Manual
LOGO 20

Mikado
Model Helicopters
www.mikado-heli.de

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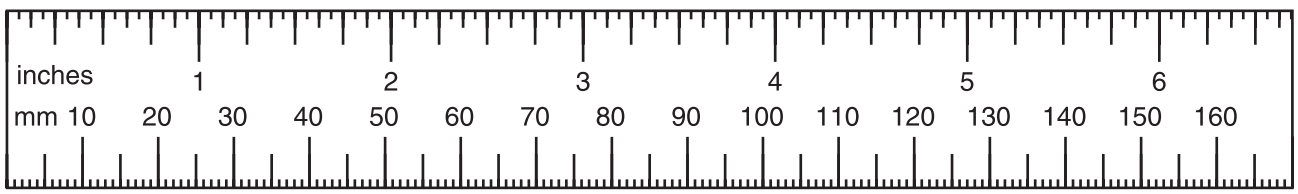
All parts shown in the boxes are displayed in real size.



OPERATING YOUR MODEL SAFELY

Operate the helicopter in spacious areas with no people nearby.
!Warning: Do NOT operate the helicopter in the following places and situations (or else you risk severe accidents):
• in places where children gather or people pass through
• in residential areas and parks
• indoors and in limited space
• in windy weather or when there is any rain, snow, fog or other precipitation
If you do not observe these instructions you may be held reliable for personal injury or property damage!

Always check the R/C system prior to operating your helicopter.
When the R/C system batteries get weaker, the operational range of the R/C system decreases. Note that you may lose control of your model when operating it under such conditions.

Keep in mind that other people around you might also be operating a R/C model.
Never use a frequency which someone else is using at the same time. Radio signals will be mixed and you will lose control of your model.

If the model shows irregular behavior, bring the model to a halt immediately. Turn off all power switches and disconnect the batteries. Investigate the reason and fix the problem. Do not operate the model again as long as the problem is not solved, as this may lead to further trouble and unforeseen accidents.

!Warning: In order to prevent accidents and personal injury, be sure to observe the following:
Before flying the helicopter, ensure that all screws are tightened. A single loose screw may cause a major accident.
Replace all broken or defective parts with new ones, as damaged parts lead to crashes.
Never approach a spinning rotor. Keep at least 10 meters/yards away from a spinning rotor blades.
Do not touch the motor immediately after use. It may be hot enough to cause burns.
Perform all necessary maintenance.

PRIOR TO ADJUSTING AND OPERATING YOUR MODEL, OBSERVE THE FOLLOWING

!Warning: Operate the helicopter only outdoors and out of people's reach as the main rotor operates at high rpm!
!Warning: While adjusting, stand at least 10 meters/yards away from the helicopter!

Novice R/C helicopter pilots should always seek advice from experienced pilots to obtain hints with assembly and for pre-flight adjustments. Note that a badly assembled or insufficiently adjusted helicopter is a safety hazard!
In the beginning, novice R/C helicopter pilots should always be assisted by an experienced pilot and never fly alone!
Throttle channel should be in motor OFF position while powering up.
When switching the R/C system ON or OFF, always proceed in the following order:

When switching ON:
• Position the throttle control stick (on transmitter) to a position where the LOGO 10 motor does not operate.
• Turn on the transmitter.
• Turn on the receiver.
• Connect the motor battery.
• Operate your model.

When switching OFF:
• Turn off the motor (move throttle control to a position where motor does not operate).
• Wait until the rotor head has stopped spinning.
• Disconnect the motor battery.
• Turn off receiver.
• Turn off transmitter.

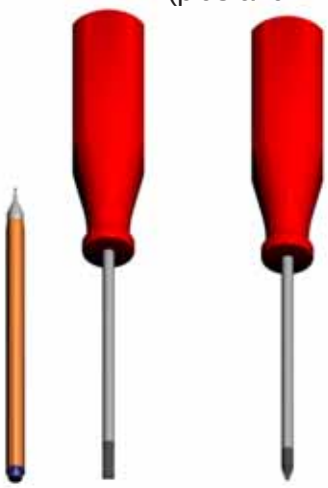
Tools for Assembly & R/C Equipment

Drill with
1.5mm bit
(.059 in)

Rubber Hammer

Threadlock

Screwdrivers
(plus and minus)



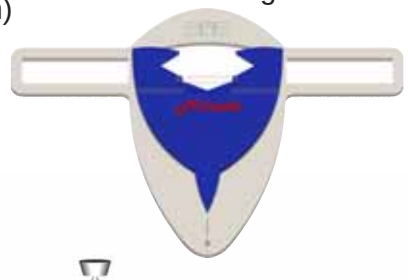
Marker

Ball link pliers

Hex Wrenches
1.5/2.0/2.5/3.0 mm
(.055/.079/.098/.118 in)

Scissors

Pitch Gauge



Alle shown products are examples. You may use different brands.

Motor + Speed Controller (check the Mikado webpages for recommended motors)

Fast Charger (Schulze isl 6-330d or isl 6-636+)

Radio with Heli-Software

Battery (Sanyo RC2400 or Sanyo 3000 NiMH)

Receiver Battery
(Sanyo AR500)

Receiver (Graupner DS 19
or SMC 19 SPCM)

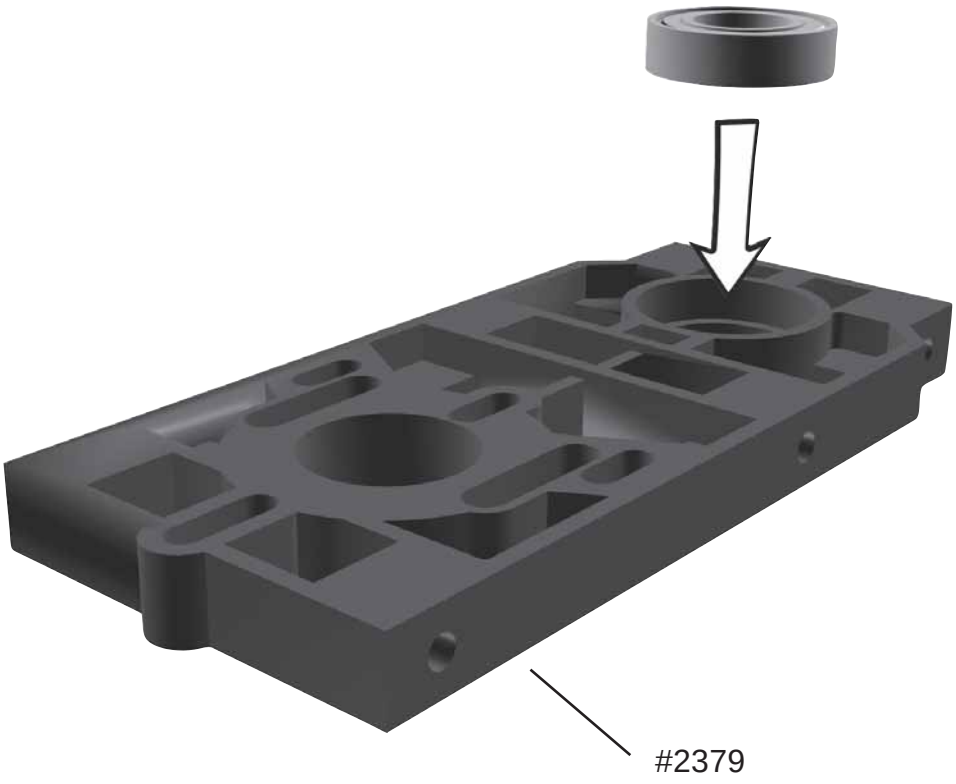
Gyro (Futaba GY240
or GY401)

4x Servos

1.1 Motorplate

Bag 1 • Bag 10

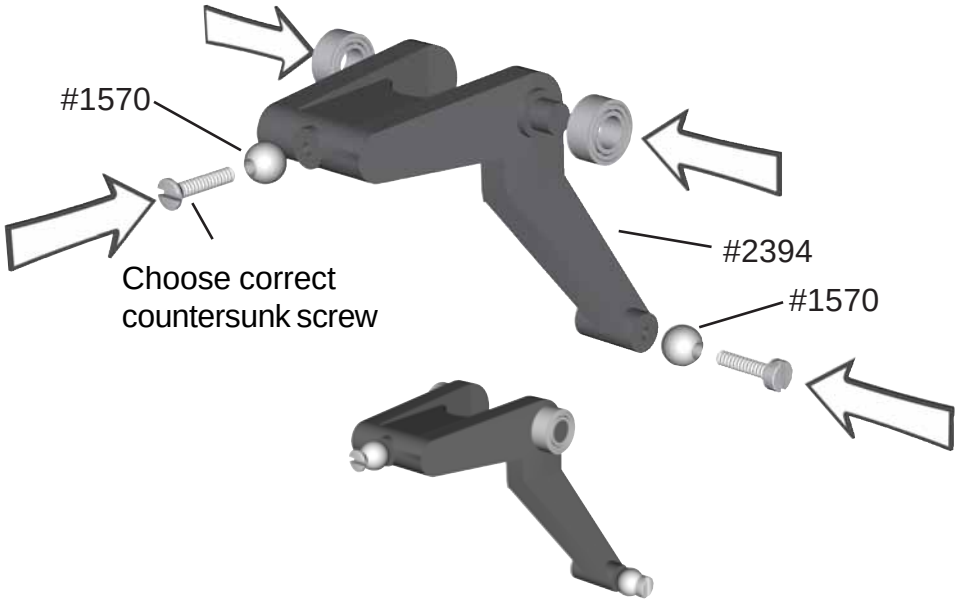
1x	10x19x5	#1329
6x	M3	#2072



1.2 Elevator Lever

Bag 1 • Bag 10 • Bag 12

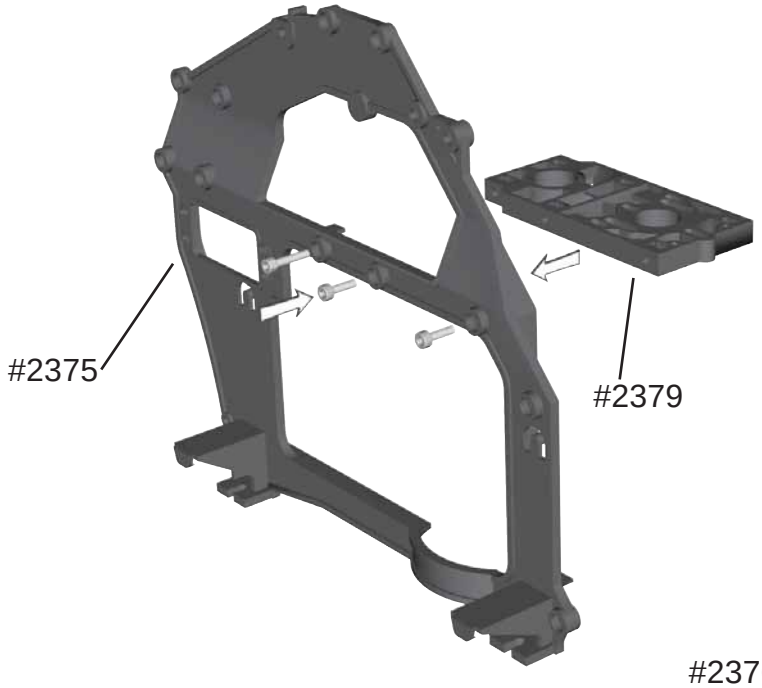
2x	4x8x3 mm	#2397
2x	Ø4,8 mm	#1570
1x	M2x8	#1902
1x	M2x10	#1911



1.3 Motor Plate

Bag 1 • Bag 12

4x	M3x10	#1953
2x	M3x14	#1955

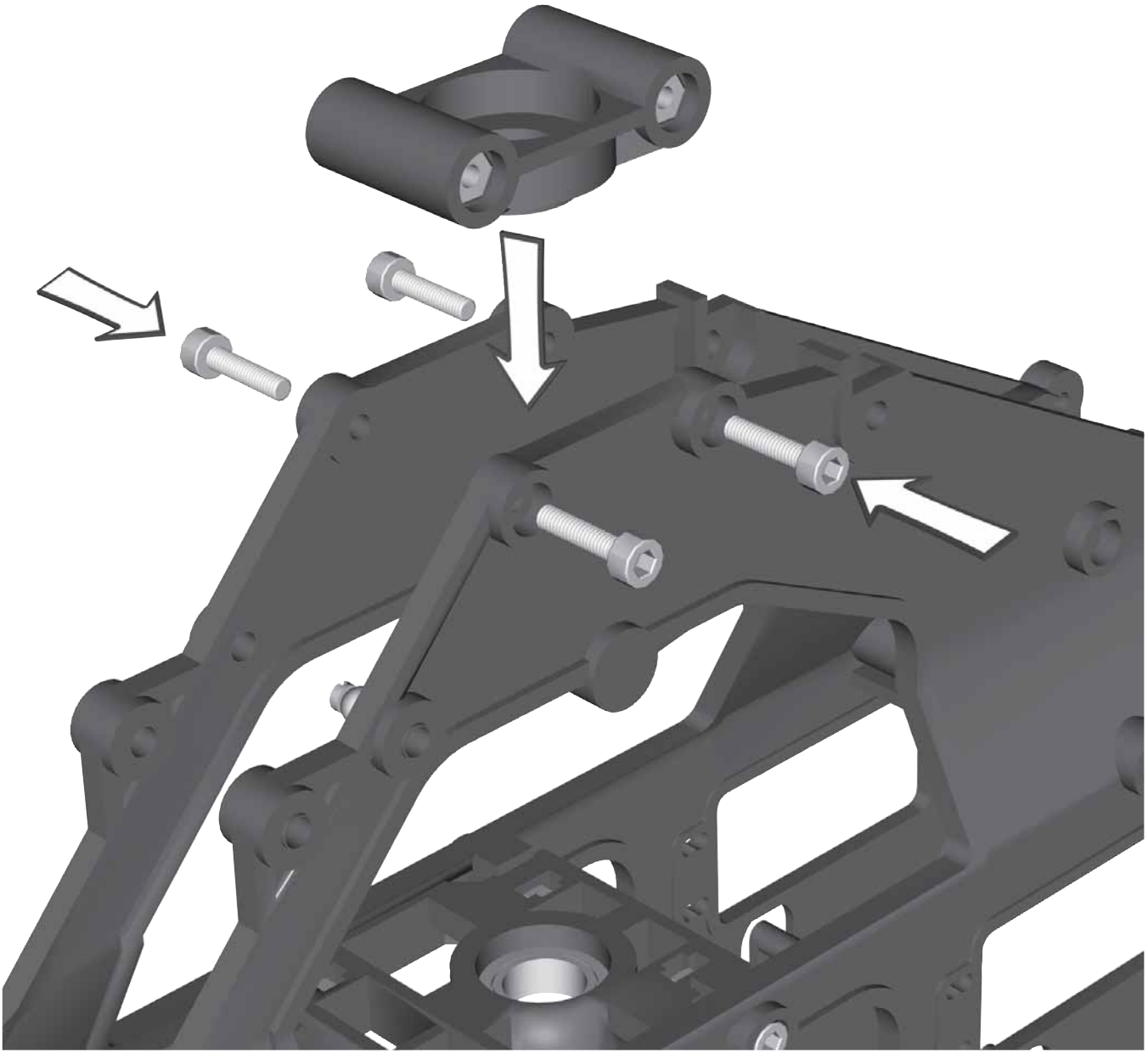


1.3 Bearing Case for Main Shaft

Bag 1 • Bag 12

2x	19 mm	#2370
4x	M3x12	#1954

#2381

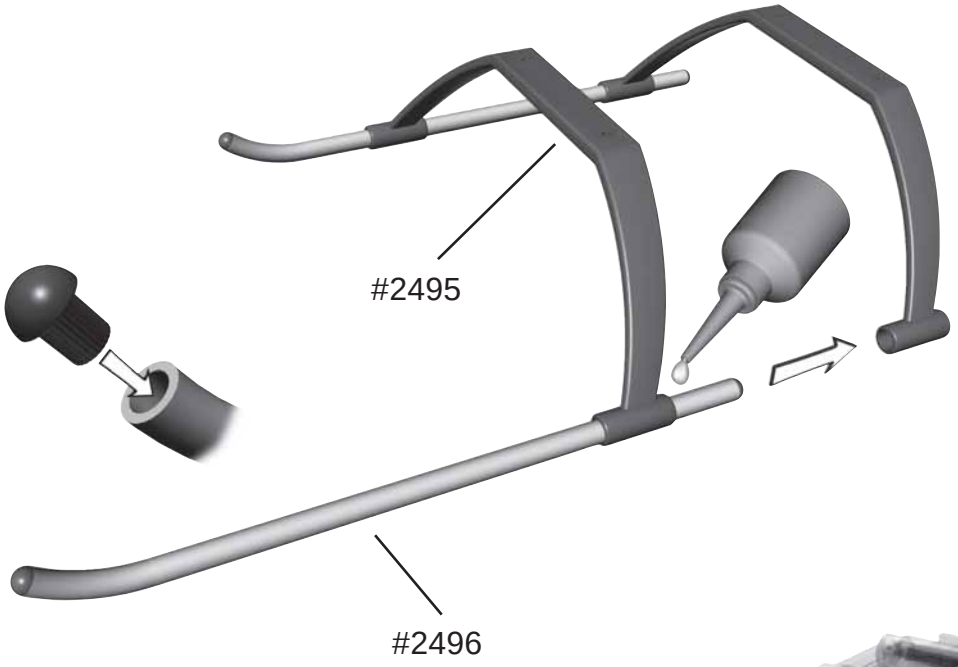


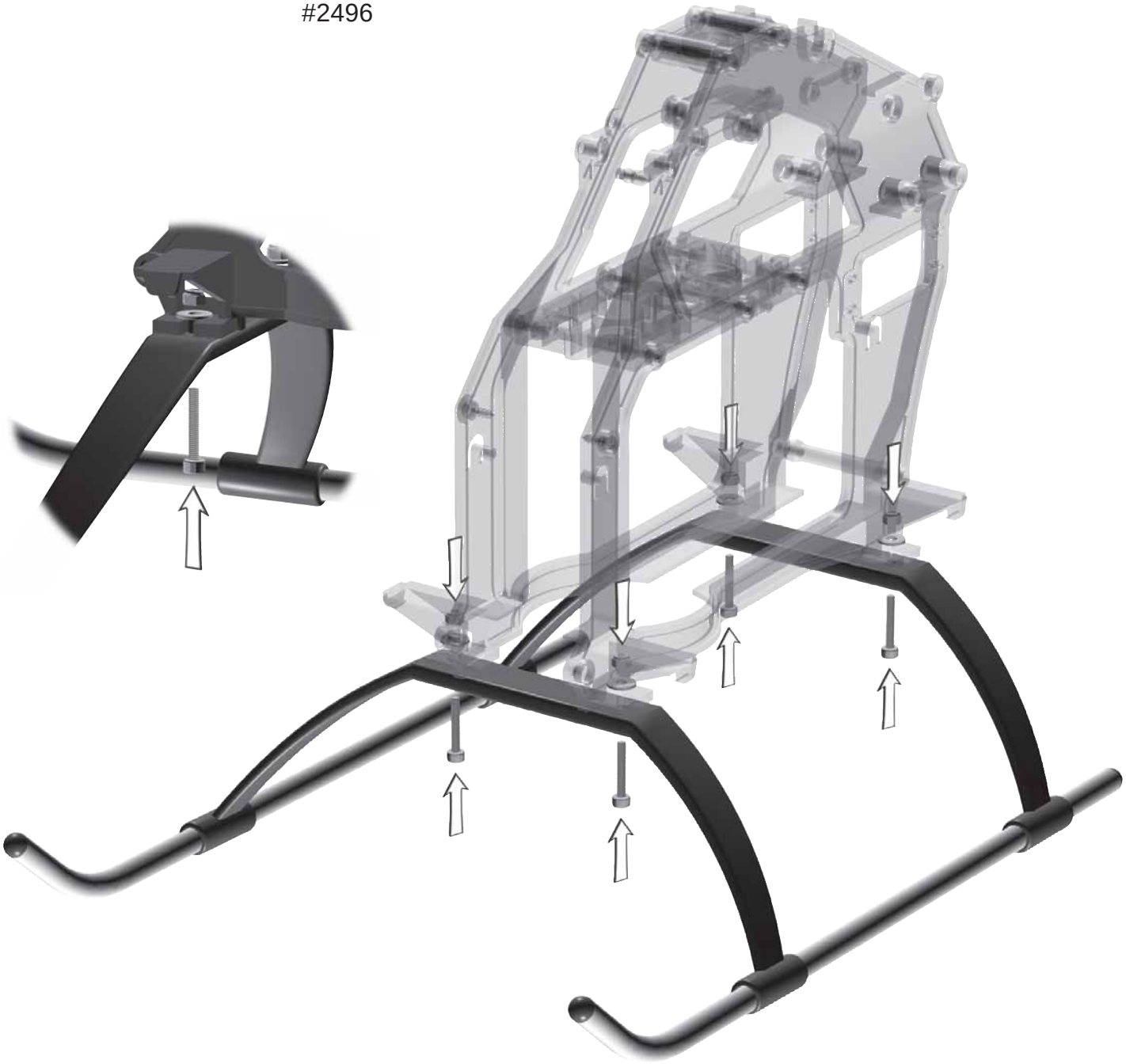
2 Landing Gear

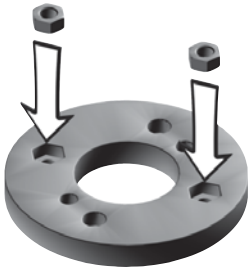
Bag 8 • Bag 12

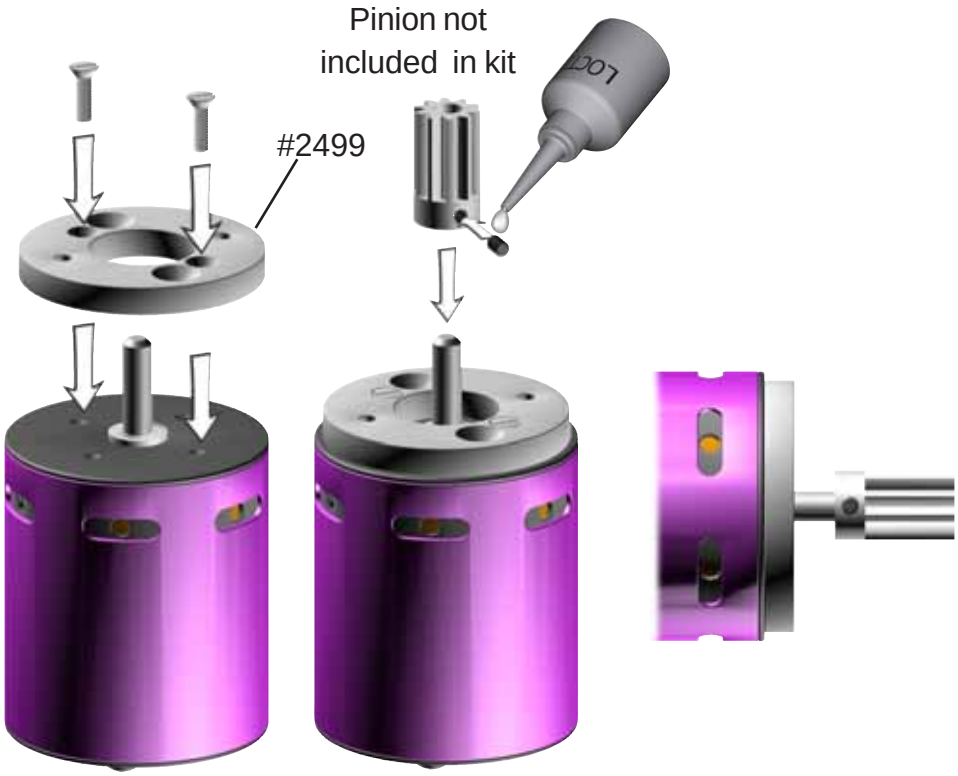
4x	M3x14	#1955
4x	M3	#2074
4x	3x7x0,5	#2012

