go ahead and bond these parts at this time using the slow CA glue or regular 5-30 minute Epoxy to bond two fiberglass components together or Stabilit, a specially formulated adhesive for this purpose and excellent for fillets. Epoxy is good to bond unlike substances like wood or metal to themselves or other parts.

3. Once the detail parts have been built into the sub assemblies are ready to paint, use a filler in sections that have gaps or slight surface imperfections, occasionally there are voids (air bubbles in the resin) that occur near the surface that need to be filled. There are allot of good fiberglass fillers on the market, it is best to check with your local hobby shop to get a recommended product. Try to stay away from porous fillers designed for wood as they will shrink and are not a good choice for large areas.

4. Most major windows and accessory holes have been precut by Century, leaving only those that have a user dependency like the type of exhaust system used on the helicopter or the exact exit position for the cooling fan shroud. For these fuselages that have been explicitly designed for the Century mechanics, almost all of these concerns have been considered and finished at the factory.

4a. When making cutouts or holes in the surface of the fiberglass the best procedure is to drill a pilot hole using the 1/16" drill bit at corners or along a curve. Start with a permanent marker to draw the opening or window. The pilot holes serve to avoid leaving sharp corners which given the nature of a helicopter will be the focal point for stress cracking originating from corners. Once the holes have been made, use the moto-tool for all other roughing cuts. The cut off wheel is the best for straight lines and either the sanding drum or the curved stone is used for smoothing edges. If the cut out is a window, do not use the moto-tool for the final work. Switch to a sanding blocks, square blocks of various sizes for straight edges and round dowels for rounded corners.

4b. In the case of the exhaust opening which will end up being 1/8" larger across the outside diameter of the exhaust pipe that extends below the bottom of the fuselage. After drawing the circle, use grinding stone and move in small circles until the hole is at the size wanted.

5. Priming the fuselage accomplishes two tasks: firstly, the primer paint is designed to aggressively adhere to the surface being painted and provide the best surface for the colored paint to adhere to; secondly, all surface imperfections will become visible. Depending on the particular imperfection, light sanding with number 600 or 800 sand paper and the second priming will take care of 90% of the highly visible problems. The remaining 10% need to be filled, let dry, sanded again and then sprayed with the second coat of primer. The primer process will be repeated until the surface is as perfect as your patience and time permit.

6. Select your paint color and follow the directions on the particular brand of paint being used as each manufacturer has different requirements.

7. Spray cans vs Airbrushed finishes. The preference is left the to the modeler, many good paint jobs have been accomplished using the spray cans however in the long run a good spray can finish requires more attention than using an airbrush. The answer is simple, you want a professional looking fuselage, not want a flying brick. We need not even think or mention any type of paintbrush larger than 1/4" wide.

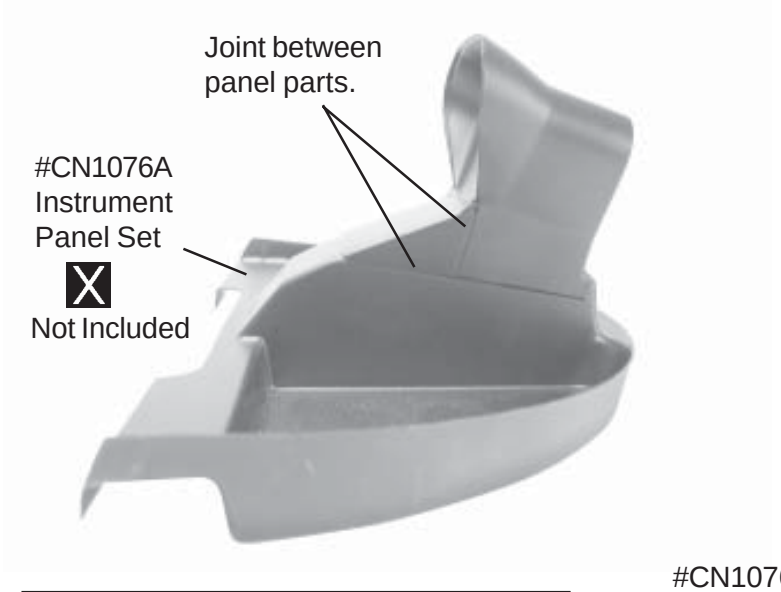
8. As for selecting the type of paint visit your local hobby shop and ask their opinion on painting fiberglass. On a general note, polyurethane is always a very safe paint that is fuel proof. A perfect paint job can be easily ruined by spilling raw 15-30% fuel accidentally. There is no paint manufacturer who will tell you that their product will resist 30% fuel for very long and for the most part the fuselage is only exposed to the oil residue from the burned exhaust. The restricted fuelling areas in a scale helicopter are prone to having fuel spills from time to time. For this reason, it is recommended to paint the area around the engine and fuel tank, especially the edges of the fiberglass opening where paint runs are likely to start. A good hobby shop will carry a bottle of clear polyurethane in liquid form just for this purpose. Thinned epoxy works well as an alternate.

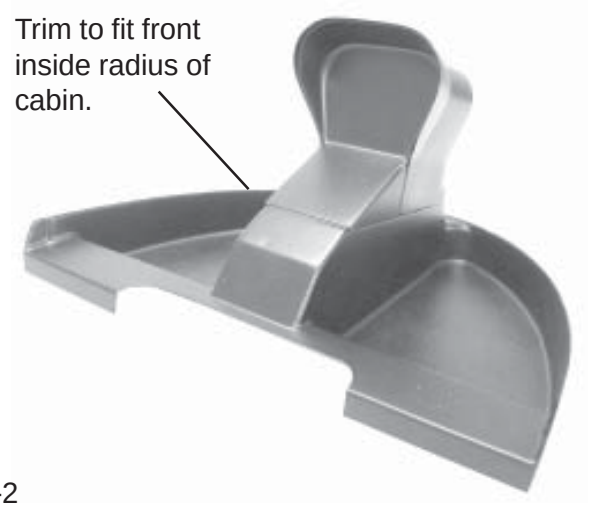
Good luck with your paint schemes and painting job undertakings.

At this point, the flying mechanics should be assembled flight ready and possibly flight tested. The remaining items to be checked before proceding is the collective pitch setup and double check the servo throws for any binding. Now is the time to finalize the setup because access to the rotorhead is very restricted after the complete cabin and top shroud are assembled. We also suggest the engine is broken in and the heli is flight trimmed before the cabin is installed.

STEP 45 Instrument Panel (Optional Scale Accessorie Kit)

Cut out the parts to assemble the instrument panel by marking and following the lines molded in the parts. Care must be taken when cutting the large radius in the front, rough cut larger and then trim to fit to the inside contour of the cabin. The plastic will need to be bonded with a solvent type of adhesive. Once dry, the parts can be painted with plastic compatible paint.





