JR PROPO®
HELICOPTERS

FORZA FBL450

JR 450 ELECTRIC POWERED FBL HELICOPTER

Specifications

[Length] 633mm
[Height] 222mm
[Width] 135mm
[Gros Weight] 820g ～

[Main rotor blades] 325mm
[Main shaft dia.] ⌀ 6
[Main rotor dia.] 731mm
[Tail output shaft dia.] ⌀ 4
[Tail rotor dia.] 155.5mm

[Control system] 120° CCPM
[Gear ratio] 【T15】9.07 : 1 : 4.29
[Li-po battery] 3cell
[Tail drive system] Belt drive

EP
Electric Powered

Contents

INTRODUCTION

Thank you for purchasing this JR product.

The FORZA 450 is an electric helicopter perfect for beginners, but will also satisfy the needs of advanced and 3D flyers.

In addition to the basic assembly kit, we have several combo options available such as the kit with motor+ESC, and a combo including servos, receiver, 3 axis gyro, motor and ESC.

Please be sure to understand the instructions in this manual before commencing assembly.

BE SURE TO OBSERVE THESE SAFETY PRECAUTIONS

Do not assemble or fly this helicopter without seeking expert assistance. Be sure to receive guidance from our dealer or an advanced pilot. An instructor helping you is requested to fully observe not only the instructions and precautions in this manual but also the rules and guidelines for flight.

In order to prevent fire or injury, always observe the stated safety precautions each time you go flying.

The manual describes warnings, dangers and cautions for safe assembly and flying. They are very important.

The following symbols are used to indicate the precautions for preventing accidents due to erroneous handling of this product. Please be sure to follow these instructions.

⚠ DANGER Neglect of this precautionary notice is very likely to result in death or serious injury to the user.

⚠ WARNING Neglect of this precautionary notice is likely to result in death, serious injury or damage to property.

⚠ NOTE Neglect of this precautionary notice is not likely to result in death or serious injury but may result in injury or damage to property.

TAKE GUIDANCE FROM OUR DEALER OR ADVANCED PILOT

This helicopter is not a toy.

If you are a beginner with R/C helicopters, or if you are unfamiliar with electric powered models, do not try to assemble or fly this model by yourself.

Because many parts are already assembled, it may look simple and easy to operate. However, it actually requires extremely delicate assembly, adjustment and operation.

Take appropriate guidance from our dealer or an advanced pilot so that you can enjoy flying this model and experience its full performance.

If you cannot complete the assembly by yourself, it is recommended you take guidance from our dealer or an advanced pilot. When you first fly the model, be sure to ask for assistance. Flying the helicopter alone may involve great danger to yourself or others, as well as damaging the helicopter. Getting proper guidance helps prevent accidents and damage.

Also, please pay close attention to the use and care of peripheral equipment including the battery, charger, etc.

BUY A RADIO CONTROL INSURANCE POLICY

Please be sure to purchase a "radio control insurance policy".

For details, please inquire with our distributors or an insurance agent.

BE CAREFUL WHEN HANDLING PARTS SUCH AS THE BATTERY OR CHARGER

Improper handling may result in electric shock, burn, explosion, or fire.

Do not use the charger or batteries near an open flame. If a power generator is used, do not use an open flame near it, the fuel, or any related devices.

Cigarettes may also cause fire - do not operate this product or related devices while smoking.

Please follow the guidance from related Instruction manuals while using this product.

When linking the connectors, please wear fire-resistant gloves to prevent electric shock and burns.

When not flying, please unplug the battery connectors.

While storing or moving the battery, please use special battery cases.

Do not store batteries in a high temperature environment such as a car trunk.

PRECAUTIONS FOR HANDLING

● Immediately after flight, the motor, speed control and battery are very hot. Be careful to avoid a fire or burn.

● Accessories such as the battery and electrical parts should be handled with care. If the insulation is torn or the connector is shorted, you could be burnt or injured. Read the instructions for use of such accessories before handling.

● Do not charge or discharge the battery near an open flame or in a hot environment.

● Unnecessary disassembly or modification of any components are strictly prohibited.
Neglect of this could result in a fault and /or accident.

● Stop and unplug the motor before doing the following actions:

① When you make adjustments to the helicopter or the control sysytem.

② When you replace any accessories or parts.

③ When the helicopter has something wrong or when you note unusual noise, smell or vibration.

④ When danger is expected.

● Use parts only within their service limits, if indicated.

● In order to realize a pleasant flight, try to keep appropriate gear backlash, movable parts moving smoothly, bolts tightened, and parts lubricated or replaced as required.

PRECAUTIONS FOR SAFE FLIGHT

The model could crash due to slight assembly failure, operational mistake, service failure (loose bolts, etc.), interference and so on. Always keep in mind that the radio control helicopter which is controlled by radio frequency, may go out of control for some reason, and the operator should pay attention to himself/herself and the surrounding environment at all times for safe flying.

◎ To fly the helicopter, it is necessary to fully master operational skills for flight as well as basic flight methods.
Receive guidance from our distributor or an experienced pilot and operate under their instructions.

◎ If you notice an abnormality before flight, be sure to eliminate the cause before flying.

◎ If two or more radio devices are used simultaneously on the same frequency, you can not operate the helicopter because of interference. If someone else is using the same frequency, operation may stop. If there is interference despite no one using the same frequency, a source of interference exists. Never fly until this interference has been cleared.

FLYING SITE AND RANGE

① The flying range of the helicopter can be defined as the distance where it can receive the radio frequency signal from the transmitter. However its true range is limited to where you can confirm the behaviors of the helicopter with your own eyes.

② Never operate the helicopter in a place where you may lose sight of it, or the radio signal from your transmitter fails to reach it - as a crash is very likely.

③ Try to understand the surroundings at all times and never fly in bad weather, such as strong wind or rain, at night or in low visibility.

④ Never fly in a place where there are people, cars, schools, hospitals, other buildings or obstacles, or by a river or on the seashore; fly at an exclusive airfield where radio signals are controlled.

⑤ Do not fly near roads, tracks, electric lines, high-tension lines or other objects determined dangerous.

⑥ Please do not let the noises of main rotor blades or other parts disturb the surroundings.

Observe these rules and manners to help enjoy this R/C helicopter.

PRECAUTIONS FOR THE OPERATOR

The following items are precautions for the operator flying this R/C helicopter.
Be sure to observe them.

① The following persons or those in the following states should never operate this helicopter:

- Infants, children, or other persons who have no knowledge or experience of R/C helicopters.
- Pregnant woman.
- When you are tired, ill, under influence of medicine or alcohol and cannot make proper judgments in safe operation.
- When you are a beginner or borrow someone's radio control helicopter and have not taken sufficient safety guidance on the operating methods.
- Those who are believed to be incapable of flying a radio control helicopter.

② Wear easy-to-move clothes.

- Choose to wear clothes whose edges or hems can not come into contact with the rotating parts of the helicopter, the antenna or controls on the transmitter, endangering you.
- It is very dangerous if accessories such as rings, bracelets, etc. are caught by the helicopter or the transmitter. Remove them and bundle long hair so that they will not be caught.

- In order to protect your feet, wear solid, easy-to-move shoes, avoiding sandals or high-heel shoes.
- Wear a cap, gloves, sunglasses or goggles as required.

③ Do not fly the Helicopter in an unnatural posture.

- Avoid standing in an unstable or slippery position.
- Do not fly while looking backward, sitting or lying.
- Do not bring the helicopter too close to the operator or surrounding people (if there are bystanders, make sure that they are behind the operator).

④ Take sufficient flight breaks.

- An excessively long flight makes the operator lose his/her concentration due to fatigue, leading to accidents. Take adequate flight breaks. Avoid an unreasonably long flight, which could result in unexpected accidents or injuries.

PRECAUTIONS FOR STARTING

① Make sure the bolts for the blades (main rotor, tail rotor) are properly tightened - there should be some movement possible. Check all other screws to confirm they are properly tightened. Retighten any loose screws.

② Make sure that no tool used for assembly or adjustment has been left in the helicopter body, and that all parts affecting flight performance are free from fault.

③ Keep the airfield as neat and tidy as possible and place the helicopter in a stable place (objects such as cables, wires, strings, debris of broken parts, screws, etc., may be scattered by the wind pressure from the rotor and damage the helicopter).

④ Make sure that the batteries in the transmitter and the receiver are fully charged.

⑤ Always turn on the transmitter first.

⑥ Conduct a distance (range) test of the transmitter. Follow the directions of your transmitter manufacturer, but generally with the antenna collapsed, move 15m or so from the helicopter. Move the controls and confirm movement of the helicopter servos. If they do not move properly, check the cause and have it repaired, if necessary.

⑦ a. Extend the transmitter's antenna to its full length. Put the receiver's antenna through an antenna tube and make sure that it can easily receive the radio signal, ensuring it cannot be caught by moving parts (do not bend or bundle the antenna).

b. When using a 2.4GHz transmitter, please adjust the antenna as directed in the manual supplied with the transmitter.

◎ Starting

① When starting the motor, make sure that there is no person, animal or obstacle around the helicopter, which may be caught by the rotors.

② After starting the motor, please understand setting the throttle stick / trim to slowest position stops the motor. Rising the rotation speed suddenly is very dangerous. Start the rotation gradually using the slow start function of the ESC. After the main rotor is rotating, abrupt stick operation will cause the helicopter to rise quickly. Please set the stick to medium-slow position and wait. Make sure the rise of the rotor speed follows your stick operation.

③ When moving to a take-off site, note that if your clothes contact the transmitter sticks, the rotor may suddenly start running. Please proceed with caution.

④ When lifting the helicopter into the air, be sure to remain at least 10m or more away from it.

⑤ Land before adjusting the transmitter or helicopter. Do not allow part of your body or clothes to contact the transmitter sticks by mistake, and do not put the transmitter down in a standing position because wind, etc. may tip the transmitter over, bumping the throttle stick, and causing the helicopter to suddenly leap into the air, endangering yourself or others.

⑥ Do not put your hand or any objects into the movable parts while they are running.

⑦ When checking the tracking adjustment stay at least 5m or more from the helicopter.

◎ Stopping

Move the throttle stick down and allow the motor and main rotor blades to stop completely. Hold the rotor head by hand, remove the power-supply batteries, and switch off the receiver. Turn the transmitter off last.

PRECAUTIONS DURING FLIGHT

① If you note an abnormality such as unusual noise, vibration, etc. during flight, swiftly land the helicopter in a safe place and eliminate the cause prior to flying again.

② If the main rotor comes into contact with the ground during flight its appearance may look faultless, but fine cracks or distortions may have occurred in different parts. If you continue to fly it in that condition, the cracks may extend, allowing the inner lead weight to fly out or cause the main rotor to come off the main blade holder, thus leading to a serious accident. If the main rotor is damaged even slightly or if there is a possibility of damage, replace it with a new one immediately.

③ Never look away from the helicopter during flight. If you do so even for a short period of time, it may change its posture or you may lose sight of it, and loose control. Always assume the worst-case scenario and all care should be taken to prevent a crash.

④ Do not fly (or hover) the helicopter keeping the main rotor at eye level because it is dangerous. Always ensure that the main rotor is higher than eye level.

⑤ Never allow the power of the transmitter or the helicopter to run low (set the transmitter timer, etc as a precautionary measure).

⑥ Do not touch the main rotor or tail rotor while they are running.

INSPECTION AFTER FLIGHT

① After each flight inspect the following :

Check screws for tightness and parts for wear, deterioration and damage.

Wipe dirt and water drops from the helicopter (if dirt on the movable parts is left uncleaned for a long time, they may move less smoothly, having a bad effect on flight performance).

② Make sure the motor, ESC, and battery are not abnormally hot.

③ When storing the helicopter for a long period of time, clean it before storage.

- Store it in a dry, safe place beyond the reach of infants or children.
- If there is damage or other problems, repair or replace components as necessary before storage.

④ To lubricate or replace parts, follow the relevant parts assembly processes in the manual and the instructions in the parts lists.

⑤ Check whether or not the receiver and gyro are firmly secured, and free from problems.

⑥ Check the receiver antenna wire from time to time because its core may become broken. This may not be immediately apparent, so have it checked periodically by the manufacturer.

⑦ Once your flying session is over, be sure to remove the battery from the helicopter.

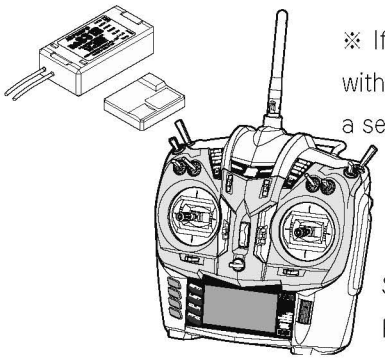
REPLACEMENT PARTS

When replacing parts, use our specified original or our authorized optional parts. Do not modify these parts.

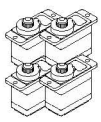
Our product warranty does not cover any troubles resulting from use of non-original parts. Do not use out-of-standard parts, because they may cause an accident or a problem exposing you to great danger.

ADDITIONAL ITEMS REQUIRED

1 Transmitter (120 CCPM capable)



※ If you are using the TAGS mini with DMSS capable transmitter, then a separate receiver is not required.



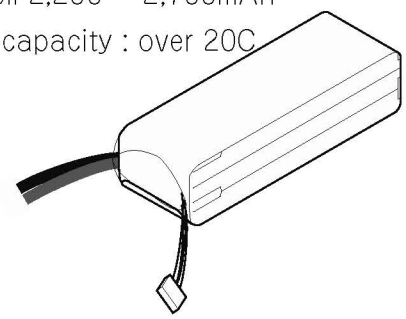
Swash servo : sub micro

Rudder servo : sub micro / mini servo

2 Lithium-polymer battery (Li-Po) 3 cell

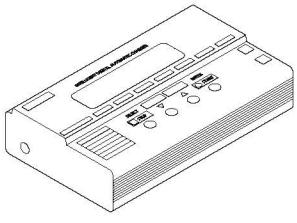
11.1V 3 cell 2,200 ~ 2,700mAh

discharge capacity : over 20C

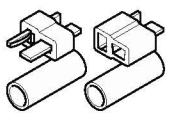


35mm × 105mm × 27mm(maximum)

3 Battery charger

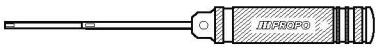


6 Battery connector - one set



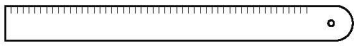
※ Please see p.22 for details.

TOOLS REQUIRED FOR ASSEMBLY



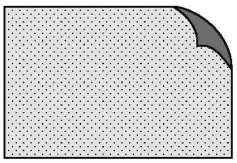
Hex driver : 1.5mm (NO.61401)
2mm (NO.61402)

JR digital pitch gauge
(NO.61796)



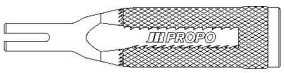
Rule: 15cm

Wrench : 5mm

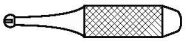


Sandpaper #300 ~ 400

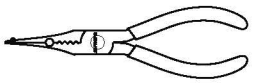
Other general tools required for making a model



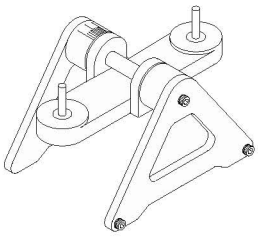
JR Universal link driver
(NO.61360)



JR Universal link trimmer
(NO.60219)



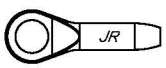
JR Universal link plier C
(NO.60242)



Blade balancer

UNIVERSAL LINKS

The Universal links have a front and back and are mounted in the specified direction at the time of attaching the linkage.
The following describes how to tell the front and back.
At the time of attaching the linkage, pay attention to the direction of each universal link during assembly.



The side marked "JR" is the front. At the time of fitting the linkage, attach the universal link to joint ball by pressing the back side onto the ball.

INDICATION OF TEMPORARY FIXATION

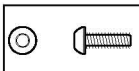
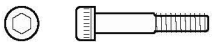
The areas marked with the following symbol should be temporarily fixed until assembly and relevant processes are completed. A number "(× 2)" next to the symbol denotes the number of parts required to be temporarily fixed.

☆

BOLT AND NUT TYPES

The following illustrates the bolts used for FORZA 450.

※ These are just examples for each type - several different sizes are used.

 Button head bolt	 Joint ball screw	 Socket head bolt	 Special socket head bolt	 Nylon lock nut
 Hex tapping screw	 Tail slide ring pin	 Setscrew	 Threaded rod	 Flat washer

PREVENTION OF LOOSENED BOLTS

Bolts may become loose if they are exposed to vibration for a long period of time. It is necessary to take proper countermeasures to prevent them from being loose.

In each process, the bolts and matching tapped holes marked with the symbols shown below should be degreased with alcohol and adhered with a screw locking agent, JR Thread lock (weak). This thread lock is for micro size bolts and it has a weak adhesion. If commercially available thread lock is used, you may be unable to remove bolts for maintenance or bolts may be damaged. Please use the supplied thread lock. A parenthesized number added to the symbol indicates the number of bolts to be coated with the screw locking agent. If multiple pieces of the same part are used, the symbols including those for their bolts may be omitted.

When applying thread lock to a part which uses bearing, do not let the thread lock contaminate the bearing.

TIGHTENING BOLTS

The bolts used for FORZA 450 are rather small. If they are over tightened, the thread may be damaged.

Please be especially careful when tightening the tapping screws into plastic parts.

GREASE

Apply thrust bearing grease to the relevant parts marked with this symbol.

SANDING

Sand the parts where indicated with this symbol.

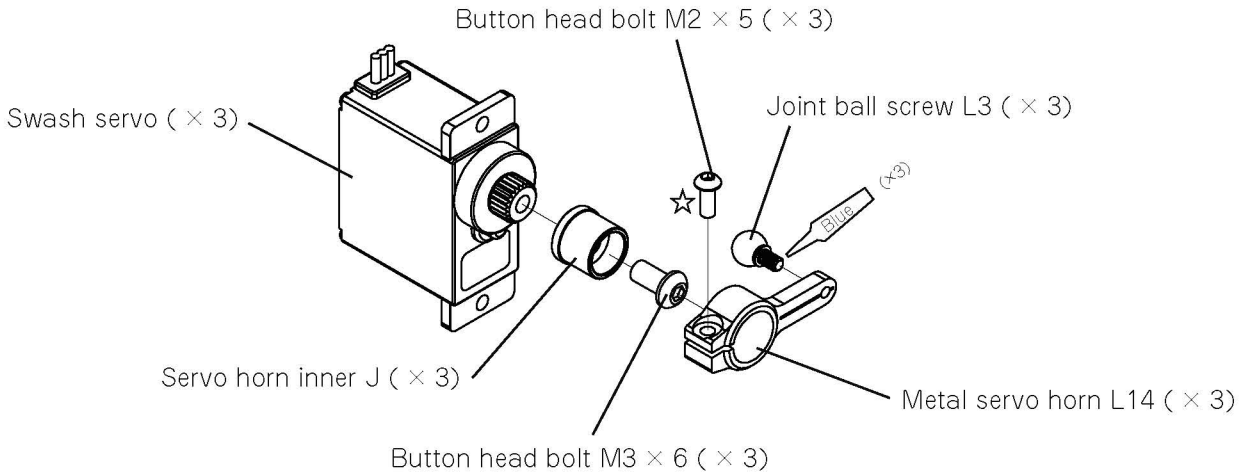
ASSEMBLY HINT

There is a hint for assembly marked with this symbol.

1-1 SERVO HORN INSTALLATION (SWASH SERVO)

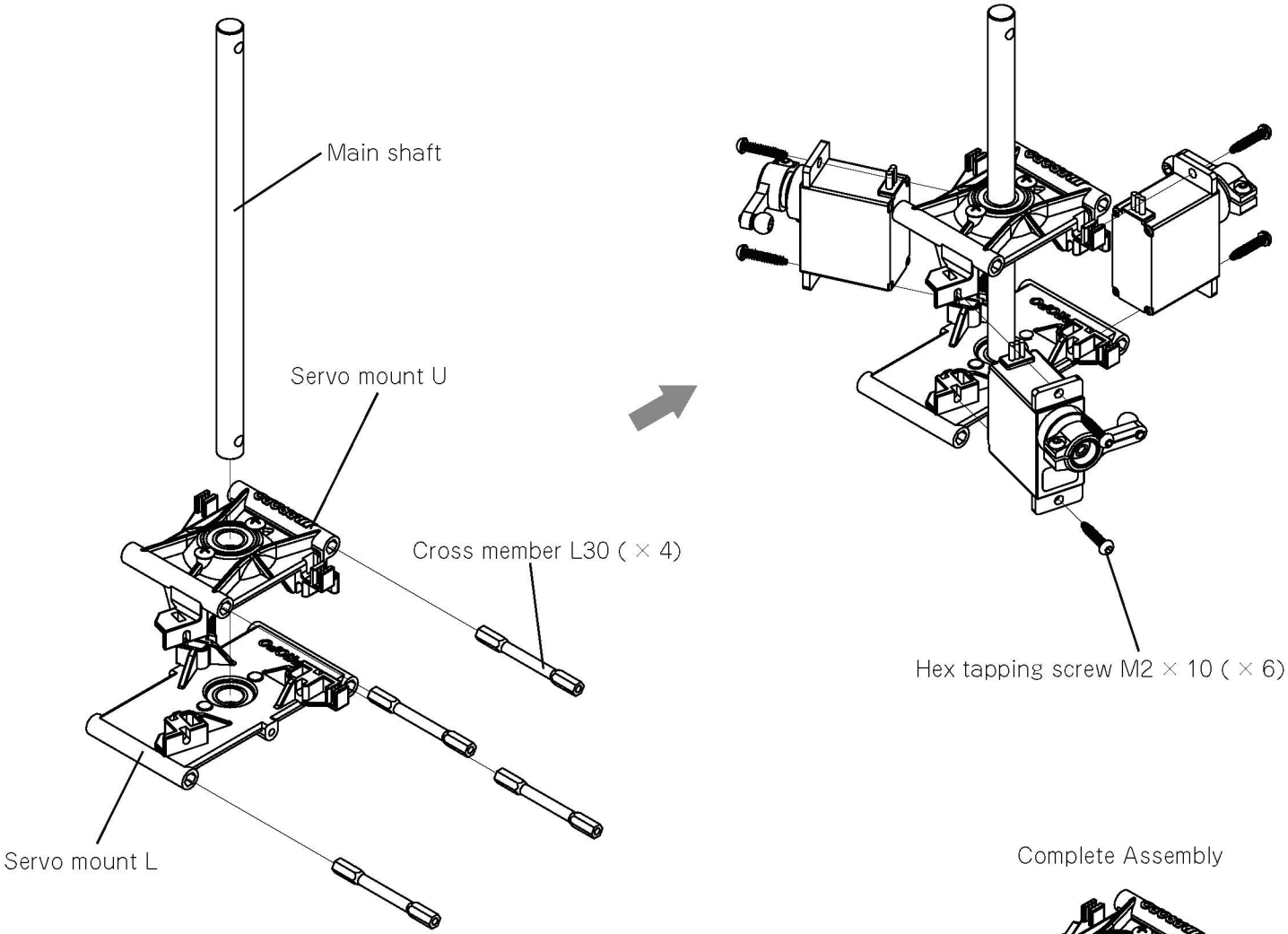
※ Note the proper direction of the Joint ball screw L3.