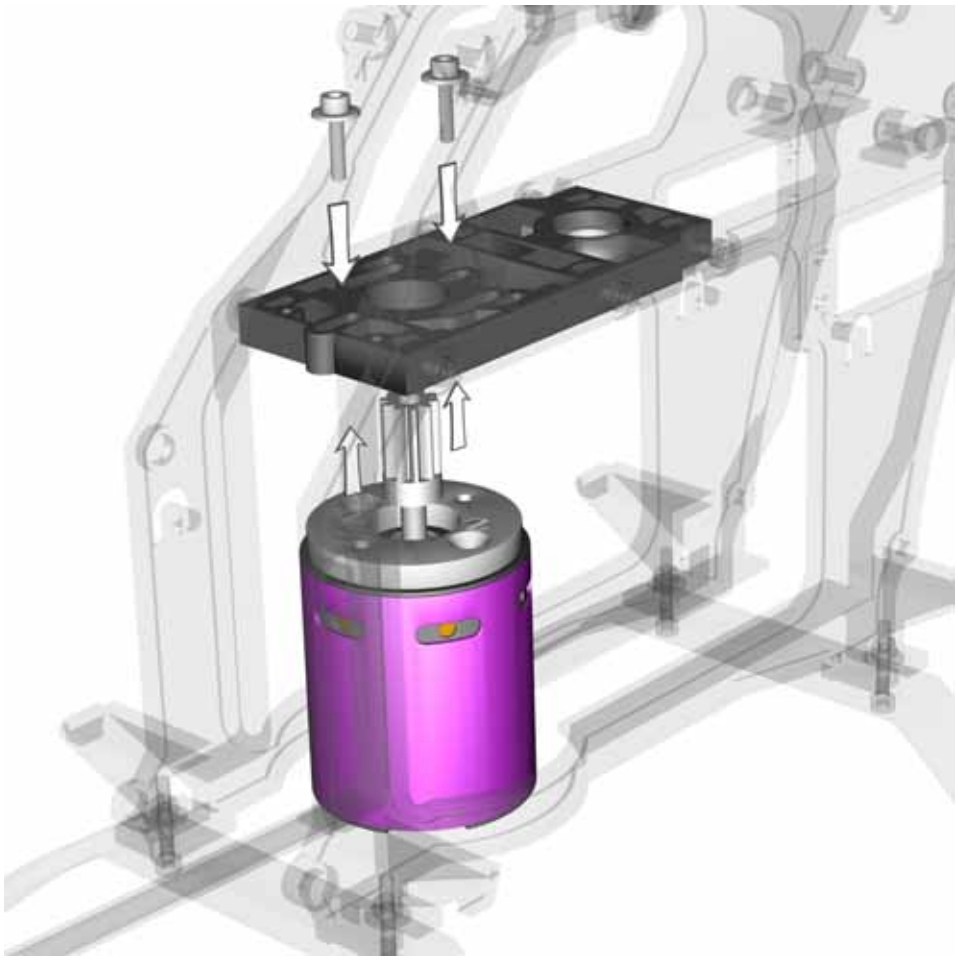
Align the skids and secure them with superglue.











3 Motor Installation

Bag 1• Bag 12

2x	M3	#2072
2x	M3x8	#1915
2x	M3x12	#1964
2x	3x7x0,5	#2012

Some electric motors are constructed such that they cannot be moved along the motor plate. If you are using one of these motors, please use the motor adaptor plate #2499. The plate is not needed for Hacker motors.

Please check from the Mikado website which pinion works best with the motorset you have (on the Mikado webpage go to LOGO 10 and click “Motorization”). When a wrong pinion is used, the performance of your electric helicopter will deteriorate and the motor or speed controller can be damaged.

Do not tighten the set screw fully until the final position of the pinion on the motor shaft is determined. This is done after installing the main gear.

There are two options for attaching the pinion:

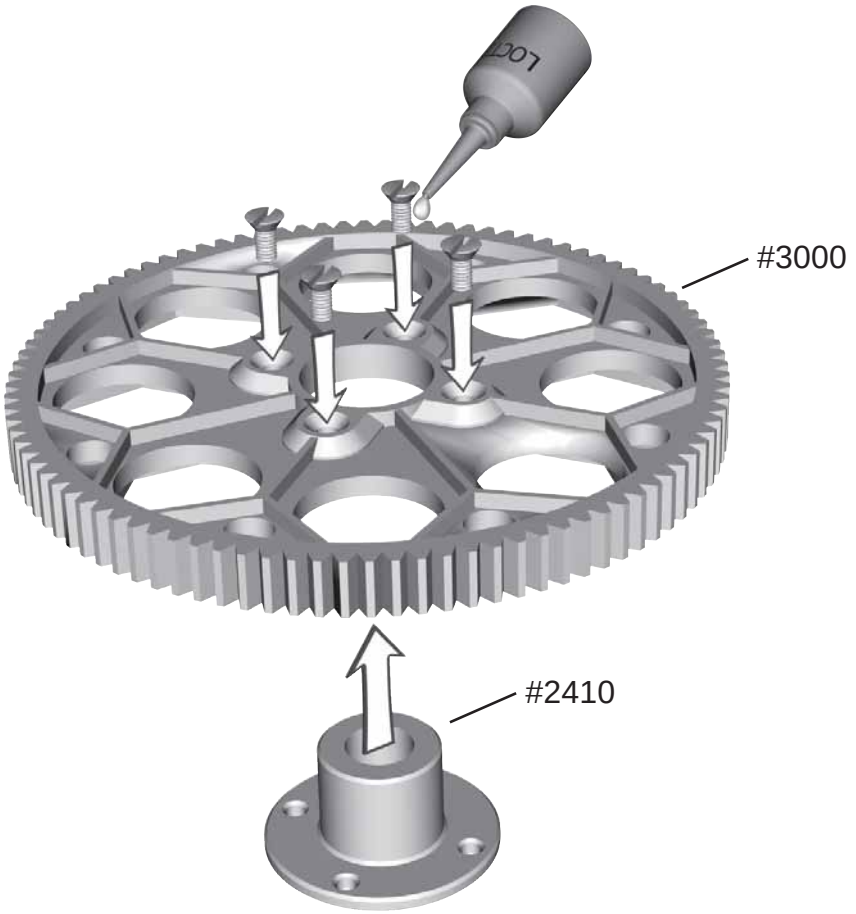
1. For securing the pinion, you may flatten the motor shaft where the set screw meets the motor shaft - without making a flat surface on the motor shaft.

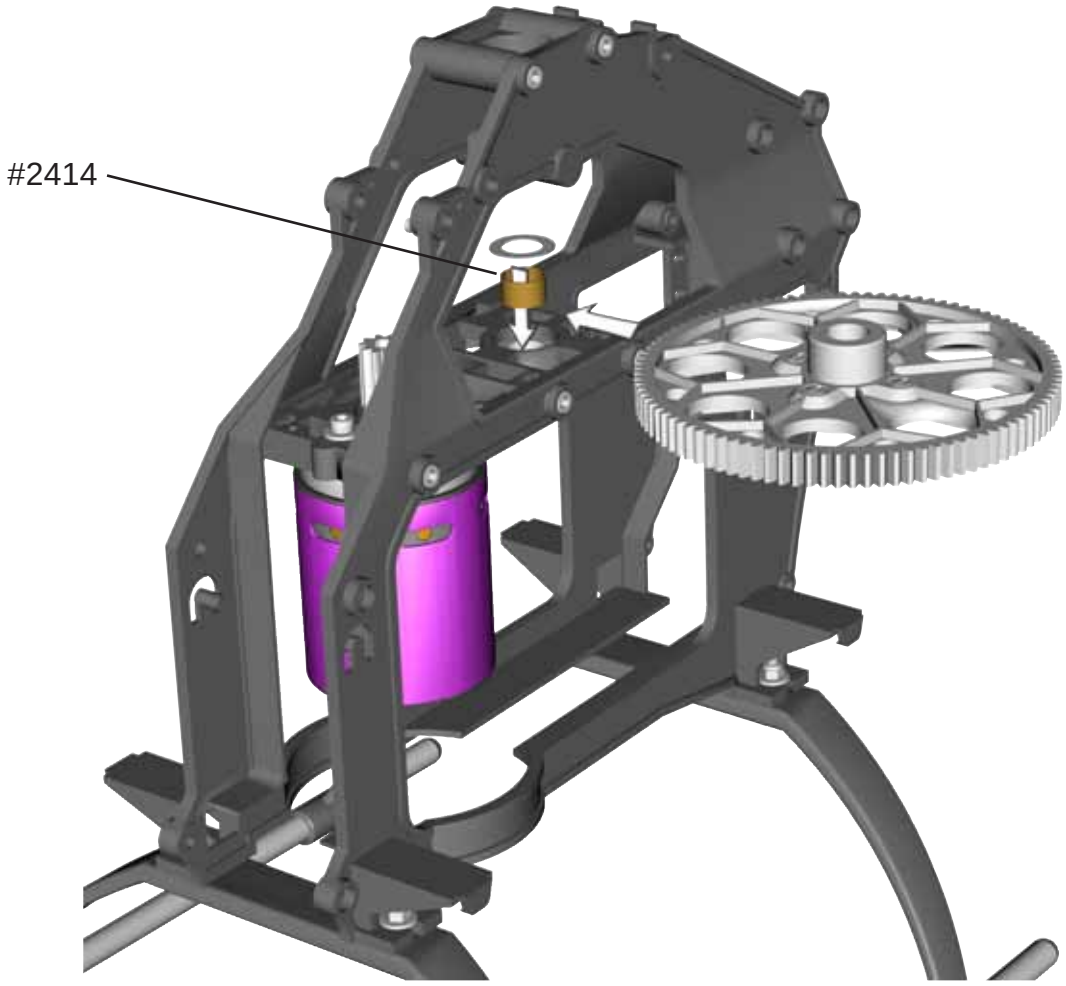
2. Alternatively, you may screw the set screw directly onto the motor shaft. For this it is required that the set screw has an appropriate rim for engaging in the motorshaft (all Mikado pinions have this rim). Note, however, that after attaching the set screw once, this rim becomes blunt so that the screw may not be used again.