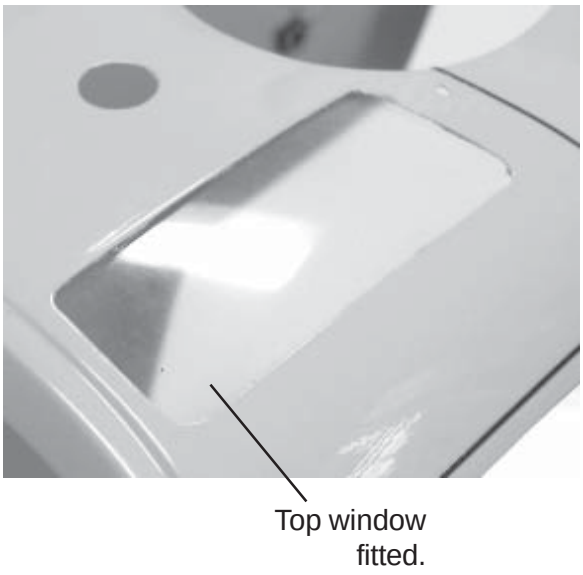
STEP 46 Windshield

Test a black marker on some of the scrap material and make sure it can be removed with rubbing alcohol. Trace the mold line in the windshield and then make a second line that is 1/4" [6mm] outside the first line. Then draw a third line that is 1/4" [6mm] outside the second line. <u>It is very important that there are 3 lines as the molded line is incorrect</u>, start by rough trimming to the outside of the 3rd line and continue to trim in smaller amounts as the windshield is test fitted to the front of the cabin. The windshield final size will fit to the recess in the cabin. Once trimmed to size, it can be masked and the outside 3/16"[4mm] and the center divide can be painted to match the body color.

! Do not install now! Only after the fuselage is completed.

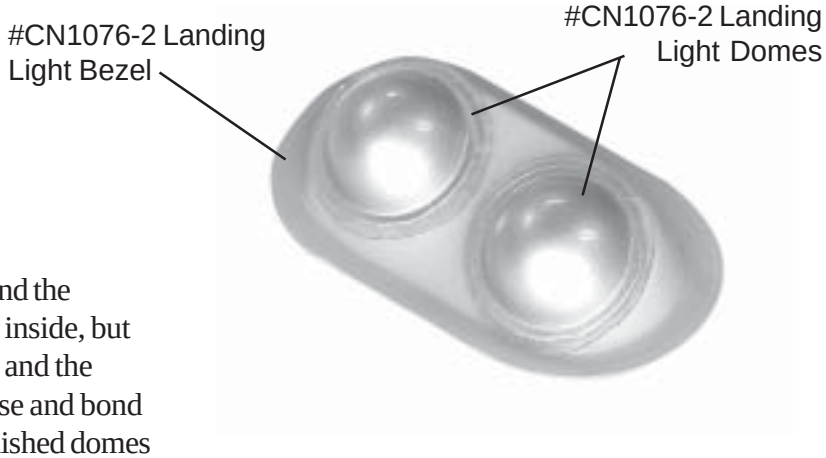
STEP 47 Cutout Window & Navigation Lights

Mark a line 3/16"[4mm] outside the molded line and cut out the parts from the plastic sheet. Carefully continue to trim the parts as you test fit them to their final positions.



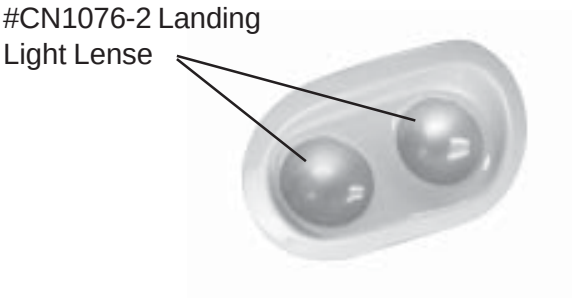
STEP 48 Top Window

After test fitting the top window, make sure that enough material has been trimmed away to clear the top shroud opening. Apply "goop" to the outside edge of the window and clamp in place until it is completely dry.



STEP 49 Landing Lights

Carefully cut out the both the landing light lenses and the domes. The domes should be painted silver on the inside, but do not paint the mating surface between the dome and the lense. Apply "goop" to the outside edge of the lense and bond to the landing light bezel. After it drys, bond the finished domes directly on top of the lenses.

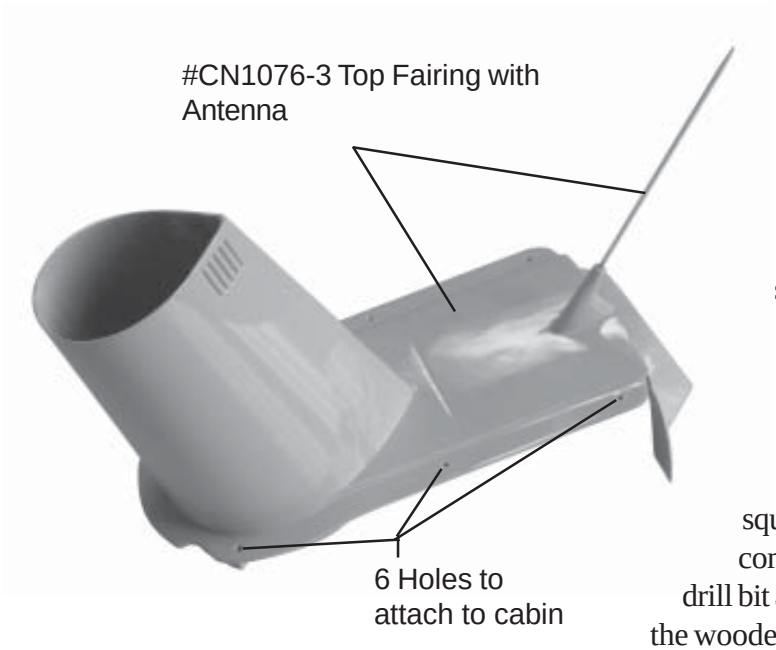


STEP 50 Landing Light Installation

The landing light is installed on the outside of the cabin, test fit to the cabin and make a pencil mark around the bezel. Draw another line 2mm inside the first. Taking some sandpaper scuff the surface from the opening to the inside line to improve the bond between the landing light and the cabin. Using epoxy bond the landing light into the main cabin.

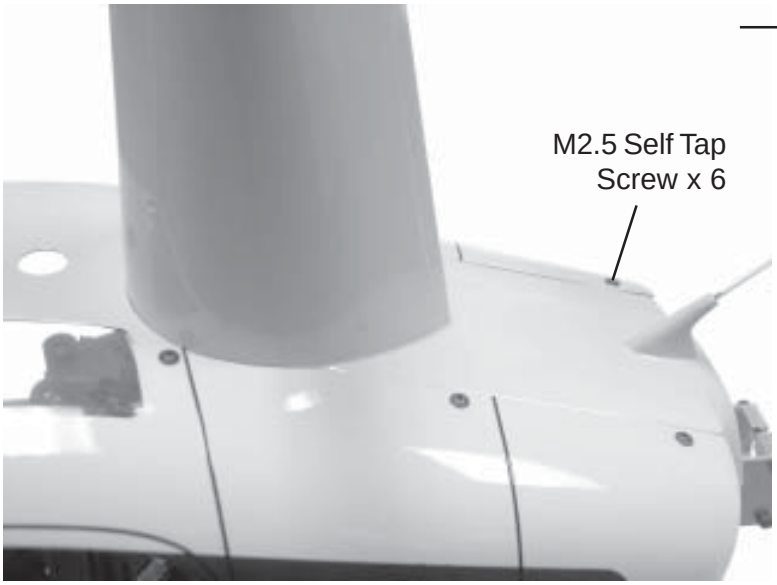
STEP 51 Cutout Window & Navigation Lights

Taking the navigation lights, continue trimming as they are fitted to the front of molded lights on the main cabin. Once trimmed, paint the navigation lights from the inside to preserve the high gloss outside surface. General aviation: red on the left and green on the right. Bond in place using "goop" adhesive applied to the edge of the lenses.