※ Temporarily tighten the Button head bolt which clamps the servo horn.



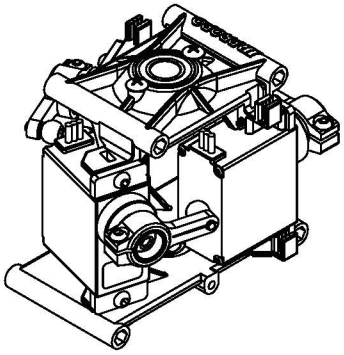
※ If you are using other makes of servo, please choose servo horns with a length of 12.5 to 14mm.

1-2 SWASH SERVO INSTALLATION

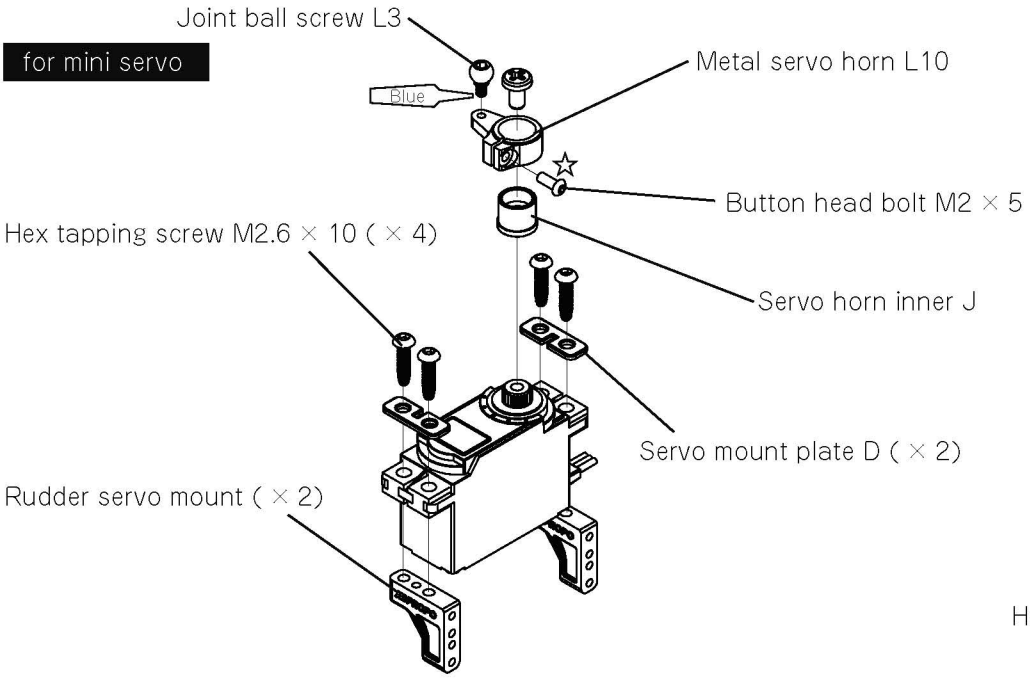


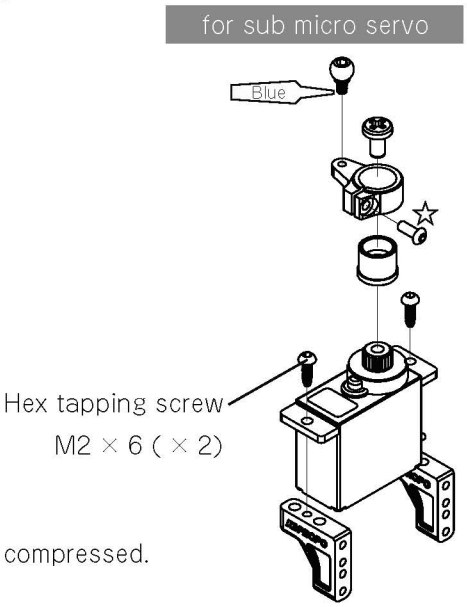
※ Temporarily install the mail shaft to adjust the bearing of the servo mount.

Complete Assembly



1-3 SERVO HORN INSTALLATION (RUDDER SERVO)

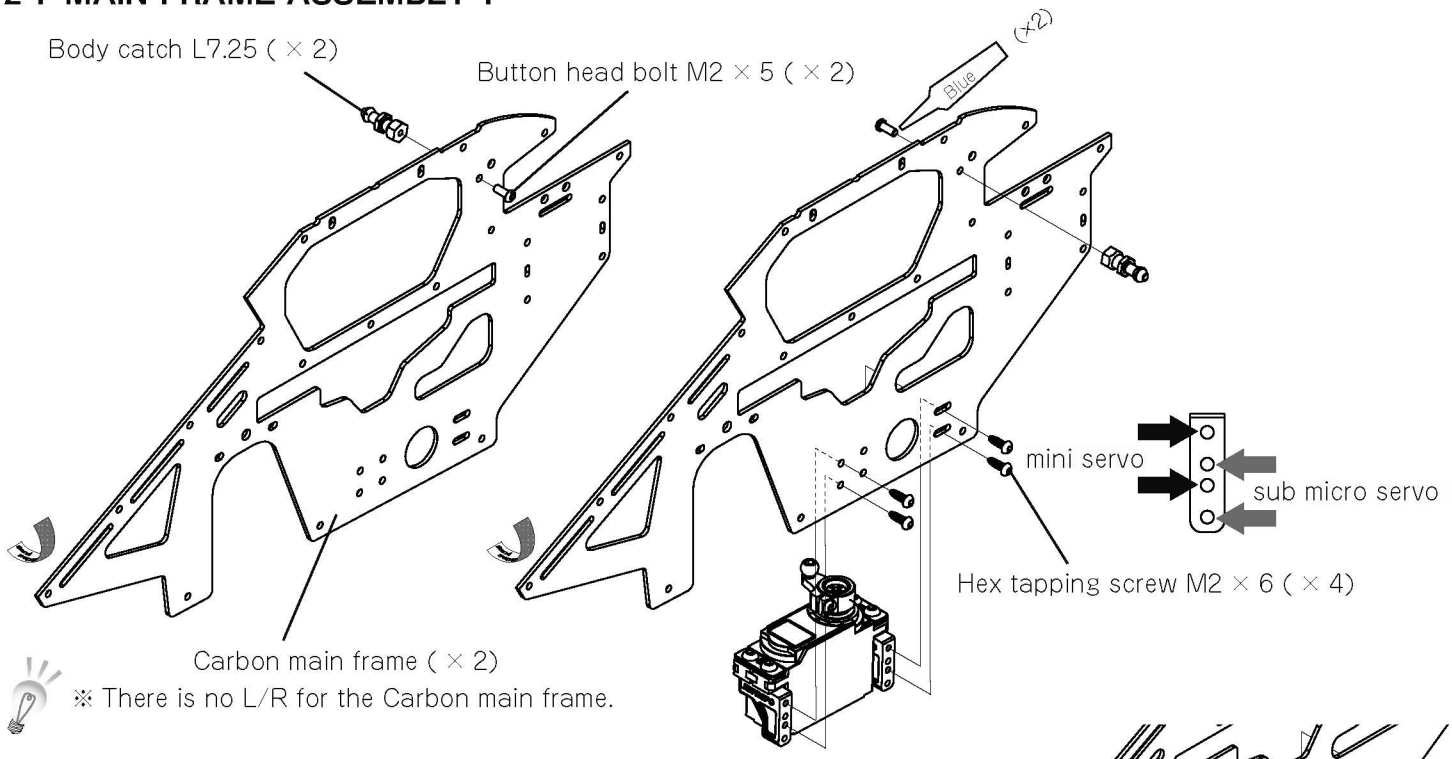




※ Use the rubber isolators supplied with the servo.
When tightening the Hex tapping bolts, the rubber grommets should be slightly compressed.
Do not use the metal grommet inserts.

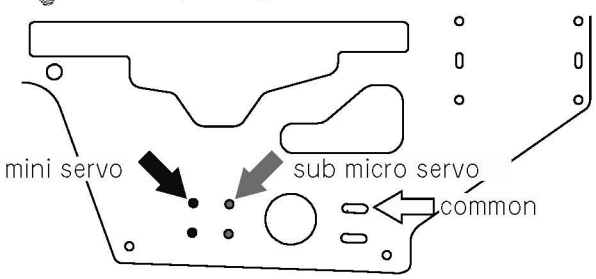
※ If you are using other makes of servo, please choose a servo horn with a length of 10 to 11mm.

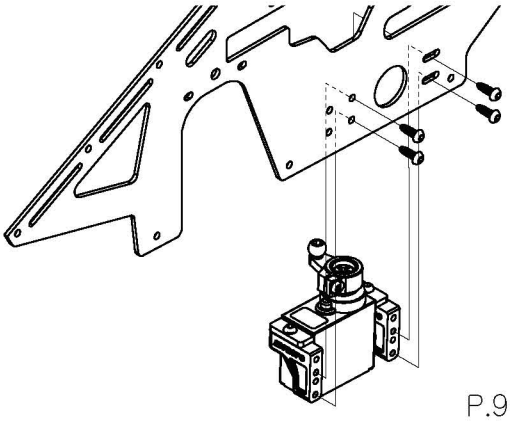
2-1 MAIN FRAME ASSEMBLY 1



※ There is no L/R for the Carbon main frame.

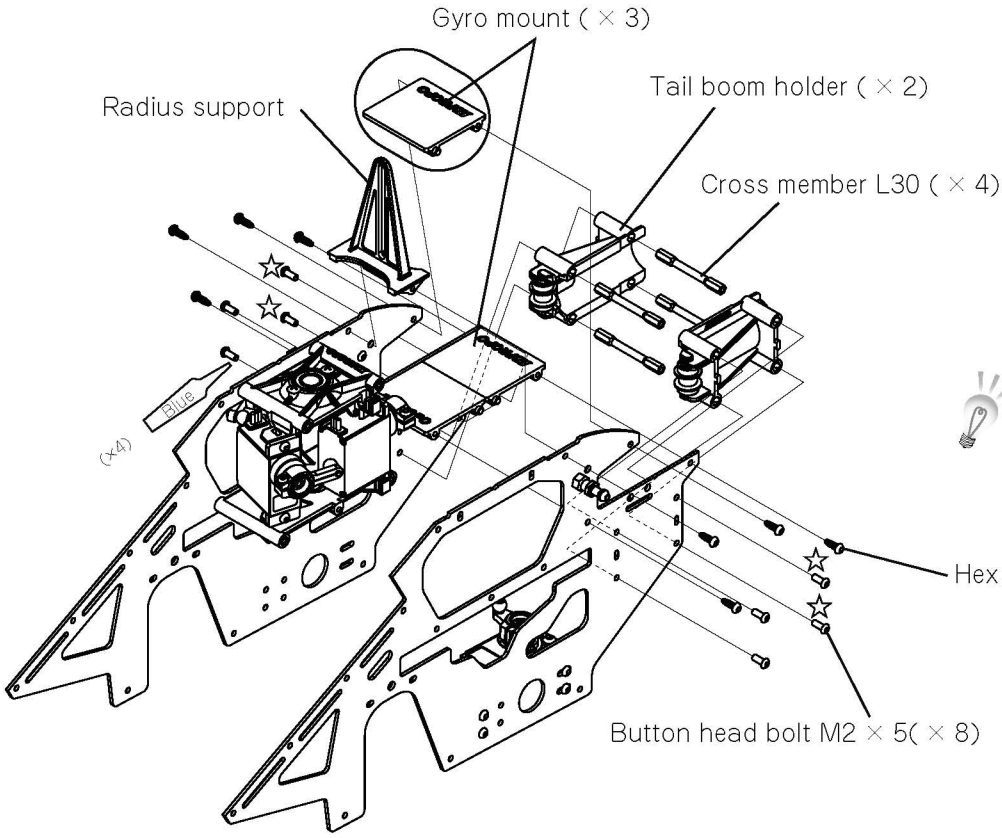
※ Different mounting holes are used depending on the servo used.

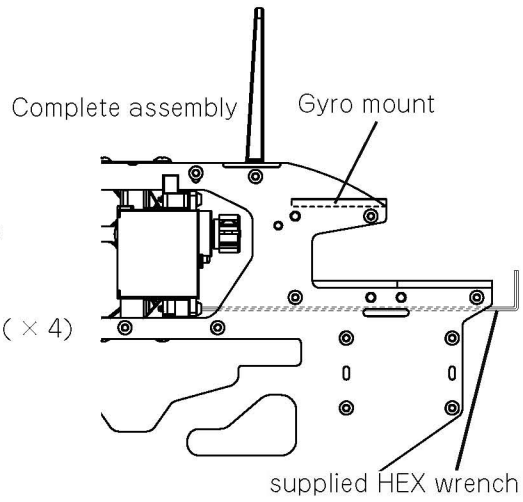




2-2 MAIN FRAME ASSEMBLY 2

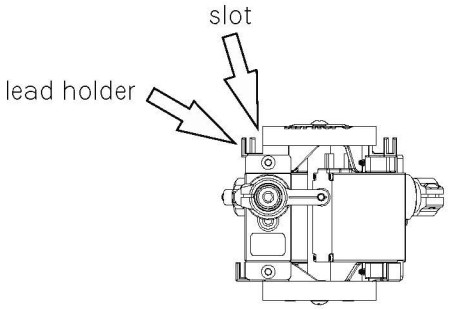
If you are using the JR TAGS01





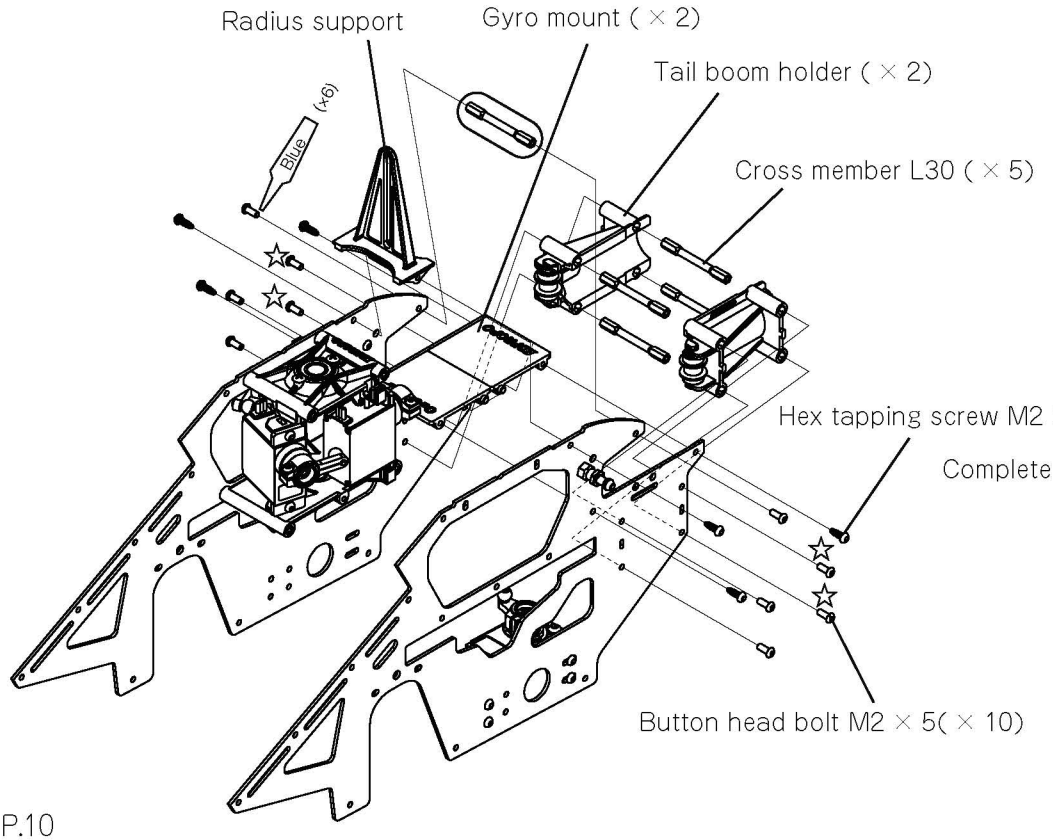
※ When removing the servo for maintenance, use a supplied wrench as above figure shows.

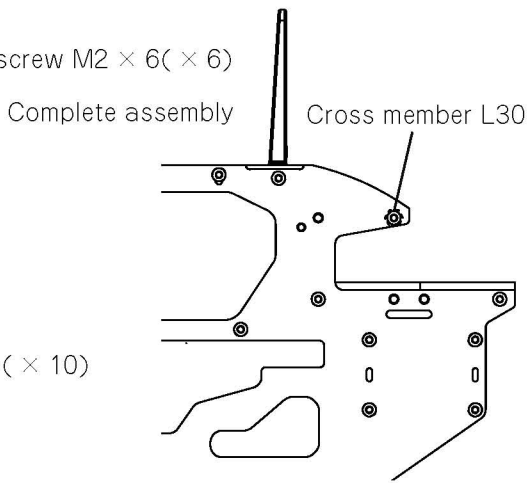
※ There are two gyro mounting options
If your gyro uses a separate sensor, refer to the figure above.
If your gyro has the sensor all-in-one, refer to the figure below.



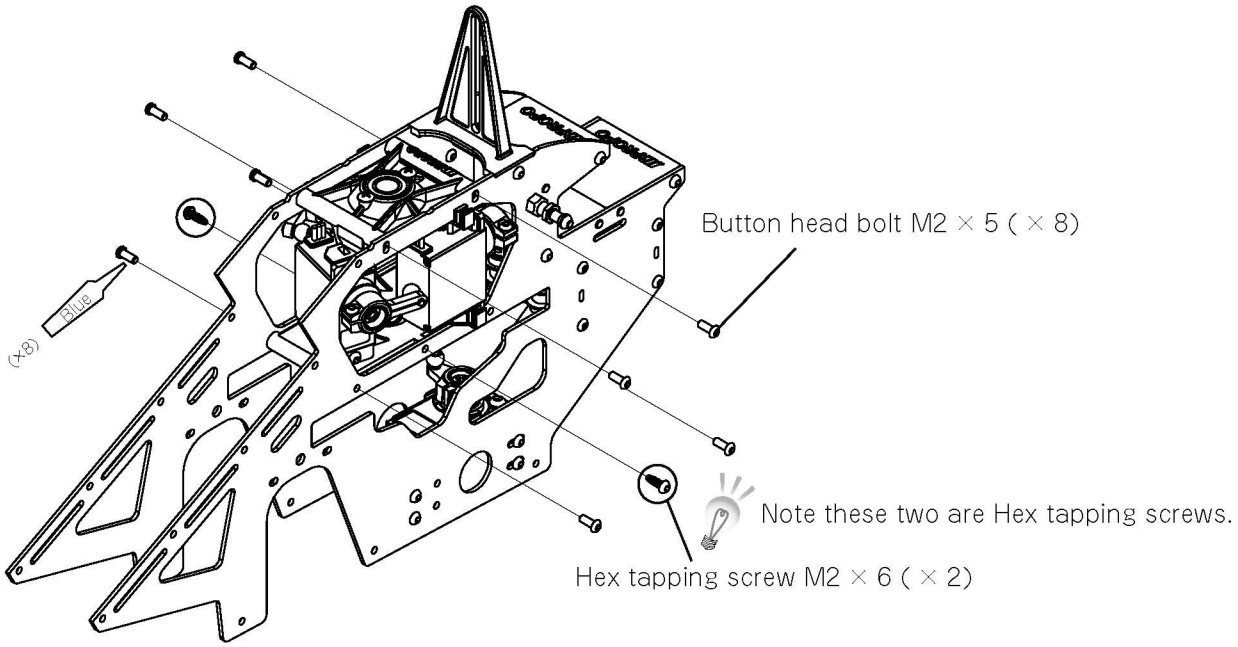
※ When installing the servo mount to the frame, fit the frame into the slot of the servo lead holder.