4.1 Hub

Bag 2

4x	M3x8	#1915
1x	10x16x0,5 mm	#2010

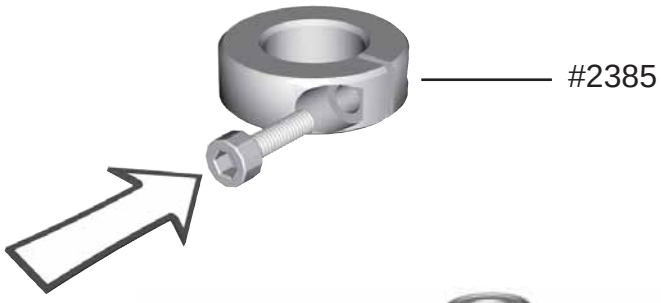


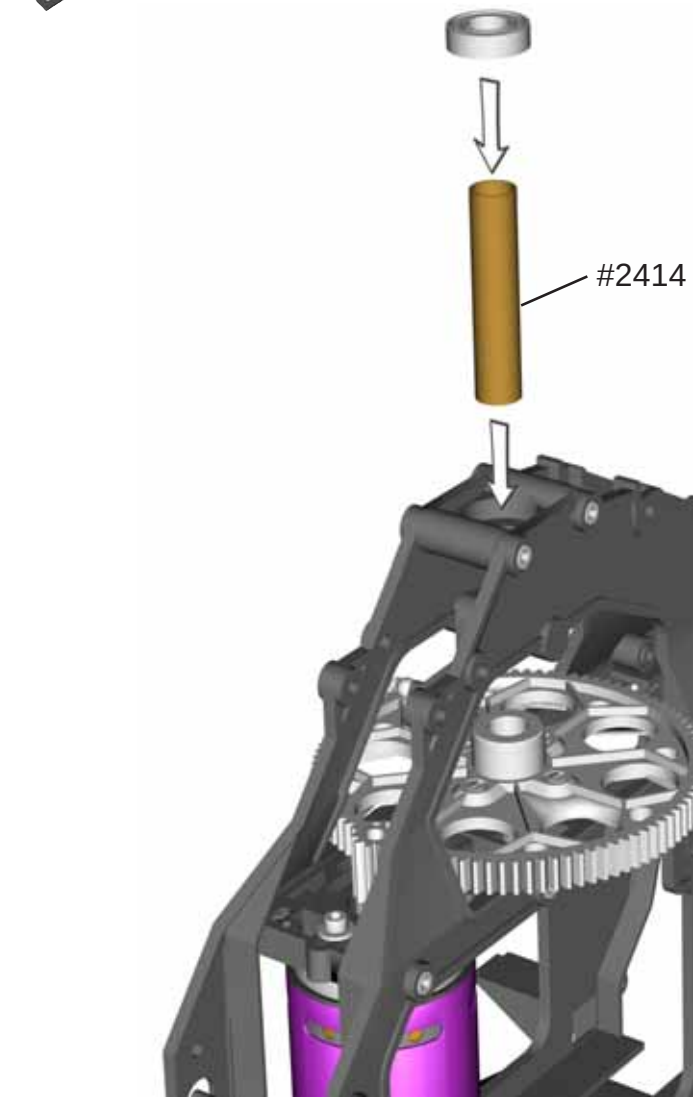


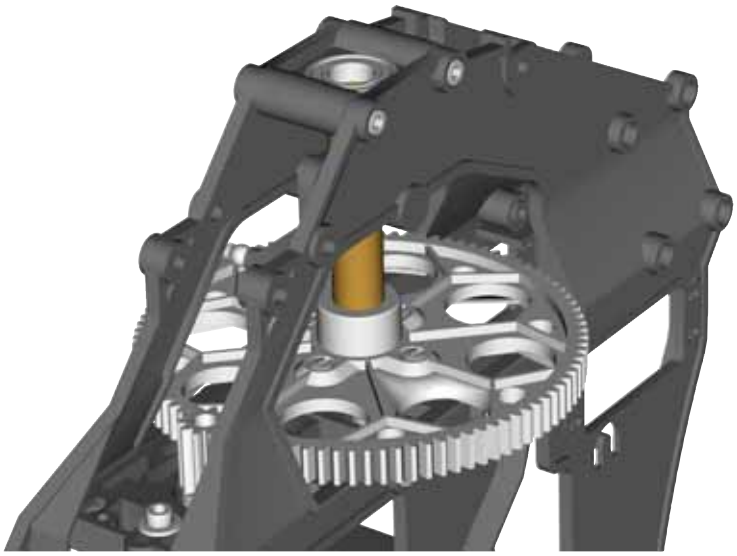
4.2 Rotor Shaft

Bag 2 • Bag 12

1x	M2,5x8	#1940
1x	10x19x5	#1329



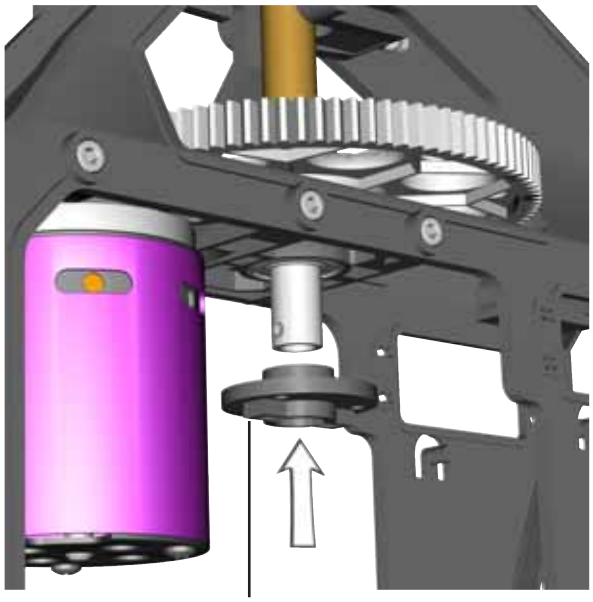




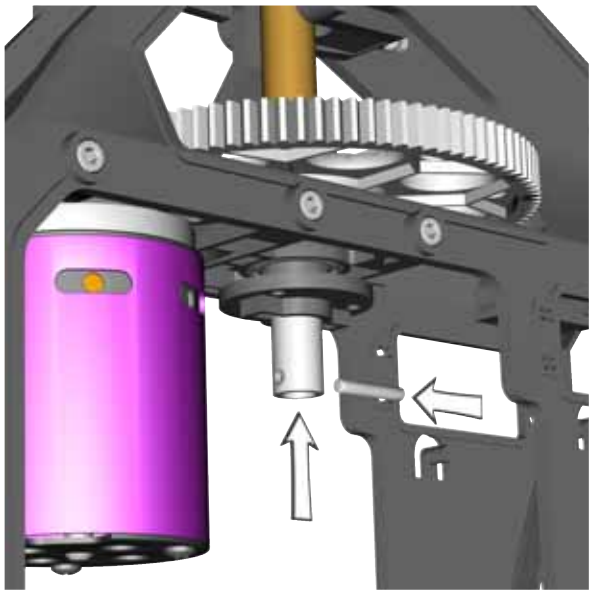
4.2 Rotor Shaft

Bag 2 • Bag 12

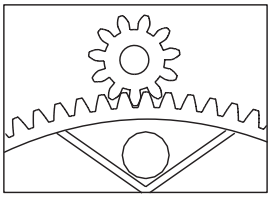
1x	3x18	#2388



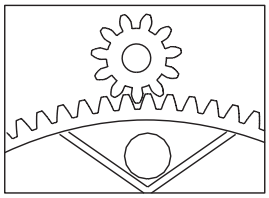
#2389



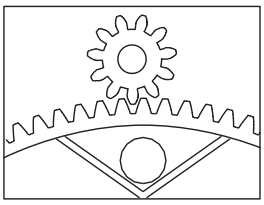
4.3 Adjusting Gear Backlash



too little backlash

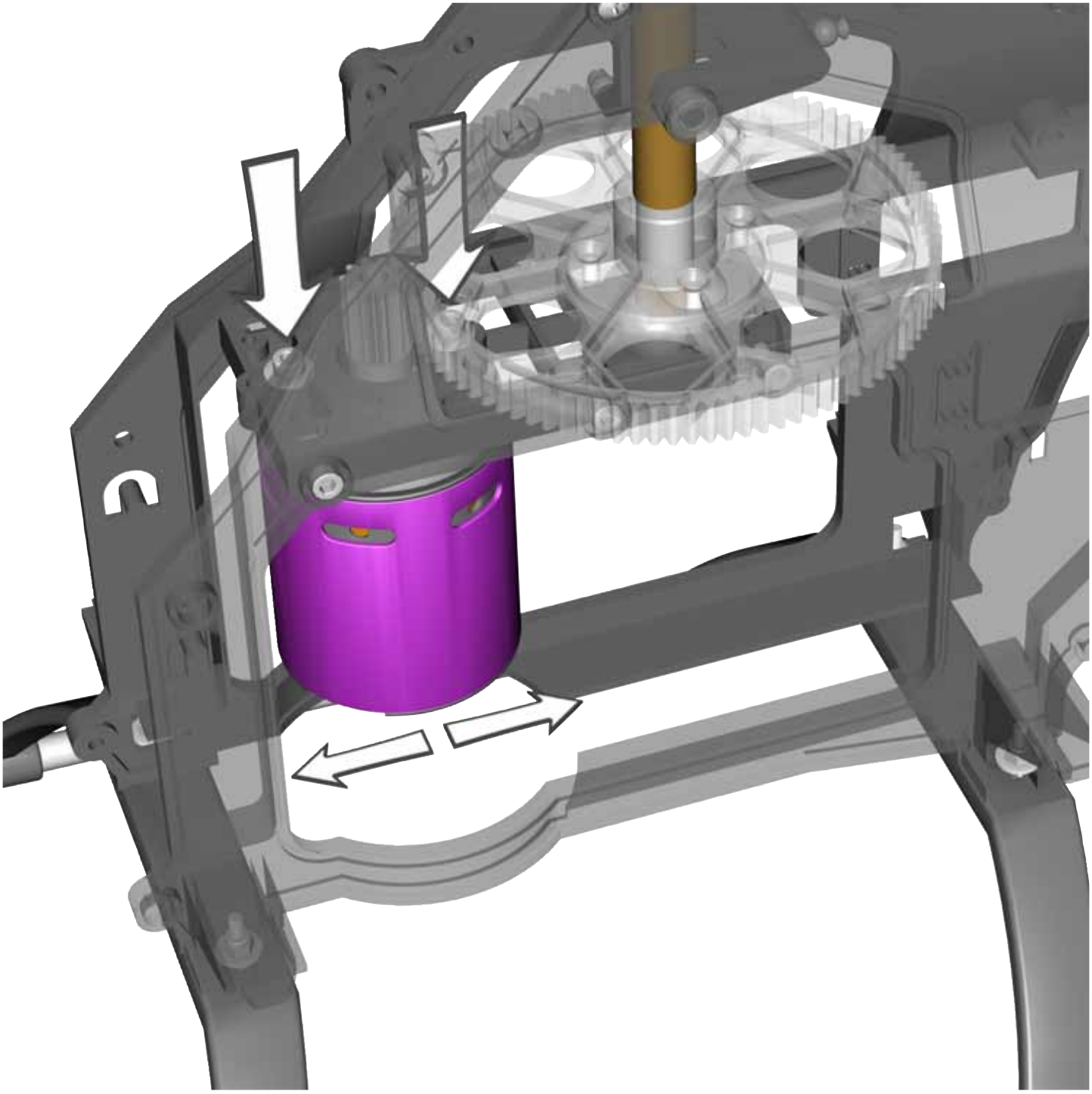


correct backlash



too much backlash

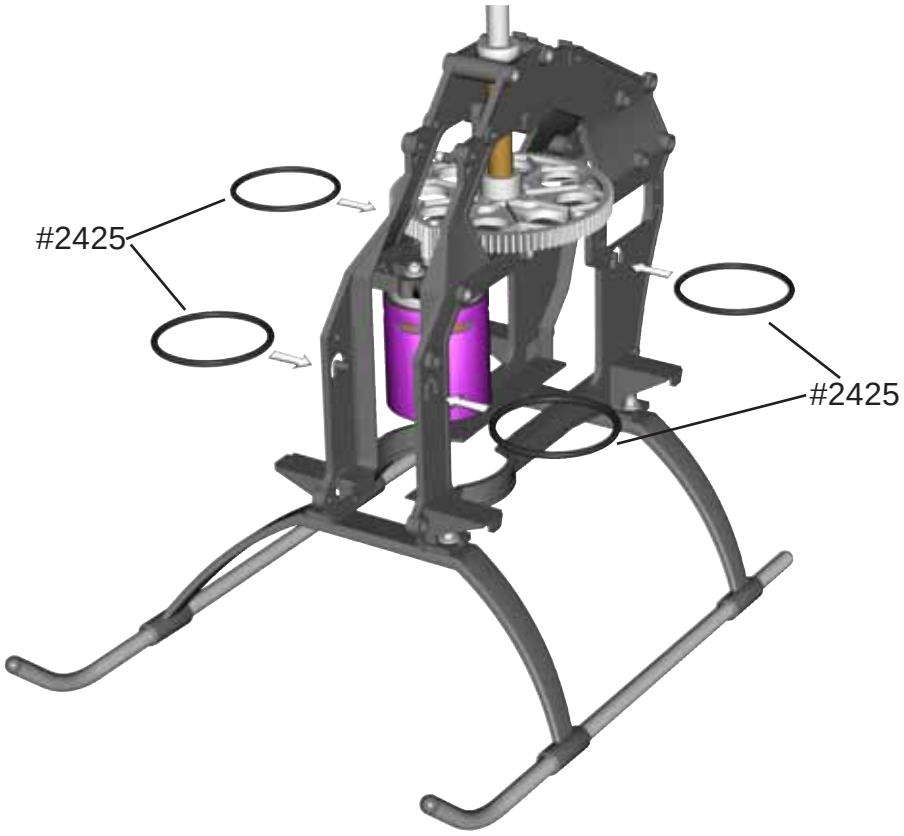
The gear backlash must be adjusted (see drawings). Excess backlash can cause premature wear of the main gear and will lead to shorter flight times.



