

VIBE 90 SG

ASSEMBLY INSTRUCTIONS



Vibe 90SG Specifications

Overall Length.....	53.5 in (1359mm)
Height.....	17.25 in (438mm)
Main Rotor Diameter	63 in (1600mm)
Tail Rotor Diameter.....	11.34 in (288mm)
Gear Ratio	8:1:4.65
Weight (no fuel)	10.25–10.75 lb (4.65–4.88 kg)
Control System.....	120 or 140 CCPM

JR PROPO
Heli Division

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INTRODUCTION

Designed by world-class heli pilot Scott Gray, the latest addition to the Vibe family of helicopters offers the ultimate in aggressive flight performance and is designed to withstand the stresses of the most extreme aerobatic and 3D maneuvers, even those that have yet to be imagined. Features like the oversized tail and main shafts, the oversized Sprag autorotation clutch and 10mm spindle shaft that can handle the most aggressive maneuvers, a robust split gear constant-driven tail rotor and a lightweight, rigid structural design make the Vibe 90™ SG an unbeatable choice for heli pilots who want to push 3D performance beyond the edge. If you've been waiting for a helicopter design that has unlimited flight performance with the reliability and the durability to handle the most demanding aerobatics...your wait is over. Once you take the controls of the Vibe 90 SG, you'll know your wait was worth it.

KEY FEATURES

- Fully tunable hi-cyclic head for extreme cyclic response
- 120/140 CCPM system
- Driven tail with bearing supported aluminum shaft
- Accepts the most popular helicopter engines
- Robust Sprag autorotation clutch
- Push-pull cyclic linkages
- High efficiency two-piece fan shroud
- Standard Flybar cage
- Easily removed, vibration-isolated tank
- Dual radial, single thrust tail blade grips
- Dual yoke T/R actuator
- Includes high-quality FRP fiberglass prepainted canopy
- All-new rotor head system with ultra-rigid dampening
- Highly configurable rotor head settings
- I-beam high rigidity frame assembly
- Oversized Main and Tail Drive transmissions
- Self-aligning, easy-to-maintain engine mount system

PREASSEMBLY WARNING

When first opening your helicopter, you will notice that all of the parts are packaged and numbered to coordinate with the assembly step numbers of this instruction manual. All small hardware (nuts, bolts, washers, etc.) for each step are separated and packaged separately within the main parts bags. When beginning a section, you will need to open only the bag with the corresponding number to the section you are going to start. It is suggested that you place all of the hardware in an open container (e.g., coffee can) during assembly so as not to lose any of the small parts. It may also be helpful to familiarize yourself with the various sizes of screws, bolts, nuts, etc., as illustrated in the appropriate assembly section before you begin assembly. At the end of each assembly, in most cases, there should be no parts remaining.

NOTE: This Kit includes 2 type of threadlock; red type (soft) and green type (hard).

Use red threadlock on the screw that has to be removed for periodical inspection etc.

Use green threadlock to the screw that should be fixed firmly.

Great care has been taken in filling the bags with the correct quantity of parts and hardware for each section. However, occasionally mistakes do happen. In the event that you find a parts shortage or are in need of technical assistance, please contact your local JR Heli Division parts dealer.

RECOMMENDED RADIO SYSTEM



DSX12



DSX9



X2720

CCPM-Ready JR Radio Systems

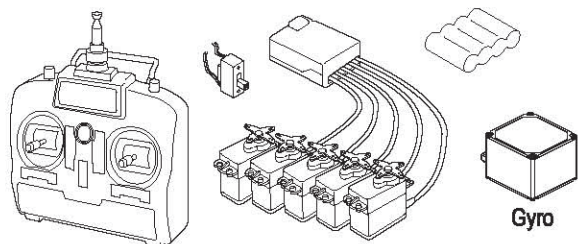
Most current JR heli radio systems (DSX12, PCM12X, DSX9, PCM9XII and X2720) are equipped with 120° and/or 140° CCPM electronics for use with JR CCPM machines.

Radios you may be flying now, like the X347, X388S, X378 and X3810 have 120° CCPM capability built in.

If you have any question, please check with JR radio system distributor.

ITEMS REQUIRED TO COMPLETE ASSEMBLY

1 JR 6-channel or greater RC helicopter system with 120° or 140° OCPM function



Gyro

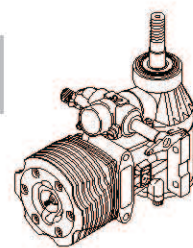
2



Servo Horn ...1pc
(with 12.5mm from the required hole)

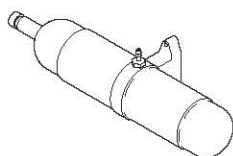
(Not necessary when servo horns are incl. in the transmitter)

3



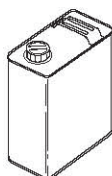
.90Size Helicopter Engine

4



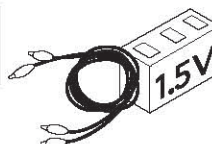
.90Size Helicopter Muffler

5



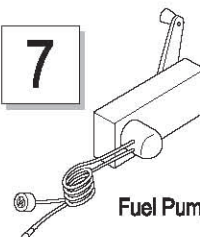
Helicopter Fuel, 15% - 30%

6



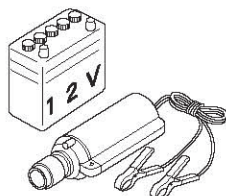
Glow Plug Battery and Glow Plug Extension

7



Fuel Pump

8



12 - Volt Electric Start and
12 - Volt Starting Battery

9



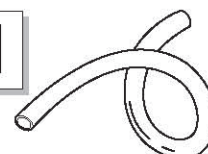
JR Starting Shaft (No. 60227)

10



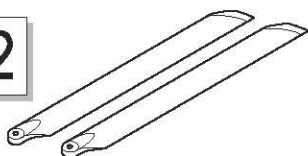
Fuel Filter (No. 60298)

11



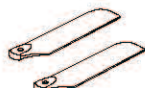
Silicone Fuel Tubing, 2.5 x 5mm
(No. 60040)

12



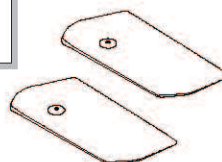
Main Rotor Blade 12mm thick grips
Bolt hole : 5mm
Length : 680 - 720mm

13



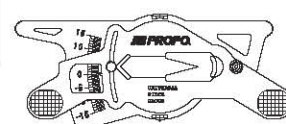
Tail Rotor Blade
(No.61150)
Length : 95 - 105mm

14



Flybar Paddle
(No.61209)

15



JR Universal Pitch Gauge
(No.60326)

16



Epoxy Glue A & B
(30 minute)

17



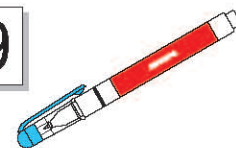
Thrust Bearing Grease
(No.61005)

18



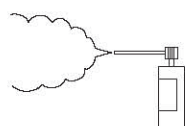
JR Locktite (Incl. in the kit)
(No.61299)

19



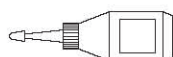
Oil Touch Pen
(No.61296)

20



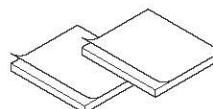
Rubbing alcohol

21



CA Glue

22



Double sided servo tape

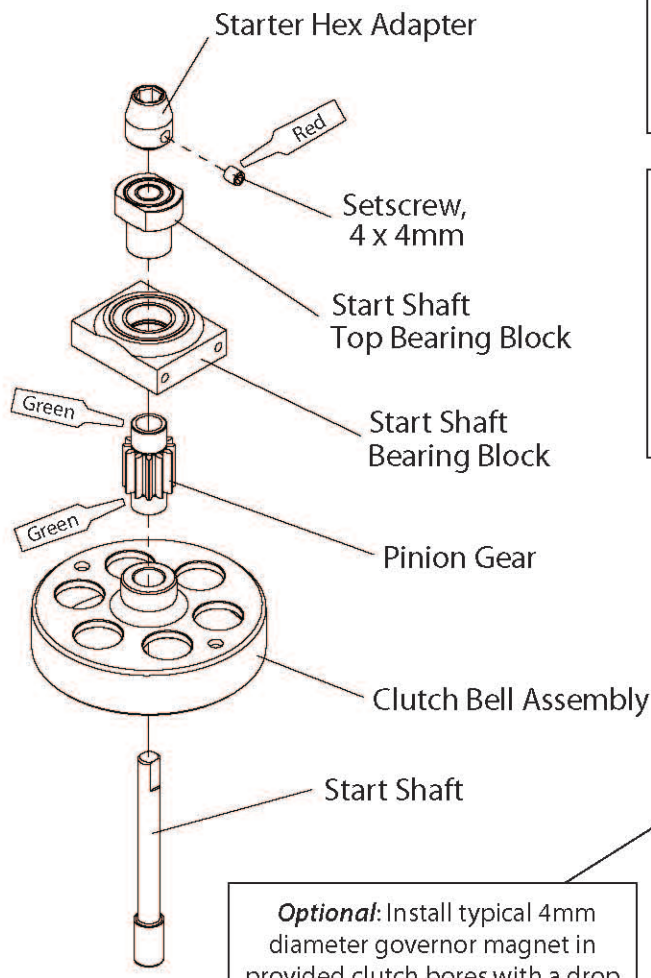
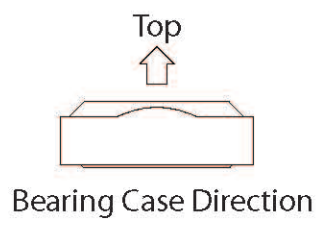
1-1

CLUTCH BELL/START SHAFT ASSEMBLY

- Setscrew, 4 x 4mm (1pc)

TIP: Clean areas with rubbing alcohol to remove any oil residue before applying threadlock.

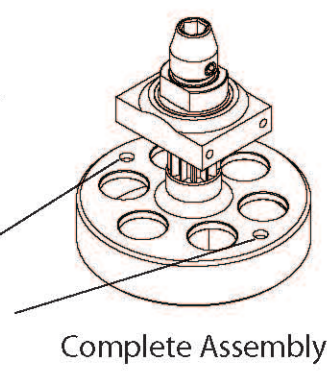
Install the bearing case as noted in the drawing.



NOTE: Your kit also includes JR red and green threadlock. Unlike conventional U.S.-made threadlock, JR red is the U.S. equivalent of blue. JR green is the equivalent of U.S. red.

Be sure the Setscrew 4x4mm is installed onto the flat spot on the start shaft to prevent it from slipping. Leave a small amount of play between the starter hex adapter and start shaft bearing block while installing the Setscrew 4x4 onto the start shaft, otherwise the Clutch Bell Assembly may not rotate freely.

Optional: Install typical 4mm diameter governor magnet in provided clutch bores with a drop of thin CA.

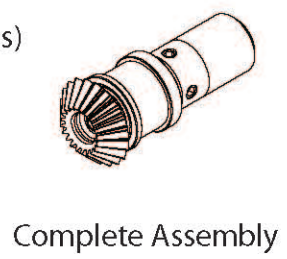
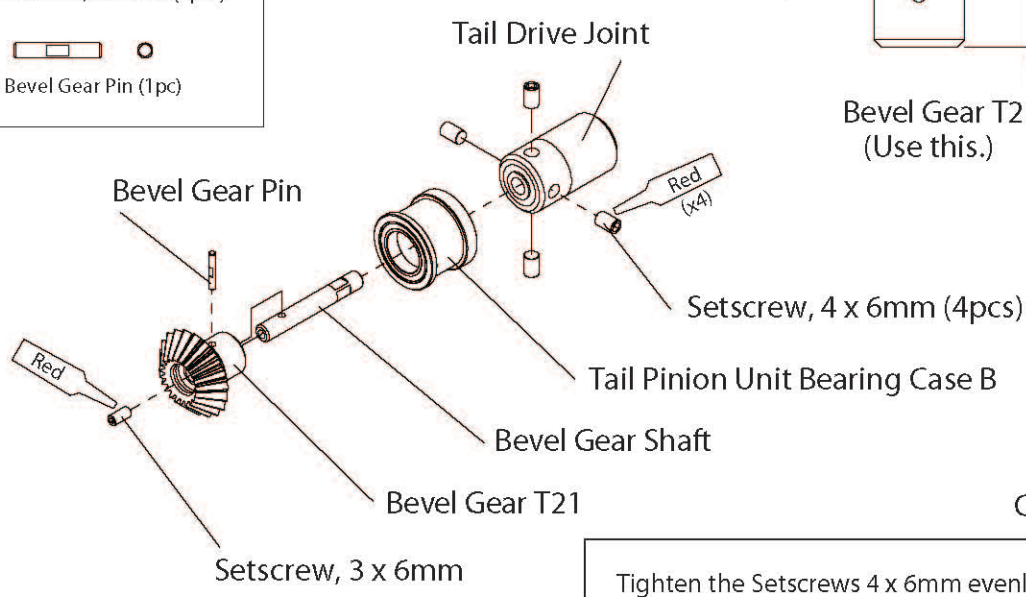
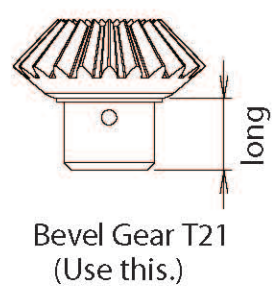


1-2

BEVEL GEAR ASSEMBLY

- Setscrew, 3 x 6mm (1pc)
- Setscrew, 4 x 6mm (4pcs)
- Bevel Gear Pin (1pc)


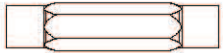














Secure so that the Setscrews are engaged in the D-shade recess



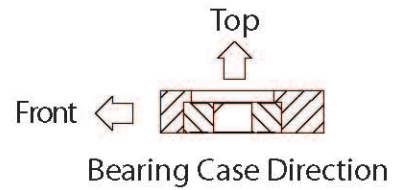
Tighten the Setscrews 4 x 6mm evenly on all sides of the Tail Drive Joint to ensure no runout.

1-3

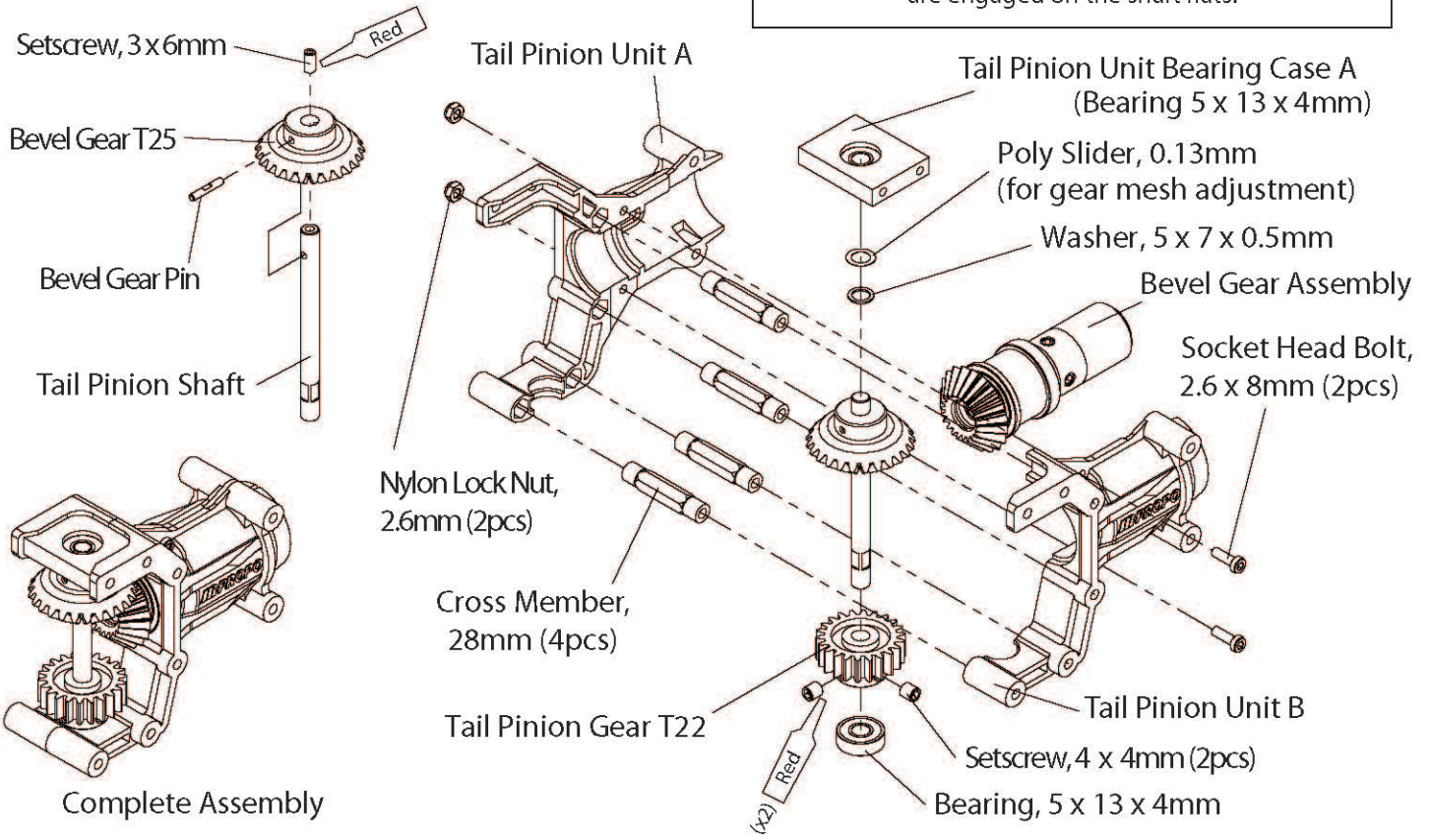
TAIL DRIVE TRANSMISSION ASSEMBLY

-   Cross Member, 28mm (4pcs)
-   Nylon Lock Nut, 2.6mm (2pcs)
-   Socket Head Bolt, 2.6 x 8mm (2pcs)
-   Washer, 5 x 7 x 0.5mm (1pc)
-   Setscrew, 4 x 4mm (2pcs)
-   Poly Slider, 0.13mm (1pc)
-   Setscrew, 3 x 6mm (1pc)
-   Bevel Gear Pin (1pc)

Install the bearing case as noted in the drawing.







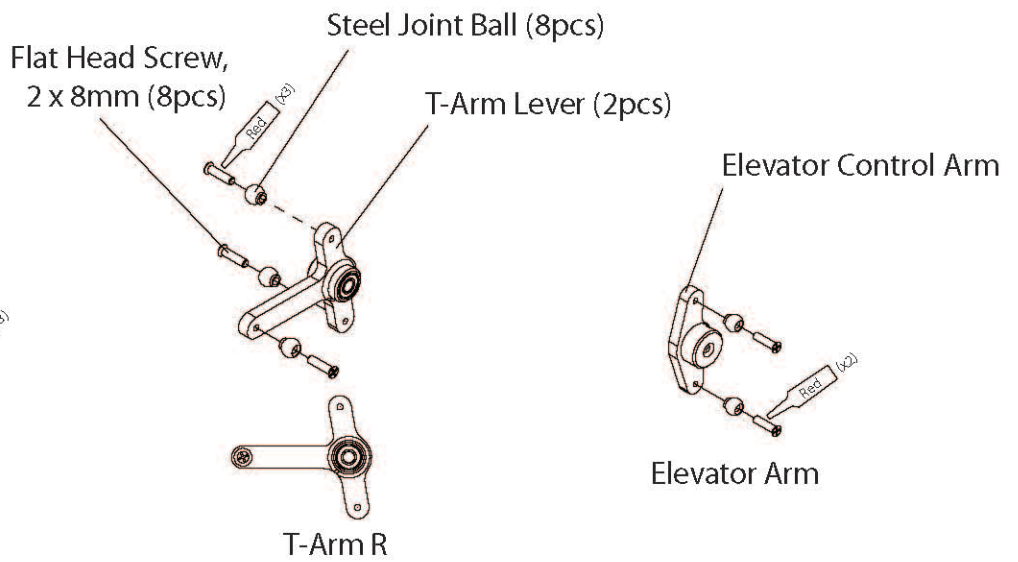
Complete the full assembly but fasten the Tail Pinion Gear T22 with 4x4mm setscrews while pushing down on the T22 gear and pulling up on the shaft and T25 bevel gear. This ensures correct bevel mesh, and no up/down slop in the shaft assembly. Secure so that the set screws are engaged on the shaft flats.



1-4

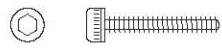


T-ARM LEVER ASSEMBLY

-   Flat Head Screw, 2 x 8mm (8pcs)
-   Steel Joint Ball (8pcs)

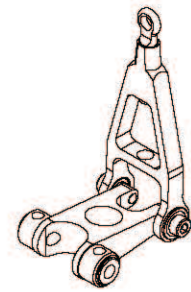
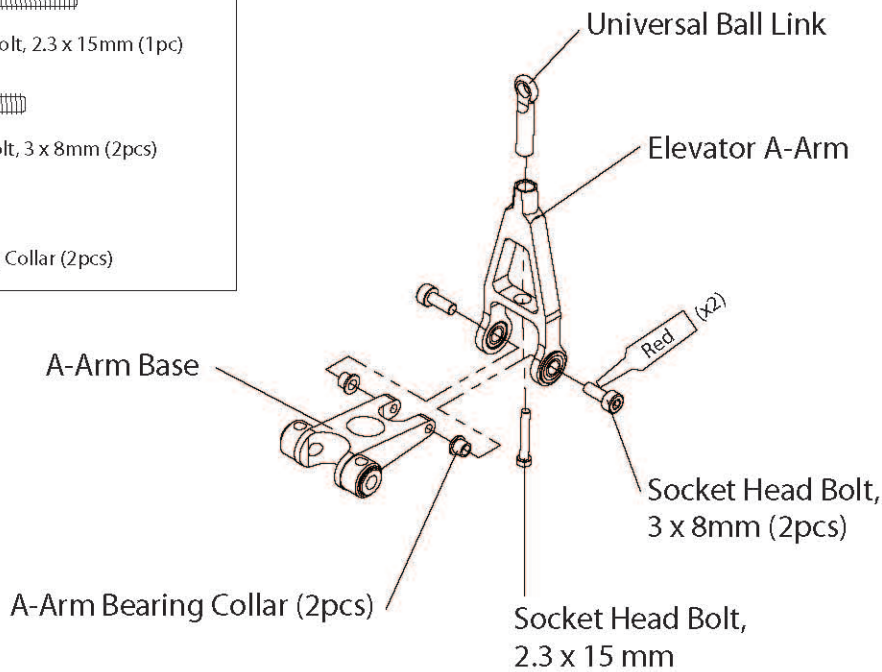


1-5

ELEVATOR A-ARM ASSEMBLY

-  Socket Head Bolt, 2.3 x 15mm (1pc)
-  Socket Head Bolt, 3 x 8mm (2pcs)
-  A-Arm Bearing Collar (2pcs)


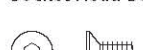

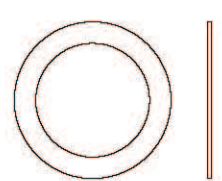
Note: Use a hobby knife to trim JR PROPO raised text to allow ease of assembly into the Elevator A-Arm



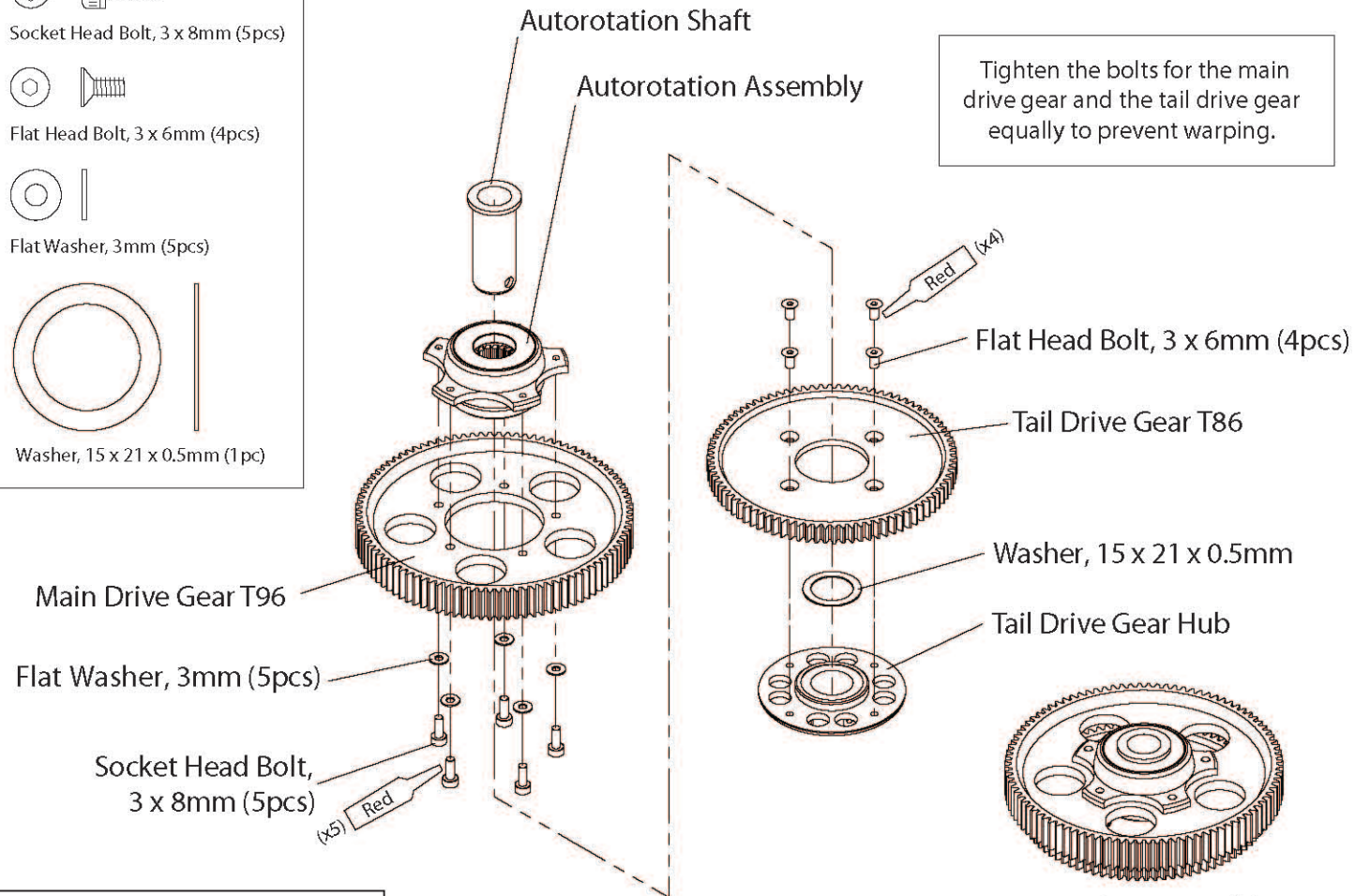
Complete Assembly

1-6

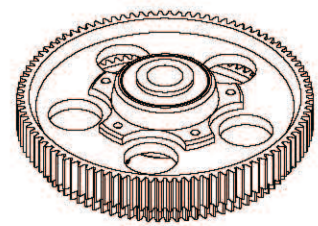
DOUBLE MAIN DRIVE GEAR ASSEMBLY

-  Socket Head Bolt, 3 x 8mm (5pcs)
-  Flat Head Bolt, 3 x 6mm (4pcs)
-  Flat Washer, 3mm (5pcs)
-  Washer, 15 x 21 x 0.5mm (1pc)

Tighten the bolts for the main drive gear and the tail drive gear equally to prevent warping.



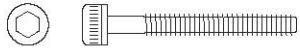
Apply light grease to autorotation shaft and 15 x 21 large washer



Complete Assembly

1-7

FUEL TANK ASSEMBLY



Socket Head Bolt, 3 x 25mm (1 pc)

Silicone Tube (not included)
Connect to Muffler
in Step 3-5.

Important: Remove flashing around opening and any debris inside fuel tank before assembly.

Fuel Tank Clunk

Silicone Tube (small)
Cut to a length of 97mm

Silicone Tube (not included)
Connect to carburetor in Step 3-5.
(Fuel filter is not included)

Fuel Tank Tube

Fuel Tank

Tank Metal S

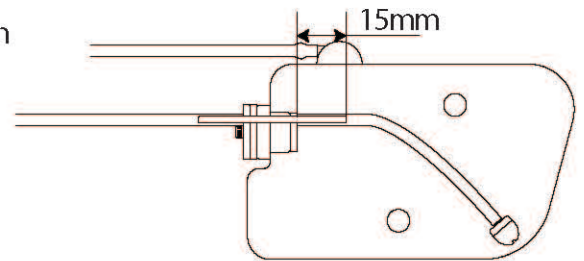
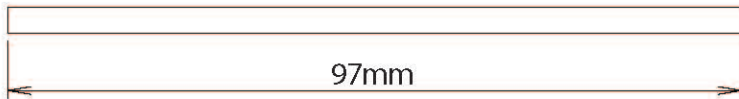
Tank Cap

Tank Metal L

Socket Head Bolt, 3 x 25mm

Note: Install the aluminum tube in the top/center of the tank opening so that it will line up with the opening in the engine mount block.

Silicone Tube (small)



1-8

FRAME SUPPORT ASSEMBLY



Cross Member with Steps L32P20 (3pcs)



Socket Head Bolt, 3 x 6mm (2pcs)



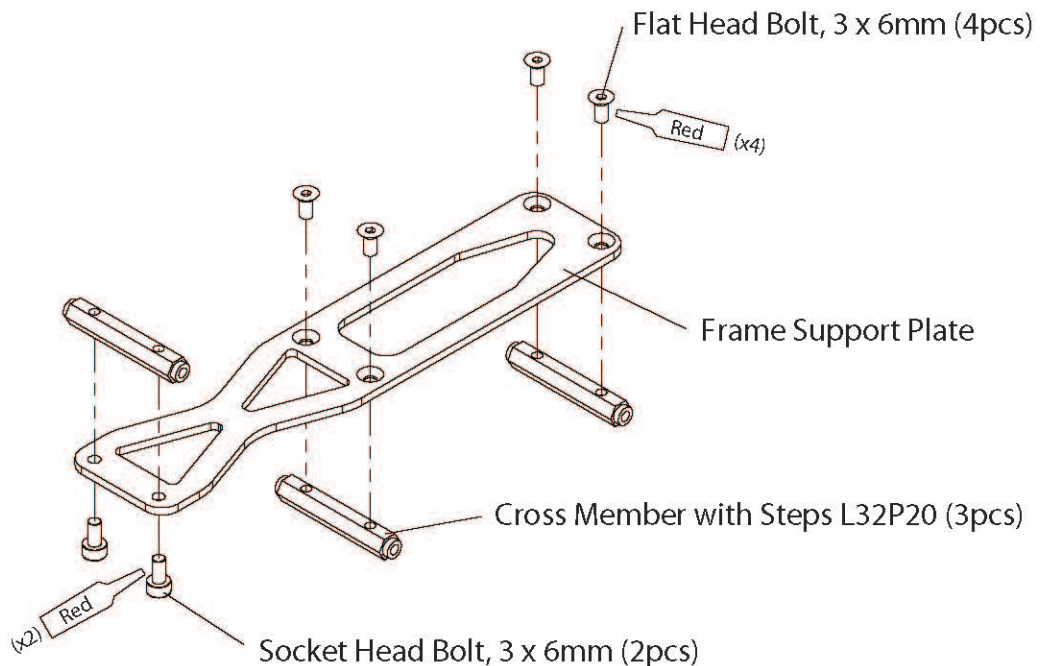
Flat Head Bolt, 3 x 6mm (4pcs)

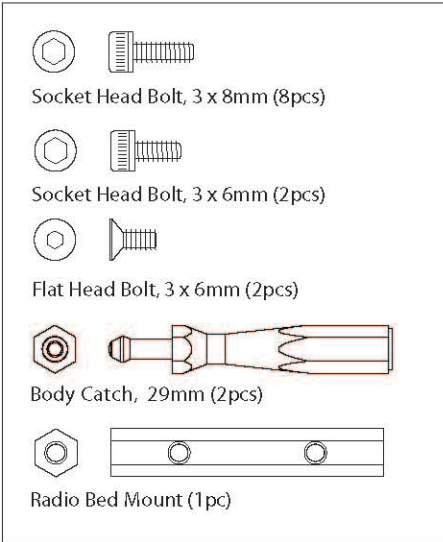
Flat Head Bolt, 3 x 6mm (4pcs)

Frame Support Plate

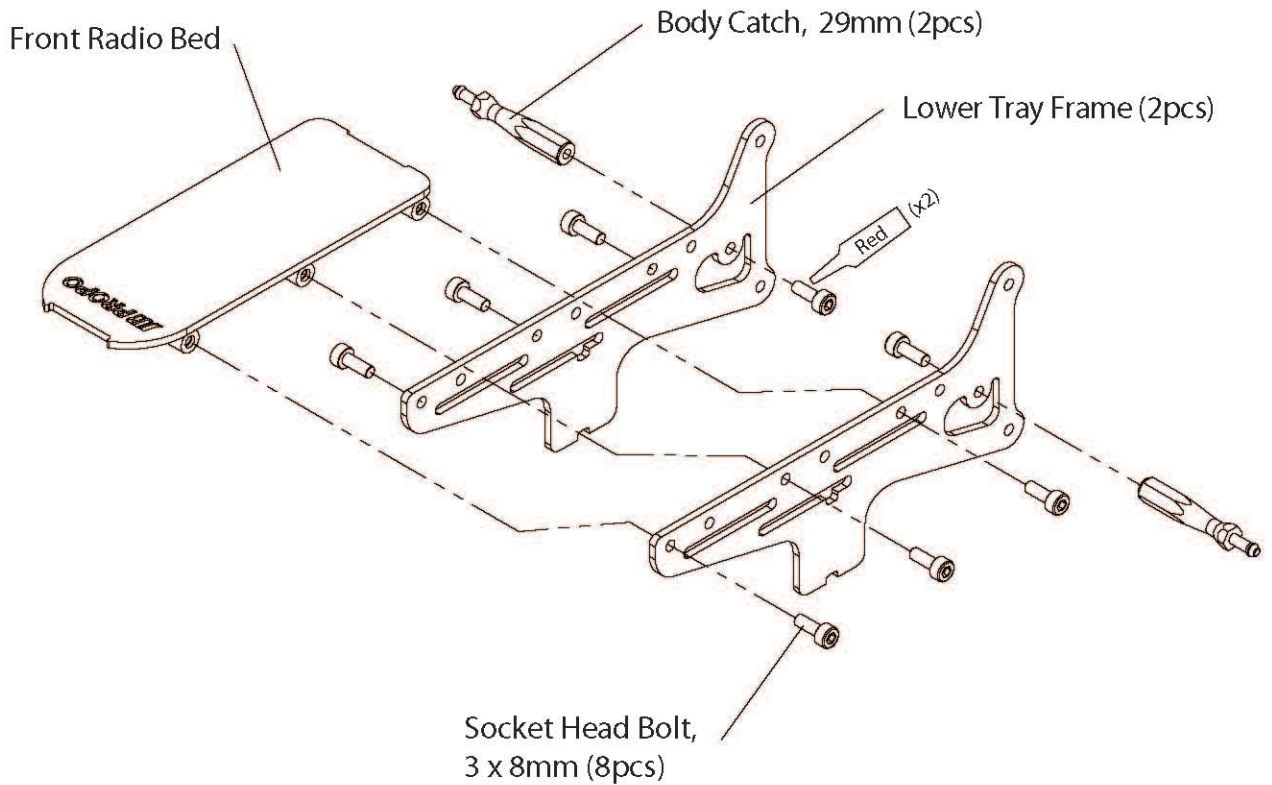
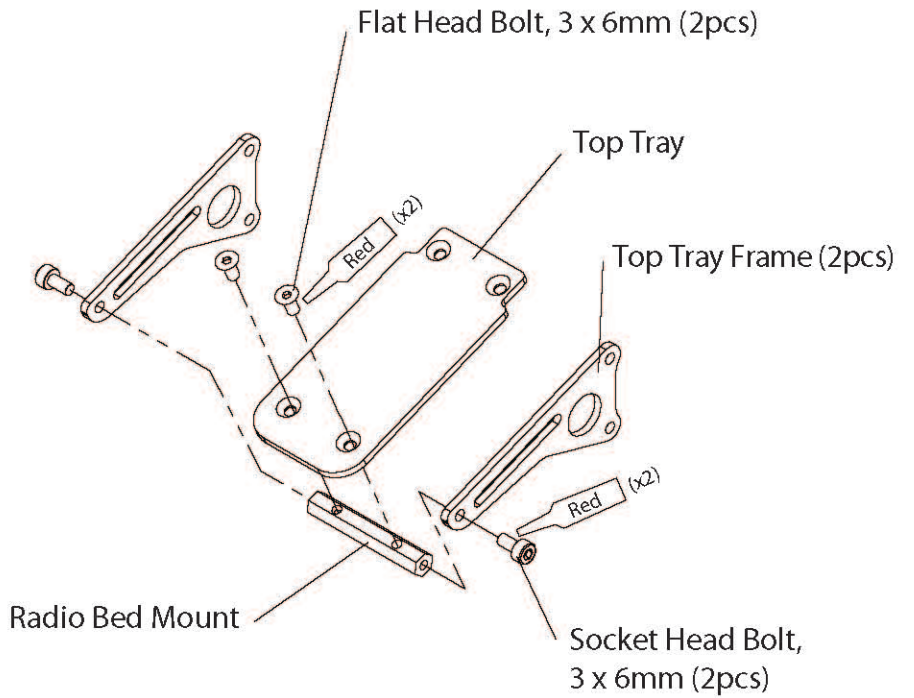
Cross Member with Steps L32P20 (3pcs)

Socket Head Bolt, 3 x 6mm (2pcs)



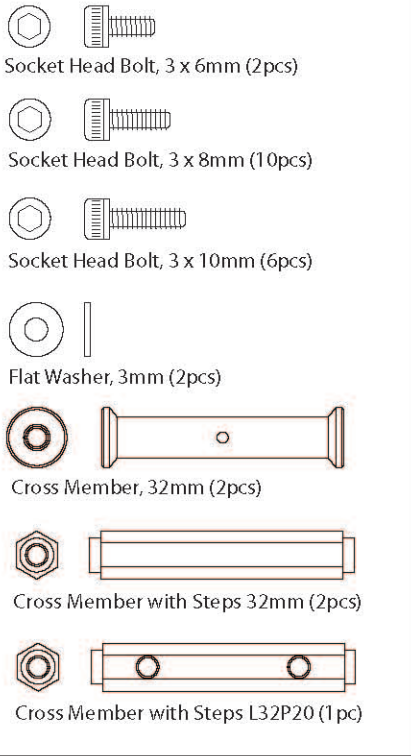


Note: The front radio bed can be installed in the rear position if using a heavy battery pack for CG purposes.



2-1

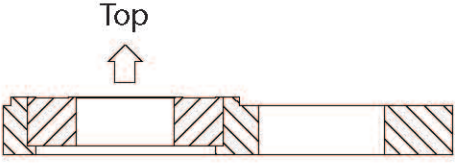
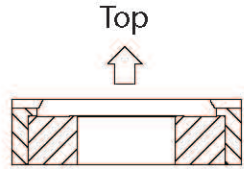
MAIN FRAME ASSEMBLY 1



Note the proper direction of the Main Frame L/R and Bearing Blocks.

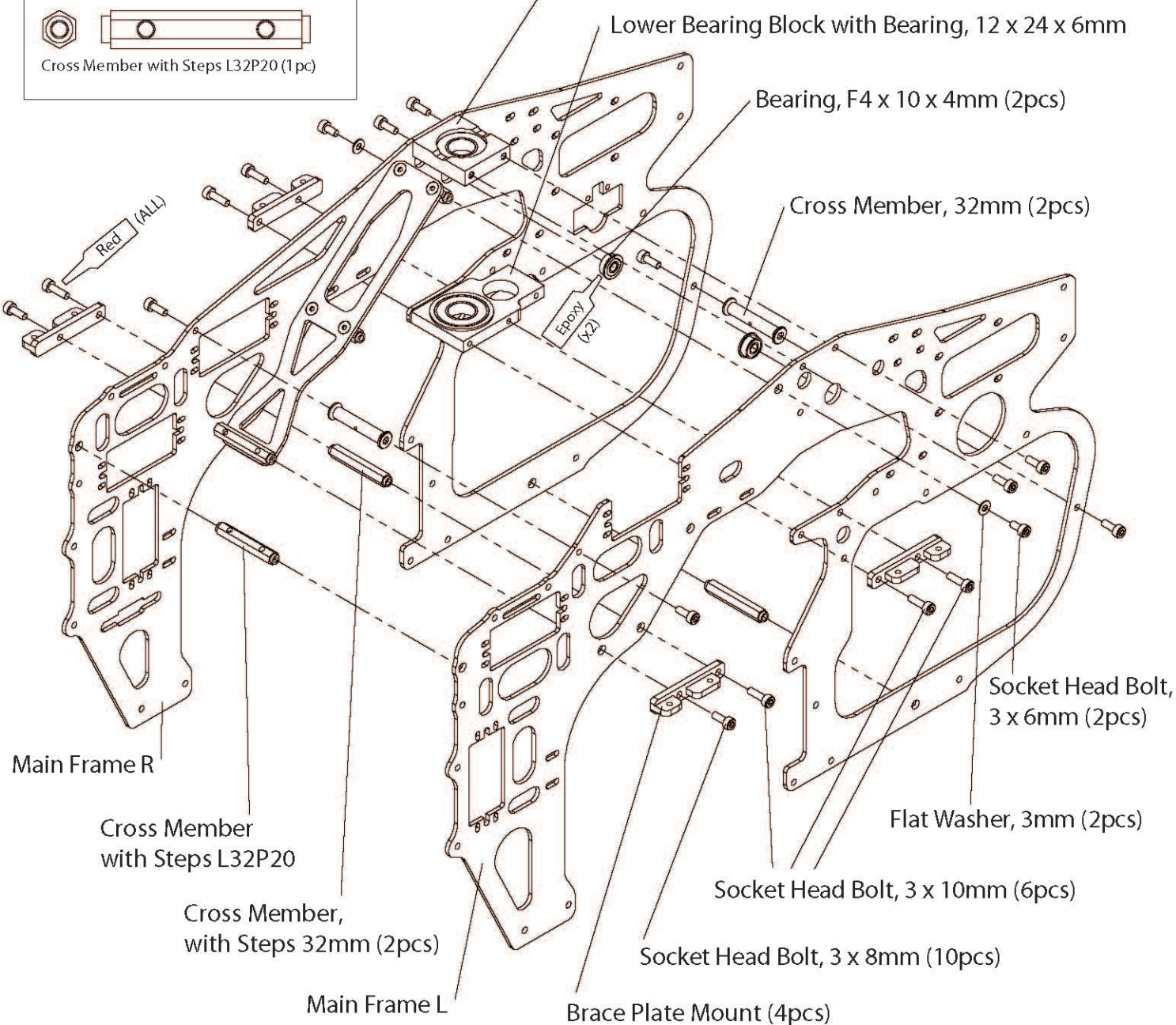
Caution: Use care to prevent any adhesive from getting in the race of the bearings.
Note: Note the proper assembly direction of the Main Frame L/R and install elevator bearings in correct L/R side frames on inside faces.

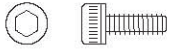
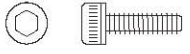
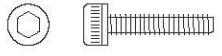

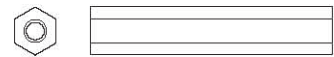
Epoxy or drop of CA is fine for securing elevator F4x10x4 bearings.



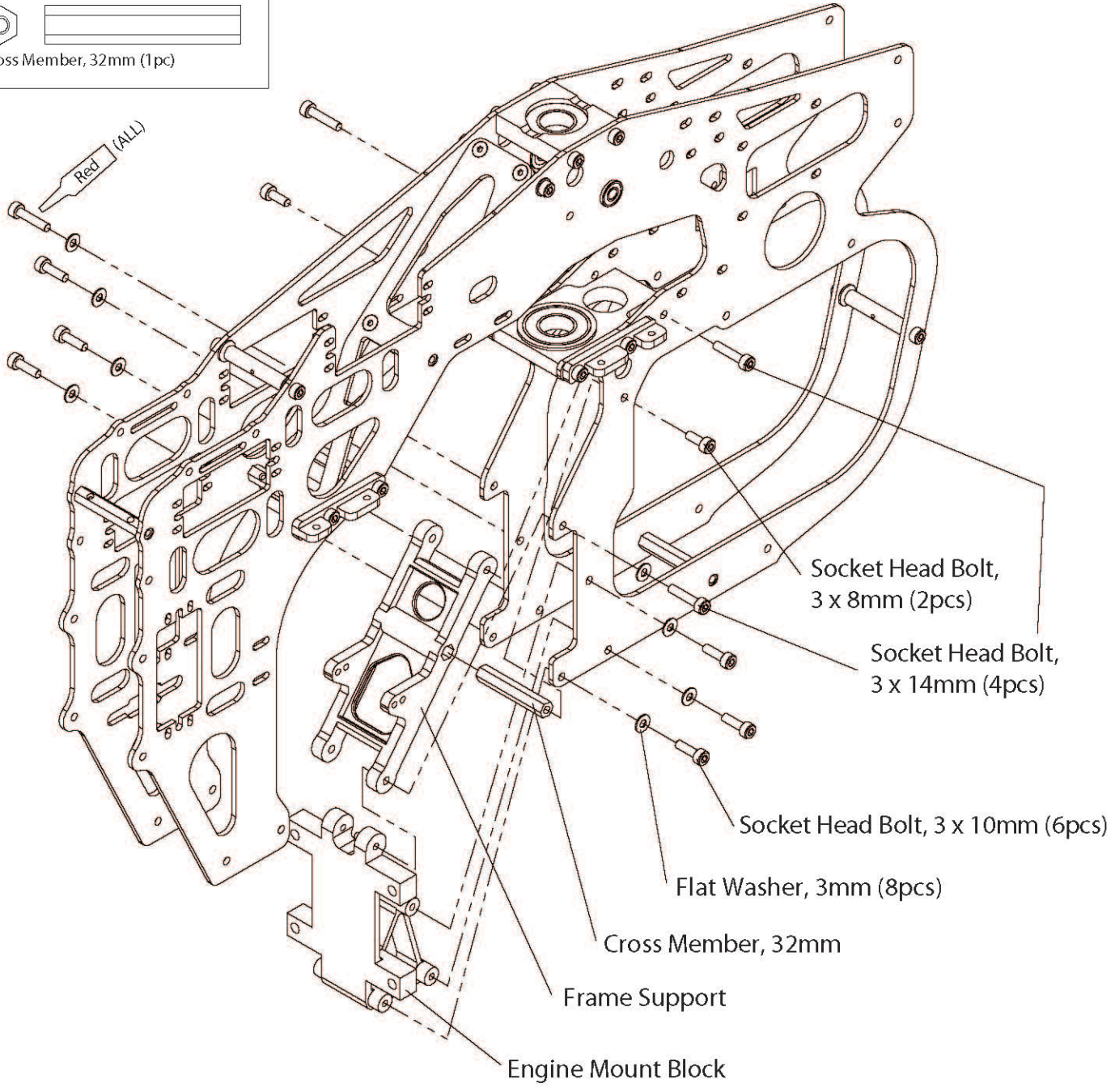
Bearing Case Direction

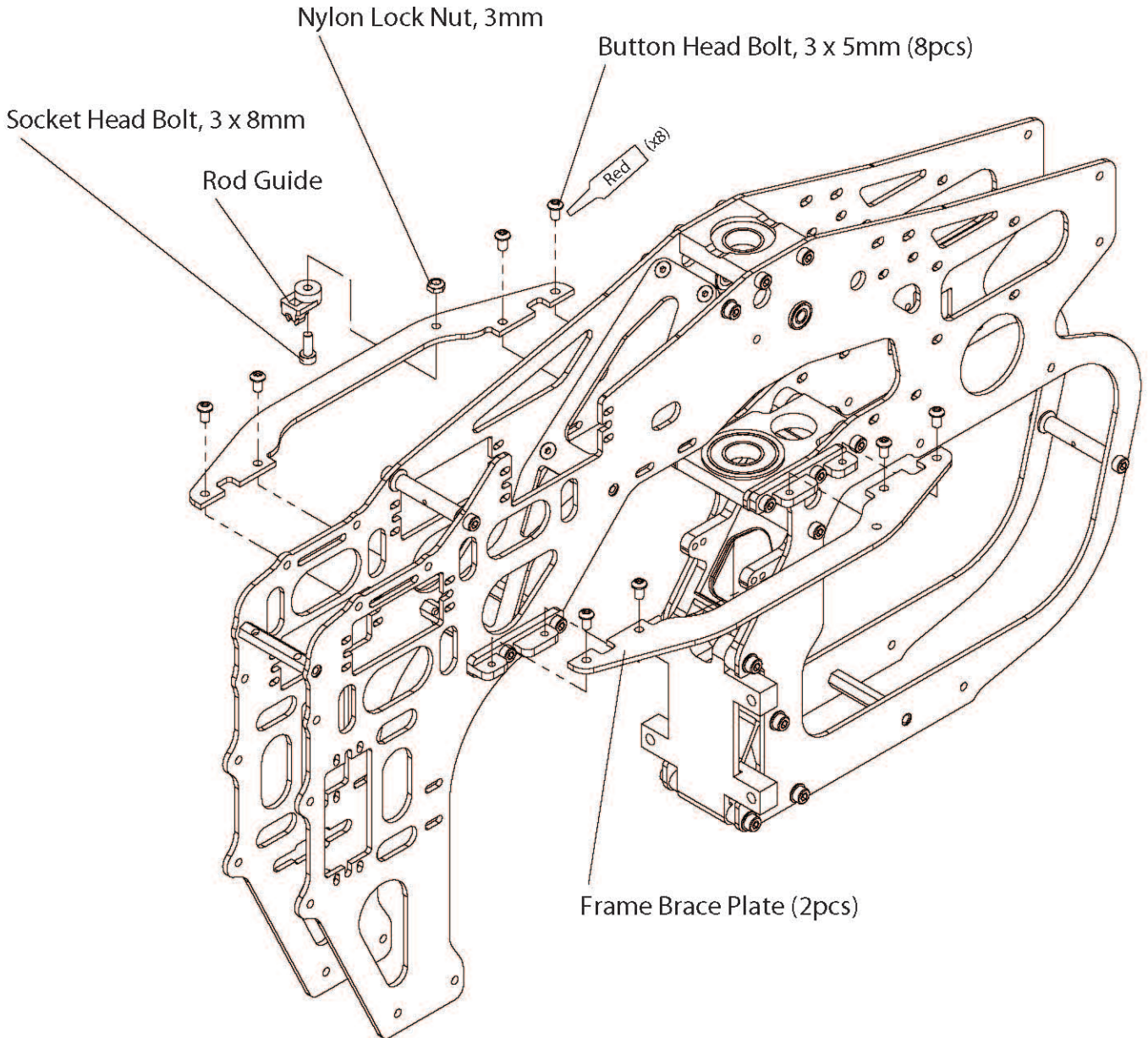
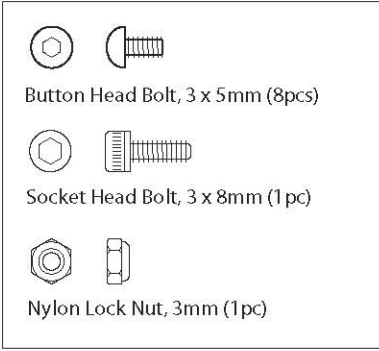
Bearing Block with Bearing, 12 x 24 x 6mm
 Lower Bearing Block with Bearing, 12 x 24 x 6mm



-  Socket Head Bolt, 3 x 8mm (2pcs)
-  Socket Head Bolt, 3 x 10mm (6pcs)
-  Socket Head Bolt, 3 x 14mm (4pcs)
-  Flat Washer, 3mm (8pcs)
-  Cross Member, 32mm (1pc)

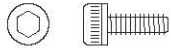
Note: Install Engine Mount Block and all bolts but do not tighten. Once assembled loosely, tighten all bolts while pushing the Engine Mount Block toward the front of the frame. This disallows any slop in the frame through holes and ensures a correctly aligned Engine.