If you are using the JR TAGS mini



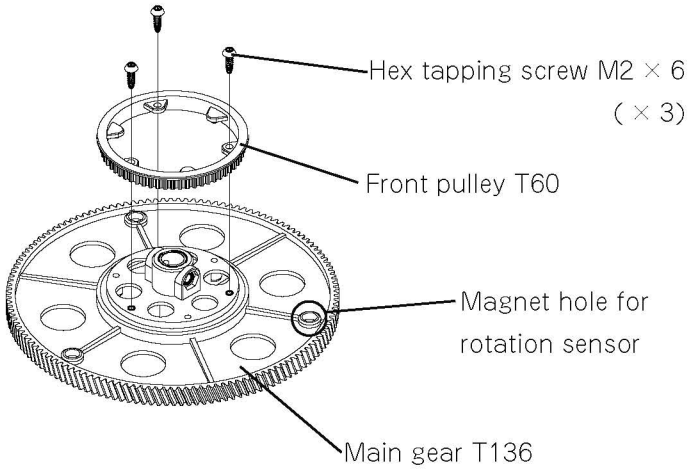


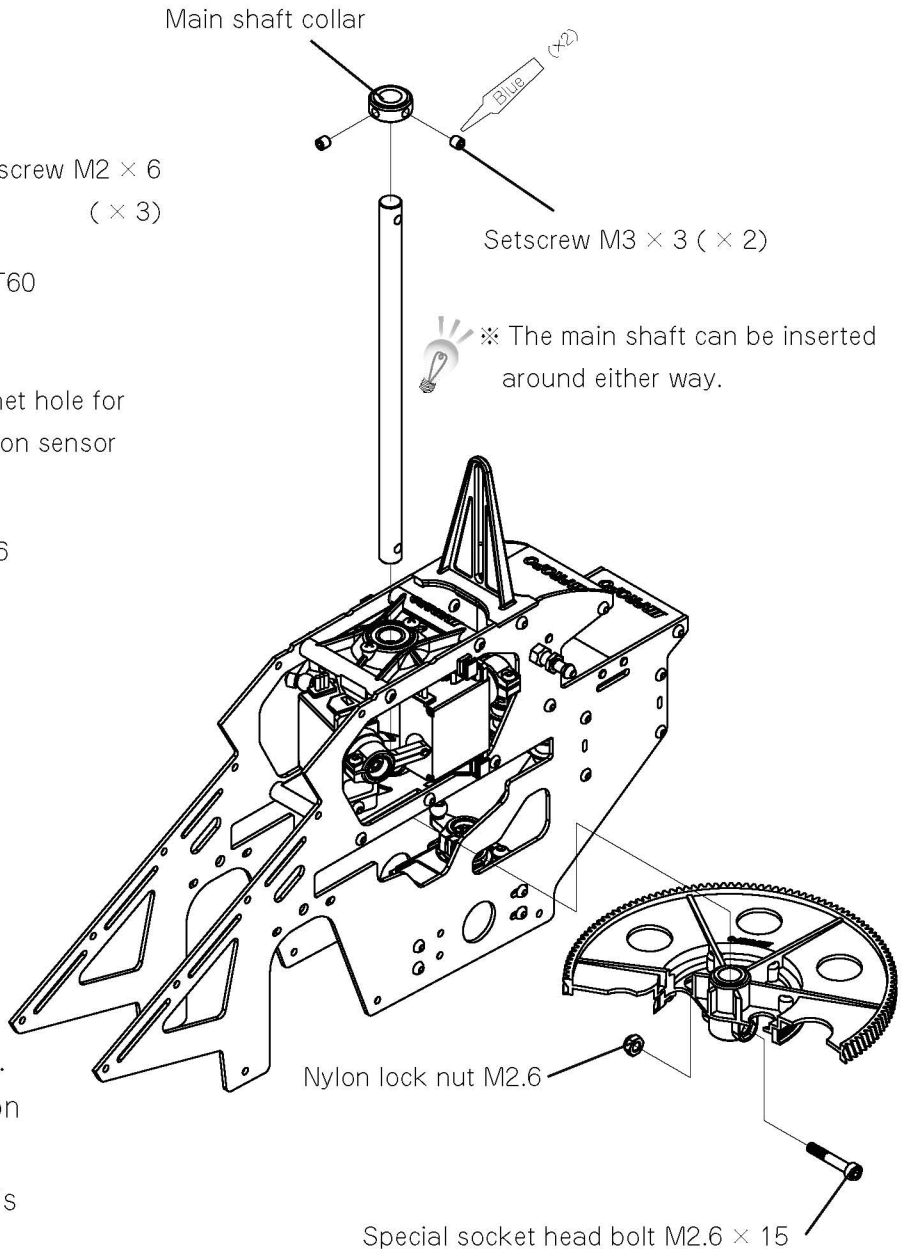
2-3 MAIN FRAME ASSEMBLY 3



3-1 MAIN GEAR ASSEMBLY

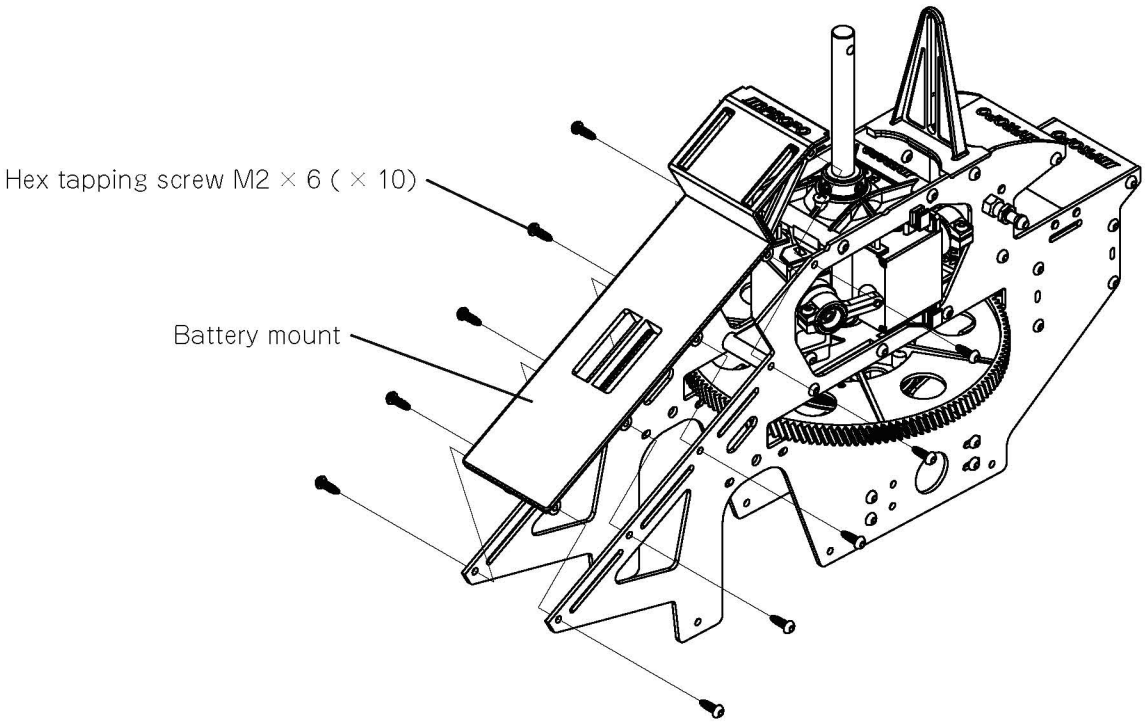
Looking at the bottom of the main gear:



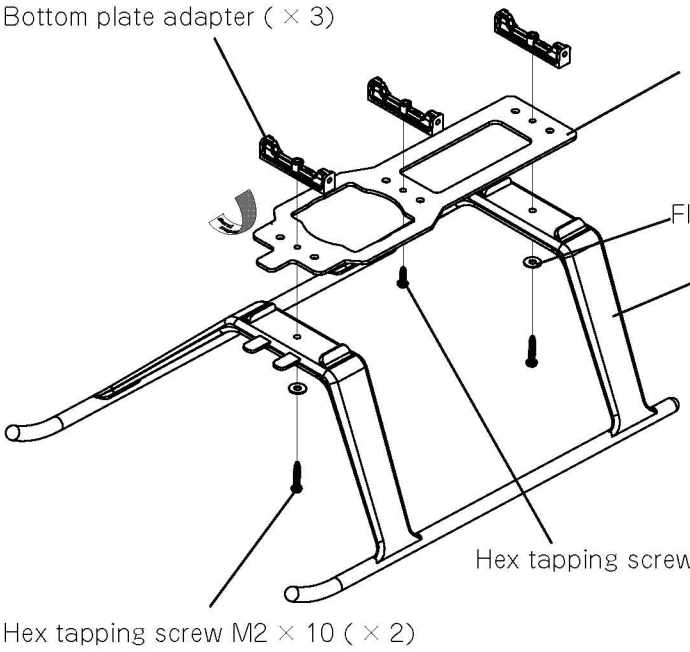


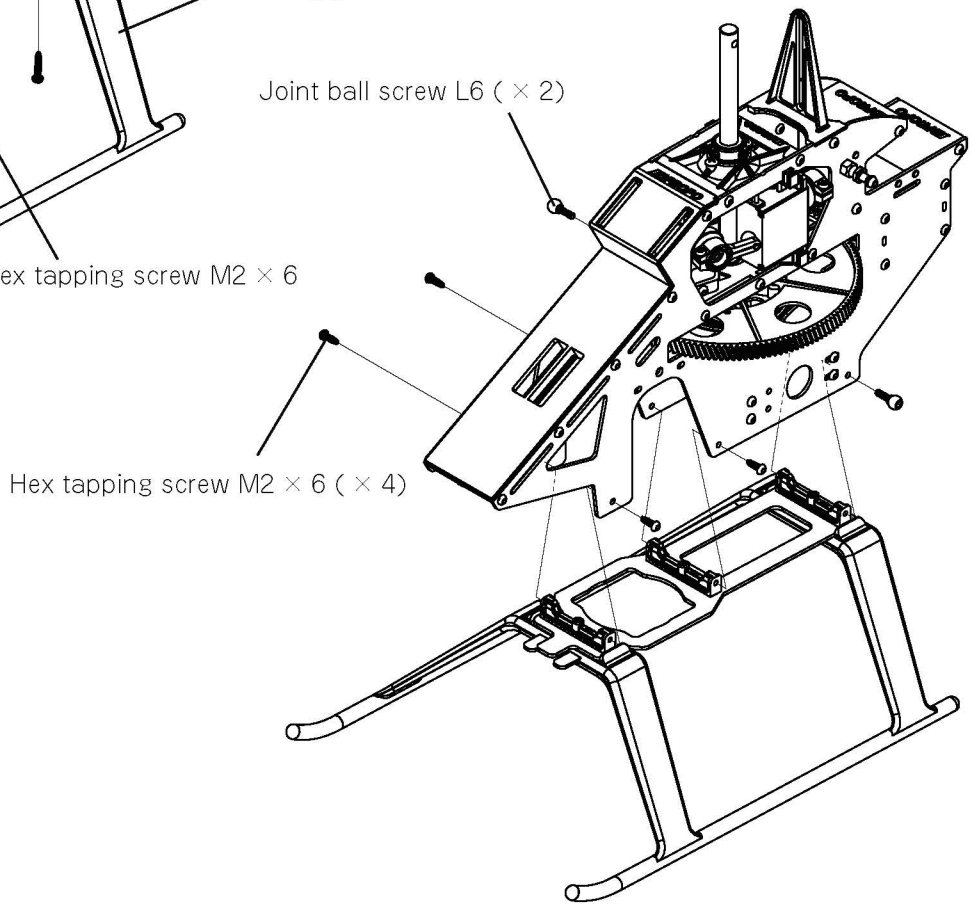
※ The Main shaft is secured at this time. Pull the main shaft up, and push down on the main shaft collar. Secure the collar set screws. Make sure the Main shaft is secured with no up-down movement.

3-2 BATTERY MOUNT INSTALLATION

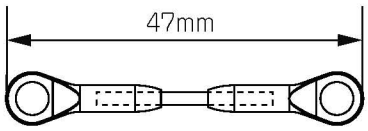


3-3 LANDING GEAR INSTALLATION

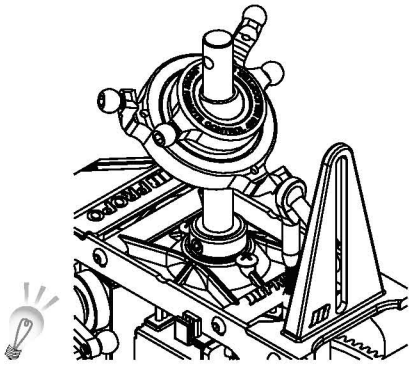




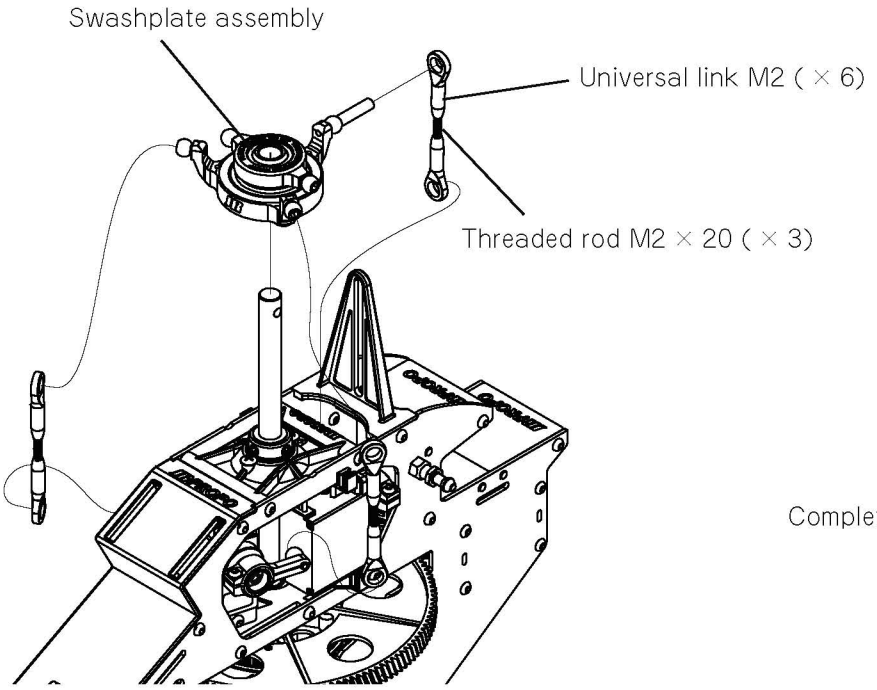
4-1 SWASHPLATE INSTALLATION



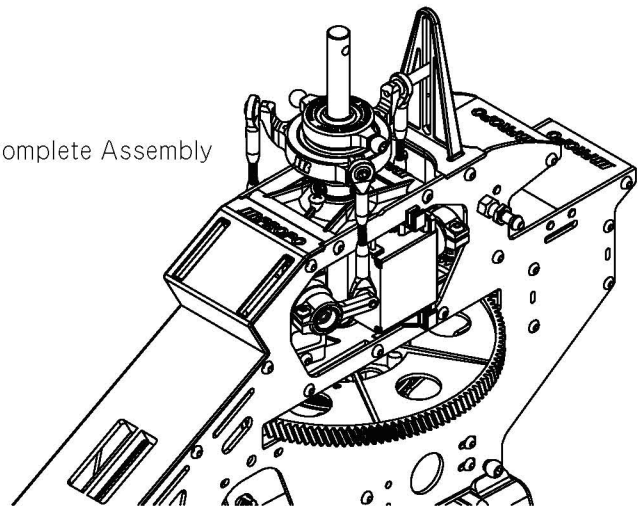
※ Make 3 sets - it is important they are the same length.



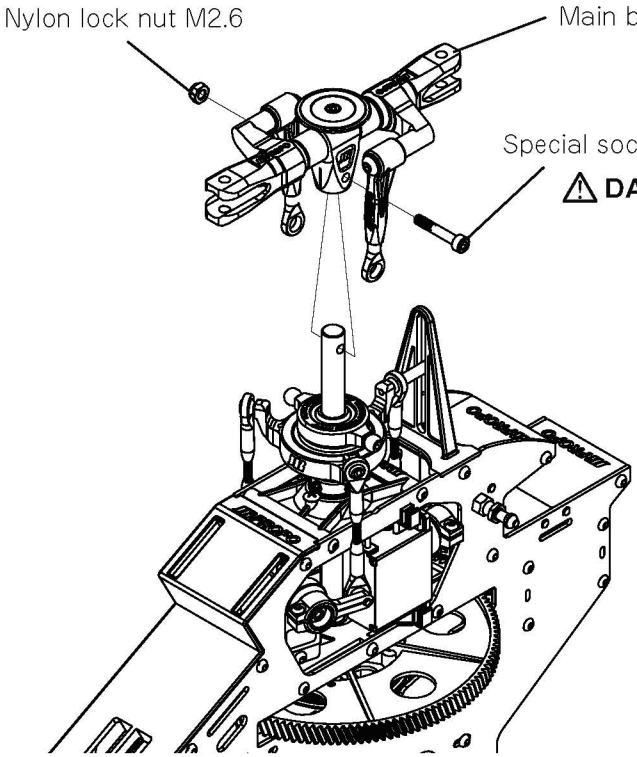
※ Install the rear linkage rod, and then install the Joint ball arm of the Swashplate into the slot on the Radius support.



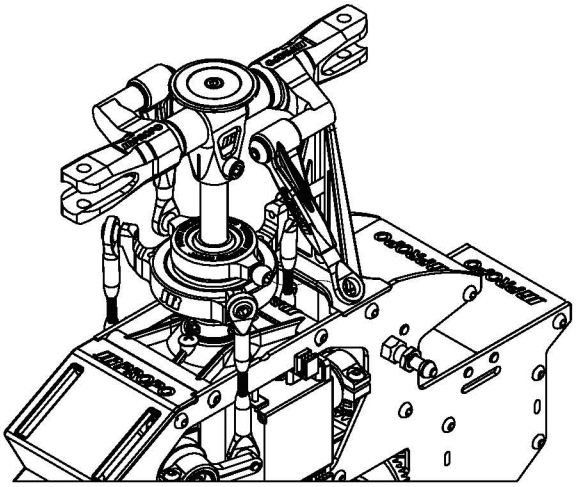
Complete Assembly



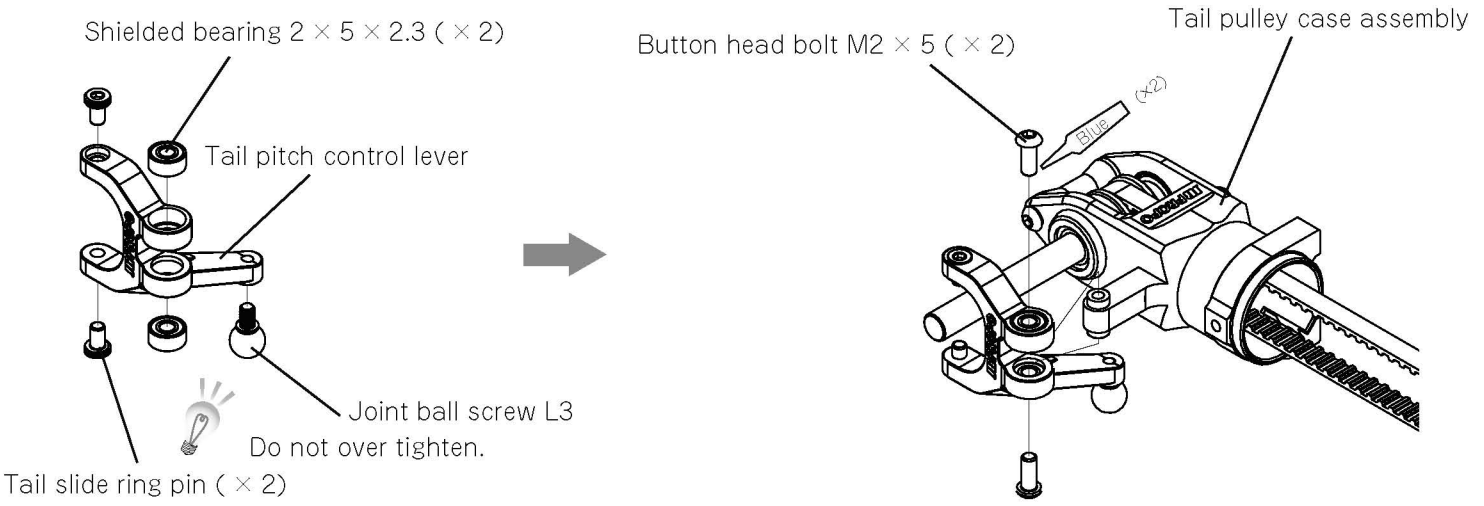
4-2 MAIN ROTOR HEAD INSTALLATION



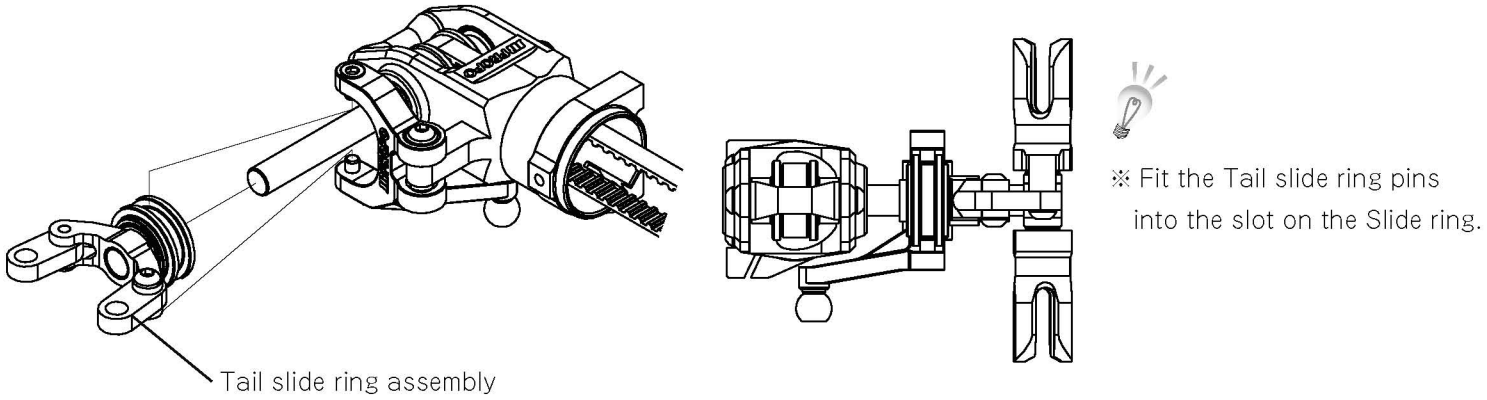
⚠ **DANGER** ※ Replace this bolt frequently during maintenance.



5-1 TAIL SLIDE RING INSTALLATION

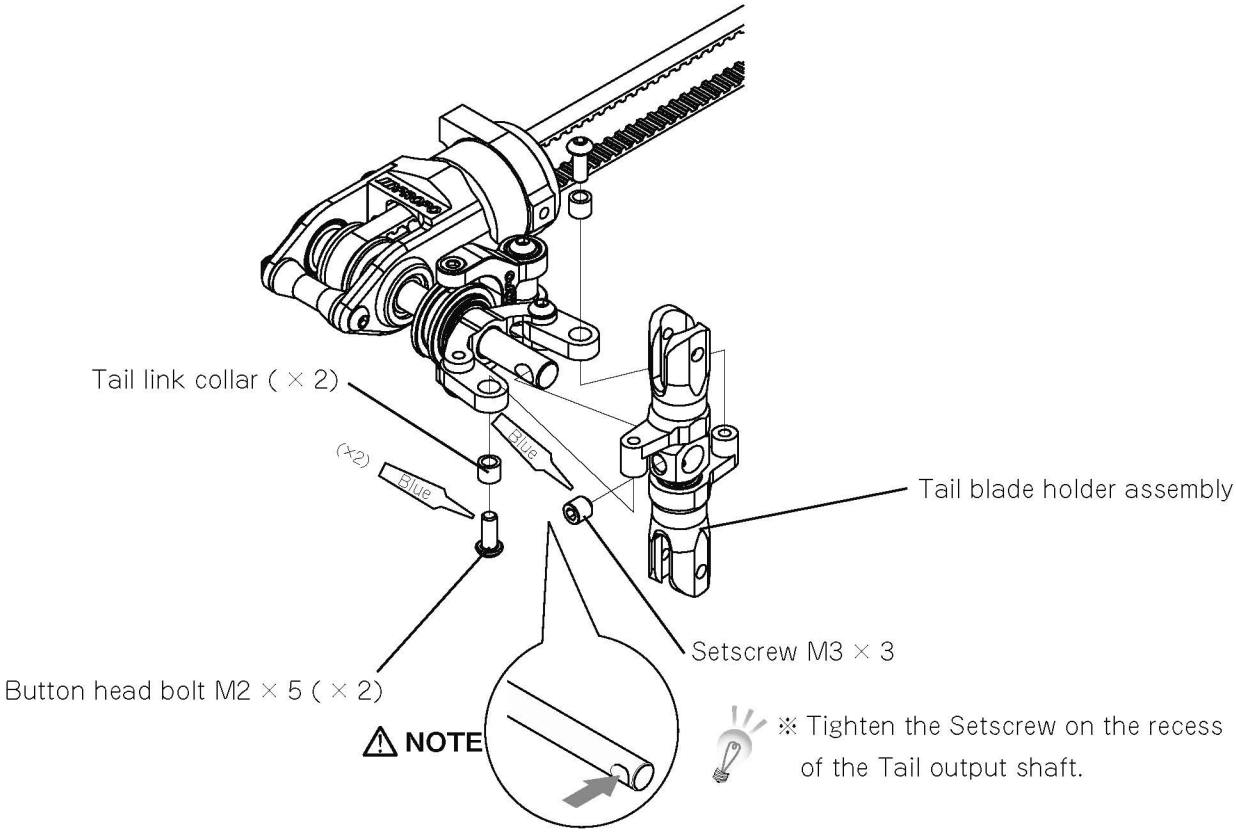


※ When installing the tail pitch control lever to the tail pulley base, twist and turn it into place.



