Heli-Max™ MX450 XS™

INSTRUCTION MANUAL

Rotor Diameter: 27.5 in [700mm]
Weight: 19–22 oz [580–760g]
Length: 25.4 in [645mm]
Height: 9 in [225mm]
Motor: ElectriFly Ammo 28-45-2700kV (GPMG5215)

WARRANTY

Heli-Max™ guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. **In no case shall Heli-Max's liability exceed the original cost of the purchased kit.** Further, Heli-Max reserves the right to change or modify this warranty without notice.

In that Heli-Max has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return this kit immediately in new and unused condition to the place of purchase.

To make a warranty claim, send the defective part or item to Hobby Services at this address.

Hobby Services
3002 N. Apollo Dr. Suite 1
Champaign IL 61822
USA

Include a letter stating your name, return shipping address, as much contact information as possible (daytime telephone number, fax number, e-mail address), a detailed description of the problem and a photocopy of the purchase receipt. Upon receipt of the package the problem will be evaluated as quickly as possible.

READ THROUGH THIS INSTRUCTION MANUAL FIRST. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.

Heli-Max™

Champaign, Illinois
(217) 398-8970
E-mail: helicoptersupport@greatplanes.com

HMXZ7012 for HMXE0210 V1.0

INTRODUCTION

The Heli-Max MX450 is a fully aerobatic-capable helicopter, offering the performance and flying manners of a 60-sized machine in a smaller, more convenient package. The MX450 is fully loaded with precision machined aluminum parts for smooth control without flexing along with a carbon fiber tail boom and fin set to keep the MX450 light and more agile. The recommended power system will give you explosive power off the ground and more than enough power to do tick tocks, tornado's, chaos's, and much more.

Take care to build straight and true. Misaligned parts will hurt the helicopter's ability to perform the extreme aerobatics it is designed for.

For the latest technical updates or manual corrections to the MX450 visit the Heli-Max web site at **www.bestrc.com/helimax**. Open the “Helicopters” link, and then select the MX450 ARF. If there is new technical information or changes to this model a “tech notice” box will appear in the upper left corner of the page.

CAUTION: Be aware that the MX450 is operated on the same frequency band as larger R/C models. If flying your heli within five miles of an R/C site, there is a real possibility that you could be operating your model on the same frequency (channel) as another R/C pilot. If this happens, a crash will result—with the person flying the more expensive model suffering the greater loss (and having greater potential for property damage or injury). The best thing to do is to join an R/C club and fly at the site where frequency control measures will be in effect. If you insist on flying elsewhere, **always be aware of your proximity to R/C flying sites.**

DECISIONS YOU MUST MAKE

In the hands of a capable pilot, the MX450 is an impressive 3D performer. But for this helicopter to perform to its full potential, it must be properly equipped with all the right gear (servos, batteries, receiver, speed control). There may be more than one type and brand of radio equipment that can be used. But based on extensive testing, following is the equipment we recommend so you can get the most performance out of your MX450 and assemble it as shown in this instruction manual.

Transmitter

At a minimum, this helicopter requires the use of a six-channel helicopter transmitter capable of mixing between the throttle and collective pitch channels. However, to unleash the full aerobatic potential of the MX450, you will need a computer radio capable of at least two sets of throttle and pitch curves. The Futaba® 6EXH radio (FUTK60** or FUTK61**) is an excellent entry-level radio for use with this helicopter. For more programming capability, any of Futaba’s higher channel-count computer helicopter radios will work very well.

Servos

You will need four servos for the MX450. The servos should weight less than 10 grams apiece, and should have a minimum torque output of 14 oz-in. A good speed rating is also important for helicopters, and we recommend that you choose servos with a speed of 0.12sec/60deg or less. We recommend the Futaba S3103 (FUTM0037) or S3107 (FUTM0025) for use with this helicopter. Note: The Futaba S3108 servo will not mount to this helicopter without modification, and is therefore not recommended.

Receiver

You will need a 6-channel receiver for this helicopter. A small PCM receiver is strongly recommended for the noise rejection and failsafe capabilities that PCM offers. We recommend the Futaba R146iP receiver (FUTL0601) You will also need a single conversion crystal to use with this receiver. While most Futaba receivers are sold on high and low bands, the R146iP is not banded and can use either high or low band crystals.

Low band (channels 11 – 35)	Crystal FUTL62**
High band (channels 36 – 60)	Crystal FUTL63**

Replace the “” in the order number for the crystals with the preferred channel number. For example, if you want to fly on channel 33, order crystal number FUTL6233.

Gyro Recommendation
We recommend the use of a heading-hold gyro with this helicopter. The Futaba GY240 gyro (FUTM0809) is an excellent choice.

Battery
The MX450 requires a 1200-2000 mAh 3-cell Lithium-Polymer (LiPo) battery capable of delivering 15A of current continuously. We recommend the ElectriFly™ 11.1V 2100 mAh pack (GPMP0841). This battery will deliver approximately 7 minutes of flight time with the recommended motor and speed control.

Motor
You will need a brushless motor capable of handling 15A of continuous current, and up to 22A in bursts. The motor should also have a kV rating of 2500-3000 RPM/V for use with the included pinion. We recommend the ElectriFly Ammo 28-45-2700kV (GPMG5215).

Speed Control
A 35-Amp or better brushless electronic speed control (ESC) is required for this helicopter. We recommend the Heli-Max 40A Brushless ESC (HMXM3004).

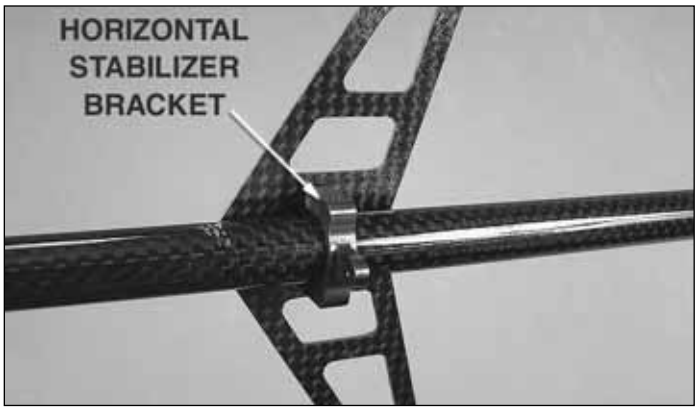
Charger
A charger capable of charging 3-cell (11.1V) LiPo batteries such as the ElectriFly PolyCharge 1-3-cell LiPo charger (GPMM3010) must be used. If using another charger, it **must** be a LiPo charger or have a LiPo charge mode. Never charge LiPo batteries with chargers not intended for LiPo batteries or chargers on NiMH or NiCd settings. Overcharging or explosion may result. In addition to the PolyCharge, the ElectriFly Triton™ (GPMM3150) and Accu-Cycle Elite™ (HCAP0280) are also suitable chargers.

Battery Charging Leads
Many chargers (including the Triton and Accu-Cycle Elite listed above) do not include charging leads, but rather have banana jacks to plug the leads into. If this is the case with your charger, you will need to purchase a charge lead to match your battery. For the recommended battery pack, the correct lead is GPMM3105.

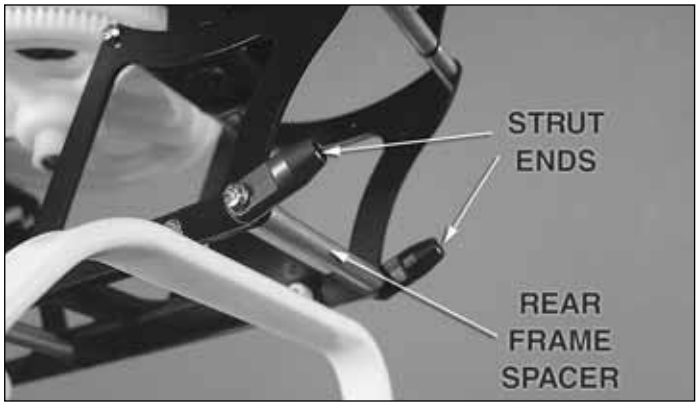
IMPORTANT!

INSPECT YOUR HELICOPTER
Check all screws on the helicopter for tightness. If any screws are loose, tighten them before flying. If any machine screw that threads into a metal part is loose, be sure to secure it with a drop of threadlocking compound. This check should include the tail blade grip screws, which will require removal of the tail rotor blades.

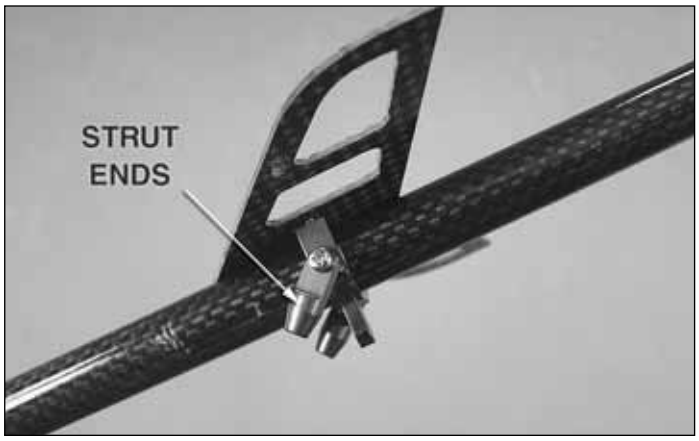
ASSEMBLE THE TAIL



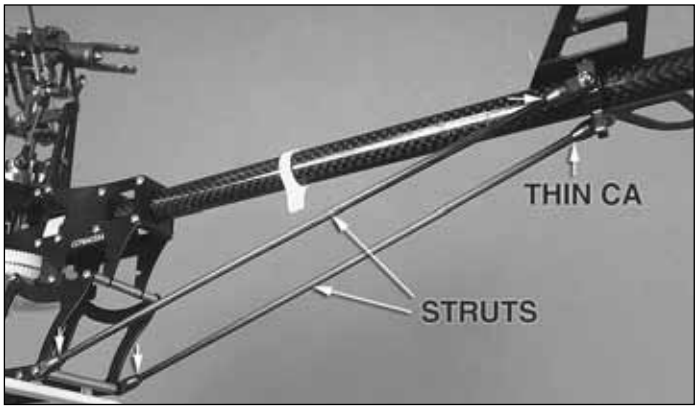
❏ 1. Install the aluminum horizontal stabilizer and the horizontal stabilizer bracket onto the tail boom with two 2 x 8mm metal screws. Do not fully tighten the screws at this time. Be sure to add a drop of threadlocker to each screw.