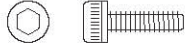


2-4

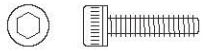
CLUTCH BELL INSTALLATION



Socket Head Bolt, 3 x 8mm (2pcs)



Socket Head Bolt, 3 x 10mm (3pcs)



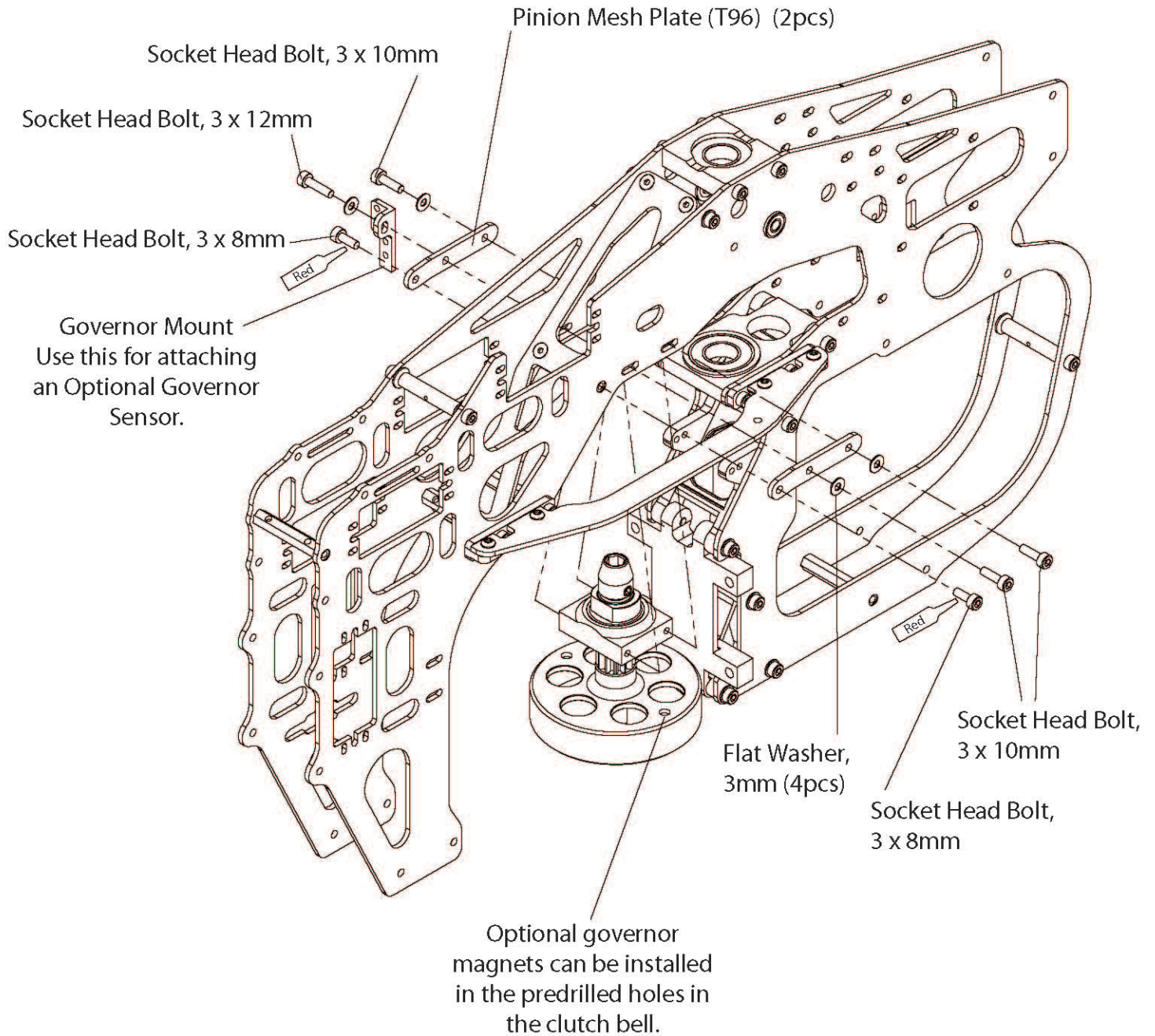
Socket Head Bolt, 3 x 12mm (1pc)

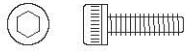


Flat Washer, 3mm (4pcs)

Note: Do not tighten the 3 x 10mm and 3 x 12mm bolts completely at this time

Note: Tighten the 3 x 8mm bolts completely at this time to locate Mesh Plates



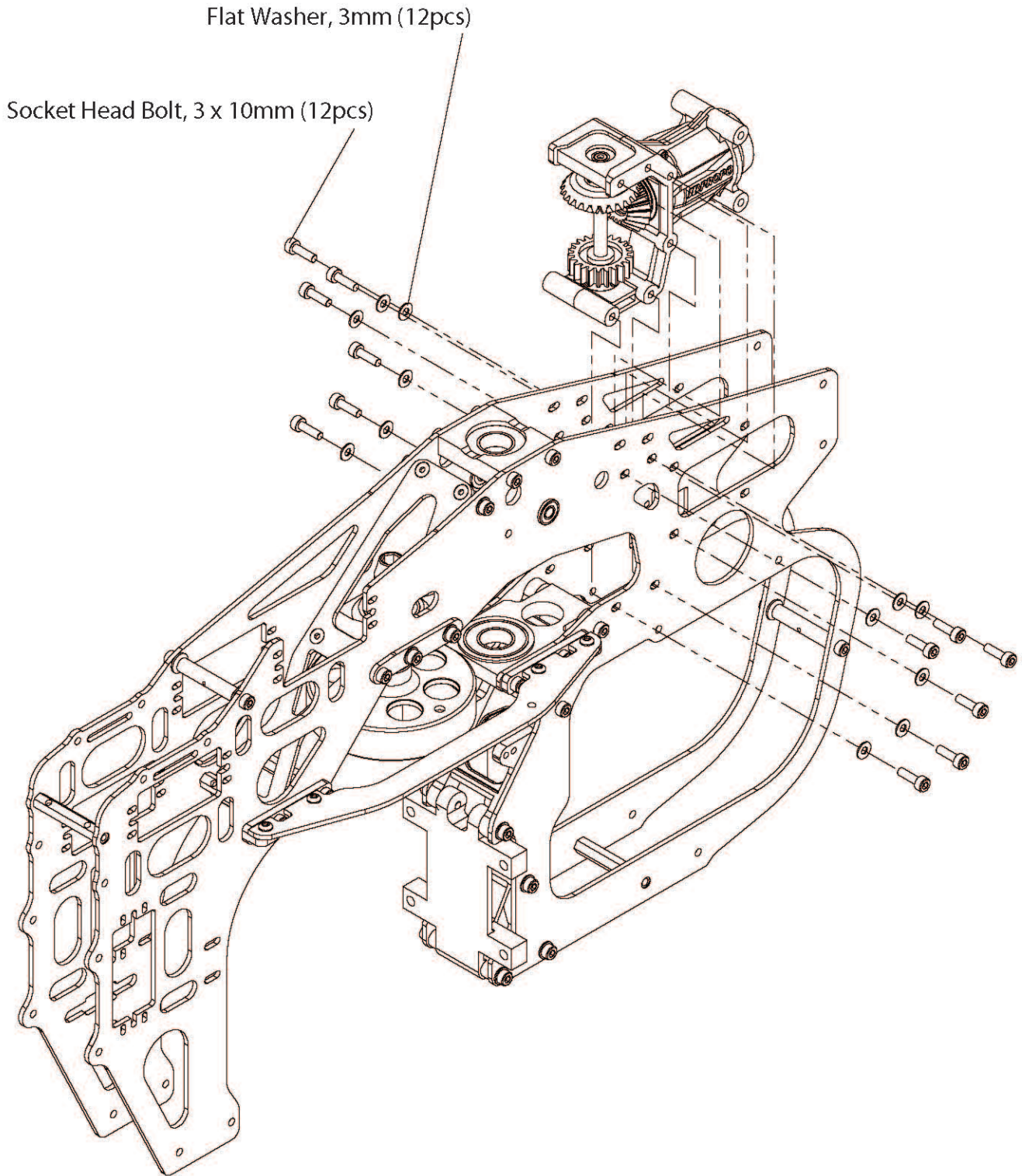


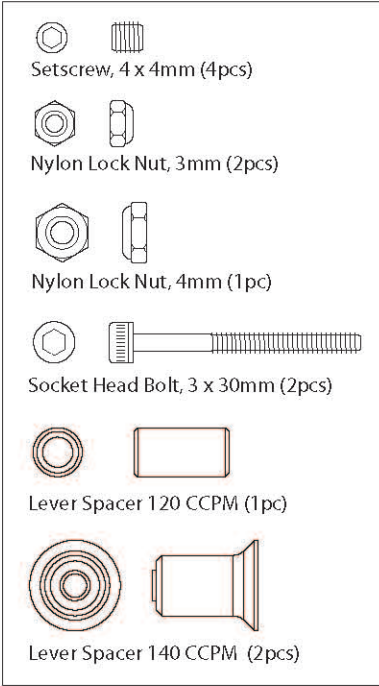
Socket Head Bolt, 3 x 10mm (12pcs)



Flat Washer, 3mm (12pcs)

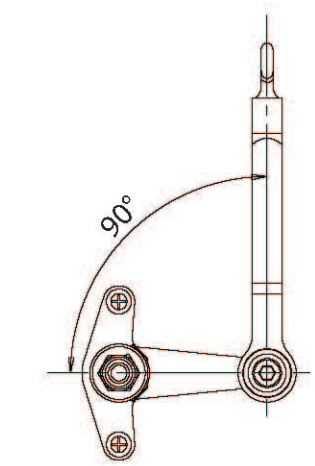
Note: Do not tighten bolts completely at this time



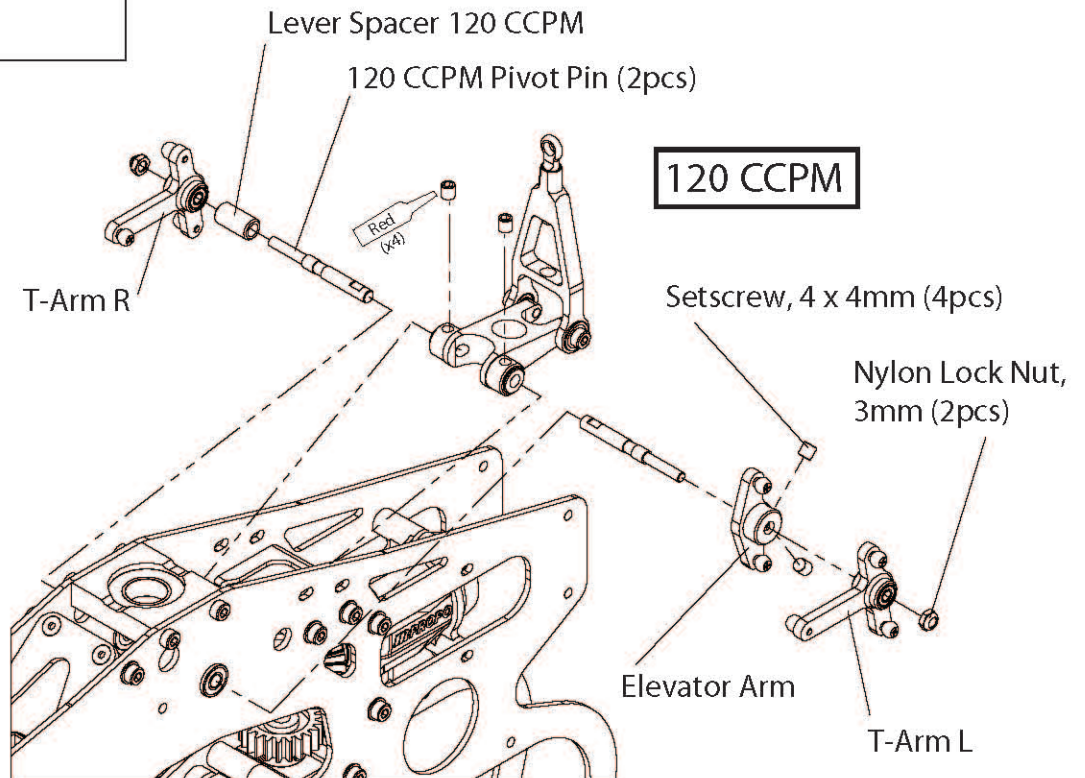
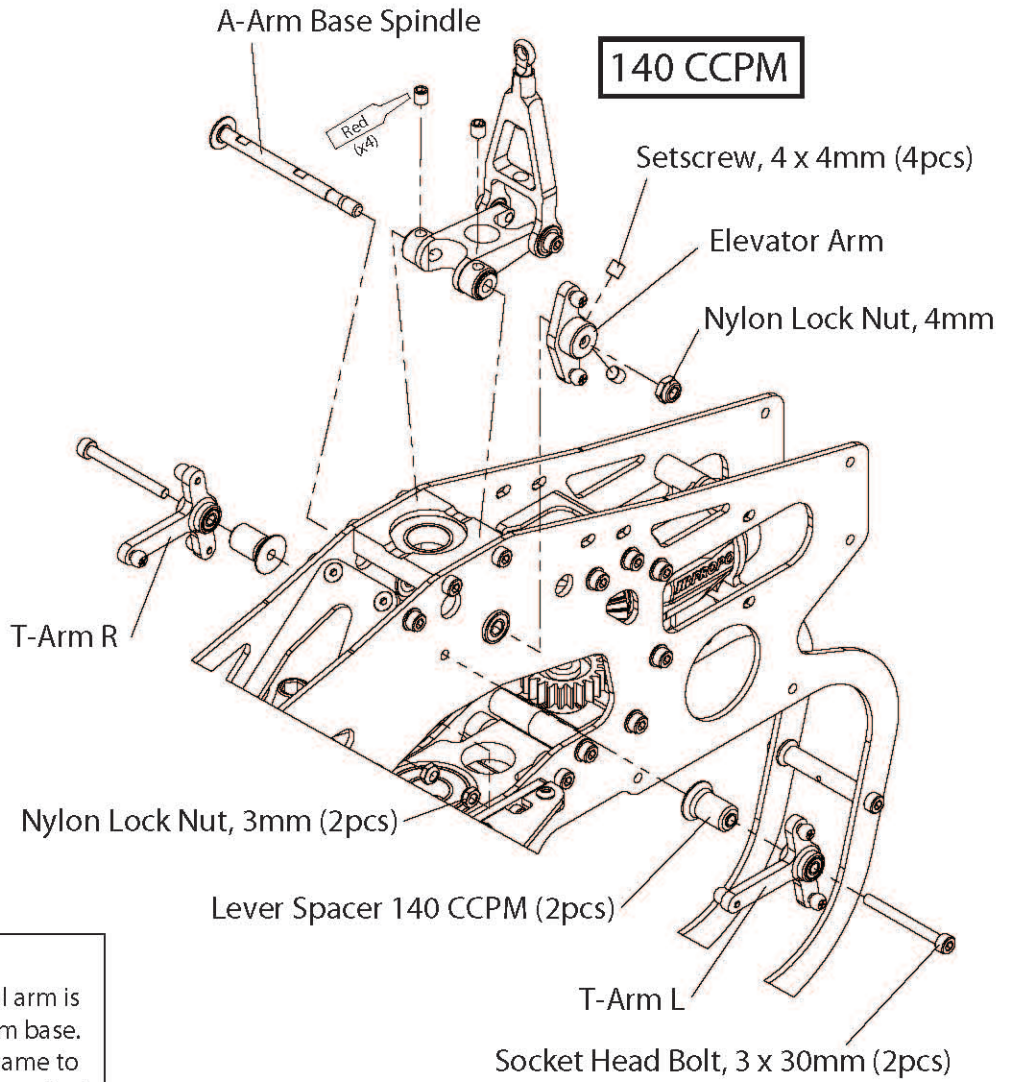


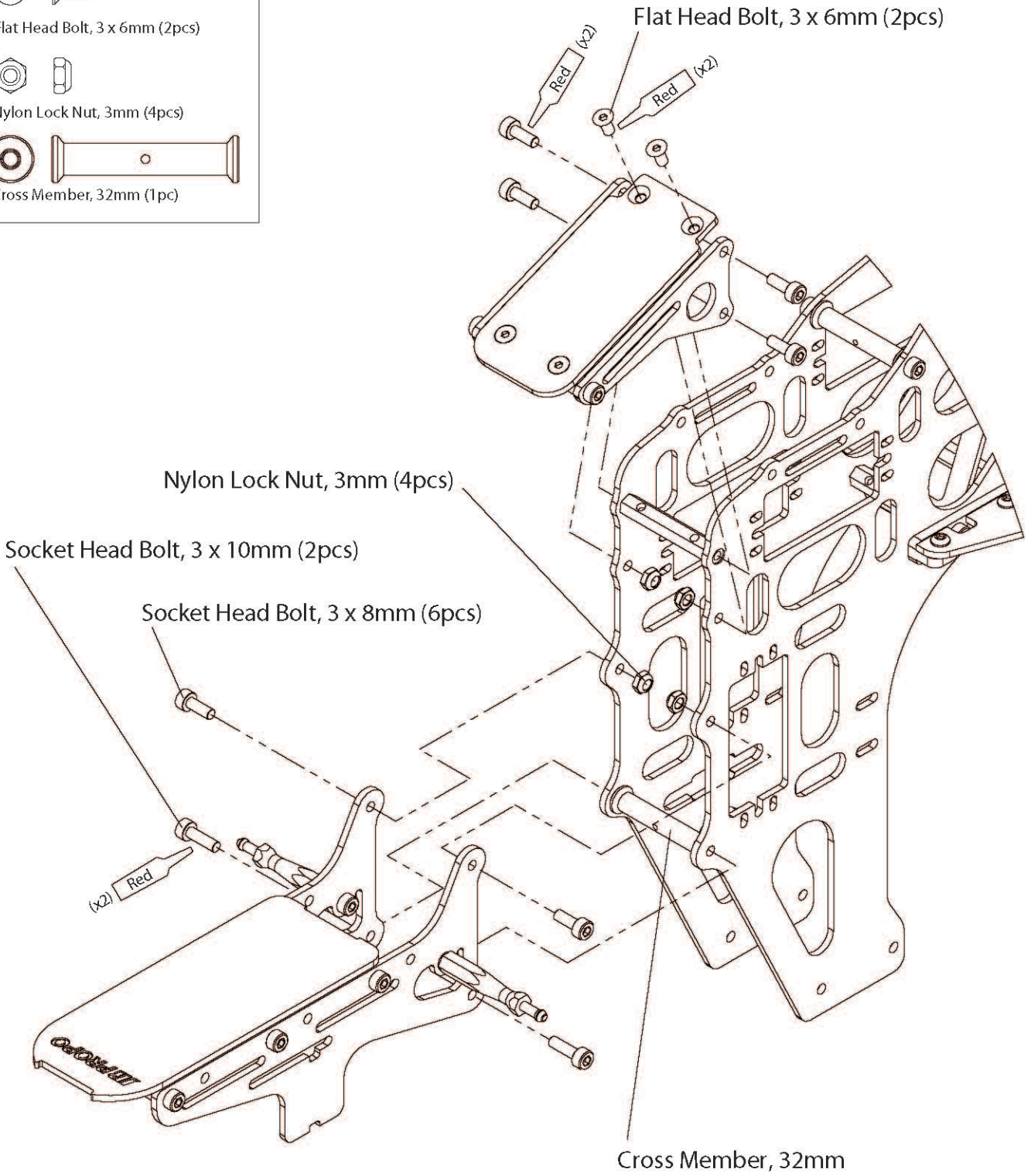
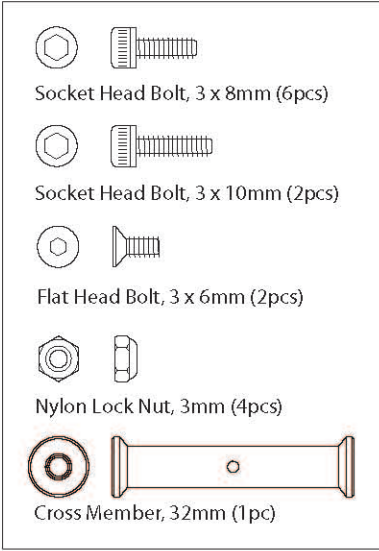
Install the CCPM Levers as necessary for 120 or 140 CCPM depending on the type you will use.

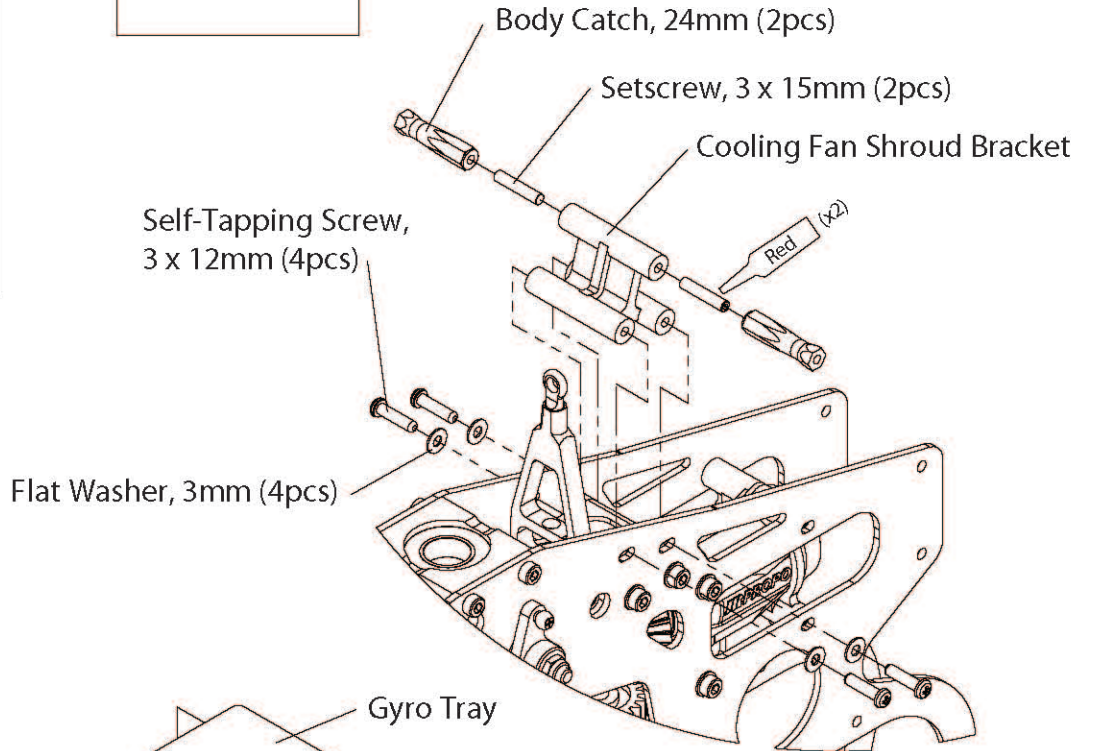
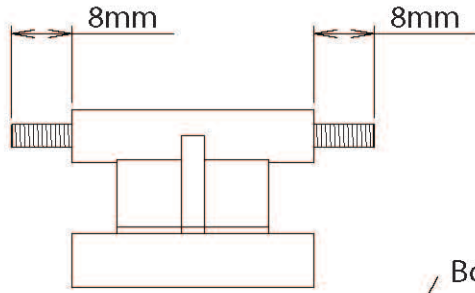
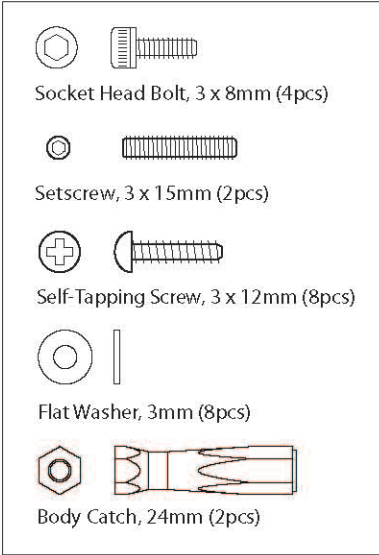
Make sure that the elevator control arm is installed so that it is 90° to the A-arm base. Use the locating hole in the main frame to help achieve the 90° position. Secure so that the Setscrew 4 x 4mm is engaged in the D-shaped recess.



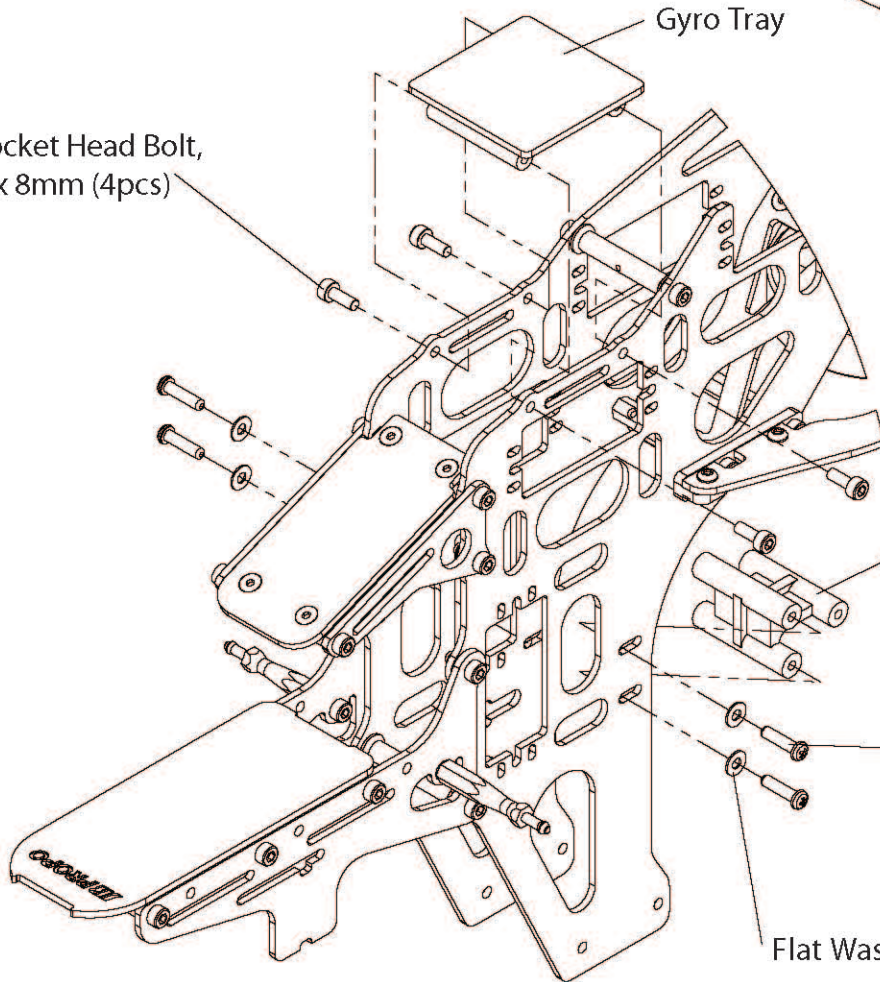
Fasten with the Nylon Lock Nut 3mm first and then fasten with Setscrew 4x4mm for T-Arm R.







Socket Head Bolt, 3 x 8mm (4pcs)

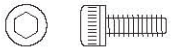


Cooling Fan Shroud Bracket

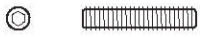
Self-Tapping Screw, 3 x 12mm (4pcs)

Don't tighten the cooling fan shroud bracket screws completely at this time

Flat Washer, 3mm (4pcs)



Socket Head Bolt, 3 x 8mm (2pcs)



Setscrew, 3 x 15mm (2pcs)



Button Head Bolt, 3 x 6mm (4pcs)



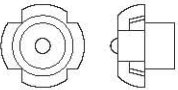
Button Head Bolt, 3 x 8mm (4pcs)



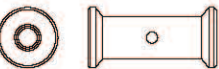
Lock Washer, 3mm (4pcs)



Spacer, 3mm (4pcs)



Fuel Tank Holder (4pcs)

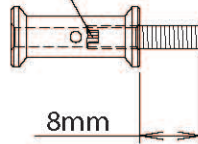


Cross Member, 17mm Black (4pcs)



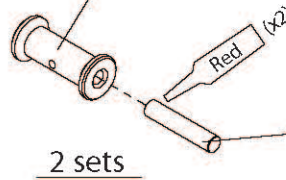
Cross Member, 32mm (1pc)

Hex Hole



8mm

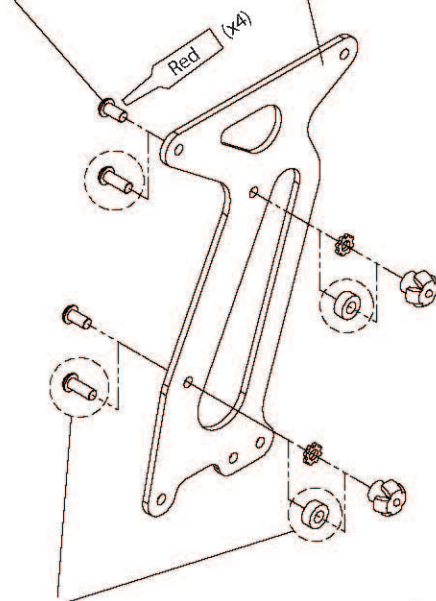
Cross Member, 17mm Black (2pcs)



Setscrew, 3 x 15mm (2pcs)

2 sets

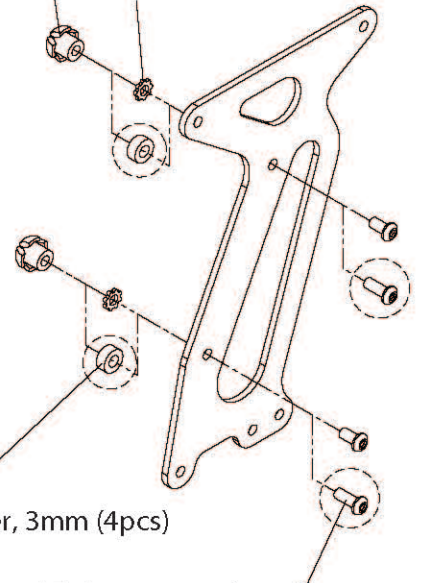
Button Head Bolt, 3 x 6mm (4pcs)



Tank Frame (2pcs)

Fuel Tank Holder (4pcs)

Lock Washer, 3mm (4pcs)

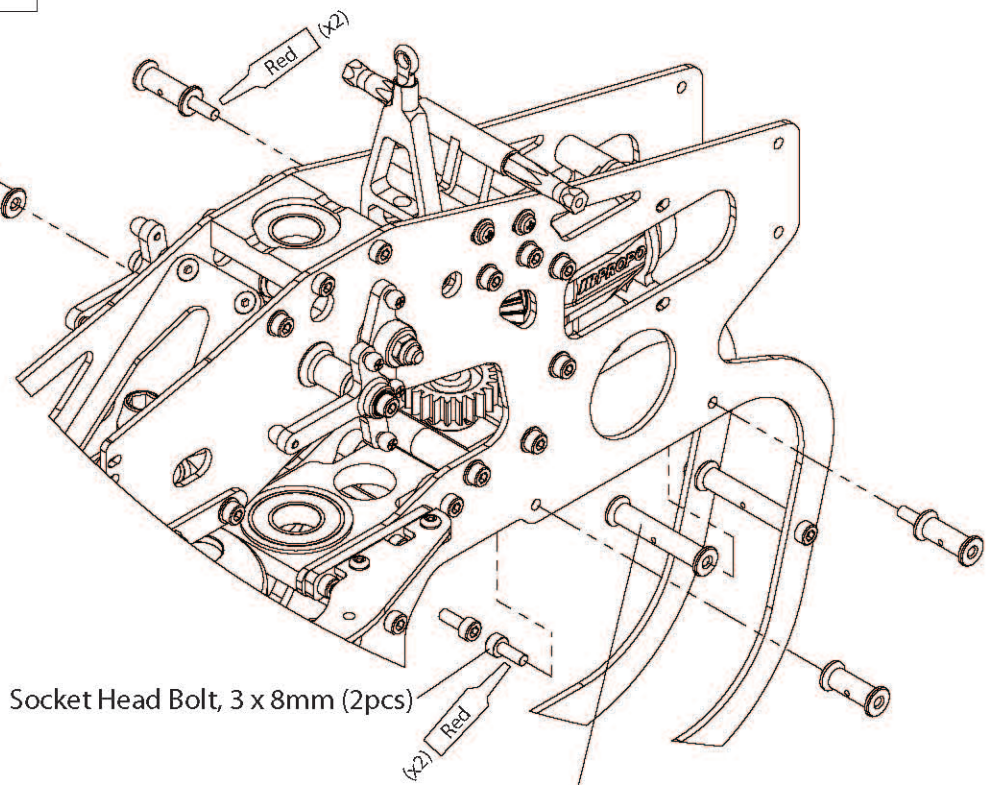


Spacer, 3mm (4pcs)

Button Head Bolt, 3 x 8mm (4pcs)

Note: For YS Engine use only.

Cross Member, 17mm Black (2pcs)

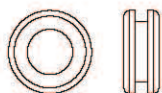


Socket Head Bolt, 3 x 8mm (2pcs)

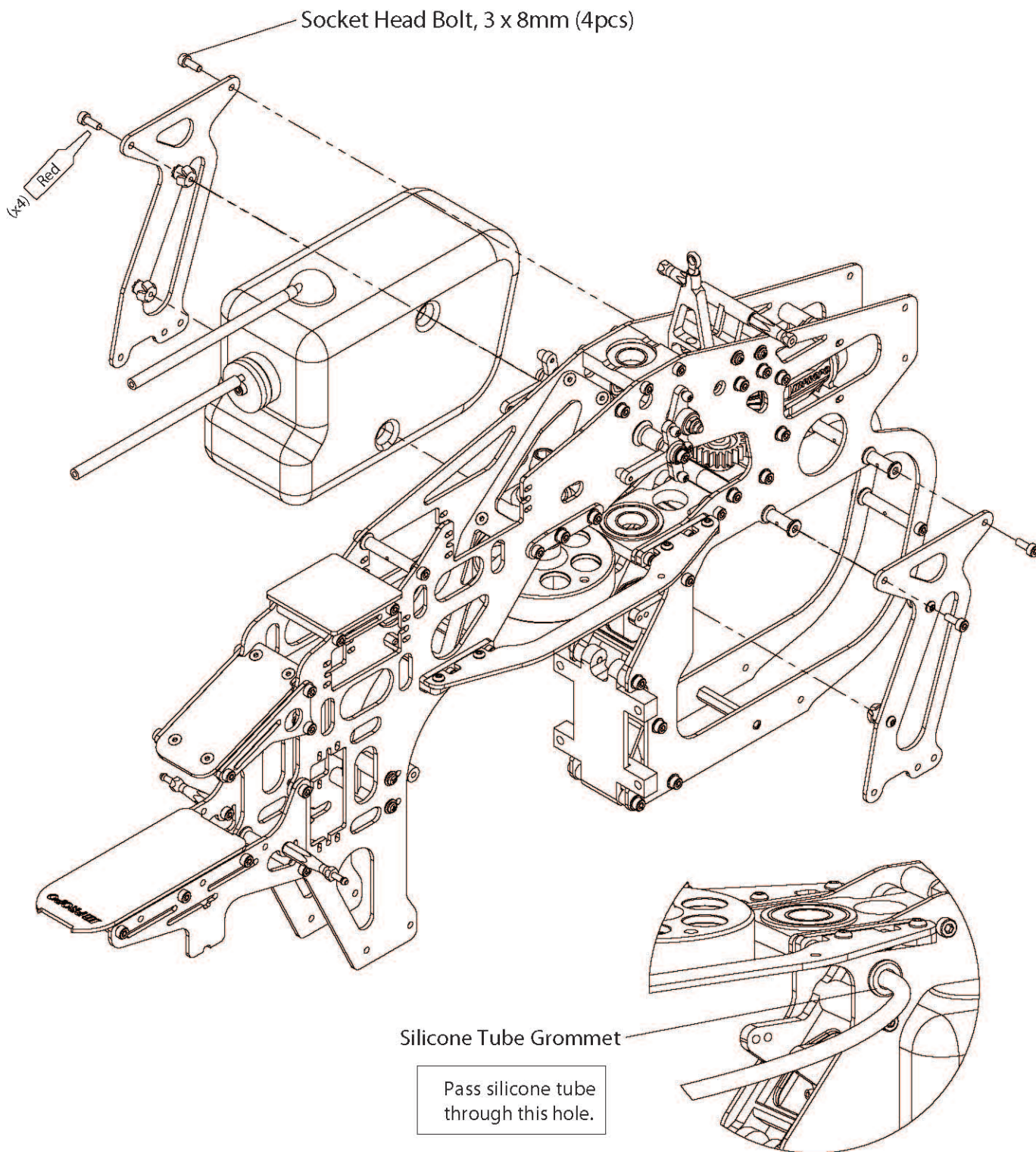
Cross Member, 32mm



Socket Head Bolt, 3 x 8mm (4pcs)



Silicone Tube Grommet (1pc)

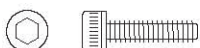




Socket Head Bolt, 3 x 10mm (2pcs)



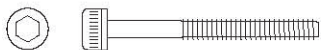
Nylon Lock Nut, 3mm (2pcs)



Socket Head Bolt, 3 x 12mm (2pcs)



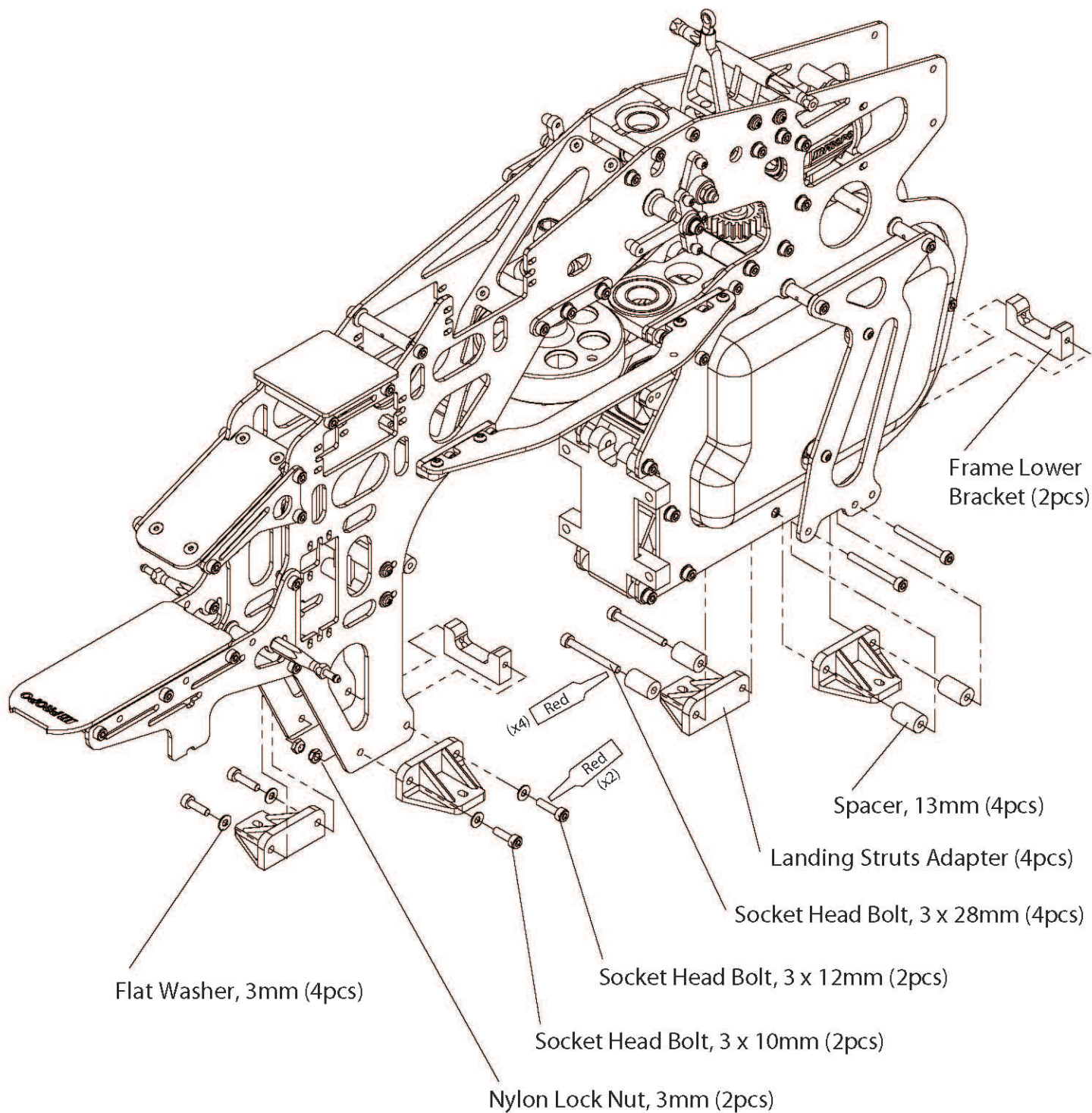
Flat Washer, 3mm (4pcs)

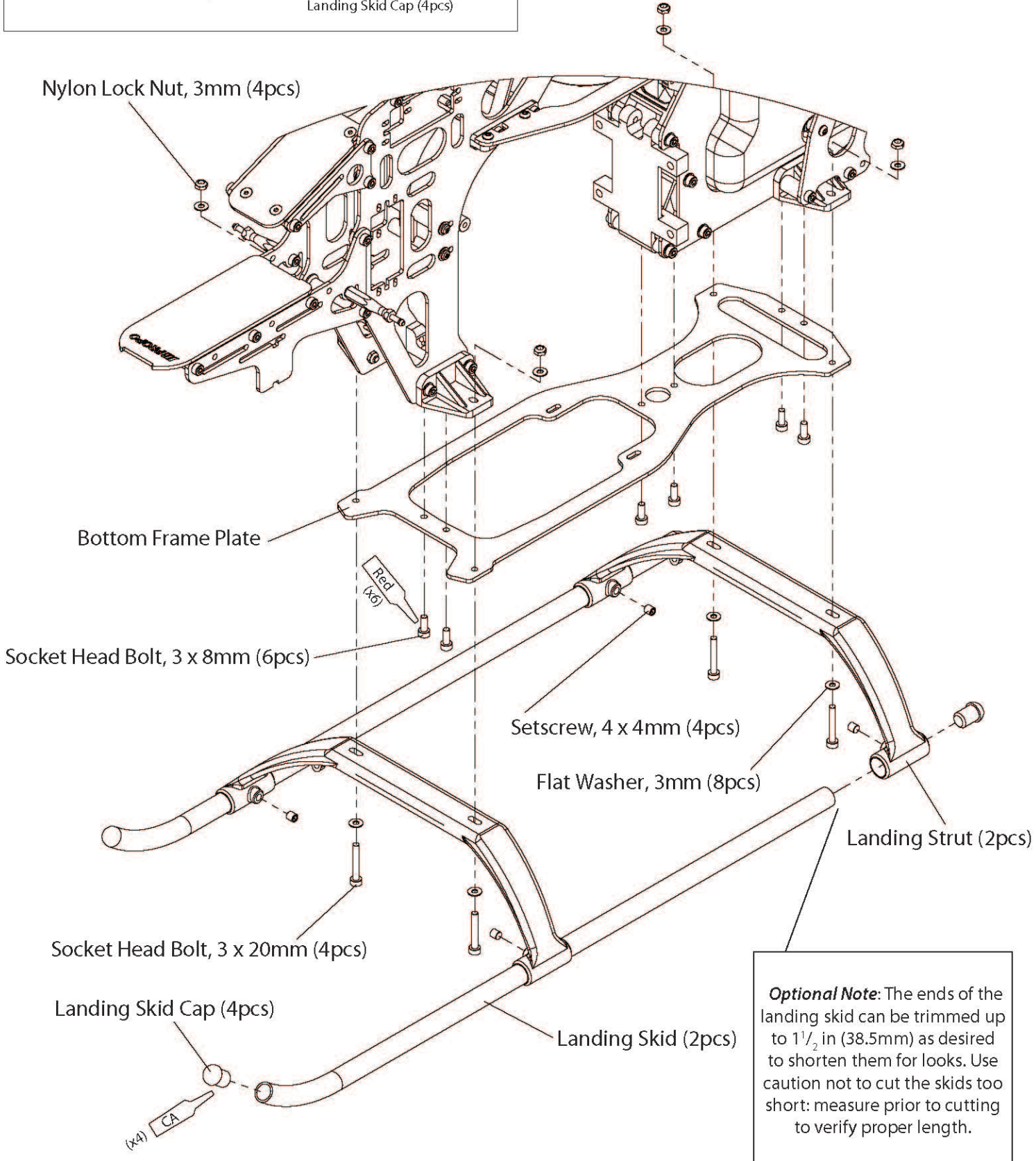
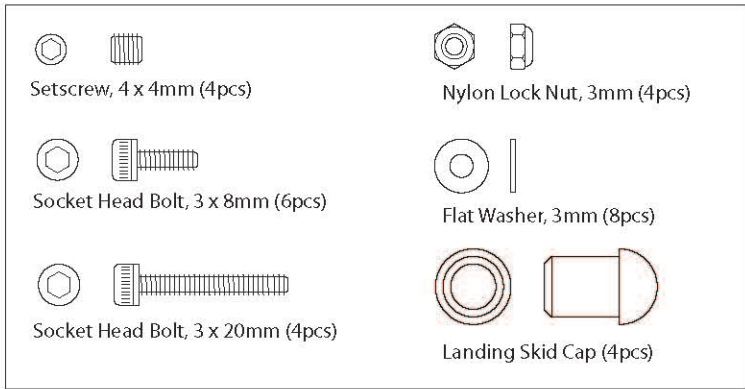


Socket Head Bolt, 3 x 28mm (4pcs)







Spacer, 13mm (4pcs)







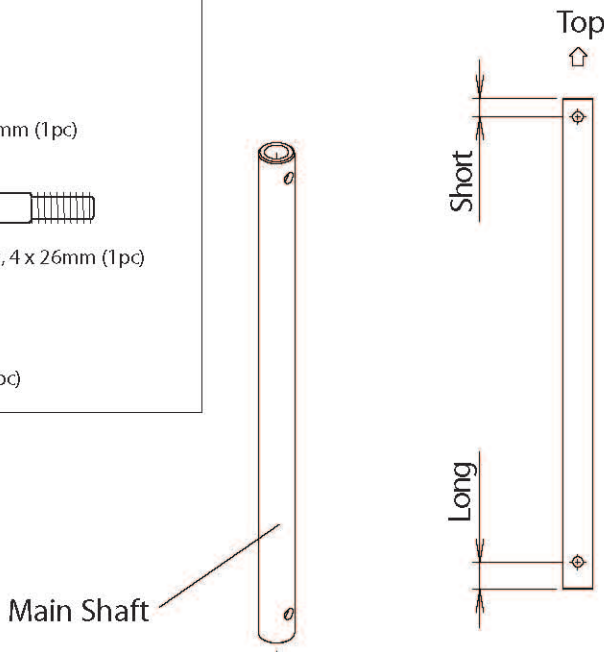
Optional Note: The ends of the landing skid can be trimmed up to 1 1/2 in (38.5mm) as desired to shorten them for looks. Use caution not to cut the skids too short: measure prior to cutting to verify proper length.