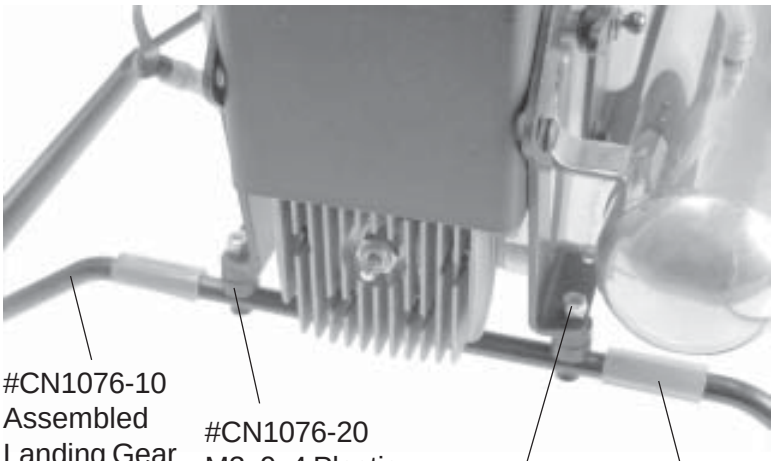
STEP 52 Top Fairing

The fasteners between the top fairing and the cabin needs to be marked, drilled and installed. Start by positioning the top fairing to the cabin and secure using tape. Make 6 center marks for the fasteners, equally spaced along each side. Notice that the front left side of the fairing has an accomodation for the extra thickness of the top window. It in not recommended to install a fastener here. After marking, drill all holes using a 1/16" [1.5mm] drill bit through both the cabin and the fairing. Remove the fairing and bond the matching wooden squares against the bottom of the fairing using epoxy. After completely dry, re-drill the six holes using a 3/32" [2.4mm] drill bit and using one screw, tap all holes ahead of time. Finally, the wooden blocks can be painted to match the inside color of the cabin. The antenna hole needs to be drilled carefully into the mount. Using a 5/64"[2mm] drill bit, hand drill 3/4"[19mm] down into the mount and test fit. After painting white, bond into place using bepoxy.



STEP 53 Top Fairing Fitted to Cabin

After all assembly is completed, bond the antenna to the mount at the back of the fairing and paint the M2.5 screw heads to match the cabin color. Note that we have shown the fairing installed, initially do not mount the main shaft while preparing the fairing as is creates too many other fitting isses. We detail the final installation of the fairing a little further in this manual.

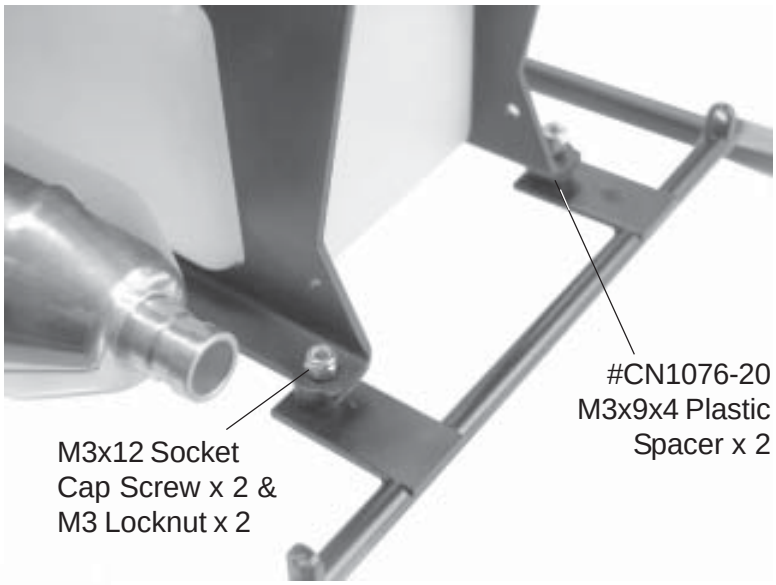


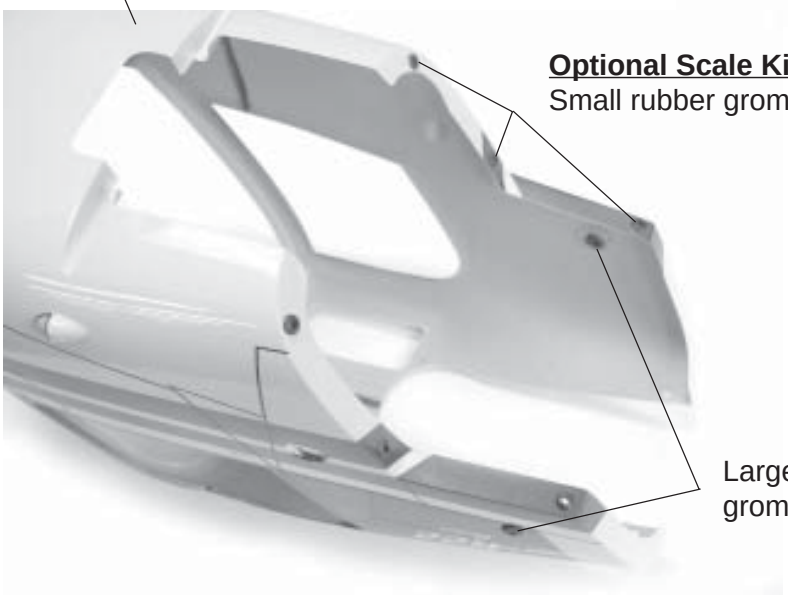
STEP 54 Front Landing Gear Mounts

Slide one M3x9 plastic spacer onto the front landing gear stud followed by one M3x7 flat washer (additional washers may be necessary to lift the engine head from touching the landing gear), then the main mechanics and one M3 locknut and leave loose for now. Make a lengthwise cut through the rubber insulator and press over the landing gear as shown (to insulate the cabin from the landing gear).

STEP 55 Rear Landing Gear Mounts

Slide one M3x12 socket cap screw from below the landing gear, insert one M3x9x4 plastic spacer then continue through the rear hole on the main mechanics and secure using one M3 locknut.





STEP 56 Cabin Grommets

Insert one large grommet into each upper side hole and bond in place using "Goop" or similar adhesive by lifting the inside edge of the grommet and applying the adhesive with a small slot screwdriver.

(Optional Scale Accessory Kit)

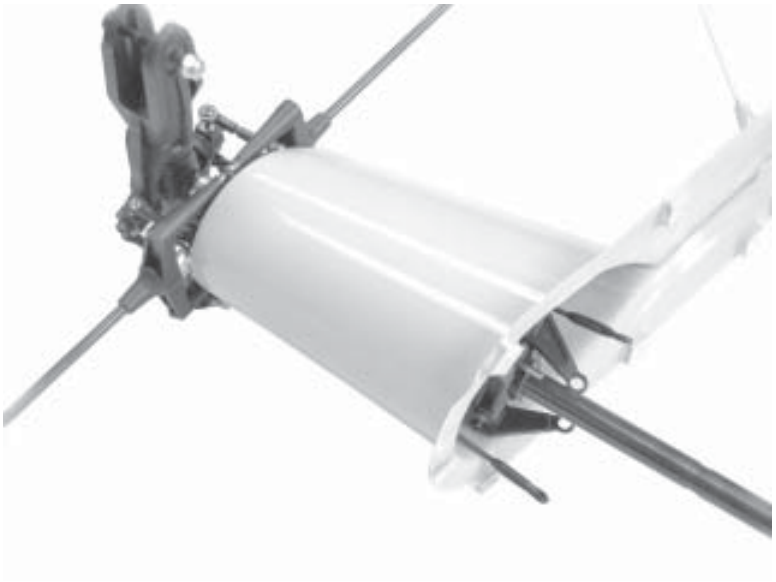
If you have purchased the accessory kit, go ahead and install the six small rubber grommets into the rear edge of the cabin. After installing, similarly bond them in place.