5 RC Support

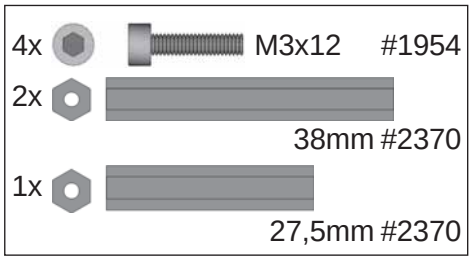
5.1 Battery Fixing Rings

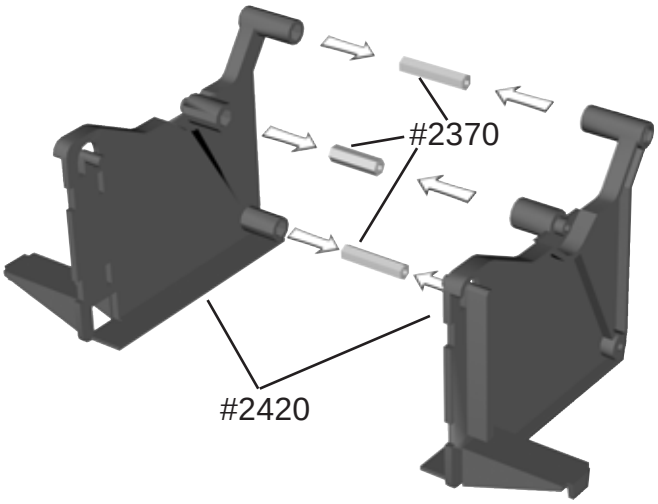
Bag 4

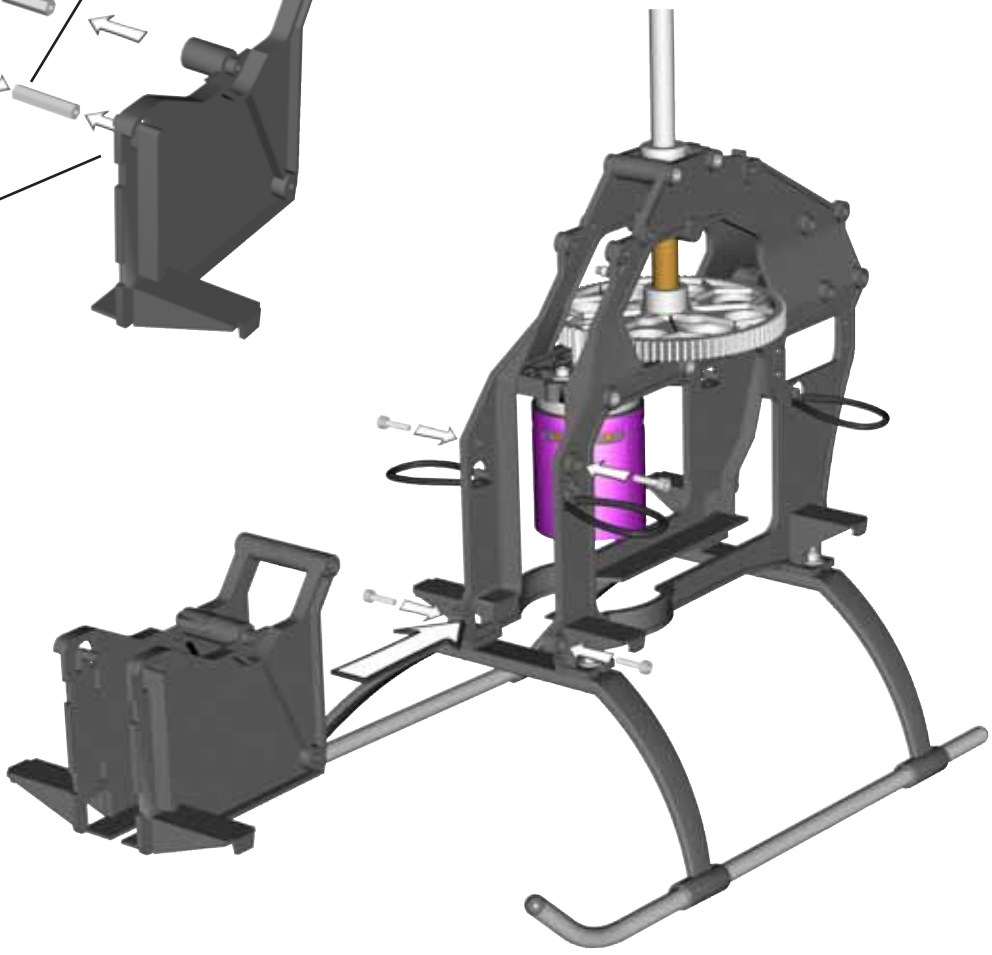


5.2 RC Support

Bag 4 • Bag 12



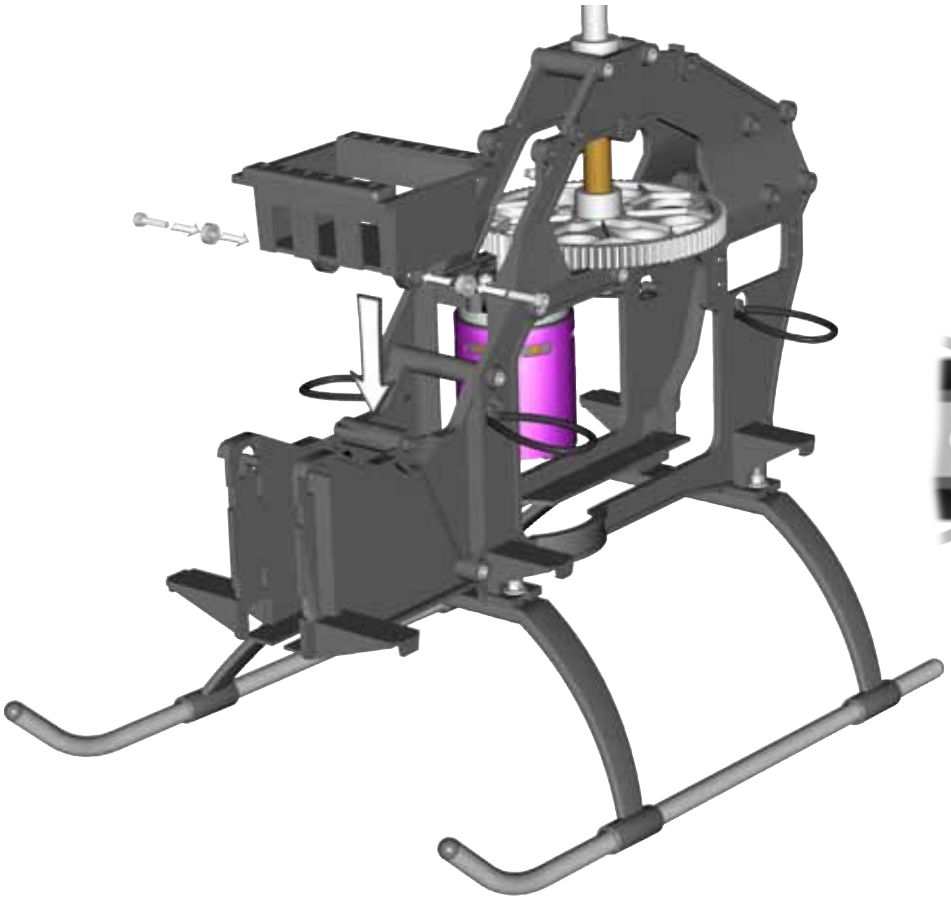


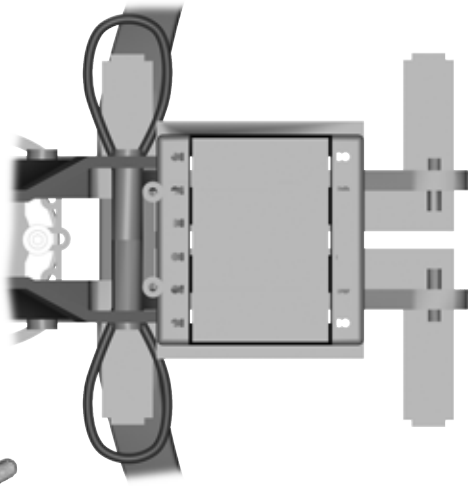


5.3 Servo Trays

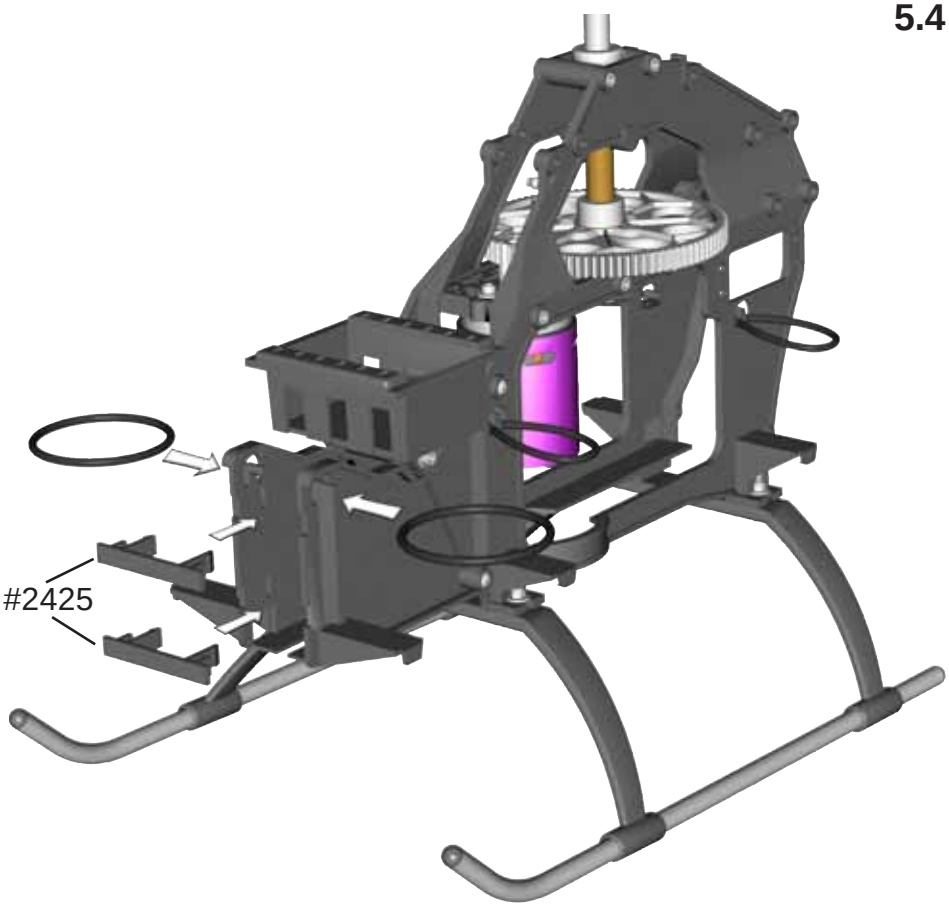
Bag 4 • Bag 10 • Bag 12

2x	M3x16	#1956
2x	3x8x3	#2397





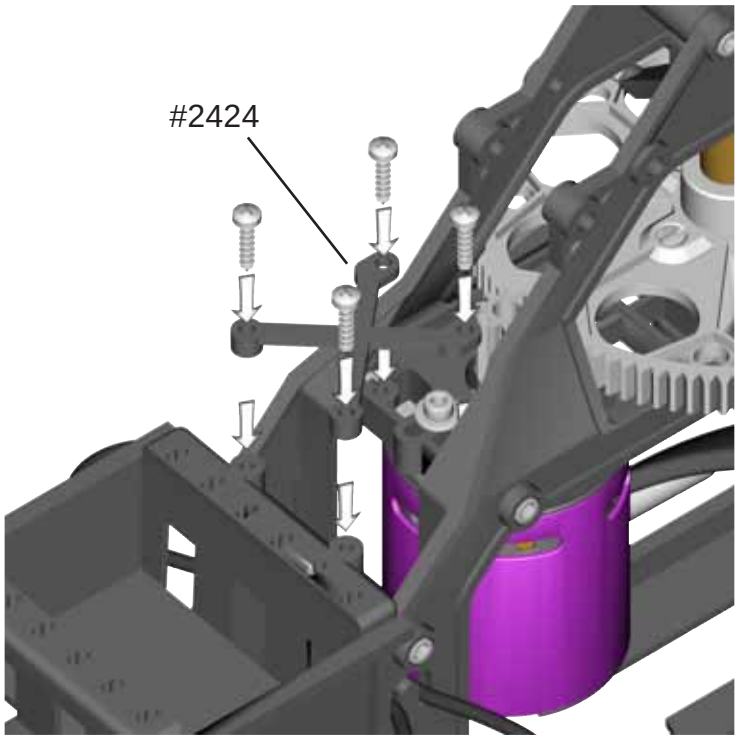
5.4 Front Battery Fixing Rings

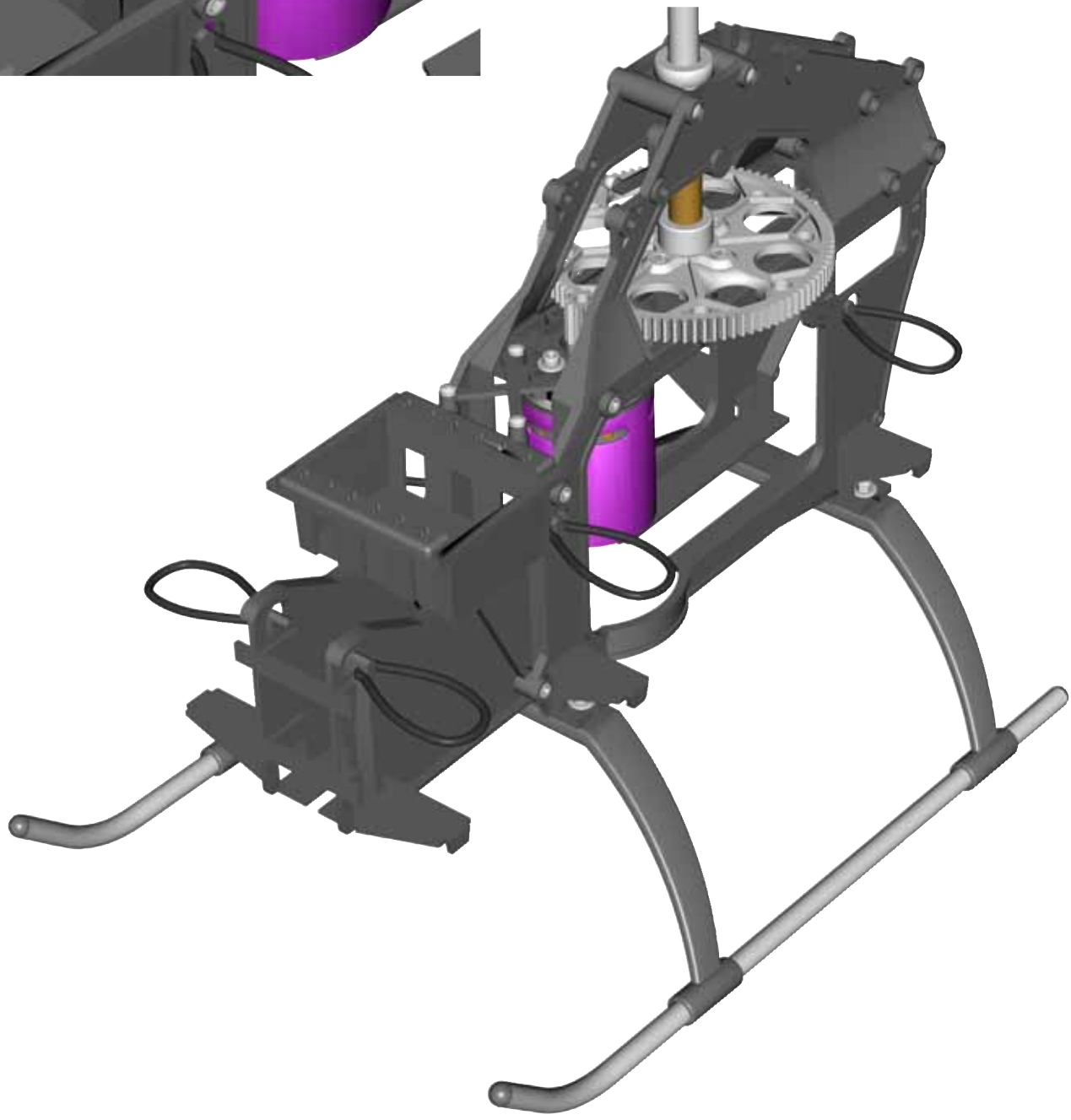


5.5 Frame

Bag 4 • Bag 12

4x	2,9x13	#2062



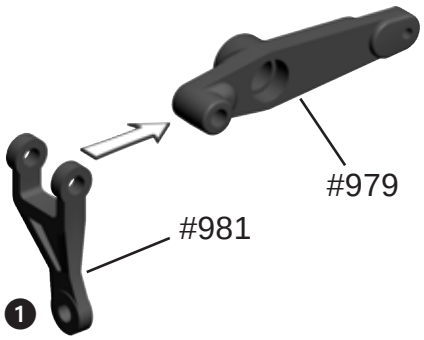


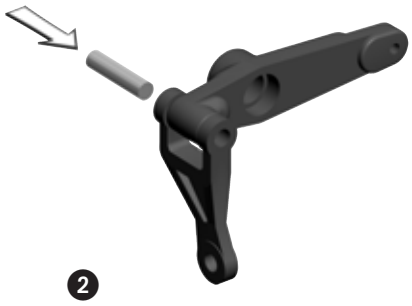
Assembly

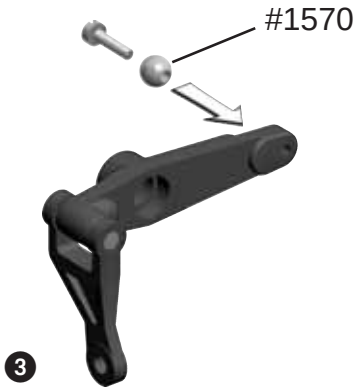
Bag 3 • Bag 10 • Bag 12

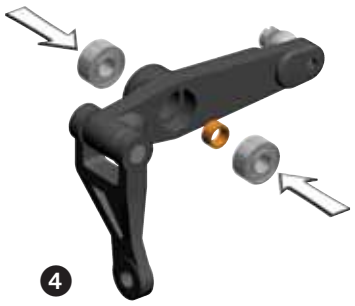
2x	2x8mm	#980
2x	M2x8	#1902
2x	Ø4,8 mm	#1570
4x	3x7x3	#930
2x	3x5x2,1	#2463
2x	M3x14	#1955
2x	3x5x0,5	#2002

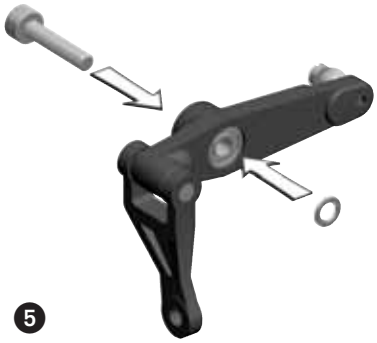
The Y-rods #981 must be able to move easily on the wash-out.

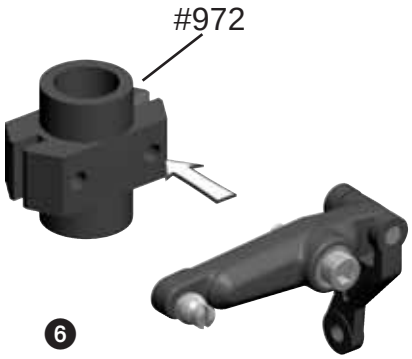


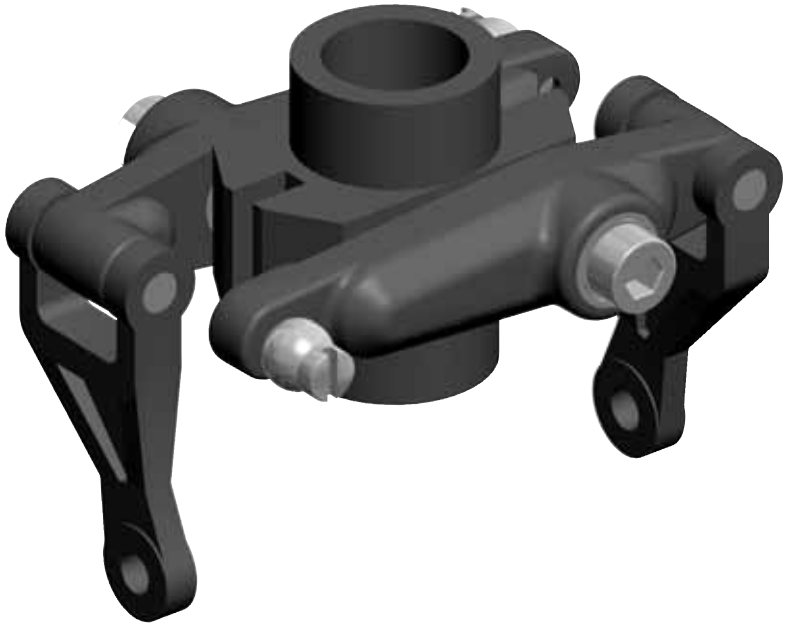










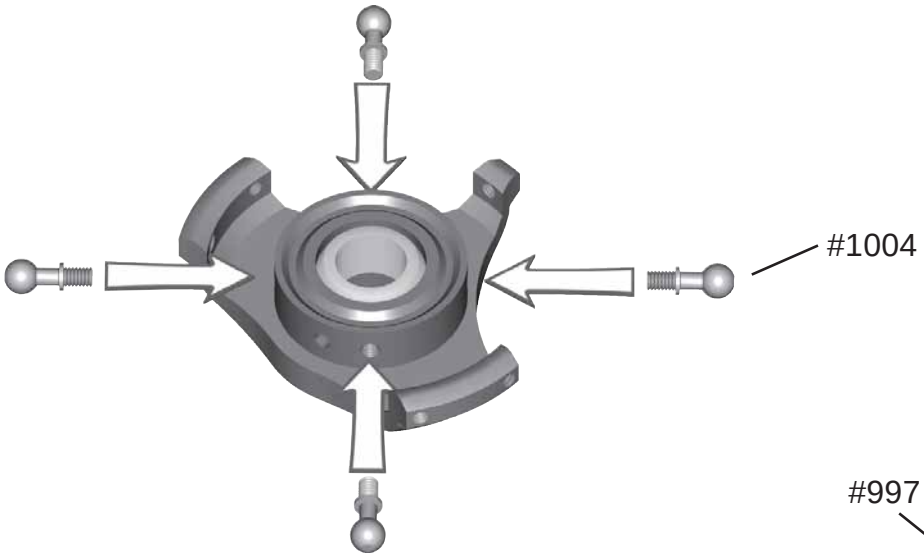


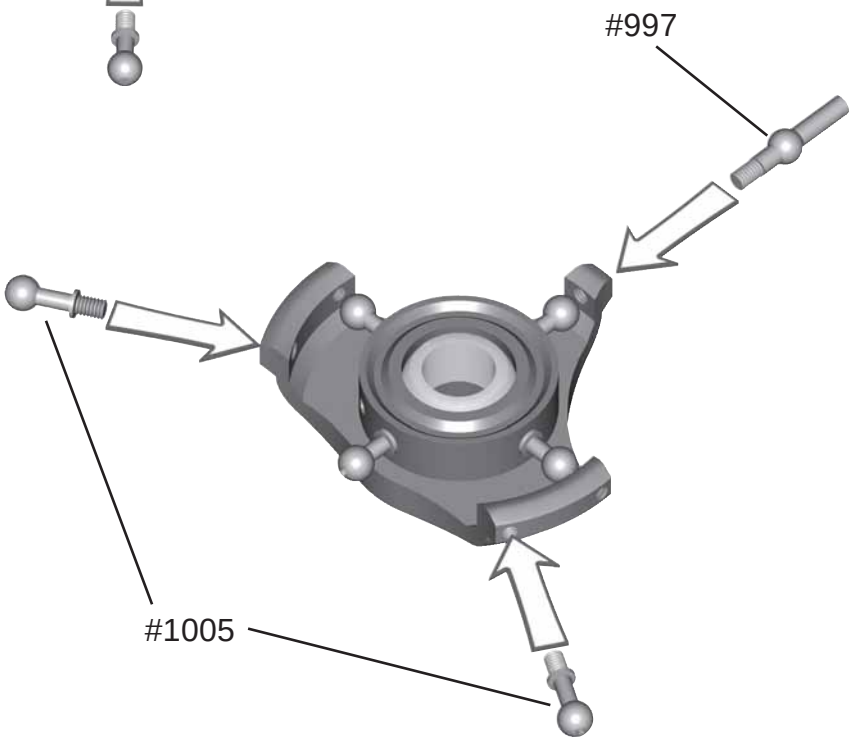
Assembly

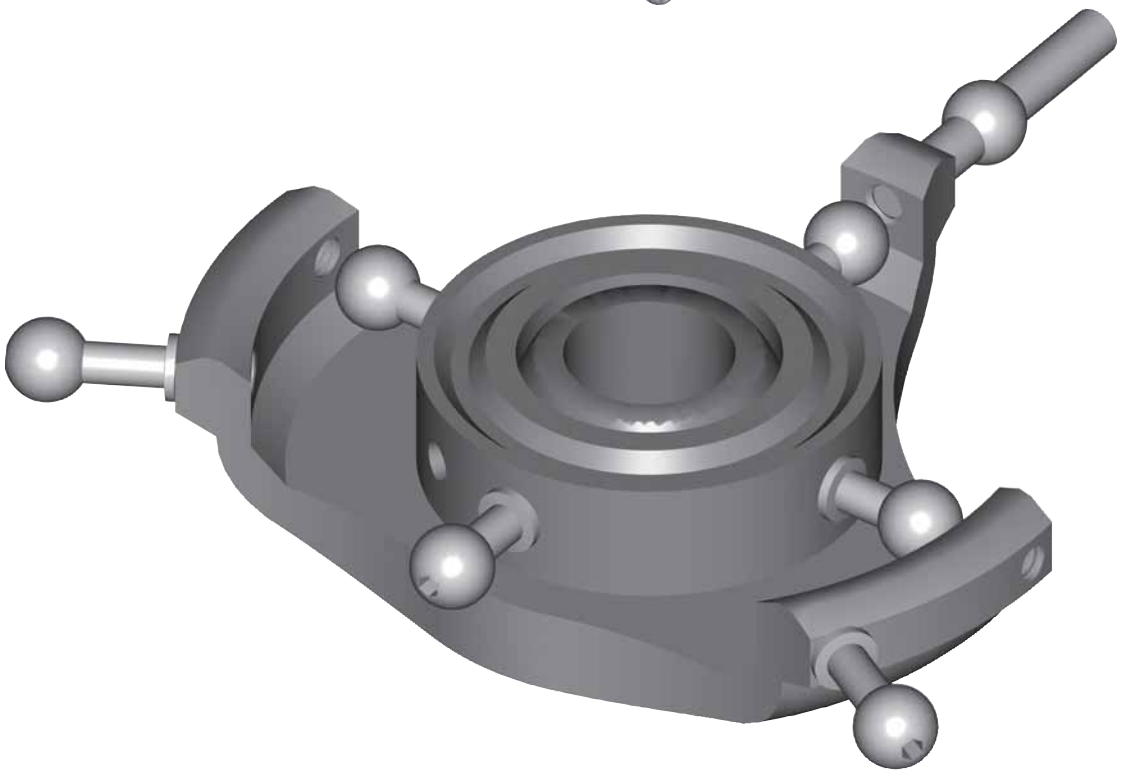
Bag 3

Secure all pivot bolts with threadlock.

Important: Tighten the pivot bolts carefully. Do not overtighten them, as they will break off.





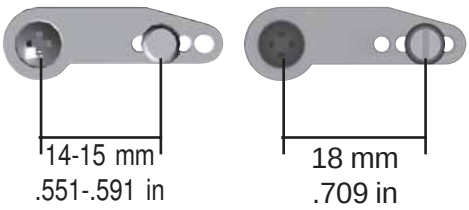


8 Preparation for Servo Installation

8.1 Servo Arms

Bag 1 • Bag 12

4x	M2x8	#1902
4x	Ø4,8 mm	#1570
4x	M2	#2070

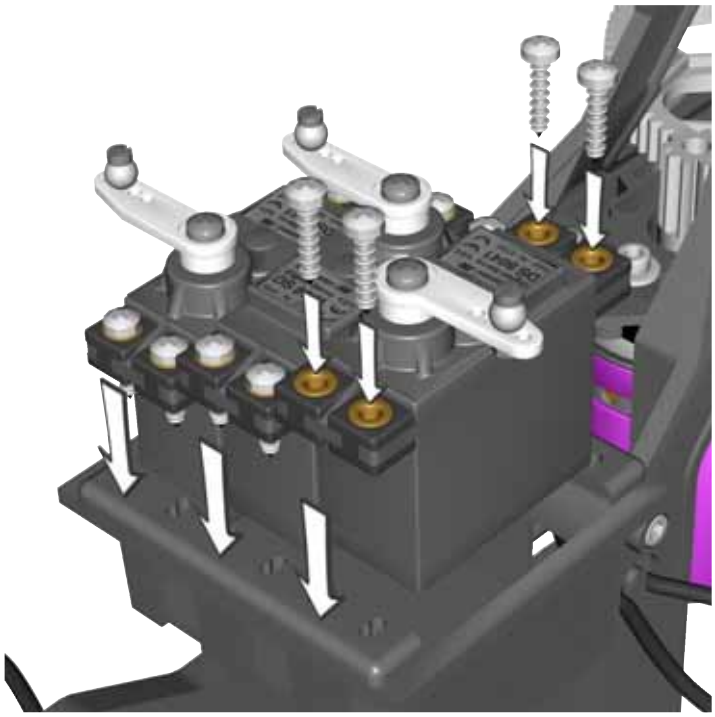


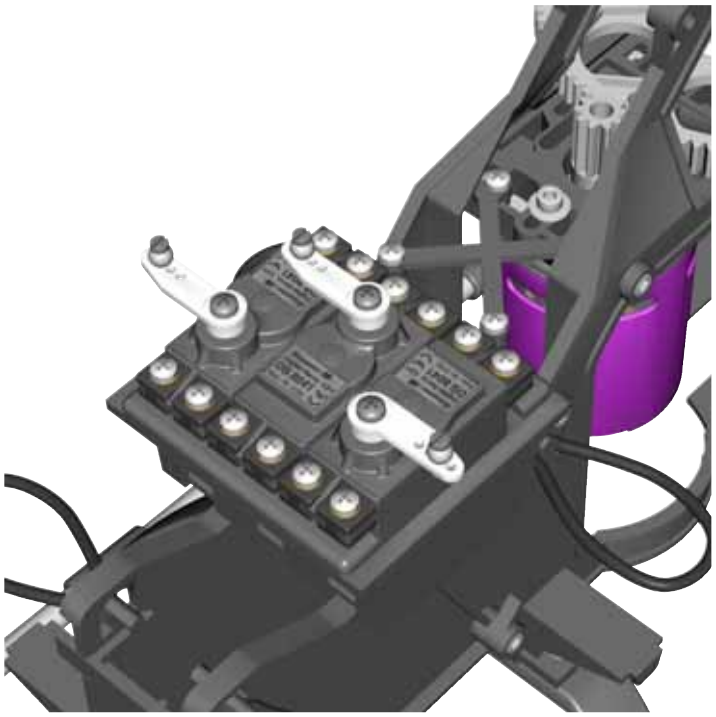
Now you must decide which pitch range you wish to use. For different flying styles, different pitch ranges must be used. For normal flight with some aerobatics, choose the standard settings and connect the push rod at the 18 mm hole on the servo arm. For 3D flight use 20 mm distance instead. The ball for the tail-rotor servo arm should be attached with a distance of 14-15 mm from the servo arm center.

8.2 Servo Centering

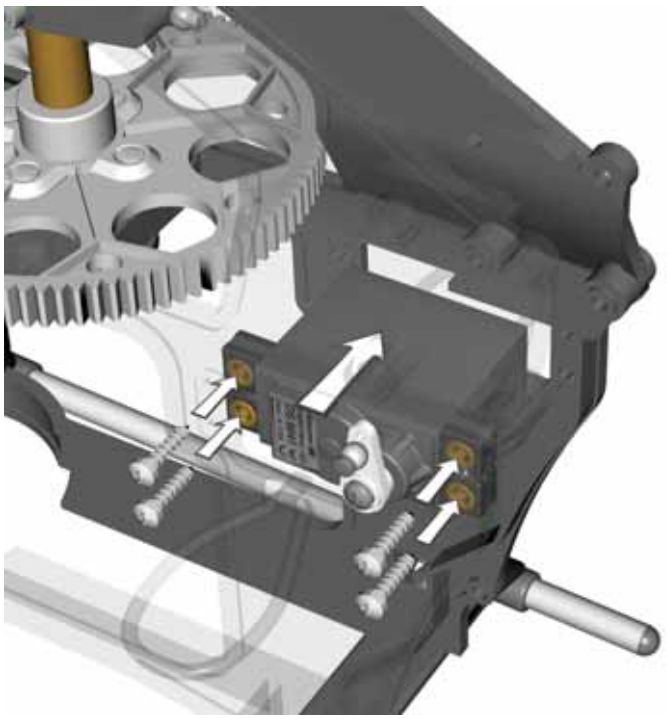
Connect the servo wires to the receiver and set all channels in your transmitter to neutral. Now attach the servo arms perpendicular to the servos.

8.3 Elevator and Aileron Servos (2x)





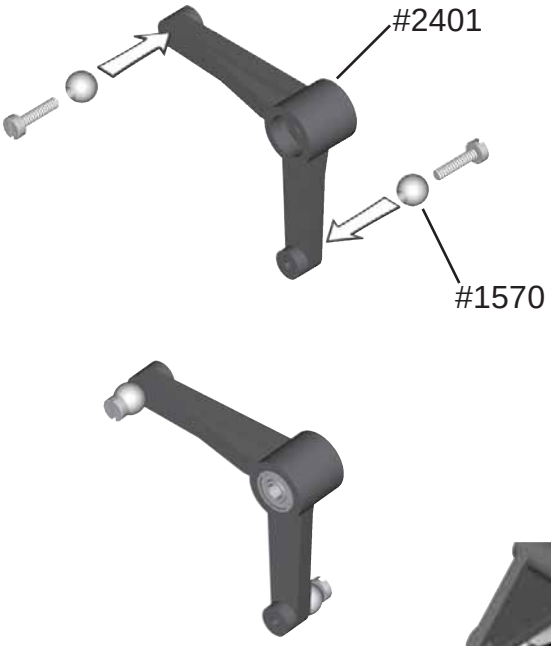
8.4 Tail Servo

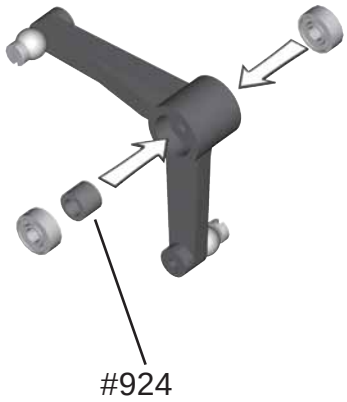


The use of Futaba servos requires that you take away a bit of material from the chassis.