 
Setscrew, 4 x 4mm (1pc)

 
Socket Head Bolt, 3 x 10mm (1pc)

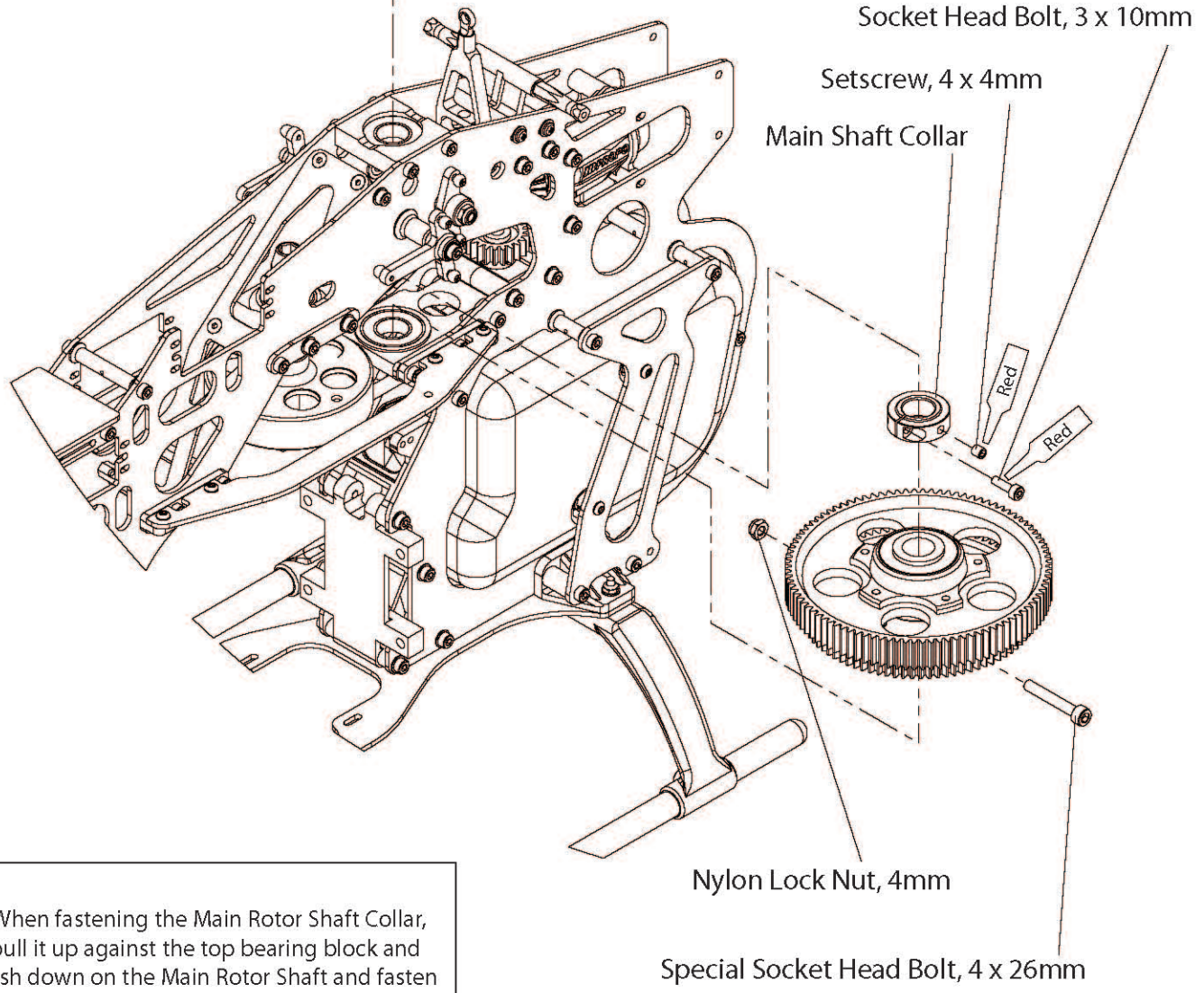
 
Special Socket Head Bolt, 4 x 26mm (1pc)

 
Nylon Lock Nut, 4mm (1pc)

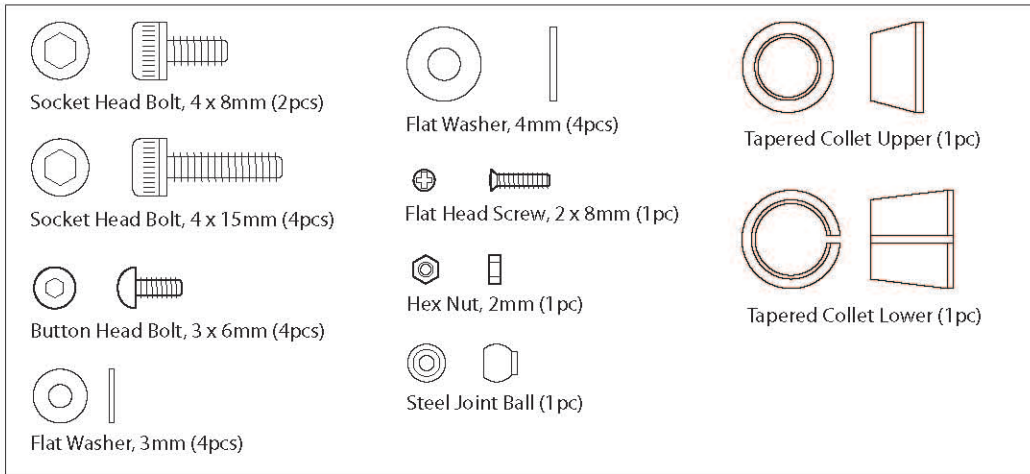


Note: If Main shaft doesn't go thru easily, unscrew the bolts for the bearing blocks and retighten them after Main shaft is installed.

Note: Tighten main shaft collar setscrew after clamp has been set.

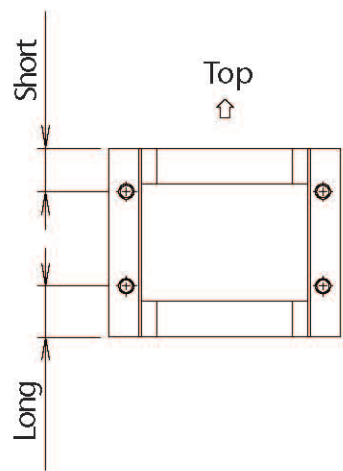
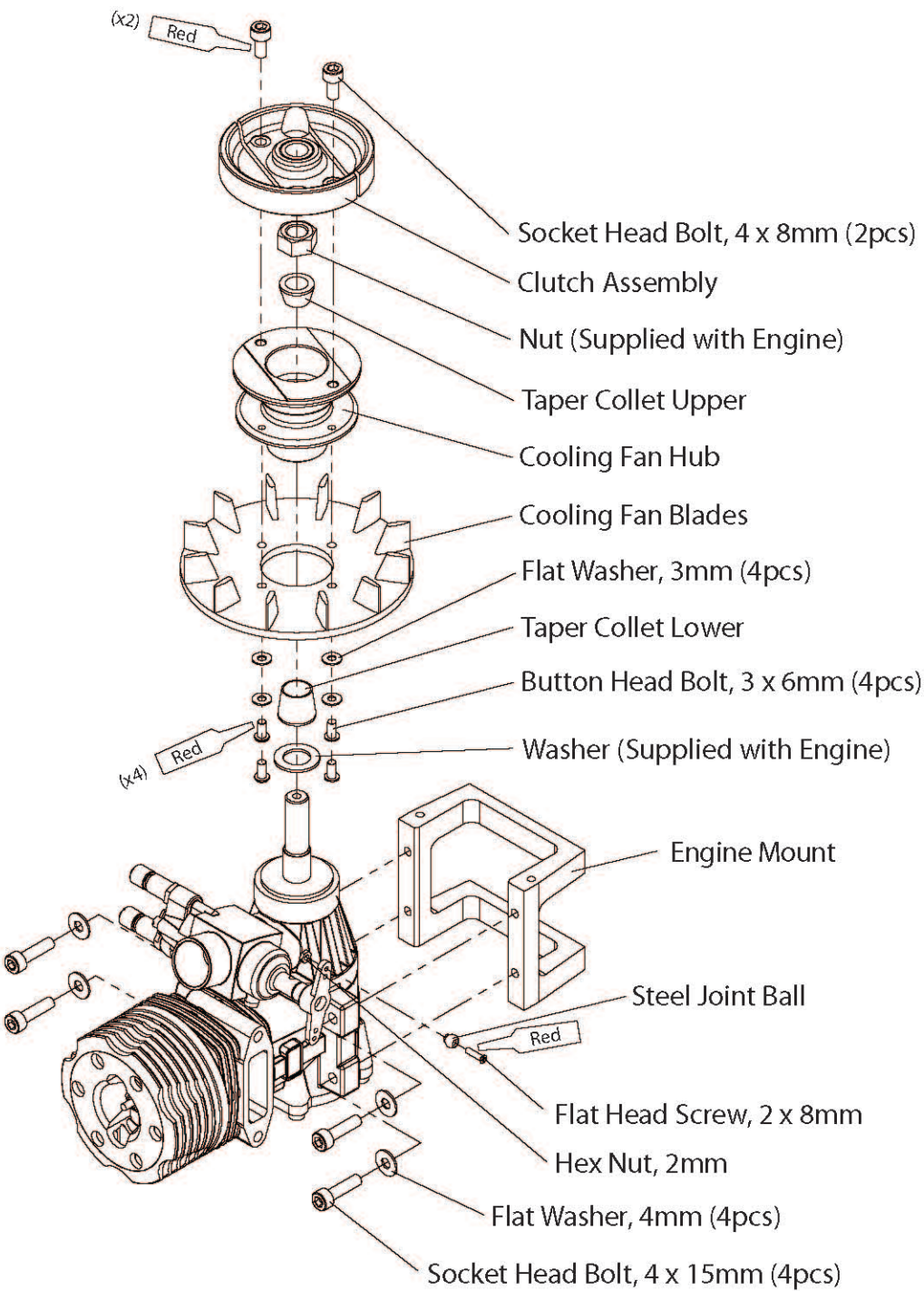


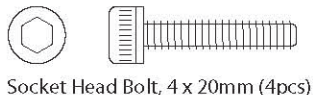
When fastening the Main Rotor Shaft Collar, pull it up against the top bearing block and push down on the Main Rotor Shaft and fasten with the Socket Head Bolt 3 x 10mm first. Then fasten with Setscrew 4 x 4mm. Make sure the Main Rotor Shaft is secure.



Note: When securing the engine bolts (4pcs), first install them loosely. Most engines have oversize clearance holes in the mounting lugs. To take up this clearance slop and have perfect engine alignment, push up or down evenly on the engine and final tighten the engine bolts.

Note: It is recommended that a crankshaft (not piston) locking tool be used to properly secure the fan assembly to the engine.

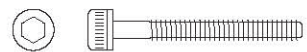




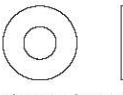
Socket Head Bolt, 4 x 20mm (4pcs)



Flat Washer, 3mm (2pcs)



Socket Head Bolt, 3 x 25mm (2pcs)

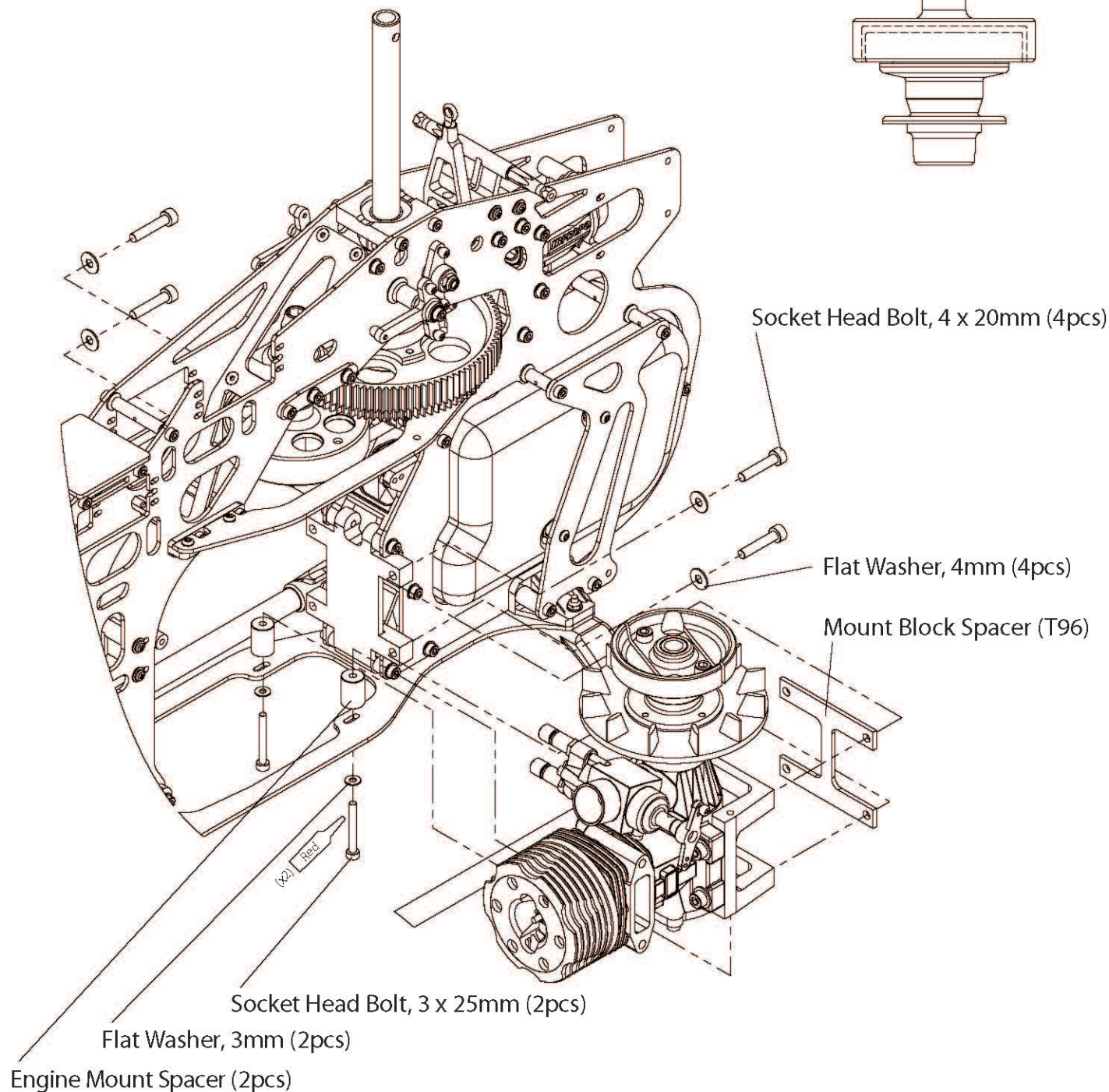
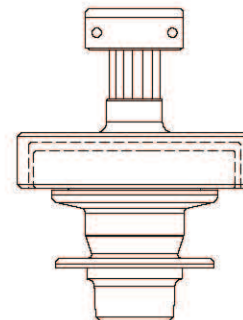




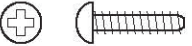
Flat Washer, 4mm (4pcs)

Check the bottom of the clutch is flush with the bottom of the clutch bell when fully assembled. If needed, a small amount of up/down adjustment can be made with the 4x engine bolts and slop in the engine lug holes. Re-tighten the engine once set.

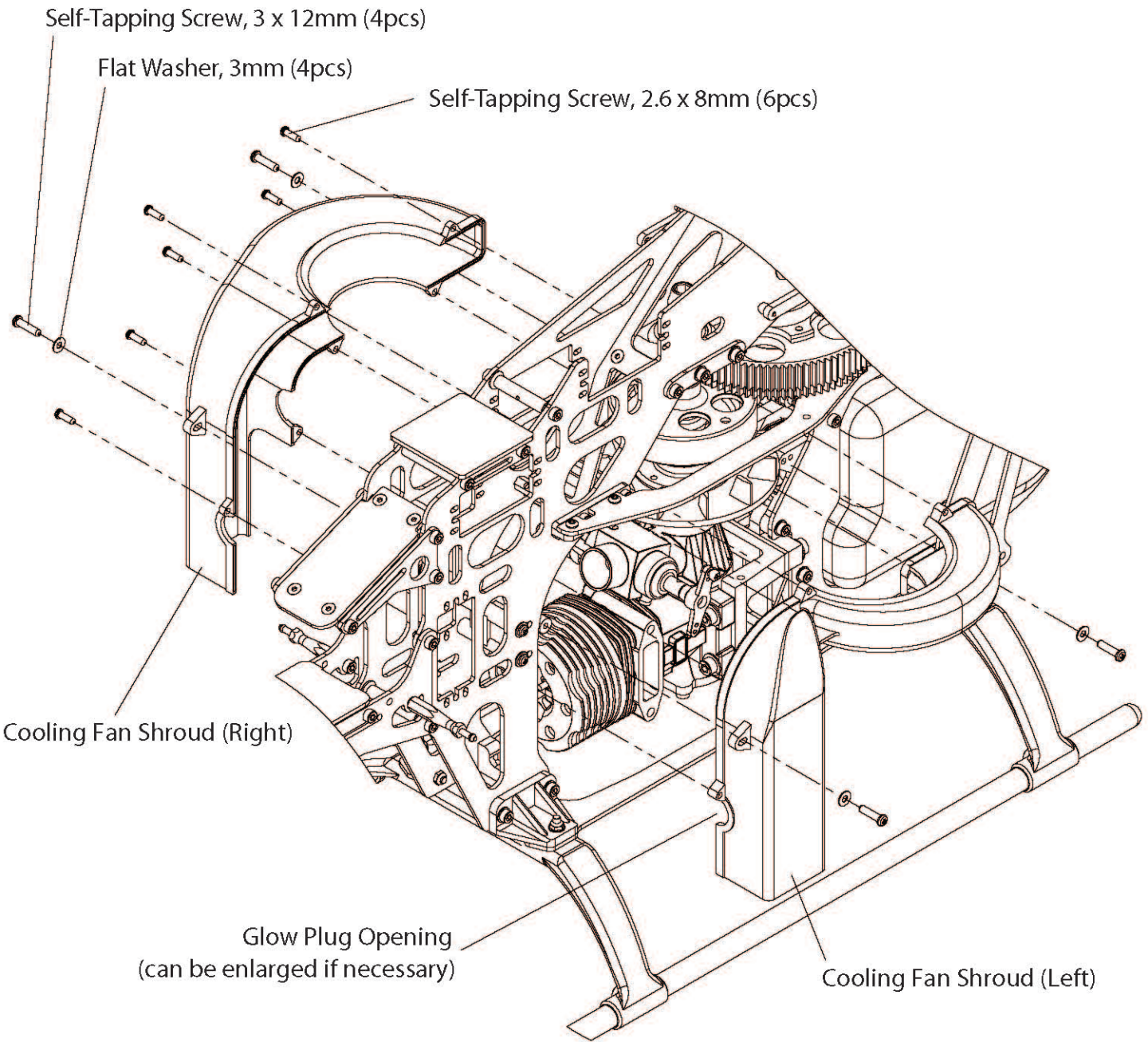
Fully tighten all bolts in Steps 2-4 and 2-5 at this time and follow the gear meshing procedure.

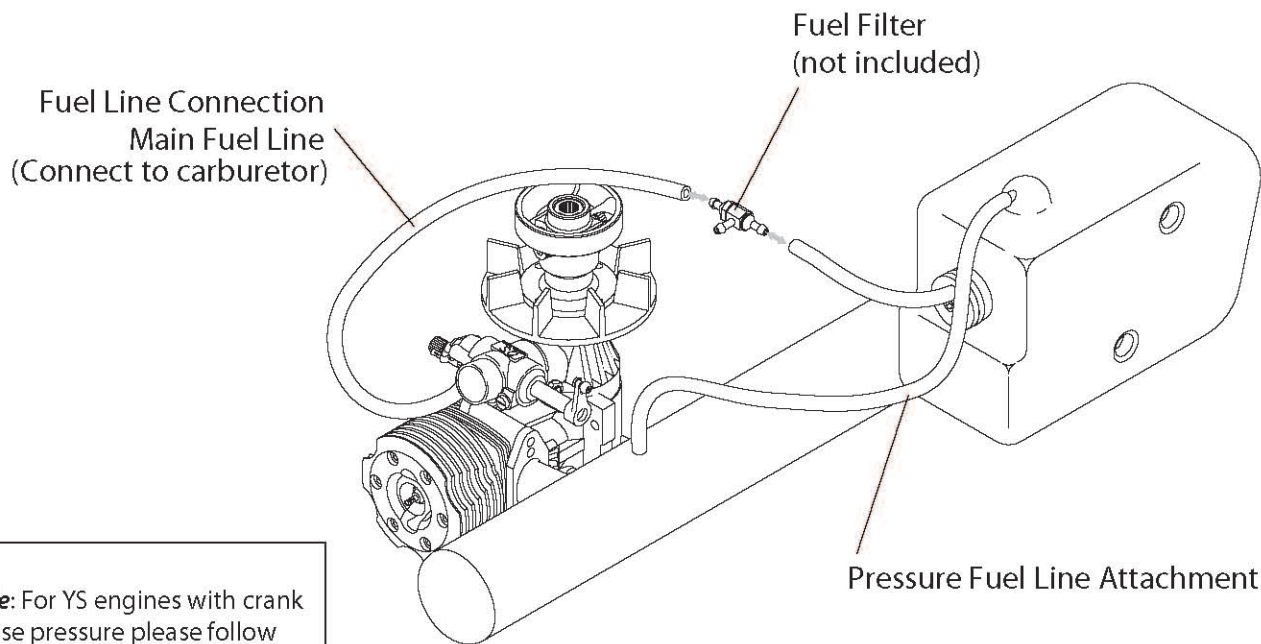
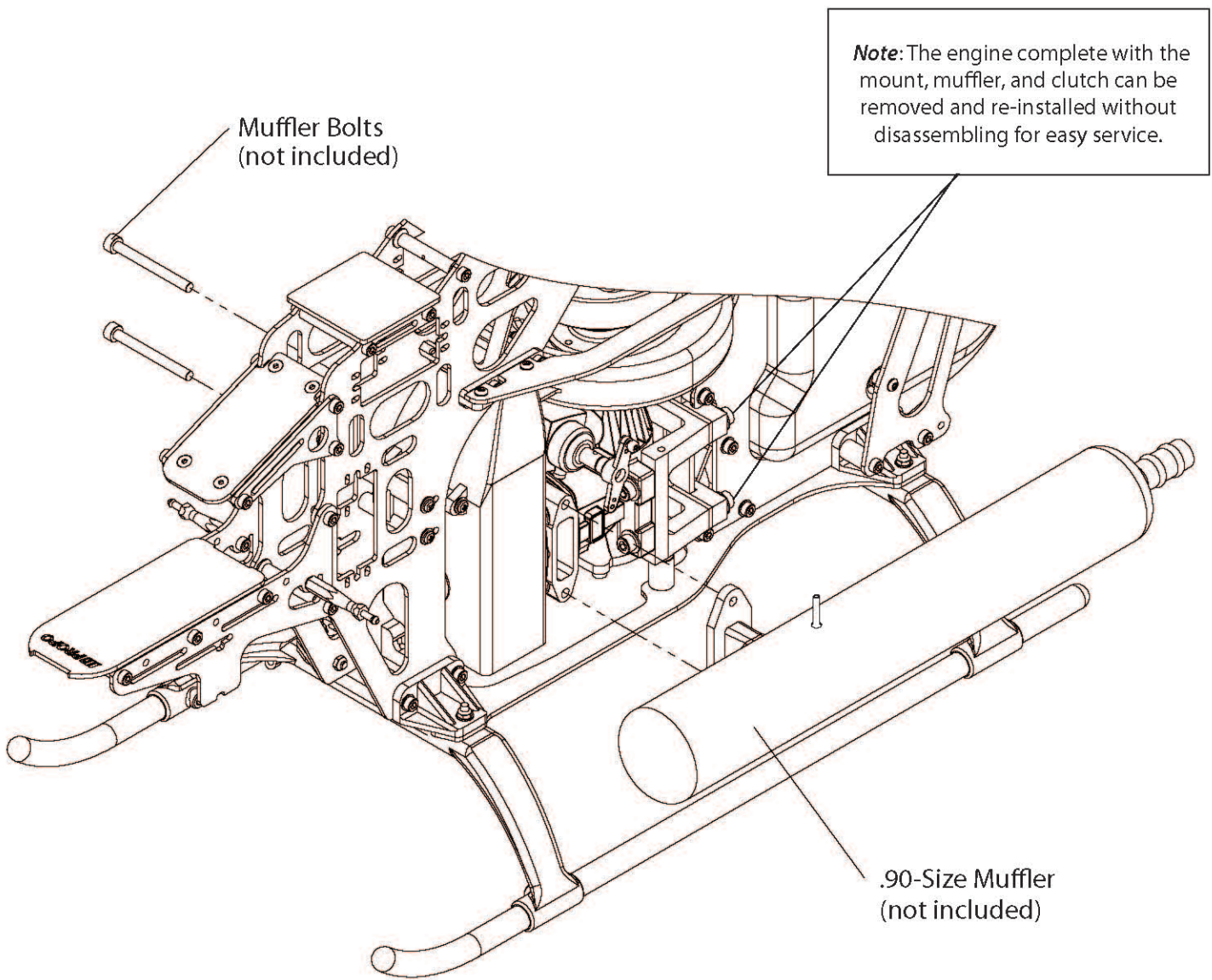
After installing the engine assembly to the frames, to set the proper gear mesh, insert one thickness of paper (the same thickness as the pages of this manual) between the pinion gear and main drive gear. Push the pinion bearing block until there is no gear backlash with the paper in place, and then tighten the bearing block screws. Then remove the paper and note that there should be a very slight amount of backlash in the gears. The mesh plates and preset engine alignment will allow only very small movement of the pinion gear and make setting this mesh relatively easy. Repeat this procedure for setting the tail drive gear mesh.



	
Self-Tapping Screw, 2.6 x 8mm (6pcs)	Flat Washer, 3mm (4pcs)
	
Self-Tapping Screw, 3 x 12mm (4pcs)	

TIP: The best alignment of the fan shroud can be achieved by attaching only the left half of the shroud. Next, align the mounts so the shroud is centered around the fan. Tighten the fan mounts then attach the right half of the shroud. With some engines and Ni-starters, you may need to trim the glow plug opening in the shroud for additional clearance.





Note: For YS engines with crank case pressure please follow fuel line plumbing instructions provided with your engine.

4-1

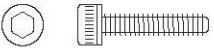
SWASHPLATE/WASHOUT INSTALLATION



Setscrew, 3 x 3mm (3pcs)



Joint Ball Spacer, 2.75mm (4pcs)



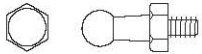
Socket Head Bolt, 3 x 14mm (2pcs)



Washer, 3 x 4.5 x 1mm (2pcs)



Flat Head Screw, 2 x 10mm (6pcs)



Control Ball, 9mm (3pcs)



Steel Joint Ball (6pcs)

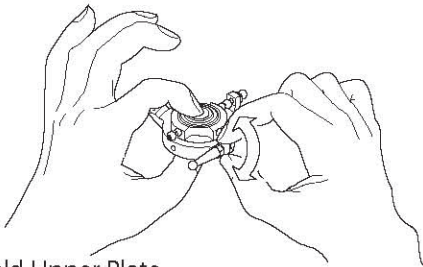


Long Control Ball, 28.25mm (2pcs)

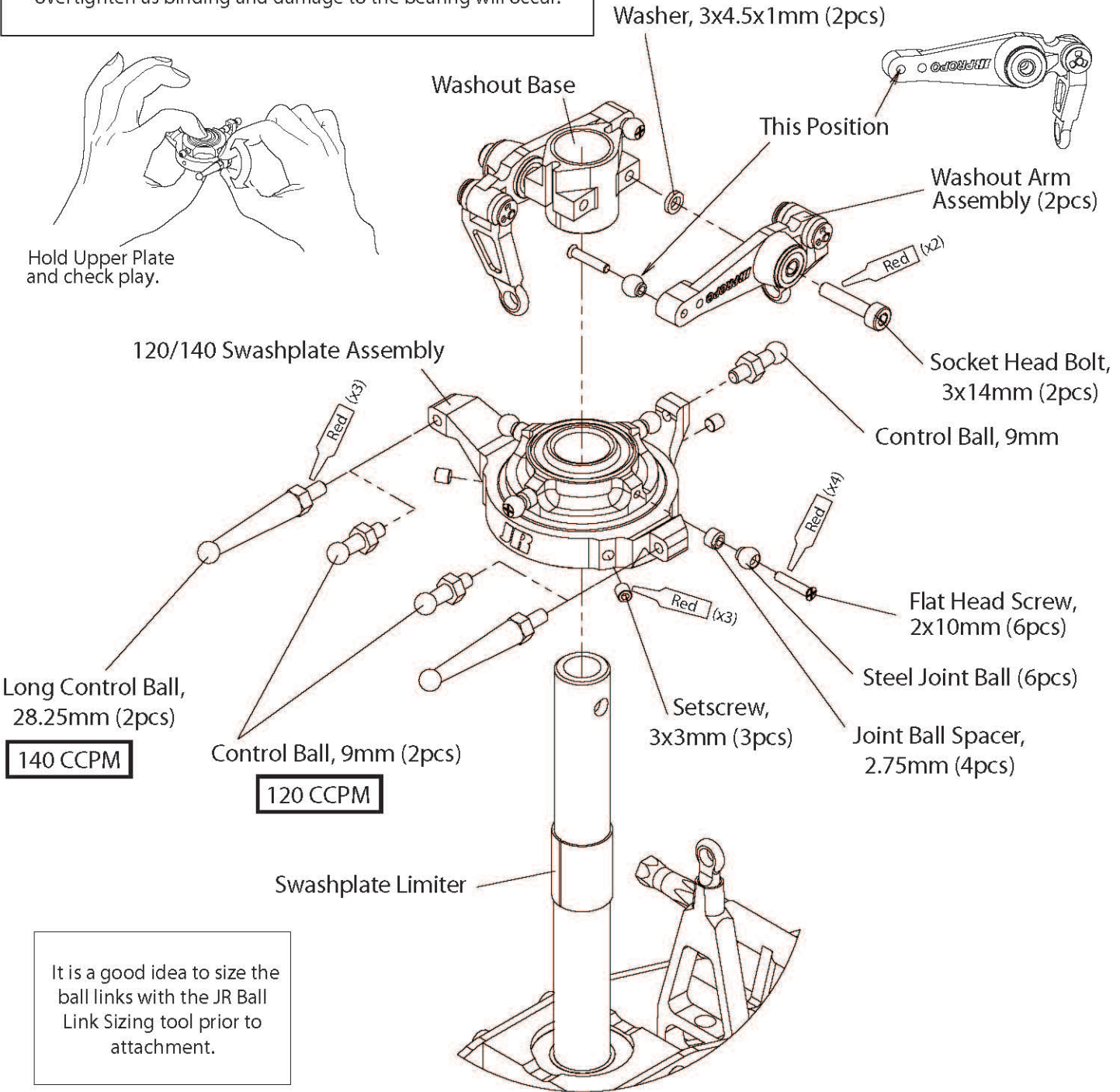
Install the long control balls for 140 CCPM or the short control balls for 120 CCPM depending on the type you will use.

Note the proper direction of the washout base. As shown in the figure below, the JR PROPO logo on the washout arm should be upside down.

If there is play between the upper and lower Swashplate, tighten Setscrew 3 x 3mm to lower the swashplate little by little. Do not overtighten as binding and damage to the bearing will occur.



Hold Upper Plate and check play.

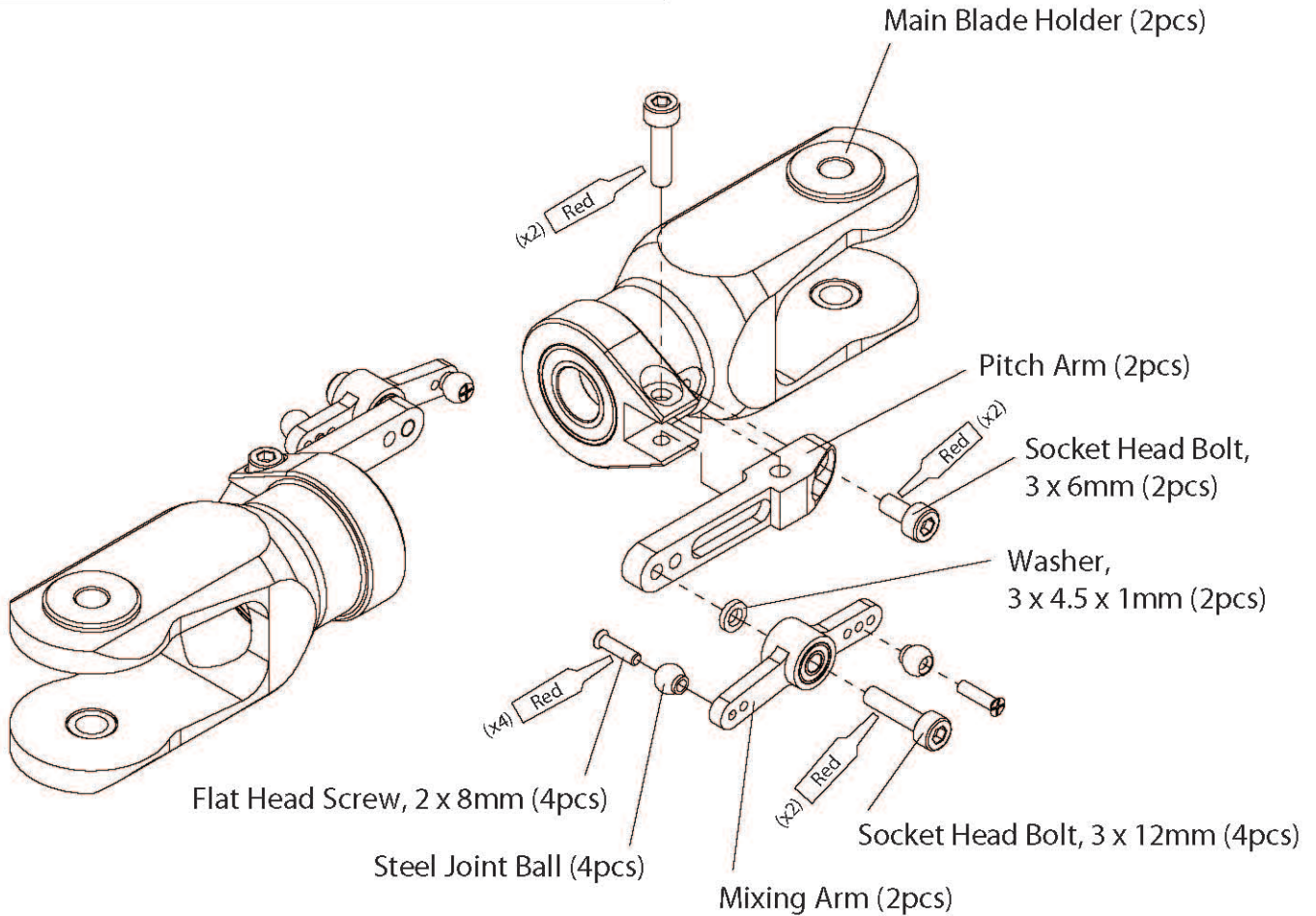


It is a good idea to size the ball links with the JR Ball Link Sizing tool prior to attachment.

4-2

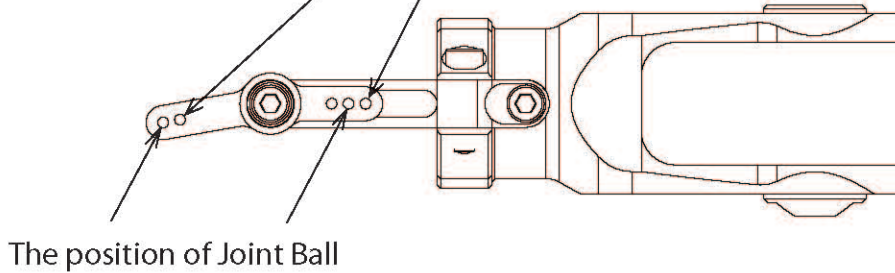
MIXING ARM INSTALLATION

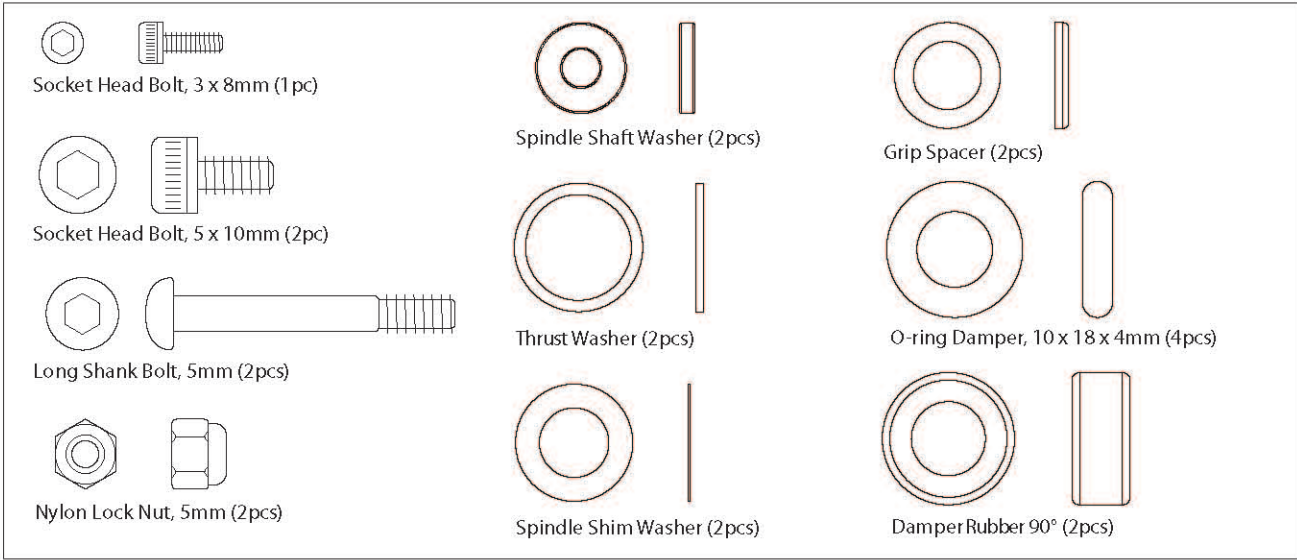
Socket Head Bolt, 3 x 6mm (2pcs)	Flat Head Screw, 2 x 8mm (4pc)
Socket Head Bolt, 3 x 12mm (4pcs)	Steel Joint Ball (4pcs)
Washer, 3 x 4.5 x 1mm (2pcs)	



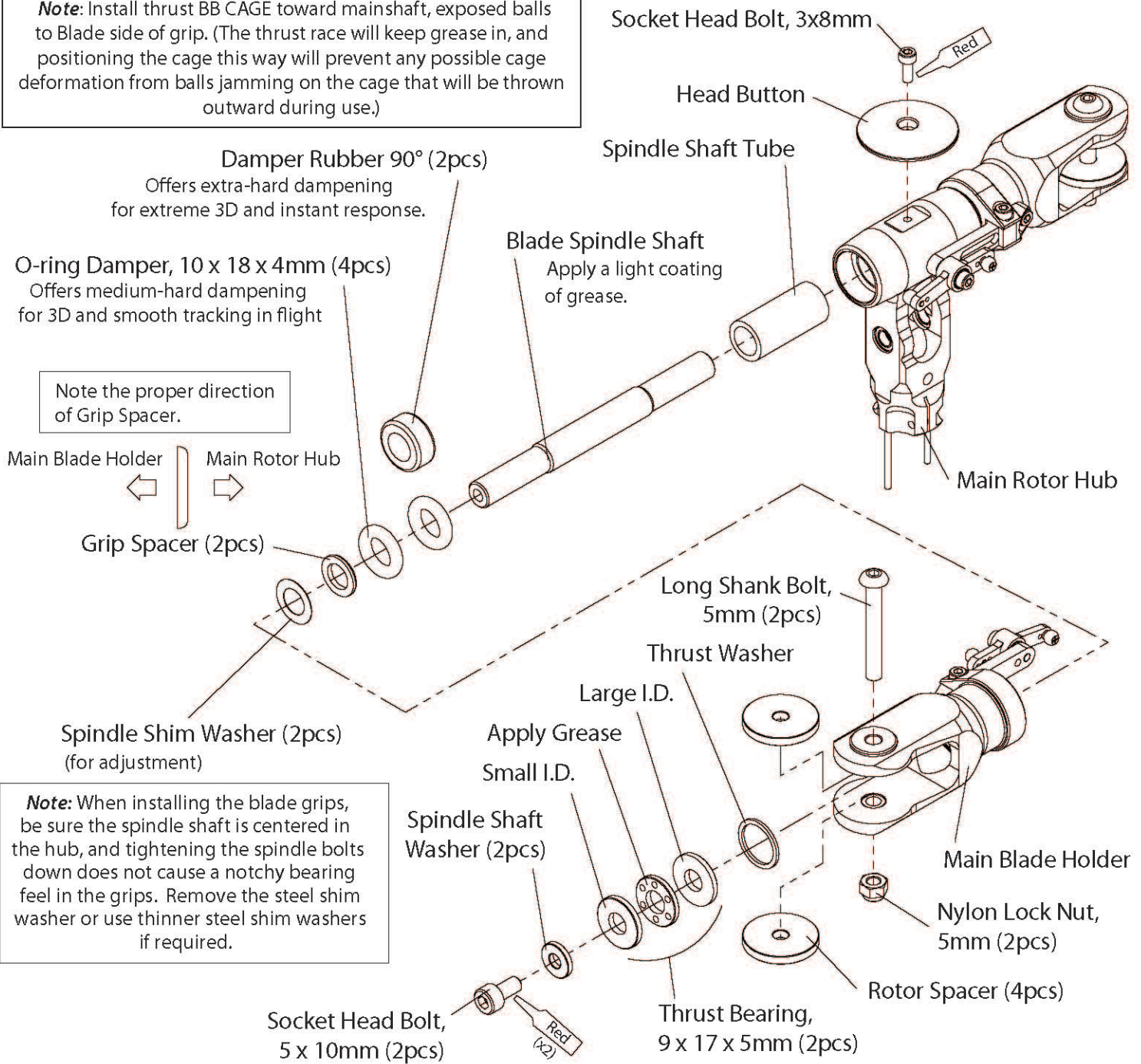
Note the proper direction of the Mixing Arm.

Optional Note: For increased cyclic response, move the steel joint ball mounting positions as shown.









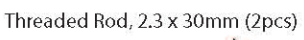


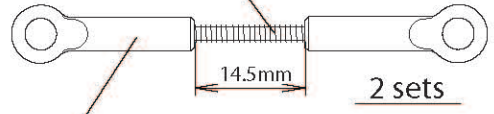


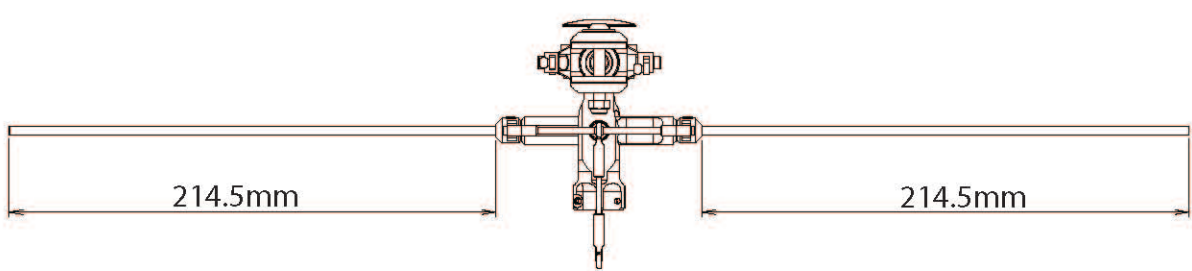
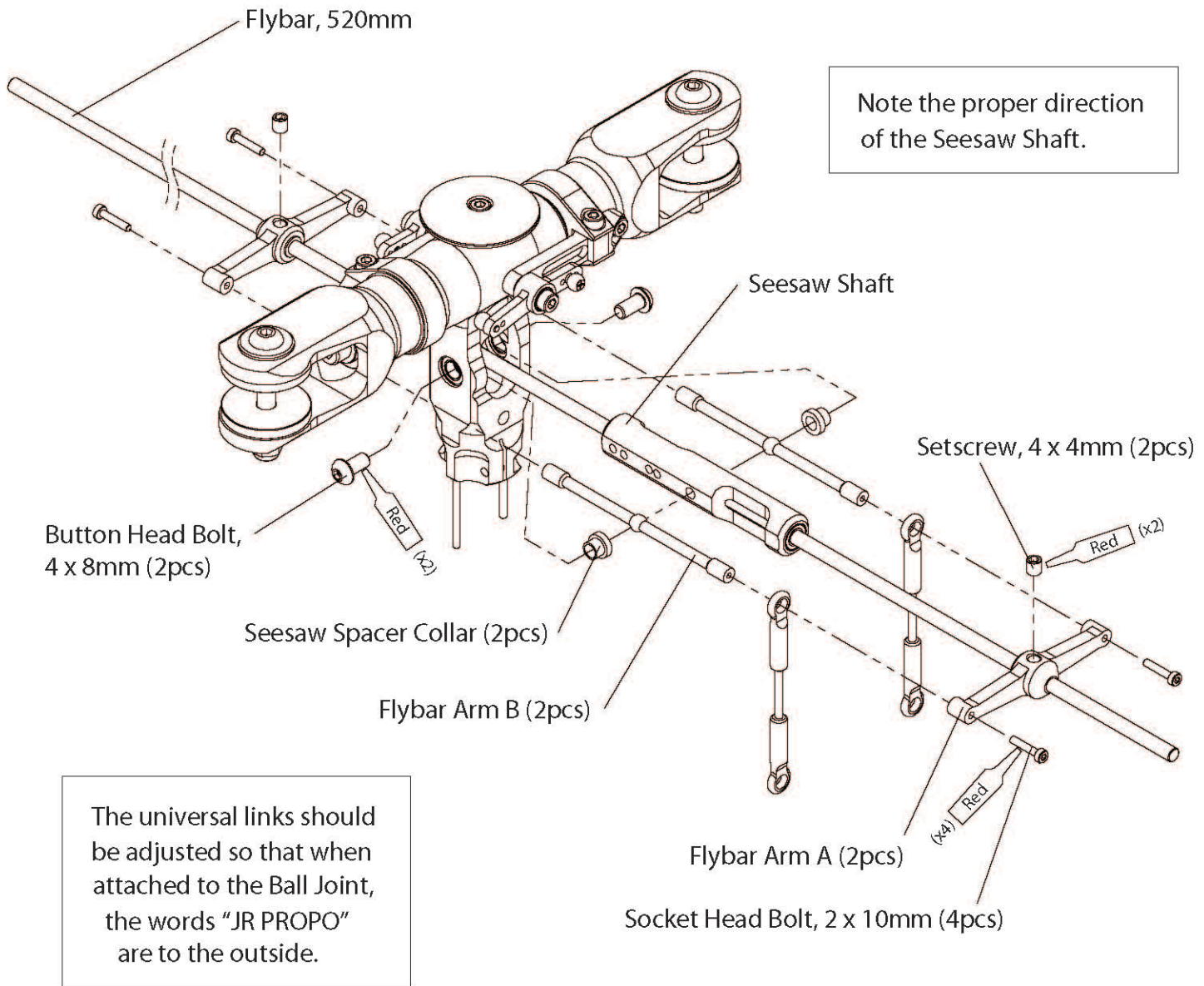
Note: Install thrust BB CAGE toward mainshaft, exposed balls to Blade side of grip. (The thrust race will keep grease in, and positioning the cage this way will prevent any possible cage deformation from balls jamming on the cage that will be thrown outward during use.)