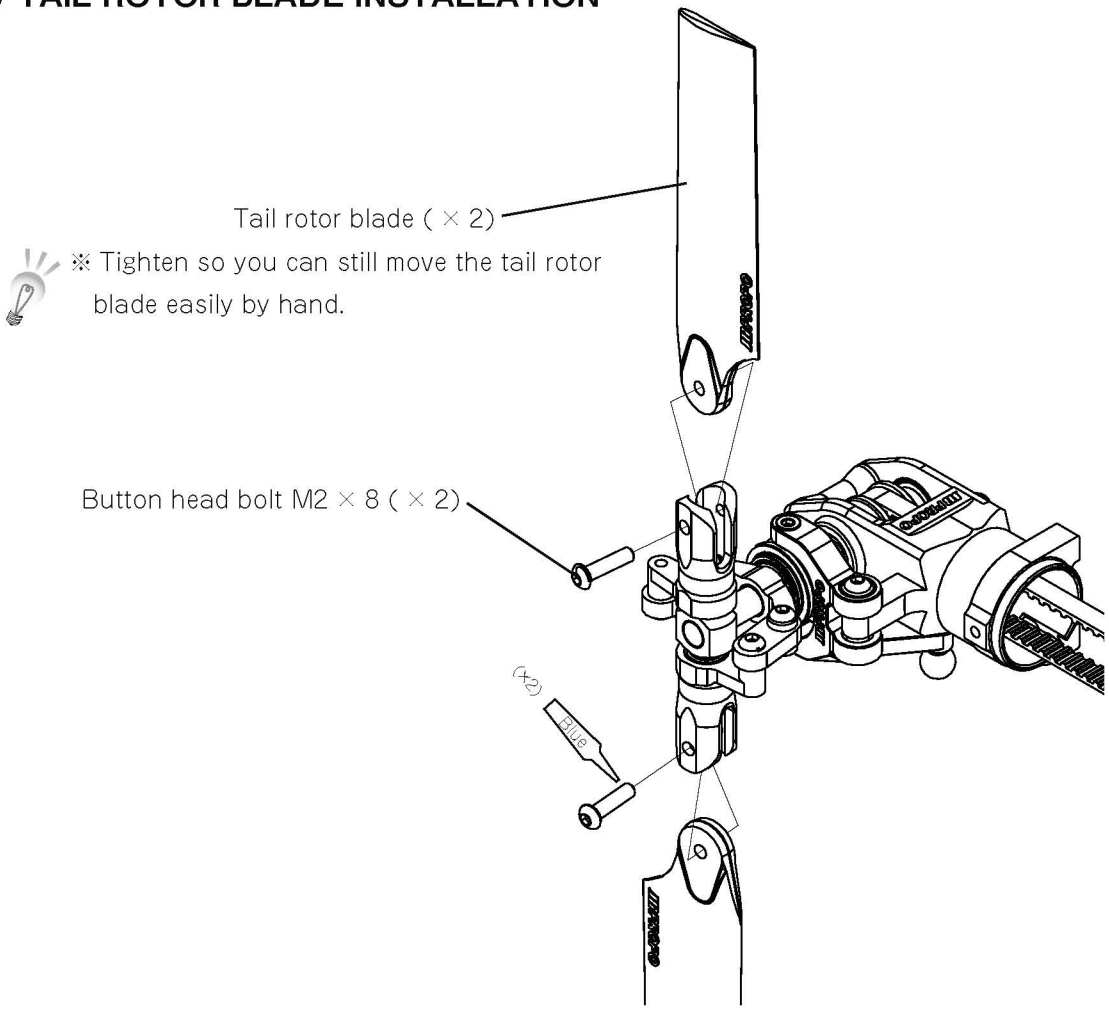
※ Fit the Tail slide ring pins into the slot on the Slide ring.

5-2 TAIL BLADE HOLDER ASSEMBLY INSTALLATION

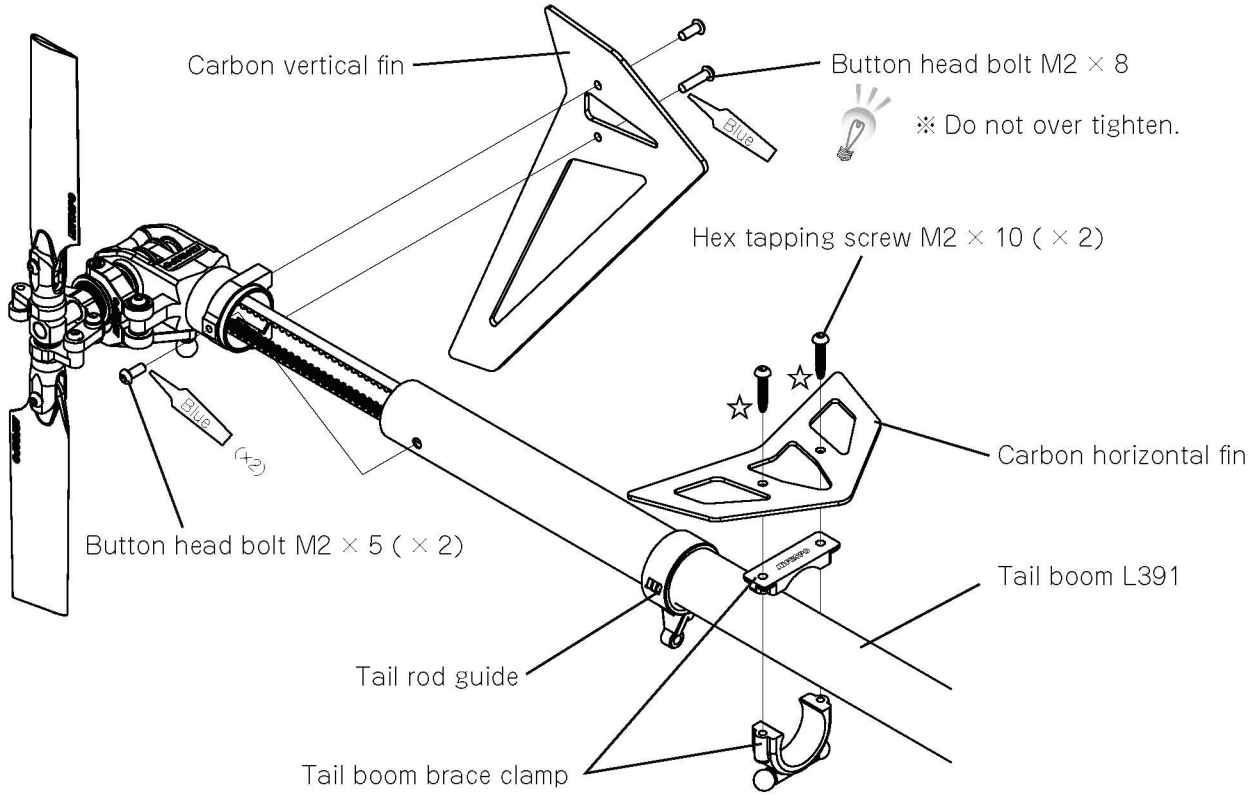


※ Tighten the Setscrew on the recess of the Tail output shaft.

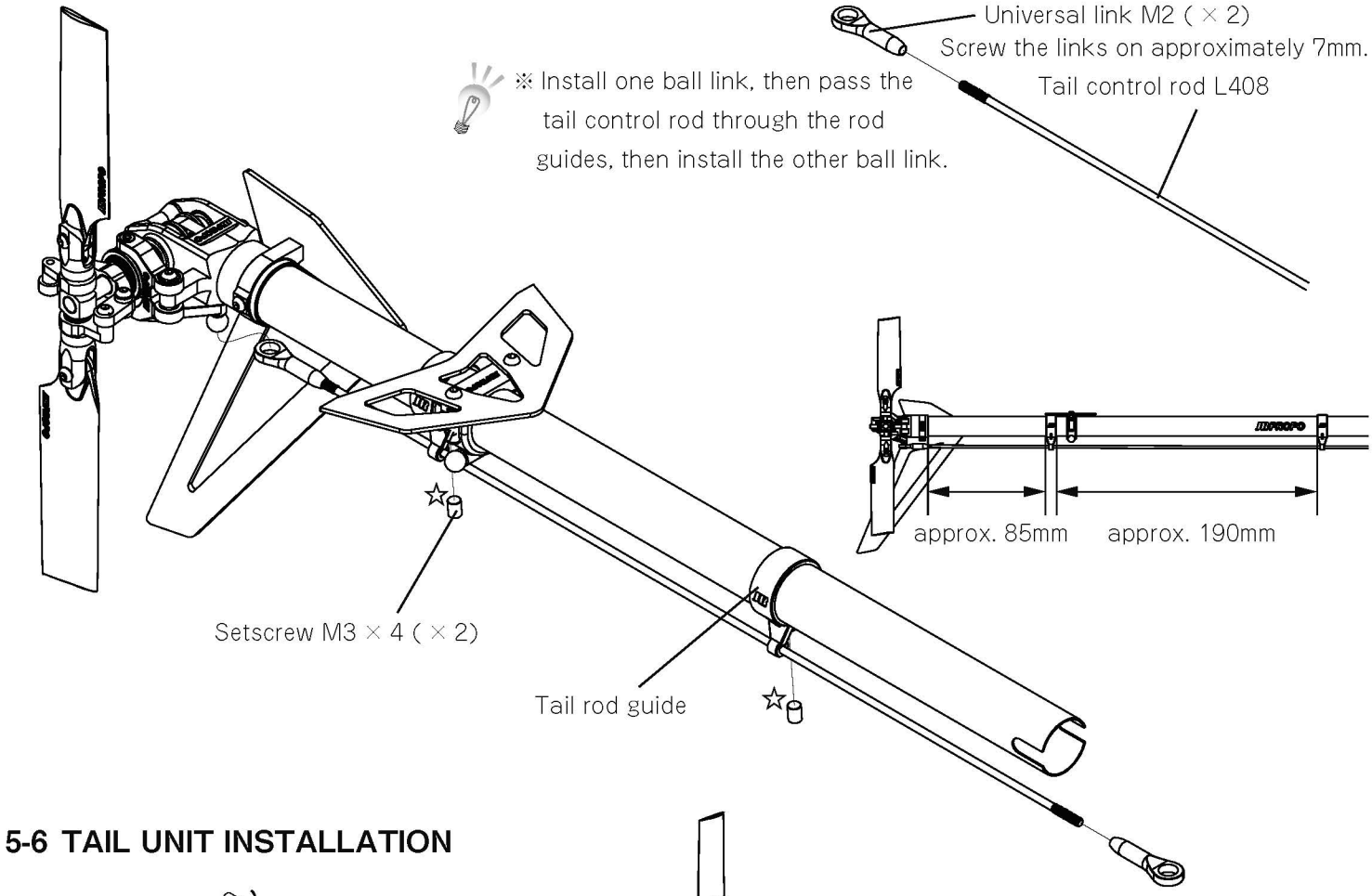
5-3 TAIL ROTOR BLADE INSTALLATION



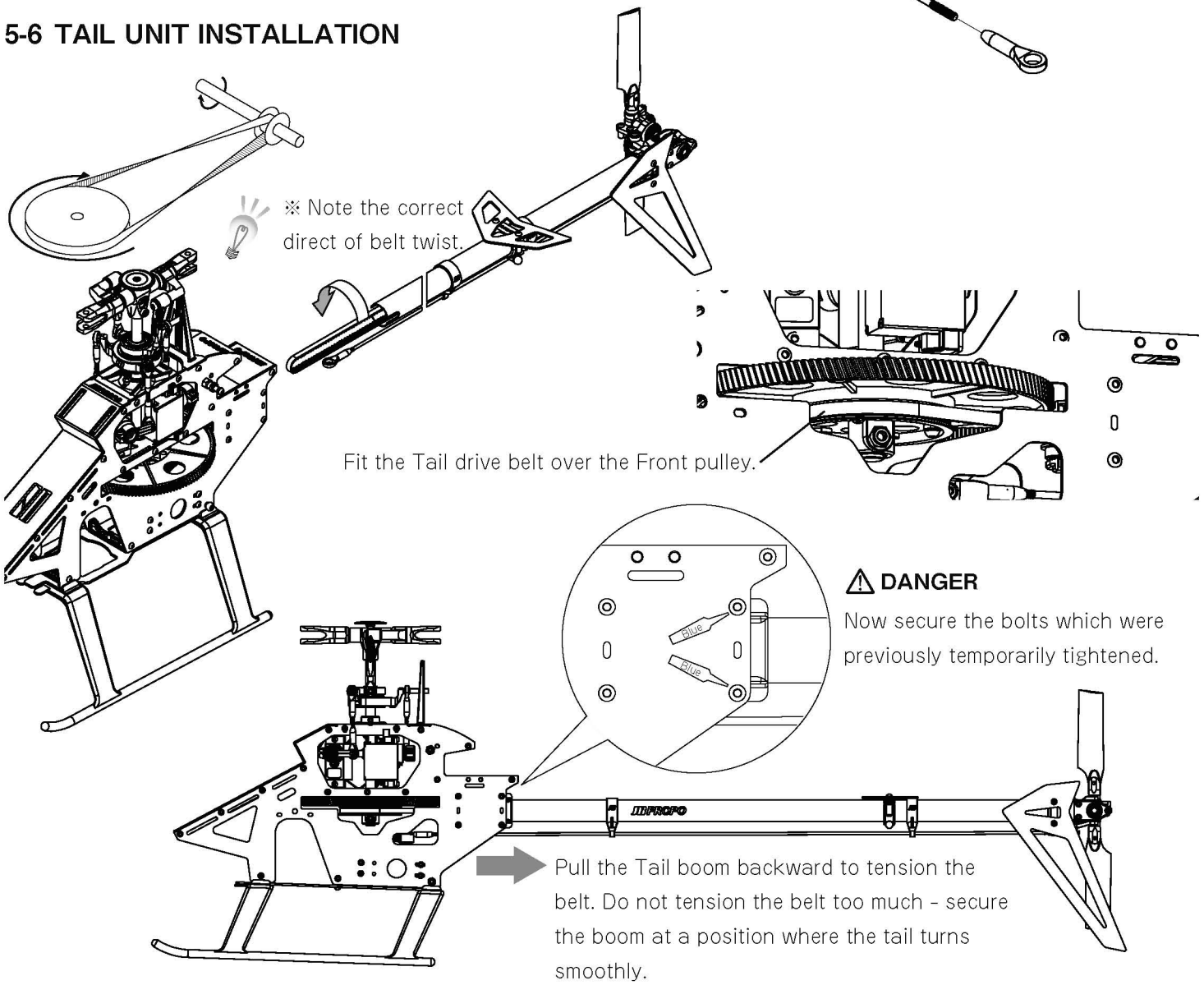
5-4 CARBON HORIZONTAL FIN AND CARBON VERTICAL FIN INSTALLATION



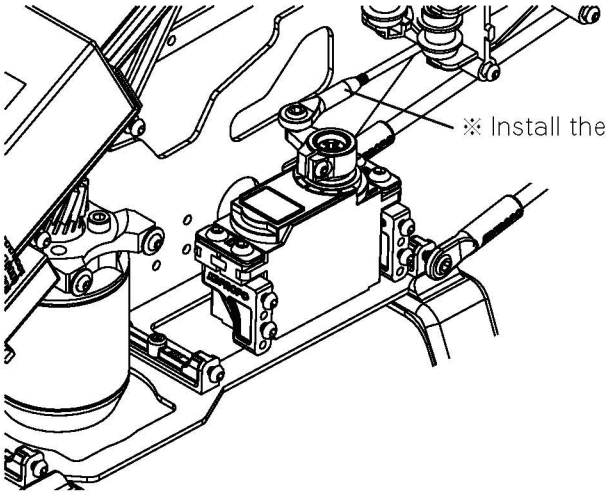
5-5 TAIL CONTROLROD INSTALLATION



5-6 TAIL UNIT INSTALLATION

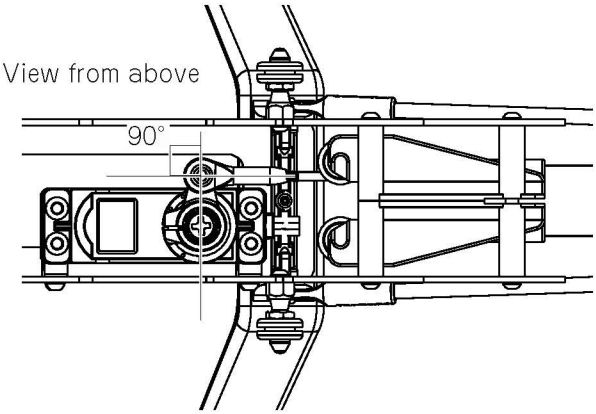


5-7 TAIL CONTROL ROD LINKAGE



※ Install the Control rod to the rudder servo.

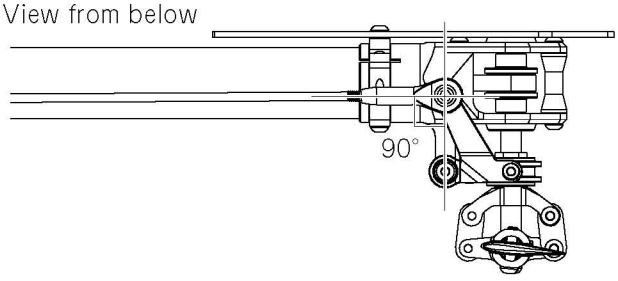
View from above



※ Adjust the universal links on the Tail control rod so the Tail control lever and the Servo horn are at right angles to the Control rod.

After servo neutral adjustment, secure the Button head bolt which was previously temporarily tightened.

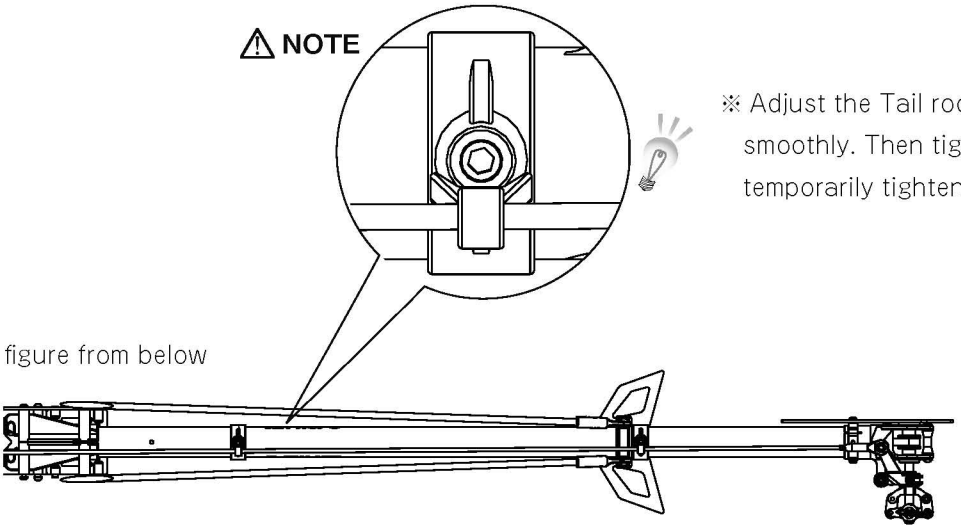
View from below



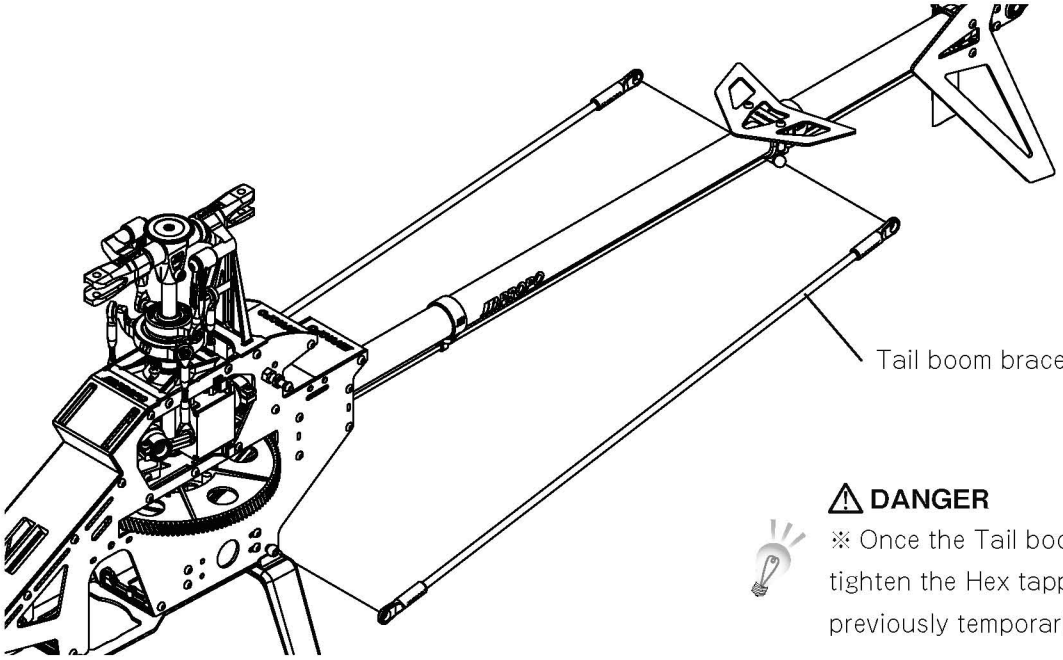
⚠ NOTE

※ Adjust the Tail rod guides so the Tail control rod moves smoothly. Then tighten the Setscrews which were previously temporarily tightened. Do not over tighten.

figure from below



5-8 TAIL BOOM BRACE INSTALLATION

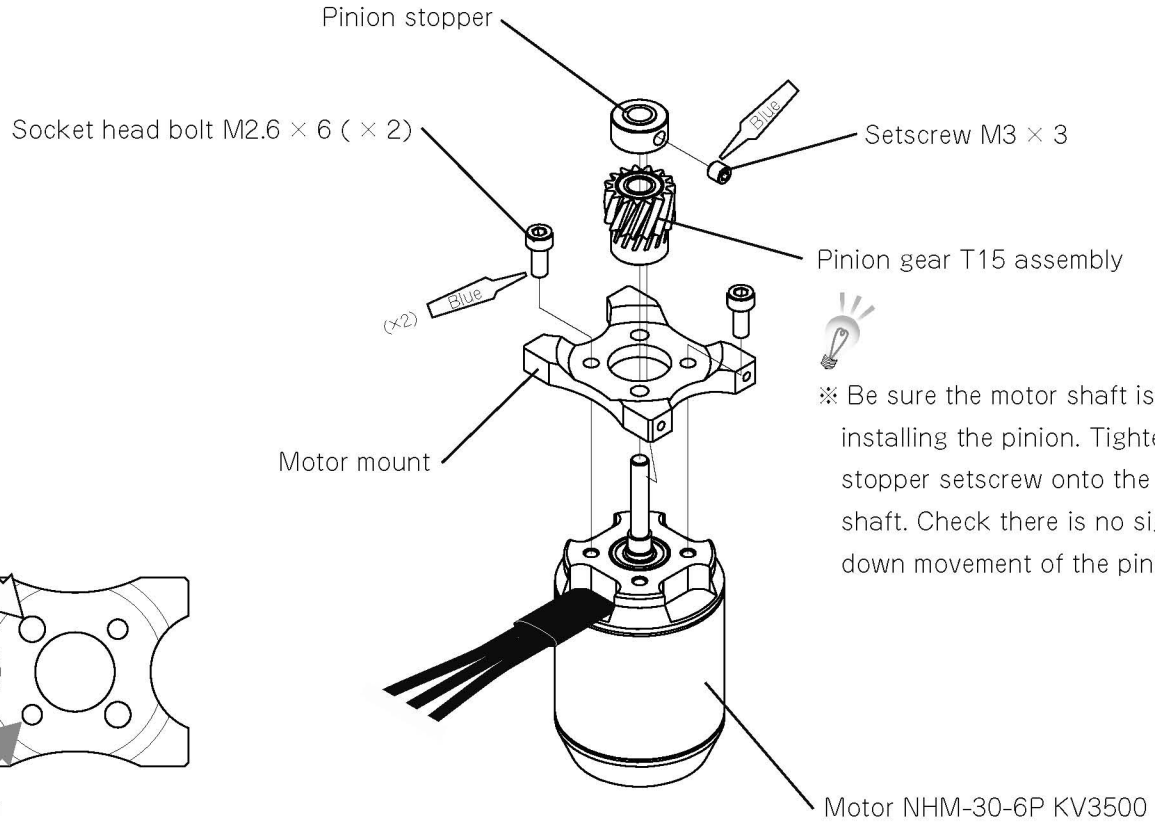


Tail boom brace (× 2)

⚠ DANGER

※ Once the Tail boom brace is installed, tighten the Hex tapping bolts which were previously temporarily tightened.