9 Aileron Lever

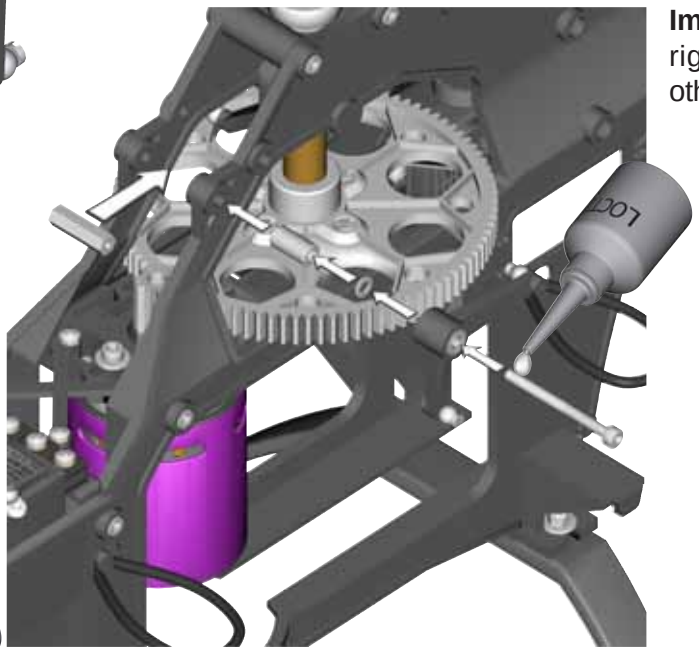
Bag 1 • Bag 10 • Bag 12

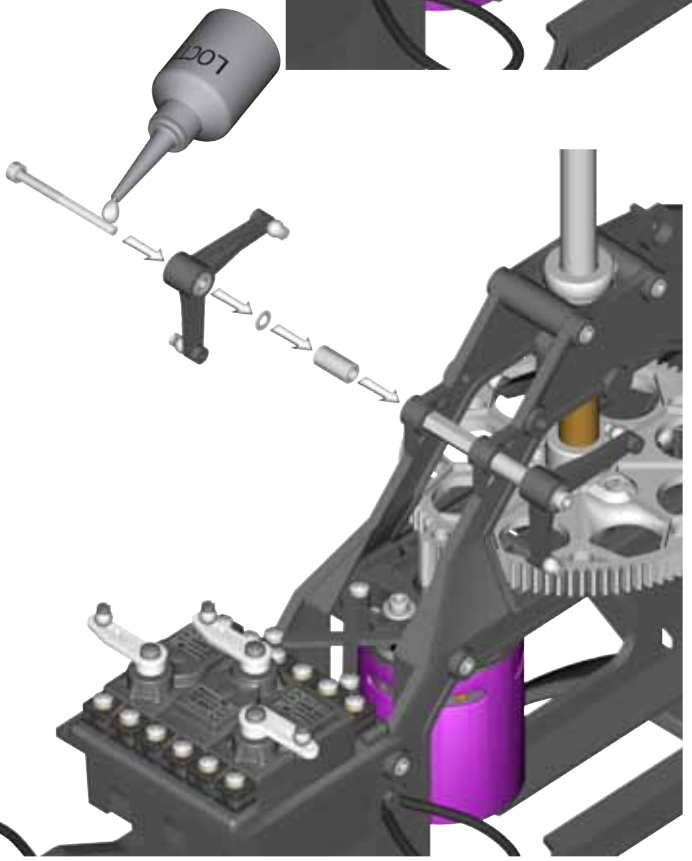


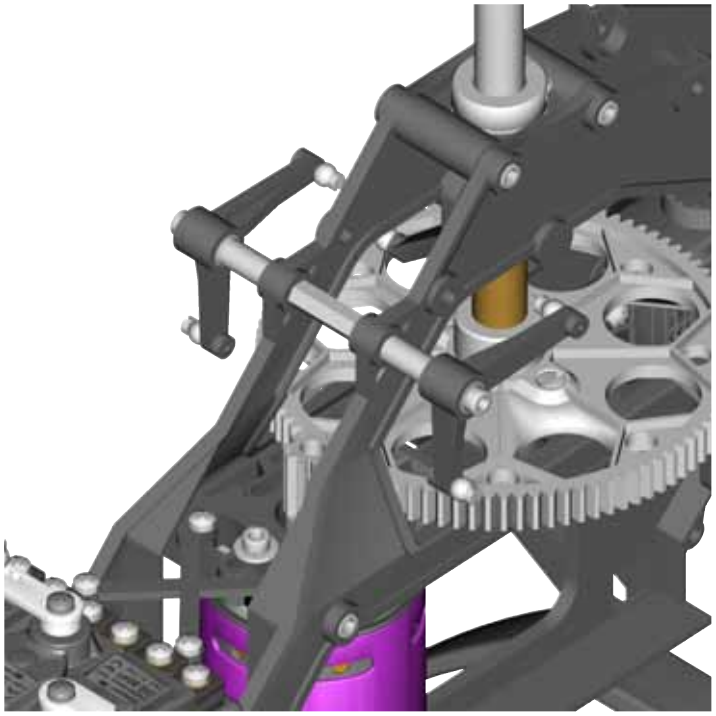


4x	3x7x3	#930
4x	M2x8	#1905
4x	Ø4,8 mm	#1570
2x	3x5x4	#924
2x	M3x35	#1961
2x	3x5x0,5	#2001
2x	Ø6x12	#2413
1x	SW5,5x20	#2390

Important: The levers for the left and right side are different from each other.