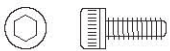


4-4

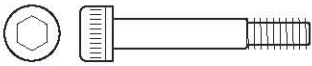
SEESAW SHAFT INSTALLATION

  Socket Head Bolt, 2 x 10mm (4pcs)	  Seesaw Spacer Collar (2pcs)
  Setscrew, 4 x 4mm (2pcs)	 Threaded Rod, 2.3 x 30mm (2pcs)
  Button Head Bolt, 4 x 8mm (2pcs)	 Universal Ball Link (4pcs) 2 sets

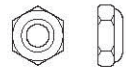




Socket Head Bolt, 3 x 8mm (2pc)



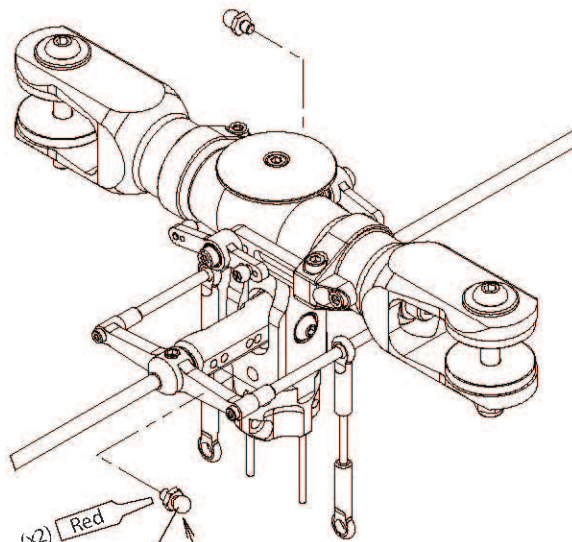
Special Socket Head Bolt, 4 x 26mm (1 pc)



Nylon Lock Nut, 4mm (1pc)



Control Ball, 4mm (2pcs)

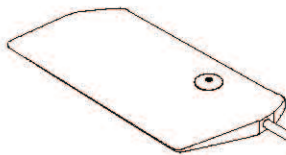


(x2) Red

Control Ball, 4mm (2pcs)

This Position

Optional Note: For increased cyclic response, move the steel joint ball mounting positions as shown.



Nylon Lock Nut, 4mm

Socket Head Bolt, 3 x 8mm (2pcs)

Be sure to engage the rotor head pins (2) into the washout base driver before securing the rotor head assembly in place.

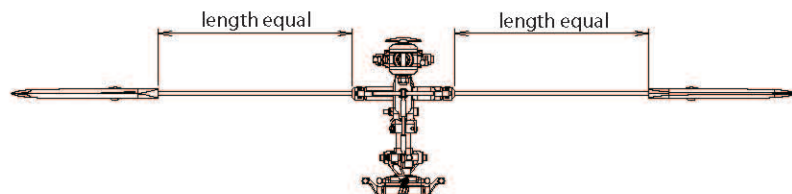
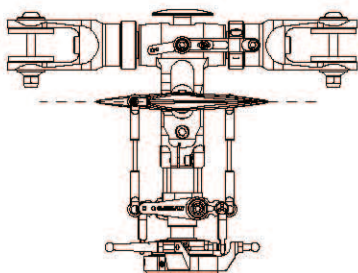
(x2) Red

Flybar Paddle (not included)

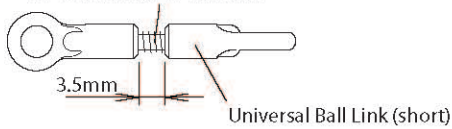
Special Socket Head Bolt, 4 x 26mm

TIP: For safety, it's important to note that a hardened bolt with a long shank should be used to attach the rotor head. We have seen many people, over time, replace these with standard bolts. This increases the chances of failures in flight.

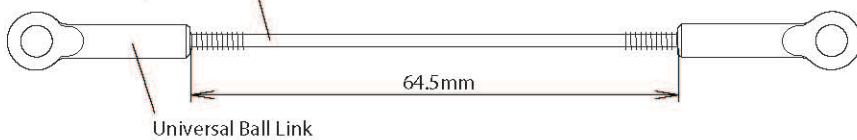
Align the flybar paddles to be even with each other and the flybar cage.



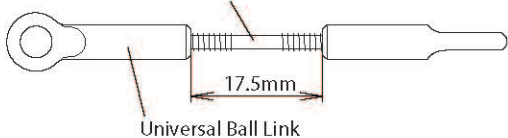
- A. MIXING ARM TO SEESAW2pcs
Threaded Rod, 2.3 x 15mm



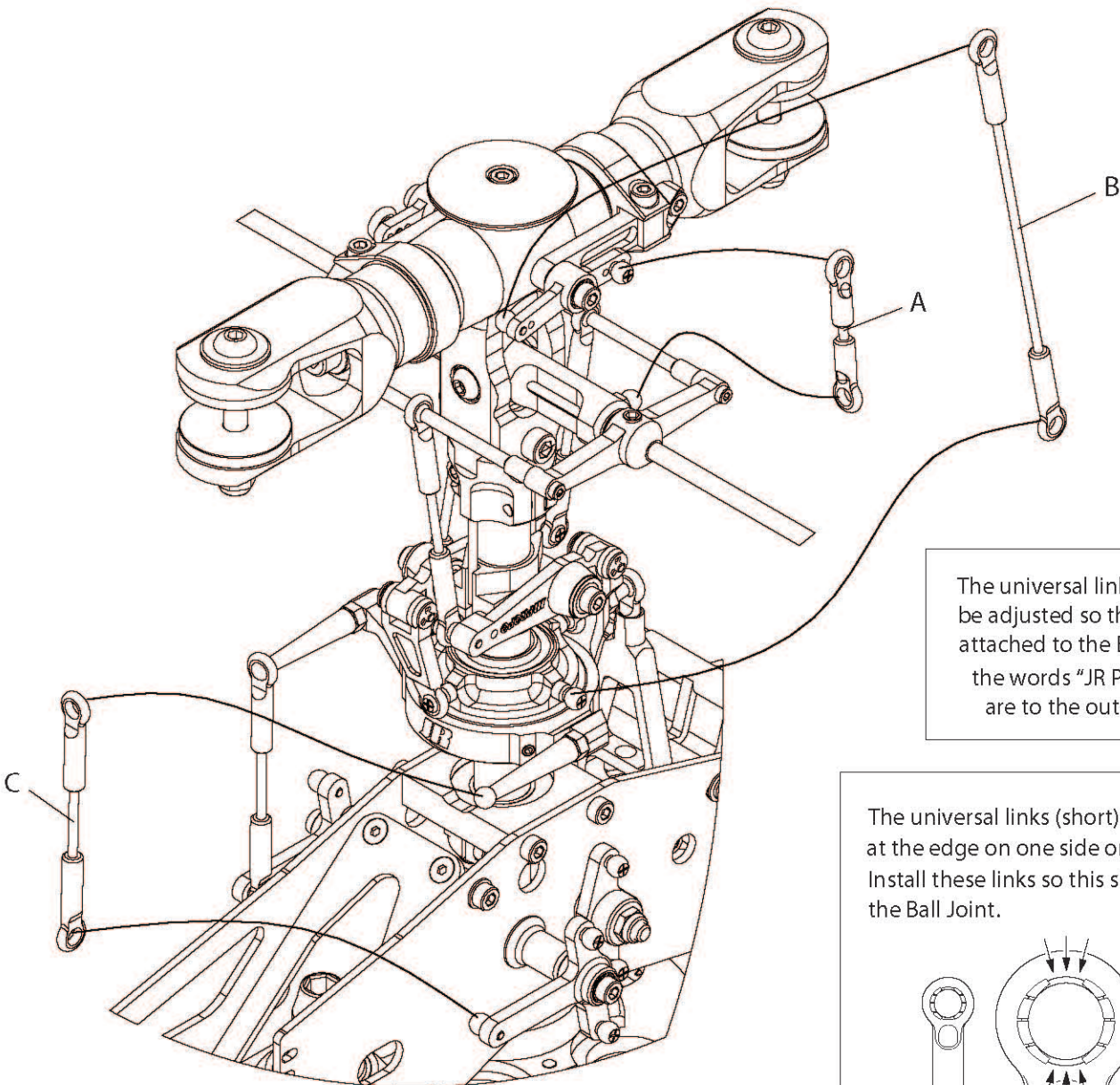
- B. MIXING ARM TO SWASHPLATE2pcs
Threaded Rod, 2.3 x 80mm



- C. SWASHPLATE TO T-ARM2pcs
Threaded Rod, 2.3 x 35mm

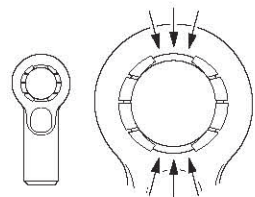


Tip: The JR Ball Links are designed with little ridges around the lip of the link. These ridges, in conjunction with the JR Ball Link Sizing Tool, are there to help you custom fit the link on the ball. If the link fits on the ball too tightly, you can use the reaming tool to enlarge the link size hole. If the link fits too loosely on the ball, you can push in on the ridges of the link with a small pair of pliers. This reduces the size of the link hole and makes the link fit tighter. JR links are some of the best links available. It is important to note that very little force is needed on the ridges to resize the link. Using pliers on any other part of the link can cause the links to break.



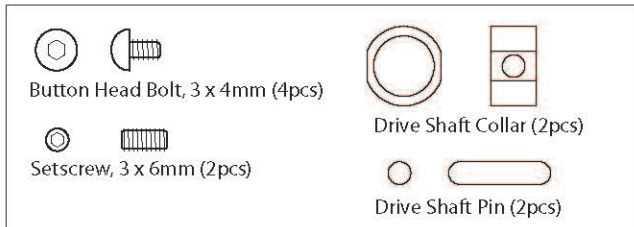
The universal links should be adjusted so that when attached to the Ball Joint, the words "JR PROPO" are to the outside.

The universal links (short) have gaps at the edge on one side only. Install these links so this side faces the Ball Joint.

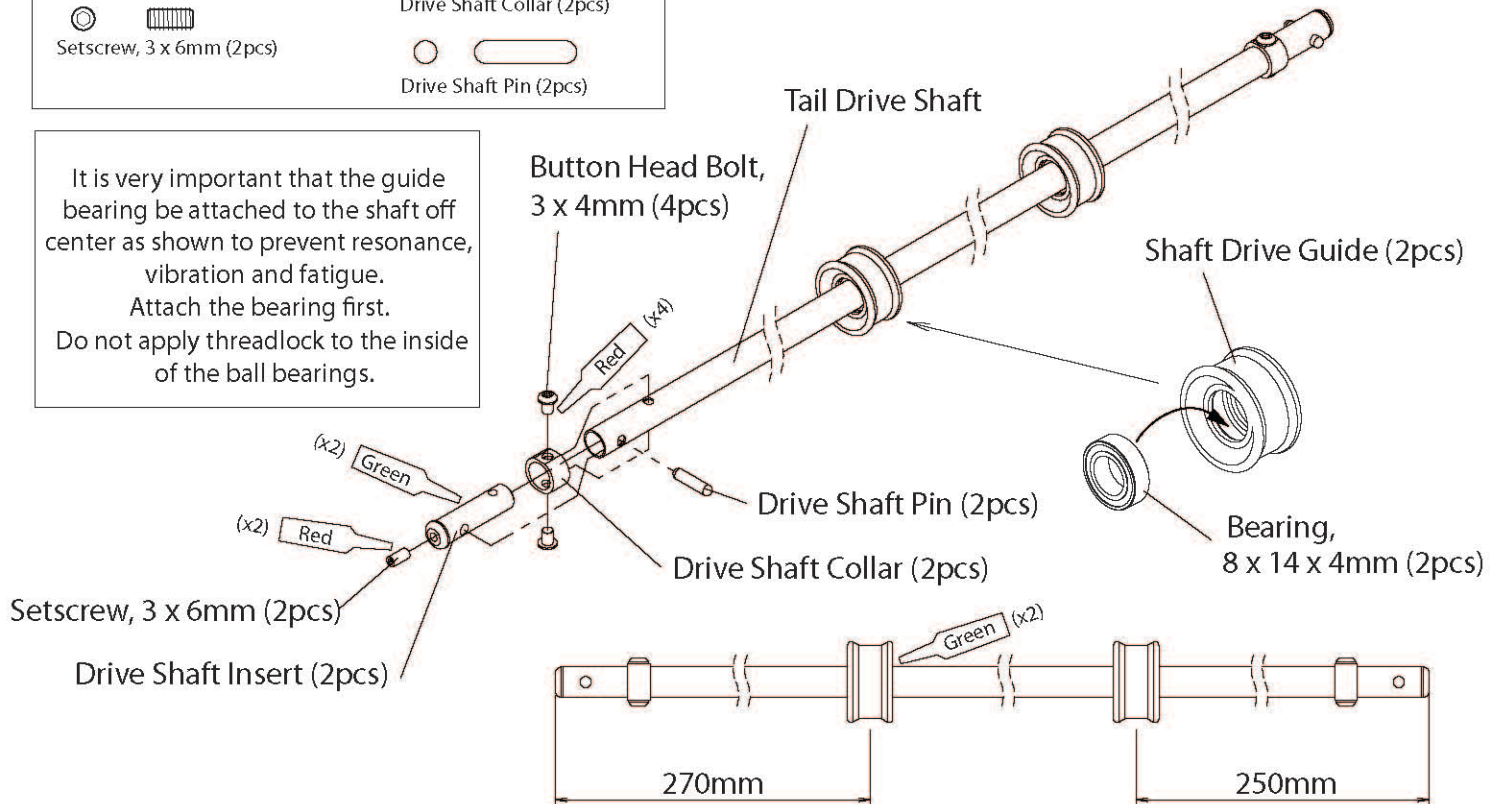


5-1

TAIL DRIVE SHAFT ASSEMBLY

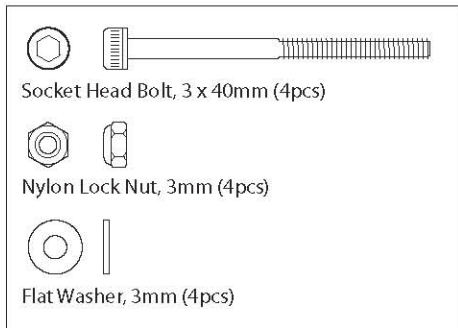


It is very important that the guide bearing be attached to the shaft off center as shown to prevent resonance, vibration and fatigue. Attach the bearing first. Do not apply threadlock to the inside of the ball bearings.

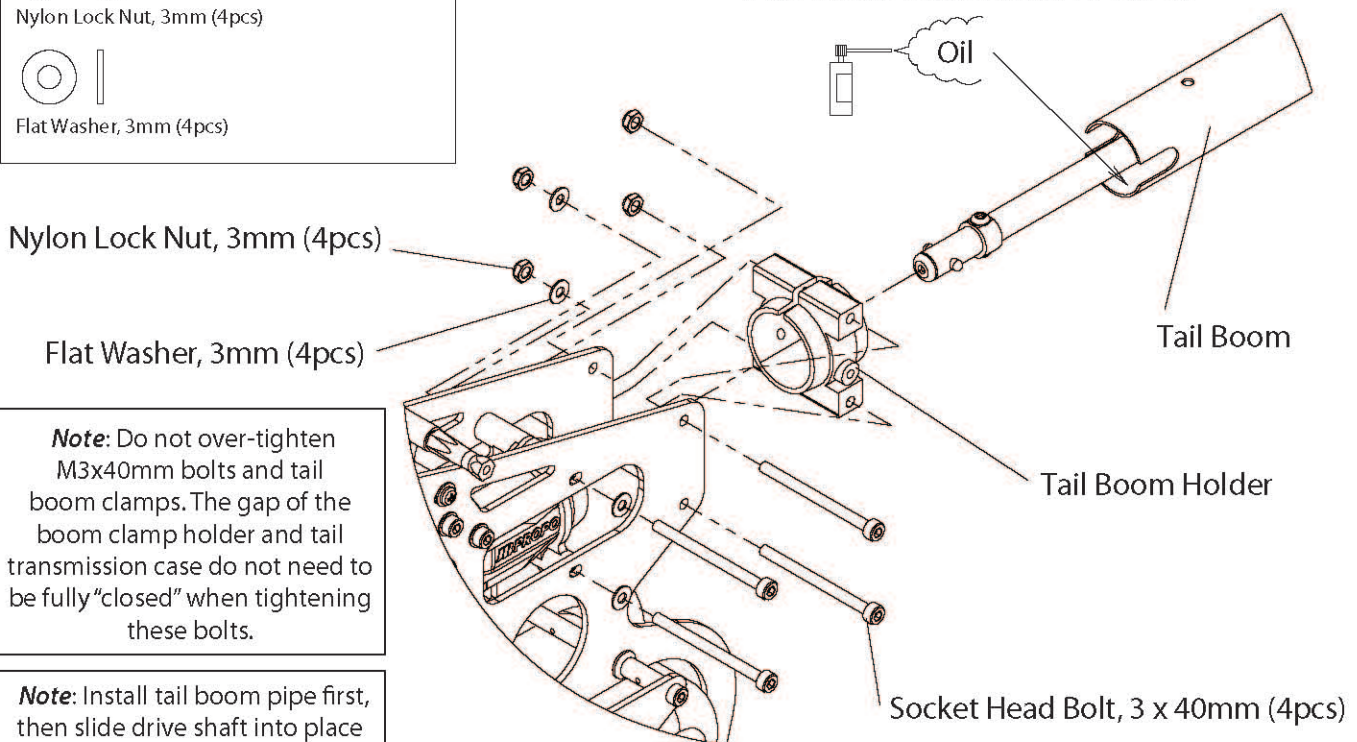


5-2

TAIL BOOM INSTALLATION

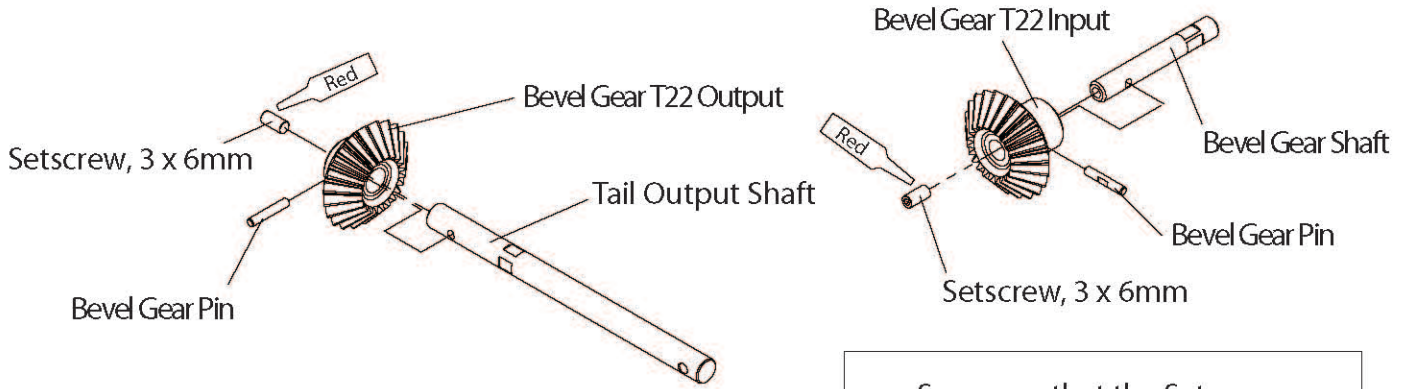
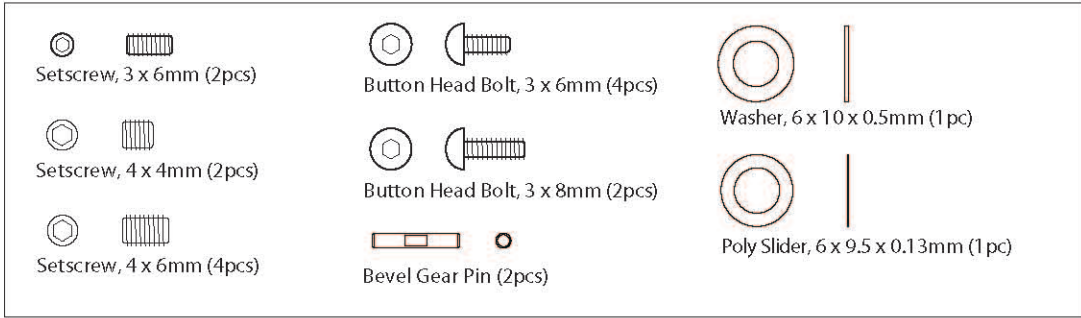


Apply oil to the inside of the Tail Boom, then install the Shaft Drive Guide.

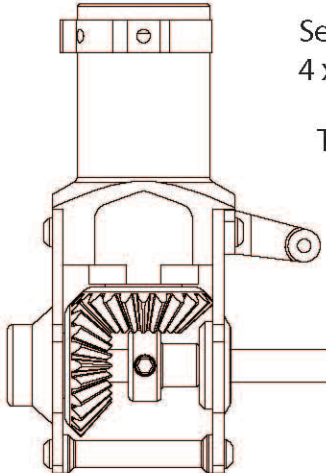
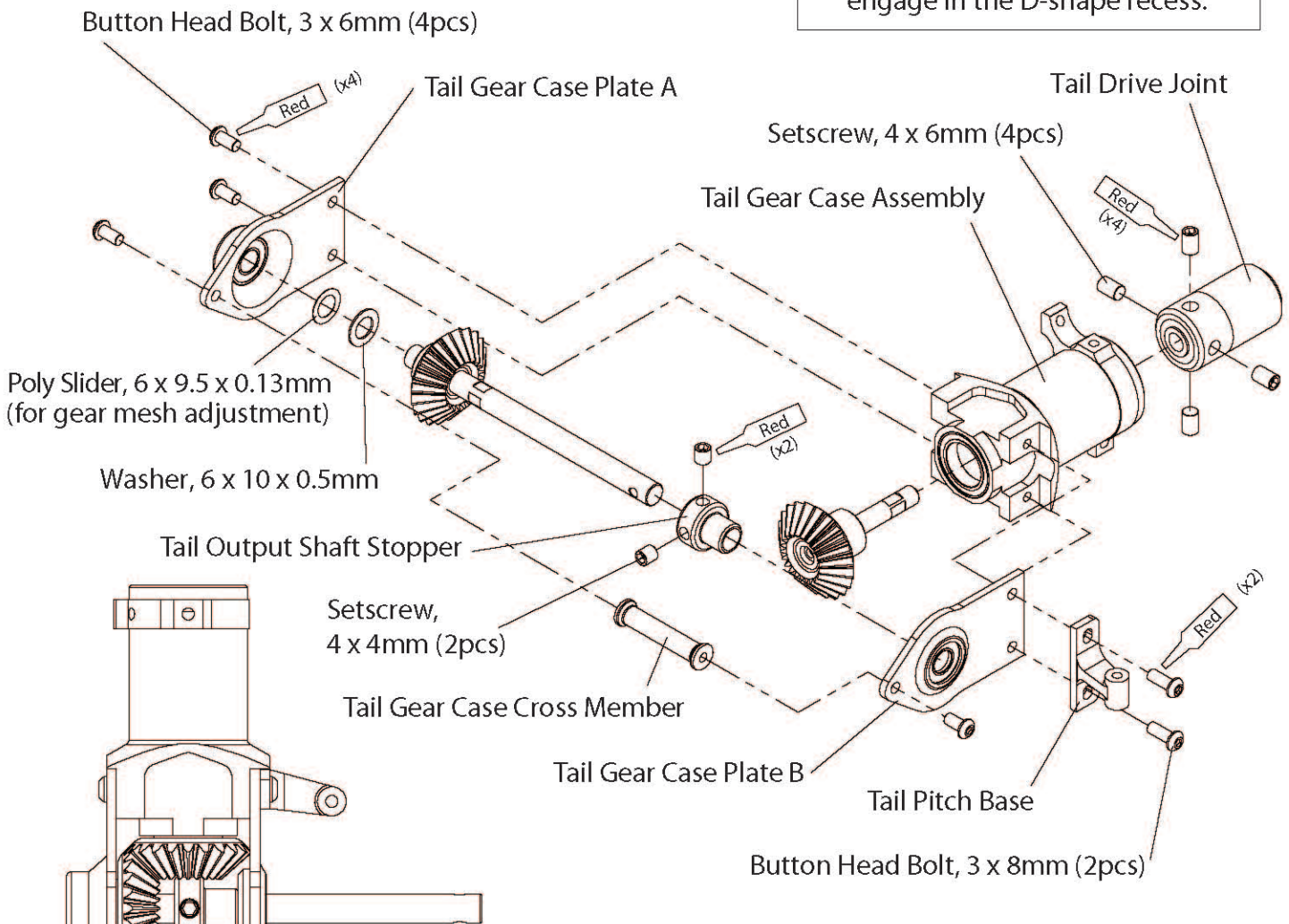


Note: Do not over-tighten M3x40mm bolts and tail boom clamps. The gap of the boom clamp holder and tail transmission case do not need to be fully "closed" when tightening these bolts.

Note: Install tail boom pipe first, then slide drive shaft into place second. Ensure torque tube engagement into the tail drive transmission output.



Secure so that the Setscrews engage in the D-shape recess.






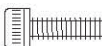




Complete Assembly

Note the proper direction of Tail Pitch Base and Tail Gear Case Plate.

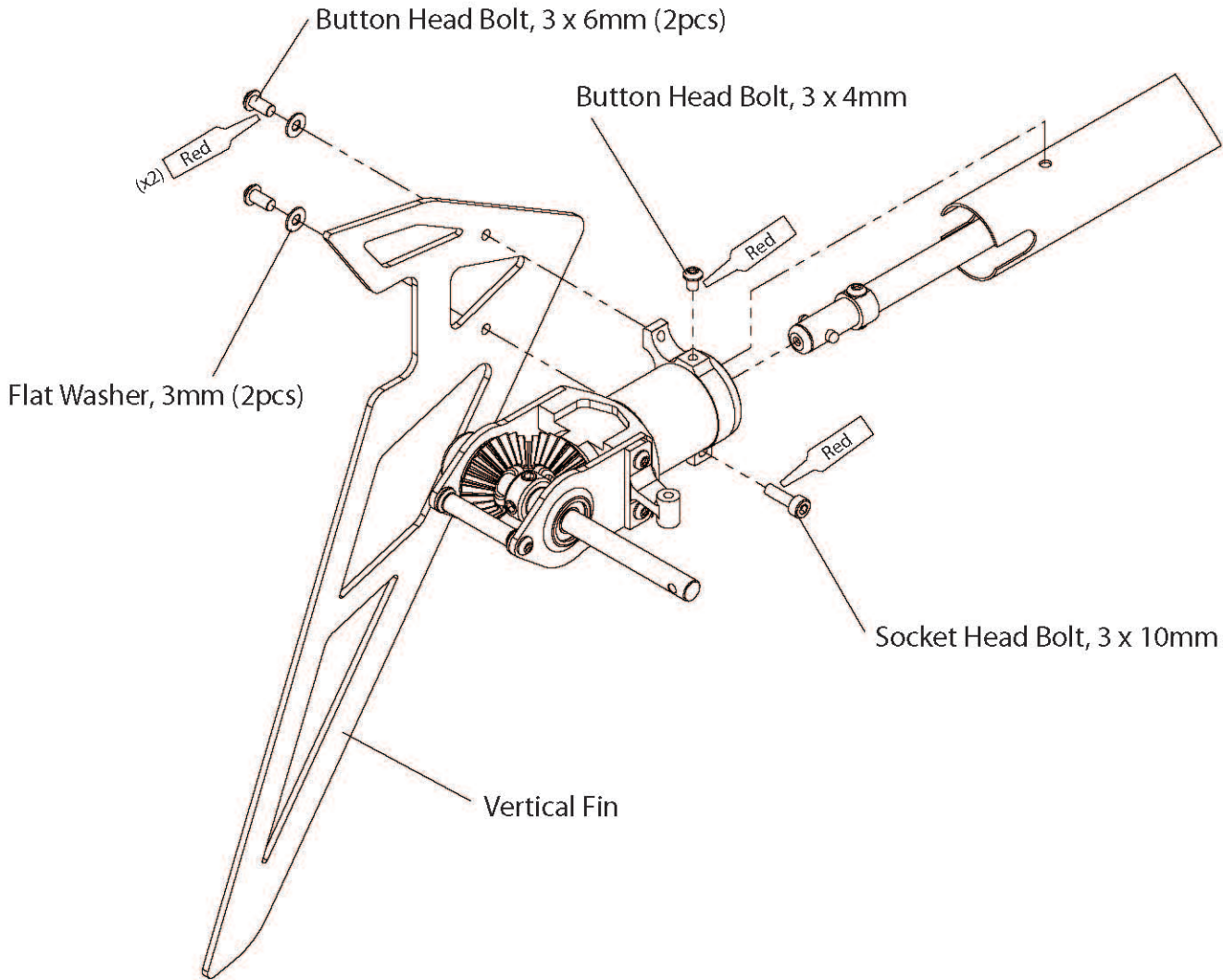
Note: Finally tighten the Tail Output Shaft Stopper setscrews after assembly is complete to remove and allow free play of the output shaft.

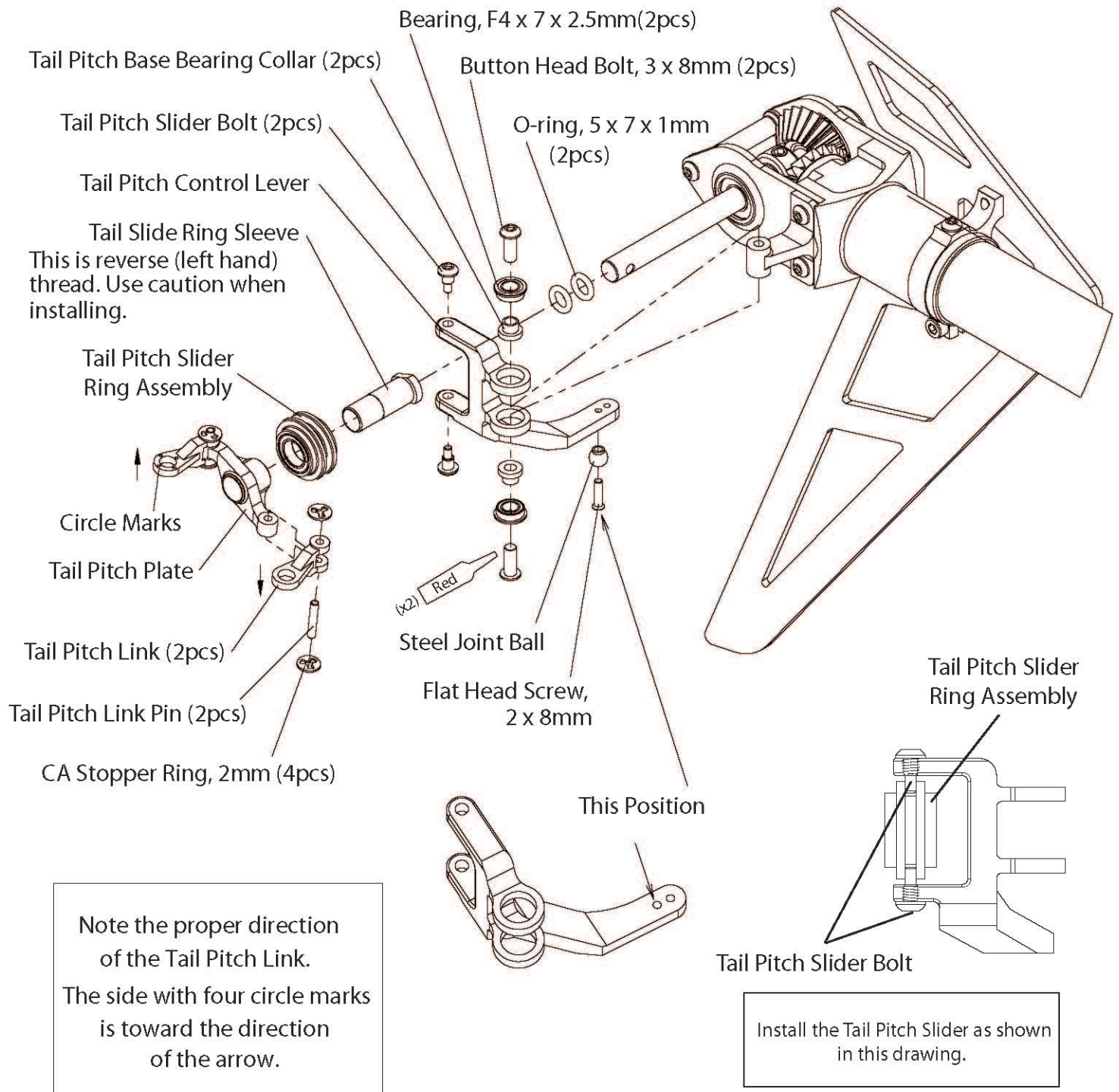
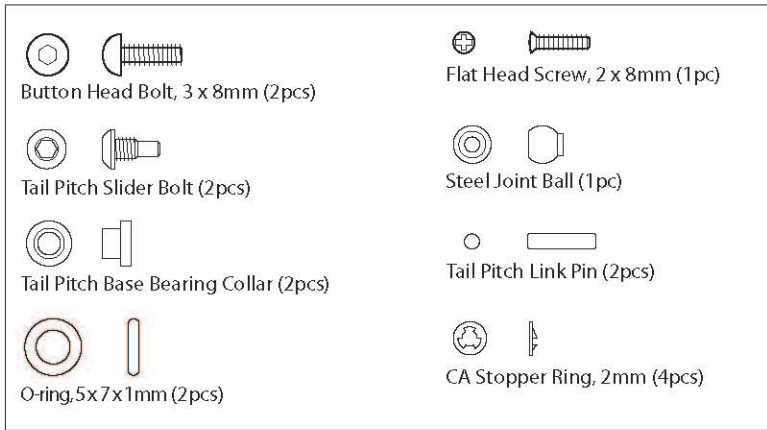
5-4

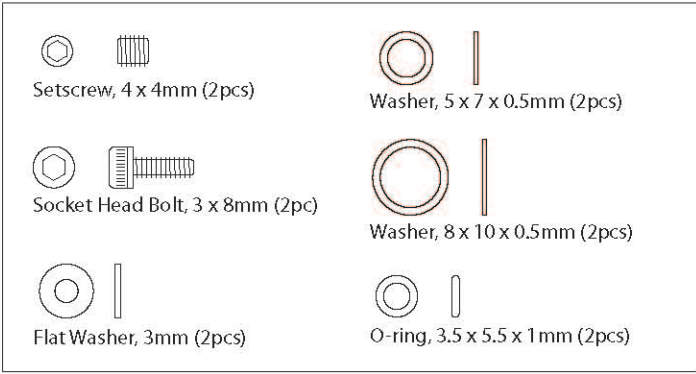
TAIL GEAR CASE INSTALLATION 2

-  
Button Head Bolt, 3 x 6mm (2pcs)
-  
Socket Head Bolt, 3 x 10mm (1pc)
-  
Button Head Bolt, 3 x 4mm (1pc)
-  
Flat Washer, 3mm (2pcs)

Position the vertical fin so that it is perpendicular to the building surface (parallel with the main rotor shaft) and tighten the tail gear case clamp bolt from the previous step. Do not over-tighten and deform the clamp.

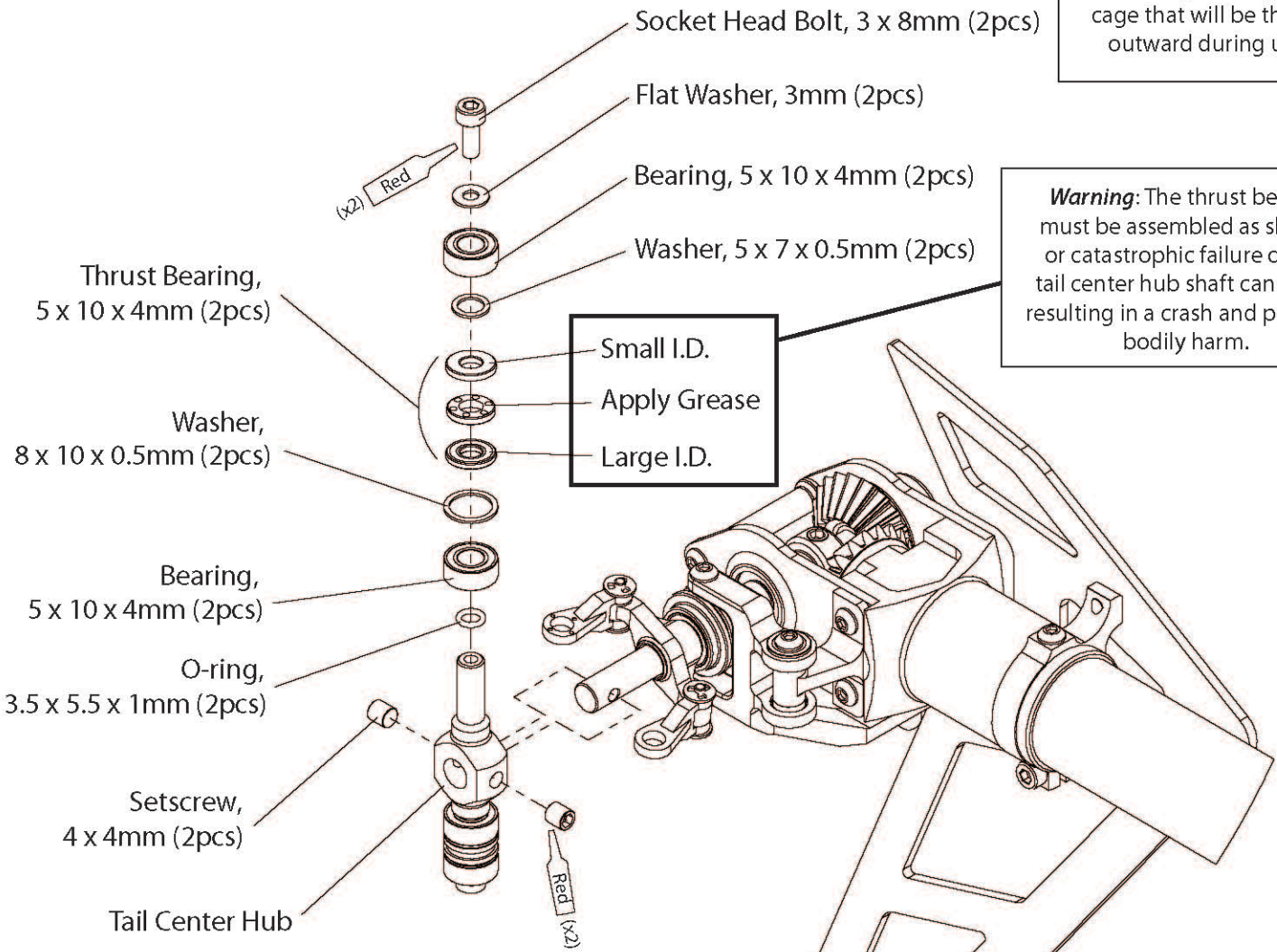






TIP: Use thin oil on the tail shaft to lubricate the tail pitch slider. Also apply grease to the tail thrust bearings.

Note: Install thrust BB CAGE toward the center of the tail center hub, exposed balls to Blade side of grip. (The thrust race will keep grease in, and positioning the cage this way will prevent any possible cage deformation from balls jamming on the cage that will be thrown outward during use.)



Warning: The thrust bearing must be assembled as shown or catastrophic failure of the tail center hub shaft can occur resulting in a crash and possible bodily harm.

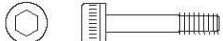
Slide the tail slide ring assembly on the tail output shaft before installation of the tail rotor hub. When attaching the tail rotor hub, be certain that the setscrews (4x4mm) engage into the holes at the end of the tail output shaft. Check to make sure the tail blade holder bearings can rotate freely, without play.



Socket Head Bolt, 2 x 10mm (8pcs)



Nylon Lock Nut, 2mm (8pcs)



Special Socket Head Bolt, 3 x 15mm (2pcs)



Nylon Lock Nut, 3mm (2pcs)



Flat Head Bolt, 2 x 10mm (2pcs)



Steel Joint Ball (2pcs)

Rotation direction:
Be sure to note the
correct direction of
the tail rotor blades
during assembly.

Tail Rotor Blade
(not included)

Flat Head Bolt, 2 x 10mm (2pcs)

Steel Joint Ball (2pcs)

Socket Head Bolt,
2 x 10mm (8pcs)

Special Socket Head Bolt,
3 x 15mm (2pcs)

Tail Blade Holder with Arm (2pcs)

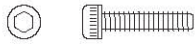
Tail Blade Holder (2pcs)

Nylon Lock Nut,
2mm (8pcs)

Nylon Lock Nut,
3mm (2pcs)

5-8

TAIL BOOM BRACE ASSEMBLY



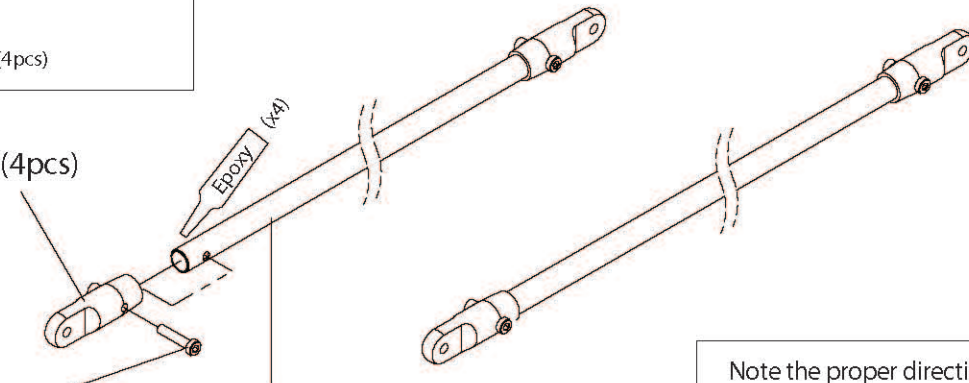
Socket Head Bolt, 2.6 x 12mm (4pcs)

Tail Brace Connector (4pcs)

Socket Head Bolt,
2.6 x 12mm (4pcs)

Tail Brace Tube (2pcs)

Note the proper direction
of the Tail Brace Connectors.



5-9

TAIL BOOM BRACE INSTALLATION



Socket Head Bolt, 3 x 8mm (2pcs)



Button Head Bolt, 3 x 6mm (2pcs)



Socket Head Bolt, 3 x 10mm (2pcs)



Nylon Lock Nut, 3mm (2pcs)

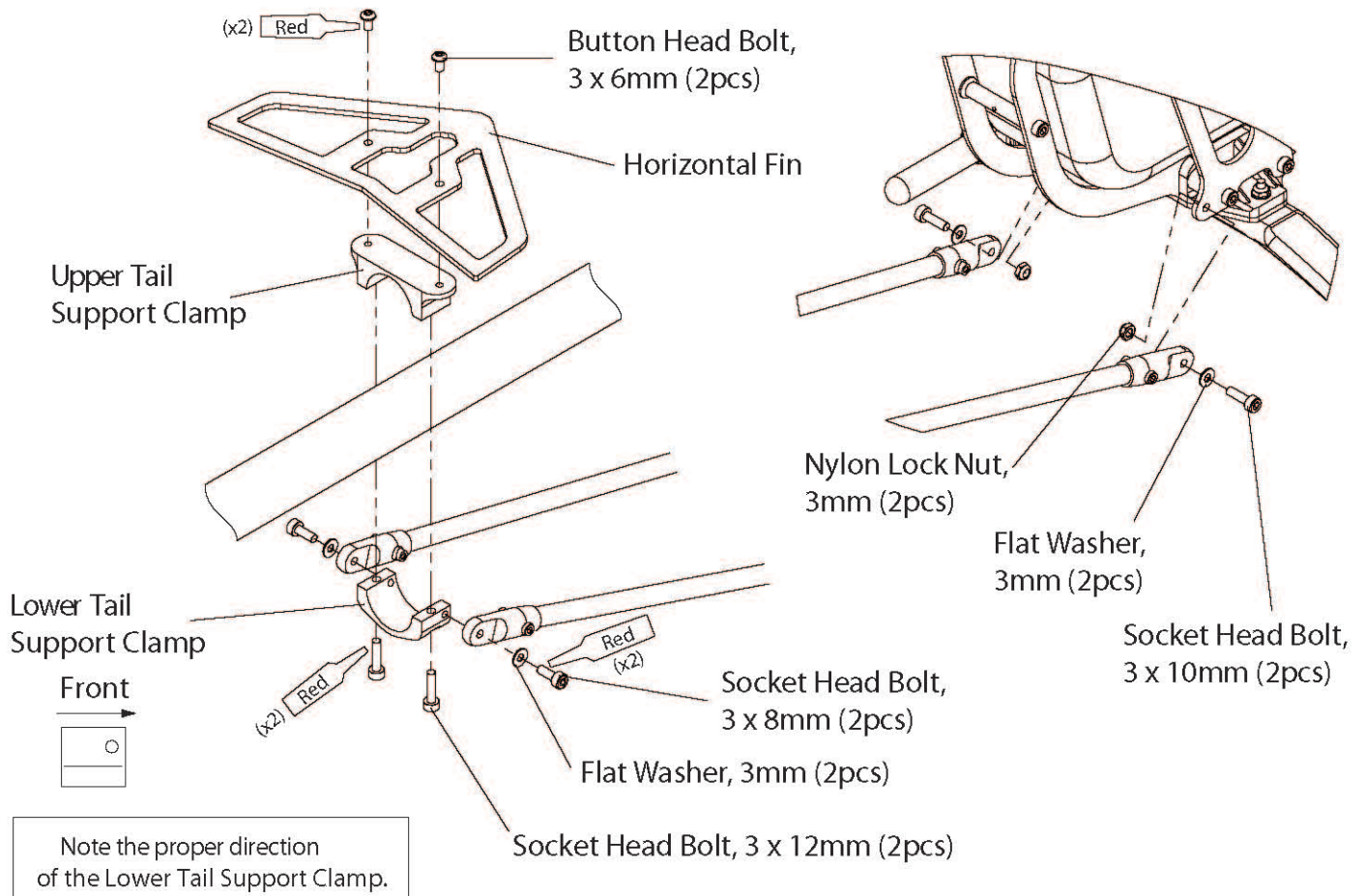










Socket Head Bolt, 3 x 12mm (2pcs)

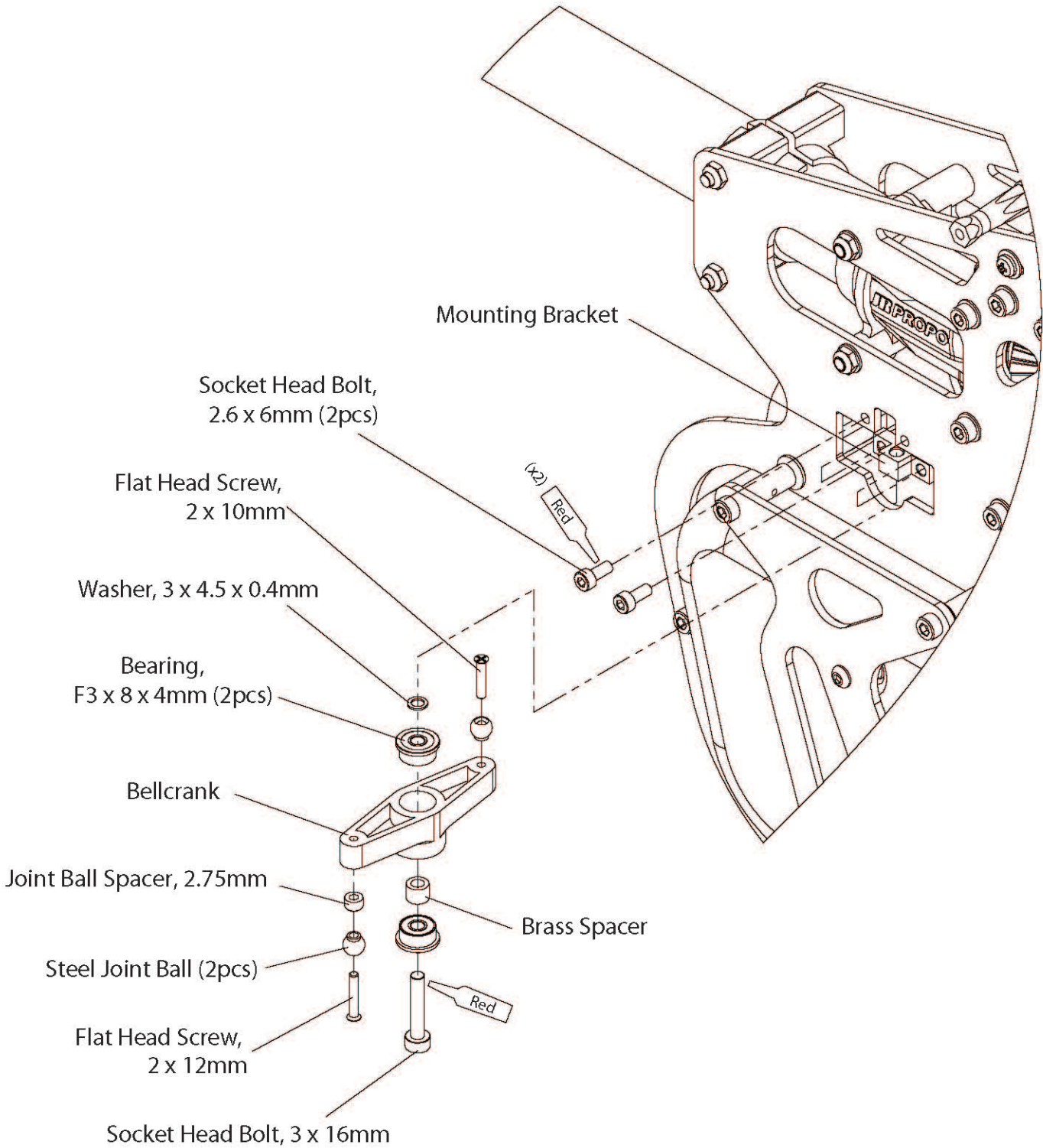


Flat Washer, 3mm (4pcs)

Position the horizontal fin so that it is
level to the building surface (90 degrees
to the main rotor shaft) and tighten the
two Tail Support Clamp Bolts.