6-1 MOTOR ASSEMBLY

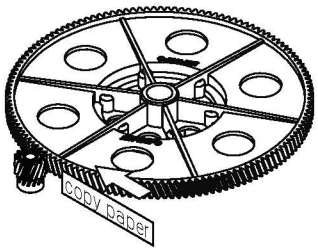


※ Be sure the motor shaft is clean before installing the pinion. Tighten the pinion stopper setscrew onto the 'flat' on the motor shaft. Check there is no significant up and down movement of the pinion gear.

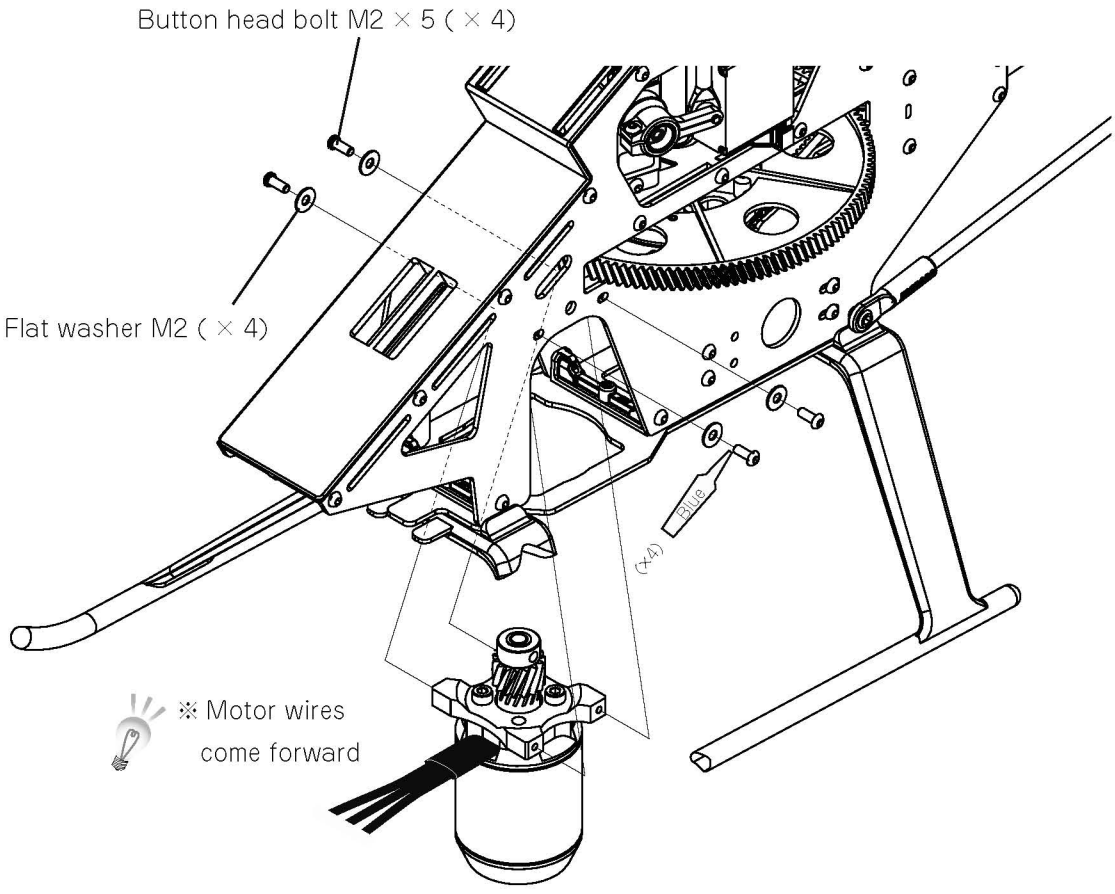
※ Use the smaller hole.

6-2 MOTOR INSTALLATION

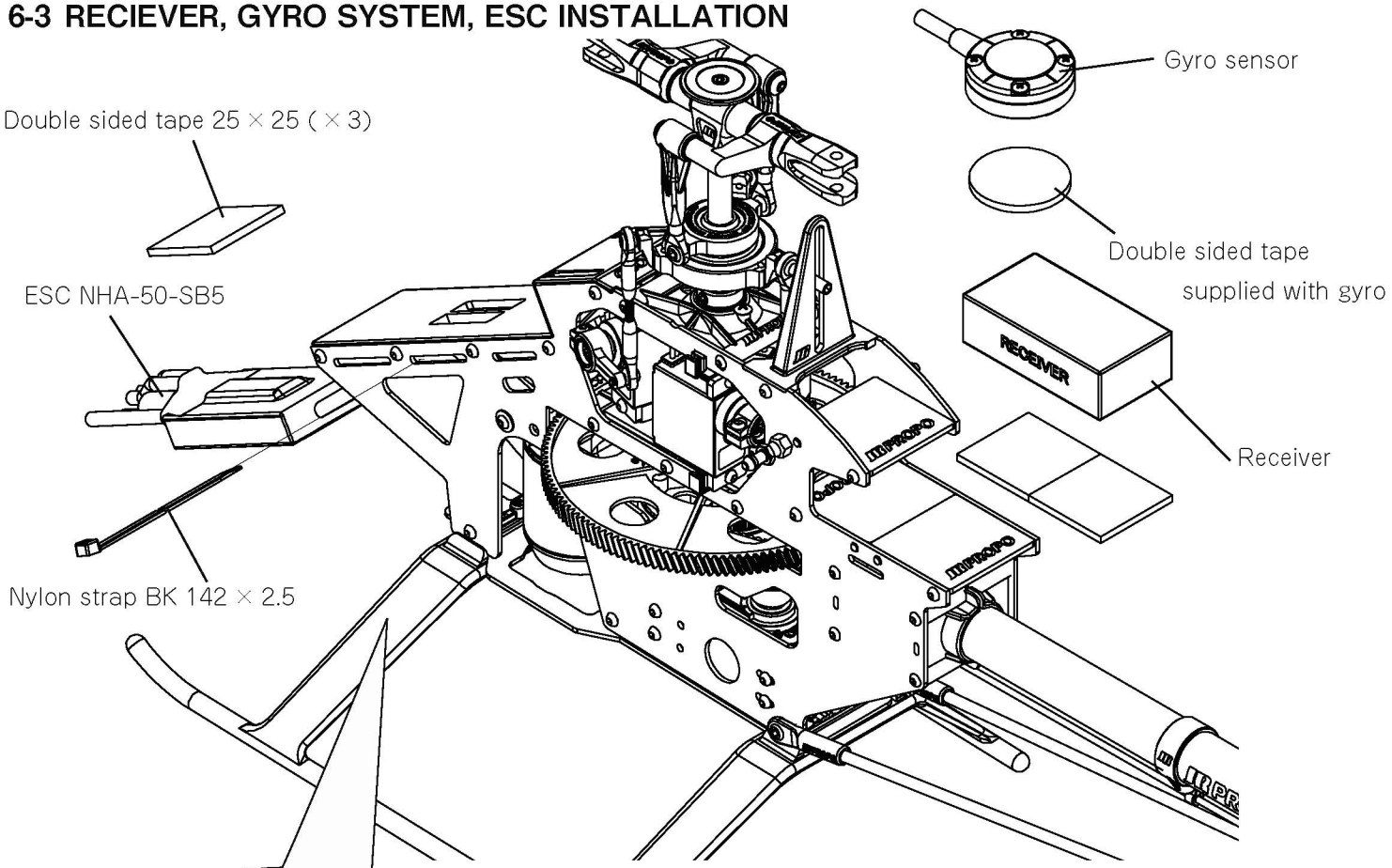
※ Use copy paper as a guide to adjust the backlash of the main and pinion.
(backlash adjustment : minimizing the gap between gears and adjusting for the best position for effective power transmission)



Slip a piece of paper between the gears



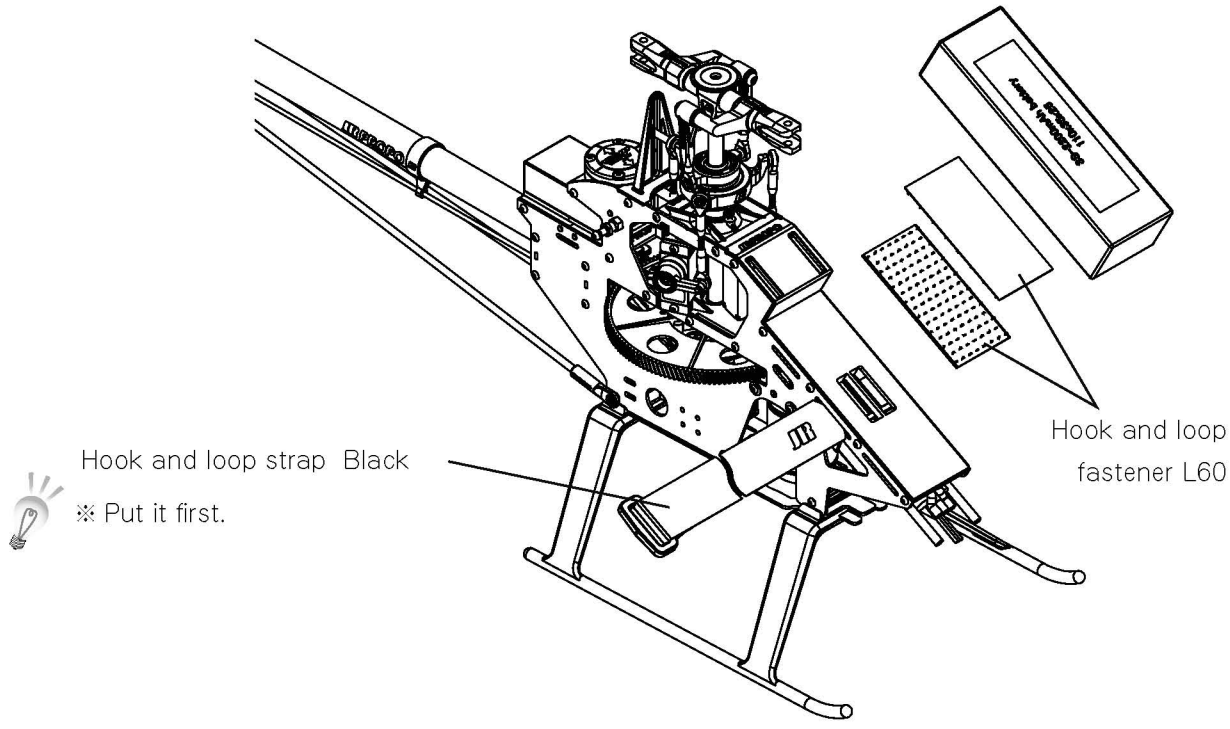
6-3 RECIEVER, GYRO SYSTEM, ESC INSTALLATION



※ Please refer to p.21

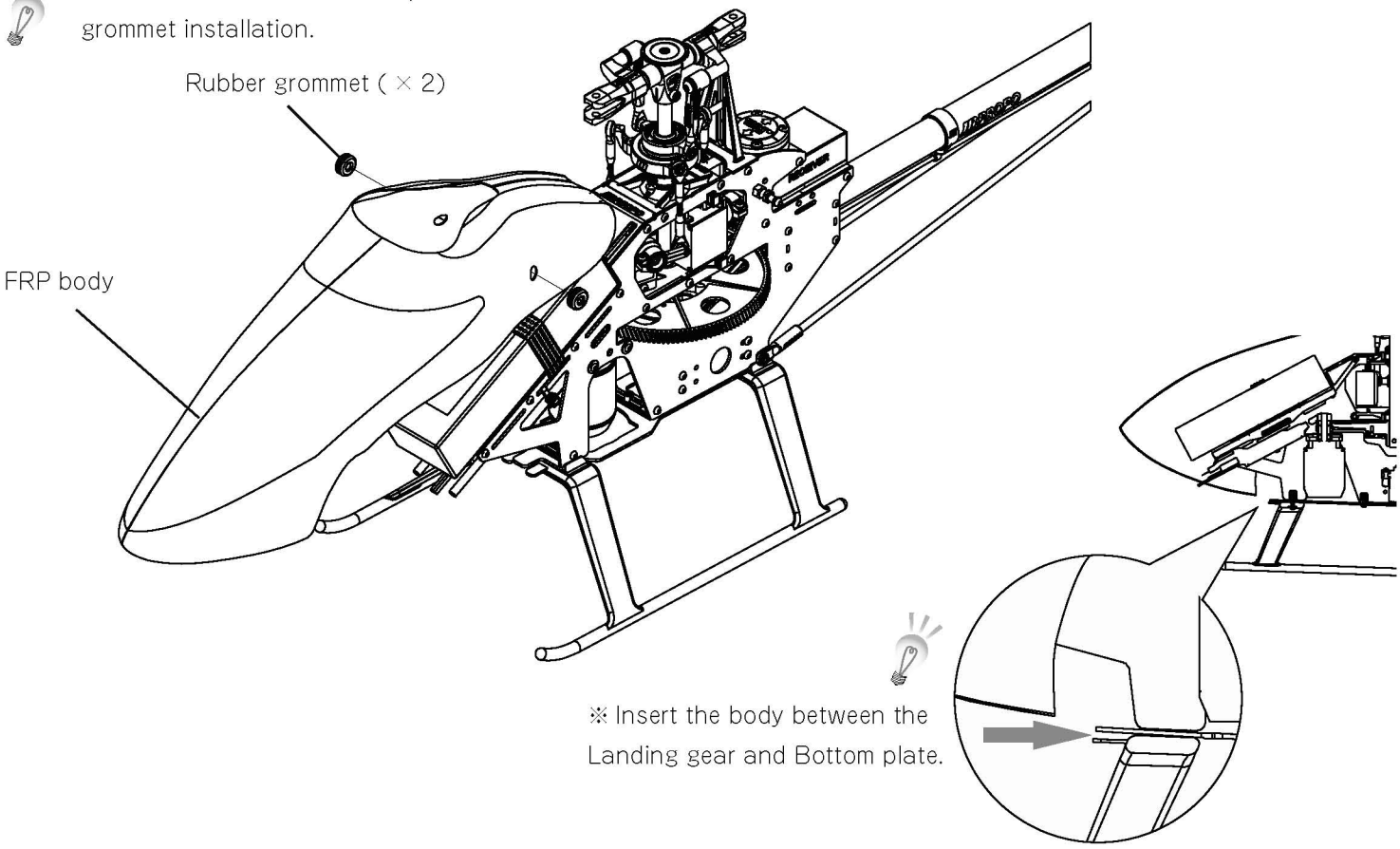
※ Mount the ESC with double sided tape
and then use a strap to secure.

⚠ **DANGER**



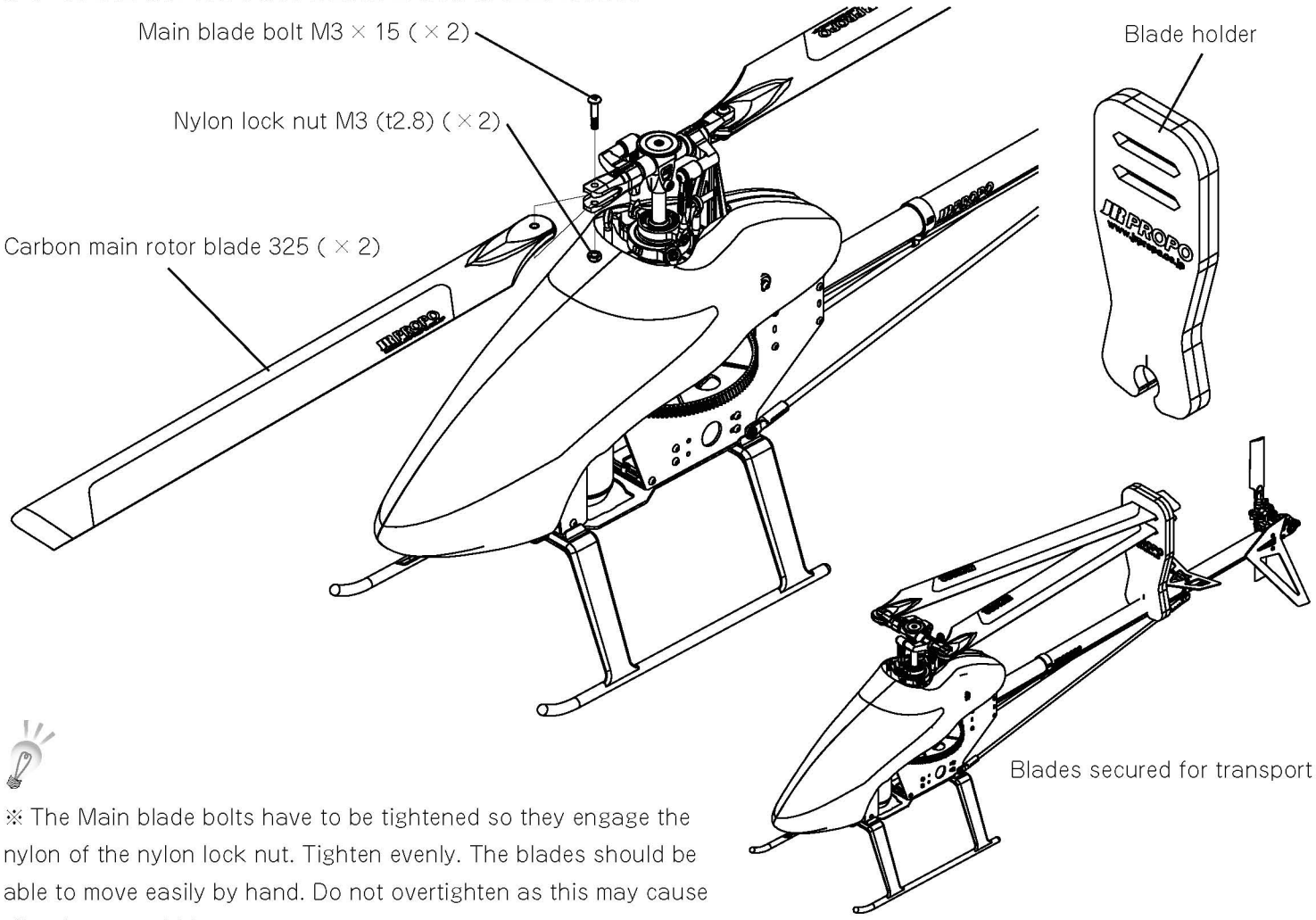
6-4 FRP BODY INSTALLATION

A small amount of oil can help with grommet installation.



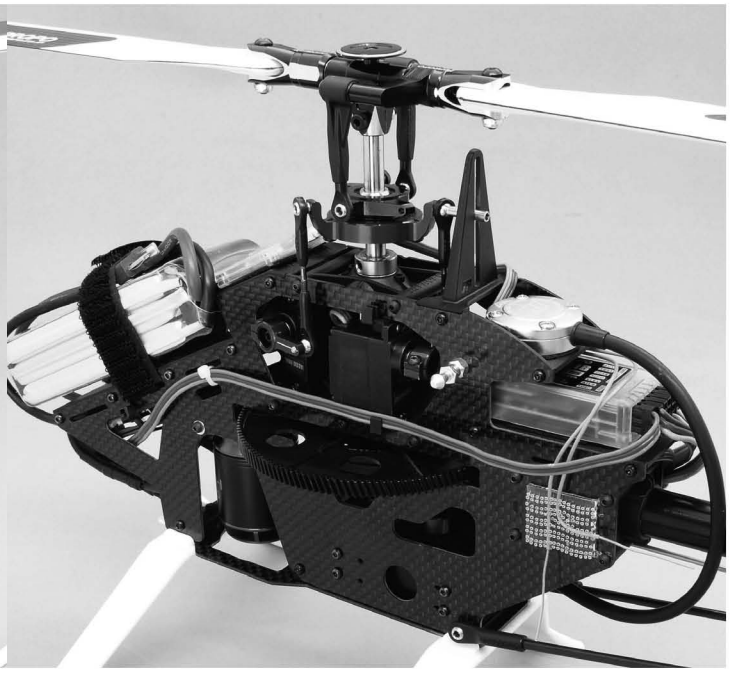
※ Insert the body between the Landing gear and Bottom plate.