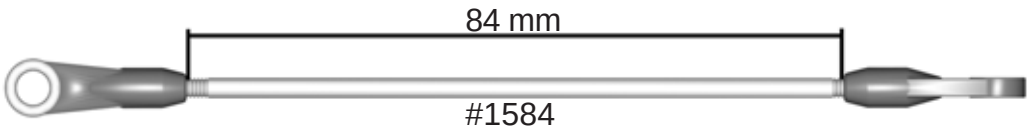


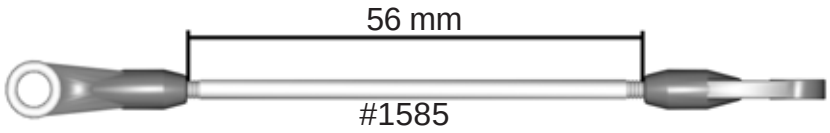




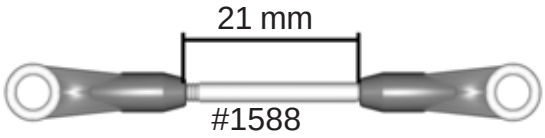
10.1 Length of Control Rods

Bag 1 • Bag 12



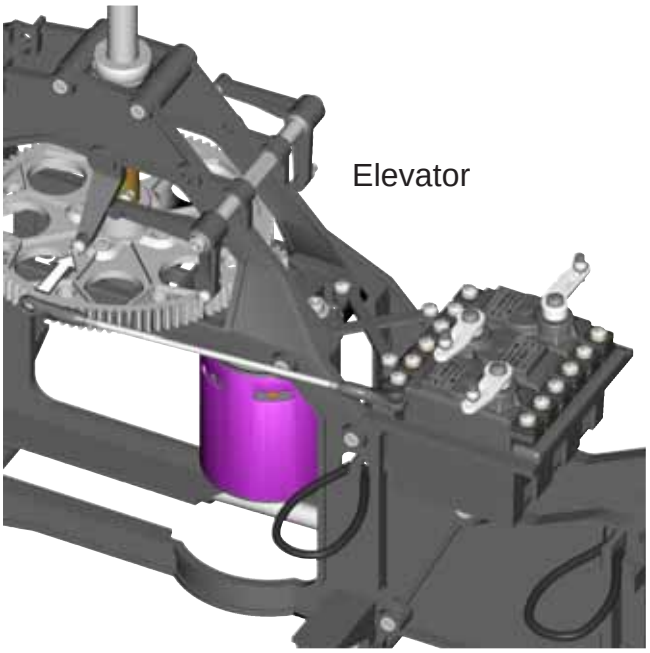


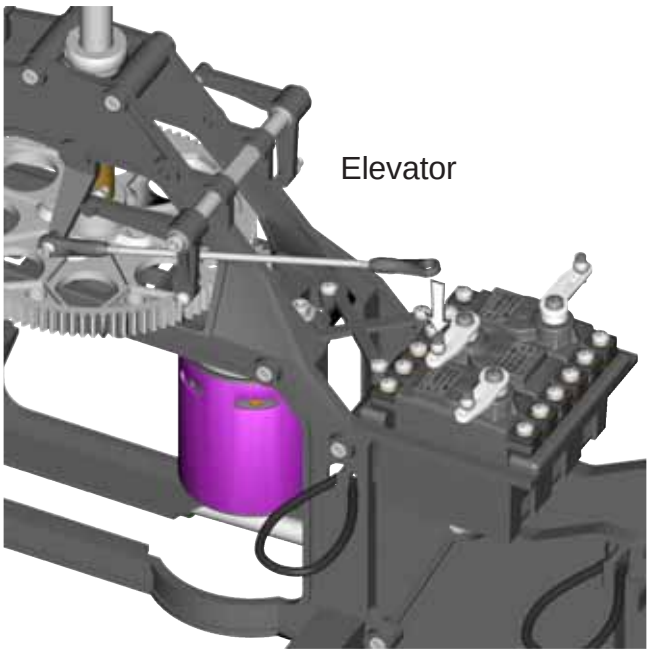
2x

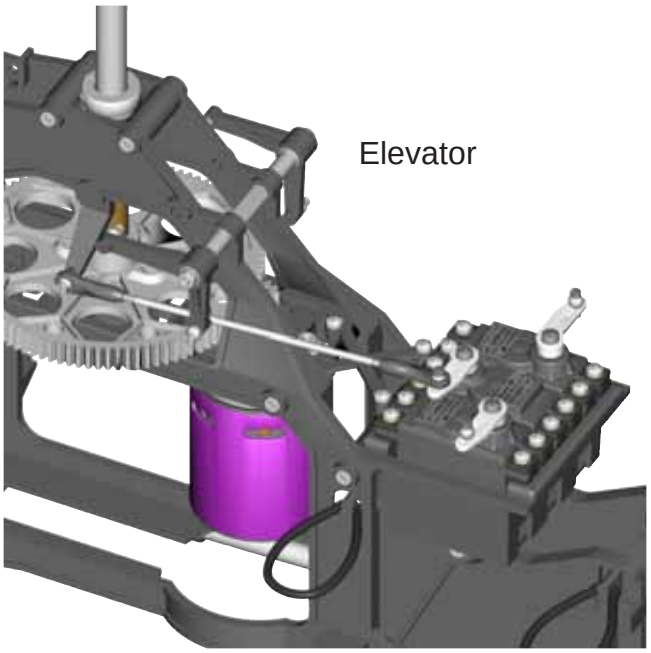


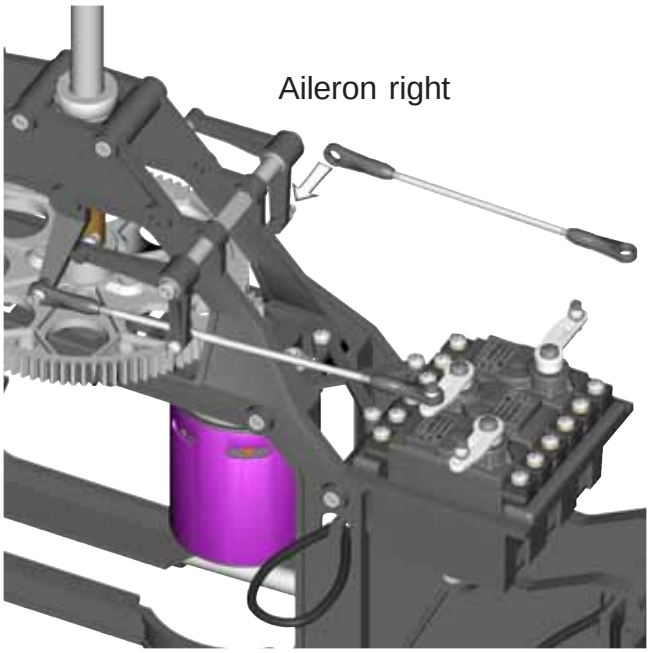
3x

10.2 Elevator and Aileron Linkages

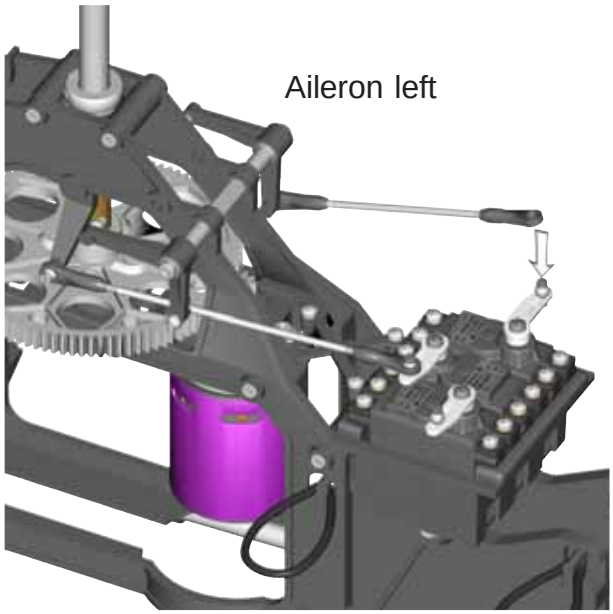




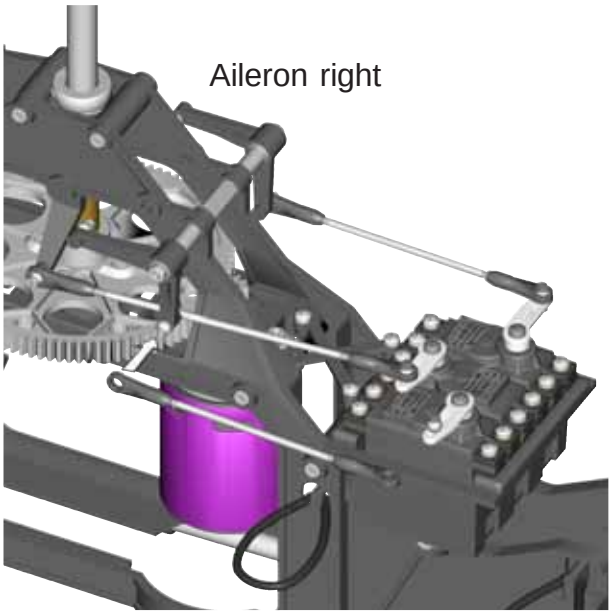




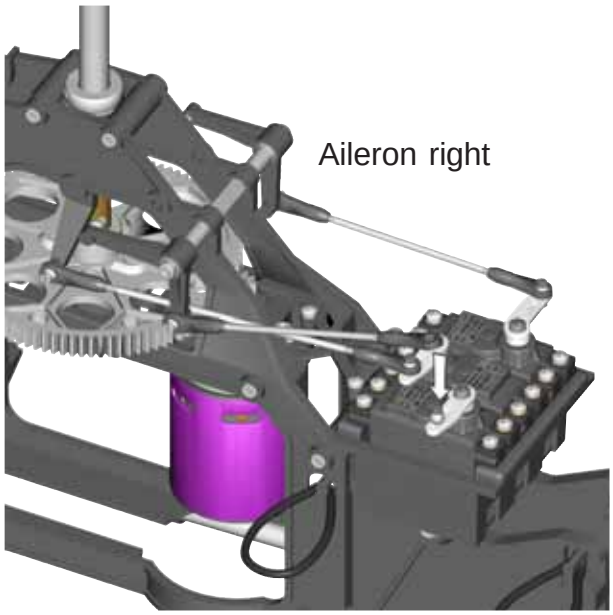
10.1 Elevator and Aileron Linkages



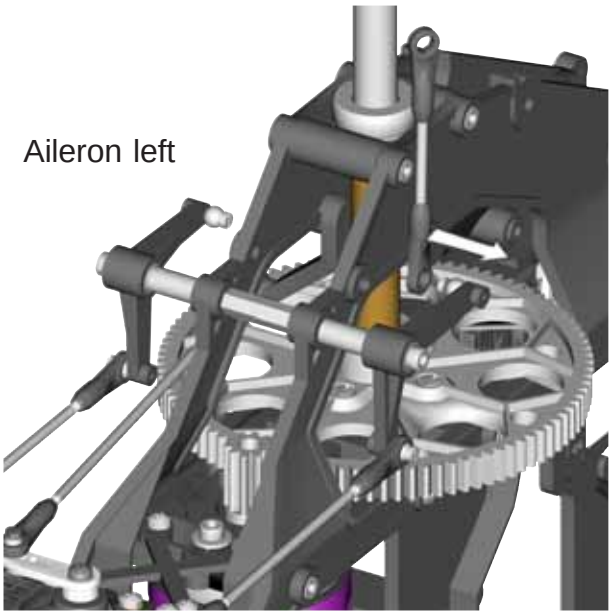
Aileron left



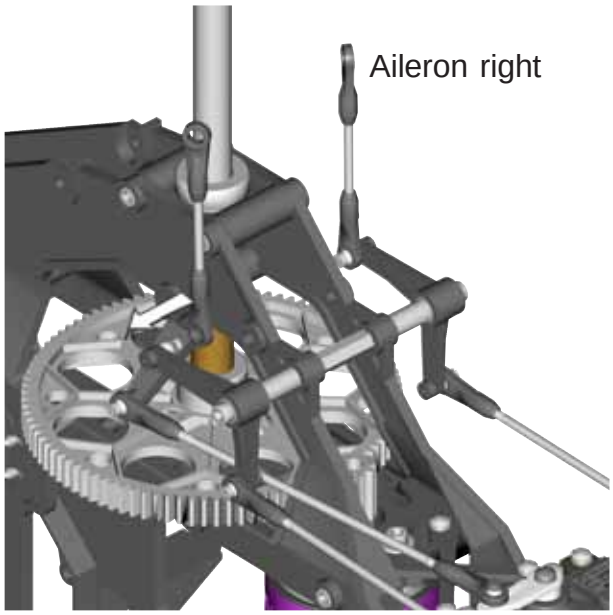
Aileron right



Aileron right

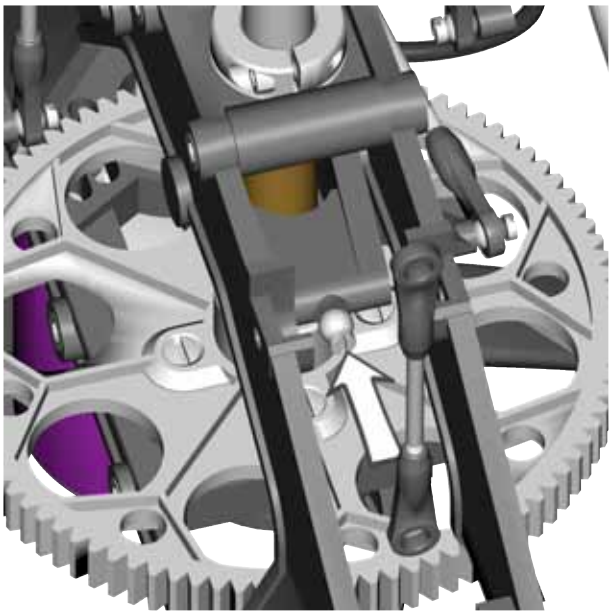


Aileron left



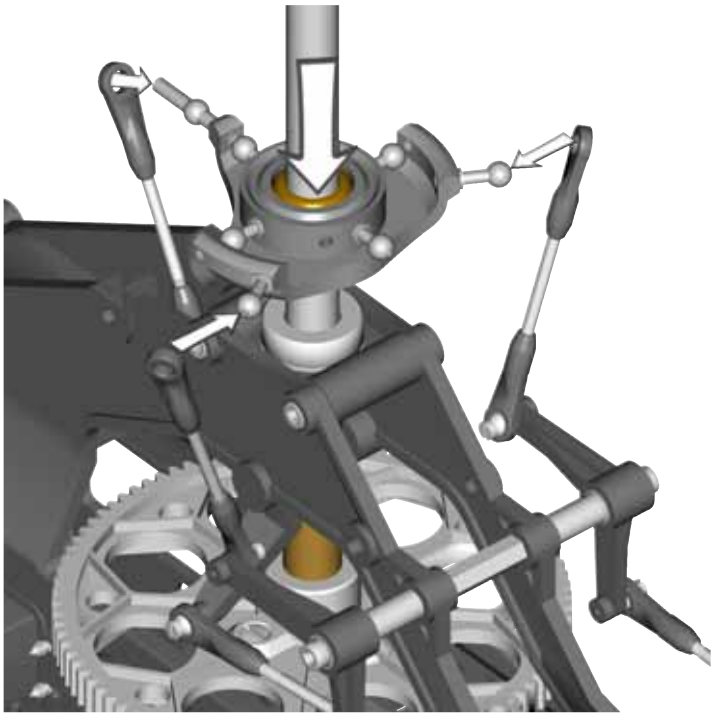
Aileron right

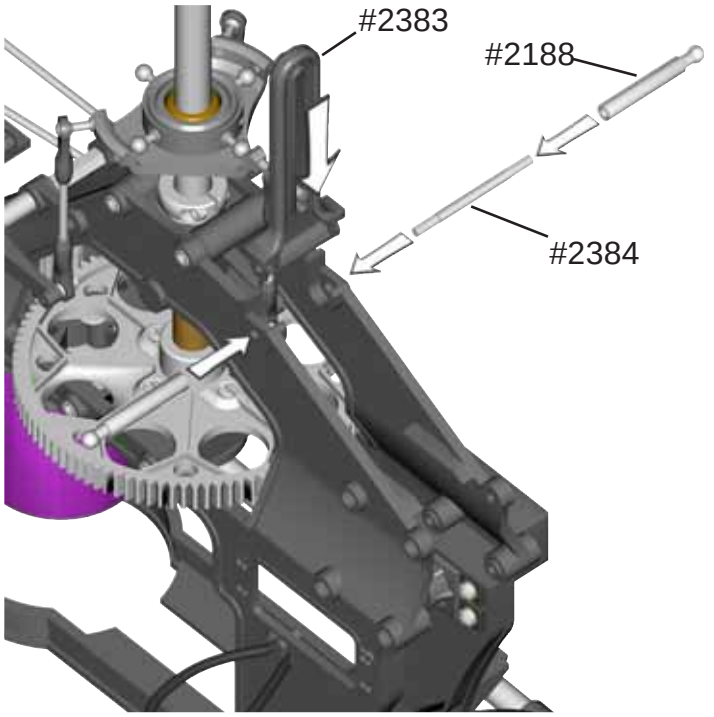
Elevator



11 Swashplate Guide Bracket

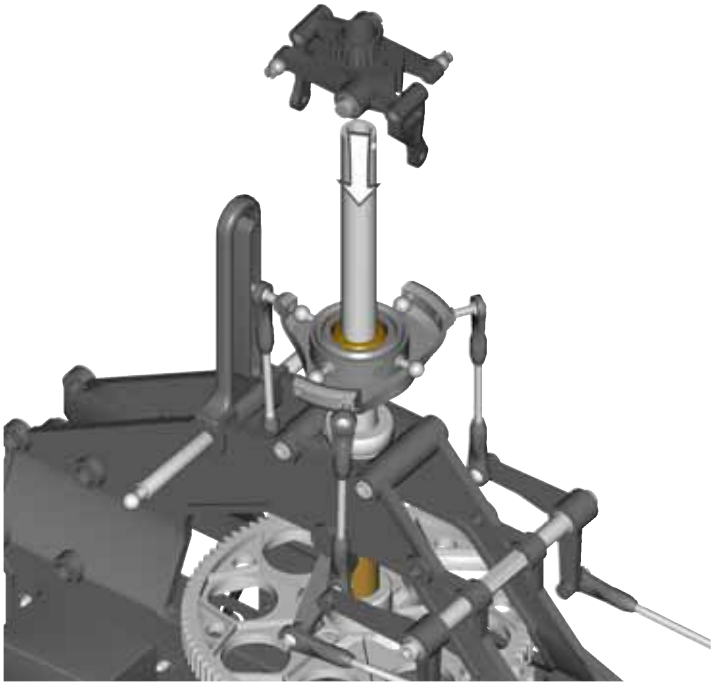
Bag 1 • Bag 12

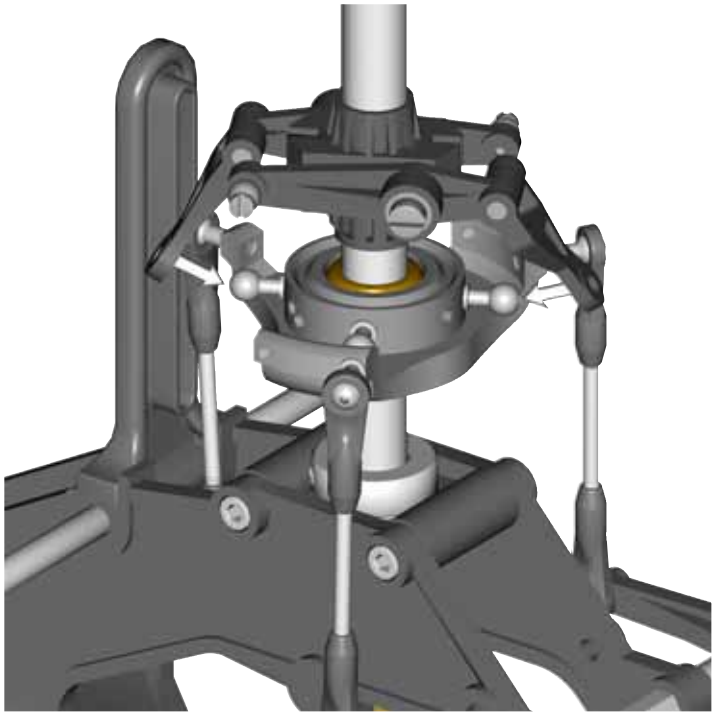




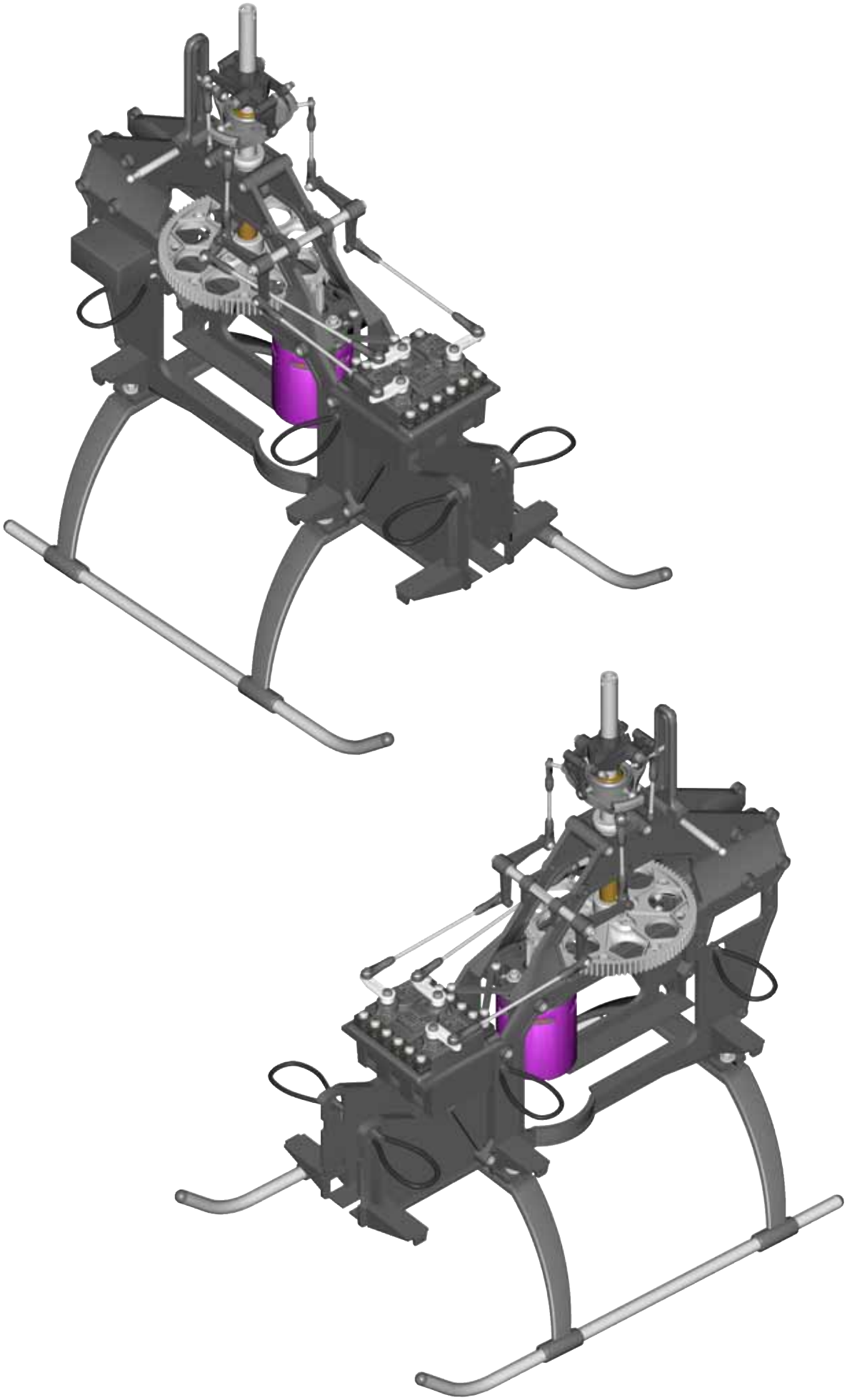
12 Installation of Wash-Out Hub

The wash-out hub must be able to move up/down easily on the rotor shaft.





13 Main Frame without Rotor Head

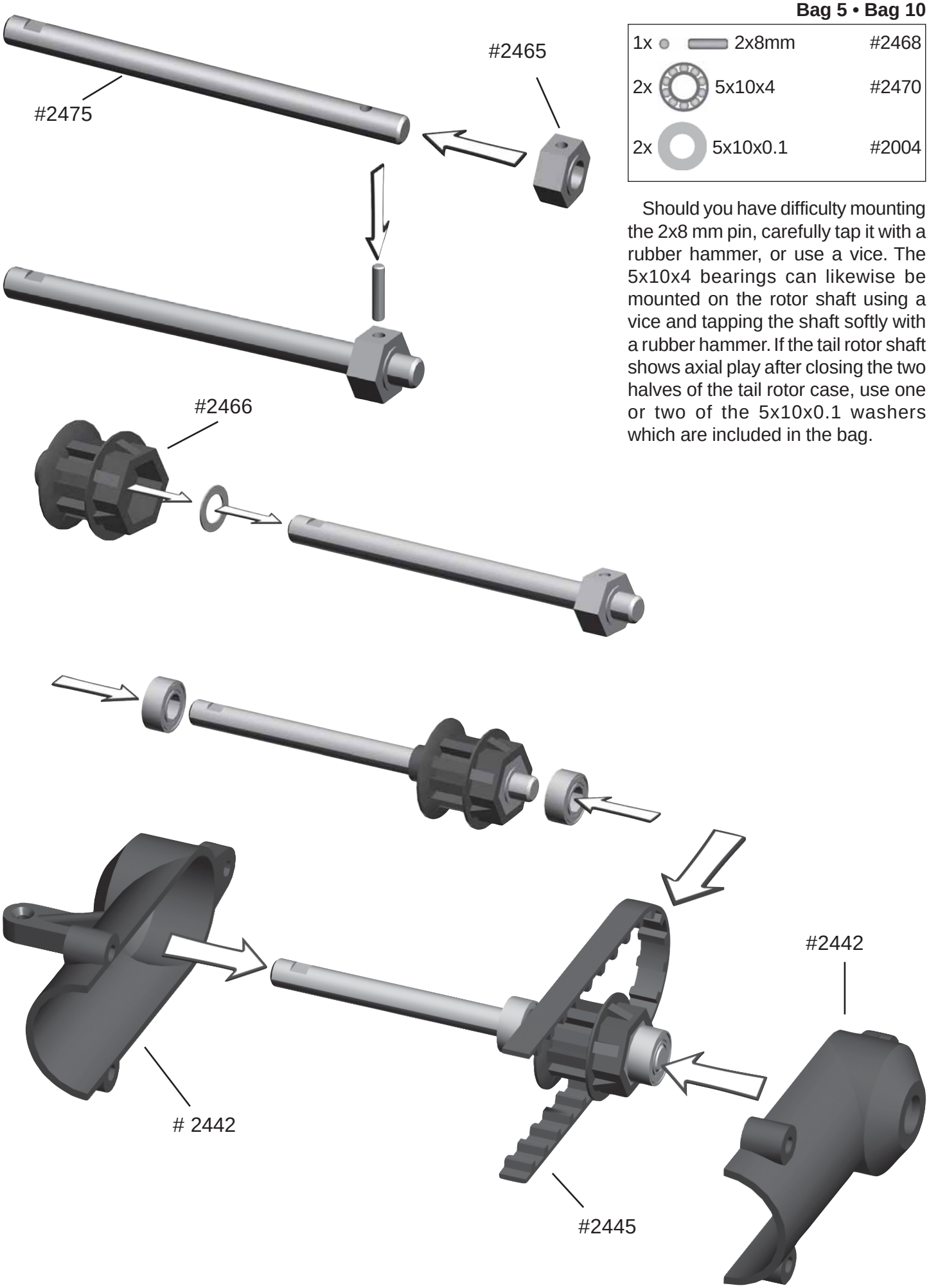


14.1 Tail Rotor Shaft

Bag 5 • Bag 10

1x	2x8mm	#2468
2x	5x10x4	#2470
2x	5x10x0.1	#2004

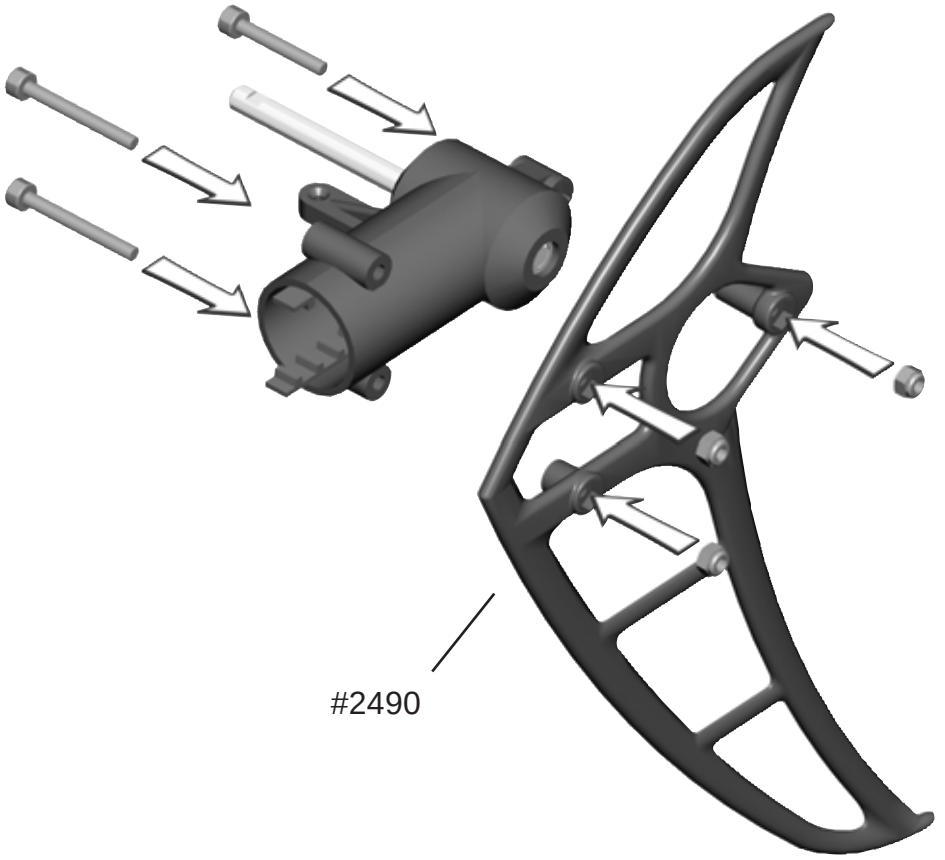
Should you have difficulty mounting the 2x8 mm pin, carefully tap it with a rubber hammer, or use a vice. The 5x10x4 bearings can likewise be mounted on the rotor shaft using a vice and tapping the shaft softly with a rubber hammer. If the tail rotor shaft shows axial play after closing the two halves of the tail rotor case, use one or two of the 5x10x0.1 washers which are included in the bag.



14.2 Vertical Fin

Bag 5 • Bag 12

2x	M3x25	#1958
1x	M3x20	#1957
3x	M3	#2074

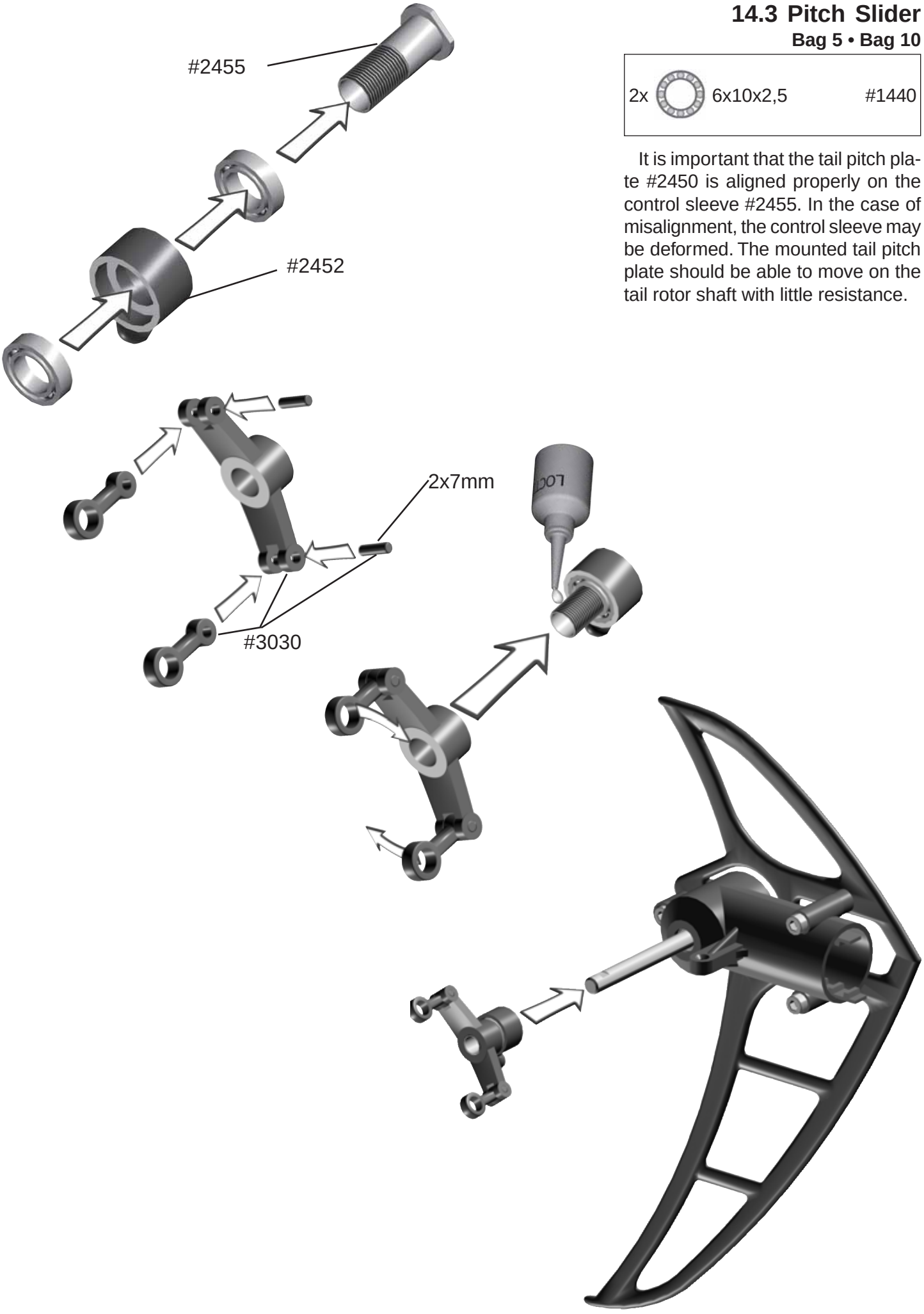


14.3 Pitch Slider

Bag 5 • Bag 10

2x	6x10x2,5	#1440

It is important that the tail pitch plate #2450 is aligned properly on the control sleeve #2455. In the case of misalignment, the control sleeve may be deformed. The mounted tail pitch plate should be able to move on the tail rotor shaft with little resistance.

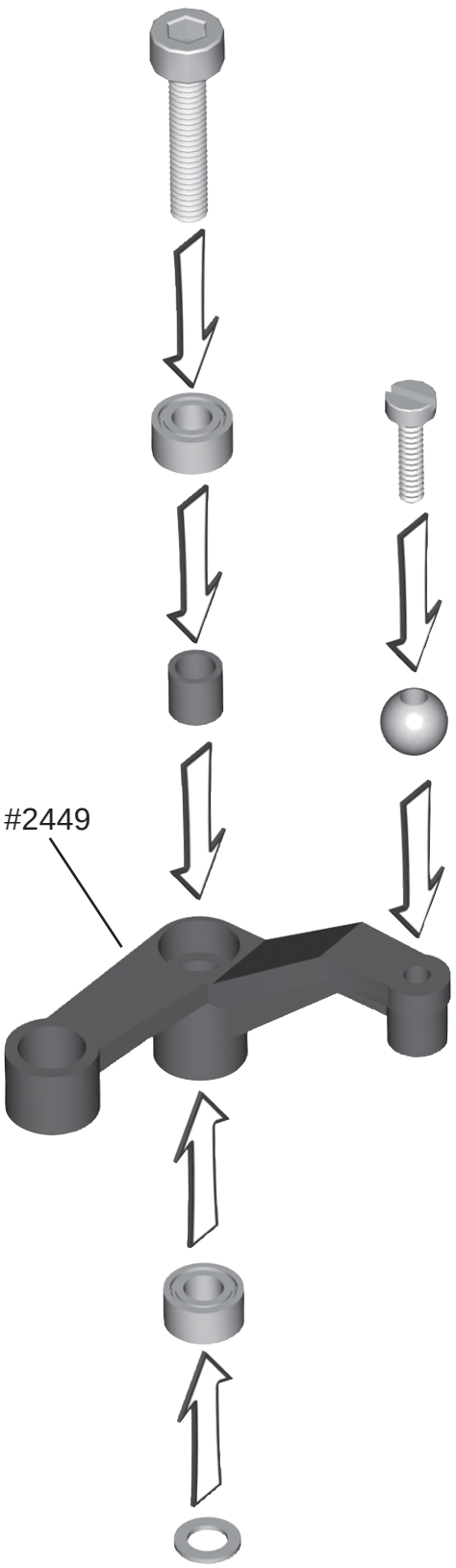


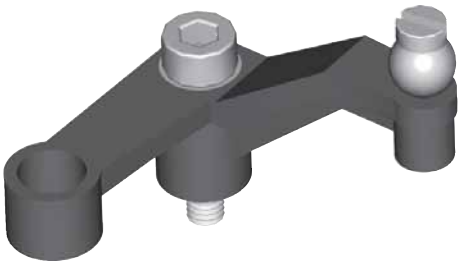
14.4 Tail Rotor Lever

Bag 5 • Bag 10 • Bag 12

2x	3x6x2,5	#2330
1x	M3x14	#1955
1x	M2x8	#1902
1x	Ø4,8 mm	#1570
1x	3x5x5	#2448
1x	3x5x0,5	#2002

The mounted tail rotor lever should be able to move with little resistance.