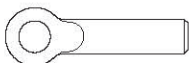


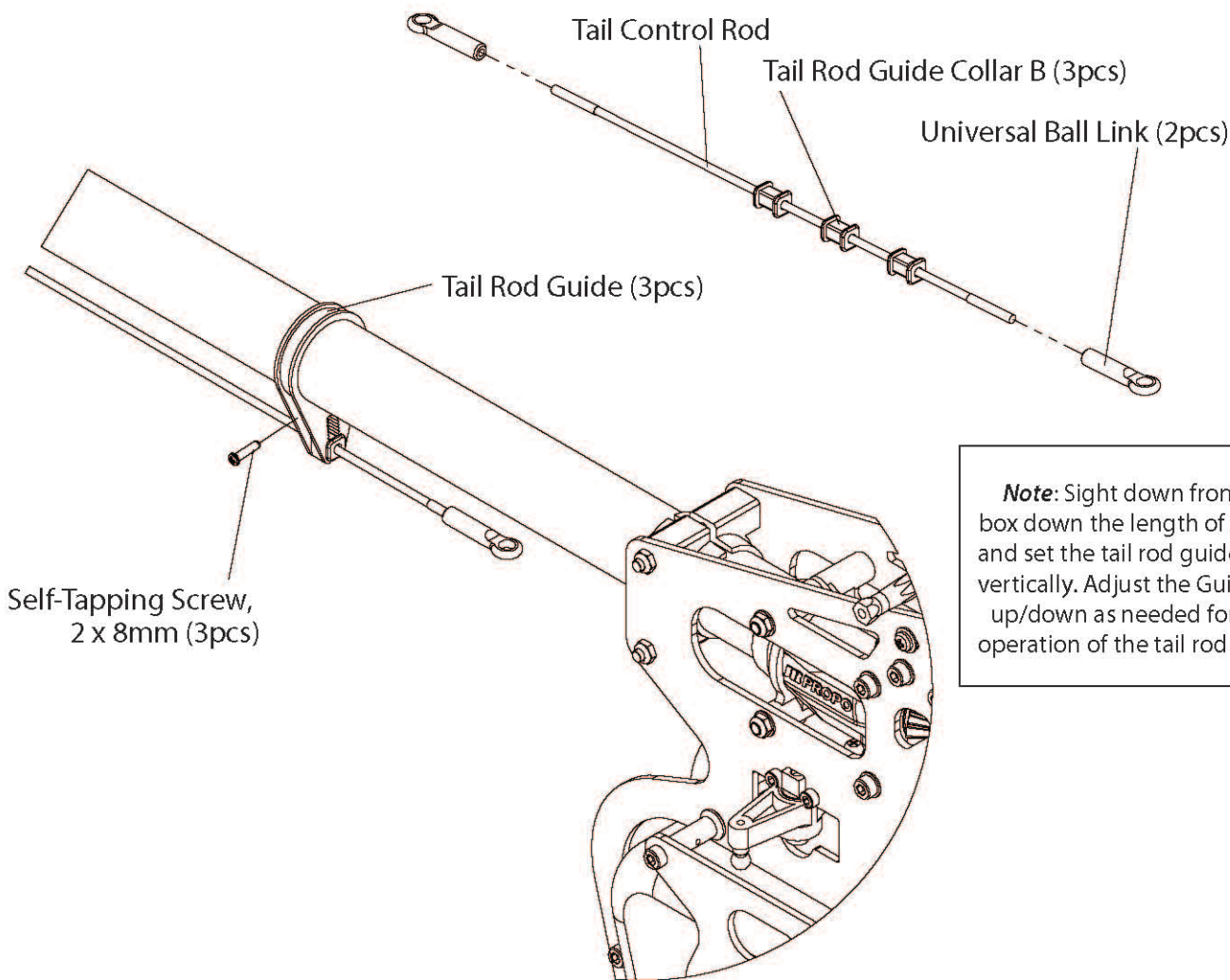
	
Socket Head Bolt, 2.6 x 6mm (2pcs)	Steel Joint Ball (2pcs)
	
Socket Head Bolt, 3 x 16mm (1pc)	Joint Ball Spacer, 2.75mm (1pc)
	
Flat Head Screw, 2 x 10mm (1pc)	Washer, 3 x 4.5 x 0.4mm (1pc)
	
Flat Head Screw, 2 x 12mm (1pc)	Brass Spacer (1pc)



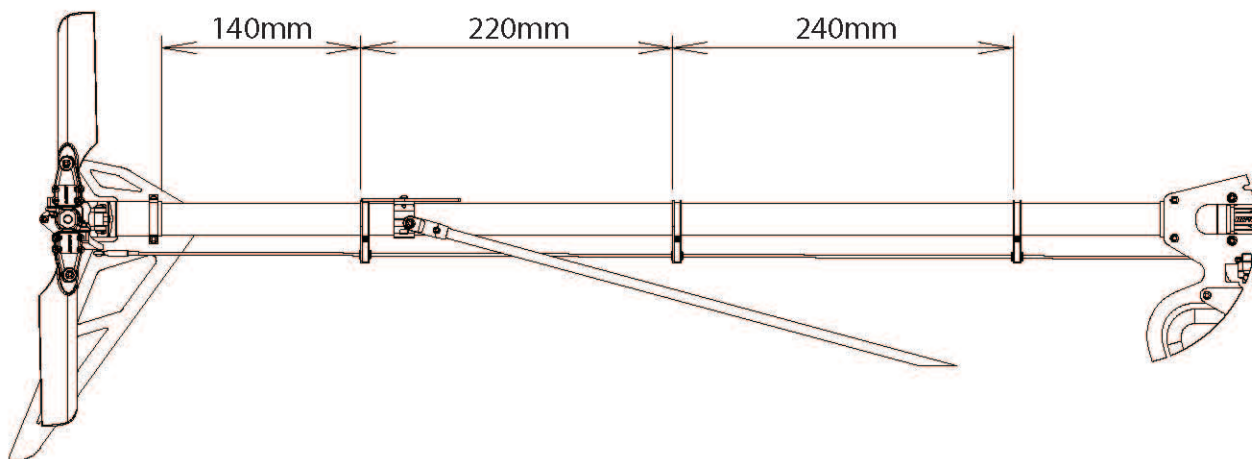
 
Self-Tapping Screw, 2 x 8mm (3pcs)

 
Tail Rod Collar Guide B (3pcs)

 
Universal Ball Link (2pcs)



Note: Sight down from the tail box down the length of the boom and set the tail rod guides to align vertically. Adjust the Guide Collars up/down as needed for smooth operation of the tail rod assembly.



RADIO SYSTEM PREPARATION

The following preparations are suggested for use with JR PROPO® radio systems. However, these procedures are applicable to most other brand radio systems. These suggested adjustments are necessary to ensure correct installation and attachment of the control linkages and servo horns.

TRANSMITTER PREPARATION

1. Set all trim levers, knobs, and switches to the neutral or zero positions.
2. Turn the transmitter power switch to the "On" position.
3. Reset all functions and input values of your computer radio system to the factory preset position.
4. Move the throttle/collective control stick to the center or half stick position. Next slide the throttle trim lever to the full low position.

RECEIVER FLIGHT PACK PREPARATION

1. With the transmitter still on, slide the receiver switch to its "On" position. All servos should move to the neutral or center position.
2. Check that all servos operate with the appropriate control stick.
3. Reset the throttle stick to the center position, making sure the throttle trim is still at low.
4. Turn off the receiver switch first, followed by the transmitter. For proper operation, it's important that the servo horns are positioned on the servos in the "exact" neutral position. Although most computer radio systems offer a sub-trim feature, it is suggested that the servo horns be manipulated on the servos to achieve the "exact" neutral settings.

SERVO HORN INSTALLATION SUGGESTIONS

Since the servo output spline on a JR system has an odd number of teeth (23), it's possible to reposition the servo arm on the servo at 90° intervals to achieve the proper neutral attachment of the servo horn.

Once the correct arm of the servo horn has been established, it's suggested that the remaining unused arms be removed from the servo horn as shown in the installation diagrams in the following section.

It will also be necessary to enlarge the appropriate hole in the servo horn slightly to allow correct installation of the steel control balls to the servo horn.

120/140 3-SERVO CCPM SWASHPLATE MIXING

The JR 120°/140° CCPM or Cyclic Collective Pitch Mixing system offers the user a control system that can accomplish the same control inputs as a one-servo standard system, but with increased precision and reduced complexity.

As with the one servo system, the JR CCPM system utilizes three servos for the three main controls: aileron (roll), elevator (pitch), and collective. The CCPM lower swashplate ring is designed with only three control balls, spaced at 120° or 140° from each other, hence the 120°/140° CCPM designation. Although the control balls are not at 90° as in the standard system, the aileron (roll) axis is still parallel to the main mechanics of the helicopter, and the elevator (pitch) axis still functions at 90° to the mechanics as does the one-servo system.

The main difference in the way that these two systems operate is that unlike the one servo system where the three servos work completely independently from each other, the CCPM systems work as a team to achieve the same control inputs. For example, if an aileron (roll) input is given, two servos work together to move the swashplate left and right. If an elevator (pitch) input is given, all three servos work together to move the swashplate fore and aft. For collective, it's also the strength of three servos that will move the swashplate up and down the main rotor shaft. With two or three servos working at the same time during any given control input, servo torque is maximized and servo centering is also increased. In addition to these benefits, CCPM achieves these control responses without the need for complex mechanical mixing systems that require many more control rods and parts to set up.

This amazing CCPM control is achieved through special CCPM swashplate mixing that is preprogrammed into many of today's popular radio systems. Since the 120° and 140° CCPM function is preprogrammed, CCPM is no more complicated to set up than a conventional one-servo standard system. When you factor in the reduced parts count and easy programming, CCPM is actually easier to set up and operate than many conventional systems.

For JR PROPO® radio owners, please refer to the radio information contained at the front of this manual or on the following pages to determine if your radio system has the CCPM function. For other brands of radio systems, please contact the radio manufacturer for CCPM information. Please note that it is not possible to program a non-CCPM radio system for CCPM operation.

UNDERSTANDING CCPM CONTROL SYSTEMS

The JR 120°/140° three servo CCPM relies on the radio's special CCPM swashplate mixing, rather than a conventional mechanical mixer that is utilized to achieve the same results.

The radio's 120° or 140° 3-servo CCPM function automatically mixes the three servos to provide the correct mixing inputs for aileron (roll), elevator (pitch), and collective. The following is an example of how each control input affects the servo's movement.

1. COLLECTIVE

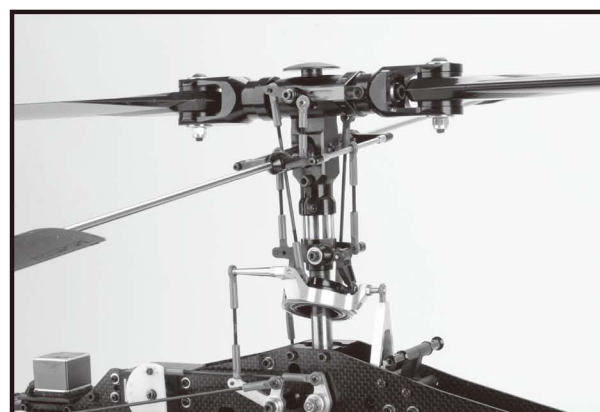
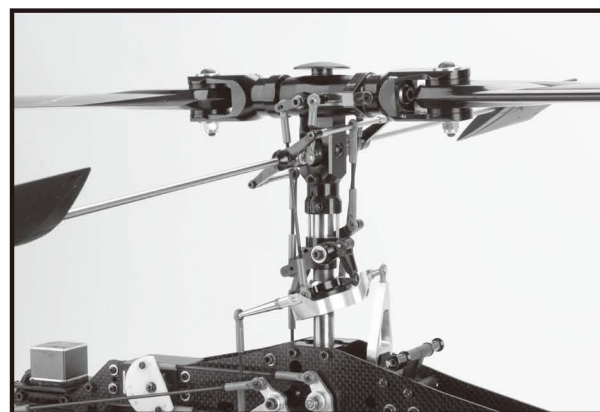
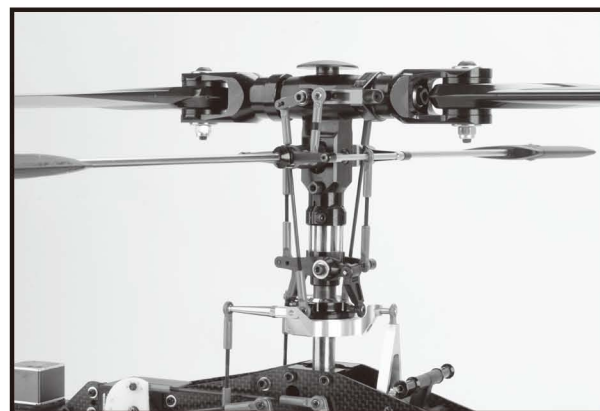
When a collective pitch input is given, all three servos move together in the same direction, at equal amounts, to raise and lower the swashplate while keeping the swashplate level. During this function, all three servos travel at the same value (100%) so that the swashplate can remain level during the increase and decrease in pitch. As mentioned, this mixing of the three servos is achieved through the radio's CCPM program.

2. ELEVATOR (PITCH)

When an elevator input is given, all three servos must move to tilt the swashplate fore and aft, but their directions vary. The servos move together in the same direction, while the rear swashplate servo moves in the opposite direction. For example, when a down elevator (forward cyclic) command is given, the front swashplate servos will move the swashplate down, while the rear swashplate servo moves so that the swashplate will tilt forward. During this function with 120° CCPM, the rear swashplate servo travels at 100%, while the front swashplate servos travel at 50% (1/2 the travel value). This difference in travel is necessary due to the fact that the position of the 120 CCPM rear control ball is two times the distance of the two front control ball positions as measured from the center of the swashplate. With 140° CCPM selected, all three servos travel at 100%, eliminating elevator trim changes during quick collective inputs.

3. AILERON (ROLL)

When an aileron (roll) input is given, the front swashplate servos travel in opposite directions, while the rear swashplate servo remains motionless, such as, when a right aileron command is given.



IMPORTANT CCPM PROGRAMMING DO'S AND DON'TS

A. TRAVEL ADJUST

It is extremely important that the travel adjustment values for the three CCPM servos (aileron, elevator and Aux1) be initially set to exactly the same travel value. If the travel value is not similar for each servo, it will create unwanted pitching and rolling of the swashplate during collective pitch inputs. The travel values for each servo will be adjusted in the final radio setup to remove any minor pitch and roll coupling during pitch, roll and collective movements.

Minor travel value adjustments are necessary due to slight variations in servo travel and centering. Although the three servos may appear to travel at the same amounts in each direction, in reality the servos can vary slightly. This variation is more common in analog-type servos. If JR's new digital servos are used, the travel adjustment values will generally not need to be altered.

B. SERVO REVERSING

It is also extremely important that the servo reversing directions for the three CCPM servos (aileron, elevator, Aux 1) be set as indicated in the upcoming radio programming steps. If one or more servos is not set to the correct direction, the CCPM function will be out of synchronization, and the three control functions (Aileron, Elevator, Collective) will not move properly. In the event that a control surface is working in the wrong direction, the control function can only be reversed by changing the desired CCPM value for that function from a (+) to a (-) value or vice versa.

Example: *If when you increase the collective pitch, the pitch of the main blades actually decreases, it will be necessary to access the CCPM function and change the travel value for this function from (+) to (-), or (-) to (+). This will reverse the direction of the collective pitch function without affecting the movement of the aileron and elevator functions.*

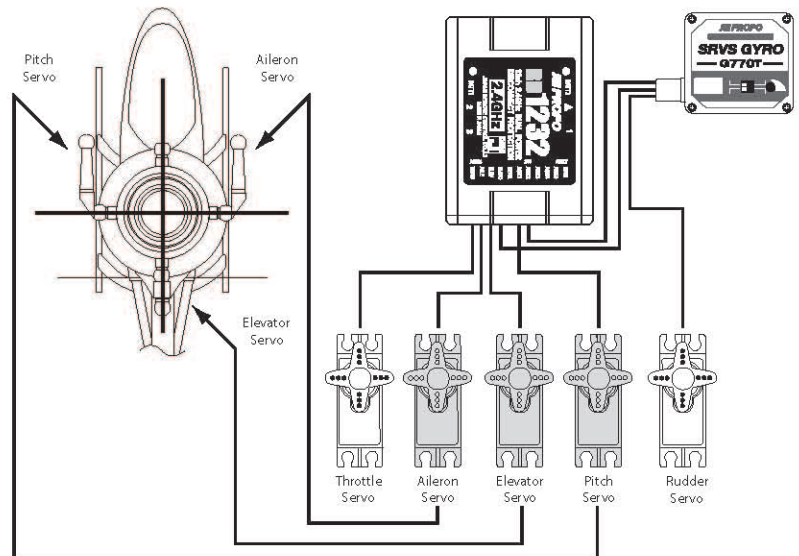
C. CCPM SERVO CONNECTIONS

The JR 120°/140° CCPM system requires the use of three servos to operate Aileron, Elevator and Aux1 (Pitch). The labeling of these servos can become quite confusing because, with the CCPM function, the three servos no longer work independently, but rather as a team, and their functions are now combined. For this reason, we will refer to the three servos in the following manner:

Elevator Servo: This is the top left servo. The channel number for this servo when using a JR radio is CH3.

Aileron Servo: This is the top right servo. The channel number for this servo when using a JR radio is CH2.

Aux 1 (Pitch) Servo: This is the front left servo. The channel number for this servo when using a JR radio is CH6.



Please refer to the CCPM connections chart below for clarification. For non-JR radios, please consult your radio instructions for proper connection.

CCPM SOFTWARE INITIAL ADJUSTMENTS

RADIO SYSTEM REQUIREMENTS (NOT INCLUDED)

6-channel or greater RC helicopter system with 120° or 140° CCPM function



DSX12



DSX9



X2720

CCPM-Ready JR Radio Systems

Most current JR heli radio systems (DSX12, PCM12X, DSX9, PCM9XII, DSX7 and X2720) are equipped with 120° and/or 140° CCPM electronics for use with JR CCPM machines. Radios you may be flying now, like the X347, X388S, X378 and X3810 have 120° CCPM capability built in.

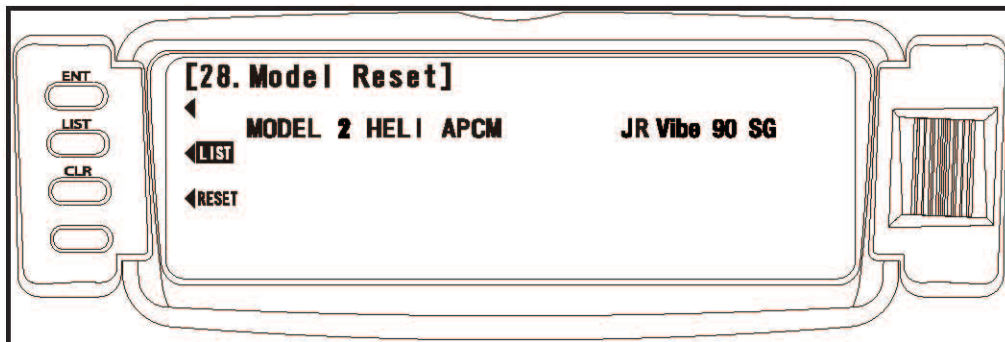
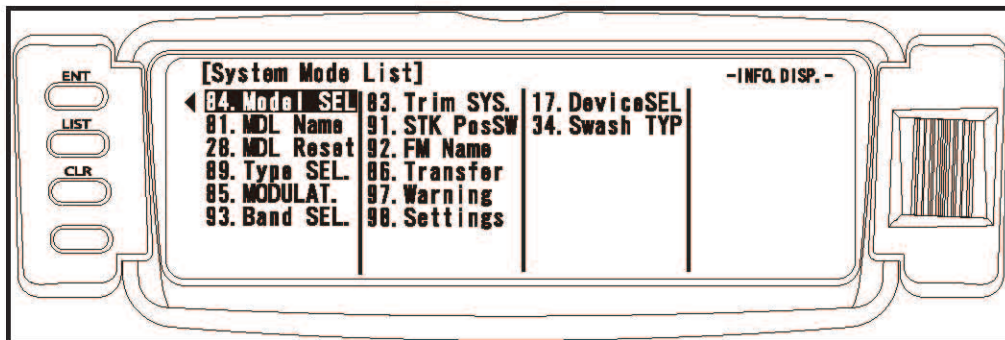
DSX12 AND PCM12X : PROGRAMMING

The following activation and setup procedure should be used for DSX12 and PCM12X systems. Prior to activating the CCPM function, it is first suggested that the data reset function be performed to reset the desired model number to be used back to the factory default settings.

Caution: Prior to performing the data reset function, it will be necessary to select the desired model number to be used.

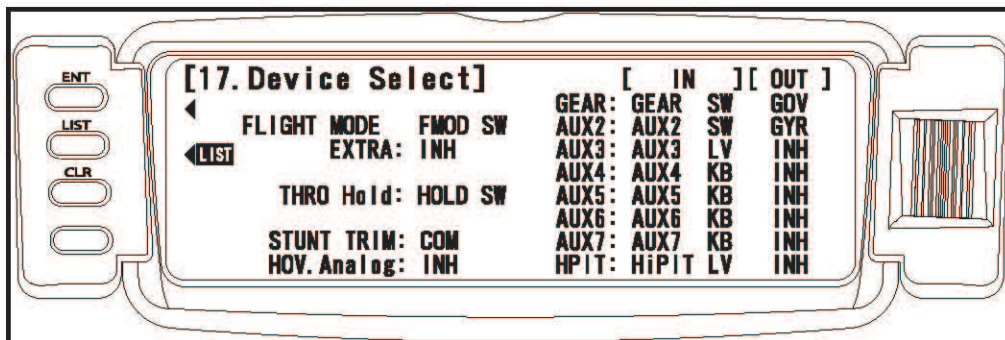
A) Model Select/Data Reset

Press the ENT key while turning the power switch on to enter the system mode. Next, move the cursor to the MODEL SEL function. Press the roll selector to enter the model select function. Select the desired model number to be used, then press the roll selector. Next, move the roll selector to highlight LST, and press the roll selector. Move the roll selector to highlight MDL RESET, then press the roll selector. Press the CLEAR key, then press YES to reset the data of the current model selected.



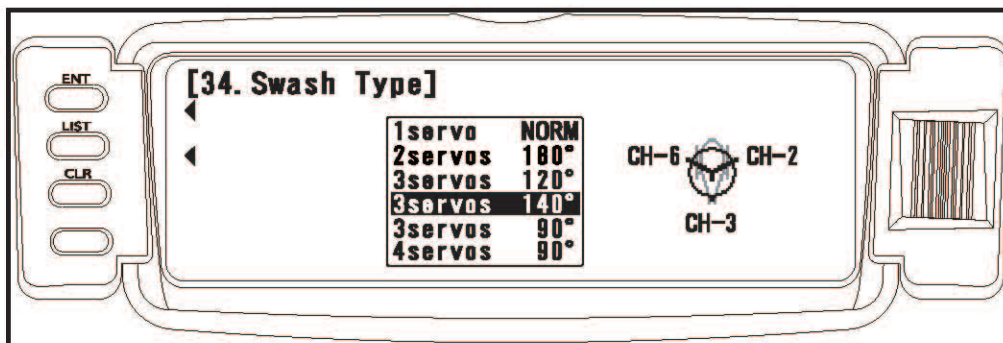
B) Device Select

Move the roll selector to highlight the Device SEL function, then press the roll selector to access the Device Select function. Next, move the cursor to the OUT: column in the GEAR row and select the GOV setting. Next, move the cursor to the OUT: column in the AUX2 row and select the GYR setting.



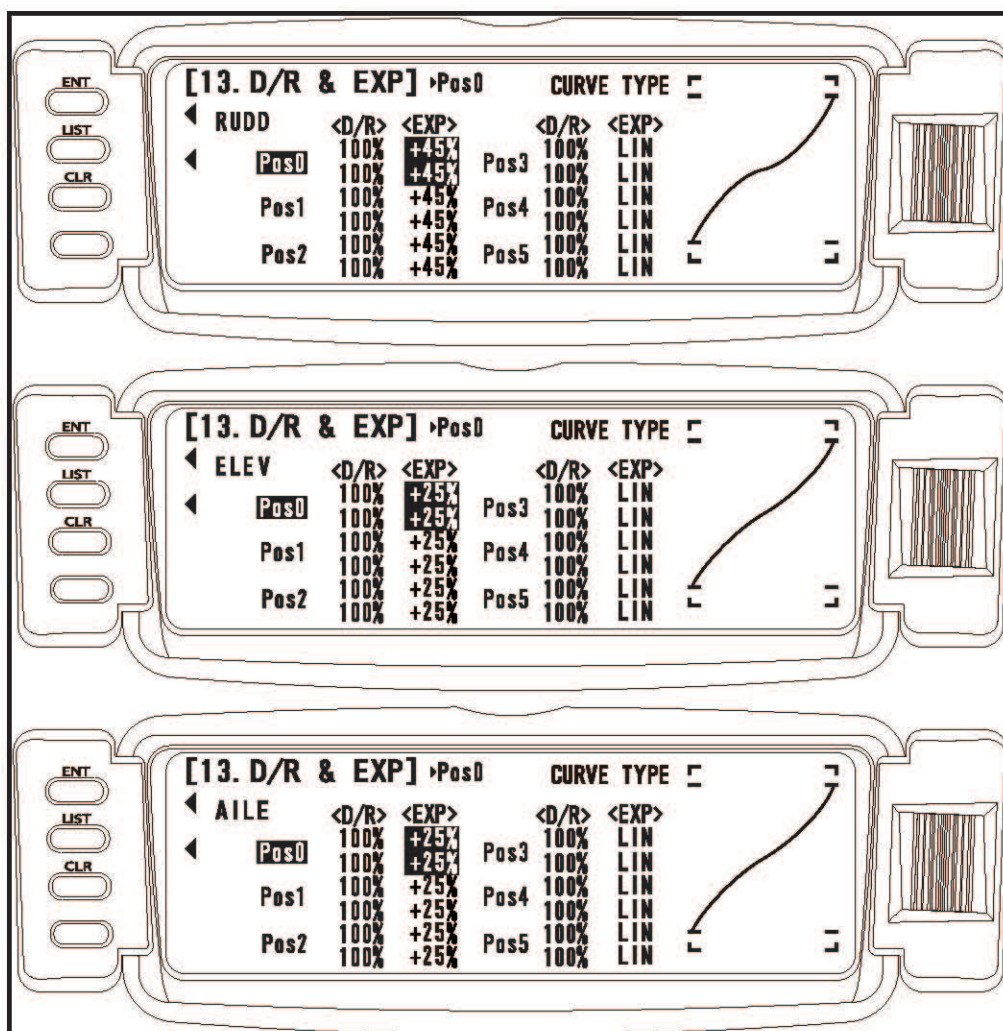
C) CCPM Activation

Move the roll selector to highlight the SWASH TYP function, then press the roll selector to access the swashplate type function. Press the roll selector to access the variations of CCPM mixing, then move the roll selector to select the desired CCPM type (120 or 140). Move the roll selector to highlight LST and press the roll selector to exit the system mode.



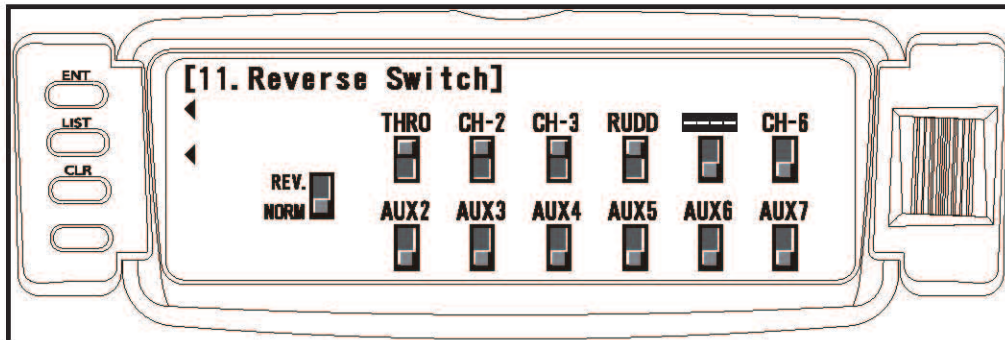
D) D/R and EXPO Selection

Turn the power switch on, then press the ENT key to enter function mode. Move the roll selector to highlight the D/R and EXPO function, then press the roll selector to enter the function. Set the Dual Rate and Expo values as desired, below are suggested settings. Press the LST key to return to the menu.



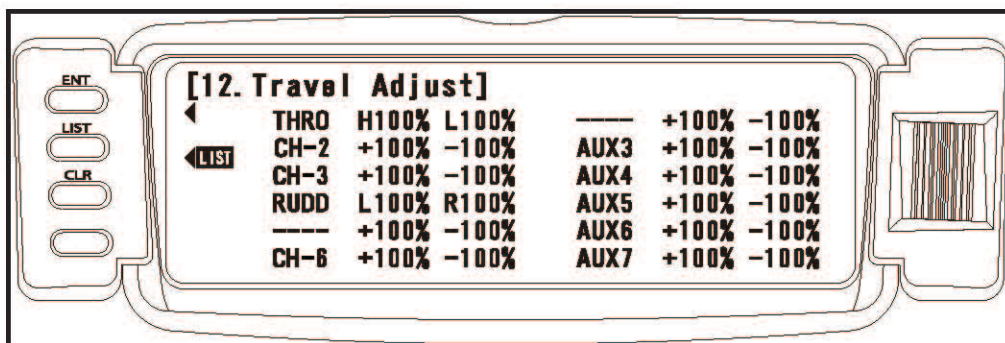
E) Servo Reversing

Move the roll selector and highlight REV.SW on the screen, then press the roll selector to enter the function. Next, reverse channels 1, 2, 3 and 4 by moving the roll selector, and pressing as needed to change from NORM to REV. Press the LST key to return to the menu.



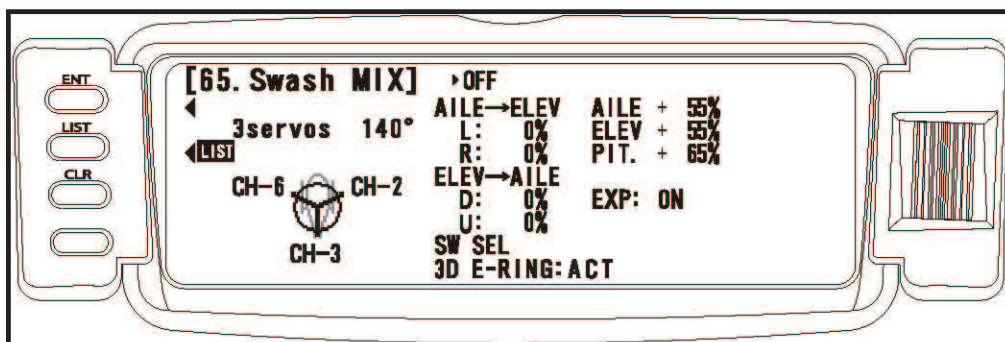
F) Travel Adjustment

Move the roll selector until TRVL ADJ is highlighted on the screen, then press the roll selector to enter the function. Adjust the values as shown by moving the roll selector to highlight the desired channel, while using the control stick to select up/down, or left/right values to be adjusted. Please note that the required travel values will vary based on the type of servo selected. Press the LST key to return to the menu.



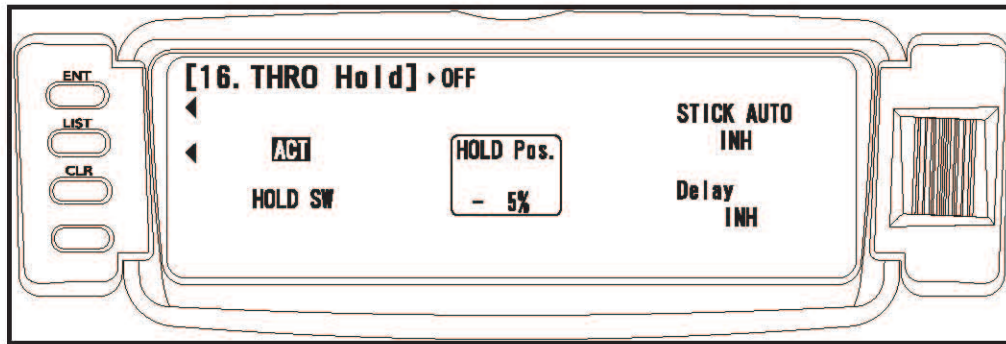
G) CCPM Settings

Move the roll selector to highlight the SWASH MIX function, then press the roll selector to enter the function. Set the value of the aileron, elevator, and pitch functions from the factory default setting using the rolling selector. Press the LST key to return to the menu.



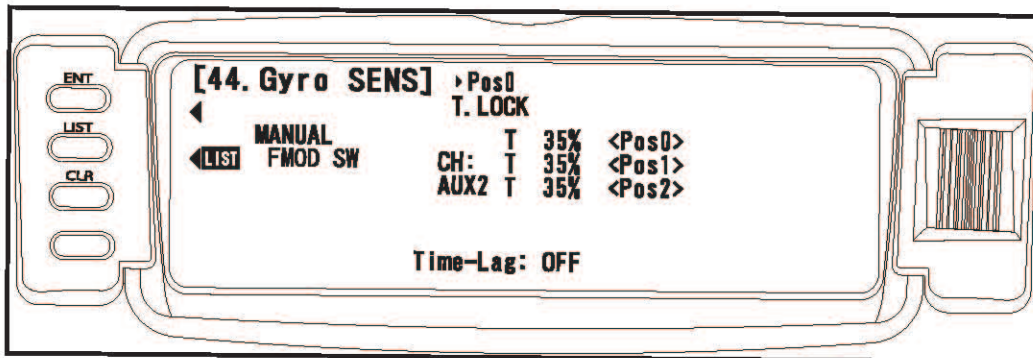
H) Throttle Hold Setting

Move the roll selector to highlight the THRO HOLD function, then press the roll selector to enter the function. Activate the throttle hold function. Once the throttle linkage is set up, set the hold position in this function so that when the throttle hold switch is pulled, the throttle servo does not move with the throttle stick at idle and throttle trim set at the idle position. Press the LST key to return to the menu.



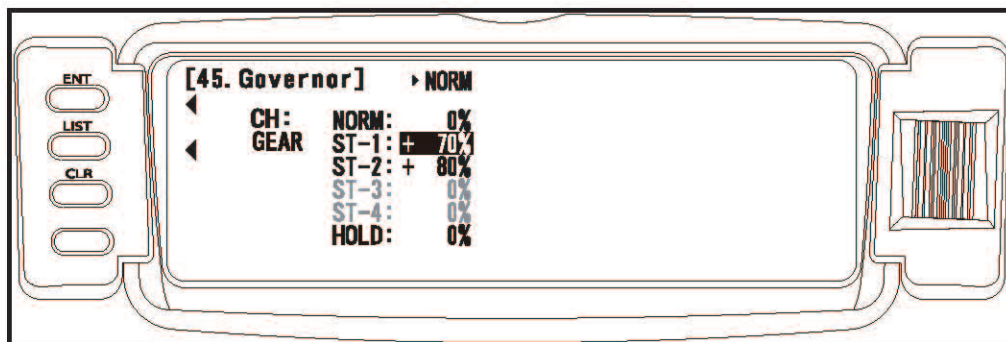
I) Gyro Sensitivity Selection

Move the roll selector to highlight the GYRO function, then press the roll selector to enter the function. Set the gyro gain as shown as a starting point for the G770T gyro. Adjust the percentage as necessary when flying the heli. Other gyros may require different settings, consult your gyro manual for further information on setting the gain. Press the LST key to return to the menu.



J) Governor

Move the roll selector to highlight the Governor function, then press the roll selector to enter the function. Set the Governor settings as shown. Adjust these values as needed in flight. This function is not required if not using a governor. Press the LST key to return to the menu.



DSX9 AND PCM9XII : PROGRAMMING

The following activation and setup procedure should be used for the DSX9 and PCM9XII systems. Prior to activating the CCPM function, it is first suggested that the data reset function be performed to reset the desired model number to be used back to the factory default settings.

Caution: Prior to performing the data reset function, it will be necessary to select the desired model number to be used.

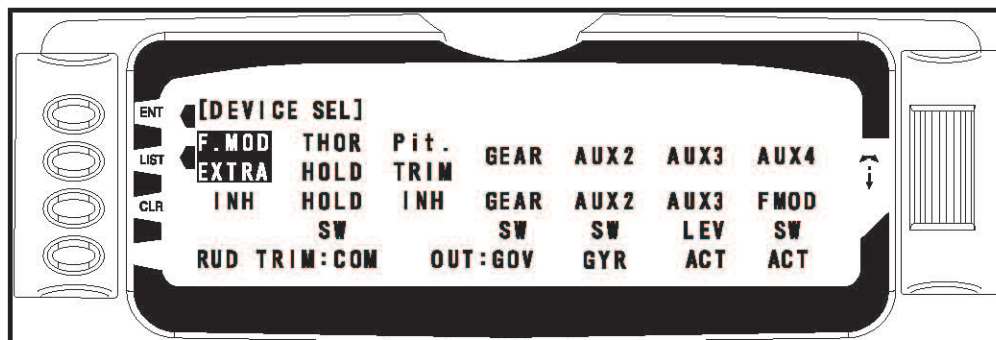
A) Model Select/Data Reset

Press the ENT key while turning the power switch on to enter the system mode. Next, move the cursor to the MODEL SEL function. Press the roll selector to enter the model select function. Select the desired model number to be used, then press the roll selector. Next, move the roll selector to highlight LST, and press the roll selector. Move the roll selector to highlight MDL RESET, then press the roll selector. Press the CLEAR key, then press YES to reset the data of the current model selected.



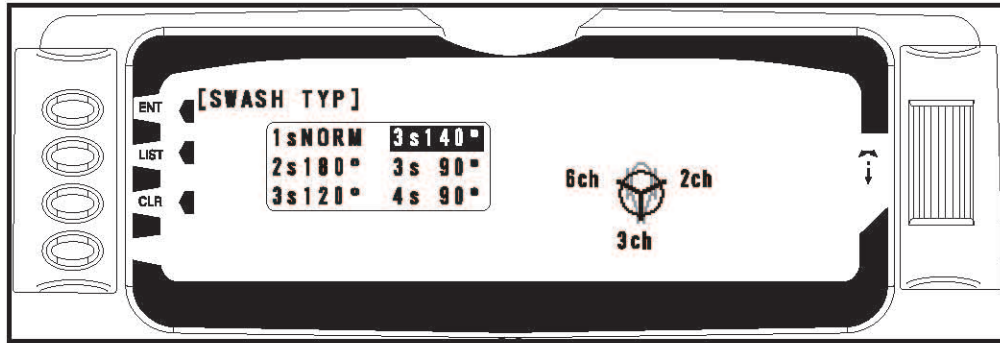
B) Device Select

Move the roll selector to highlight the Device SEL function, then press the roll selector to access the Device Select function. Next, move the cursor to the OUT: row in the GEAR column and select the GOV setting. The GYR setting for channel AUX2 will be set when the gyro function is activated in a following step.



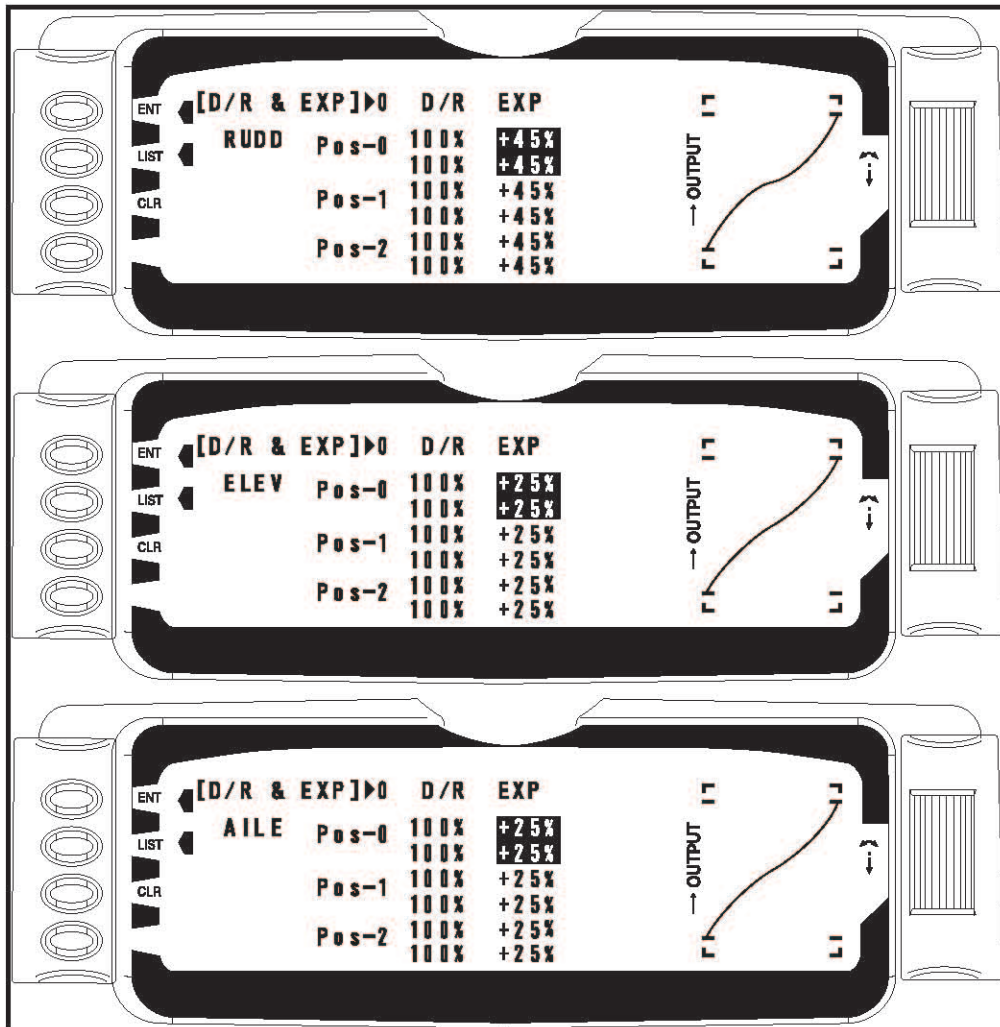
C) CCPM Activation

Move the roll selector to highlight the SWASH TYP function, then press the roll selector to access the swashplate type function. Press the roll selector to access the variations of CCPM mixing, then move the roll selector to select the desired CCPM type (120 or 140). Move the roll selector to highlight LST and press the roll selector to exit the system mode.



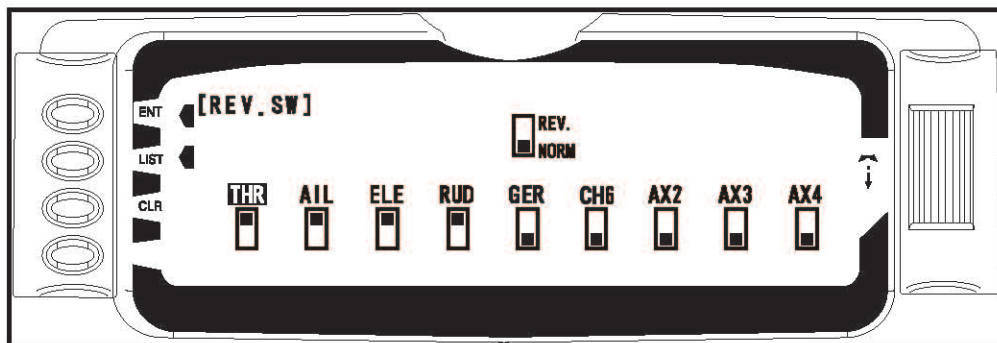
D) D/R and EXPO Selection

Turn the power switch on, then press the ENT key to enter function mode. Move the roll selector to highlight the D/R and EXPO function, then press the roll selector to enter the function. Set the Dual Rate and Expo values as desired, below are suggested settings. Press the LST key to return to the menu.



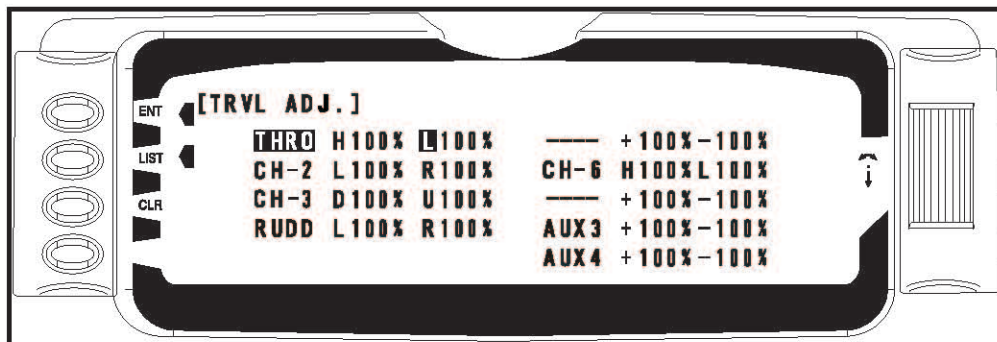
E) Servo Reversing

Move the roll selector and highlight REV.SW on the screen, then press the roll selector to enter the function. Next, reverse channels 1, 2, 3 and 4 by moving the Roll selector, and pressing as needed to change from NORM to REV. Press the LST key to return to the menu.



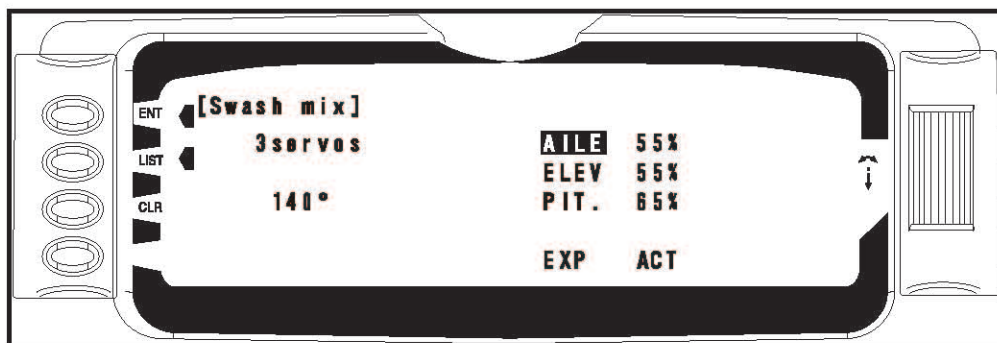
F) Travel Adjustment

Move the roll selector until TRVL.ADJ is highlighted on the screen, then press the roll selector to enter the function. Adjust the values as shown by moving the roll selector to highlight the desired channel, while using the control stick to select up/down, or left/right values to be adjusted. Please note that the required travel values will vary based on the type of servo selected. Press the LST key to return to the menu.



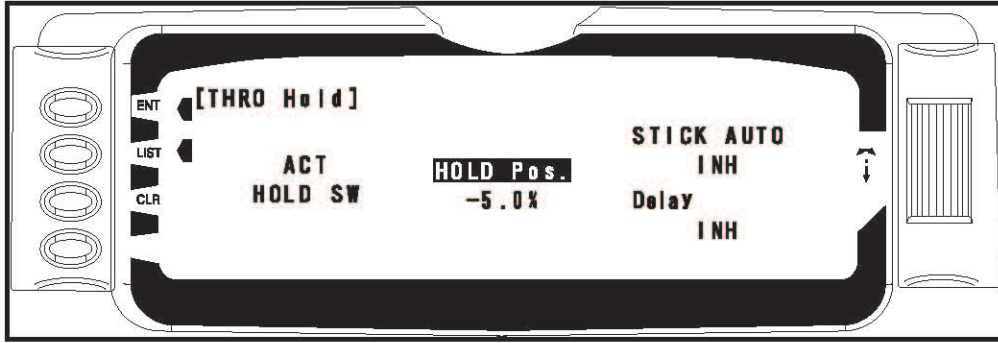
G) CCPM Settings

Move the roll selector to highlight the SWASH MIX function, then press the roll selector to enter the function. Set the value of the aileron, elevator, and pitch functions from the factory default setting using the + and - keys. Press the LST key to return to the menu.