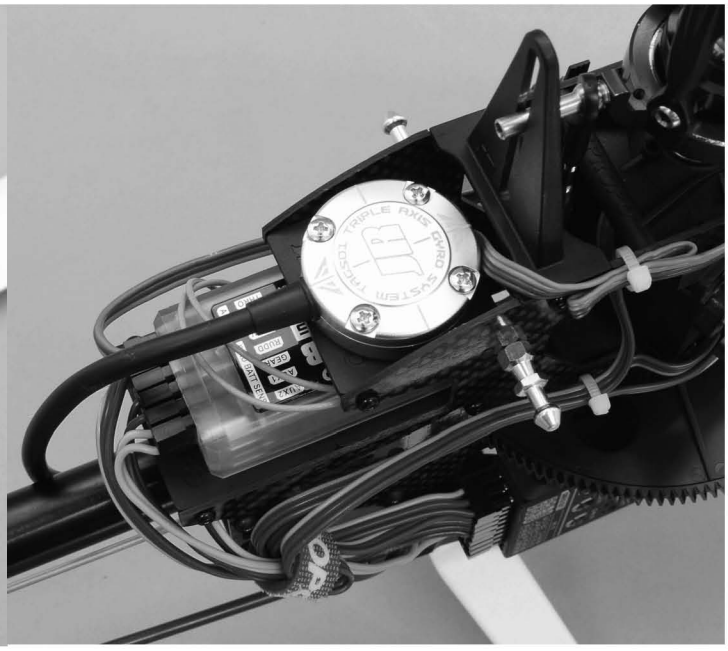
6-5 CARBON ROTOR BLADE INSTALLATION



※ The Main blade bolts have to be tightened so they engage the nylon of the nylon lock nut. Tighten evenly. The blades should be able to move easily by hand. Do not overtighten as this may cause vibration or wobble.

INSTALLATION EXAMPLES FOR BATTERY, ESC





CHOOSING A BATTERY

※ Please use the following as a guide.

Battery	Pinion	Gear Ratio	Motor	Approximate flight time(when using 2,500mAh)		Rotor RPM		MAX current
		Pinion : Main	KV value	Hovering	Hard 3D	Hovering	3D / Flying	
3 cell	T15	9.07 : 1	3,500	approx. 5 mins	approx. 3 mins	2,700rpm ~ 2,800rpm	3,600rpm ~ 3,800rpm	50A

● Battery Guide

Li-Po Battery			
Cell	Voltage / Capacity	Discharge capacity	Size
3 Cell	11.1V 2,200mAh ~ 2,700mAh	20C or greater	35mm × 105mm × 27mm(maximum)

● Flight Time

ⓐ Flight time is affected by the battery used. If using a 2,500mAh capacity battery, please set the flight time to:

Hovering only approx 5 mins

3D only approx 3 mins

In order to extend battery life, it is recommended to leave at least 15% battery capacity remaining after each flight.

ⓑ Please do not fly consecutively.

After each flight, please do not start the next flight until the motor, ESC and other parts have cooled down.

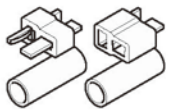
If you fly consecutively, the motor, ESC and other parts may get damaged from overheating.

● Connectors

Connectors rated for 50A or above are recommended.

Mistakes in confusing plus (+) and minus (-) are very dangerous and may lead to catastrophic accidents.

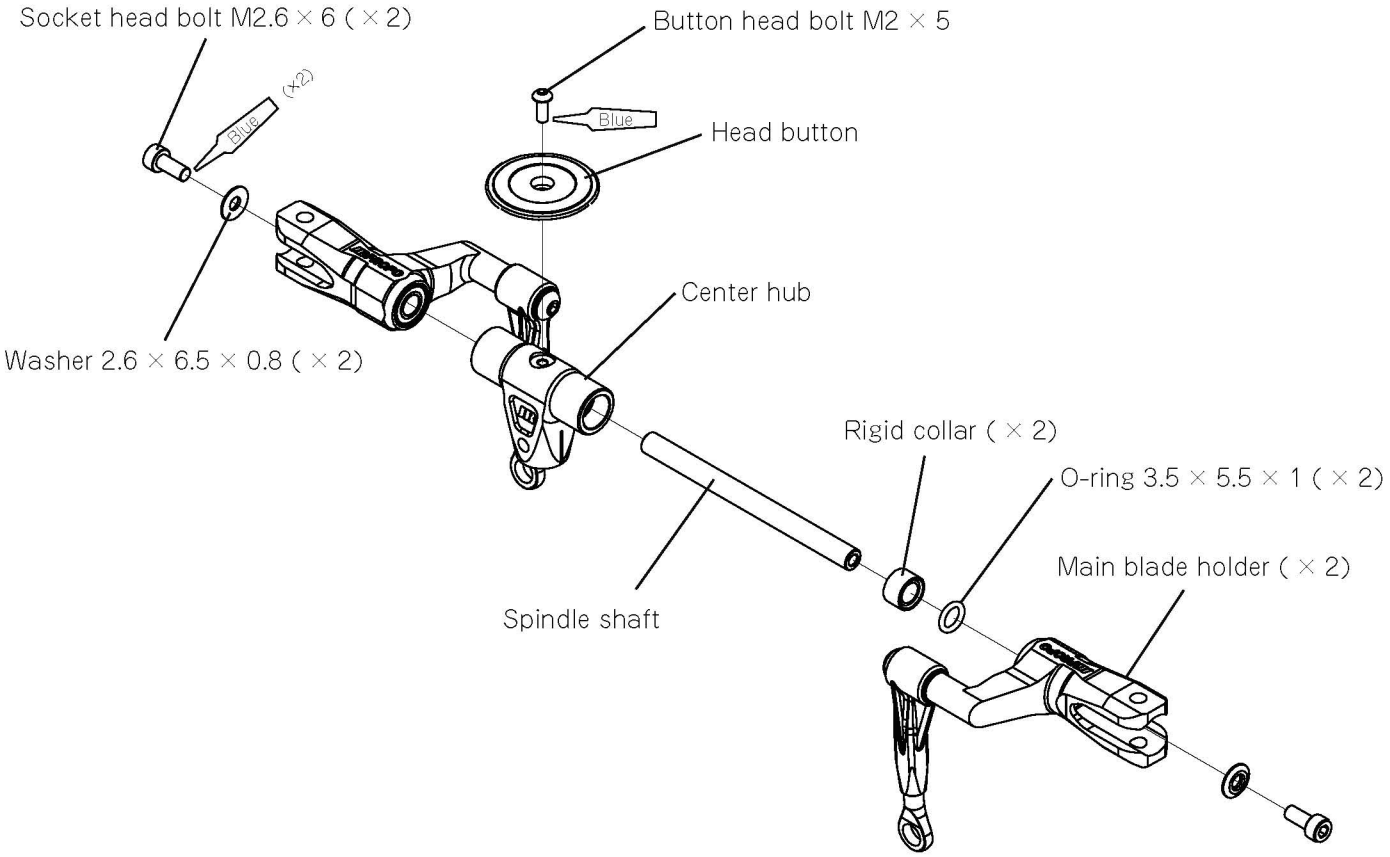
To prevent connection mistakes, please confirm the connecting method and the color of the wires are correct.

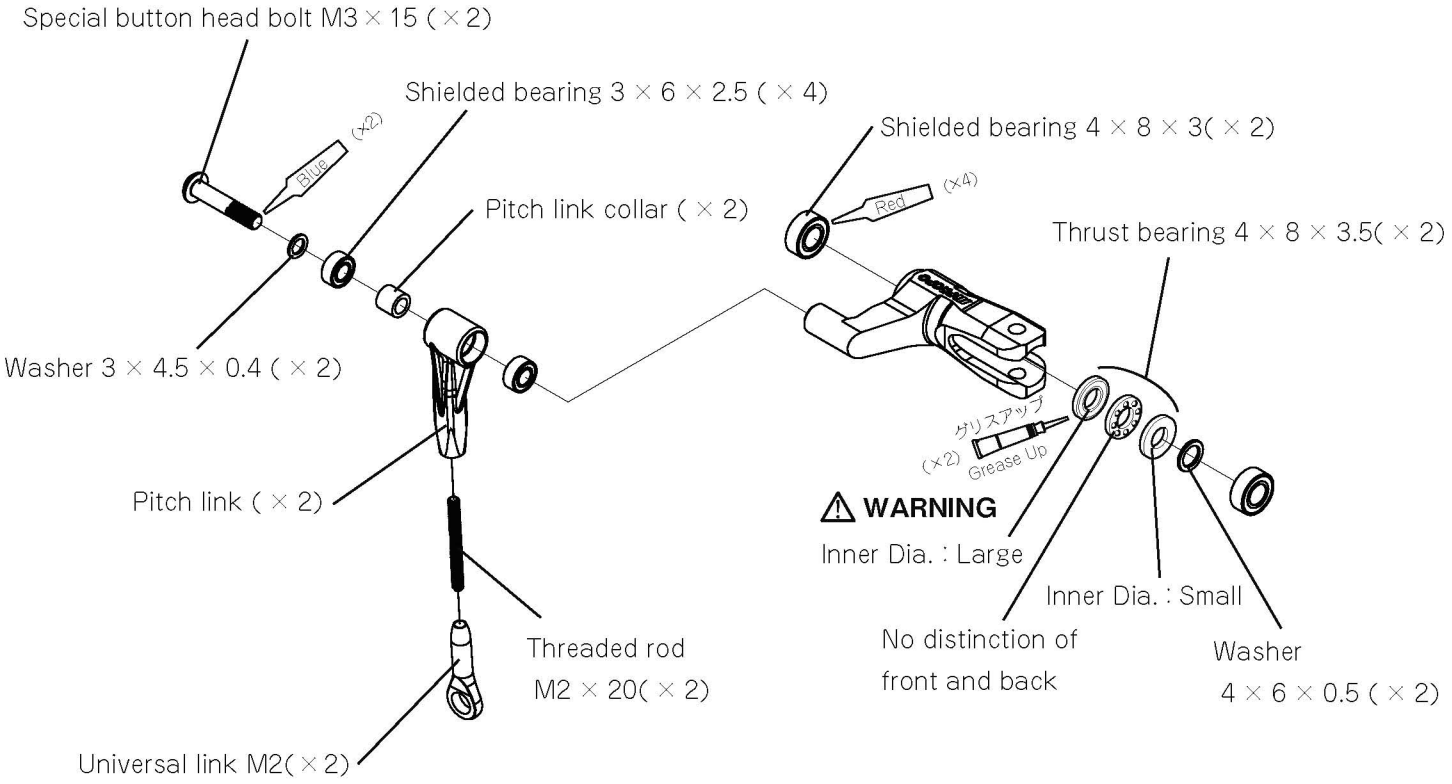


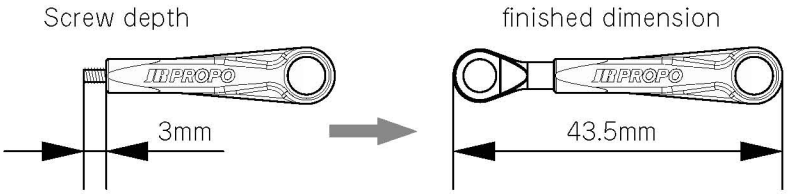
When repair is neccesary- MAIN ROTOR HEAD ASSEMBLY

⚠ DANGER

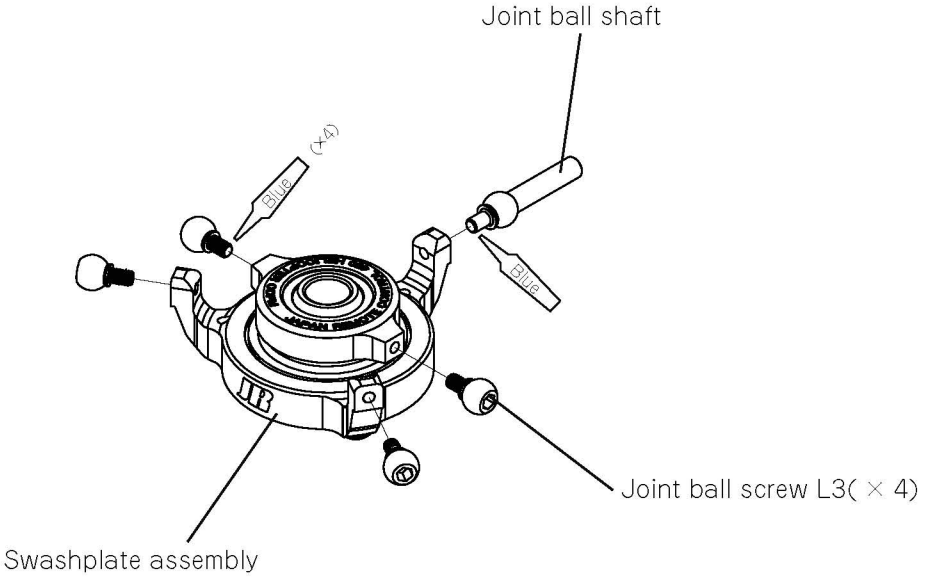
※ Replace the spindle bolts when performing maintenance.
※ Use JR thread lock red No.61611 for securing the bearings.



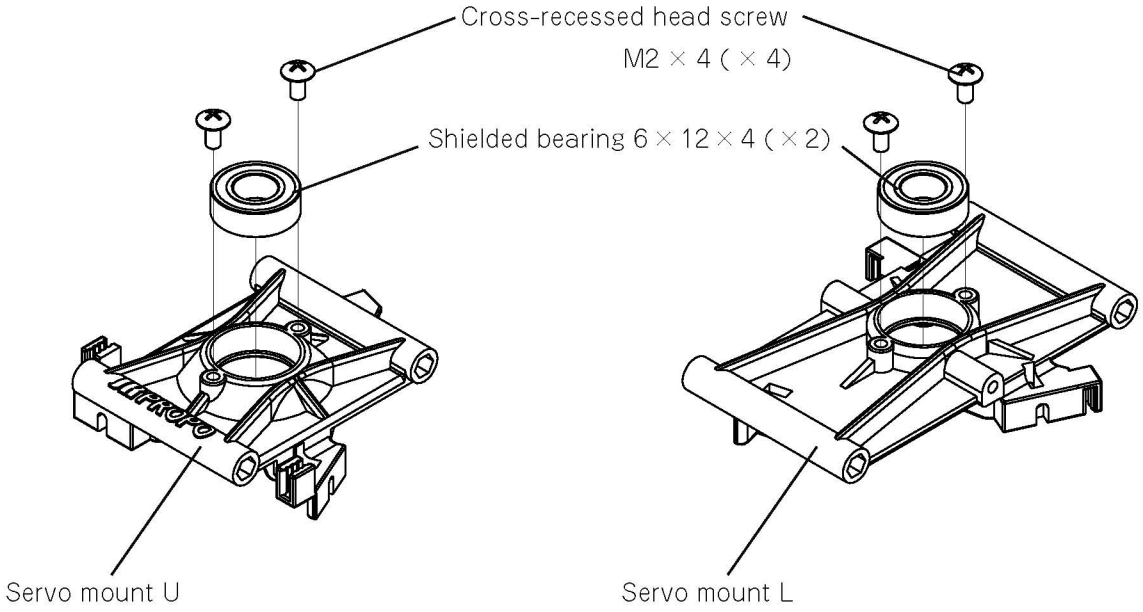




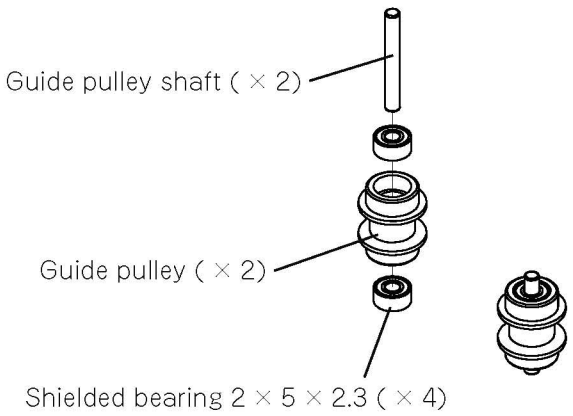
When repair is neccesary- SWASHPLATE ASSEMBLY

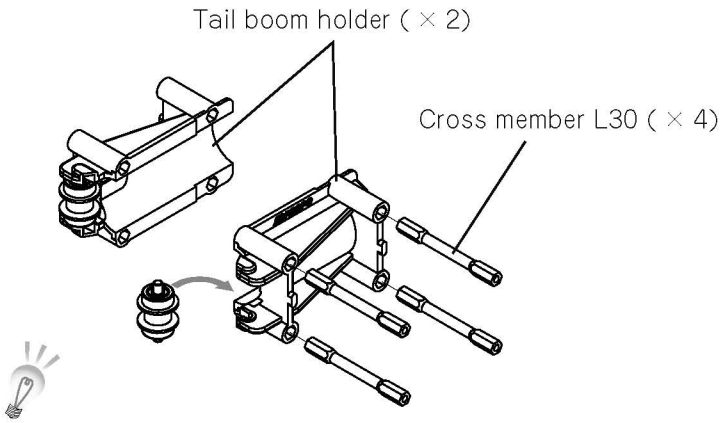


When repair is neccesary- SERVO MOUNT U/L



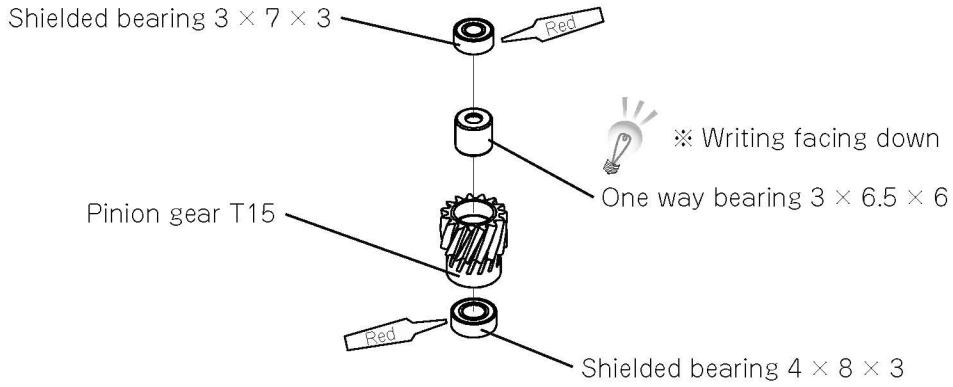
When repair is neccesary- GUIDE PULLEY AND TAIL BOOM HOLDER



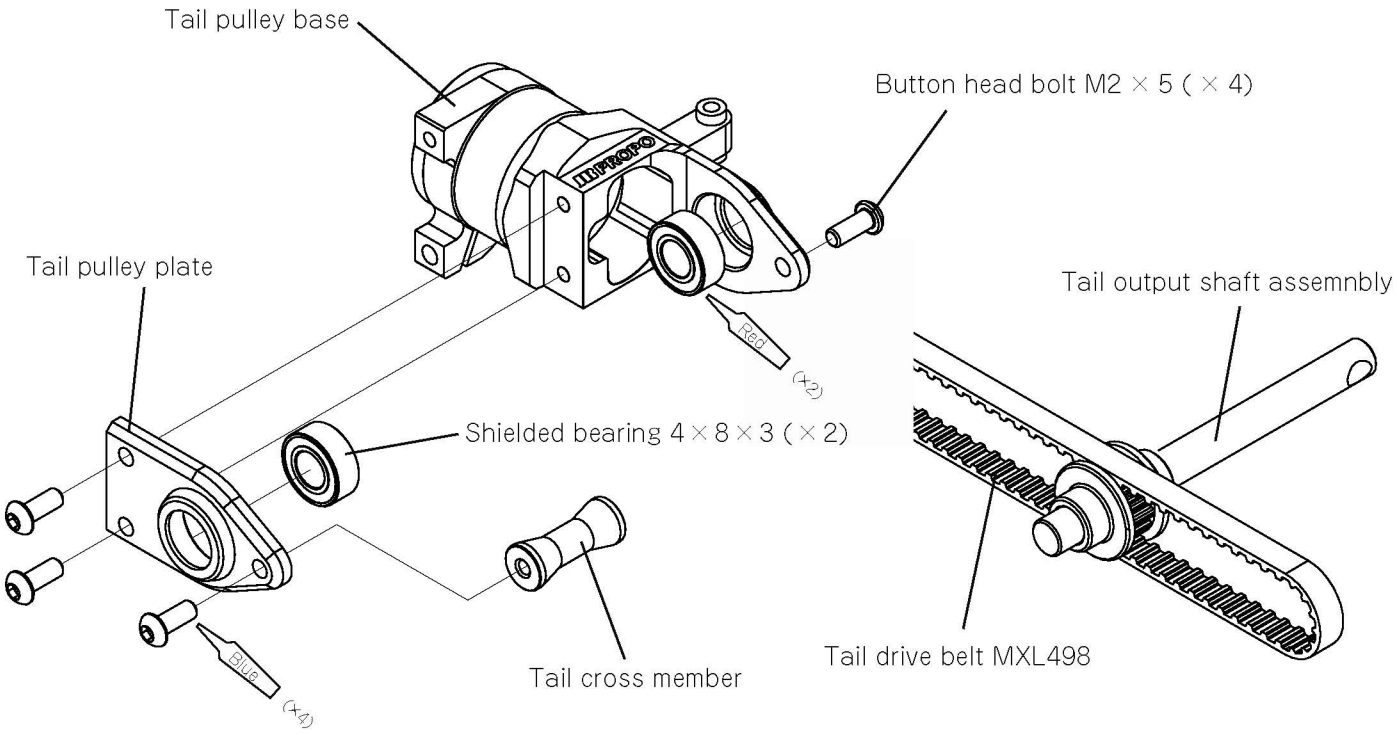


※ Press the Guide pulley shafts into the slots on the Tail boom holder until they click.