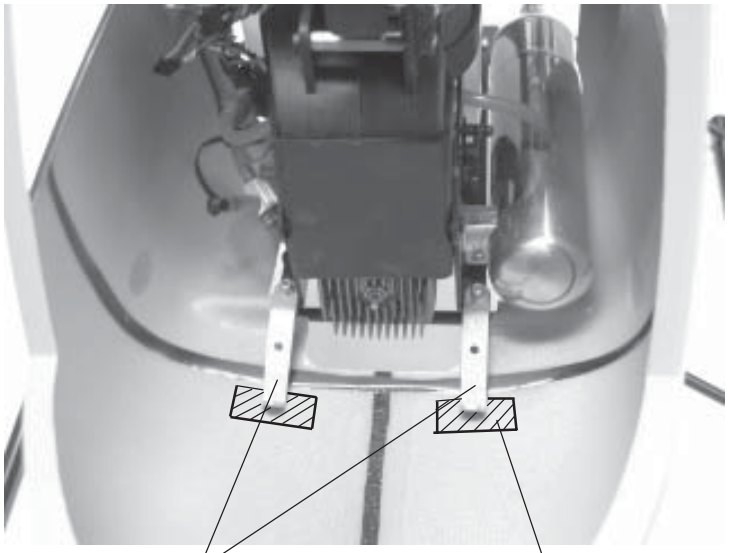
STEP 57 Top Shroud Installation

Before the cabin can be installed the top shroud needs to be fitted. Remove the rotor head assembly and insert through the finished fiberglass shroud. Ensure that the washout arm pushrods are connected to the "A" pushrods and that the longer "C" pushrods are attached to the short steel balls on the bell mixer.

Holding the shroud against the rotor head, insert the main shaft into the upper bearing and slide into position. Make sure that the mast stopper is correctly installed with the step towards the ball bearing. Attach the bottom M3x16 socket cap screw and locknut through the autorotation unit. Press down on the main shaft (make sure the main shaft spins) and tighten the set screws to secure the mast stopper using threadlock.

Lift the shroud and connect the plastic washout links to the short steel balls on the inner race of the swashplate and the long "C" pushrods to the long balls on the inner race.





#CN1076-19
Front Landing Gear
Brackets x 2

Insulator material
below brackets.

STEP 58 Cabin Installation

Loosen and remove the two front M3 locknuts from the landing gear (use the 5.5 nut driver for access). Tip the cabin forward and slide over the mechanics being careful to position the slot in the bottom of the cabin with the rubber isolators on the front landing gear. On top, flex the top of the cabin to overlap the top shroud and press the rubber grommets over the cabin body mounts. Attach the two front landing gear brackets and replace the M3 locknuts to secure the cabin in place. It is recommended to bond a 1" square piece of rubber or soft velcro under each of the front brackets to avoid the fiberglass from cracking over time due to engine vibration.

STEP 59 Receiver & Rx Battery Mounting

The receiver and the receiver battery pack should be mounted in the bottom of cabin all the way in the front to balance the helicopter. Underneath the scale instrument panel (if purchased separately. It is best to wrap the receiver and battery in 1/4"[6mm] sheet foam, secured with vinyl tape and then use sticky backed velcro on the outside of the foam/tape and the inside of the fiberglass to keep this equipment from shifting during flight. The gyro can be mounted on top of the throttle servo. Once completed the windshield can be bonded in place with "goop" or canopy adhesive.

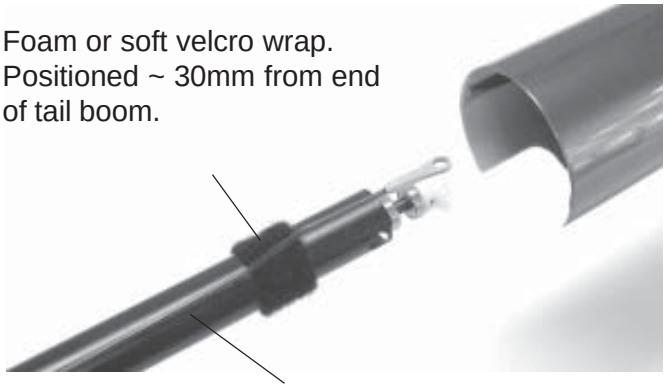
(Optional Scale Accesory Kit)
The instrument panel was trimmed initially to fit the curvature in the front of the cabin. Using double sided servo tape applied to the edges of the panel and in the front, carefully position and press into place.

#CN1076A
Scale Accessory Kit (not included)

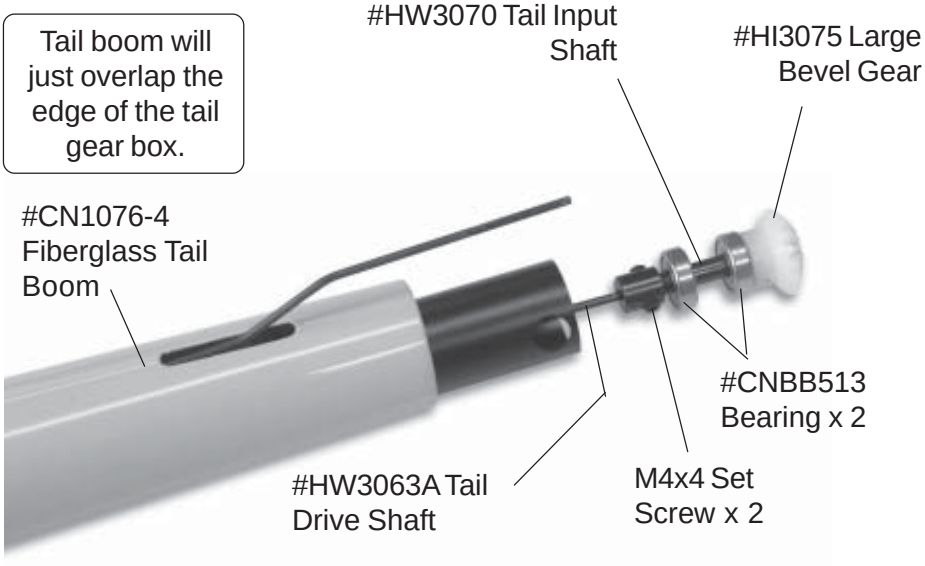
STEP60 Tail Drive through Fiberglass Tail Boom

Remove the tail boom from the main mechanics.

To avoid vibration, attach a thin wrap of foam or the loop side of velcro around the tailboom, positioned just past where the tail gearbox is attached. After the foam/velcro has dried, remove the tail gear box from the end of the tail boom and insert through the fiberglass tail boom. Be careful in passing the rudder pushrod through the slot in the top of the fiberglass boom, the ball link needs to be aligned vertically, or removed altogether then reattached later.