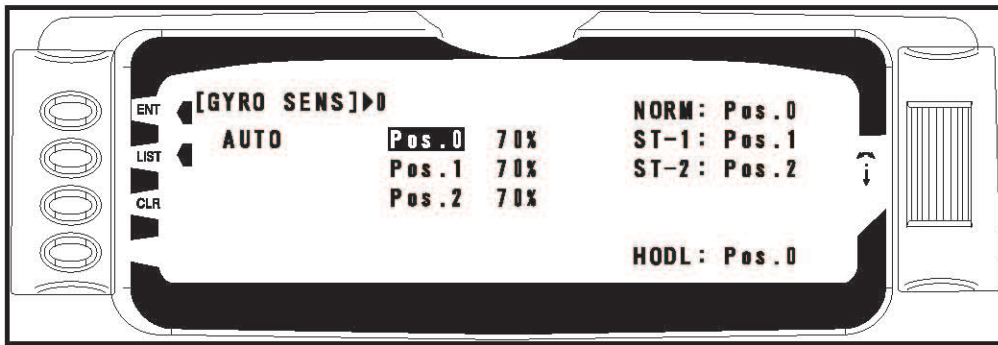
H) Throttle Hold Setting

Move the roll selector to highlight the THRO HOLD function, then press the roll selector to enter the function. Activate the throttle hold function. Once the throttle linkage is set up, set the hold position in this function so that when the throttle hold switch is pulled, the throttle servo does not move with the throttle stick at idle and throttle trim set at the idle position. Press the LST key to return to the menu.



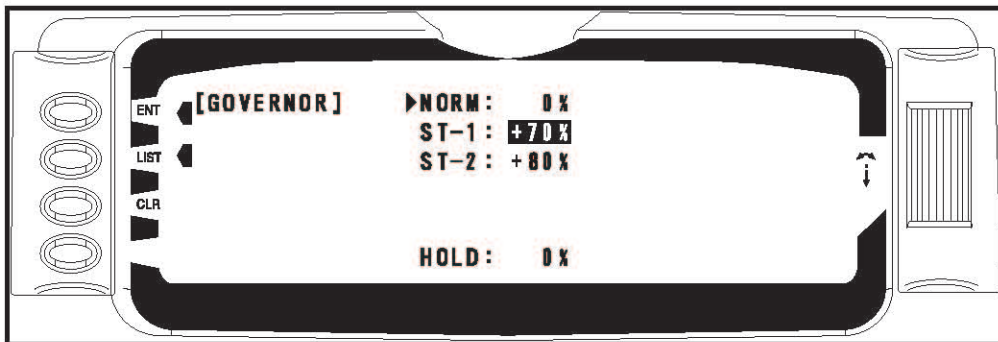
I) Gyro Sensitivity Selection

Move the roll selector to highlight the GYRO function, then press the roll selector to enter the function. Set the gyro gain as shown as a starting point for the G770T gyro. Adjust the percentage as necessary when flying the heli. Other gyros may require different settings; consult your gyro manual for further information on setting the gain. Press the LST key to return to the menu.



J) Governor

Move the roll selector to highlight the GOVERNOR function, then press the rolling selector to enter the function. Set the governor settings as shown. Press the LST key to return to the menu.



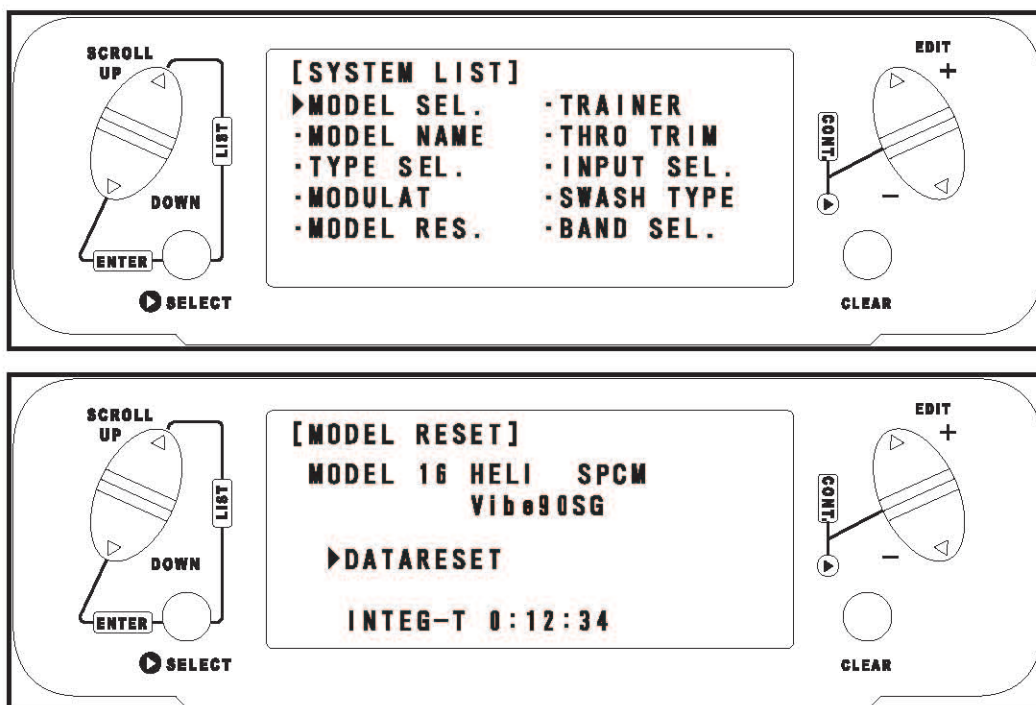
DSX7 AND X2720 : PROGRAMMING

The following activation and setup procedure should be used for the DSX7 and X2720 systems. Prior to activating the CCPM function, it is first suggested that the data reset function be performed to reset the desired model number to be used back to the factory default settings.

Caution: Prior to performing the data reset function, it will be necessary to select the desired model number to be used.

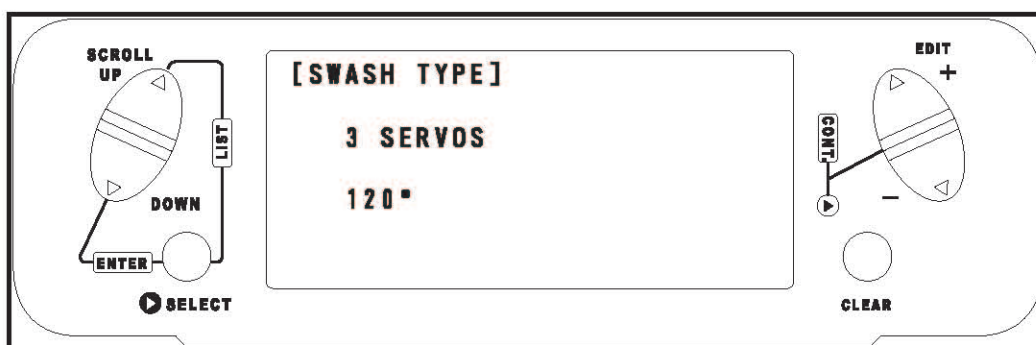
A) Model Select/Data Reset

Press the Down and Select keys while turning the power switch on to enter the system mode. Next, move the cursor to the MODEL SEL function with the UP key. Select the desired model number to be used with the increase or decrease key. Next, press the UP key until MODEL RESET is displayed. Press the CLEAR key, then press YES to reset the data of the current model selected.



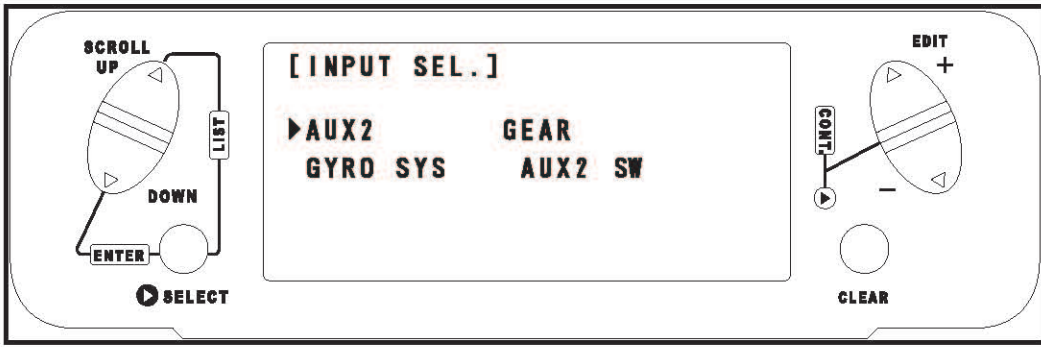
B) CCPM Activation

Press the UP key until the SWASH TYPE function is displayed, then press the INCREASE key to select 120 CCPM type as shown.



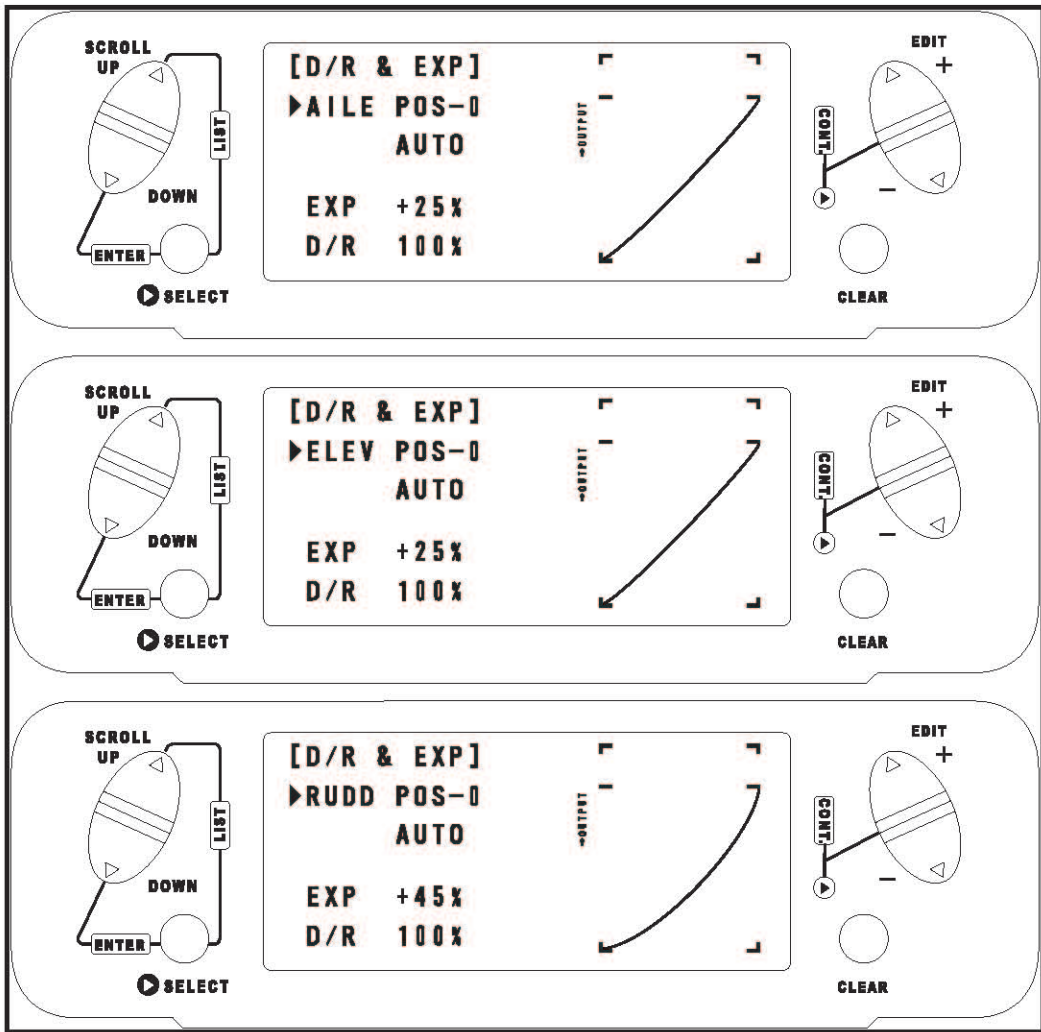
C) Input Select function

Press the DOWN key until the INPUT SELECT function is displayed, then set AUX 2 to GYRO and GEAR to AUX2. Press the down and select keys together to exit the system menu.



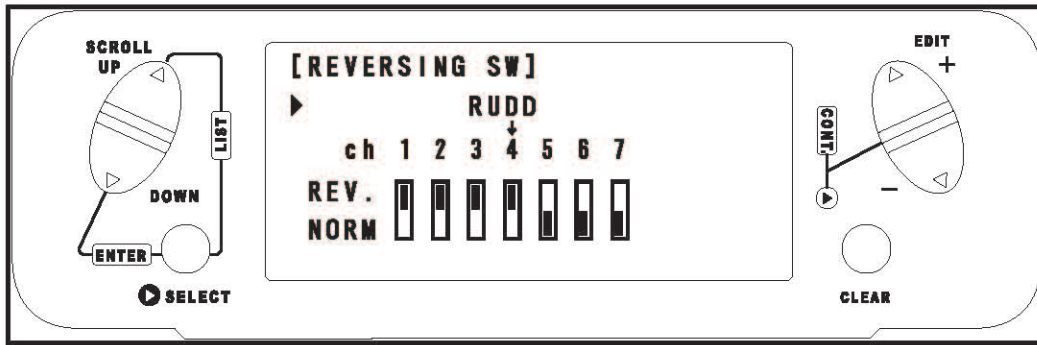
D) D/R and EXPO Selection

Turn the power switch on, then press the DOWN and SELECT keys together to enter the function mode. Press the UP key to select the D/R and EXPO function. Set the Dual Rate and Expo values as desired, below are suggested settings.



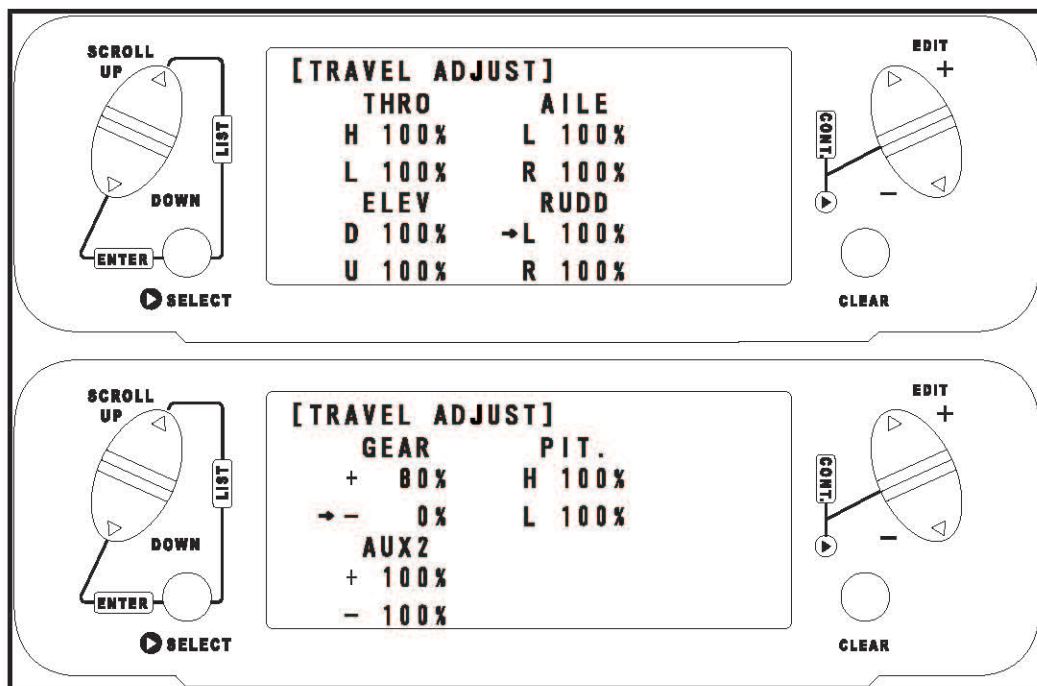
E) Servo Reversing

Press the UP key to select the REVERSING function. Next, reverse channels 1, 2, 3 and 4 by selecting the channel with the SELECT key, and pressing the INCREASE key as needed to change from NORM to REV.



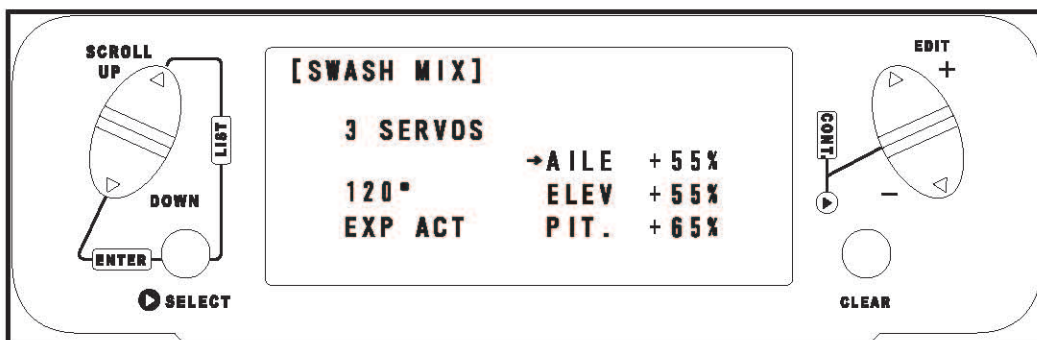
F) Travel Adjustment

Press the UP key to select the TRAVEL ADJUST function. Set the Travel Adjust values as shown as initial settings, while using the control stick to select up/down, or left/right values to be adjusted. Please note that the required travel values will vary based on the type of servo selected. Use the gear travel adjust values to set the governor setting to adjust the head speed of the heli as desired.



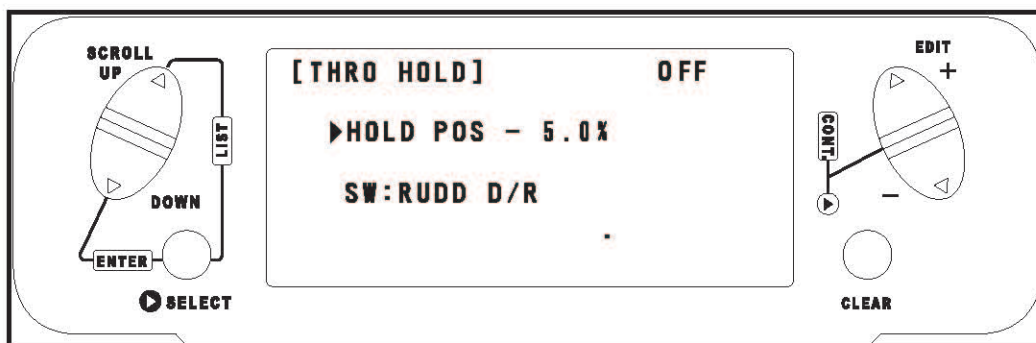
G) CPM Settings

Press the UP key to select the SWASH MIX function. Change the value of the aileron, elevator, and pitch functions from the factory default setting using the INCREASE key and selecting the channel with the select key to the values as shown.



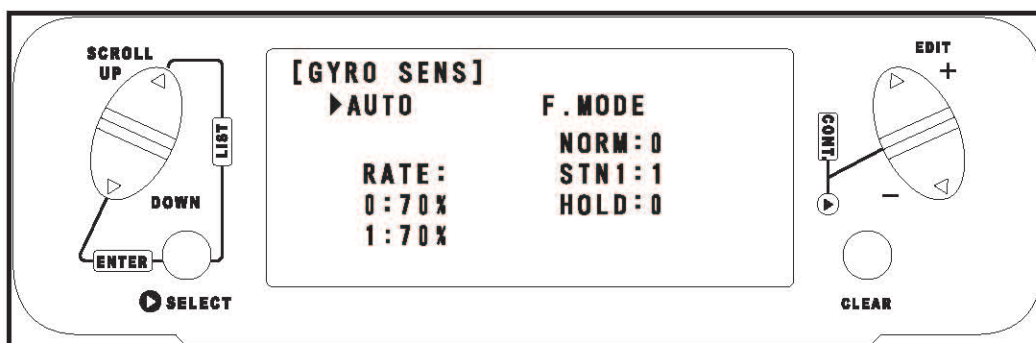
H) Throttle Hold Setting

Press the UP key to select the THRO HOLD function. Press the INCREASE key to activate the function. Once the throttle linkage is set up, set the hold position in this function so that when the throttle hold switch is pulled, the throttle servo does not move with the throttle stick at idle and throttle trim set at the idle position.



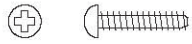
I) Gyro Sensivity Selection

Press the UP key to select the GYRO SENS function. Set the gyro gain as shown as a starting point for the G770T gyro. Adjust the percentage as necessary when flying the heli. Other gyros may require different settings; consult your gyro manual for further information on setting the gain.



6-1

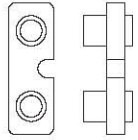
SERVO INSTALLATION 1



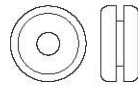
Self-Tapping Screw, 2.6 x 12mm (8pcs)



Flat Washer, 2.6mm (8pcs)



Type B Servo Mounting Plate (4pcs)



Switch Dampener (2pcs)

We recommend the same model be used for all Swashplate servos. Be careful when tightening the tapping bolt. If it is too loose, the servo will move. Over-tightening it will cause damage. The ideal position will dent the rubber slightly. Be sure to note the fore and aft position of the servo output shaft.

Self-Tapping Screw, 2.6 x 12mm (8pcs)

Flat Washer, 2.6mm (8pcs)

140 CCPM

Aileron Servo (Ch 2)

Rudder Servo

Type B Servo Mounting Plate (4pcs)

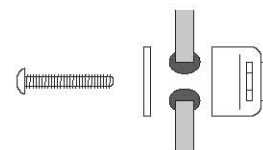
120 CCPM

Aileron Servo (Ch 2)

Switch Harness

Switch Dampener (2pcs)

Screw Supplied with Switch

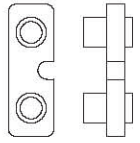




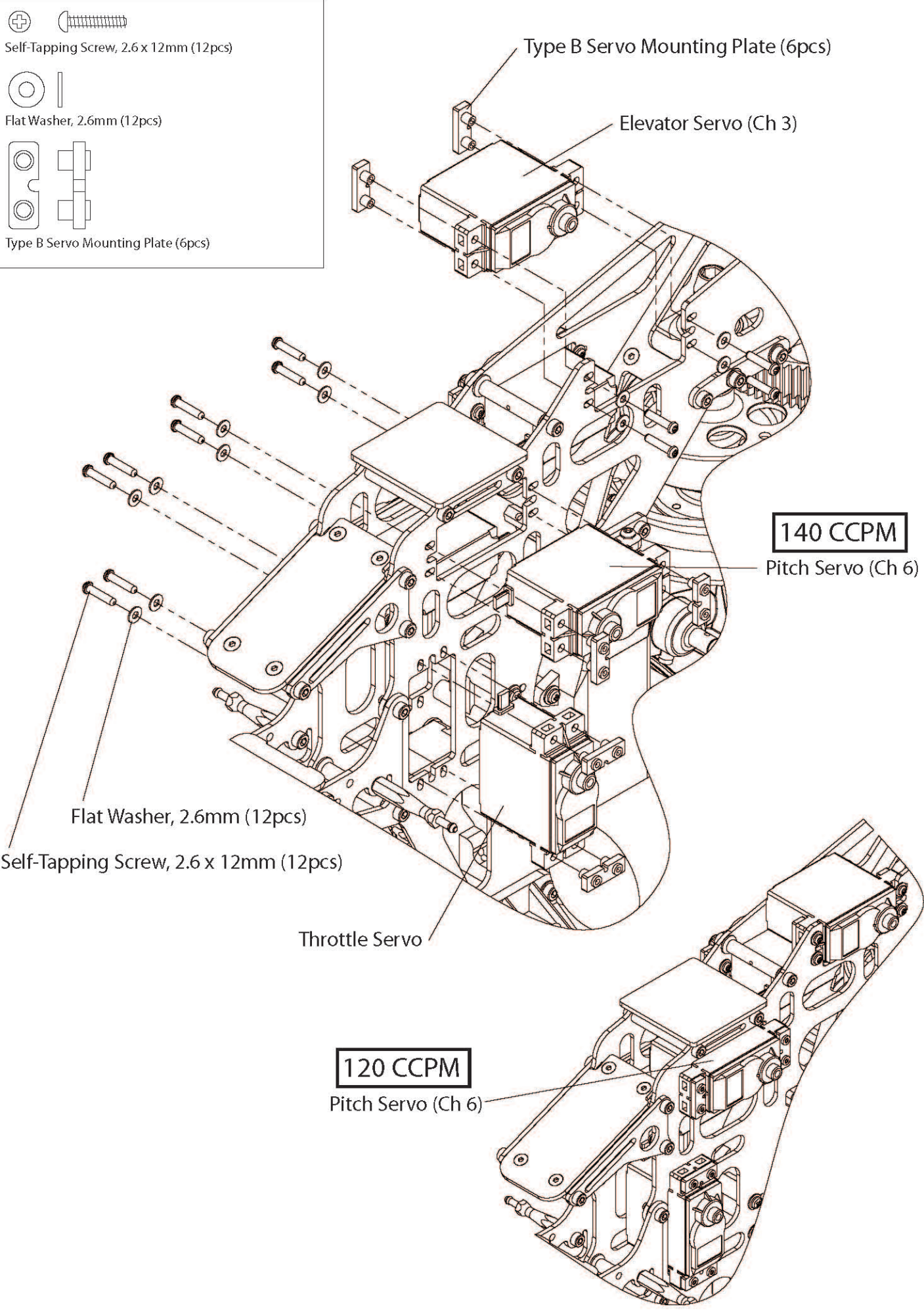
Self-Tapping Screw, 2.6 x 12mm (12pcs)



Flat Washer, 2.6mm (12pcs)



Type B Servo Mounting Plate (6pcs)





Flat Head Screw, 2 x 8mm (6pcs)



Steel Joint Ball (6pcs)



Hex Nut, 2mm (6pcs)

Note: See Step 6-5 to properly center the wheels on the servos.

Hex Nut, 2mm (6pcs)

Flat Head Screw, 2 x 8mm (6pcs)

Steel Joint Ball (6pcs)

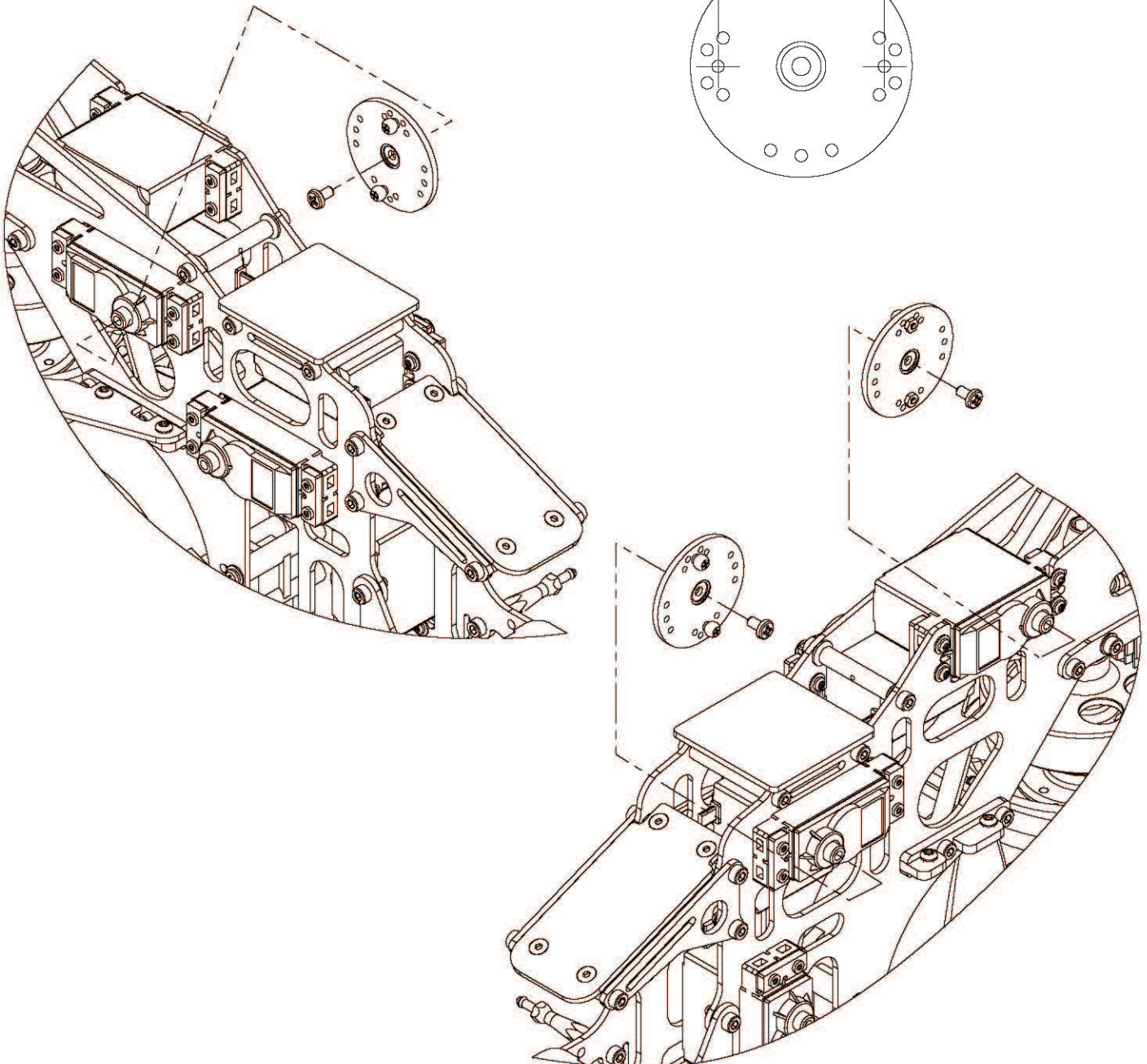
JR Large HD Servo Horn (3pcs)

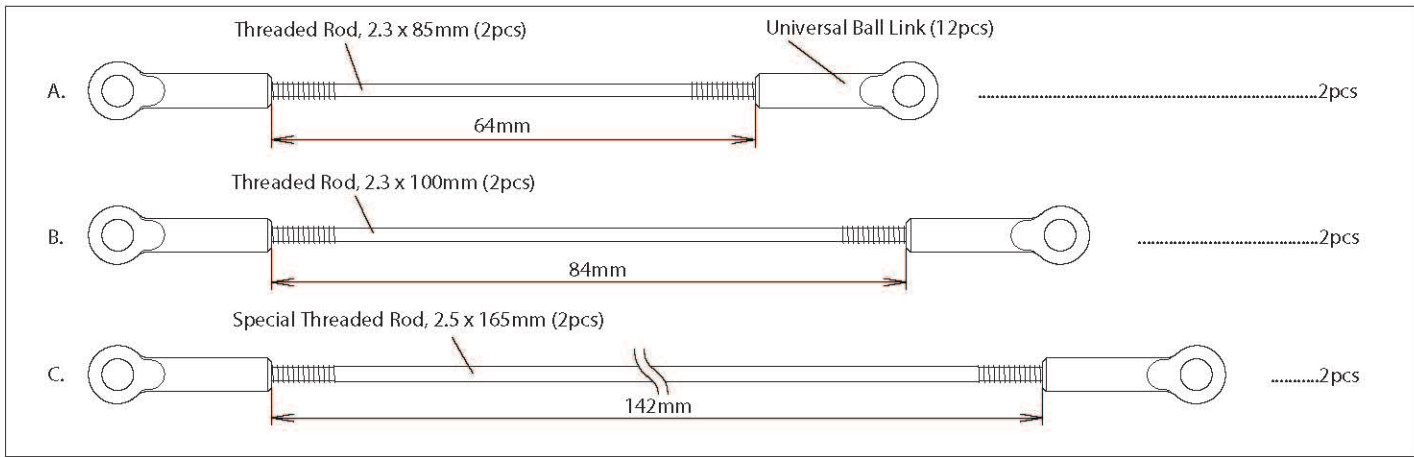
2pcs

1pc

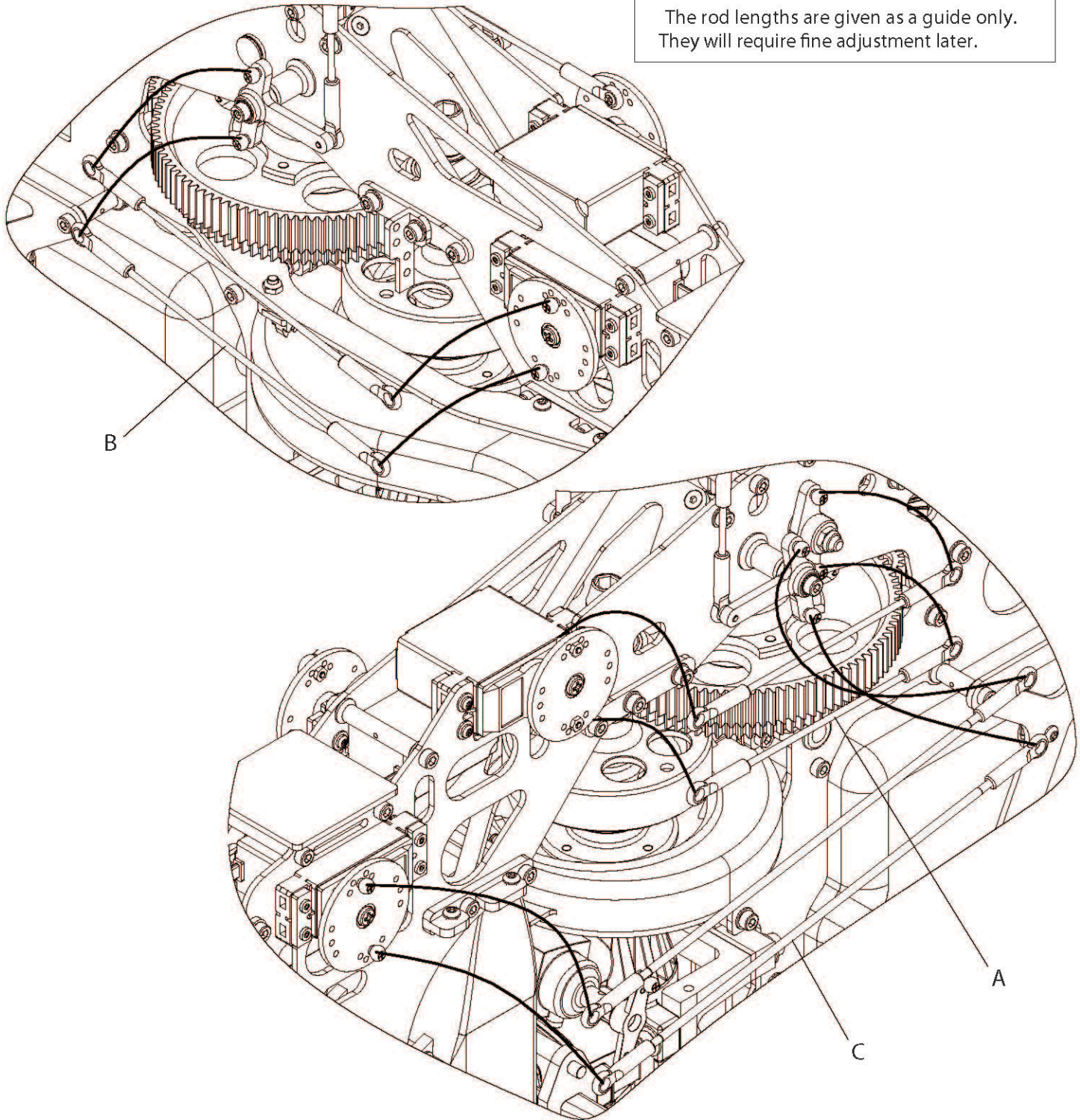
(x6) Red

27mm

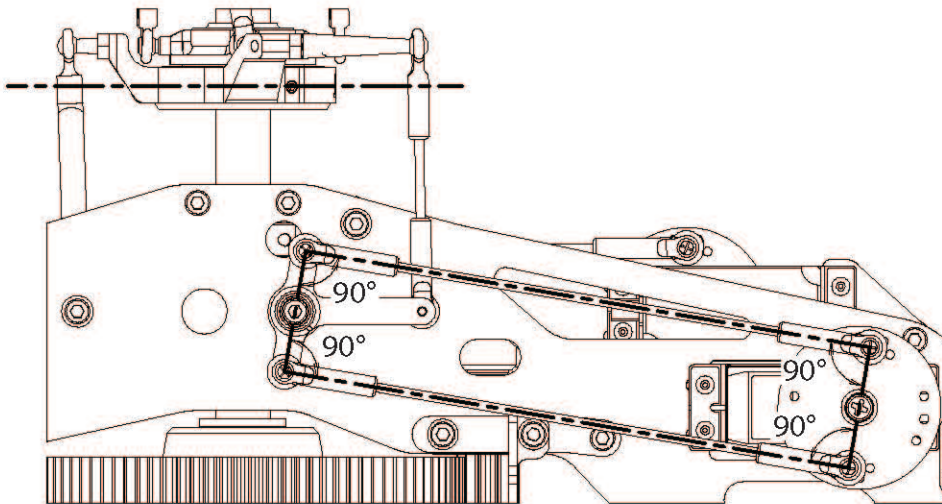
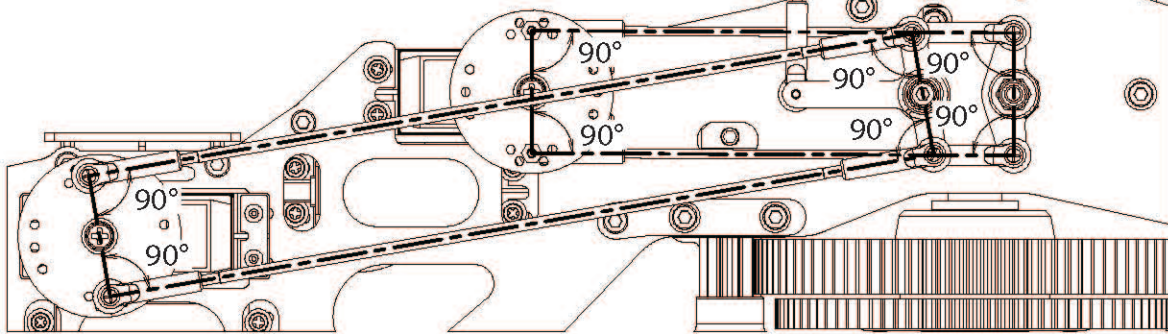
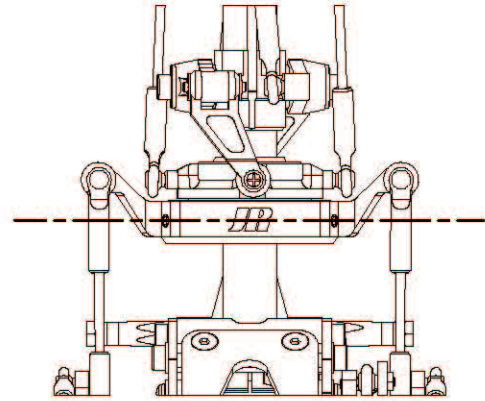




The rod lengths are given as a guide only. They will require fine adjustment later.

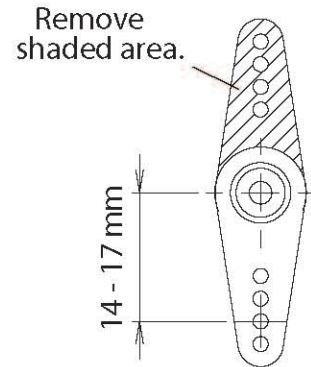
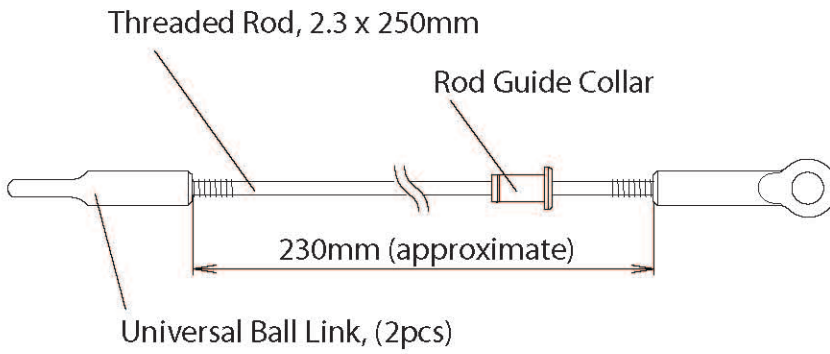
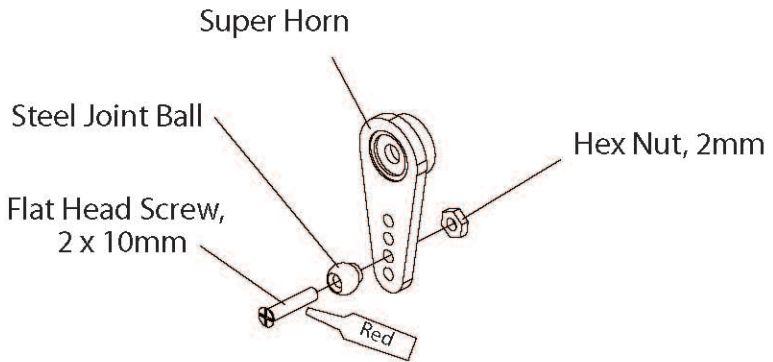


After the control linkages have been attached to the swashplate, it will be necessary to check the swashplate to ensure that it is level. To do this, turn on the radio system and place the collective stick in the center position as before. Next, check to make sure that all trim levers and knobs are also in their center position. Check to ensure that the servo wheels are centered as shown. If the servos are not centered as shown, please adjust the sub trim function in the radio system as necessary. Once it's determined that the servo wheels are centered properly, it will now be necessary to check the swashplate to ensure that it is also level or neutral in this position. It is suggested that the swashplate first be checked from the rear of the model to ensure that it's level from left to right. If the swashplate is not level as compared to the frame of the model, adjust either the left or right servo control rod as needed.

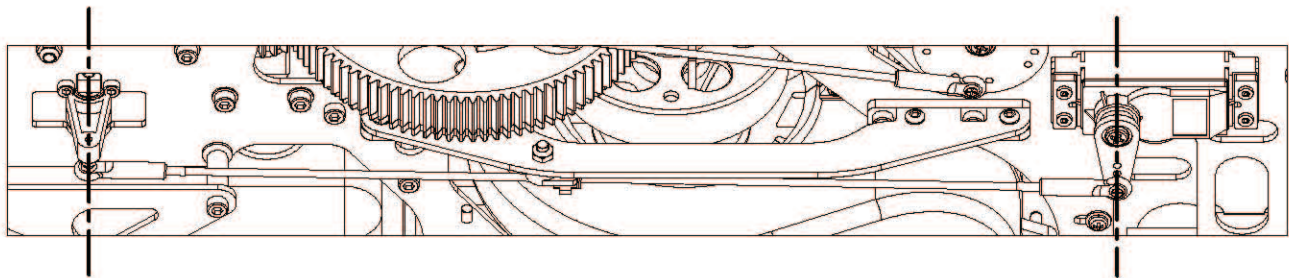
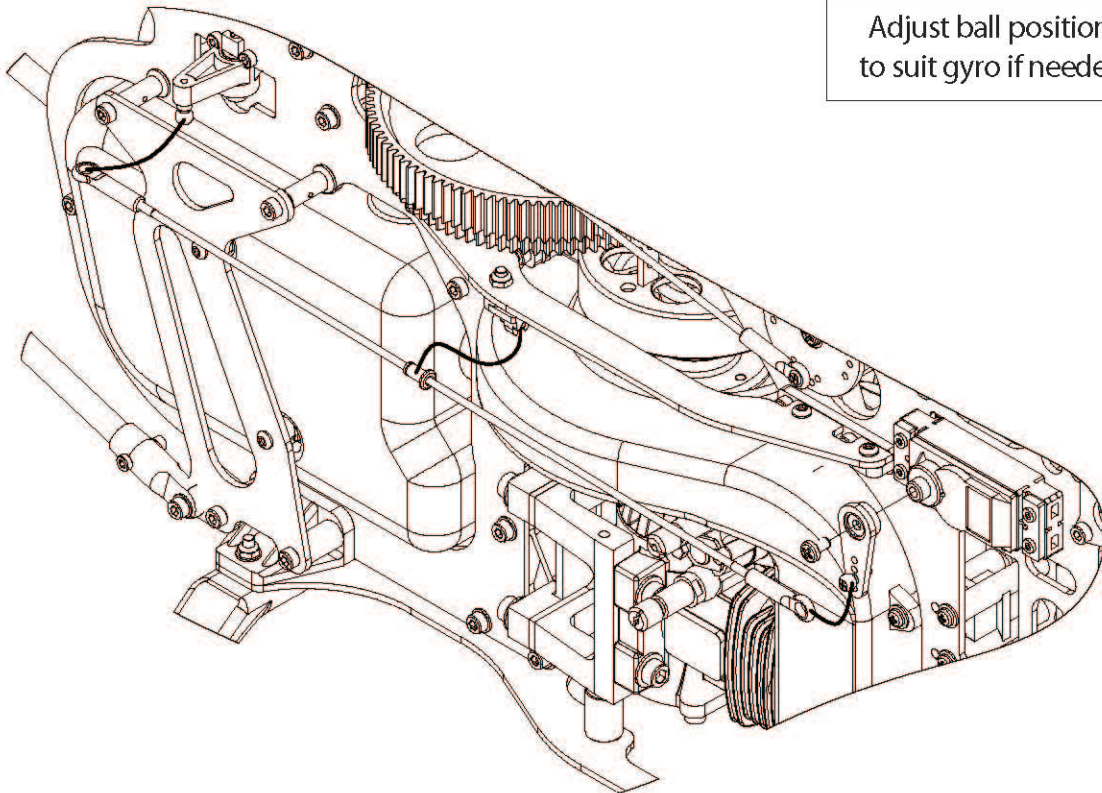




17mm between bottom of Swashplate and top of Frame at Zero pitch, all servos neutral.



Once the left to right adjustment is completed, it will now be necessary to check the fore/aft position of the swashplate to ensure that it is also level on this axis. If the swashplate is not level in the fore/aft axis, it is suggested that the adjustment be made to the rear servo control linkage as needed by slightly repositioning the elevator control arm on the elevator A-arm assembly, or adjusting both front servo control rods. If you are unsure as to which linkage needs adjustment or are having difficulty obtaining the correct adjustment, please check the length of each control rod to ensure that it is adjusted to the correct length. Only minor adjustments should be made to the lengths of the control linkages at this time. Any major adjustments indicate either incorrect linkage lengths or incorrect servo arm positioning. If the control linkage lengths are altered from the recommended lengths more than one or two turns, this will have a great effect on the range and settings of the collective pitch in later steps. If required, use sub trims of each servo to fine-tune 90 degree positions of the linkages. No more than 15pts should ever be required, since the servo arm can be flipped and a different spline can be used.