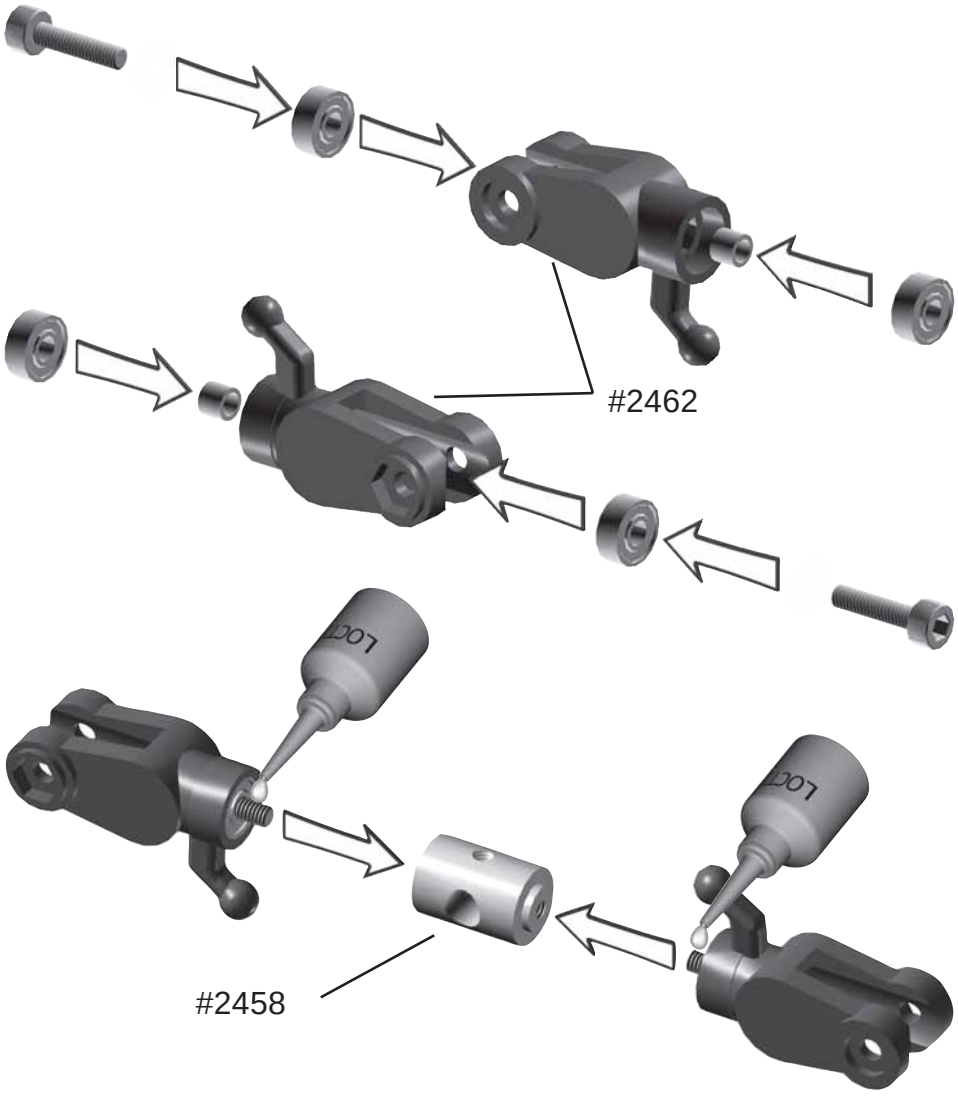


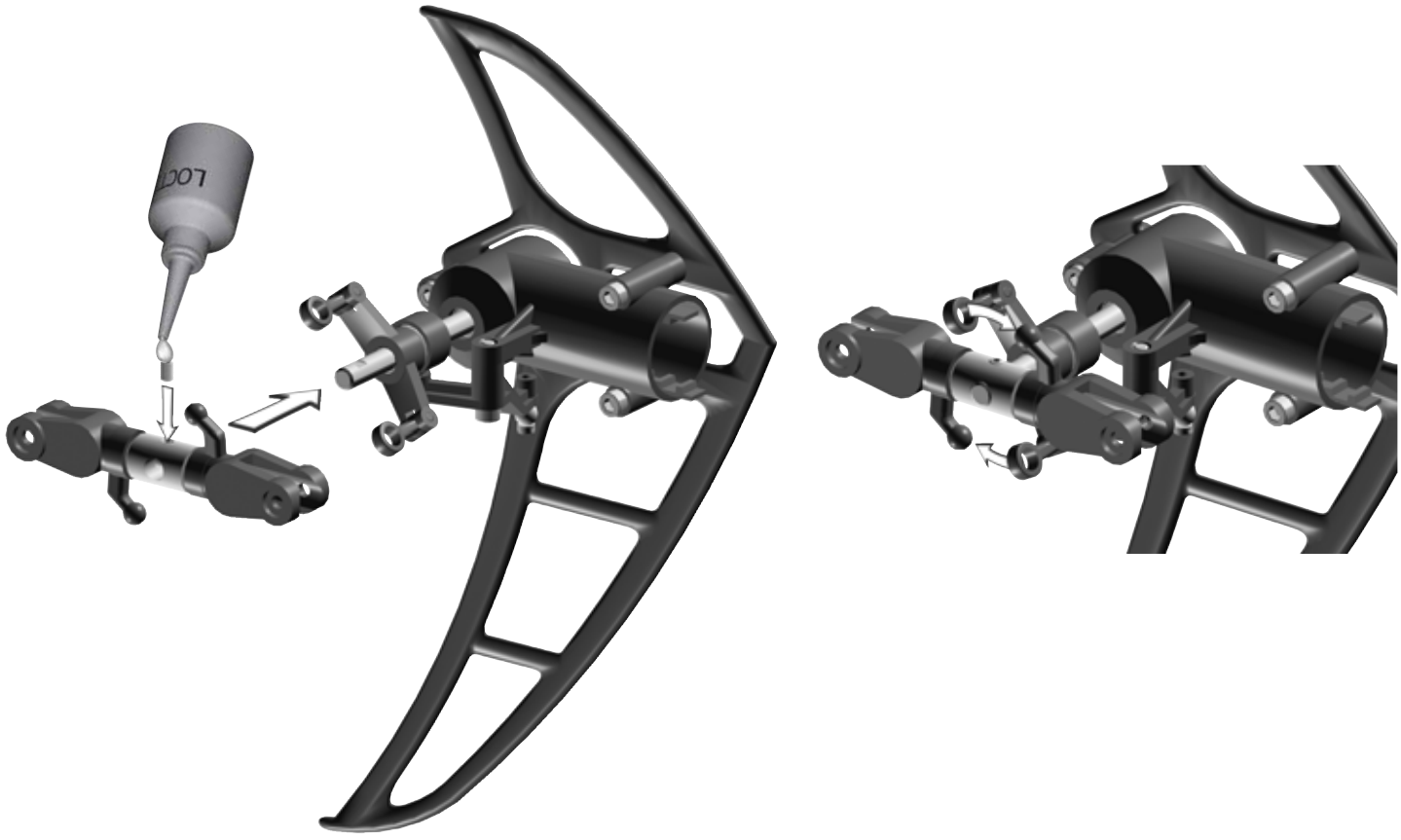


14.5 Tail Rotor Hub

Bag 5 • Bag 10 • Bag 12

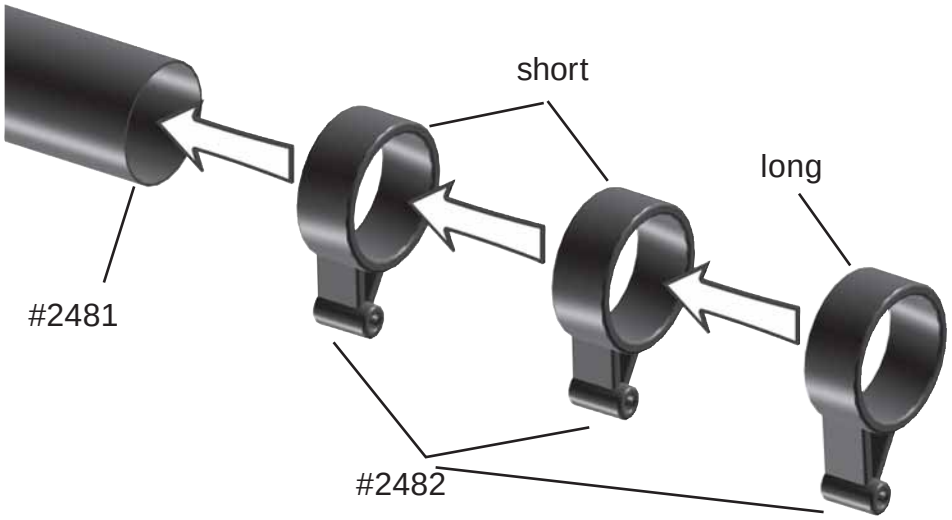
2x	M3x12	#1954
2x	3x5x2	#2463
4x	3x8x3	#2423
1x	M3x3	#1920



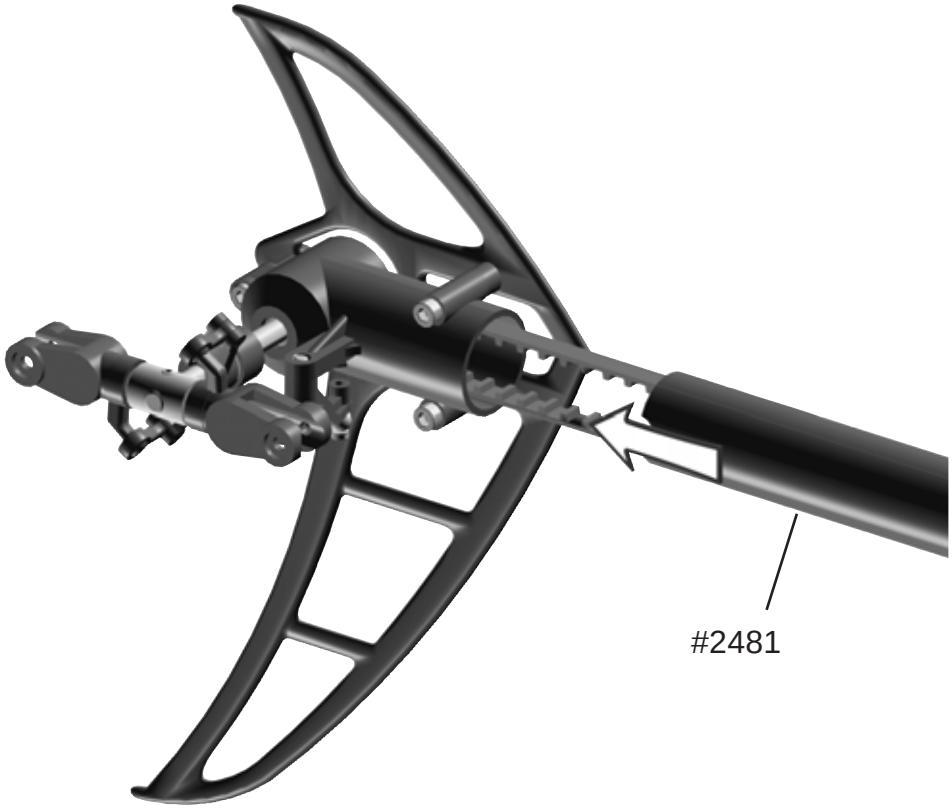


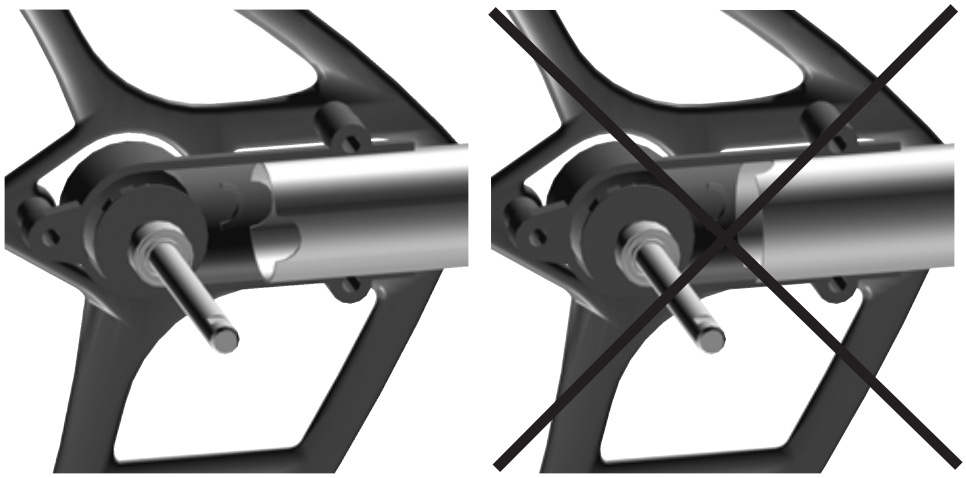
15.1 Tail Boom Assembly

Bag 6 • Bag 11



Note:There are two different sizes of tail rotor pushrods: Two are shorter in height than the third.

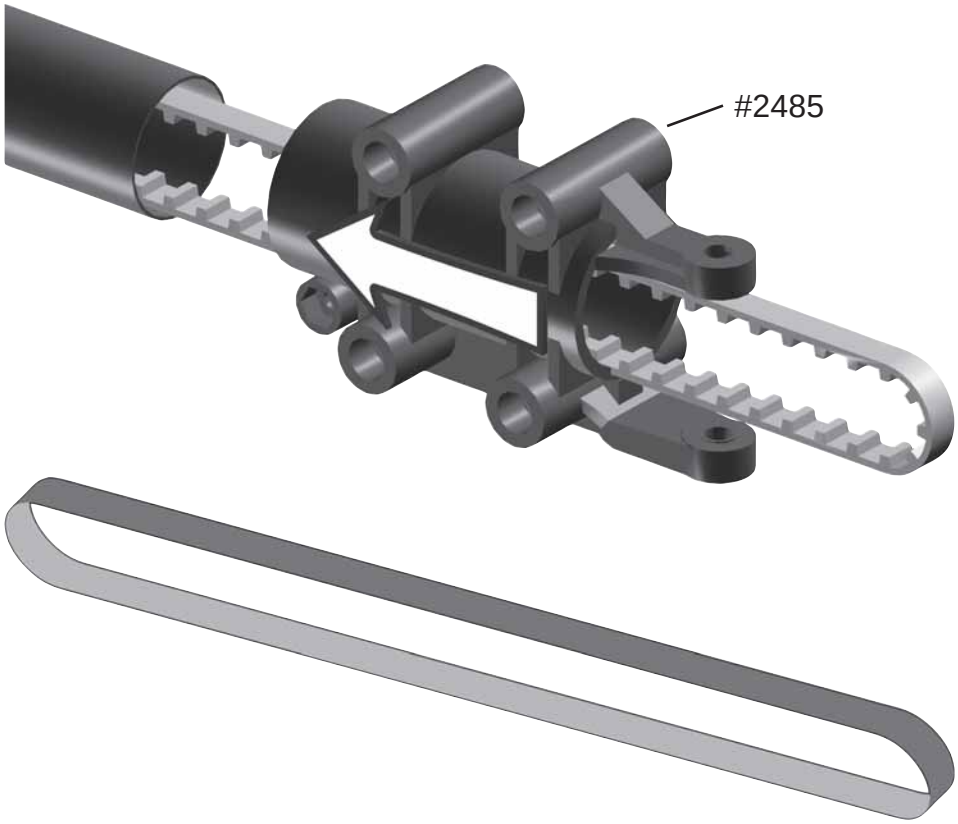


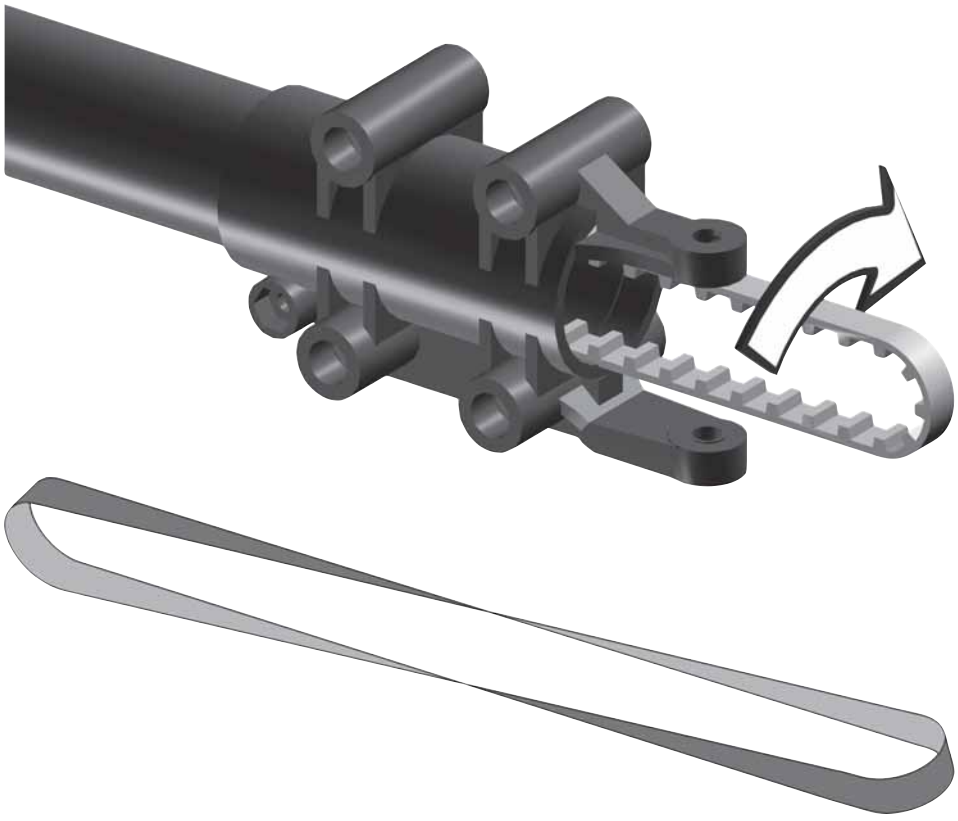


The tail boom has two round cutouts on one end. These should be fitted into the matching shapes in the tail rotor case.

15.2 Tail Boom Holder

Bag 6



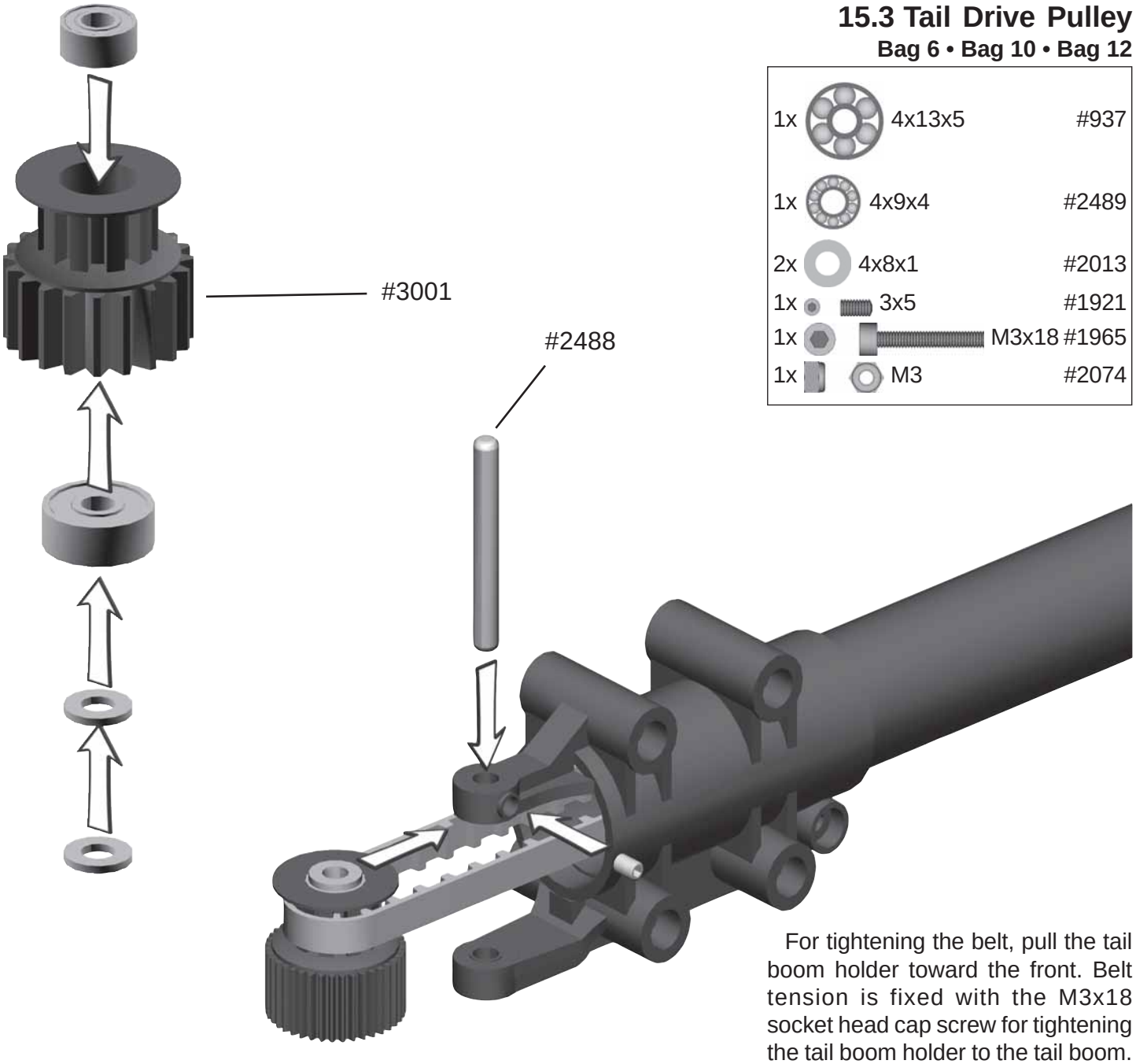


Turn the tail drive belt 90 degrees (clockwise).