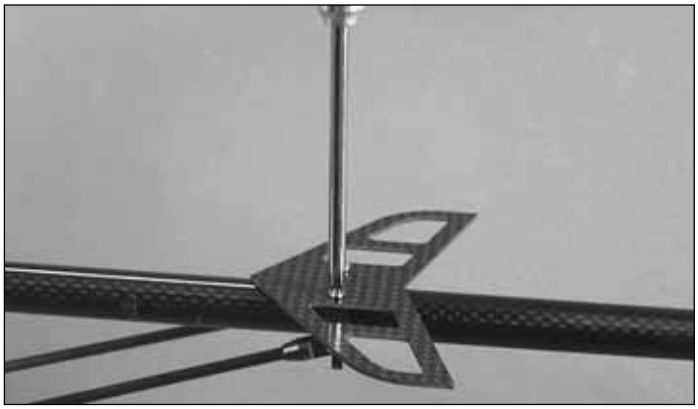
❏ 2. Secure two aluminum tail strut ends and the rear frame spacer to the frames with two 2x10mm machine screws as shown. Use a drop of threadlocker to secure each screw.



❏ 3. Secure two tail strut ends to the aluminum horizontal stabilizer bracket with 2x8mm metal screws. Use a drop of threadlocker to secure each screw.

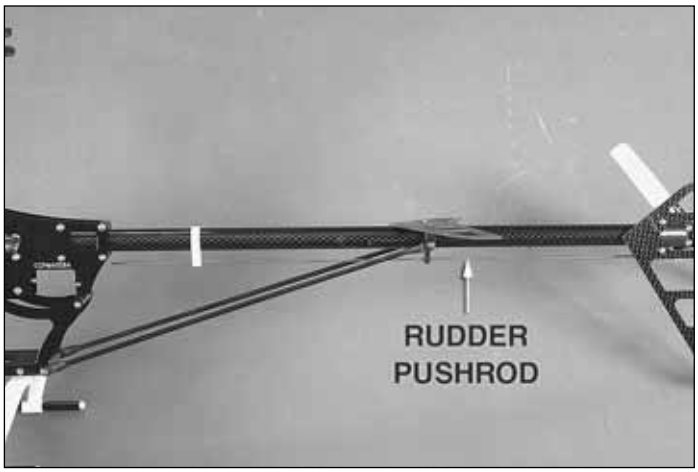


❑ 4. Insert the carbon fiber tail struts into the aluminum strut ends. Secure each end with a drop of thin CA.

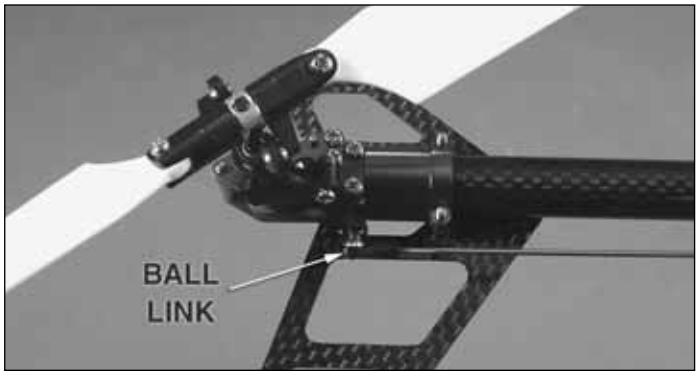


❑ 5. Finalize the position of the horizontal stabilizer bracket, and tighten the horizontal stabilizer screws to hold the assembly firmly in place. Do not over tighten. Use a drop of threadlocker to secure each screw.

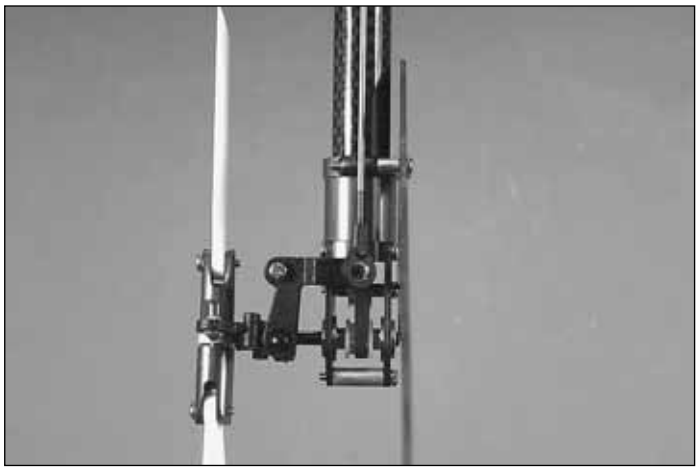
INSTALL THE PUSHRODS



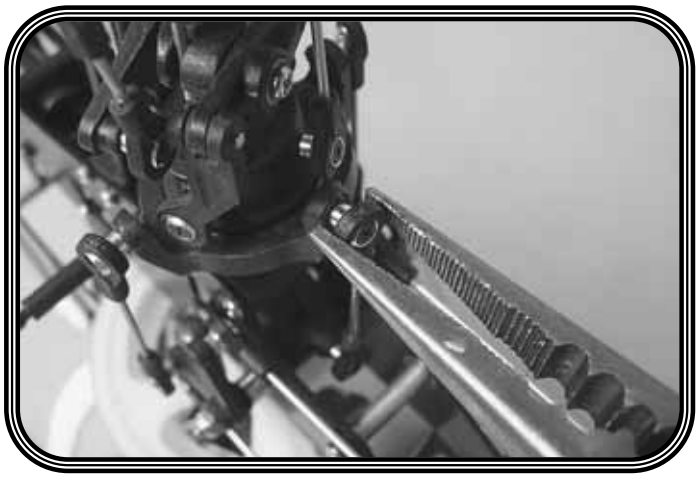
❑ 1. Slide the rudder pushrod back through both supports on the tail boom.



❑ 2. Screw a ball link onto the threaded end of the rudder pushrod.



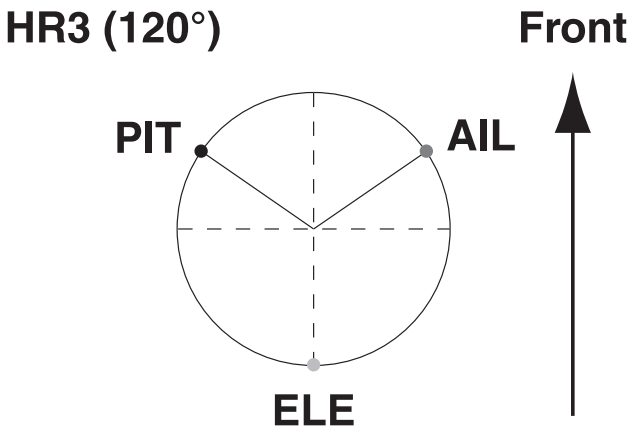
❑ 3. Connect the ball link to the ball on the tail rotor pitch control horn. Check to see that the ball link runs freely on the ball, and loosen it if necessary using the following Heli-Max Tip.



HELI-MAX TIP

How to adjust the fit of ball links.

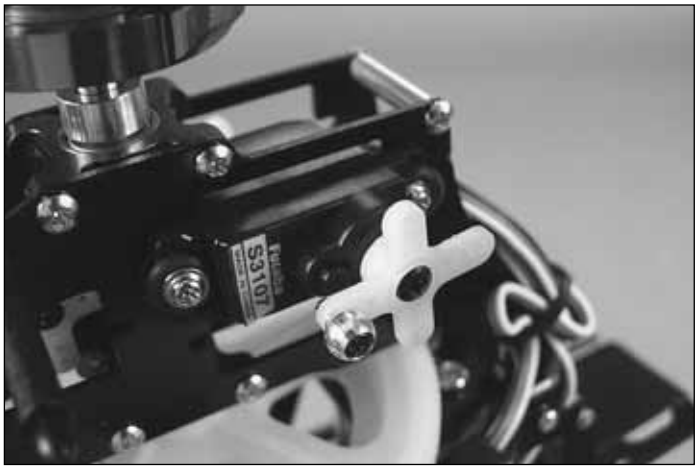
If a ball link does not twist freely on its ball, squeeze it firmly with a pair of needlenose pliers *while it is installed on the ball.*



Use this swash plate diagram in your radio for proper setup.

INSTALL THE SERVOS

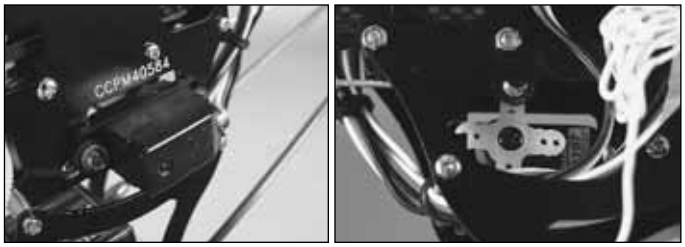
❏ 1. Locate the 4 aluminum balls and the 4 2mm x 6mm machine screws. Install the 4 ball links onto all 4 control horns (AIL, ELE, PIT, RUD).



❏ 2. Using two plastic servo screw nuts, install the Aileron servo as shown. With the aileron servo centered, the servo arm should be completely horizontal with the ball end to the rear as shown.

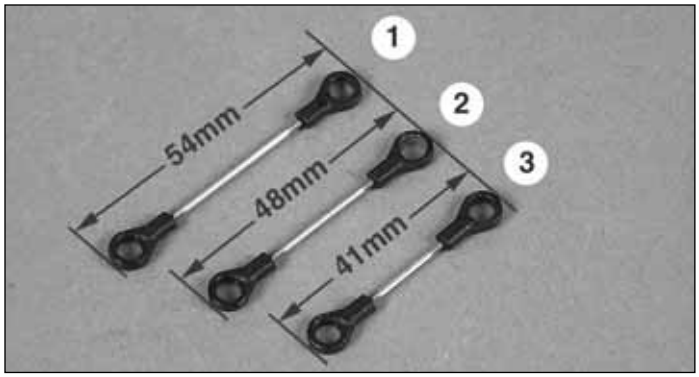
❏ 3. Using two plastic servo screw nuts, install the pitch servo as shown. With the pitch servo centered, the servo arm should be completely horizontal with the ball end to the rear as shown.

❏ 4. Using two plastic servo screw nuts, install the elevator servo as shown. With the elevator servo centered, the servo arm should be completely horizontal with the ball end to the rear. The output shaft of the servo should point towards the front of the heli.



❏ 5. Using two plastic servo screw nuts, install the rudder servo as shown. With the rudder servo centered, the servo arm should be completely horizontal with the ball end up as shown. The output shaft of the servo should point towards the rear of the heli.

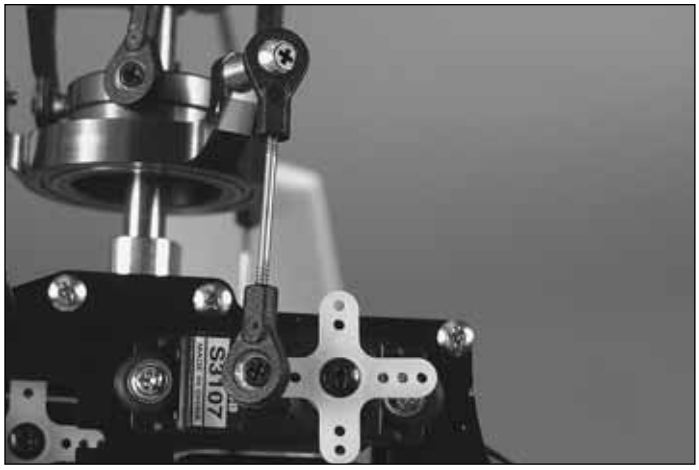
INSTALL LINKAGES



❏ 6. Locate the 3 control rods and the 6 ball link ends.