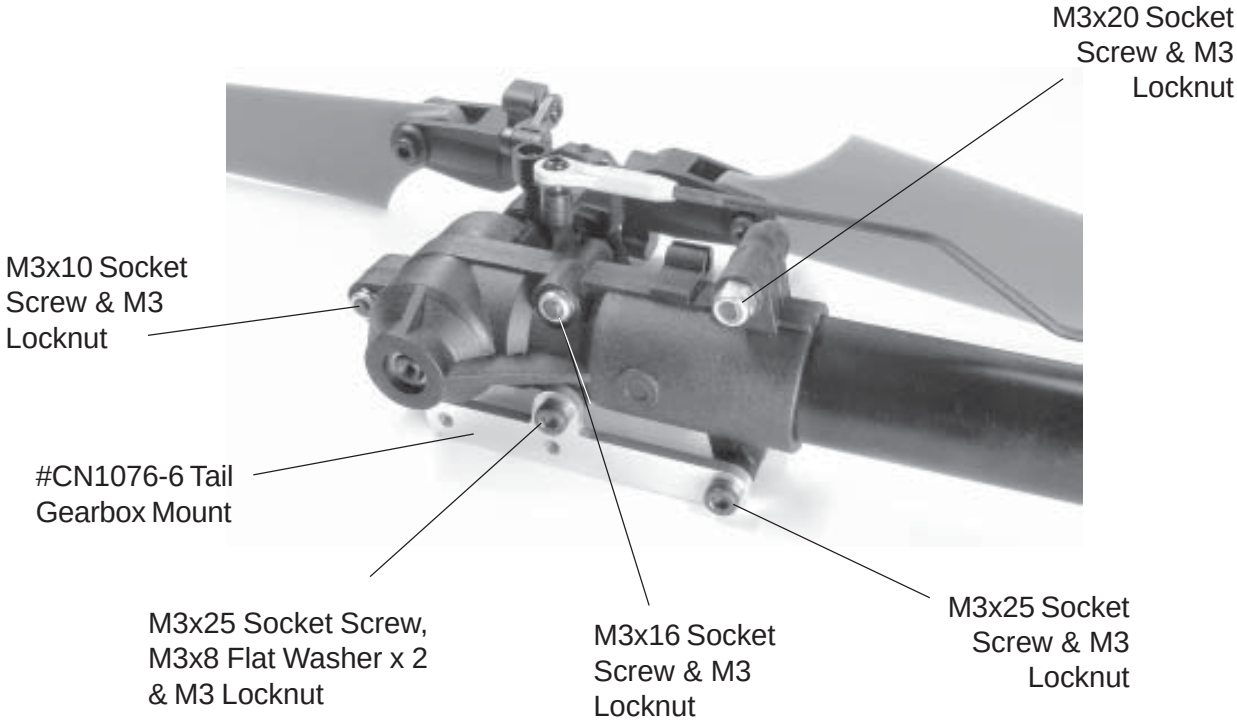
Tail boom Assembly.



Tip: Before assembling the tail gear box, verify that the tail input shaft rotates straight on the end of the tail drive shaft by rotating slowly in your fingers. If the tail input shaft does not turn true, adjust the tension of the M4x4 Set Screws. The problem is a result of the set screws not having the same tension.

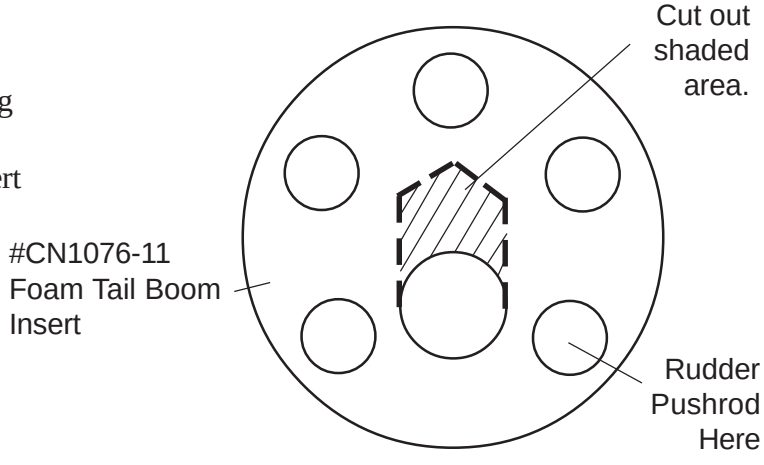
STEP 61 Tail Gearbox Assembly

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 greased the gears before closing the gear box. Position the gear box halves over the holes in the end of the tail boom and secure with one M3x10 Socket Screw and M3 Locknut at the end of the gear box and one M3x16 Socket Screw and M3 Locknut at the center-top location. Attach the tail gear box mount for the tail fins using one M3x25 Socket Screw inserted through the upper-center hole in the mount, slide two M3x8 Flat Washers and secure with one M3 Locknut on the other side of the gear box. Attach the front of the mount with one M3x25 Socket Screw inserted through the mount and secure with one M3 Locknut. Notice that the tail pitch bellcrank is positioned on the top of the tail gearbox that matches up with the tail pushrod as it exits the fiberglass tail boom. Also not the tail rotor is mounted on the left side of the helicopter. In this configuration, as the rudder pushrod is moved forward the helicopter's nose will turn left to the left.



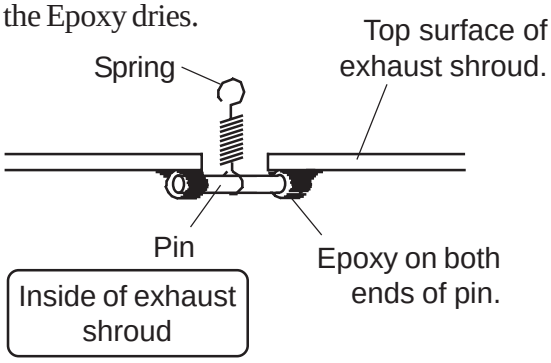
STEP 62 Foam Inside Support

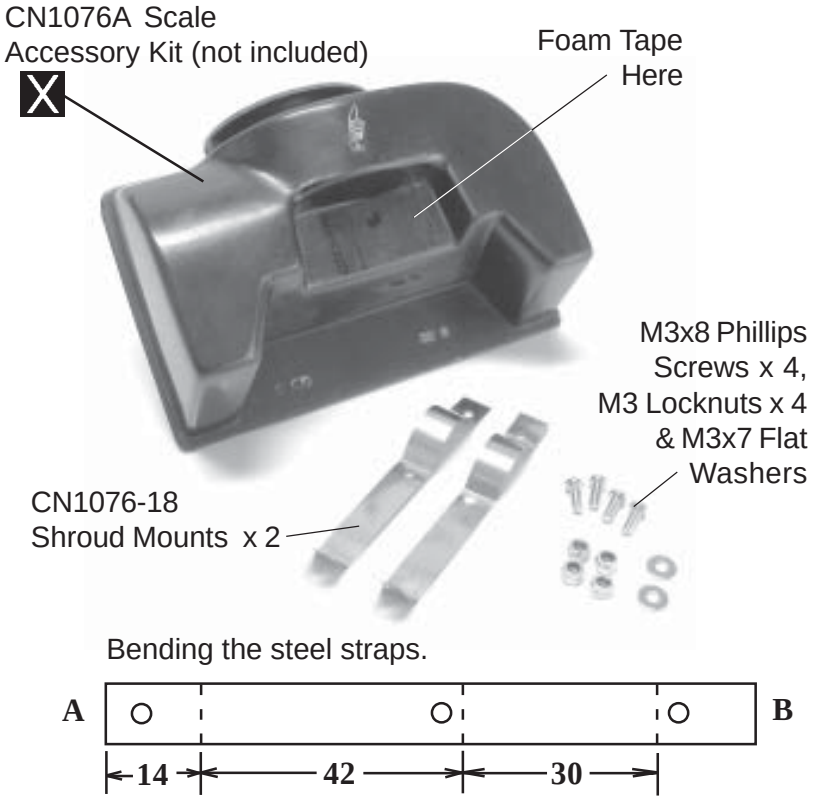
The fiberglass tail boom needs to be positioned correctly to avoid the tail boom side plates from pressing against the inside surface of the fiberglass tail boom. This support is provided by the foam insert. The insert needs to be modified slightly, by cutting the dotted section away using an exacto knife.