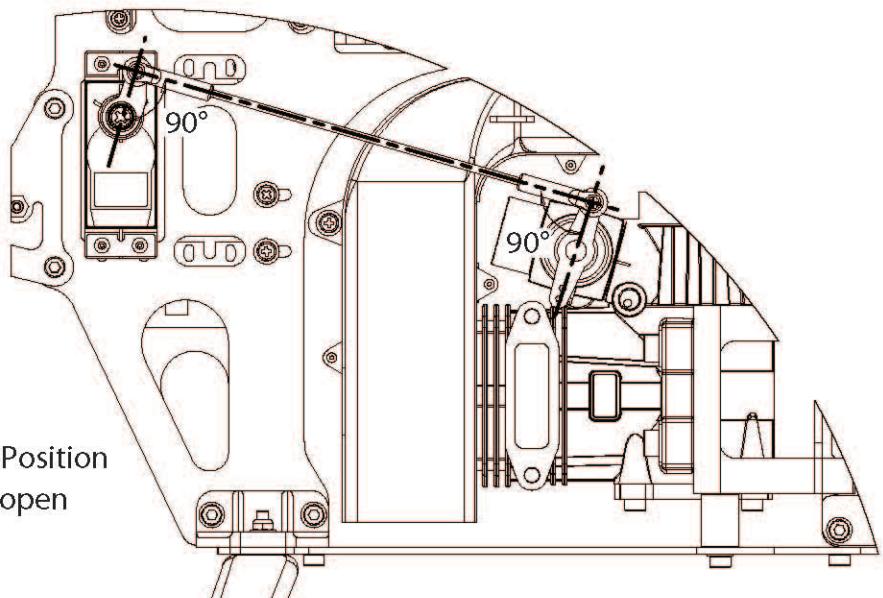
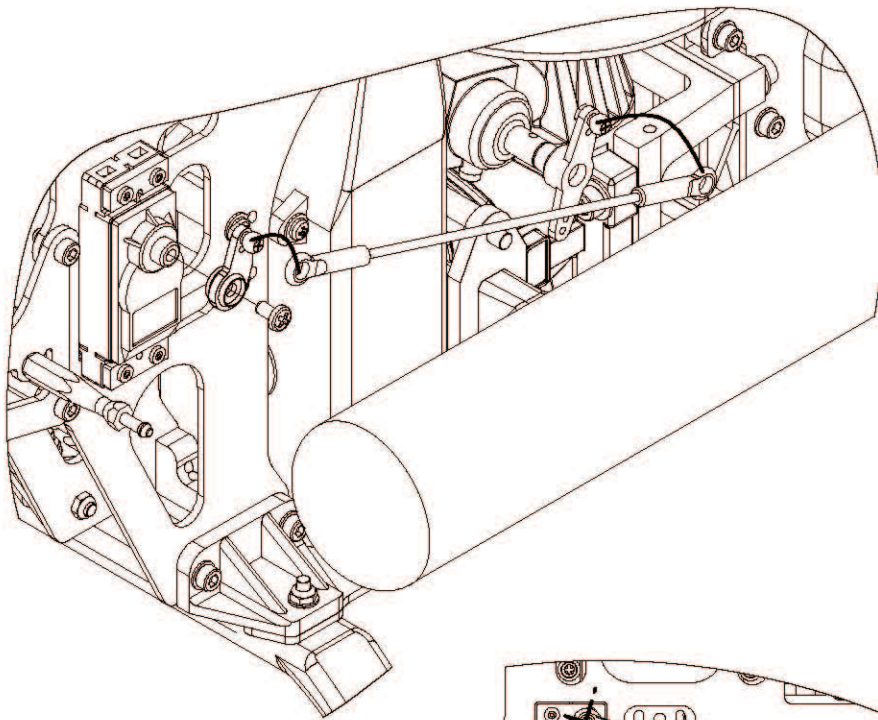
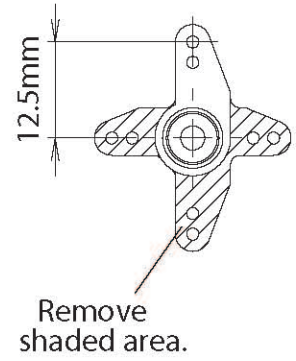
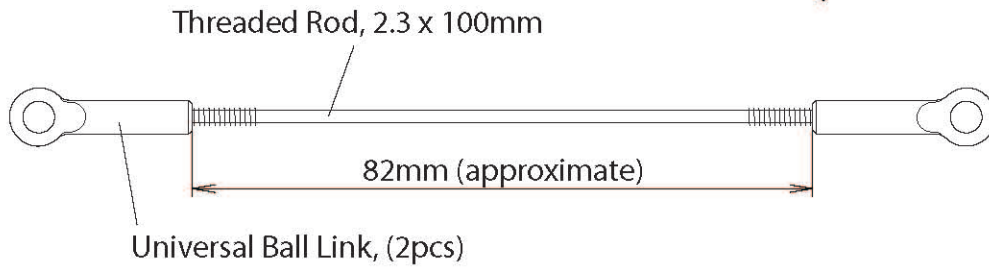
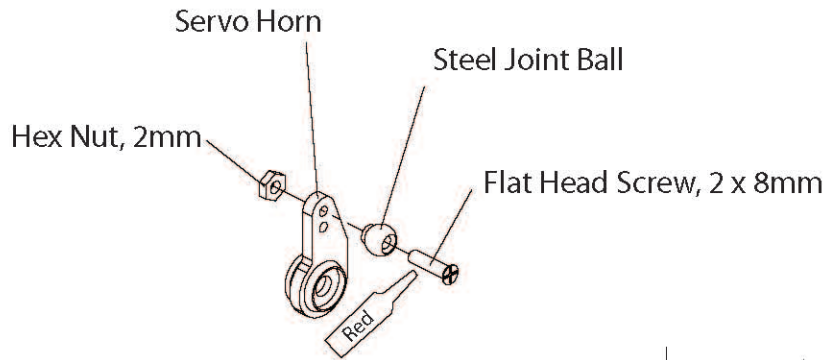
Adjust ball position to suit gyro if needed.



 
 Flat Head Screw, 2 x 8mm (1 pc)

 
 Steel Joint Ball (1 pc)

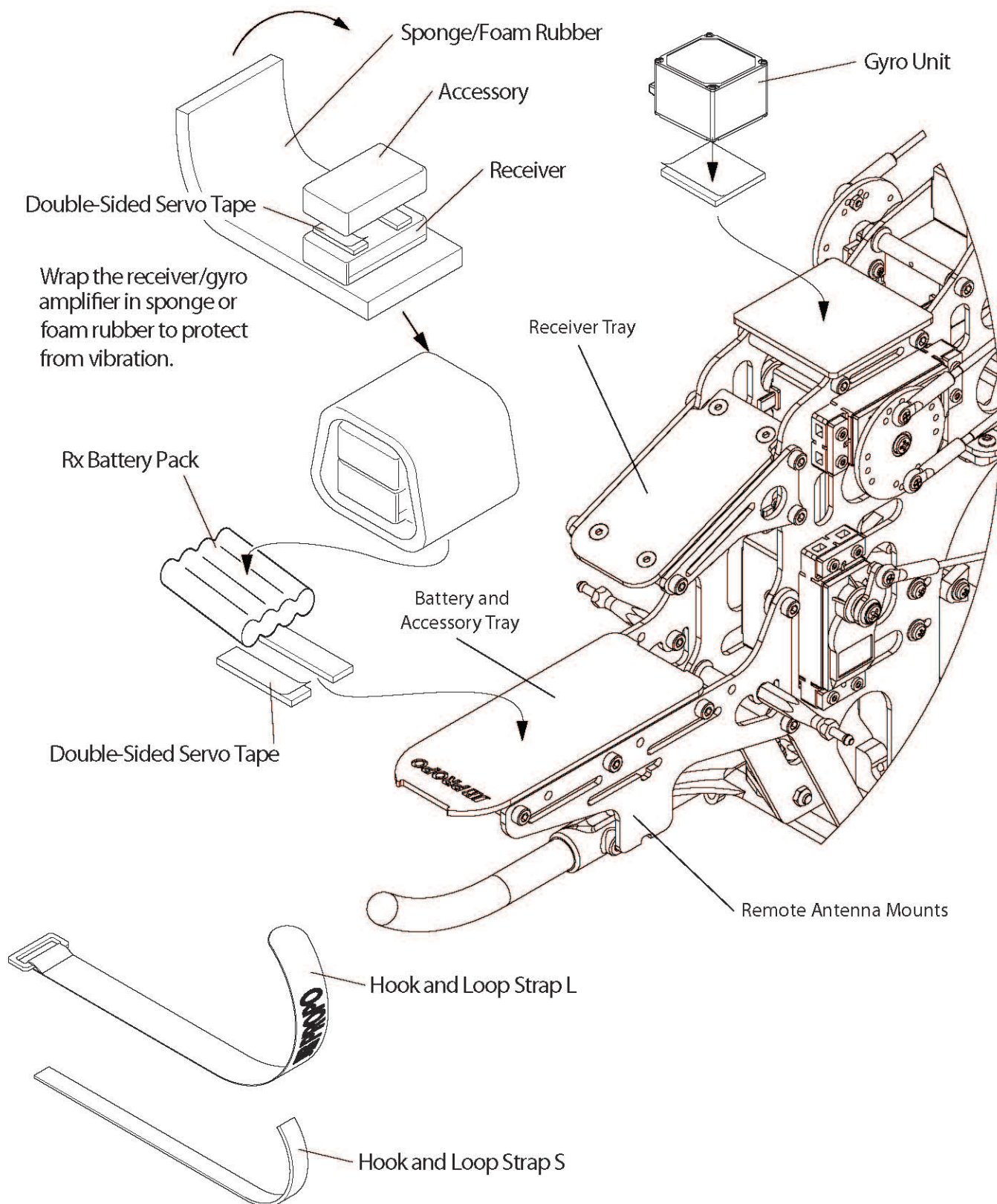
 
 Hex Nut, 2mm (1 pc)



Be certain when installing the gyro unit to the front radio bed that it does not come in contact with the frame of the helicopter, etc. Also make sure that the front radio bed is free from oil and debris. Clean with rubbing alcohol to ensure proper adhesion.

Double-sided servo tape and sponge/foam rubber are not included in this kit.

Use the hook and loop straps included in this kit to secure.



GENERAL RADIO SETUP INFORMATION

THROTTLE ARM/SERVO HORN POSITIONS

To achieve the correct position of the throttle/servo arm, it may be necessary to re-position the throttle arm on the carburetor. It may also be necessary to adjust the length of the throttle linkage slightly to achieve the full open and closed positions of the carburetor.

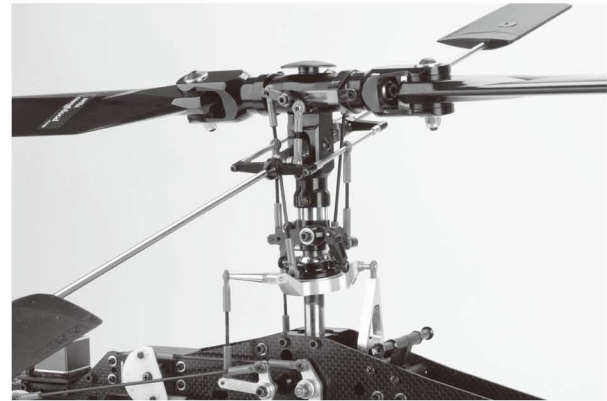
It is also possible to increase/reduce the travel of the throttle servo through the travel adjust function found in most computer radio systems. If this function is used, make sure the values for the high and low positions remain equal (same value for high/low). If these values are not equal, it will create a differential, or uneven movement of the throttle, making rotor rpm adjustment and fine-tuning more difficult.

CCPM SERVO CENTERING WITH THE SUB-TRIM FUNCTION

It may be necessary to make minor servo centering adjustments with the use of the sub-trim function to achieve the desired servo arm positions. Adjust the sub-trim percentages through the radio system as necessary to make the servo wheels center properly. With proper servo arm positioning, little to no sub trim will be required.

PITCH-TO-AILERON MIXING ADJUSTMENT WITH TRAVEL ADJUST

It is very possible that the travel of each servo varies slightly, which can cause the swashplate to be tilted to the left or right when the collective is moved to the extreme high and low pitch positions. This condition is generally more common when standard-type servos are used. If JR PROPO® digital servos are used, the adjustment required is generally very small, if any. These variations in travel can be corrected by altering the travel value of each servo slightly through the travel adjustment function. To check the pitch-to-aileron mixing, it will first be necessary to position the collective stick in the center position and make sure the swashplate is level. Next, move the collective stick from the center position to the high pitch position while viewing the swashplate from the rear of the model as shown in the diagram below. While moving the swashplate, look for any tendency for the swashplate to roll to the left or right as it reaches the high pitch position. Repeat this procedure several times to be sure that your observations are correct. If no rolling tendency is found, it will now be necessary to repeat this procedure from the center collective stick position to full low pitch. If no rolling tendency is found, proceed to the next step.



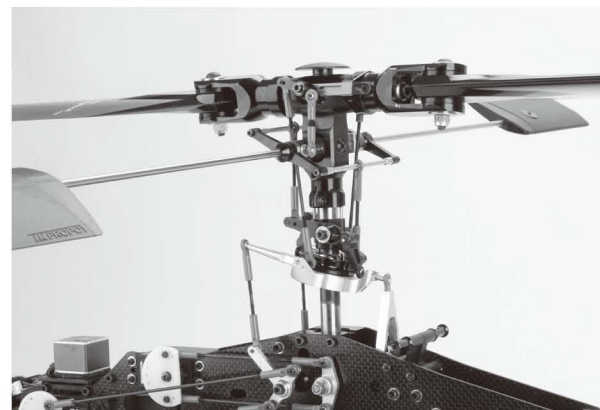
In our example, we have shown that the swashplate has been tilted to the left as the collective has been increased to full pitch. This would indicate that the left servo's maximum travel is less than the right servo's maximum travel.

In this condition, we suggest that the travel value for the left servo be increased slightly (5–10%). Repeat the procedure above if the same condition occurs, but to a lesser degree. The travel value of the right servo should be decreased slightly and retested. In most cases, it will require only the adjustment of the left or right servo to correct this situation. Once this condition has been corrected, repeat this procedure for the center-to-low collective pitch position and adjust as needed.

PITCH-TO-ELEVATOR MIXING ADJUSTMENT WITH TRAVEL ADJUST

The total travel of each servo can vary slightly, which can also cause the swashplate to be tilted fore and aft when the collective is moved to the extreme high and low pitch positions. This situation can also be corrected if necessary through the use of the travel adjustment function.

To check pitch-to-elevator mixing, it will first be necessary to position the collective stick in the center position as in the previous step. Next, move the collective stick from the center to the high pitch position while viewing the swashplate from the left side of the model. While moving the swashplate, look for any tendencies for the swashplate to tilt fore or aft as it reaches the high pitch positions. Repeat this procedure several times to be sure that your observations are correct. If no fore or aft tilting tendencies are found, it will now be necessary to repeat this procedure from the center collective stick position to full low pitch. If no tilting tendency is found, proceed to the next step.



In our example, we have shown that the swashplate has tilted backward as the collective has been increased to full high pitch. This would indicate that the top servo's maximum travel is less than that of the two left/right servos.

In this condition, we suggest that the travel value for the rear servo be increased slightly (5–10%). Repeat the above procedure and decrease the value as needed until the tilting tendency is eliminated. For information on the travel adjustment function, please refer to your radio's instruction manual for details. Once this condition has been corrected, repeat this procedure for the center-to-low collective pitch position and adjust as needed.

Note: *It is very important that during this step, only the travel value for the top servo (elevator) be adjusted to correct any pitch-to-elevator tendencies. If the travel value of the left or right servo changes, this will affect the pitch-to-aileron tendencies corrected in the previous step. If you feel that readjustment of the left and right servo travel is necessary, then it is suggested that the travel for each servo be increased or decreased at the same amount and the pitch-to-aileron procedure be retested.*

Now that the radio system is completely installed into the helicopter, it's necessary to check and adjust the following:

1. Servo Direction (Servo Reversing)

Check to ensure that all servos have been set to the correct direction.

2. Sub-Trim Settings

It's suggested that the correct neutral settings be achieved without the use of the Sub-Trim function, as this will affect the neutral position of the servos. Adjust the cyclic trim using the control rods until a neutral hover is achieved.

3. Pitch/Throttle Curve Adjustment

It is very important that the throttle and pitch curves are adjusted properly to achieve the best performance from your helicopter. When properly adjusted, the main rotor head rpm should remain consistent throughout all maneuvers and throttle stick positions. A constant rpm will also help to improve the effectiveness and accuracy of the tail rotor and gyro systems.

A) Pitch Curve

It will now be necessary to establish the maximum pitch value required for your application prior to adjustment. For example, if you are a 3D pilot, then your maximum negative pitch will be -12, and your maximum positive pitch will be +12.

The maximum pitch range that you will require will be 24° total. The maximum pitch range mentioned above must be established through the use of the pitch travel value in the CCPM function. As mentioned previously, do not try to establish the maximum pitch curve values through adjustment of the travel adjustment function, as this will alter the pitch-to-aileron and pitch-to-elevator travel values established earlier.

Please refer to the CCPM activation section for information on how to access the CCPM function. Once the CCPM function has been activated, set the maximum positive pitch settings as mentioned above. Since the CCPM function does not allow for independent travel settings for positive and negative pitch, it will be necessary to establish the maximum positive pitch, since this is generally the largest degree of pitch in the pitch range. Once the maximum positive pitch range is set, the maximum pitch range positive and negative can be reduced as needed through the pitch curve function. Set the main rotor pitch gauge to the desired maximum pitch setting, then increase or decrease the CCPM pitch travel (labeled Pitch or Ch 6) as needed until this pitch setting is achieved.

Once this procedure has been completed, the positive and negative pitch settings for each flight mode can be adjusted through the radio's pitch curve function. Please refer to your radio's instruction manual for more information.

PITCH RANGE AND CURVE SETTINGS

Note: Flight modes #1 and #2 are duplicated for safety.

Throttle Curve Settings

Below are examples of possible throttle curves during various flight conditions.

Since throttle curves can vary greatly due to engine and muffler combinations, it will be necessary to fine-tune and adjust these values during test flights to achieve a constant main rotor rpm.

It will also be necessary to set the correct idle speed of the engine when the throttle hold function is activated. This idle value is located within the throttle hold function. This will allow the engine to remain at idle when practicing autorotations.

Gyro Gain Adjustment (All Gyros)

Please refer to your Gyro's instruction manual for proper gain settings.

Gyro Direction

It will also be necessary to confirm the direction the gyro compensates when the body of the helicopter is rotated. To do this, turn the radio system on and suspend the helicopter by the main rotor head. Next, move the rudder stick to the right and watch the direction that the tail rotor servo arm travels. Now while watching the tail rotor servo arm, rotate the body of the helicopter counterclockwise. The servo arm should move in the same direction as when the rudder stick was moved to the right. If the arm moves in the opposite direction, reverse the gyro and re-test. Generally with the G770T Gyro, it will be necessary to reverse the direction of the gyro with the switch on the gyro.

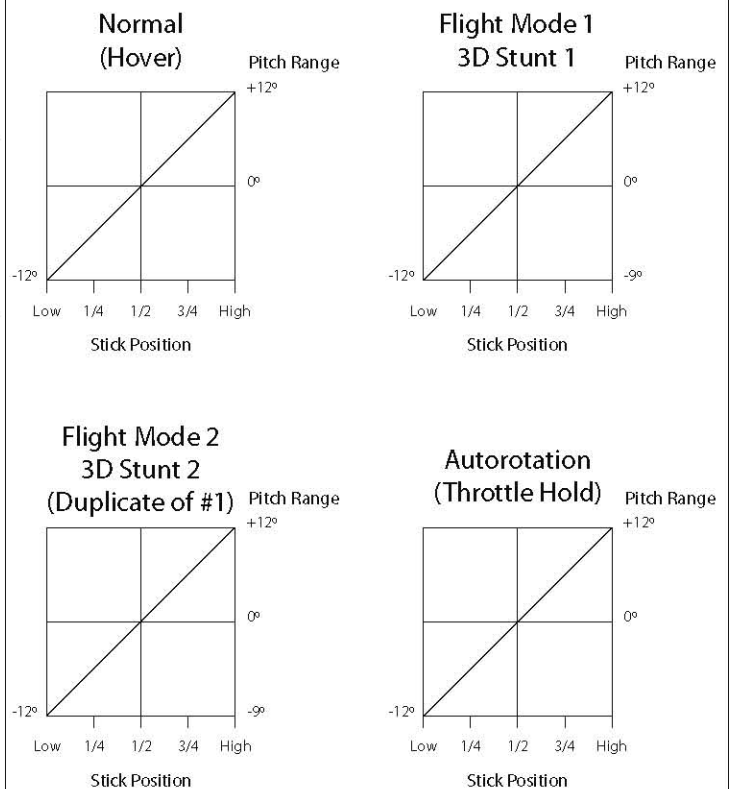
Governor Setting

Set the Governor settings as shown in the radio programming section. Set the throttle curve in normal mode as shown, then set the throttle curves in stunt 1 and 2 up to be a straight line at the top of the graph (+100%) and adjust the governor settings to adjust head speed. If not using a governor, you will need to set V-shaped throttle curves in stunt 1 and 2, with the throttle set to +100% at full negative and positive pitch, and 60% to 70% at center stick.

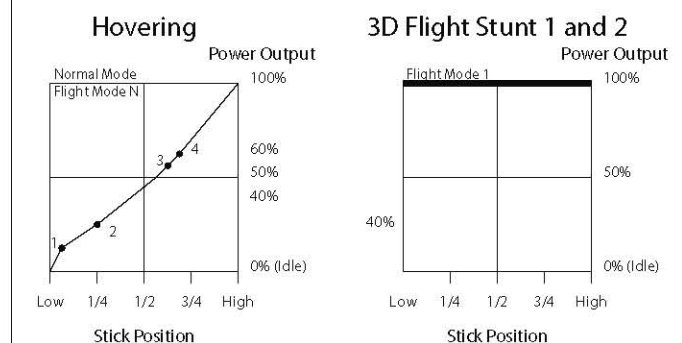
Pitch Range Settings

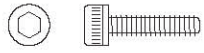
Flight Mode	Application	Low Pitch (Low Stick)	Hovering Pitch (Half Stick)	High Pitch (High Stick)
N	Hovering	-12°	0°	+12°
1	3D Flight #1	-12°	0°	+12°
*2	3D Flight #2	-12°	0°	+12°
H	Autorotation	-12°	0°	+12°

Pitch Curve Settings



Throttle Curve Settings

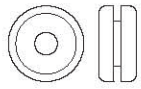




Socket Head Bolt, 3 x 12mm (2pcs)



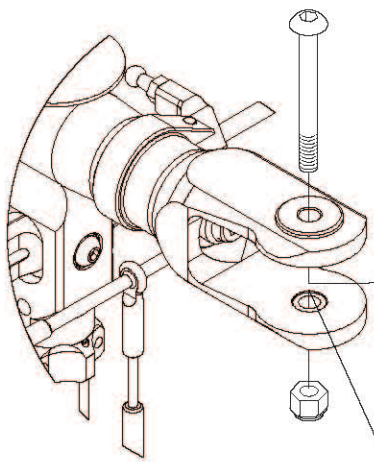
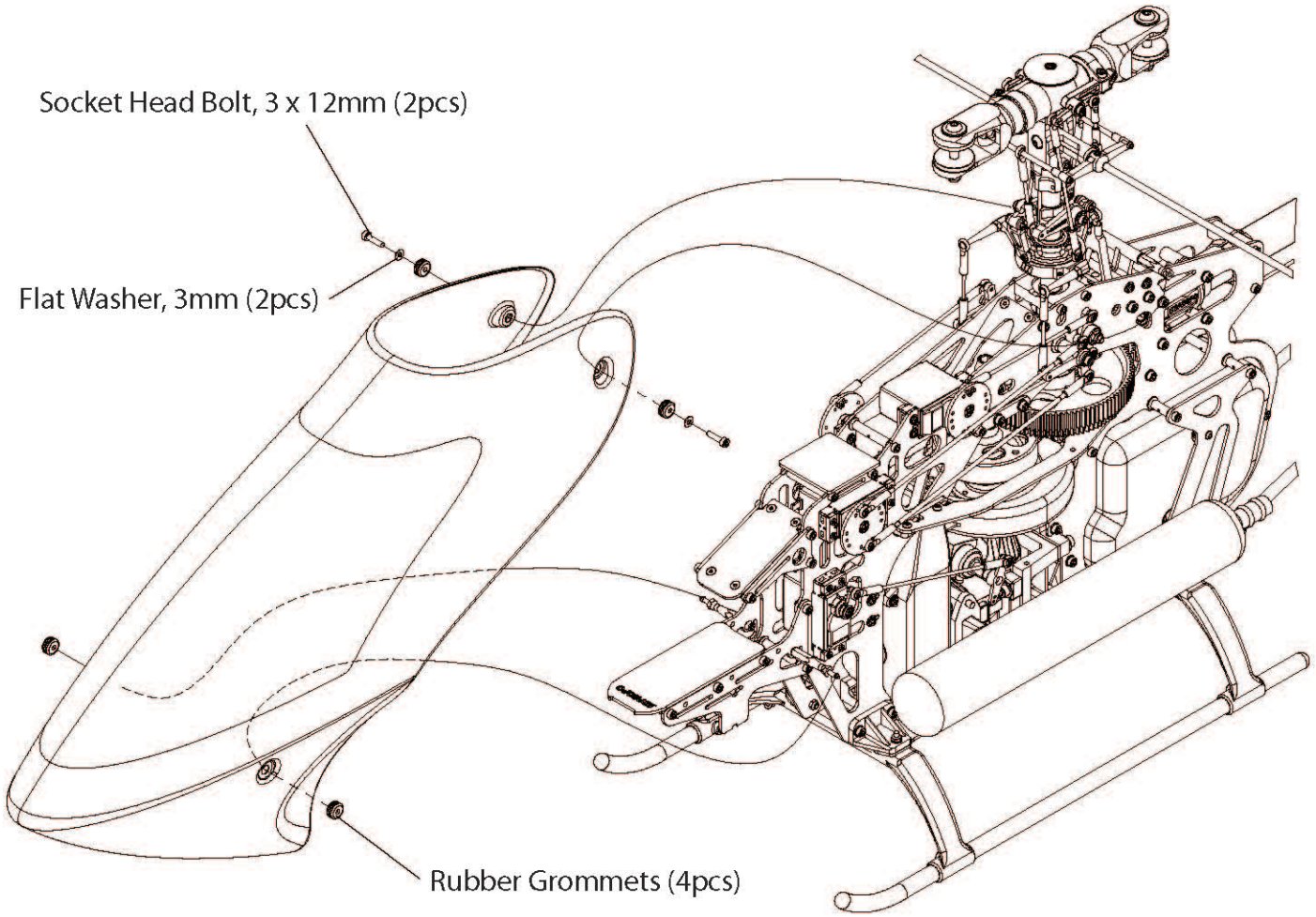
Flat Washer, 3mm (2pcs)



Rubber Grommets (4pcs)

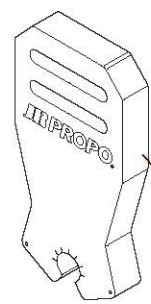
Tip: Carefully cut out decals from provided decal sheet. Use a spray bottle with two drops of dish soap and water to allow repositioning of the decals. Refer to the photos on the box for decal placement.

Check to ensure the body does not come in contact with any portion of the main frame, muffler, linkages, etc. Trim for clearance if necessary.



Screw the Long Shank Bolt into the nylon grips (at the tip of the Lock Nut). The Main Blades should be tightened so they can pivot when moderate pressure is applied. Don't allow the main blade to swing freely within the main blade holders. Tightening the Main Blades too much will cause precession vibration.

Main Rotor Blade
(not included)
12mm thick grips
Bolt hole : 5mm
Length : 680 - 720mm



Blade Holder

FINAL PREFLIGHT CHECK

Once all assemblies have been completed, please review the following suggestions before attempting initial flights.

- Review the instruction book and confirm that all assembly steps have been completed thoroughly.
- Check to ensure that all servos are operating smoothly and in the correct direction. Also verify that there is no binding in the control rods and that each servo horn is secured with a servo horn mounting screw.
- Check to ensure that all bolts and screws have been completely tightened and secured with threadlock where indicated.
- Verify that the gyro is operational and compensating in the correct direction.
- Make sure that both the transmitter and receiver have been fully charged (refer to your radio system instructions for proper charging procedures).
- Check to ensure that the throttle is working properly and in the correct direction.

BLADE TRACKING ADJUSTMENT

Blade tracking is an adjustment to the main rotor blade pitch that must be accomplished during the initial test flights.

Although the blade pitch angle in each blade may appear equal, it is still possible for a set of main rotor blades to run "out of track," making adjustment necessary.

Main rotor blades that are out of track with one another can cause vibration, instability and a loss of power due to additional drag.

On the initial flight, it will be necessary to increase the blade speed to just before lift-off rpm and view the rotor disc at eye level from a safe distance (approximately 15 to 20 feet (4.7 to 6 meters)).

Note which blade is running low (by colored tracking tape) and increase the pitch of the low blade one turn of the ball link at a time until each blade runs in track (on the same plane).

Please refer to the diagrams on the following page to identify the different tracking situations, as well as methods to mark each rotor blade for tracking identification.

BLADE TRACKING IDENTIFICATION

Out of Track
Incorrect
Adjustment is necessary.

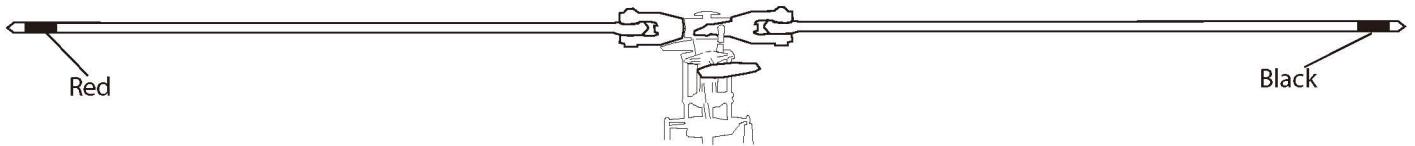


In Track
Correct
Adjustment is not necessary.

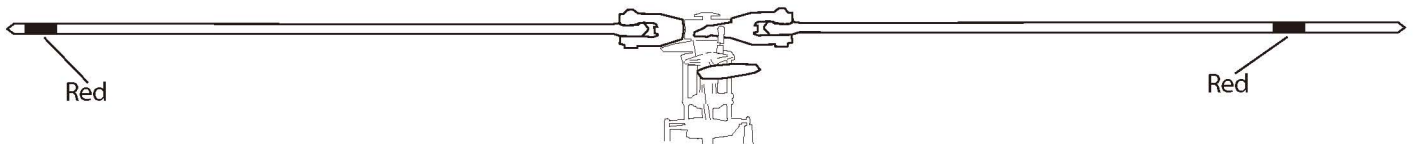


Caution: Be sure to maintain a safe distance from the helicopter (15 to 20 feet (4.7 to 6 meters) when tracking main rotor blades.

Blade Labeling for Tracking Purposes



A: Use two different blade tracking tape colors (e.g., black and red) at the tip of each main rotor blade.



B: Use the same color blade tracking tape located at different positions on each rotor blade.

Note: Adding additional blade tracking tape to the rotor blades at this stage will make it necessary to re-static balance the main rotor blades.

Engine

After each day of flying, fully drain the fuel tank. Then start the engine and let it idle until the engine and the fuel line are completely burned off. It is also suggested that an after-run oil be used to prevent premature engine corrosion.

Check All Nuts and Bolts

A helicopter is subject to high vibration during flight. It is important to check that all screws, nuts and bolts are properly secured after each day of flying. It is also suggested that you perform a “quick” inspection between each initial test flight for approximately the first 6 to 10 flights.

Main Rotor Head

Periodically check the main rotor head dampeners to maintain maximum rotor head performance.

When reassembling the main rotor head, apply a light coating of oil to the dampeners to prolong life.

It is also suggested at this time that the rotor head thrust bearings be lubricated using a high-speed grease. This will prolong the visibility of the thrust bearings.

Washout Base

Lubricate the washout base using light oil every 10–15 flights to ensure smooth operation and reduce wear. Inspect the washout base every 50–75 flights. If excessive wear is noted, replace as needed.

Tail Pitch Slider

Lubricate the tail pitch slider using light oil every 5–10 flights to ensure smooth operation and reduce wear.

Check Ball Link Wear

Check to ensure that all universal links fit freely but securely to the control balls. If there is excessive play noted, adjust and/or replace the universal link in question.

Battery Maintenance

Check to ensure that your batteries are properly mounted and charged. The most frequent cause of crashes (aside from pilot error) is battery failure or disconnection. Be certain that your batteries are fully charged and limit your flight time to 3 or 4 flights between charging. If more flight time is required, purchase a reliable quick field charger.

Cleaning

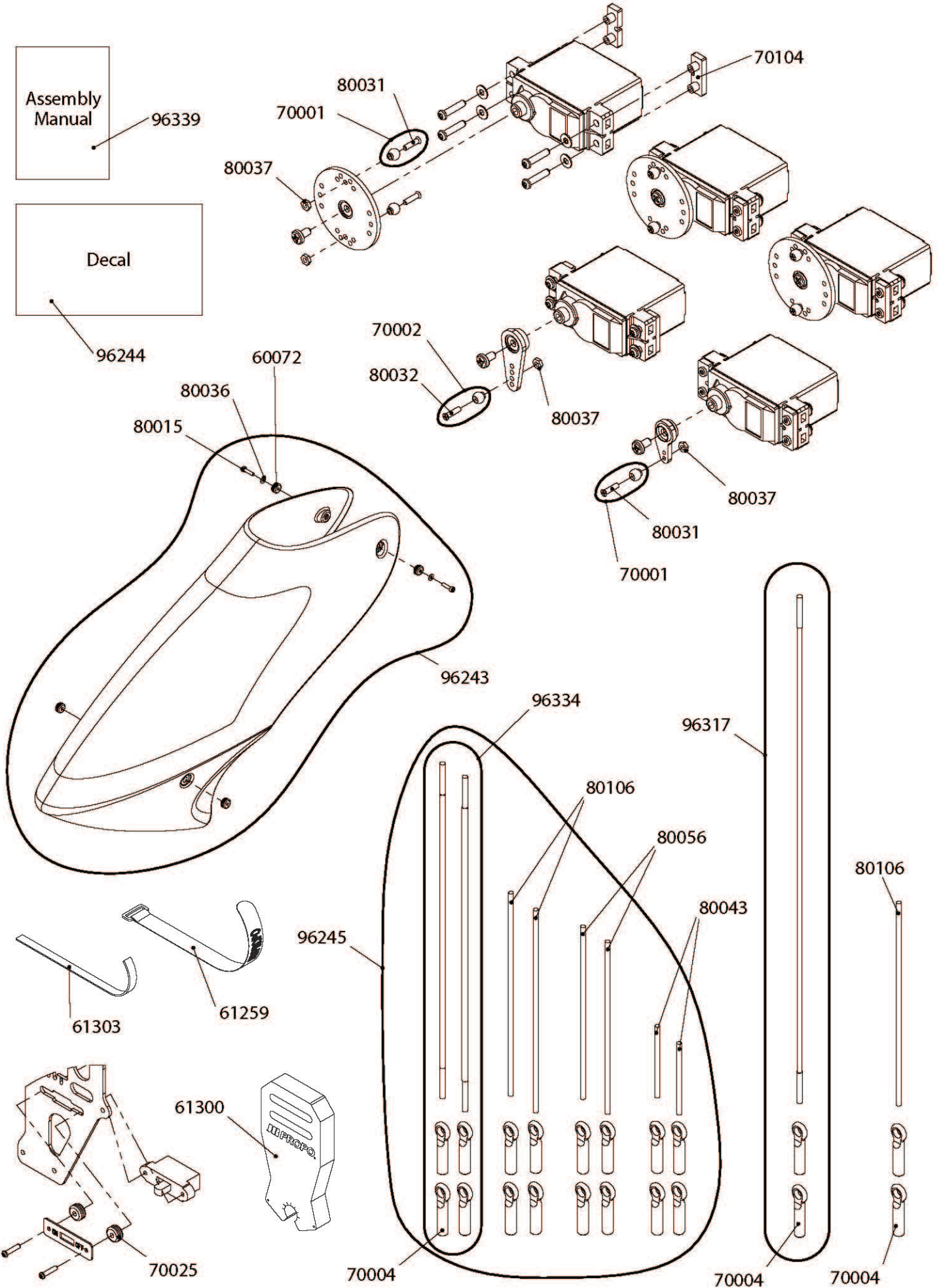
At the end of each flight or flying session, wipe down your helicopter with a clean towel or rag. This is also a good time to inspect all parts for tightness or fatigue. Remember, a clean, well-maintained helicopter will provide you with many hours of trouble-free flight.

Ball Links

Check ball links every 15–20 flights for increased play and looseness. Adjust the ball links using pliers to tighten the ball race if needed.



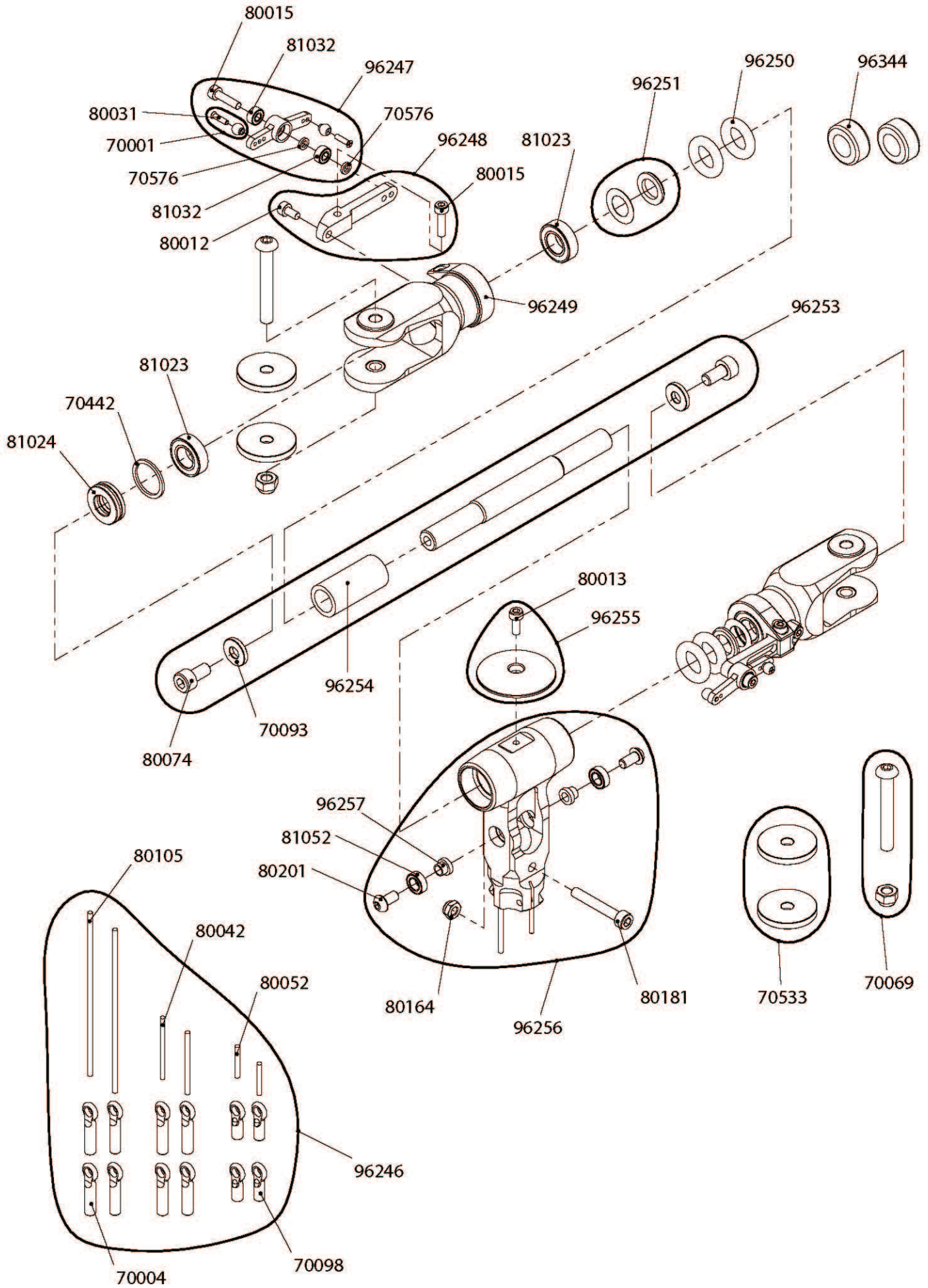
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60072	RUBBER GROMMET	4
61259	HOOK AND LOOP STRAP L	2
61300	BLADE HOLDER	1
61303	HOOK AND LOOP STRAP S	2
70001	JOINT BALLS, 2x8mm SCREWS	10
70002	JOINT BALLS, 2x10mm SCREWS	10
70004	UNIVERSAL BALL LINK: ALL	10
70025	SWITCH DAMPER RUBBER	4
70104	SERVO MOUNTING PLATE	10
80015	SOCKET HEAD BOLTS, 3x12mm	10
80031	FLAT HEAD SCREWS, 2x8mm	10
80032	FLAT HEAD SCREWS, 2x10mm	10
80036	PLATE WASHERS, 3mm	10
80037	HEX NUTS, 2mm	10
80043	CONTROL ROD, 2.3x35mm	2
80056	CONTROL ROD, 2.3x85mm	2
80106	CONTROL ROD, 2.3x100mm	2
96243	FRP BODY SET VIBE 90SG	1
96244	DECAL VIBE 90SG	1
96245	LINKAGE SET CCPM	1
96317	TAIL CONTROL ROD, L250	1
96334	ELEVATOR CONTROL ROD, 2.5x165mm	1
96339	ASSEMBLY MANUAL VIBE 90SG	1

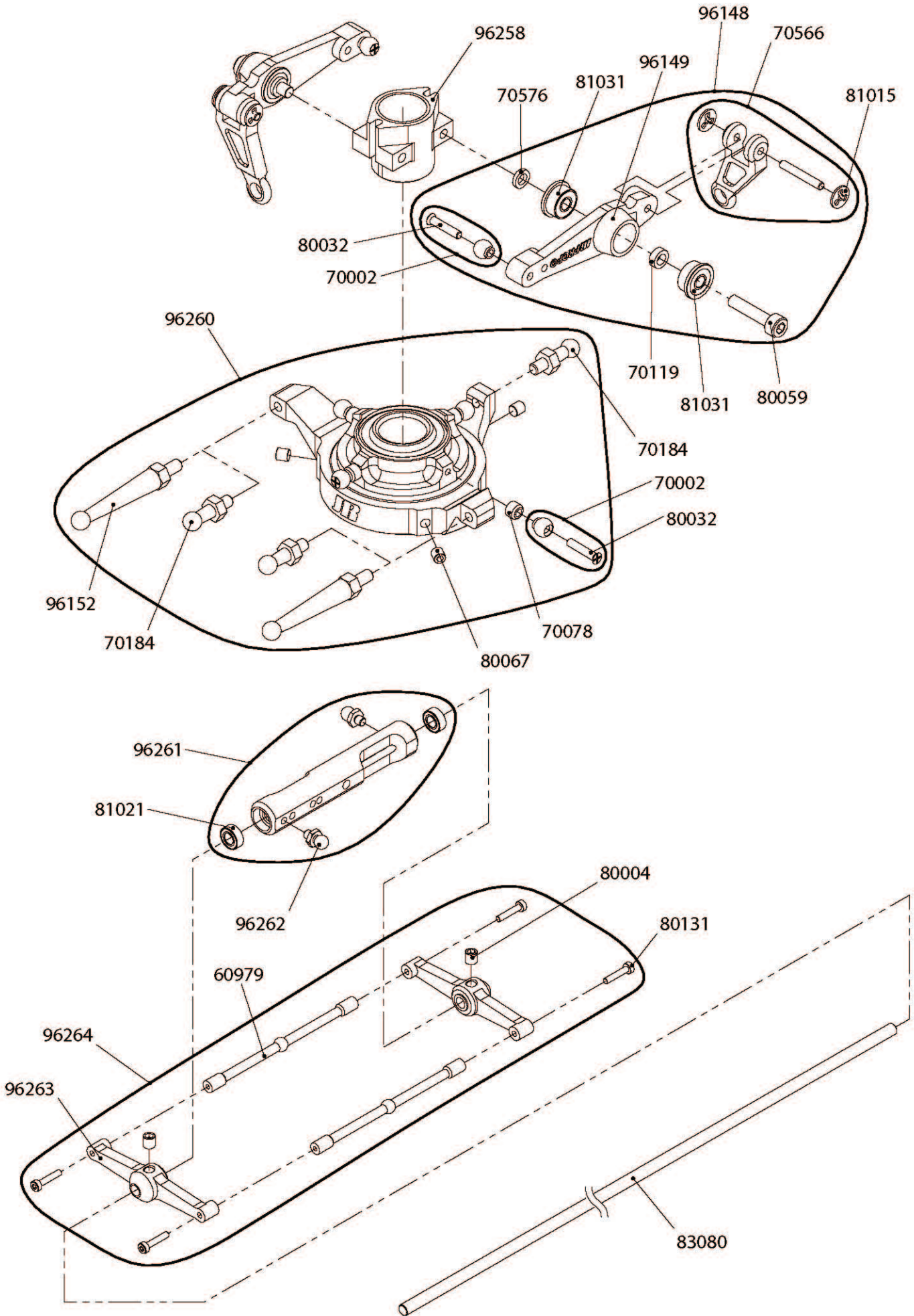
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
70004	UNIVERSAL BALL LINK: ALL	10
70069	BLADE BOLT SET	2
70093	SPINDLE SHAFT WASHER	2
70098	UNIVERSAL BALL LINK (SHORT)	5
70001	JOINT BALLS, 2x8mm SCREWS	10
70442	THRUST WASHER	2
70533	ROTOR SPACER, t3.0	4
70576	WASHER, 3x4.5x1mm	2
80012	SOCKET HEAD BOLTS, 3x6mm	10
80013	SOCKET HEAD BOLTS, 3x8mm	10
80015	SOCKET HEAD BOLTS, 3x12mm	10
80031	FLAT HEAD SCREWS, 2x8mm	10
80042	CONTROL ROD, 2.3x30mm	2
80052	CONTROL ROD, 2.3x15mm	2
80074	SOCKET HEAD BOLTS, 5x10mm	10
80105	CONTROL ROD, 2.3x80mm	2
80164	NYLON LOCK NUT, 4mm (t3.8)	10
80181	SPECIAL SOCKET HEAD BOLT, 4x26mm	2
80201	BUTTON HEAD BOLTS, 4x8mm	10
81023	BEARING, SEALED, 9x17x5mm	2
81024	THRUST BEARING, 9x17x5mm	1
81032	BEARING, SEALED, 3x7x3mm	2
81052	BEARING, SEALED, 5x9x3mm	2
96246	LINKAGE SET ROTOR HEAD	1
96247	MIXING ARM SET w/BEARING	1
96248	PITCH ARM	1
96249	MAIN BLADE HOLDER	2
96250	DAMPER O-RING, 10x18x4mm	4
96251	GRIP SPACER SET	2
96253	BLADE SPINDLE SHAFT	1
96254	SPINDLE SHAFT TUBE	1
96255	HEAD BUTTON	1
96256	MAIN ROTOR HUB	1
96257	SEESAW SPACER COLLAR	2
96344	DAMPER RUBBER 90°	2

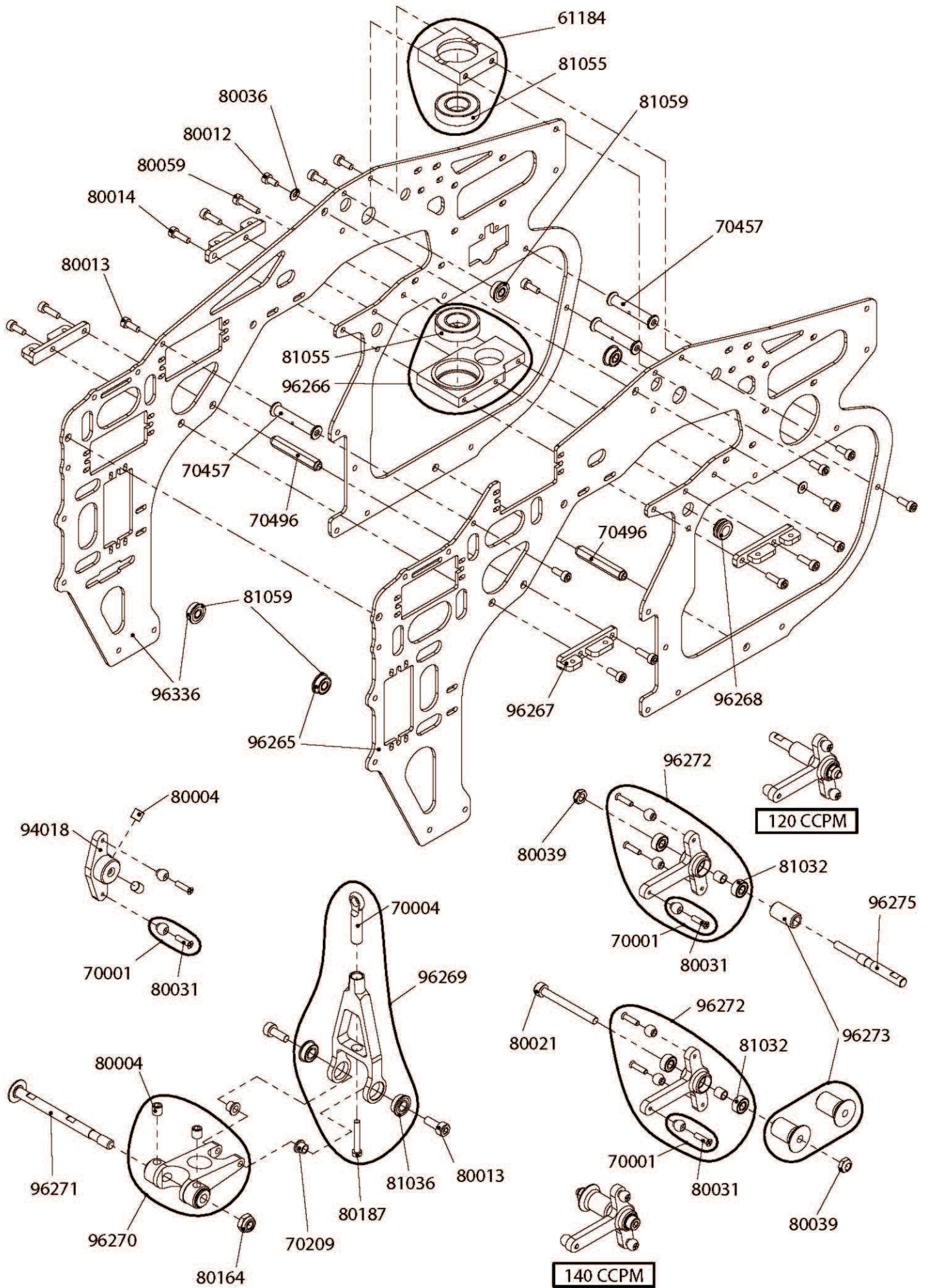
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60979	FLYBAR ARM B	2
70002	JOINT BALLS, 2x10mm SCREWS	10
70078	CONTROL BALL SPACER, 2.75mm	2
70119	SPACER, 3x5x1.8mm	2
70184	BALL ARM, 9mm	1
70566	WASHOUT LINK B	2
70576	WASHER, 3x4.5x1mm	2
80004	SETSCREWS, 4x4mm	10
80032	FLAT HEAD SCREWS, 2x10mm	10
80059	SOCKET HEAD BOLTS, 3x14mm	10
80067	SETSCREWS, 3x3mm	10
80131	SOCKET HEAD BOLTS, 2x10mm	10
81015	CA STOPPER RING, 2mm	10
81021	BEARING, SEALED, 4x8x3mm	2
81031	BEARING, SEALED, F3x8x4mm	2
83080	FLYBAR, 4x520mm	2
96148	WASHOUT ARM SET w/BEARING	1
96149	WASHOUT ARM	2
96152	LONG CONTROL BALL	1
96258	WASHOUT BASE METAL	1
96260	120/140 ALUMINUM SWASHPLATE	1
96261	SEESAW SHAFT w/BEARING	1
96262	BALL ARM L4C, 4mm	2
96263	FLYBAR ARM A	2
96264	FLYBAR ARM A/B SET	1