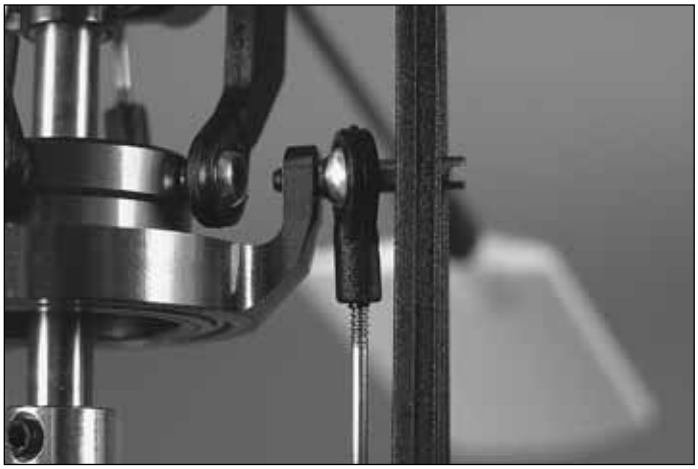
1) Pitch (54mm)
2) Elevator (48mm)
3) Aileron (41mm)

All measurements are overall length with the ball links threaded on to the metal rods.



❏ 7. Install the Aileron control linkage as shown.

❏ 8. Install the Pitch control linkage as shown.



❏ 9. Install the elevator control linkage as shown. Be sure that the swash plate is level with all the control arms and the servos are horizontal. If they are not, remove and adjust accordingly.

❏ 10. Install the ball link to the rudder control linkage and snap it on the ball attached to the control arm.

INSTALL GYRO, ESC & RECEIVER

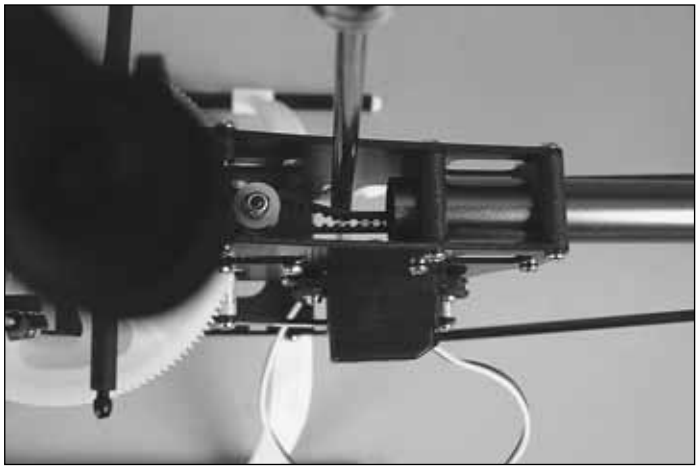
❏ 11. Install the Futaba 401 gyro on the top of the frames as shown with double sided foam tape. Be sure the surface is clean to get a good bond. An optional mount (HMXE7921) is available for a more secure mounting, if desired.

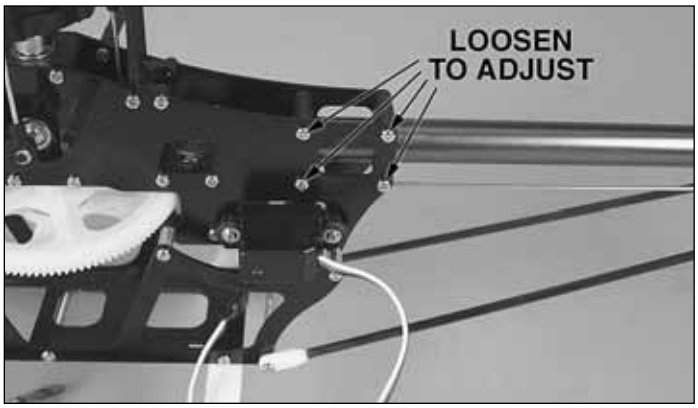
❑ 12. Install the receiver in the bay under the spur gear. Be sure to keep the receiver towards to rear of the bay as show. Attach with double sided foam tape or Velcro. Make sure that the receiver antenna is routed so that it cannot possibly interfere with the main or tail rotor blades. There are many possible ways to route the antenna, and you may have to try different methods to get interference-free operation, but it is essential that the antenna be constrained from contact with the blades

❑ 13. Install the pinion onto the motor, and install the motor in the helicopter. Be sure to set the gear mesh properly. This can be done by pushing the pinion and spur together with a strip of typing paper between them and tightening the motor screws. The paper can then be removed by turning the gears to eject it.

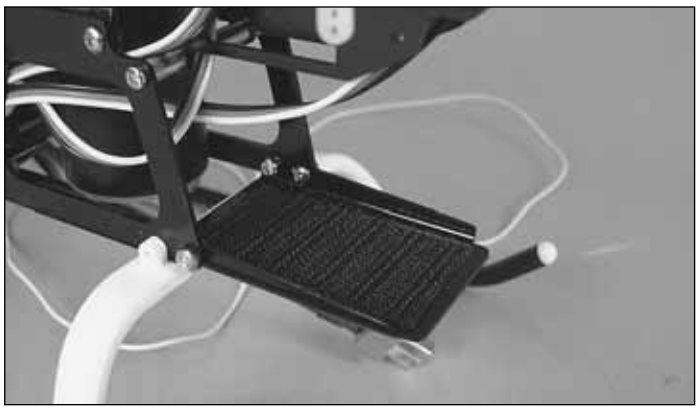
❑ 14. Install the ESC to the bottom of the frames as shown with hook and loop material or double sided foam tape.

FINAL ASSEMBLY & SETUP

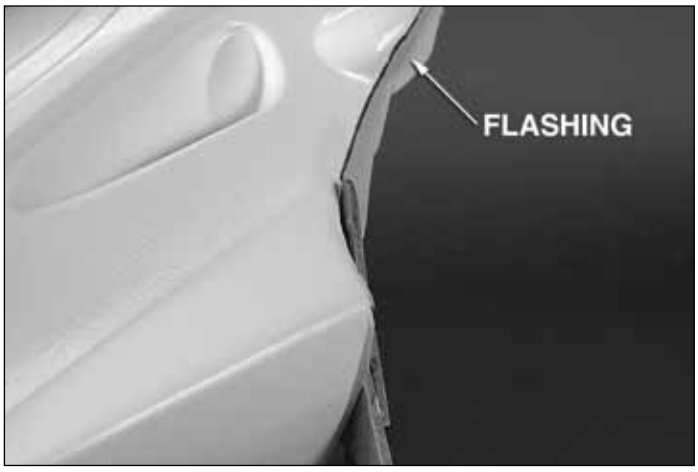




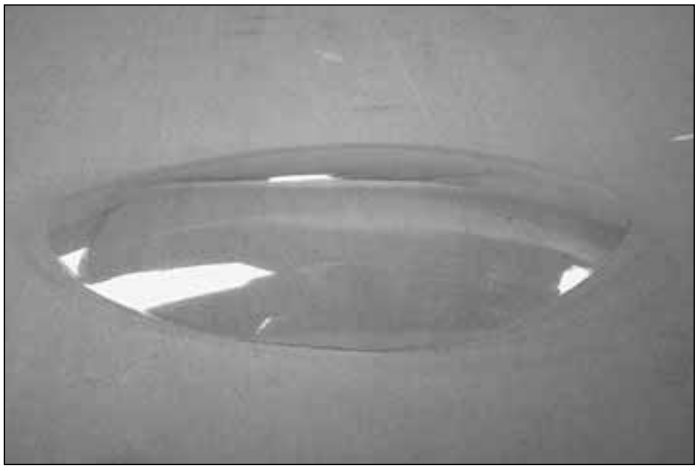
❑ 1. Check the tail drive belt tension by pressing on one side of the belt with a screwdriver. With gentle pressure, it should be possible to push the belt approximately as far as the picture shows. If you can easily push the belt against itself, it is too loose. If it does not deflect easily, then it is too tight. If you need to adjust the belt tension, simply loosen the screws shown and slide the tail boom in or out. When you have the tension correct, retighten the screws. Recheck the rudder pushrod adjustment.



❑ 2. Attach the hook side of hook and loop fastener to the battery tray.



❑ 3. Cut the window out of the canopy, and trim the flashing from around the rear opening.



❑ 4. Cut the clear shield out along the molded-in cut lines.

❑ 5. Secure the shield to the canopy with the two small screws packaged with the shield.

❑ 6. Install the canopy onto the helicopter.

❑ 7. Apply decals as desired.

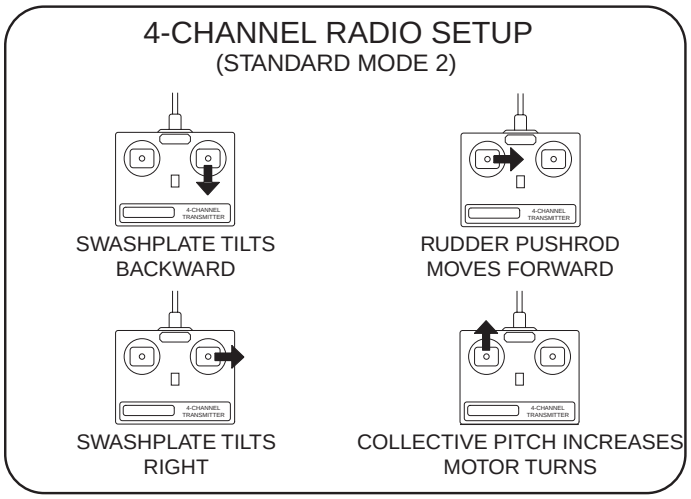
CHECK THE CONTROL DIRECTIONS

❑ 1. Attach the “loop” side of the hook-and-loop material to the battery. Mount the battery to the battery tray.

❑ 2. For safety, do not install the main blades while performing bench setup.

❑ 3. Lower the throttle stick all the way and turn on the transmitter. Connect your battery to the ESC. If the ESC has a BEC switch, turn it on.

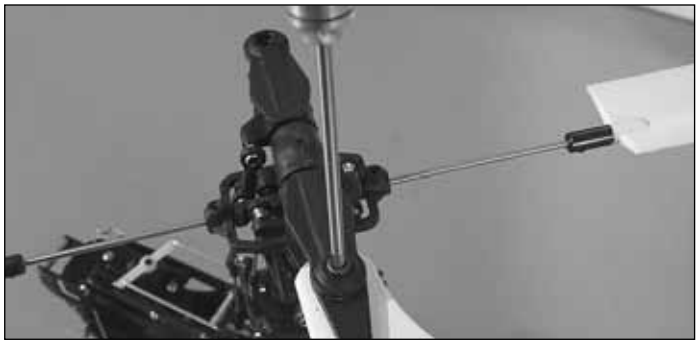
❑ 4. Check all the servos to see if they are centered. Since you set the center points as you set up the linkages, they should already be very close. Use the trims or subtrims on the transmitter to center the controls.