STEP 63 Scale Engine Exhaust (Optional Scale Accessory Kit)

If the optional accessory kit has been purchased the scale engine exhaust needs to be fitted before the cabin can be installed on the mechanics. Start by attaching the spring to the top surface of the engine exhaust. Using pliers, hold both the pin with the spring centered and apply a full drop of Epoxy to each end of the pin and carefully insert into the hole in the top of the shroud. Position the shroud upside down with some tension on the spring while the Epoxy dries.





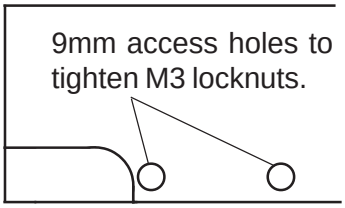
STEP 64 Mounting the Shroud (Optional Accessory Kit)

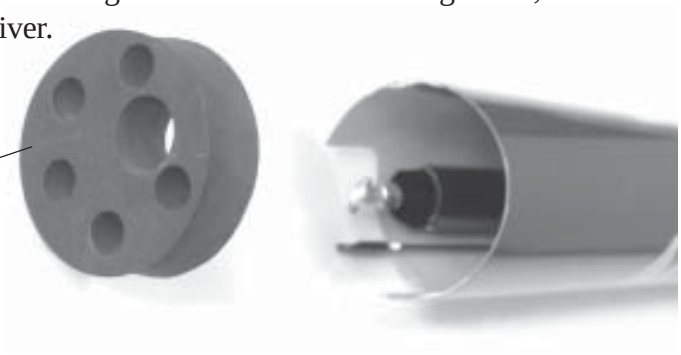
The steel straps need to be bent before they are installed to the main mechanics. Start by bending the straps following the illustration and photo for reference. Attach the straps around the plastic mounts that connect the upper frames to the lower frames and secure using one M3x8 Phillips screw and M3 locknut. The shroud is attached to the "A" end of the strap, the actual angle can be adjusted with pliers after it is attached to the shroud. Having installed the straps to the mechanics, mark and drill two 1/8"[3mm] holes and attach the strap to the top of the shroud using one M3x8 Phillips screw through the strap, the shroud, insert one M3x7 flat washer and secure with the M3 locknut. The last step is to remove the M3x35 Socket screw from the lower tail boom clamp and capture the spring into the slot. Gently grab the spring with pliers and replace the screw. Note, in the future when removing the tail boom, only loosen this screw, do not completely remove it. Remove the backing tape from the foam pad and attach to the recess in front of the spring. This will keep the exhaust stroud from vibrating against the bottom surface of the main mechanics.

STEP 65 Rear Scale Struts (Optional Accessory Kit)

After all the fiberglass components are installed. The rear scale struts can be attached. Carefully insert the three legs into the small grommets on the back edge of the cabin, approximately 1/2"[12mm]. Using one M3x10 socket cap screw through the scale strut and then through the mount hole on the rear landing gear and secure with one M3 locknut from the inside. Repeat for the other side.

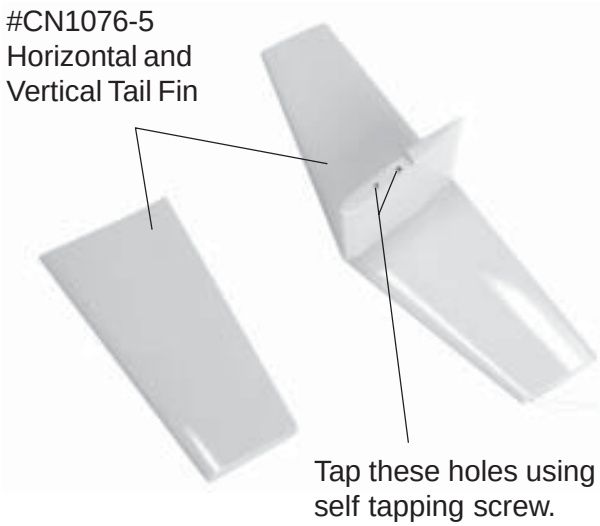
Once the foam insert is modified in the last step it can be positioned inside the fiberglass tail boom. Simply press the insert into the tail boom until it stops. The rudder pushrod is inserted into the smaller hole to the right of the central cutout. Mount the completed tail boom to the mechanics and make sure the navigation light is centered along the centerline of the main shaft. Mark the positions on the outside of the fiberglass tail boom where the lower locknuts are located to tighten the metal tailboom to the main mechanics. Make a mark on both sides of the tail boom. On the left side, grind two 9mm diameter holes to insert a Whia 5.5 nutdriver through the access hole. On the right side, the holes can be 3mm, just large enough to insert a 2.5 hex key or hex driver.

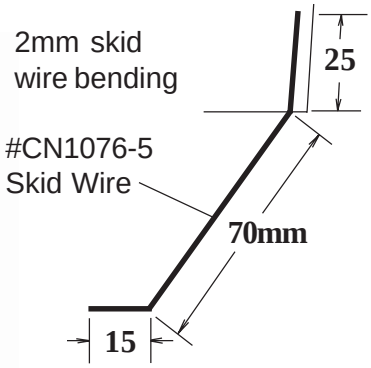




STEP 67 Tail Fins

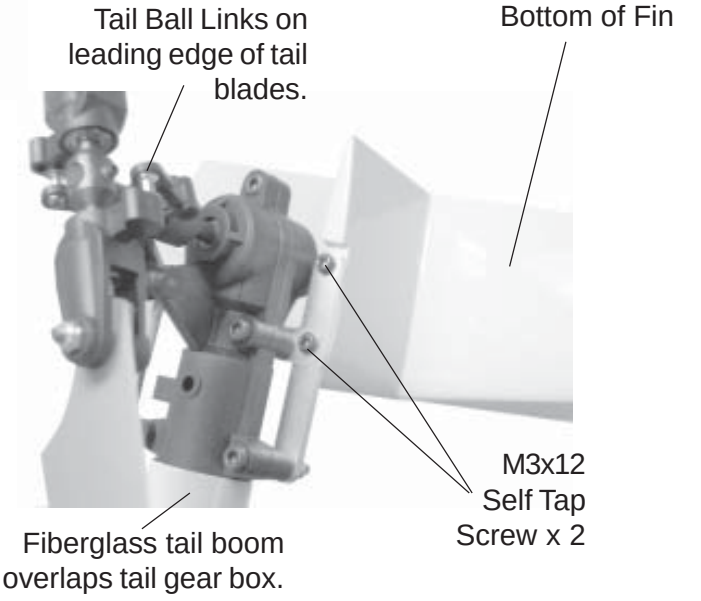
The fiberglass tail fins need to be attached together. Using sandpaper roughen the inside surface of the horizontal fin and the matching outside surface stub on the other side of the vertical fin. Using "goop" or Epoxy apply adhesive to the stub, slide the horizontal fin in place and hold in position using tape wrapped from the end of the horizontal fin to both the top and bottom of the vertical fin. After completely dry, tap the two holes for mounting the fin assembly using an available M3x12 Self Tapping Screw. Follow the bending diagram for the skid wire and drill a 0.078"[2mm] hole very carefully into the bottom of the tail fin along the leading edge that is solid Epoxy (drill by hand) and bond the wire in place with Slo Ca adhesive.