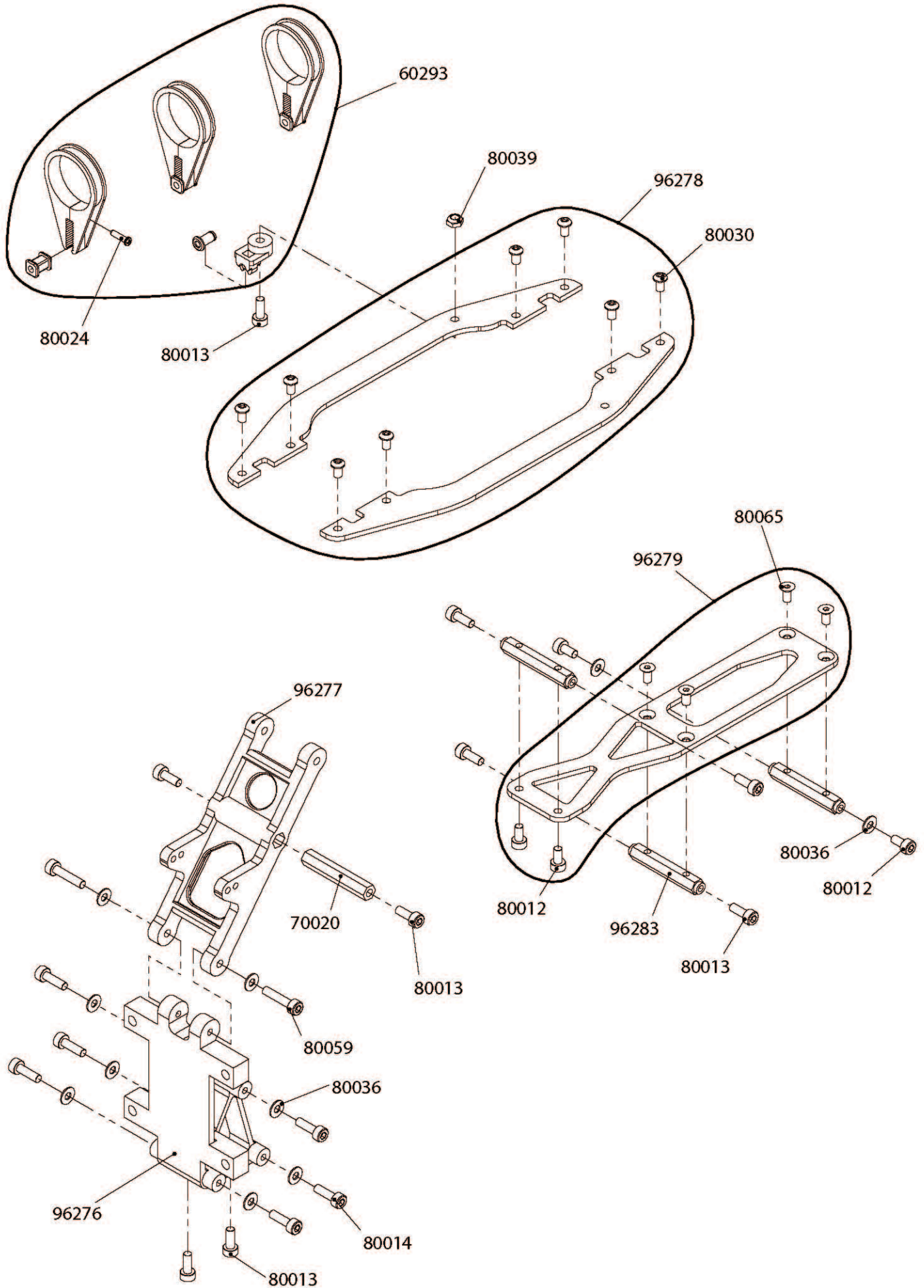
REPLACEMENT PARTS LISTING





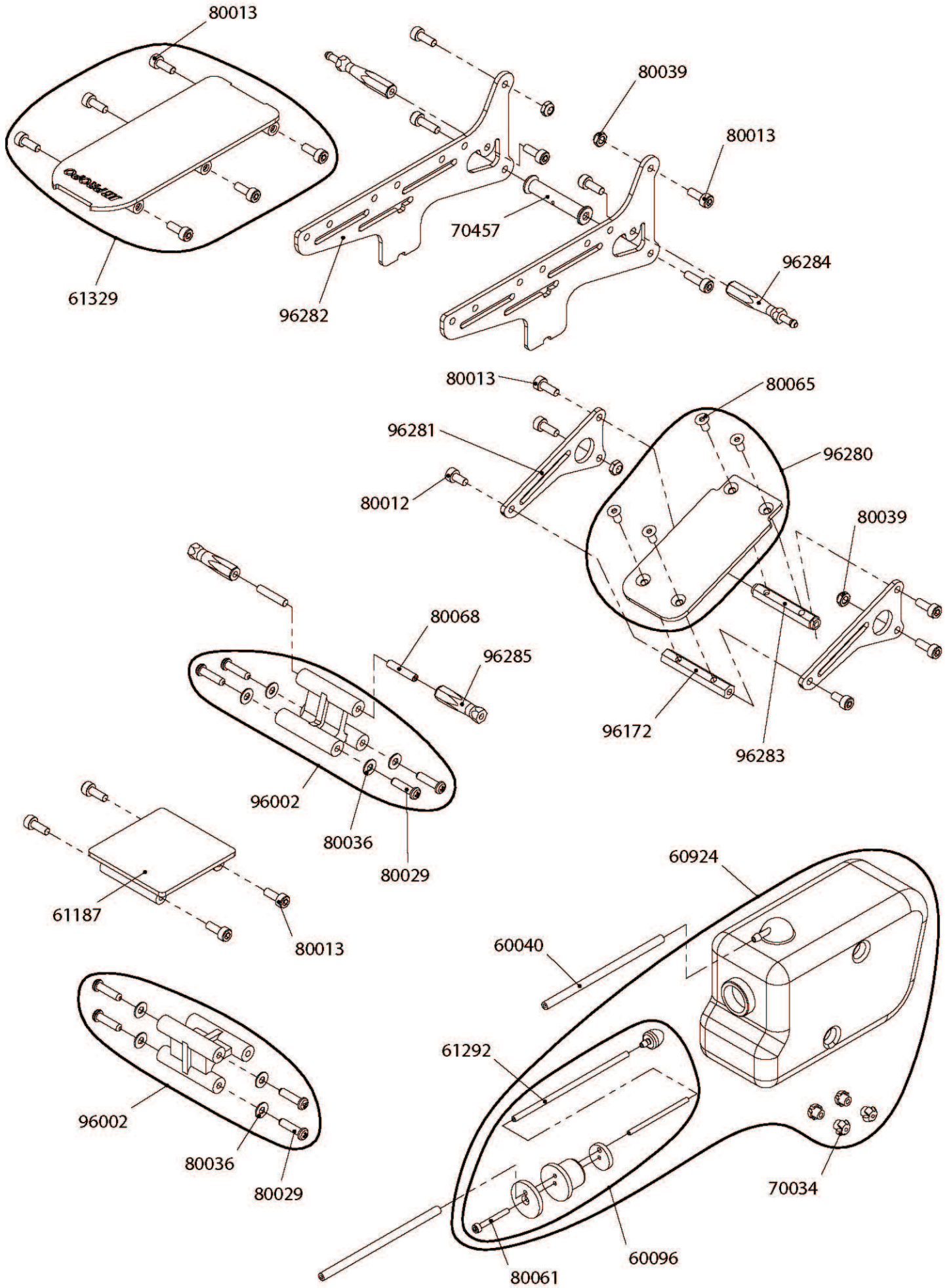
Item #	Description	Quantity
61184	BEARING BLOCK w/BEARING, 12x24x6mm	1
70001	JOINT BALLS, 2x8mm SCREWS	10
70004	UNIVERSAL BALL LINK: ALL	10
70209	CCPM A-ARM COLLAR	2
70457	CROSS MEMBER, 32mm	2
70496	CROSS MEMBER w/STEPS, 32mm	2
80004	SETSCREWS, 4x4mm	10
80012	SOCKET HEAD BOLTS, 3x6mm	10
80013	SOCKET HEAD BOLTS, 3x8mm	10
80014	SOCKET HEAD BOLTS, 3x10mm	10
80021	SOCKET HEAD BOLTS, 3x30mm	10
80031	FLAT HEAD SCREWS, 2x8mm	10
80036	PLATE WASHERS, 3mm	10
80039	NYLON LOCK NUT, 3mm (t2.8)	10
80059	SOCKET HEAD BOLTS, 3x14mm	10
80164	NYLON LOCK NUT, 4mm (t3.8)	10
80187	SOCKET HEAD BOLTS, 2.3x15mm	5
81032	BEARING, SEALED, 3x7x3mm	2
81036	BEARING, SEALED, F4x8x3mm	2
81055	BEARING, SEALED, 12x24x6mm	1
81059	BEARING, SEALED, F4x10x4mm	2
94018	ELEVATOR CONTROL ARM	1
96265	MAIN FRAME LEFT, w/BEARING	1
96266	BEARING BLOCK MS LOWER, w/BEARING	1
96267	FRAME BRACE MOUNT	2
96268	SILICONE TUBE GROMMET	2
96269	ELEVATOR A-ARM	1
96270	ELEVATOR A-ARM BASE	1
96271	BASE SPINDLE SHAFT	1
96272	T-ARM LEVER	1
96273	CCPM LEVER SPACER SET	1
96275	PIVOT PIN 120CCPM	2
96336	MAIN FRAME RIGHT, w/BEARING	1

REPLACEMENT PARTS LISTING



Item #	Description	Quantity
60293	TAIL ROD GUIDE SET: ALL JR	4
70020	CROSS MEMBER, 32mm	2
80012	SOCKET HEAD BOLTS, 3x6mm	10
80013	SOCKET HEAD BOLTS, 3x8mm	10
80014	SOCKET HEAD BOLTS, 3x10mm	10
80024	SELF-TAPPING SCREWS, 2x8mm	10
80030	BUTTON HEAD BOLTS, 3x5mm	10
80036	PLATE WASHERS, 3mm	10
80039	NYLON LOCK NUT, 3mm (t2.8)	10
80059	SOCKET HEAD BOLTS, 3x14mm	10
80065	FLAT HEAD BOLTS, 3x6mm	10
96276	ENGINE MOUNT BLOCK	1
96277	FRAME SUPPORT	1
96278	FRAME BRACE PLATE	1
96279	FRAME SUPPORT PLATE	1
96283	CROSS MEMBER w/STEPS L32P20	2

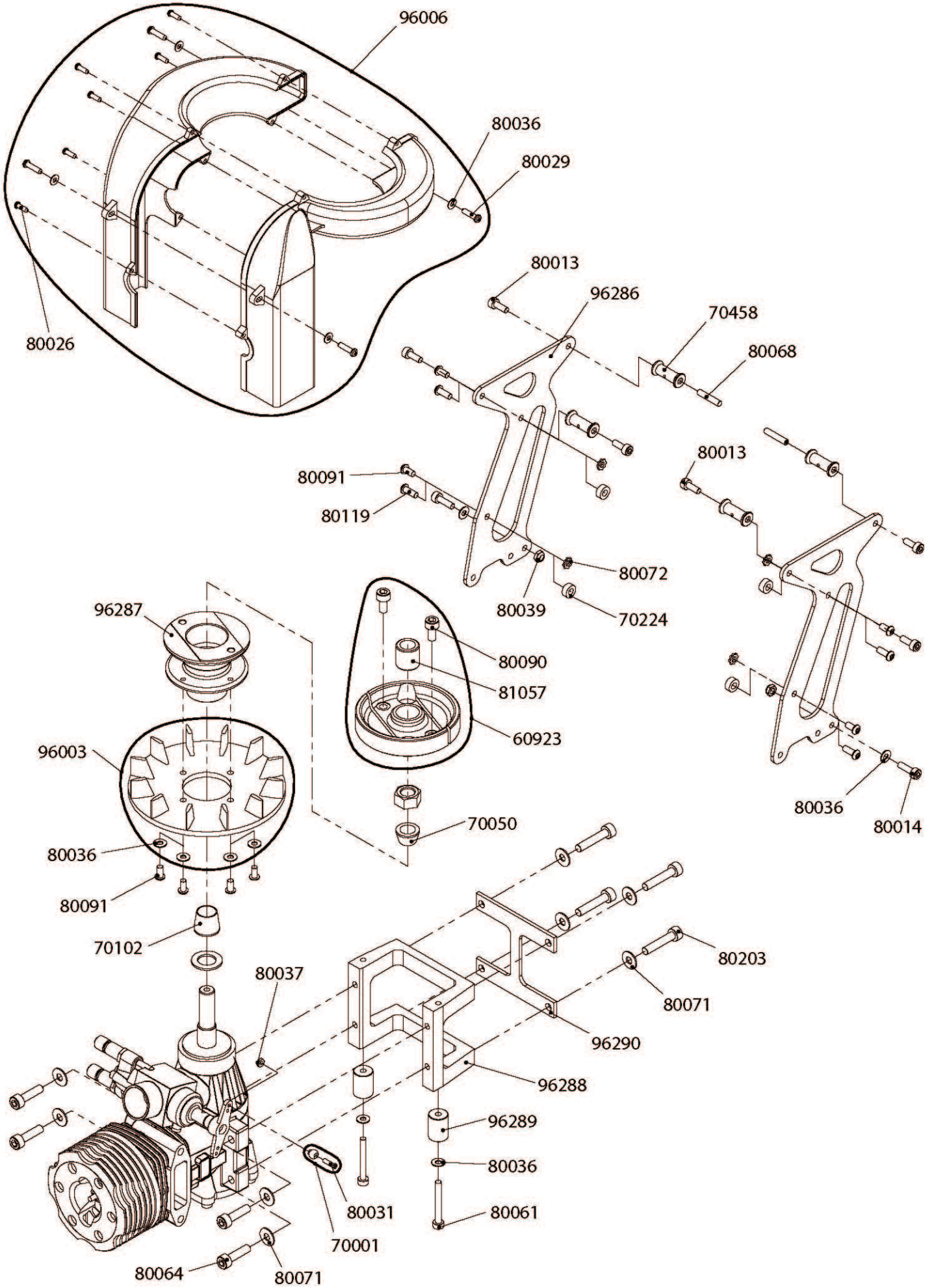
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60040	SILICONE FUEL TUBE 2.5x5x1000	1
60096	TANK CAP SET	1
60924	FUEL TANK SET (600cc)	1
61187	GYRO MOUNT	1
61292	SILICONE FUEL TUBE 2.5x3.6x150	1
61329	FRONT BED	1
70034	FUEL TANK HOLDER	4
70457	CROSS MEMBER, 32mm	2
80012	SOCKET HEAD BOLTS, 3x6mm	10
80013	SOCKET HEAD BOLTS, 3x8mm	10
80029	SELF-TAPPING SCREWS, 3x12mm	10
80036	PLATE WASHERS, 3mm	10
80039	NYLON LOCK NUT, 3mm (t2.8)	10
80061	SOCKET HEAD BOLTS, 3x25mm	10
80065	FLAT HEAD BOLTS, 3x6mm	10
80068	SETSCREWS, 3x15mm	10
96002	COOLING SHROUD BRACKETS	2
96172	FRONT BED MOUNT	3
96280	TOP TRAY	1
96281	TOP TRAY FRAME	2
96282	LOWER TRAY FRAME	2
96283	CROSS MEMBER w/STEPS L32P20	2
96284	BODY CATCH, 29mm	2
96285	BODY CATCH, 24mm	2

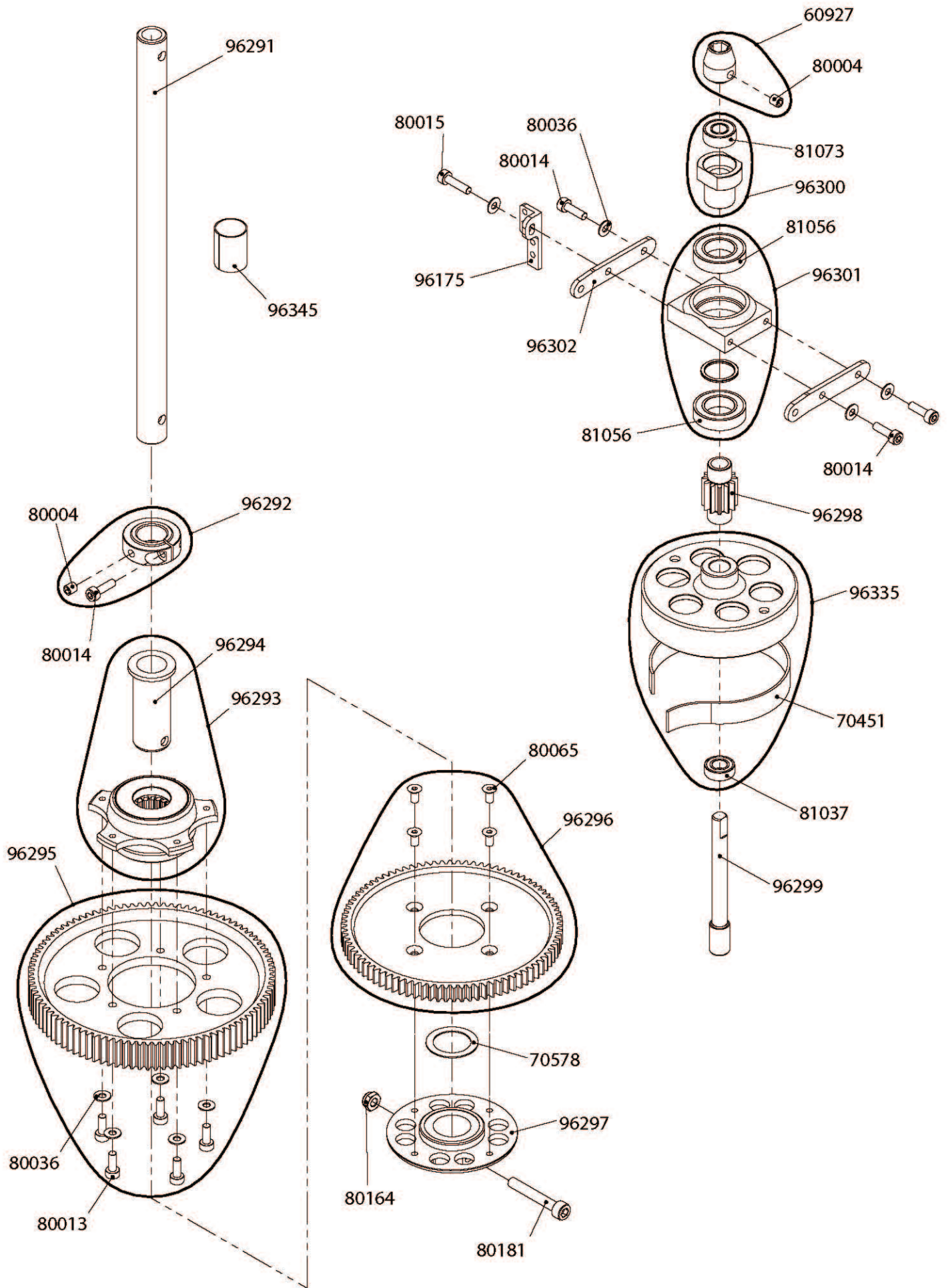
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60923	CLUTCH ASSEMBLY	1
70001	JOINT BALLS, 2x8mm SCREWS	10
70050	TAPER COLLET UB	1
70102	TAPER COLLET LC	1
70224	SPACER, 3mm	2
70458	CROSS MEMBER, 17mm (THREADED)	4
80013	SOCKET HEAD BOLTS, 3x8mm	10
80014	SOCKET HEAD BOLTS, 3x10mm	10
80026	SELF-TAPPING SCREWS, 2.6x8mm	10
80029	SELF-TAPPING SCREWS, 3x12mm	10
80031	FLAT HEAD SCREWS, 2x8mm	10
80036	PLATE WASHERS, 3mm	10
80039	NYLON LOCK NUT, 3mm (t2.8)	10
80061	SOCKET HEAD BOLTS, 3x25mm	10
80064	SOCKET HEAD BOLTS, 4x15mm	10
80068	SETSCREWS, 3x15mm	10
80071	PLATE WASHERS, 4mm	10
80072	LOCK WASHER, 3mm	10
80090	SOCKET HEAD BOLTS, 4x8mm	10
80091	BUTTON HEAD BOLTS, 3x6mm	10
80119	BUTTON HEAD BOLTS, 3x8mm	10
80203	SOCKET HEAD BOLTS, 4x20mm	10
81057	ONE-WAY BEARING, 8x12x12mm	1
96003	COOLING FAN BLADES	1
96006	COOLING FAN SHROUD	1
96286	TANK FRAME	2
96287	COOLING FAN HUB	1
96288	ENGINE MOUNT	1
96289	SPACER, 3x10x14mm	2
96290	MOUNT BLOCK SPACER (T96)	1

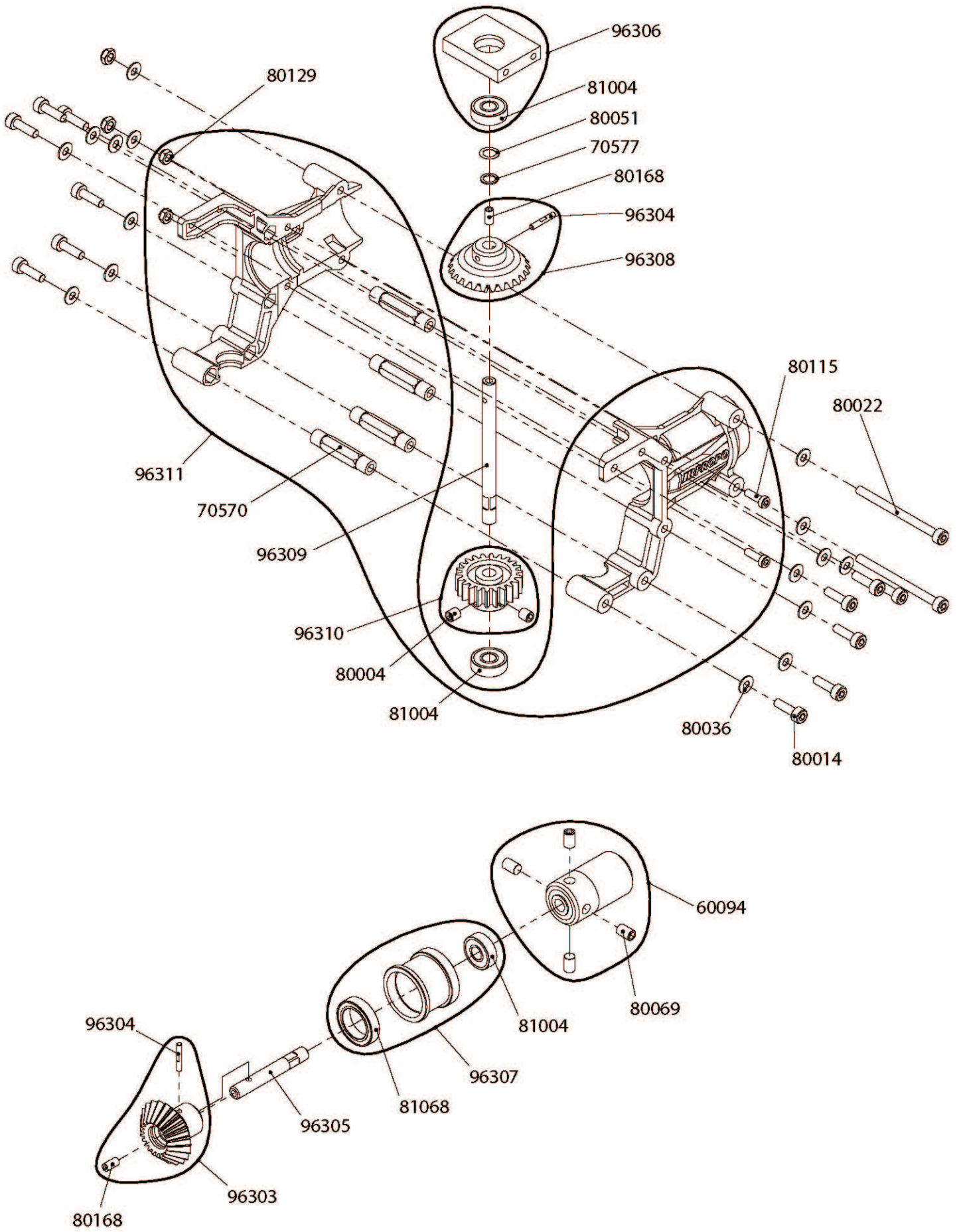
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60927	STARTER HEX ADAPTER	1
70451	CLUTCH LINING	1
70578	WASHER, 15x21x0.5mm	2
80004	SETSCREWS, 4x4mm	10
80013	SOCKET HEAD BOLTS, 3x8mm	10
80014	SOCKET HEAD BOLTS, 3x10mm	10
80015	SOCKET HEAD BOLTS, 3x12mm	10
80036	PLATE WASHERS, 3mm	10
80065	FLAT HEAD BOLTS, 3x6mm	10
80164	NYLON LOCK NUT, 4mm (t3.8)	10
80181	SPECIAL SOCKET HEAD BOLTS, 4x26mm	2
81037	BEARING, SEALED, 6x12x4mm	2
81056	BEARING, SEALED, 12x21x5mm	1
81073	BEARING, SEALED, 6x13x5mm	2
96175	GOVERNOR MOUNT	1
96291	MAIN SHAFT	1
96292	MAIN SHAFT COLLAR	1
96293	AUTOROTATION UNIT	1
96294	AUTOROTATION SLEEVE	1
96295	MAIN DRIVE GEAR T96	1
96296	TAIL DRIVE GEAR T86	1
96297	TAIL DRIVE GEAR HUB	1
96298	PINION GEAR T12	1
96299	START SHAFT	1
96300	START SHAFT TOP BEARING BLOCK	1
96301	START SHAFT BEARING BLOCK	1
96302	PINION MESH PLATE (T96)	2
96335	CLUTCH BELL ASSEMBLY	1
96345	SWASHPLATE LIMITER	1

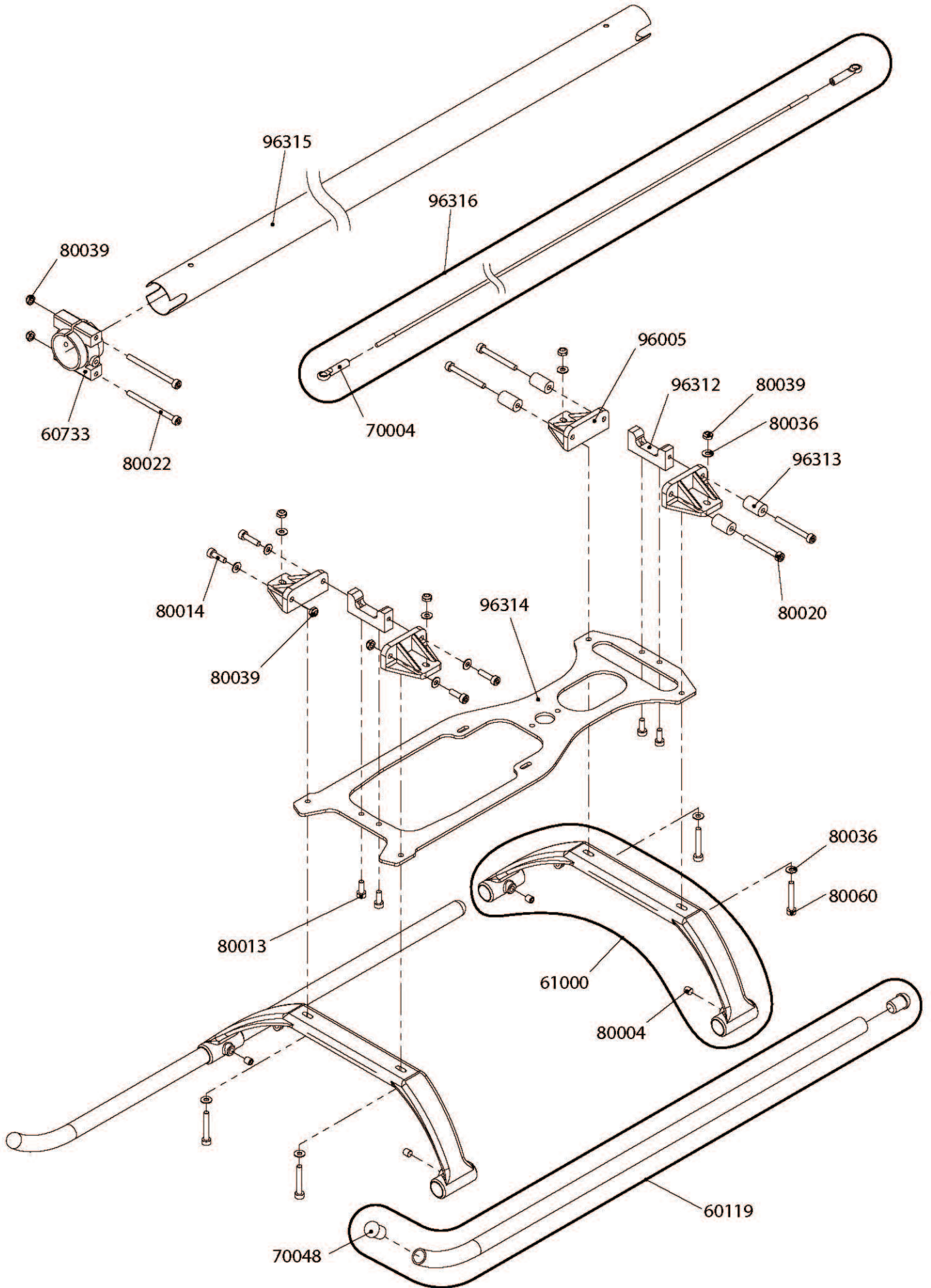
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60094	TAIL DRIVE JOINT	1
70570	CROSS MEMBER, 28mm	2
70577	WASHER, 5x7x0.5mm	2
80004	SETSCREWS, 4x4mm	10
80014	SOCKET HEAD BOLTS, 3x10mm	10
80022	SOCKET HEAD BOLTS, 3x40mm	10
80036	PLATE WASHERS, 3mm	10
80051	POLY SLIDER, t0.13	10
80069	SETSCREWS, 4x6mm	10
80115	SOCKET HEAD BOLTS, 2.6x8mm	10
80129	NYLON LOCK NUT, 2.6mm	10
80168	SETSCREWS, 3x6mm	10
81004	BEARING, SEALED, 5x13x4mm	2
81068	BEARING, SEALED, 12x18x4mm	1
96303	BEVEL GEAR T21	1
96304	BEVEL GEAR PIN	2
96305	BEVEL GEAR SHAFT	1
96306	TAIL PINION UNIT BEARING CASE A	1
96307	TAIL PINION UNIT BEARING CASE B	1
96308	BEVEL GEAR T25	1
96309	TAIL PINION SHAFT	1
96310	TAIL PINION GEAR T22	1
96311	TAIL PINION UNIT CASE LFT/RT	1

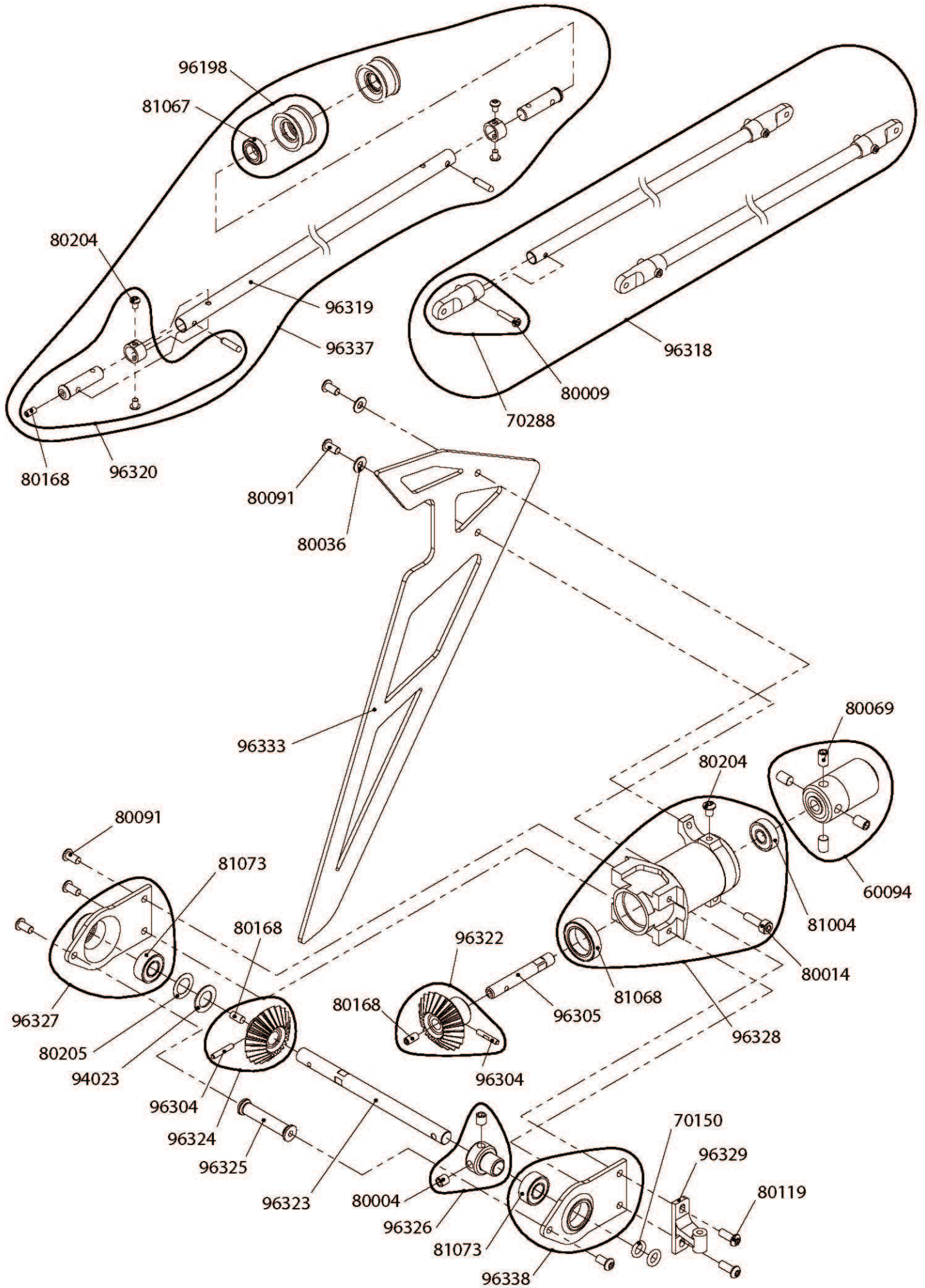
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60119	LANDING SKIDS	2
60733	TAIL BOOM HOLDER	2
61000	LOW PROFILE LANDING STRUT	2
70004	UNIVERSAL BALL LINK: ALL	10
70048	LANDING SKID CAP	4
80004	SETSCREWS, 4x4mm	10
80013	SOCKET HEAD BOLTS, 3x8mm	10
80014	SOCKET HEAD BOLTS, 3x10mm	10
80020	SOCKET HEAD BOLTS, 3x28mm	10
80022	SOCKET HEAD BOLTS, 3x40mm	10
80036	PLATE WASHERS, 3mm	10
80039	NYLON LOCK NUT, 3mm (t2.8)	10
80060	SOCKET HEAD BOLTS, 3x20mm	10
96005	LANDING STRUT MOUNT	4
96312	FRAME LOWER BRACKET	1
96313	SPACER, 3x8x13mm	2
96314	BOTTOM FRAME PLATE	1
96315	TAIL BOOM, 808mm	1
96316	TAIL CONTROL ROD, 785mm	1

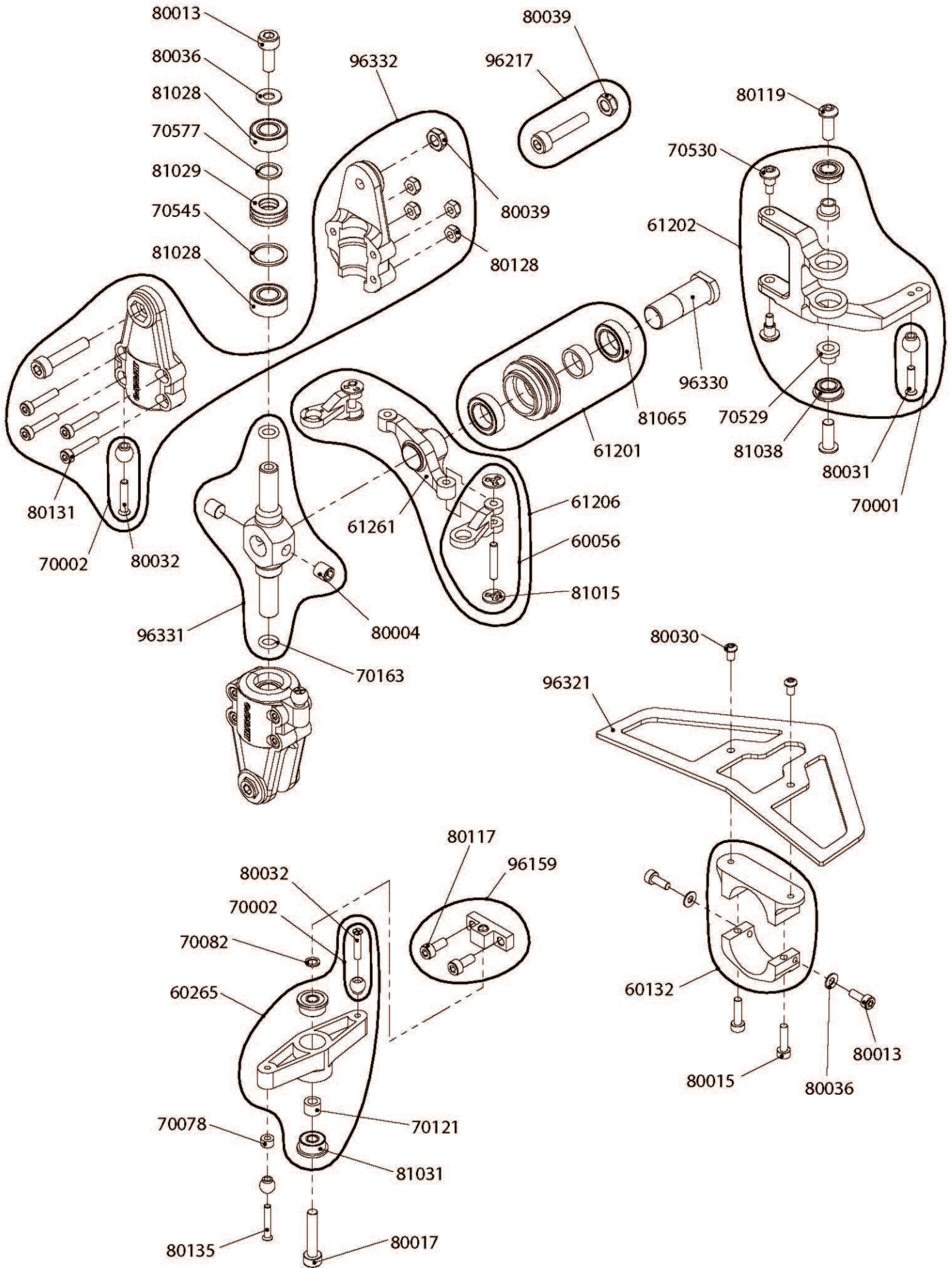
REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60094	TAIL DRIVE JOINT	1
70150	O-RING, 5x7x1mm	2
70288	TAIL BRACE CONNECTOR (60)	4
80004	SETSCREWS, 4x4mm	10
80009	SOCKET HEAD BOLTS, 2.6x12mm	10
80014	SOCKET HEAD BOLTS, 3x10mm	10
80036	PLATE WASHERS, 3mm	10
80069	SETSCREWS, 4x6mm	10
80091	BUTTON HEAD BOLTS, 3x6mm	10
80119	BUTTON HEAD BOLTS, 3x8mm	10
80168	SETSCREWS, 3x6mm	10
80204	BUTTON HEAD BOLTS, 3x4mm	10
80205	POLY SLIDER, 6x9.5x0.13mm	10
81004	BEARING, SEALED, 5x13x4mm	2
81067	BEARING, SEALED, 8x14x4mm	2
81068	BEARING, SEALED, 12x18x4mm	1
81073	BEARING, SEALED, 6x13x5mm	2
94023	WASHER, 6x10x0.5mm	2
96198	SHAFT DRIVE GUIDE	1
96304	BEVEL GEAR PIN	2
96305	BEVEL GEAR SHAFT	1
96318	TAIL BRACE SET	1
96319	TAIL DRIVE SHAFT	1
96320	DRIVE SHAFT INSERT SET	2
96322	BEVEL GEAR T22 INPUT	1
96323	TAIL OUTPUT SHAFT	1
96324	BEVEL GEAR T22 OUTPUT	1
96325	TAIL GEAR CASE CROSS MEMBER	1
96326	TAIL OUTPUT SHAFT STOPPER	1
96327	TAIL GEAR CASE PLATE LEFT, w/BEARING	1
96328	TAIL GEAR CASE ASSEMBLY	1
96329	TAIL PITCH BASE	1
96333	VERTICAL FIN	1
96337	TAIL DRIVE SHAFT SET	1
96338	TAIL GEAR CASE PLATE RIGHT, w/BEARING	1

REPLACEMENT PARTS LISTING





Item #	Description	Quantity
60056	TAIL PITCH LINK	2
60132	ALUMINUM TAIL SUPPORT CLAMP	1
60265	MIXING LEVER w/BEARING	1
61201	TAIL SLIDE RING	1
61202	TAIL PITCH CONTROL LEVER SET	1
61206	TAIL PITCH PLATE SET	1
61261	TAIL PITCH PLATE	1
70001	JOINT BALLS, 2x8mm SCREWS	10
70002	JOINT BALLS, 2x10mm SCREWS	10
70078	CONTROL BALL SPACER, 2.75mm	2
70082	WASHER, 3x4.5x0.4mm	10
70121	SPACER, 3x5x3.8mm	2
70163	TAIL HUB O-RING, 3.5x5.5x1mm	2
70529	TAIL PC BEARING COLLAR	2
70530	TAIL PC SLIDE BOLT	2
70545	WASHER, 8x10x0.5mm	2
70577	WASHER, 5x7x0.5mm	2
80004	SETSCREWS, 4x4mm	10
80013	SOCKET HEAD BOLTS, 3x8mm	10
80015	SOCKET HEAD BOLTS, 3x12mm	10
80017	SOCKET HEAD BOLTS, 3x16mm	10
80030	BUTTON HEAD BOLTS, 3x5mm	10
80031	FLAT HEAD SCREWS, 2x8mm	10
80032	FLAT HEAD SCREWS, 2x10mm	10
80036	PLATE WASHERS, 3mm	10
80039	NYLON LOCK NUT, 3mm (t2.8)	10
80117	SOCKET HEAD BOLTS, 2.6x6mm	10
80119	BUTTON HEAD BOLTS, 3x8mm	10
80128	NYLON LOCK NUT, 2mm	10
80131	SOCKET HEAD BOLTS, 2x10mm	10
80135	FLAT HEAD SCREWS, 2x12mm	10
81015	CA STOPPER RING, 2mm	10
81028	BEARING, SEALED, 5x10x4mm	2
81029	THRUST BEARING, 5x10x4mm	2
81031	BEARING, SEALED, F3x8x4mm	2
81038	BEARING, SEALED, F4x7x2.5mm	2
81065	BEARING, SEALED, 7x11x3mm	2
96159	RUDDER LEVER MOUNT	1
96217	BLADE BOLTS SET (TAIL)	2
96321	HORIZONTAL FIN	1
96330	TAIL SLIDE RING SLEEVE	1
96331	TAIL CENTER HUB	1
96332	TAIL BLADE HOLDER	2

Safety Precautions

This is a sophisticated hobby Product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the Product or other property. This Product is not intended for use by children without direct adult supervision. The Product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

Product Warranty

Thank you for purchasing this product. The following describes the provisions on product warranty and liability indemnity. Read them thoroughly before using the product.

1. The product has been delivered to you after strict inspection. After unpacking the kit, be sure to check its contents. If there are any faulty parts or failures, contact our Distributor prior to assembling them.
2. For the assemblies (rotor head, etc.), be sure to check assembly of parts and tightness of bolts and nuts. If an abnormality is notice, contact our Distributor without using them.
3. For product faults and failures noticed before completion of assembly, we will replace the relevant parts with new ones only when we have determined them as a clear incipient failure. Even if a specific faulty part has an effect on other faultless ones, our product warranty only covers the faulty item. If you have even the slightest suspicion on some parts during assembly, contact our Distributor without using.
4. Note that our product warranty does not cover any failures of parts which have resulted from your handling during assembly.
5. The component parts of the product have been fully examined and checked in their design phase and manufactured under a full management system. We have also confirmed through long-term tests that they have no quality problem. However wear, deterioration, problems, service life of parts, and the performance of the helicopter body depend greatly on the working environment at your site (assembly, adjustment, flight condition, storage), and the characteristics of the helicopter body differ considerably depending on these unidentifiable factors. As it is virtually impossible for us to have direct involvement with the product under your management, we will take no responsibility for any product failures which have occurred during use after completion of assembly, and any accidents or losses attributable to them. Note also that we will take no responsibility when you have used parts other than our original ones or those produced by our authorized optional parts manufacturer, or for any other problems or accidents resulting from modifications.

Liability Indemnity

1. The Product, by its nature, includes dangerous elements depending on how it is handled. When flying it, operate it at your own risk, paying full heed to the surrounding persons and objects as well as yourself. Note that we will take no responsibility for any accidents of whatever cause during use of this product. It is recommended to buy a radio control or recreation insurance policy just in case of unexpected accidents. For details of the radio control insurance policy, inquire our distributor or a nearby radio control model shop or insurance agent.

REPAIR AND AFTER-SALE SERVICE

For Repair and After Services of JR Helicopter, please consult with JR Helicopter distributor.

Transfer of Product

The manual may be accompanied by a supplemental manual, additional manual or errata because of improvements to the product or typographical errors of the manual. They may include very important information for flight.

[For Transferor]

When transferring the product hand over the accompanying documents together.

[For Transferee]

Check the accessories at the time of handing over the helicopter body. If you are not sure what has accompanied the manual, check with JR Helicopter distributor.

* These days an increasing number of goods have been transferred (sold and purchased) through Internet auction. The relevant parties are kindly requested to check the condition of the helicopter body and the existence of the accessories and it is their responsibility to trade openly.

Instructions for Disposal of WEEE by Users in the European Union

This product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household where you purchased the product.





JR PROPO[®]

Heli Division

Japan Remote Control Co., Ltd.

Heli Division

35 Ookuroda Matsusaka City
Mie Pref. 515-0063 Japan

**VIBE 90
SG**

VIBE 90 SG Assembly Instructions / Dec.2008

(The Specifications of the VIBE 90 SG and the contents of the instructions are subject to change without notice.)