❑ 5. Make certain that the swash plate and the motor respond in the correct direction as shown in the diagram. To operate the motor, you may have to “arm” your ESC. Follow the instructions that came with your ESC to do this. If any of the controls respond in the wrong direction, use the servo reversing in the transmitter to reverse the servos connected to those controls. Be certain the servos have remained centered. Adjust if necessary.

BLADE BALANCING & INSTALLATION

❑ 1. Balance your main blades using the Heli-Max Blade Balancer (HMXR4855). Do so according to the instructions that came with your balancer.



❑ 2. Attach the main rotor blades. The blades should be tight enough in the grips to hold their position when moved, but still move easily by hand.

ADJUST COLLECTIVE PITCH

WARNING: Disconnect the motor from the ESC to prevent accidental startup while performing pitch adjustment.

❑ 1. Cut out the pitch template from the last page of this manual and slip it over one of the main blades.

❑ 2. We recommend 8 degrees of maximum collective pitch in both directions as a starting point. Check to see that the bottom of the pitch template is level with the flybar at maximum positive pitch and the top of the template is level with the flybar at full negative collective pitch. Adjust your linkages or radio endpoints if necessary to achieve these values.

❑ 3. Once you are comfortable with the helicopter, feel free to increase or decrease this pitch value to suit your flying style.

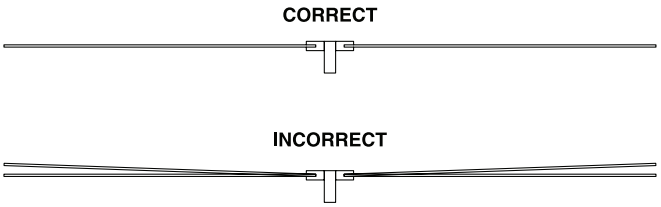
SET CONTROL THROWS

To set rates on the elevator and aileron, check to see that the control rates are set to maximum for high rates. This can be verified by checking that the ball link attached to the seesaw is close to touching the main rotor grips at full input. Check the elevator rate with the flybar perpendicular to the tailboom, and check the aileron rate with the flybar parallel to the tailboom. These maximum deflections work well for high rates, and we recommend 60% of these values for low rates.

Rudder control throw will be affected by your gyro settings, and will need to be tuned to suit your flying style.

ADJUST BLADE TRACKING

❑ 1. Apply the two different colored stripe decals to the tips of your main rotor blades.



❑ 2. At zero pitch, bring the main rotor up to speed and observe whether the rotational planes of the blades are the same. If they are not, adjust one of the linkages to bring the blades into the same plane.

RANGE CHECK

Ground check the operational range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 50 feet away from the model and still have control. Have an assistant stand by your model and, while you work the controls, tell you what the servos are doing. Repeat this test **with the motor running** at various speeds. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

SAFETY PRECAUTIONS

Failure to follow these safety precautions may result in severe injury to yourself and others.

Keep your face and body as well as all spectators away from the plane of rotation of the rotors whenever the battery is connected.

Keep these items away from the rotors: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the rotors.

The spinning blades of a model helicopter can cause serious injury. When choosing a flying site for your MX450, stay clear of buildings, trees and power lines. AVOID flying in or near crowded areas. DO NOT fly close to people, children or pets. Maintain a safe pilot-to-helicopter distance while flying.

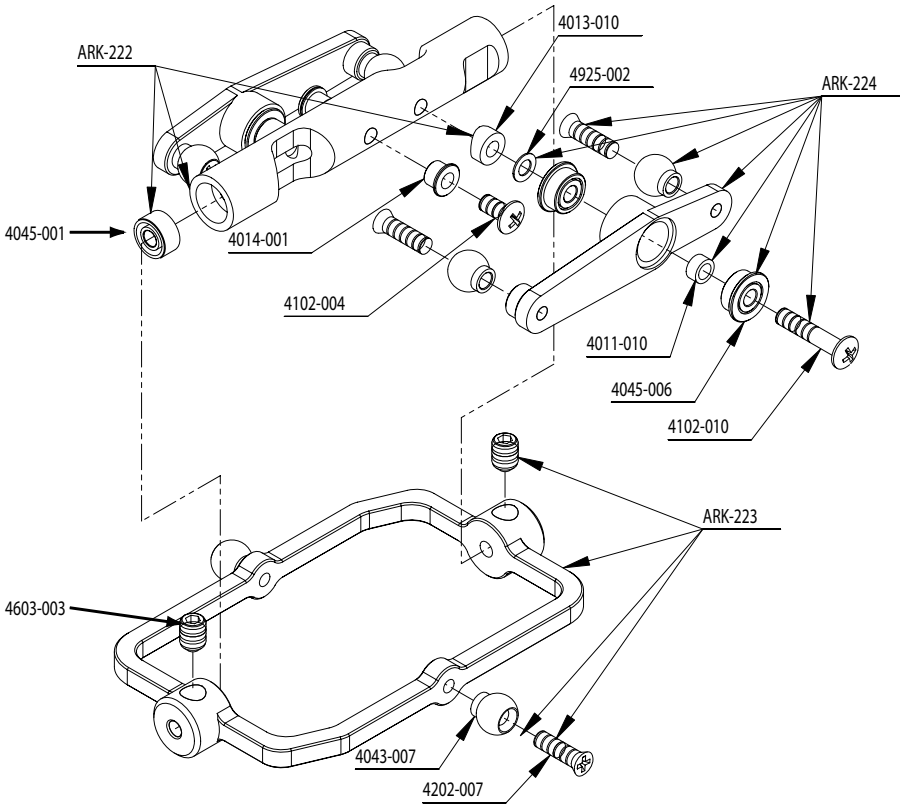
MX450 XS Parts List

SKU	Mfr #	DESCRIPTION
HMXE7701	4001-106	Stabilizer Blade
HMXE8210	4001-110	Auto-Rotation Gear Set
HMXE9713	4001-111	Drive Pulley 11T
HMXE9714	4001-112	Counter Gear 21T
HMXE8402	4001-113	Main Shaft Collar
HMXE7610	4001-114	Stabilizer Control Rod
HMXE7614	4001-116	Mixing Arm Rod
HMXE7622	4001-120	Pitch Rod
HMXE7626	4001-125	Control Rod CCPM
HMXE7101	4002-204	Anti-Rotation Guide
HMXE7902	4002-205	Lower Frame Set
HMXE7910	4002-206	Motor Mount Set
HMXE7201	4002-207	Battery Mount
HMXE7930	4002-210	Skid Set
HMXE7413	4002-211	Canopy MX450 XS
HMXE7415	4002-212	Windshield MX450 XS
HMXE7906	4002-213	Upper Frame
HMXE9710	4003-304	Tail Shaft w/Pulley 11T
HMXE9711	4003-305	Guide Pulley w/Bearing
HMXE9521	4003-309	Tail Rotor Hub
HMXE9501	4003-311	Tail Rotor Blade
HMXE9622	4003-313	Tail Pitch Lever Set
HMXE9702	4003-314	Tail Boom Brace Set
HMXE9715	4003-315	Tail Drive Belt (L)
HMXE9623	4003-316	Rudder Control Rod (L)
HMXE9422	4003-318	Tail Gear Case Plate w/Bearing Alum
HMXE9531	4003-320	Tail Pitch Plate Full Set
HMXE9530	4003-321	Tail Pitch Plate
HMXE7507	4004-066	Decal MX450 XS
HMXZ7012	4004-067	Instruction Manual MX450 XS
HMXE8312	4011-001	Bearing Collar 3x5x4mm
HMXE7315	4011-010	Bearing Spacer
HMXE9065	4012-008	Radius Arm
HMXE8630	4012-112	Spindle Bushing
HMXE8804	4012-019	Seesaw (L)
HMXE8635	4013-001	Feathering Spindle
HMXE8612	4013-002	Anti-Rotation Pin
HMXE8401	4013-003	Main Shaft
HMXE7801	4013-006	Stabilizer Bar
HMXE8808	4013-010	Seesaw Standoff
HMXE8807	4014-001	Stand Off
HMXE9066	4016-001	Needle Pin 1.5x7mm
HMXE8608	4016-002	Center Hub Pin 1.5x18mm
HMXE7903	4021-009	Cross member M2x34
HMXE7904	4021-010	Cross member M2x16
HMXE7905	4021-011	Cross member M2x8
HMXE8013	4021-014	Motor Pinion 14T
HMXE8012	4021-016	Motor Pinion 13T
HMXE8011	4021-018	Motor Pinion 12T
HMXE8010	4021-019	Motor Pinion 11T
HMXE8009	4021-020	Motor Pinion 10T
HMXE8008	4021-021	Motor Pinion 9T
HMXE8007	4021-022	Motor Pinion 8T
HMXE8205	4022-008	Main Gear 138T (w/One Way Bearing)
HMXE8206	4022-009	Autorotation Gear 105T
HMXE7920	4022-013	Gyro Mount
HMXE7430	4022-017	Canopy Mount
HMXE7381	4022-018	Servo Nut Plastic
HMXE8410	4023-003	Auto-rotation drive shaft
HMXE9423	4031-001	Tail Gear Case Mount Aluminum
HMXE7908	4031-004	Cross Member 2 x 10.4mm
HMXE7909	4031-010	Cross Member 2 x 4mm
HMXE7623	4043-002	Rod End 1.2mm
HMXE7357	4043-007	Ball 4.6mm
HMXE7305	4045-001	Bearing 2x5x2.5mm
HMXE7306	4045-002	Bearing 3x8x3mm
HMXE7307	4045-003	Bearing 3x8x4mm
DTXC1547	4045-004	Bearing 5x11x5mm
HMXE7308	4045-005	Bearing Flanged 3x8x3mm
HMXE7304	4045-006	Bearing Flanged 2x5x2.3mm
HMXE7343	4102-004	Pan Head Screw 2x4mm
HMXE7344	4102-005	Pan Head Screw 2x5mm
HMXE7345	4102-008	Pan Head Screw 2x8mm
HMXE7346	4102-010	Pan Head Screw 2x10mm
HMXE7347	4102-012	Pan Head Screw 2x12mm
HMXE7348	4102-014	Pan Head Screw 2x14mm
HMXE7350	4102-022	Pan Head Screw 2x21mm
HMXE7351	4202-007	Flat Head Screw 2x7mm
HMXE7352	4202-015	Flat Head Screw 2x15mm
HMXE7375	4302-006	Tapping Screw 2x6mm
HMXE7353	4402-005	Button Head Screw 2x5mm
HMXE7354	4502-006	Cap Screw 2x6mm
HMXE7377	4603-003	Set Screw 3x3mm
HMXE7355	4702-004	Nylon Nut 2mm
HMXE7378	4702-045	Nut 2mm
HMXE7379	4703-055	Nylon Nut 3mm
HMXE7361	4925-002	Flat Washer 2x3.5x0.2mm
HMXE7356	4925-003	Flat Washer 2x4x0.3mm
HMXE7380	4925-004	E-ring 2.5mm
HMXE7360	4935-005	Washer
HMXE7358	5400-115	O-ring
HMXE7359	5801-011	Washer 3x4.5x0.5mm
HMXE9007	ARK-202	Swash Plate Aluminum CCPM
HMXE8620	ARK-203	Top Dome Aluminum
HMXE9421	ARK-204	Tail Gear Case Set Aluminum
HMXE7907	ARK-208	Lower Frame Full Set
HMXE9103	ARK-215	Carbon Tail Boom 345mm
HMXE9625	ARK-218	Carbon Tail Fin Set
HMXE8611	ARK-220	Center Hub Set Aluminum
HMXE9057	ARK-221	Slide Block Aluminum
HMXE8806	ARK-222	Seesaw w/Bearing Aluminum
HMXE8811	ARK-223	Stabilizer Control Arm Aluminum
HMXE8821	ARK-224	Mixing Arm w/Bearing Aluminum
HMXE9061	ARK-225	Washout Control Arm w/Bearing Alum
HMXE9107	ARK-228	Horizontal Stabilizer Mount Aluminum
HMXE9703	ARK-229	Tail Boom Brace End Aluminum
HMXE9062	ARK-230	Washout Control Set w/Bearing Alum
HMXE8311	ARK-231	Main Blade Holder w/Bearing Alum
HMXE9524	ARK-232	Tail Blade Holder w/Bearing Aluminum
HMXE7319	ARK-233	Bearing Block w/Bearing Aluminum
HMXE7322	ARK-234	Counter Gear Case w/Bearing Alum
HMXE9104	ARK-235	Tail Boom Mount Aluminum
HMXE8307	ARK-237	Main Rotor Blade Fiberglass 325mm