STEP 68 Mounting the Tail Fins

Attach the completed tail fin assembly to the tailboom using two M3x12 Self Tapping Screws. If you have not done already, tap these holes ahead of time to avoid damaging the screw heads. Continue tightening until the fin assembly is flush to the mount. Do not over tighten these screws.



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 pages 23-26.

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. Following the setup in this manual, an exponential amount of 25-35% will make the helicopter much easier to control.

Mechanical 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 stick)	(mid stick)	(high stick)
N	Hovering	-2	5	9
1	Stunt & Aerobatics	-8	5	9
H	Autorotation	-8	5	12

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

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.

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 learining 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 manufacturers 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.

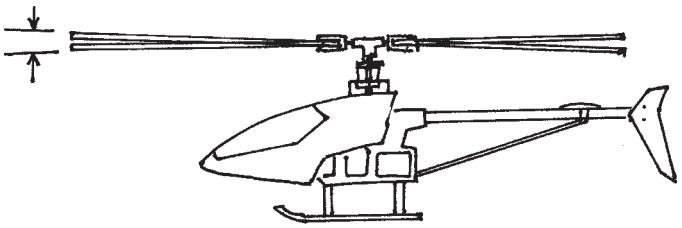
Q. The engine rotates and tries to start but doesn't.
A. The glow plug may be getting old. The glow plug batteries are weak. The starter may be turning the wrong direction.

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 factury set, beginners should not adjust it!!

Adjusting the Blade Tracking

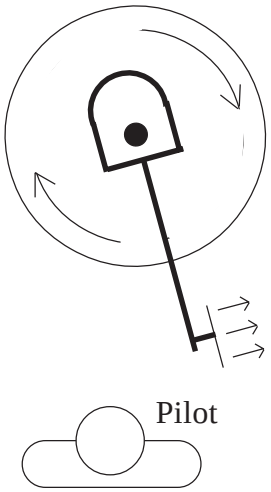
Pitch Once the helicopter is flying the pitch settings have to be fine tuned. Using appropriate training gear, increase the throttle until just before the helicopter lifts off and sight the rotor disk from 15' back. If there appears to be 2 rotor disks then adjust Pushrod J until only one disk appears. Using colored tape mark one blade so you can adjust the correct blade.



Tail Rotor Setup (rate gyro)

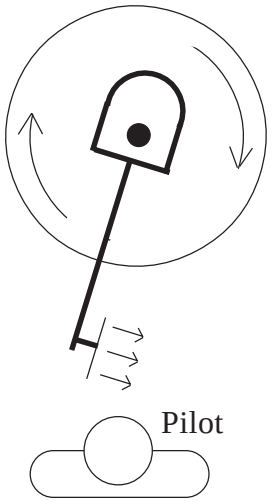
What separates airplane radio equipment from the helicopter version is in the control of the individual curves discussed earlier and in the Revo-mixing[1].

Take a moment to consider the helicopter <u>hovering</u> 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 lengthening[2] 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 shortening[2] 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.

Note 1:
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 the beginner.

Note 2: The tail rotor is mounted on the left side of the helicopter, this is opposite to all our regular models.

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.

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

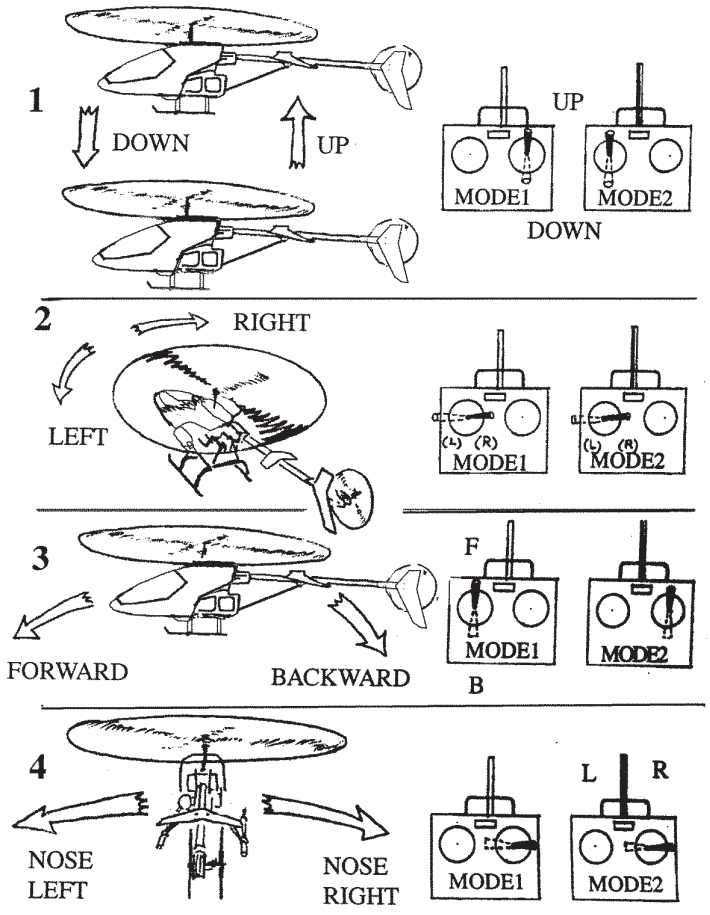
All trim adjustments are to allow you to lift the helicopter straight up and can be made one click or detent at a time on the radio.

(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.