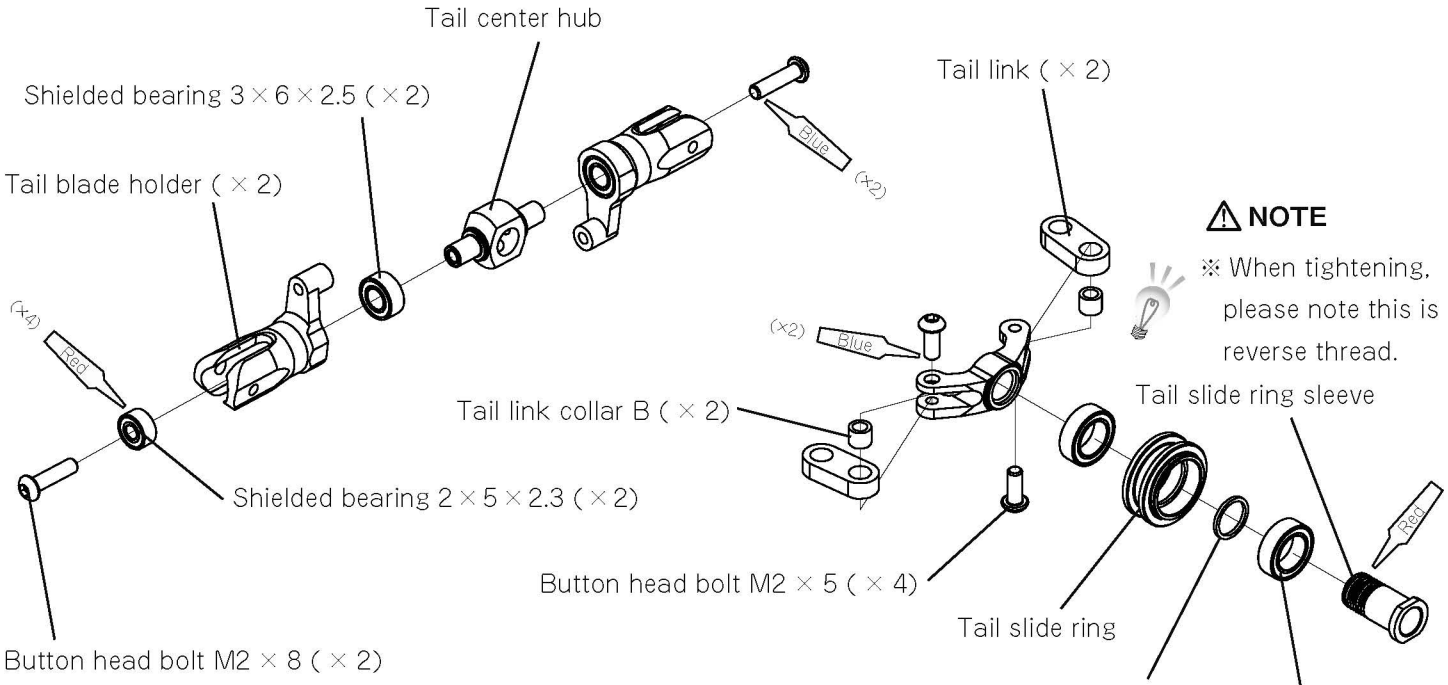
When repair is neccesary- PINION GEAR T15



When repair is neccesary- TAIL PULLEY CASE



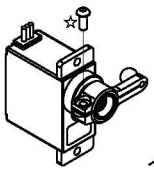
When repair is neccesary- TAIL BLADE HOLDER ASSEMBLY

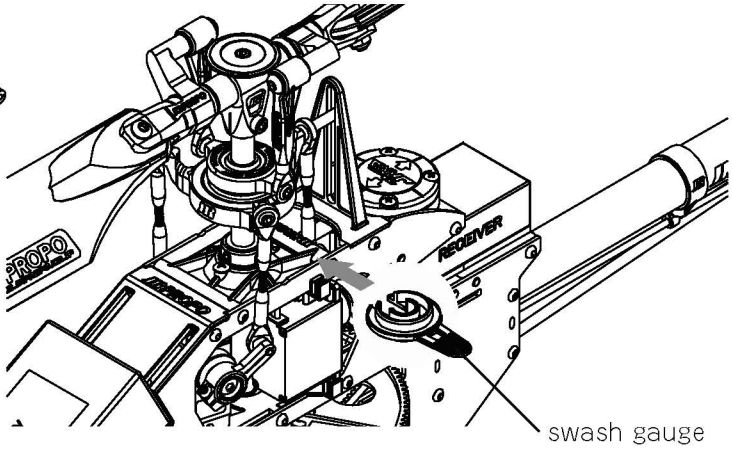


OVERALL BASIC ADJUSTMENT AFTER ASSEMBLY

※ Please also refer to your radio and gyro manual.
If you are using the JR TAGS01, please refer to the Radio setup information for this adjustment.

The servo horns should so far only be temporarily tightened.

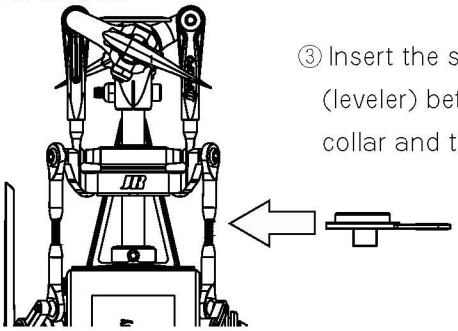




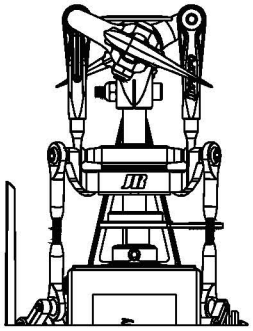
swash gauge
(swash leveler)

① Disconnect the motor wires before making any adjustments. Turn on the transmitter first then turn on the receiver (helicopter).

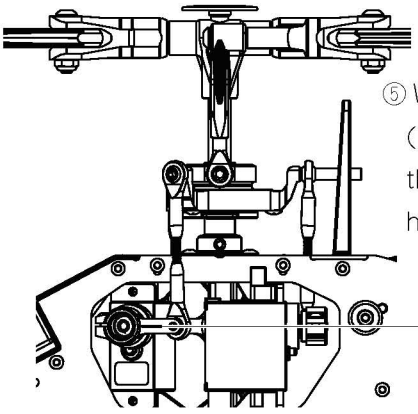
②Confirm the transmitter sticks and trims are in the neutral position. If your transmitter has pitch trim levers, set these to neutral as well.



③ Insert the swash gauge (leveler) between the shaft collar and the swash plate.

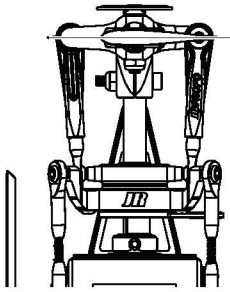


④ Push down on the swashplate.



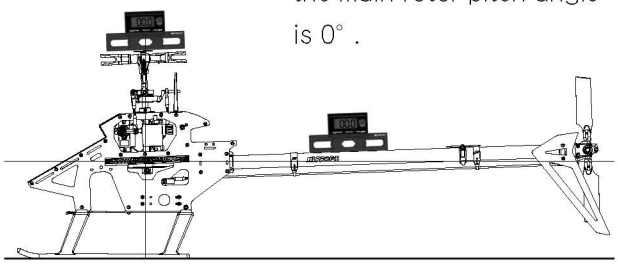
⑤ With the swash gauge (leveler) installed, adjust the linkages so the servo horns become horizontal.

Horizontal



0°

⑥ Tighten the button head bolts on the servo horns which were previously temporarily tightened. Adjust the pitch links so the main rotor pitch angle is 0° .

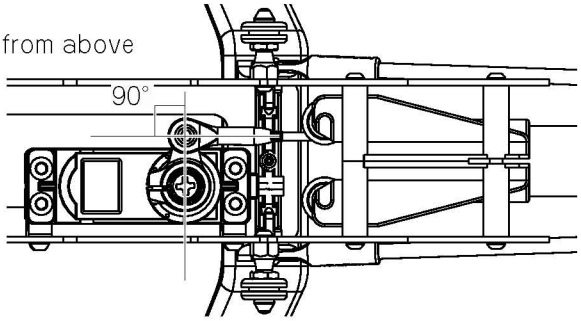


※ Note for zeroing your pitch gauge: Because this helicopter has a front sloping main shaft, zero the pitch gauge as shown in this figure (on the head button, gyro mount or tail boom)

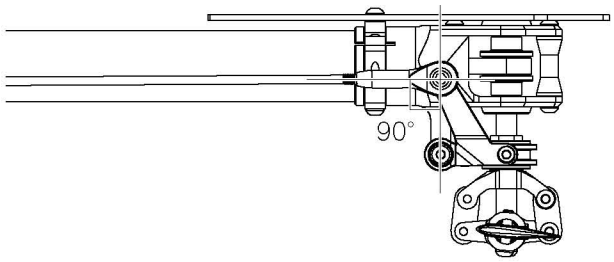
⑦ Rudder adjustment

Confirm the tail control rod is positioned at 90 degrees. If it is not, adjust the length of the tail control rod and the servo horn angle.

View from above



View from below



SETTING AND ADJUSTMENT OF THE TRANSMITTER

1 .【Rotor pitch setting】

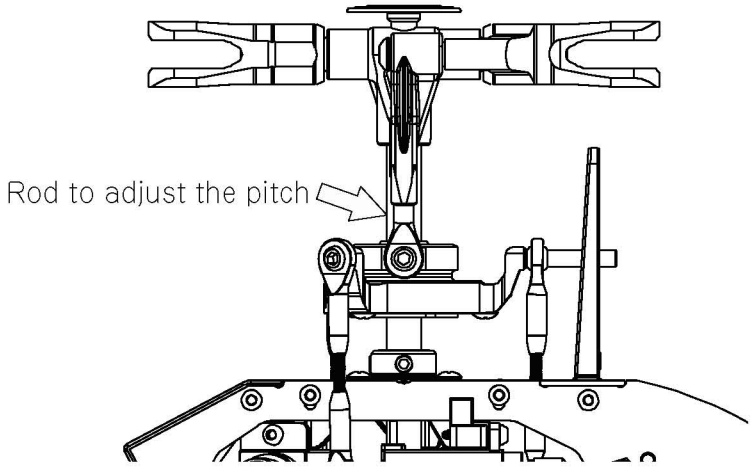
Measure the pitch of the Main Rotor Blades using the JR digital pitch gauge (No.61796, sold separately).

The intermediate (middle) value should be set to 0° - with the pitch stick in its middle position the pitch reading should be 0° . If it is not, adjust the length of the rods shown in the following figure to accurately set the pitch to 0° .

Once the intermediate pitch has been adjusted to 0° by rod adjustment, measure the high and low pitch values. It is presumed that they are almost as described in the table. If they are slightly higher or lower, use the "swash type (mix)" function to adjust the pitch stroke (swash pitch mix %). Increase or decrease the pitch percent value as required. In this case, the high and low pitches cannot be separately adjusted. If the above-mentioned intermediate pitch has been correctly adjusted, adjusting either the high or low pitch should automatically result in the figures seen in the table. If this is not the case, change the rod length and the pitch percent value in the swash mix, ignoring the intermediate value, so that the high and low pitches are properly adjusted.

	Low pitch	Intermediate pitch	High pitch	※ When confirming or adjusting the reference pitch
Reference pitch	-12°	0°	+12°	range, the pitch curve should be at default values.

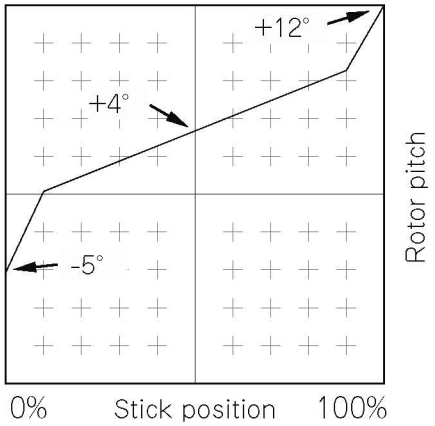
Hovering	-5°	+4°	+12°
Stunt	-8°	+3°	+10°
3D	-11°	0°	+11°



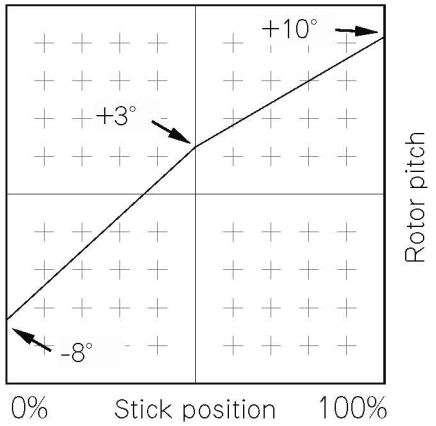
2 .【Pitch Curve (Transmitter pitch curve adjustment)】

This function allows you to make adjustment freely between specific points as to how much Main Rotor Blade pitch should be set at a particular pitch (throttle) stick position. This is one of the basic important adjustments of the helicopter. This adjustment depends on the Main Rotor Blades used and interaction with the throttle curve. To begin with make adjustment as shown in the following figure, referring also to the table in the previous section. Make fine adjustments after test flying.

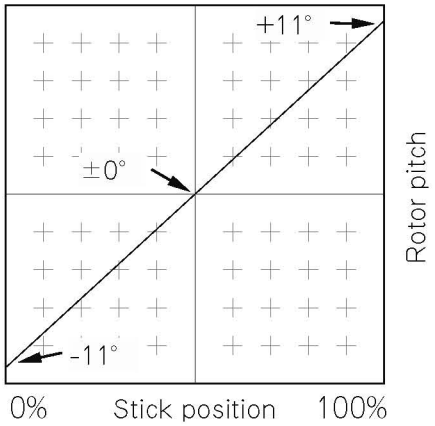
Pitch curve



【Hovering】



【Stunt】



【3D】

3 .【Throttle curve (Transmitter Throttle Curve Function)】

Adjust the throttle curve so the rotor rpm is as per the table on page 22.

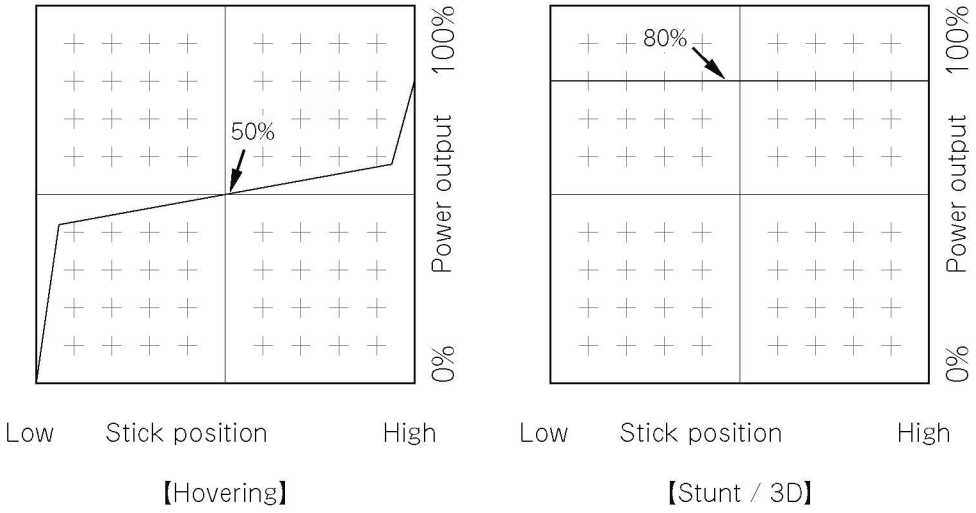
For details, please refer to your transmitter Instruction Manual and adjust the values accordingly.

Please be extra careful not to turn on the motor.

The throttle values here are just examples. In order to prevent over-speed of the main rotor, please adjust carefully after test flying the helicopter.

※ If your radio has a Throttle delay function, we recommend you to use this to prevent sudden changes in rotor speed when changing flight modes.

Throttle curve



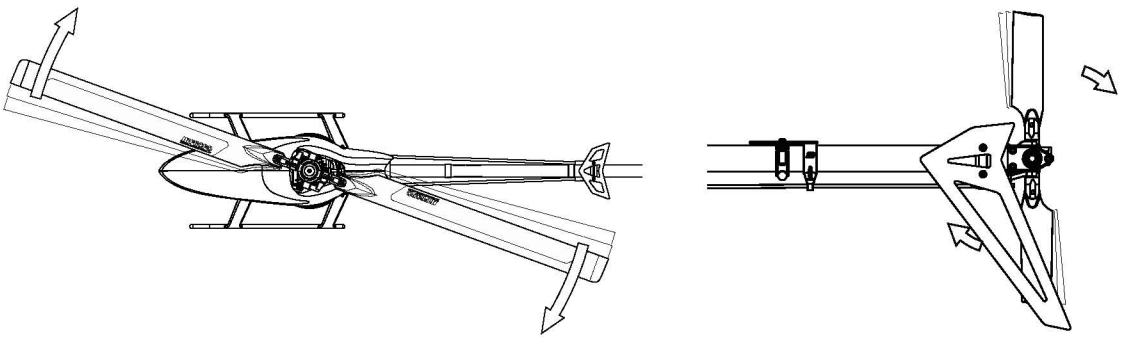
FINAL CHECKS PRIOR TO FLIGHT

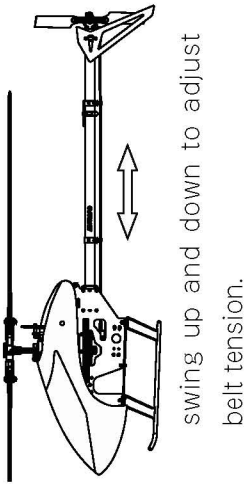
Although some items can only be adjusted after test flights, it is possible to do some final check prior to flight. Please recheck the following:

① Look through all the steps in the Instruction Manual again and make sure that all bolts are firmly tightened. Check in particular the bolts used for mounting the balls to the levers, and each bolt which was tightened after backlash adjustment of the gear mesh was completed.

② Check the rotation direction of the rotor blades.

When turning the Main rotor in the direction of the arrows (as shown in the figure below), confirm that the Tail rotor blades rotate in the direction indicated by the arrows. If not, check the direction of belt twist.





※ Check belt tension again.

Loosen the button head bolts securing the boom and pull back the tail boom to tension the belt. Hold the tail boom and hang the helicopter nose down. Then gently swing up and down several times with the battery installed as shown in the figure to the right. Now tighten the button head bolts - and the belt tension should be perfect.

③ Confirm all servos function smoothly and their direction of operation is correct.
Also check that the servo horn screws are firmly tightened.

④ Make sure the gyro control direction is correct.

⑤ Make sure that the battery in the transmitter and that powering the receiver (in the helicopter) is fully charged.

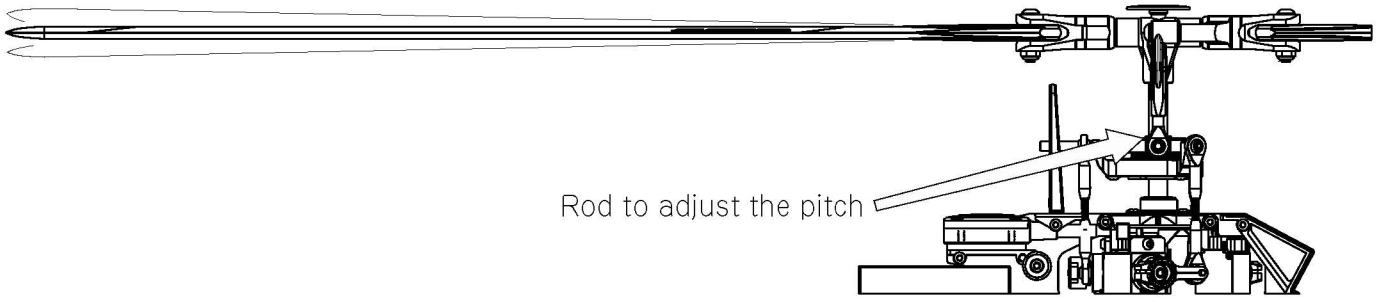
⑥ Check that the receiver, gyro, ESC and battery are firmly secured.

⑦ Make sure that the Main Rotor Blades and the Tail Rotor Blades are attached in the correct orientation.

If no issues have been found after checking all of the above, test fly the helicopter and make adjustments as necessary.
If possible, the helicopter should be test flown under the guidance of an experienced operator.

FINE ADJUSTMENT FOLLOWING THE TEST FLIGHT

【Items which need to be readjusted after the test flight】
Tracking Adjustment
This is to adjust both Main Rotor Blades to the same pitch, so each produces the same amount of lift. If they are not uniform, their trajectory is not seen as an identical line as shown in the figure below. This leads to vibrations and a helicopter which does not fly well. When the helicopter is about to leave the ground, look at the plane of rotation of the Main Rotor Blades from the side. No adjustment is required if the trajectory of the Main Rotor Blades is seen as an identical line. If vertically misaligned, pitch adjustment on one blade is required. On either the 'high' or 'low' blade adjust the Universal Link of the rod shown in the following figure in such a manner that the blade pitch is increased or decreased as required.



Tracking adjustment is dangerous. Remain at least 5m or more from the helicopter at all times.

BE SURE TO READ PRIOR TO FLIGHT

This helicopter is not a toy. It is intended for those having had prior experience flying a radio control helicopter, with appropriate knowledge and skills.
Even an advanced operator well-versed in radio control helicopters may forget some safety precautions. Refresh your memory by reading the following.
Fly the helicopter in a manner suitable for the operator's skills, avoiding any unnecessary risk during flight. For maneuvers demonstrated in a competition, emulate them after fully understanding and mastering the operating methods and skills required.
When flying the helicopter, not only a beginner or intermediate operator, but an advanced operator should never fly alone. Listen to explanations from an assistant or an instructor having expertise, and fly under their instruction.