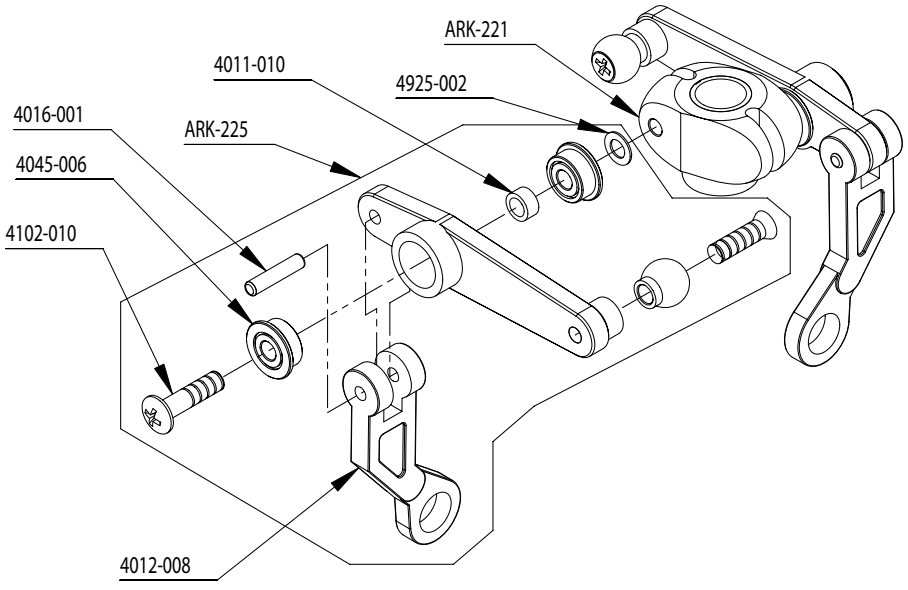
Option Parts

SKU	Mfr #	Description
HMXE7921	4012-021	Upper Gyro Mount Aluminum
HMXM3004	ARK-131	Brushless ESC w/Heatsink 40A
HMXE7951	ARK-210	Carbon Frame Full Set CCPM
HMXE8306	ARK-212	Carbon Main Blade Set 325mm
HMXE7702	ARK-213	Carbon Stabilizer Blade Set
HMXE9502	ARK-214	Carbon Tail Blade Set
HMXE7412	ARK-217	Fiberglass Canopy MX400 Style
HMXE7414	ARK-236	Fib/glass Canopy MX450 XS Painted
HMXE9109	ARK-238	Tail Boom Servo Mount Aluminum
HMXE9535	ARK-239	Tail Pitch Plate Aluminum
HMXE9536	ARK-240	Tail Pitch Plate Full Set Aluminum
HMXE1007		Mini Blade Holder
HMXE4304		Carbon Main Blades 315mm
HMXE4305		Carbon Main Blades 325mm
GPMP0841		11.1V 2100mAh LiPo Battery
GPMG5215		Ammo 28-45-2700KV Brushless Motor