Robinson 22HP Replacement Parts

HW3000	Hardware Pack	1
HW3005A	Hardened Start Shaft Assembly	1
HI3007	Starter Shaft Bearing Blocks	1
HI3009	Cooling Fan	1
HI3010A	Machined Clutch Bell & Lining	1
HI3010B	Clutch Gear Only 26T	1
HW3011	Clutch Shoes	1
HW3018A	Engine Mount - 46/50	1
HI3020A	Cooling Fan Shroud	1
HI3040	Counter Drive Gear	1
HW3042	Primary Drive Shaft	1
HW3054A	Main Shaft Lock Ring - 10mm	1
HI3056	Main Gear	1
HW3057	Tail Drive Bevel Gear	1
HW3059A	Tail Drive Primary Shaft w/Spacer	1
HW3062A	Tail Boom - R22	1
HW3063A	Tail Drive Shaft Set - R22	1
HW3070	Tail Gearbox Input Shaft	1
HW3073	Tail Gearbox Output Shaft	1
HW3074	Tail Gear Spacer Tube	1
HI3075	Tail Gear Set	1
HI3078	Tail Gearbox L&R	1
HI3087A	Tail Pitch Slider Set	1
HI3089	Tail Pitch Ball Links	2
HI3096A	Tail Blade Grip (1 piece/ 3BB type)	2
HW3098A	Tail Rotor Hub	1
HI6099	Tail Rotor Blades (Pair) - 95mm	1
HI3102A	Tail Pitch Lever Set - Standard	1
HI3106A	Tail Pushrod Guide Set	3
HI3107	Upper Side Frames	2
HI3107A	Upper Bearing Spacer (14x19x1)	2
HW3112D	Lower Side Frames - R22	2
HW3115B	Upper Servo Frame Set CCPM	2
HW3116A	Rudder Servo Mount Set	1
HW3127	Hex Frame Spacers & Threaded Rod	1
HI3138A	Fuel Tank w/ Fittings	1
HI3145	Ball Links (16 L, 6 S)	1
HI3146C	Metal 120 Degree Swashplate Set CCPM - 10mm	1
HI3152C	Washout Set - 10mm	1
HI3152A	Radius Link With 12mm Pin	2
HI3154	Universal Tail Drive Coupler - R22	1
HI3167B	Seesaw Off Set Plate	2
HI3167E	Special Ball Set M3X6	2
HI3167F	Seesaw Bearing Cup - 4mm	2
HI3167G	Seesaw Tie Bar, Screw & Spacers	2
HW3173A	Flybar - 4mm	1
HI3176C	Flybar Control Arm - 4mm	2
HI3179A	Flybar Paddles & Weights - 4mm	2
HW3180A	Feathering Shaft - 6mm	1
HI3181	Damping Rubbers	2
HI3184	Rotor Blade Grip	2
HI3189	Bell Mixing Arm Set	1
HW3192A	Linkage Set - CCPM	1
HI3205	Servo Mounting Tab Set	10
HI3206	Tail Pushrod Coupler	1
CN0402	Hex Start Adapter w/set screw(5mm)	1
CNLR1000S	Ball Links 2mm (Grey) - Tail Pushrod	10
CNLR1003	Micro Washer 3x5x0.5T	10
CNLR1013	Black M2 Steel Ball - Short (servos)	2
CNLR1014	Stainless M3 Steel Ball - Short (bell mixer arms)	2
CNLR1015	Stainless M3 Steel Ball - Med (washout arms)	2
CNLR1016A	Stainless M3 Steel Ball - Long (bell mixer)	2
CN2403	Hurricane 660mm Sym Carbon Main Blades (pair) - R22	1
CN2405	Hurricane 660mm Semi Carbon Main Blades (pair) - R22	1

Ball Bearings

CNBB0730	Ball Bearing 3x7x3 - Flybar, Mixing arms	2
CNBB0930	Ball Bearing 3x9x2.5 - Tail Grips	2
CNBB0840	Ball Bearing 4x8x3 - Flybar	2
CNBB49T	Ball Bearing 4x9x4 - Thrust Tail Grips	1
CNBB410	Ball Bearing 4x10x4 - Tail Grips	
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 6x12x4 - Thrust Main Blade Grip	2
CNBB1060	Ball Bearing 6x10x3 - Pitch Plate	2
CNBB1980	Ball Bearing 8x19x6 - Lower Main Shaft	2
CNBB1019	Ball Bearing 10x19x5 - Upper Main Shaft	2
CNBB1812	Ball Bearing 12x18x4 - Clutch Bell	1
HW3050	Autorotation One Way Bearing Set	1

Fuselage Parts

CN1076A	R22 Scale Accessory Set (Instrument panel, rear cooling shroud & rear side struts)	1
CN1076-1	R22 Fiberglass Main Cabin	1
CN1076-2	R22 Windshield & Top Window	1
CN1076-3	R22 Fiberglass Top Fairing with Cap	1
CN1076-4	R22 Fiberglass Tail Boom	1
CN1076-5	R22 Fiberglass Tail Fin Set	1
CN1076-6	R22 Tail Gear Box Mount	1
CN1076-7	R22 Tail Boom Clamp Plates (2)	1
CN1076-8	R22 Tail Boom Mounts (2)	1
CN1076-9	R22 Main Cabin Side Mounts (2)	1
CN1076-10	R22 Assembled Landing Gear	1
CN1076-11	R22 Foam Tail Boom Insert	1
CN1076-12	R22 Male Universal Drive Coupler	1
CN1076-13	R22 Main Rotor Head	1
CN1076-14	R22 Tail Boom Plate Hardware Pack	1
CN1076-15	R22 Tail Pitch Control Rod Set	1
CN1076-16	R22 Main Shaft	1
CN1076-17	R22 Washout Guide Mount	1
CN1076-18	R22 Cooling Fan Shield Mount	1
CN1076-19	R22 Front Cabin Mount Plates (2)	1
CN1076-20	R22 Landing Gear Spacers (4)	1
CN1076-21	R22 Rotor Head Pushrod Set - Long	1
CN1076-22	R22 Throttle Control Rod	1
CN1076-23	R22 Ultra Low Speed 12T Drive Gear	1
CN1076-24	R22 Rear Scale Struts w/ Grommets	1
CN1076-25	R22 Instruction Manual	1

Robinson R22HP Accessories

CN0427A	One way Hex start system w/hex adapter - 5mm
CN0520A	Carbon torque tube tail drive 2 B.B - R30
CN2007A	Trainer Pod 30/46 w/4 fiberglass Legs
CN2008A	Trainer Pod 50/60-Gas w/4 long fiberglass Legs
CN2015	Hardened Tip Hex Wrench Set (4 piece ground tips)
CN2016	4.8V on -board Battery Monitor/Alarm
CN2018	PG2000 II remote on/off Piezo Gyro
CN2046	Basic Heli Setup Tool Kit (pitch gauge, blade balancer, pliers & etc.)
CN2052	Accuratech Machined Blade Balancer
CN2123	Carbon fiber flybar stiffeners - R50
CN2137	2 oz Header Tank w/ Universal Bracket -**purple**
CN2155	Piston Locking Tool - **purple**
CN2153	Machined Throttle Extension - OS32SX,46FX, TT36H -**purple**
CN2202	Aluminum Turbo cooling fan - **purple**
CN2213	2oz Header Tank w/ Machined Mount Bracket - **purple**
CN2214B	Air Filter (OS32-50, TT36-46)
CN2215A	Head Button (silver)
CN2215AB	Head Button (B-black, P-purple)
CN2217P	Machined Aluminum Anodize Color Caps - **purple**
CN2218P	Machined Aluminum Anodize Color Washers - **purple**
CN2219	Ball Link Easy Driver
CN2220A	Main Shaft (10mm) Thrust Bearing Kit
CN2222	Remote Glow Plug Adapter w/ Mount
CN2253	Servo Wire Holders (5)
CN2255	Control Rod Setup Gauge
CN2262	Curved Hobby Scissors
CN2263A	Constant Tail Drive - R50
CN2274	Spiral Servo Wire Wrap (36in)
CN2275	Machined Adjustable Bell Mixer Set
CN2282B	Machined Pitch Plate Assembly - (B - Black, P - Purple)
CN2286	3 in 1 Fuel Filter-Cutoff-Mount Set
CN2291	Metal Washout Hub
CN3059	Scale Fuselage HP Muffler - **Black**