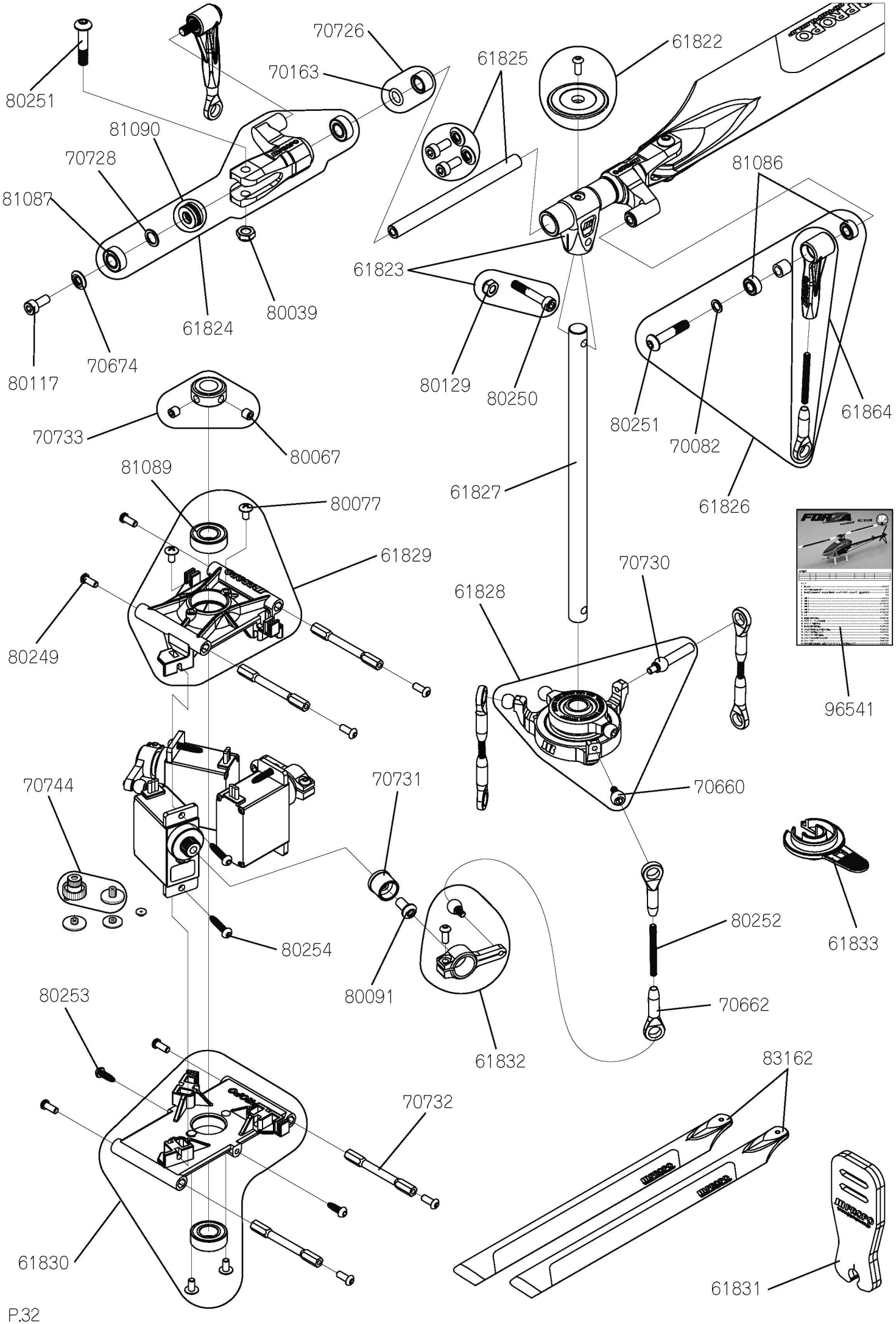
1.【Precautions after Assembly】
ⓐ Check all bolts are fully tightened. Tighten any loose ones.
ⓑ Be sure to use screw locking agent when tighten all bolts, if so instructed in the Instruction Manual. When doing this, degrease the bolts and nuts completely.
ⓒ Check the rotating parts (Main Rotor Blades, Tail Rotor) and that their bolts are fully tightened.
However it is necessary that the blades can be moved slightly back and forth.
ⓓ Set the throttle stick to the slowest position, then turn on the transmitter (ensure it is fully charged).
Next, turn on the helicopter by plugging in the main battery. Always turn on in this order.
Operate the sticks (throttle/pitch, aileron, elevator and rudder) to confirm correct function.
Always have the motor unplugged so that the motor will not turn on.
ⓔ Never cut or bundle the antenna wire. Put it in the antenna tube so that it will not be caught by the rotor or the main gear.
If a 2.4Ghz transmitter set is used, please adjust the antenna to the correct orientation as recommended in the radio manual.
ⓕ Securely hold the helicopter with both hands when moving it. The helicopter has sharp parts (such as machined metal) pay attention to avoid injury.

2.【Precautions Prior to Flight】
ⓐ Make sure that the Main Rotor Blades and Tail Rotor are free from any cracks or damage. If they are damaged even just a little, do not use them.
ⓑ With the stick at the slowest position, turn on the transmitter then receiver and check for correct control movements.
ⓒ Care should be taken not to catch your cloths on the transmitter sticks when moving the helicopter. Move the helicopter to the takeoff position using two or more persons - one holding the helicopter with both hands and the other carrying items required for flight, such as the transmitter.
ⓓ Be sure to check the remaining capacity of all batteries prior to flight.
ⓔ Conduct a distance (range) test of the transmitter. With the transmitter antenna collapsed, move 15m or more from the helicopter. Move all the sticks and confirm the movement of the helicopter servos follow the sticks. If they do not move properly determine the cause and correct before flight. Ask for repair if it is needed.
ⓕ If two or more Radios are used simultaneously on the same frequency you cannot fly the radio control helicopter because of interference. If someone else is using the same frequency, wait until he or she has finished operation. If there is interference despite no one using the same frequency. it is conceivably an external interference source exists. Never fly until that interference source has been cleared.
ⓖ While connecting the batteries powering the helicopter, make sure the throttle stick is at the slowest position and the throttle hold switch is on.

3.【Precautions during flight】
ⓐ Never fly the Helicopter near houses, high-tension lines or a heavy-traffic road.
ⓑ Never fly it above people, houses, behind you or to far away. If the helicopter crashes or comes into contact with the human body, it could cause serious injury or death.

ⓒ Keep your eyes on the helicopter during flight. If you look away even for a short period of time, it may change its position or you may lose sight of it and loose control.
ⓓ Do not fly (or hover) with the Main Rotor Blades at eye level because it is dangerous. Always ensure that the Main Rotor Blades are higher than eye level.
ⓔ Be careful not to exhaust the battery power. Use the timer function on the transmitter, keep the remaining battery power under check.
ⓕ When stopping the Main Rotor Blades never touch them. Wait for them to stop naturally.
ⓖ If you notice an abnormality during flight, land the helicopter immediately and check for any loose bolts, etc. Do not fly it again until the cause has been completely eliminated.
ⓗ In a crash parts like the Li-Po battery or the ESC in the helicopter could catch fire. Keep a fire extinguisher near during flight for safety and fire prevention.
ⓘ Other adjustments and notices will be updated at any time on the following website. Introduction and setting methods for recommended ESCs and Motors are also on this website. Please check it for more information.

4. 【Precautions after flight】
ⓐ Check for any loose bolts or shaky parts. If there is any abnormality, repair them before the next flight.
ⓑ If the Main Rotor Blades or any other part come into contact with the ground during flight, do not use those parts even if their appearance looks faultless. Replace them with new ones.
ⓒ Check whether or not the battery, receiver, gyro, etc. are firmed secured.
ⓓ Check the antenna wire from time to time because its core may have been broken. If broken within the coating, it may not be immediately apparent. Refer to the manufacturer periodically for servicing.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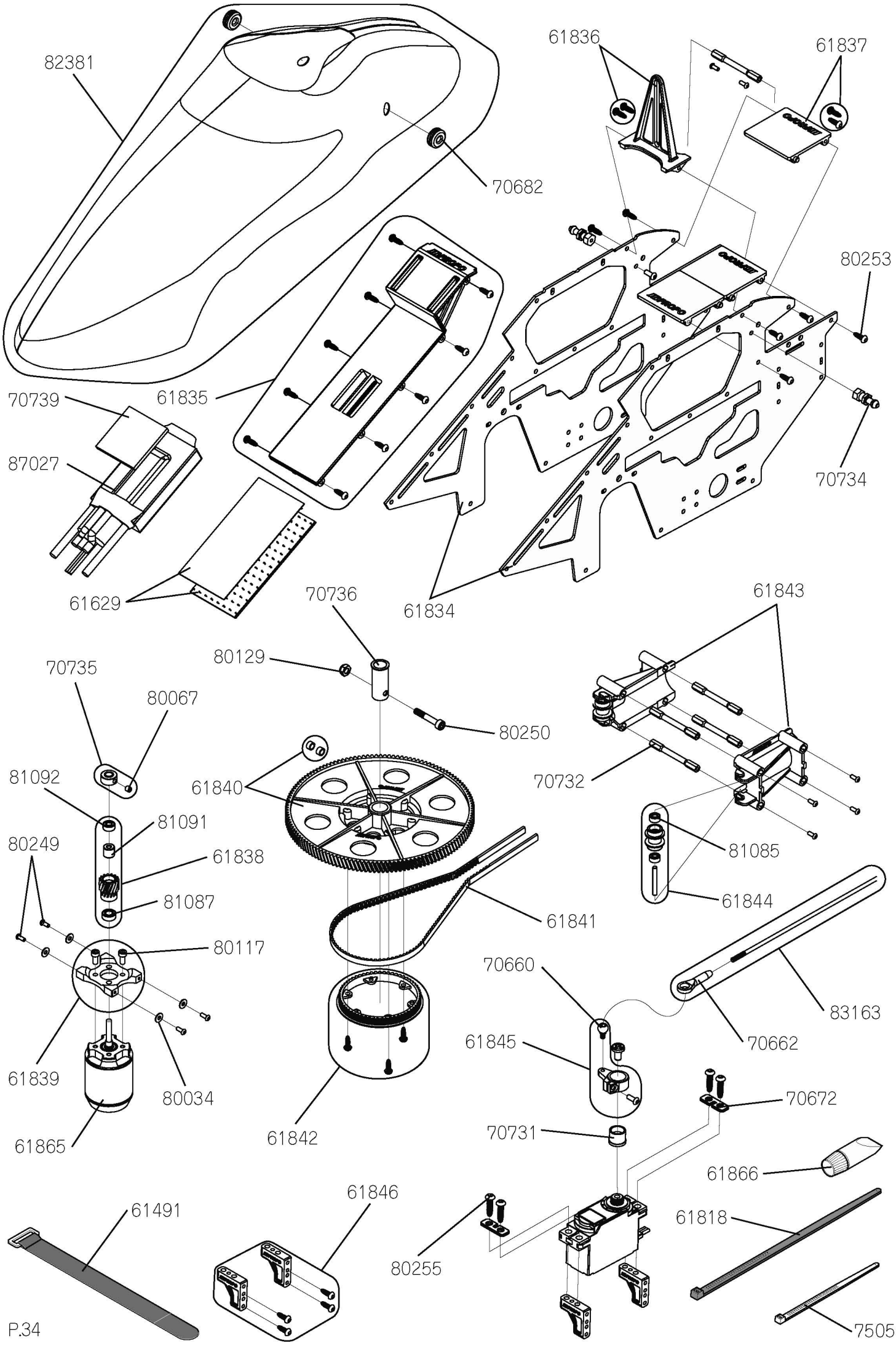
Item #	Description	Quantity	Note
61822	Head button	1	w/Button head bolt M2 × 5
61823	Center hub	1	w/Special socket head bolt M2.6 × 15, Nylon lock nut M2.6
61824	Main blade holder assembly	1	w/L-840ZZ, Thrust bearing 4 × 8 × 3.5, Washer 4 × 6 × 0.5
61825	Spindle shaft	1	w/Socket head bolt M2.6 × 6, Washer 2.6 × 6.5 × 0.8
61826	Pitch link set	1	w/Bearing. collar, bolt,rod, link for 1 kit
61827	Main shaft	1	
61828	Swashplate assembly	1	w/Joint ball screw L3, Joint ball shaft
61829	Servo mount U	1	w/L-1260ZZ, Cross-recessed head screw M2 × 4
61830	Servo mount L	1	w/L-1260ZZ, Cross-recessed head screw M2 × 4
61831	Blade holder	1	
61832	Metal servo horn L14	1	w/Joint ball screw L3, Button head bolt M2 × 5
61833	Swash gauge	1	
61864	Pitch link	2	w/Threaded rod M2 × 20, Universal link M2
70082	Washer 3 × 4.5 × 0.4	10	
70163	O-ring 3.5 × 5.5 × 1	2	
70660	Joint ball screw L3	5	
70662	Universal link M2	10	
70674	Washer 2.6 × 6.5 × 0.8	10	
70726	Rigid collar set	1	w/O-ring 3.5 × 5.5 × 1 for 1 kit
70728	Washer 4 × 6 × 0.5	2	
70730	Joint ball shaft	1	
70731	Servo horn inner J	1	
70732	Cross member L30	2	
70733	Main shaft collar	1	w/Setscrew M3 × 3
70744	Swash servo metal gear set (DS21)	1	2pcs (2 kinds)
80039	Nylon lock nut M3 (t2.8)	10	
80067	Setscrew M3 × 3	10	
80077	Cross-recessed head screw M2 × 4	10	
80091	Button head bolt M3 × 6	10	
80117	Socket head bolt M2.6 × 6	10	
80129	Nylon lock nut M2.6	10	
80249	Button head bolt M2 × 5	10	
80250	Special socket head bolt M2.6 × 15	5	
80251	Special button head bolt M3 × 15	5	
80252	Threaded rod M2 × 20	2	
80253	HEX tapping screw M2 × 6	10	
80254	HEX tapping screw M2 × 10	10	
81086	Shielded bearing 3 × 6 × 2.5-T	2	L-630ZZ
81087	Shielded bearing 4 × 8 × 3-T	2	L-840ZZ
81089	Shielded bearing 6 × 12 × 4-T	2	L-1260ZZ
81090	Thrust bearing 4 × 8 × 3.5-T	2	
83162	Carbon main rotor blade 325	2	
96541	Instructions (Forza 450)	1	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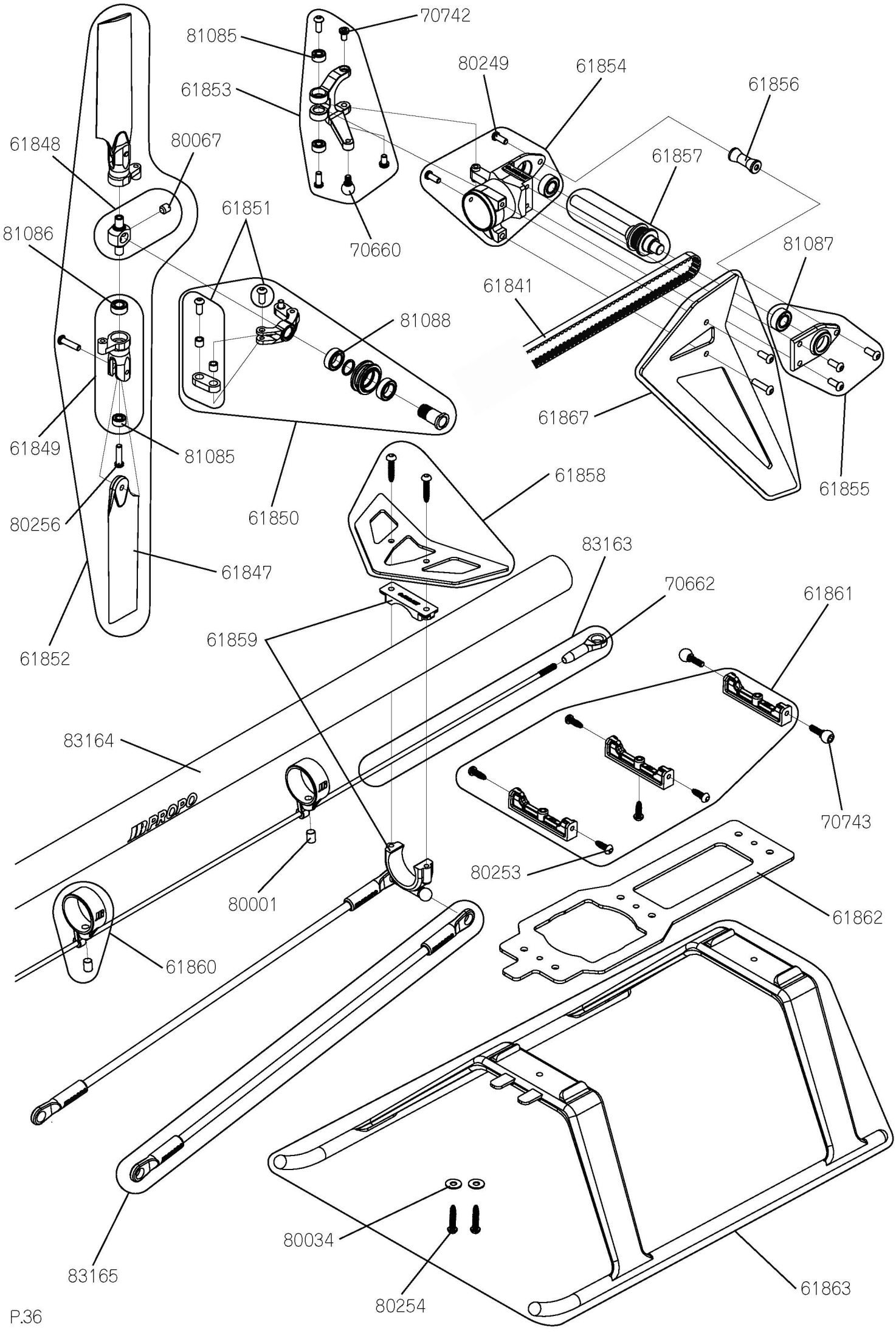
Item #	Description	Quantity	Note
61491	Hook and loop strap Black	2	L : 200
61629	Hook and loop fastener L60	2	
61818	Nylon strap BK 142 × 2.5	10	
61834	Carbon main frame	1	
61835	Battery mount	1	w/HEX tapping screw M2 × 6
61836	Radius support	1	w/HEX tapping screw M2 × 6
61837	Gyro mount	1	w/HEX tapping screw M2 × 6
61838	Pinion gear T15 assembly	1	w/L-840ZZ, HF-0306, L-730ZZ
61839	Motor mount	1	w/Socket head bolt M2.6 × 6
61840	Main gear T136	1	w/Collar 2.6 × 3.6 × 2
61841	Tail drive belt MXL498	1	
61842	Front pulley T60	1	w/HEX tapping screw M2 × 6
61843	Tail boom holder	2	
61844	Guide pulley	1	w/L-520ZZ, Guide pulley shaft
61845	Metal servo horn L10	1	Joint ball screw L3,Button head bolt M2 × 5
61846	Rudder servo mount	2	w/HEX tapping screw M2 × 6
61865	Motor NHM-30-6P	1	Kv : 3500
61866	Thread lock (weak)	1	Color : blue for micro screws, weak adhesion

70660	Joint ball screw L3	5	
70662	Universal link M2	10	
70672	Servo mount plate D	10	Color : red
70682	Rubber grommet	4	
70731	Servo horn inner J	1	
70732	Cross member L30	2	
70734	Body catch L7.25	2	
70735	Pinion stopper	1	w/Setscrew M3 × 3
70736	Main gear sleeve	1	
70739	Double sided tape 25 × 25	5	
75059	Nylon strap S	10	

80034	Flat washer M2	10	
80067	Setscrew M3 × 3	10	
80117	Socket head bolt M2.6 × 6	10	
80129	Nylon lock nut M2.6	10	
80249	Button head bolt M2 × 5	10	
80250	Special socket head bolt M2.6 × 15	5	
80253	HEX tapping screw M2 × 6	10	
80255	HEX tapping screw M2.6 × 10	10	
81085	Shielded bearing 2 × 5 × 2.3-T	2	L-520ZZ
81087	Shielded bearing 4 × 8 × 3-T	2	L-840ZZ
81091	One-way bearing 3 × 6.5 × 6-T	1	HF-0306
81092	Shielded bearing 3 × 7 × 3-T	2	L-730ZZ
82381	FRP body	1	w/Rubber grommet
83163	Tail control rod L408	1	w/Universal link M2
87027	ESC NHA-50-SB5	1	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Item #	Description	Quantity	Note
61841	Tail drive belt MXL498	1	
61847	Tail rotor blade	2	
61848	Tail center hub	1	w/Setscrew M3 × 3
61849	Tail blade holder assembly	1	L-520ZZ · L-630ZZ already assembled
61850	Tail slide ring assembly	1	whole set
61851	Tail link	2	w/Tail link collar, Button head bolt M2 × 5
61852	Tail blade holder assembly	1	whole set
61853	Tail pitch control lever	1	w/L-520ZZ,Joint ball screw L3, Slide ring pin, bolt
61854	Tail pulley base	1	w/L-840ZZ, Button head bolt M2 × 5
61855	Tail pulley plate	1	w/L-840ZZ, Button head bolt M2 × 5
61856	Tail cross member	1	
61857	Tail output shaft assembly	1	Tail pulley T14 already assembled
61858	Carbon horizontal fin	1	w/HEX tapping screw M2 × 10
61859	Tail boom brace clamp	1	U/L one each
61860	Tail rod guide	2	w/Setscrew M3 × 4
61861	Bottom plate adapter	3	w/HEX tapping screw M2 × 6
61862	Carbon bottom plate	1	
61863	Landing gear	1	w/HEX tapping screw M2 × 10, Flat washer
61867	Carbon vertical fin	1	w/Button head bolt M2 × 5, M2 × 8
70660	Joint ball screw L3	5	
70662	Universal link M2	10	
70742	Tail slide ring pin	2	
70743	Joint ball screw L6	2	
80001	Setscrew M3 × 4	10	
80034	Flat washer M2	10	
80067	Setscrew M3 × 3	10	
80249	Button head bolt M2 × 5	10	
80253	HEX tapping screw M2 × 6	10	
80254	HEX tapping screw M2 × 10	10	
80256	Button head bolt M2 × 8	10	
81085	Shielded bearing 2 × 5 × 2.3-T	2	L-520ZZ
81086	Shielded bearing 3 × 6 × 2.5-T	2	L-630ZZ
81087	Shielded bearing 4 × 8 × 3-T	2	L-840ZZ
81088	Shielded bearing 5 × 8 × 2.5-T	2	L-850ZZ
83163	Tail control rod L408	1	w/Universal link M2
83164	Tail boom L391	1	
83165	Tail boom brace	2	Tail boom brace end already assembled

PRODUCT WARRANTY AND LIABILITY INDEMNITY

PRODUCT WARRANTY

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, contact our Distributor.
2. Note that our product warranty does not cover any failures of parts which have resulted from your handling during assembly.
3. For other product warranty, please inquiry with our distributors.

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.

REPAIR AND AFTER-SALE SERVICE, TRANSFER OF PRODUCT

REPAIR

For repair assistance, please contact the shop where you purchased the product.
Please do not try to repair by yourself if you do not have enough knowledge or experience of R/C helicopters.
If you replace parts or repair by yourself, refer to the parts list and relate manuals.
If you ask for repair, please confirm first if it is repairable.

AFTER-SALE SERVICE

Please contact our distributors for any inquiry about this product.

TRANSFER OF PRODUCT

JR or JR distributors take no part in transferring or reselling our products.
The relevant parties are kindly requested to check the condition of the helicopter and the existence of the accessories and it is their responsibility to trade openly.

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Forza 700 DFA Assembly Manual