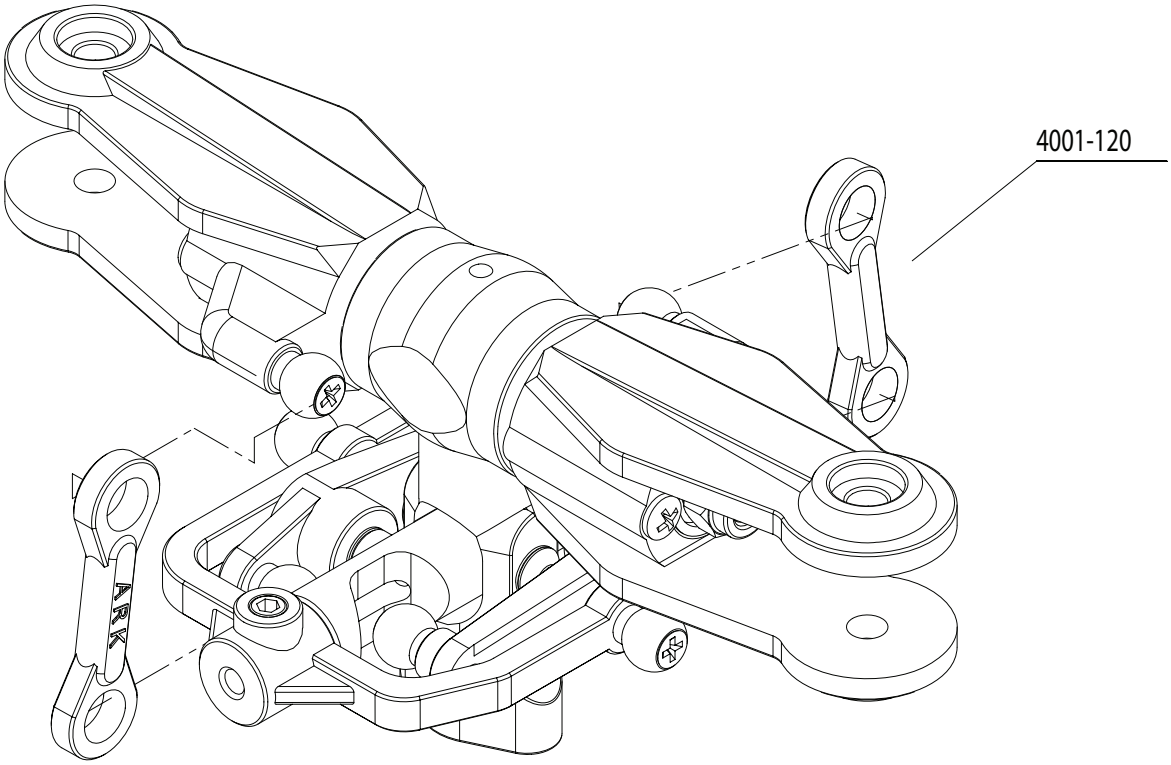
ROTOR HEAD



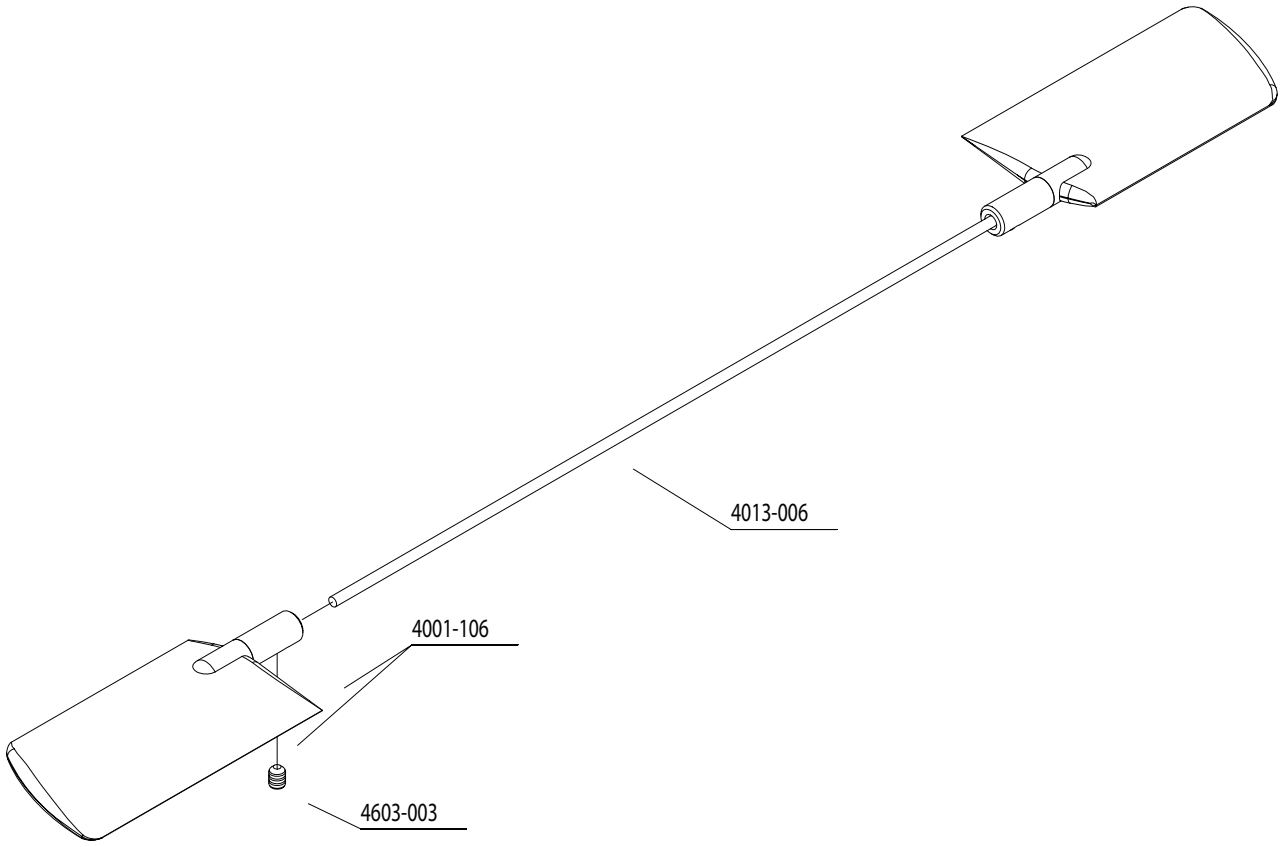
MIXING LEVERS



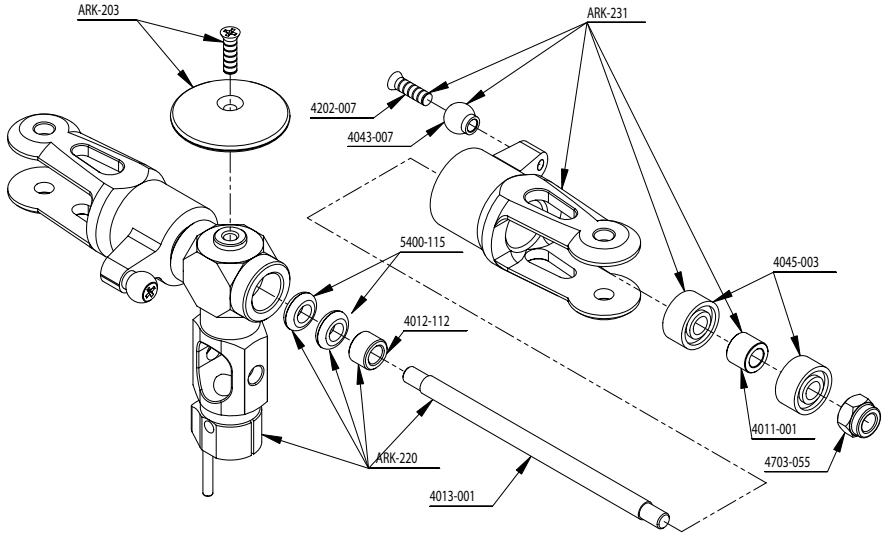
PITCH LINKS



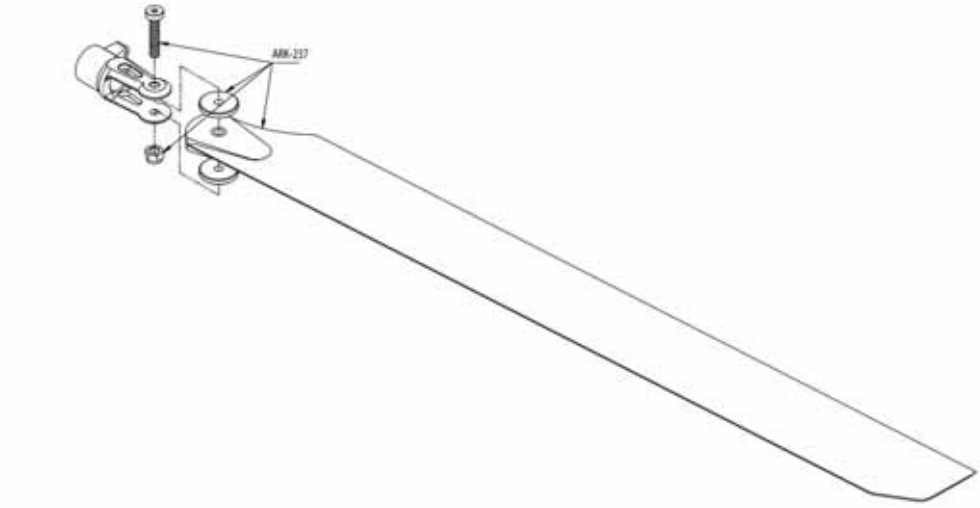
FLYBAR



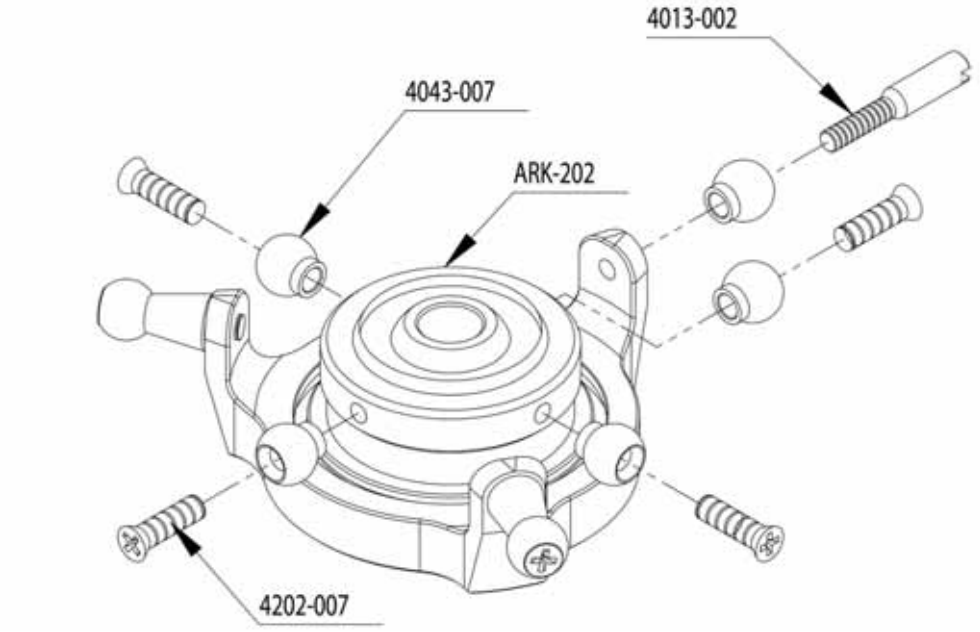
BLADE GRIPS



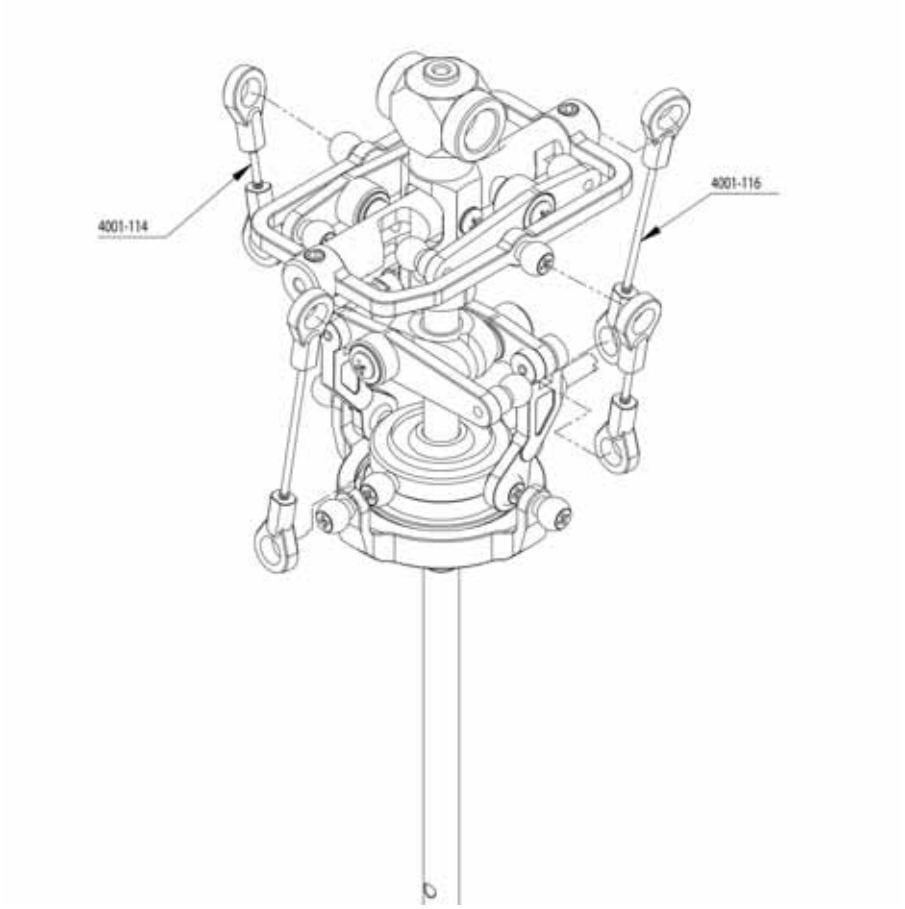
BLADE ATTACHMENT

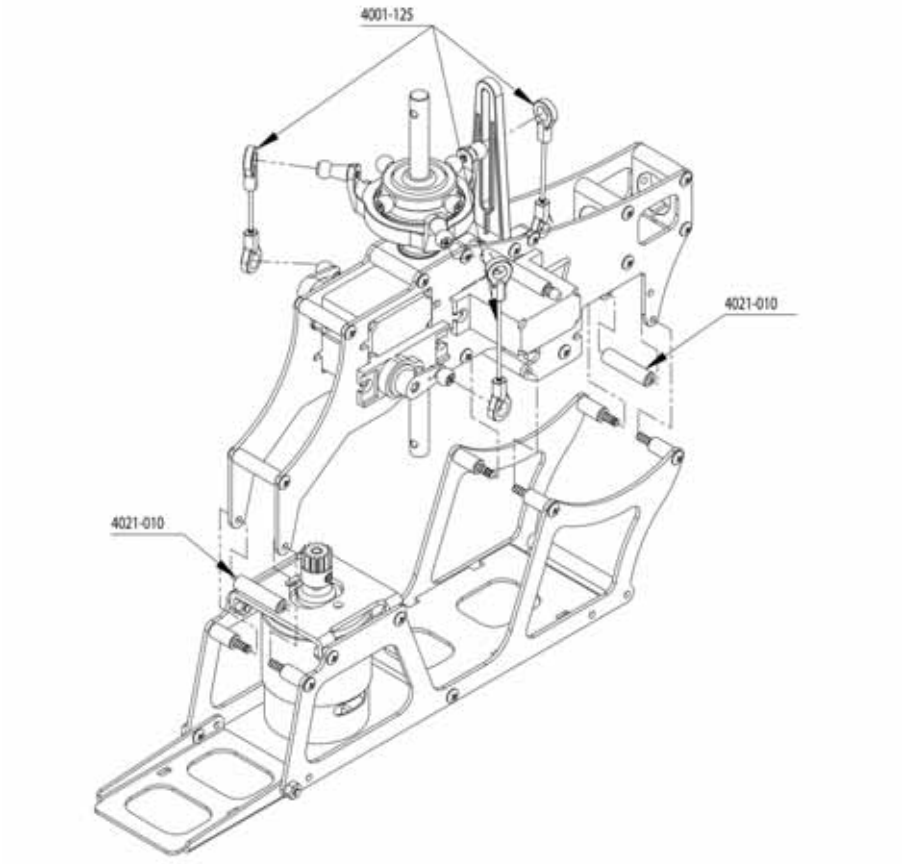


CCPM SWASH PLATE

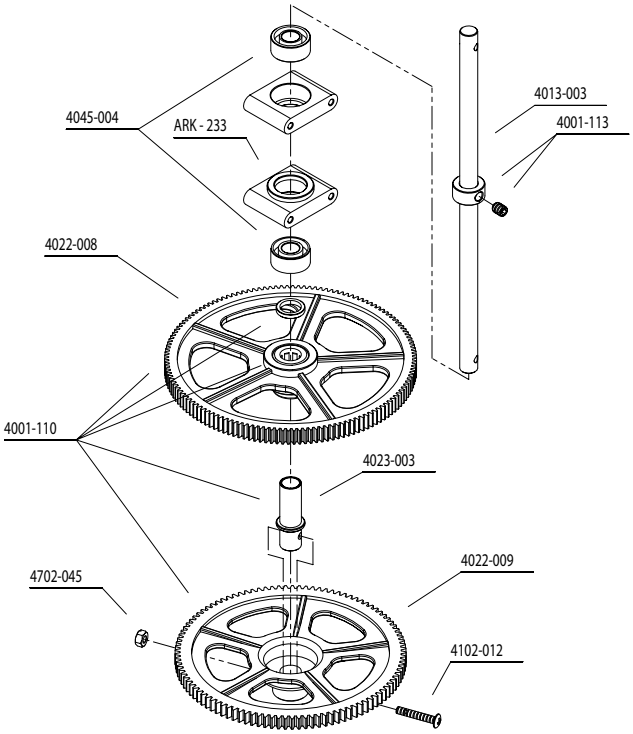


LINKAGES

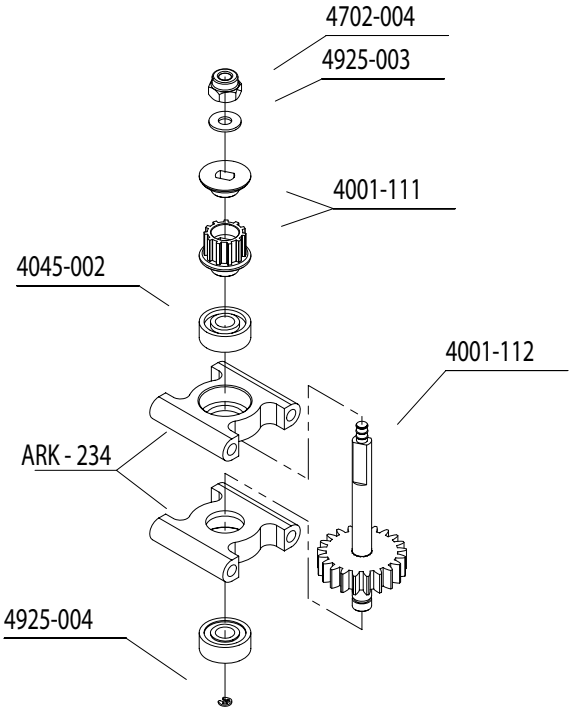




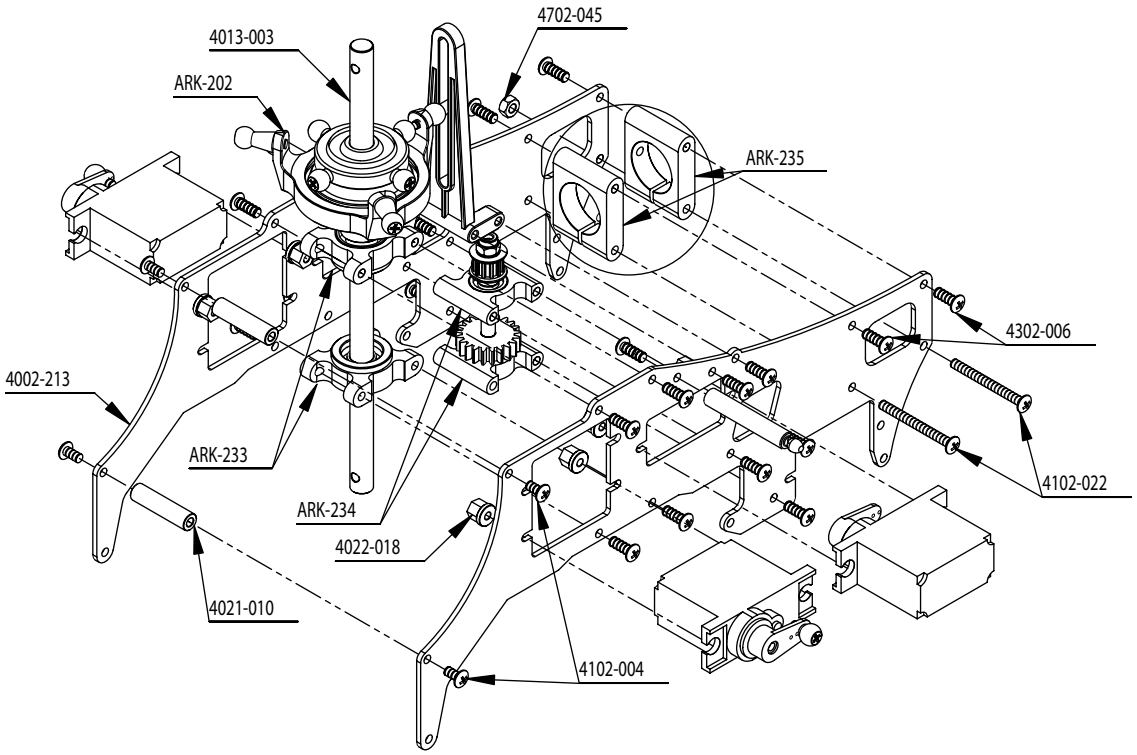
MAIN SHAFT



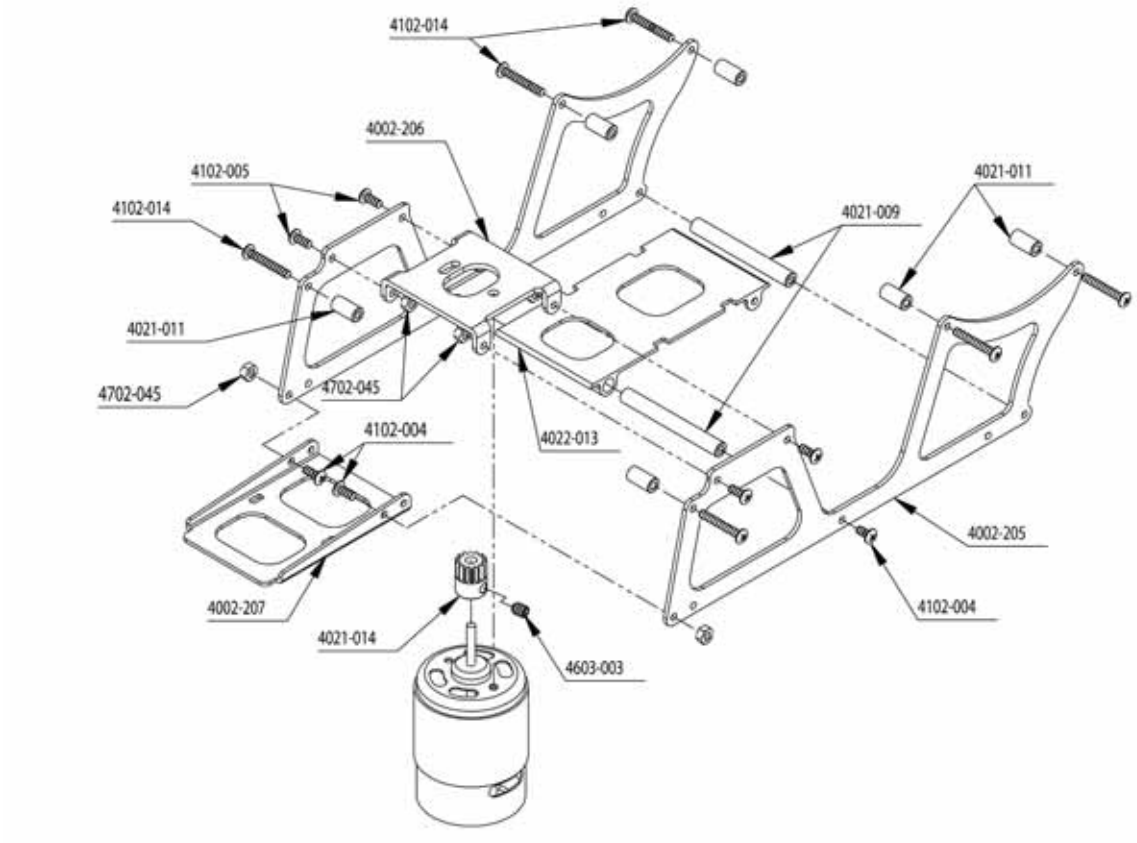
TAIL DRIVE



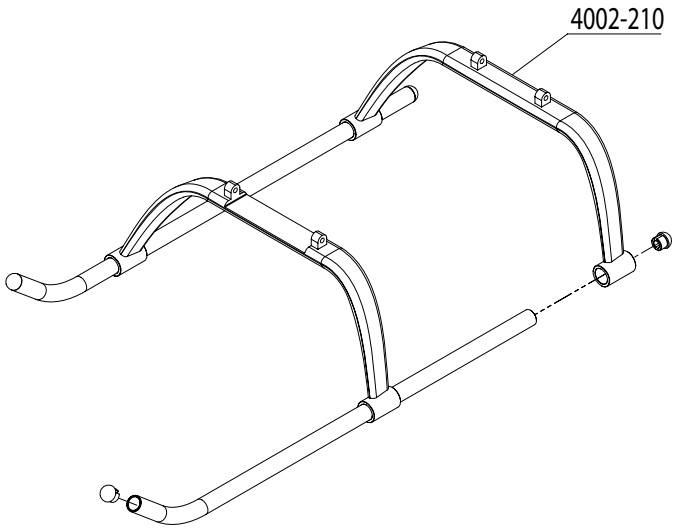
UPPER FRAME



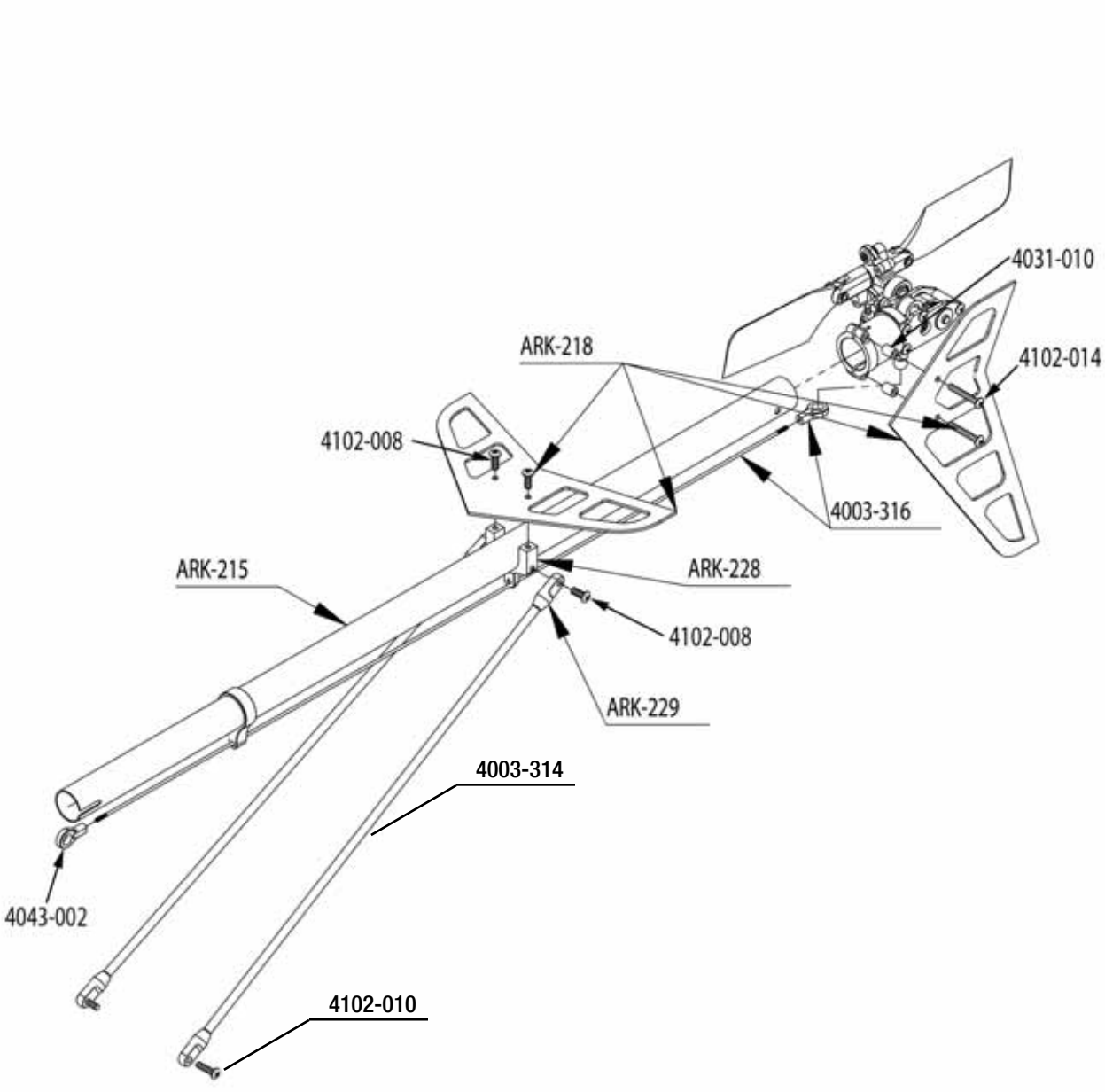
LOWER FRAME



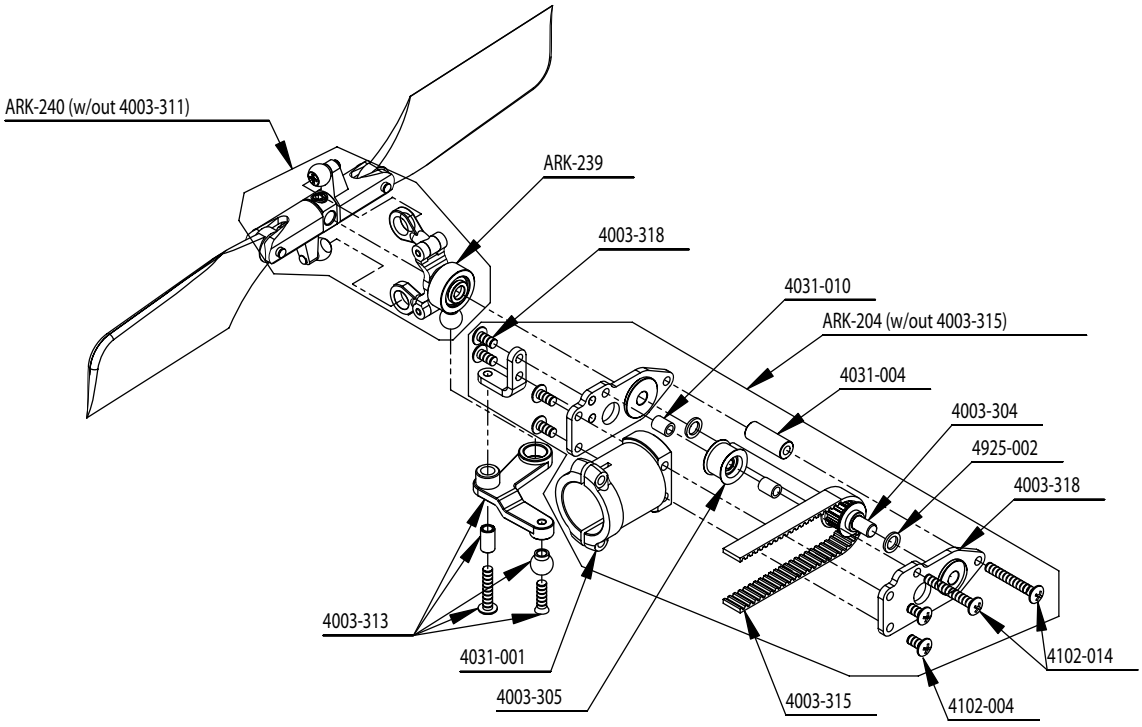
LANDING GEAR



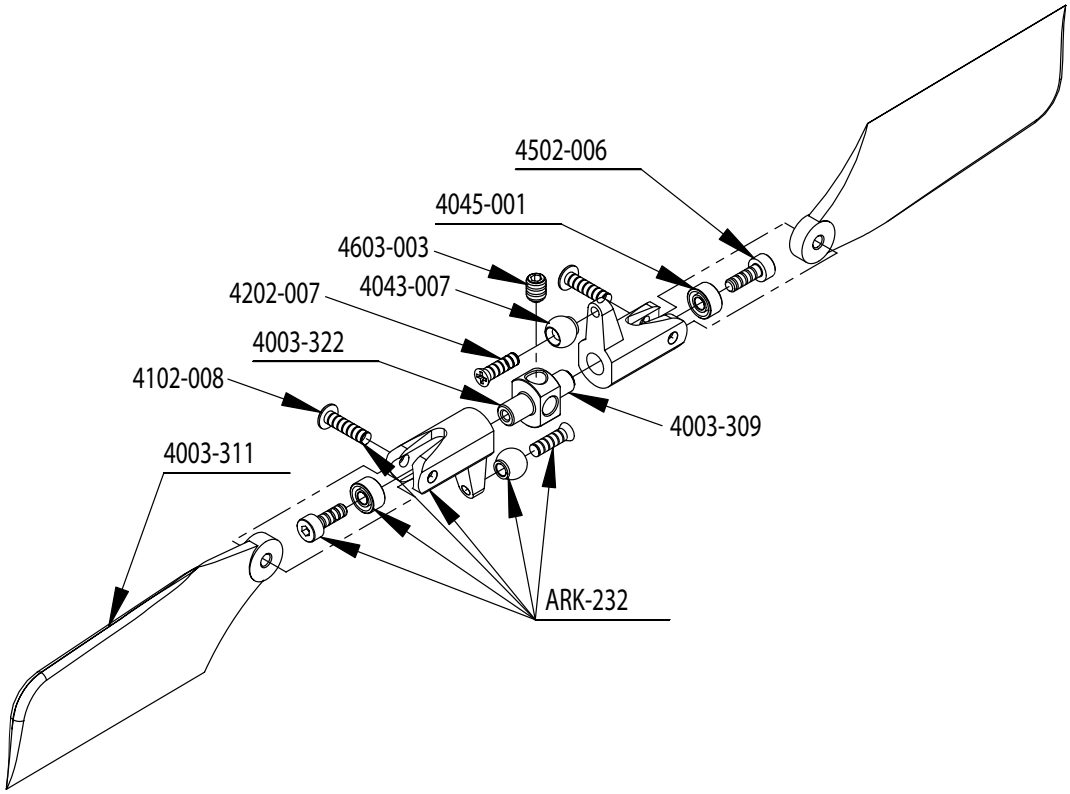
TAIL BOOM



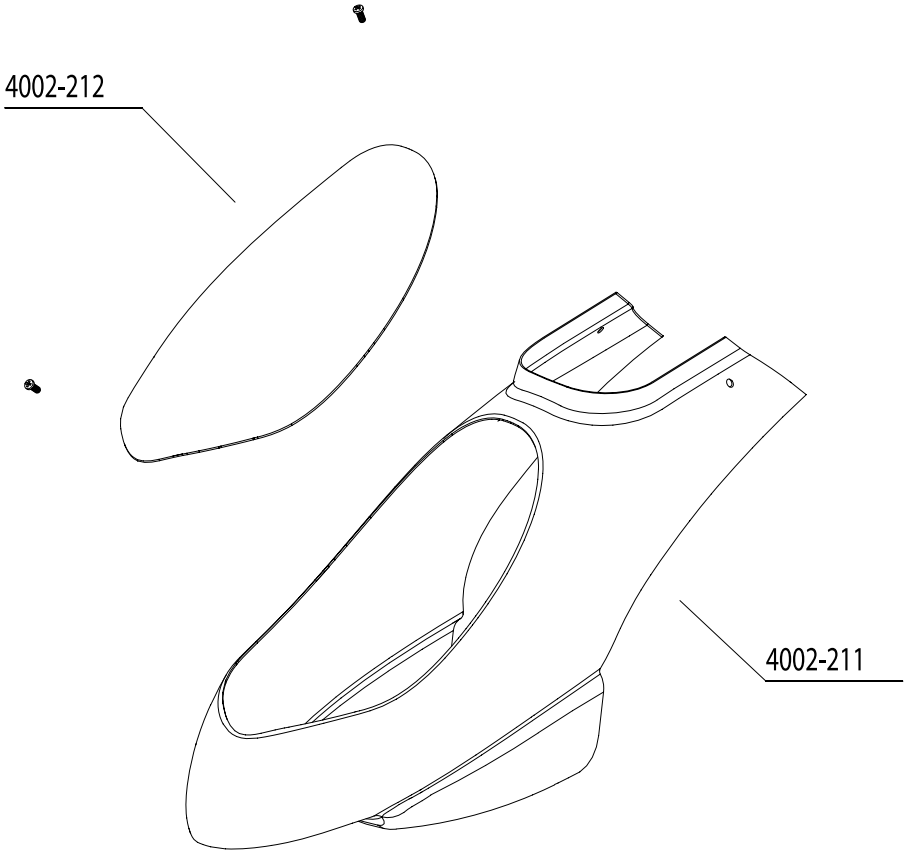
TAIL DRIVE GEARBOX



TAIL ROTOR



CANOPY



PITCH TEMPLATE