15.3 Tail Drive Pulley

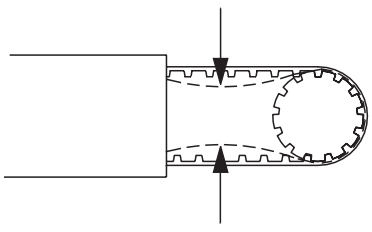
Bag 6 • Bag 10 • Bag 12

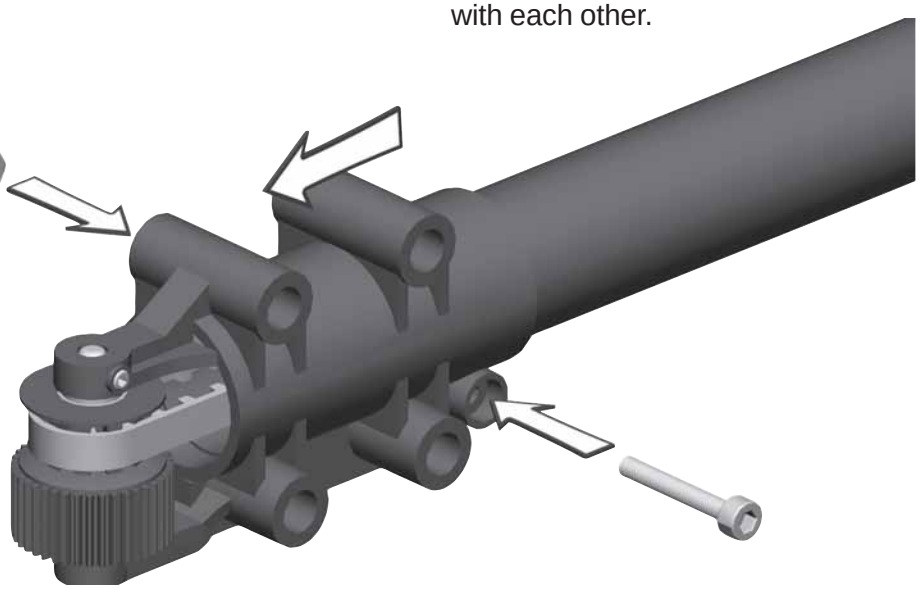
1x	4x13x5	#937
1x	4x9x4	#2489
2x	4x8x1	#2013
1x	3x5	#1921
1x	M3x18	#1965
1x	M3	#2074



For tightening the belt, pull the tail boom holder toward the front. Belt tension is fixed with the M3x18 socket head cap screw for tightening the tail boom holder to the tail boom. The belt should be tight. When pressing with your fingers, both sides of the belt should not come in contact with each other.

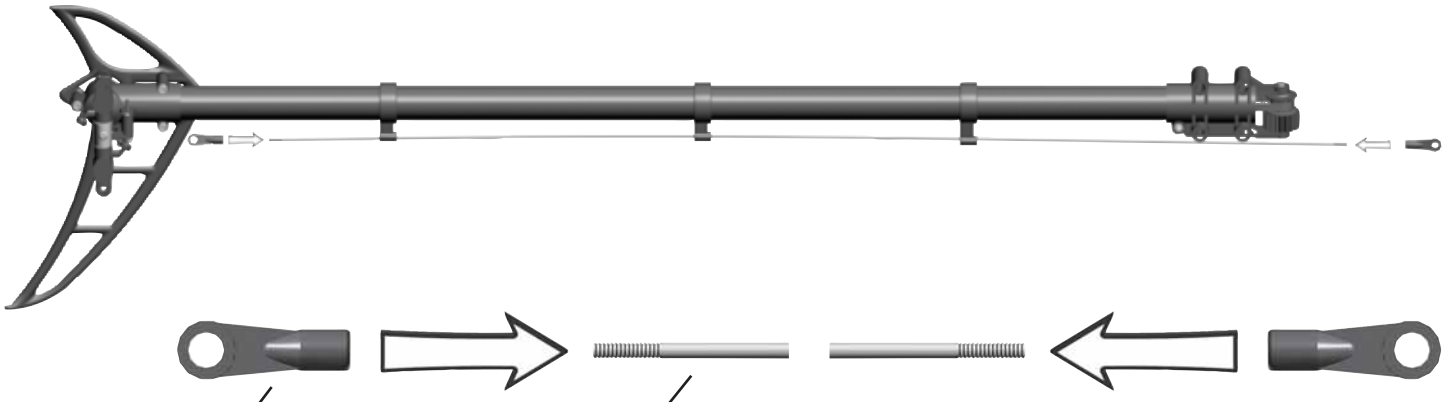
Important: Check belt tension prior to every flight. Incorrect belt tension can cause disturbances for your model R/C system. Incorrect belt tension can lead to a situation where you lose control of the tail rotor of your helicopter.





15.4 Tail Control Rods

Bag 11 • Bag 12



#1560

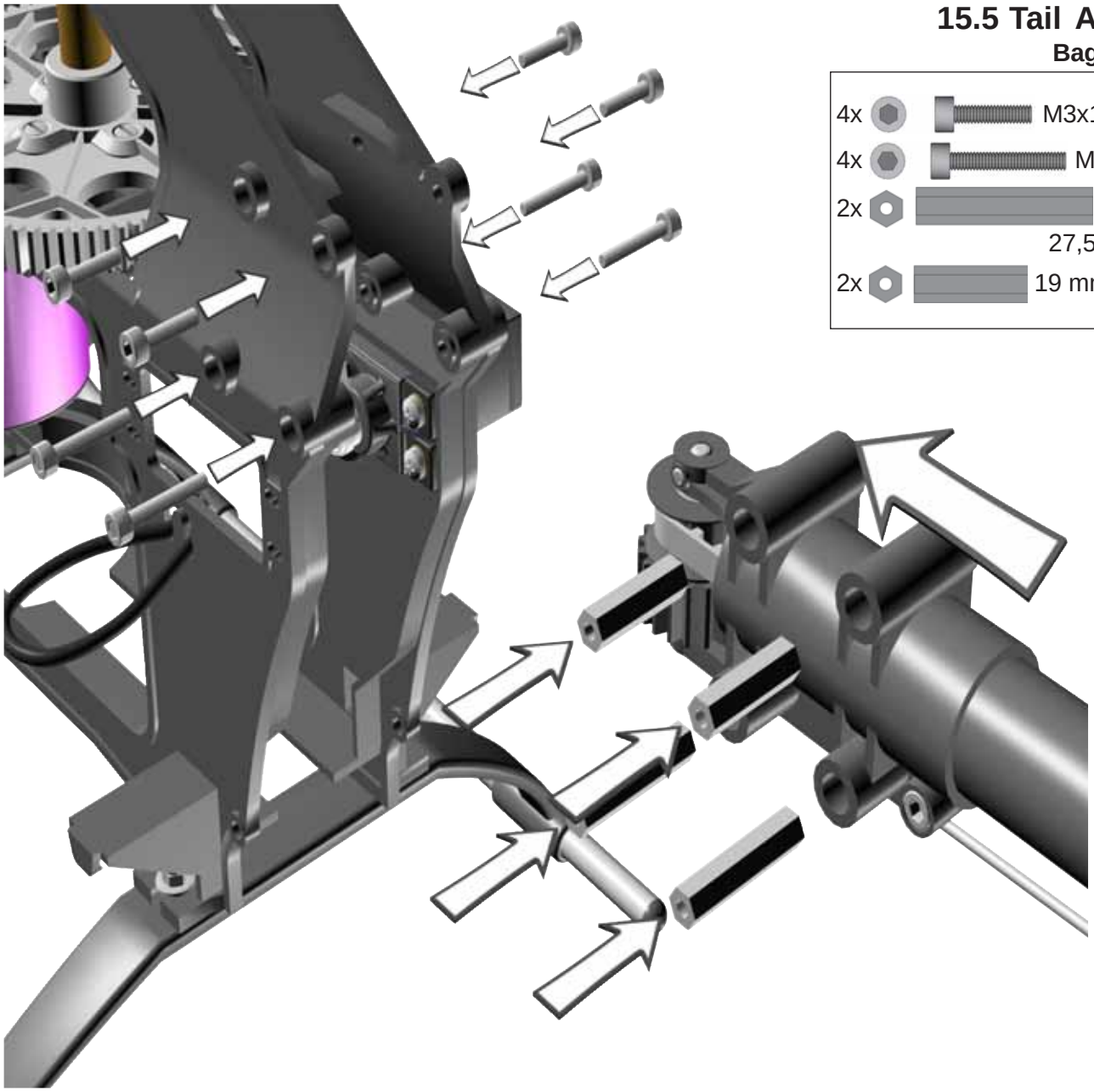
#2484

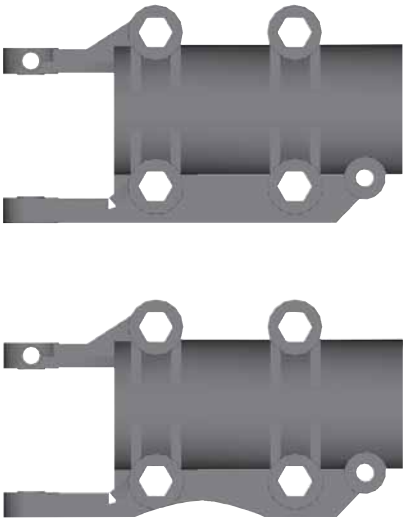
Screw the two 2 mm ball links onto the control rods. Their exact positions are of no importance at this point. The ball ends are attached to the balls more easily when the text on them is pointed away from the helicopter.

15.5 Tail Assembly

Bag 6 • Bag 12

4x	M3x12	#1954
4x	M3x18	#1965
2x	27,5 mm	#2370
2x	19 mm	#2370



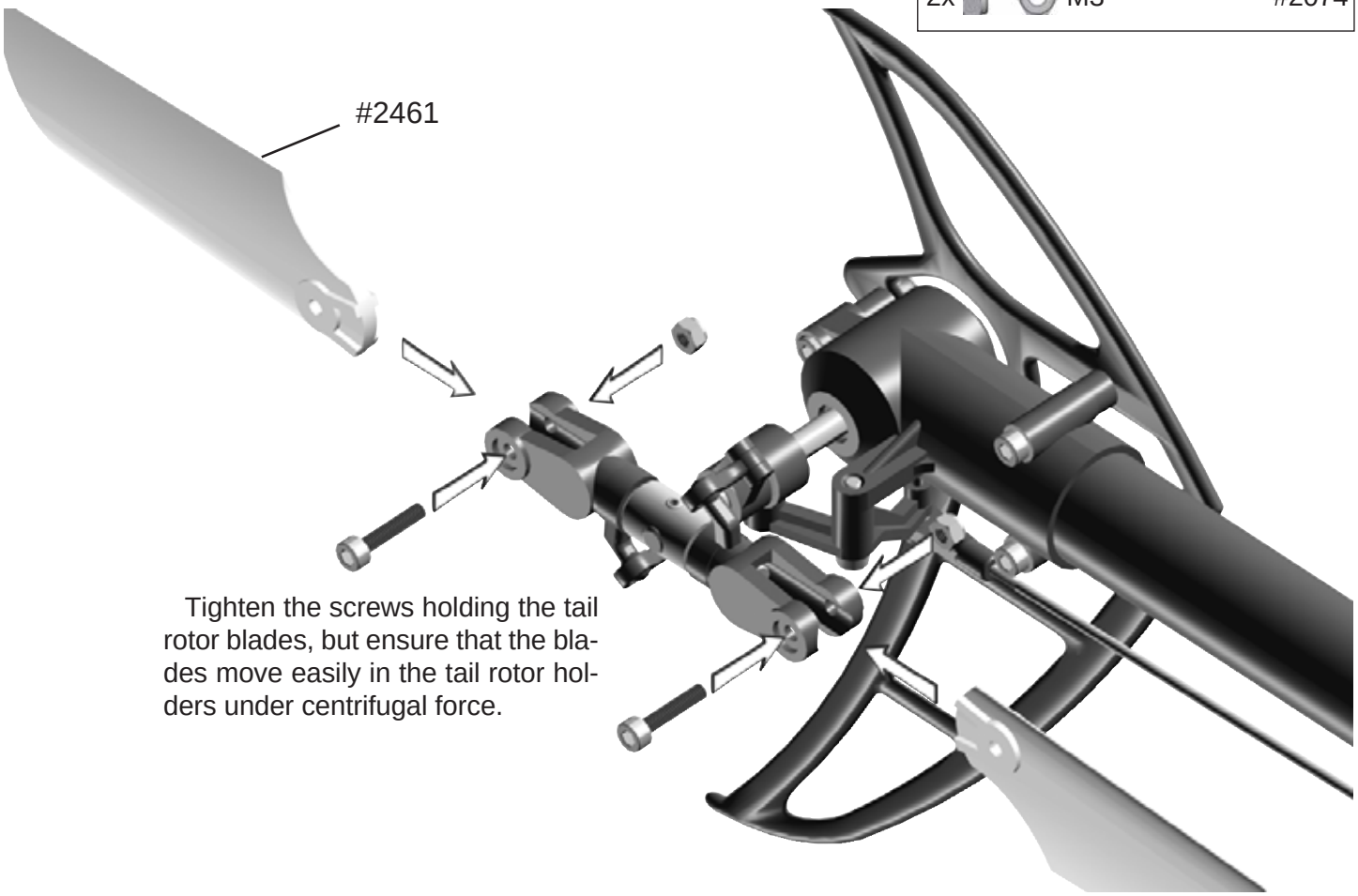


If you wish to use longer servo arms, it is necessary that you take away some material from the bottom surface of the tail boom holder.

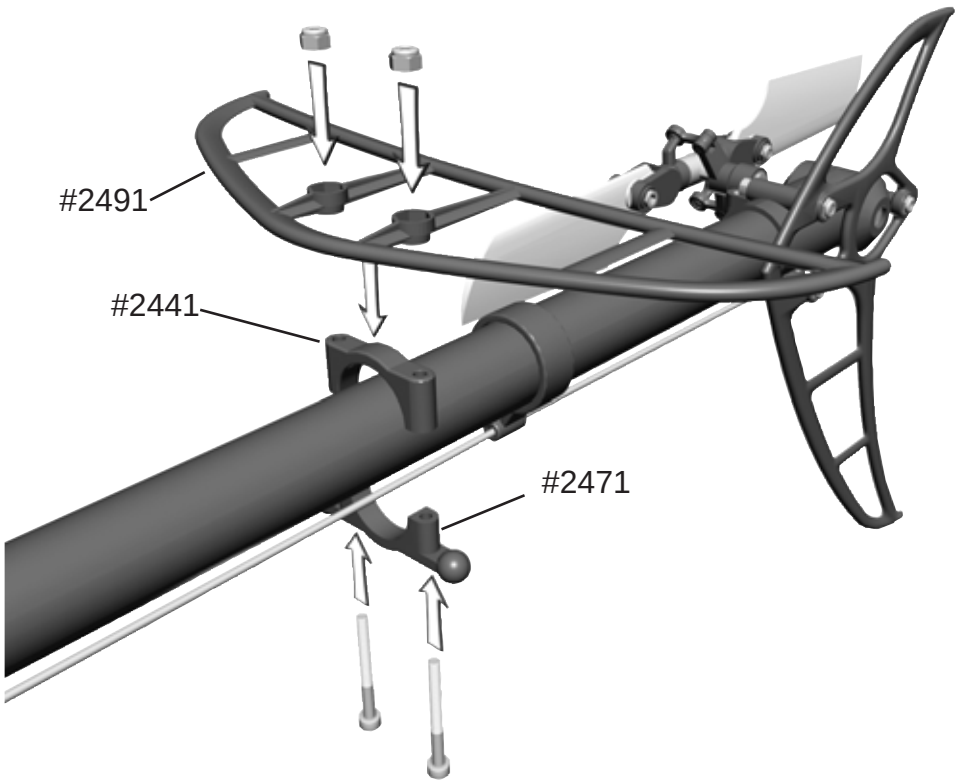
15.6 Tail Rotor Blades

Bag 5 • Bag 12

2x	M3x14	#1955
2x	M3	#2074



Tighten the screws holding the tail rotor blades, but ensure that the blades move easily in the tail rotor holders under centrifugal force.



15.7 Horizontal Fin

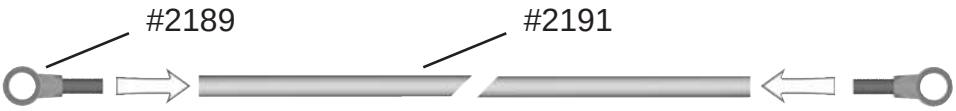
Bag 6 • Bag 12

2x	M3x25	#1958
2x	M3	#2074

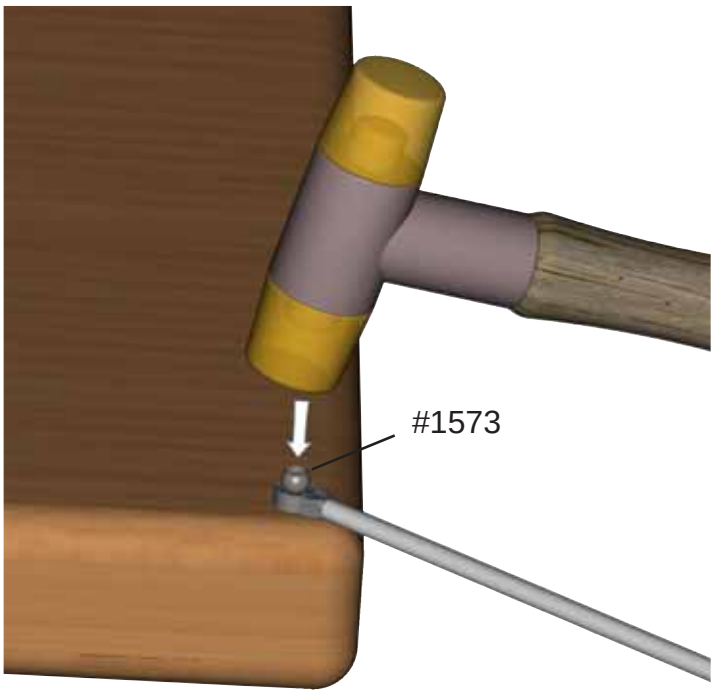
Avoid overtightening the M3x18 mm socket head cap screws when drilling them into the plastic frame. Mount the horizontal stablilizer perpendicular to the vertical fin.

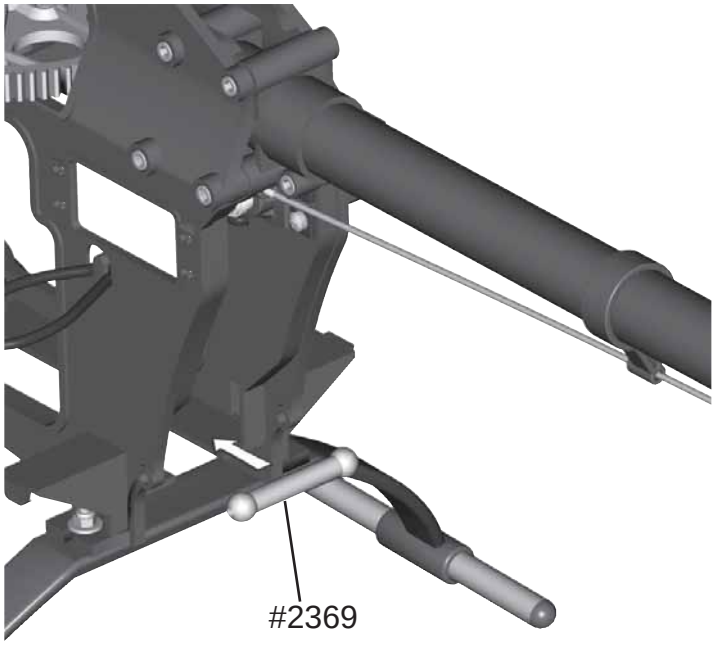
15.8 Tail Boom Brace

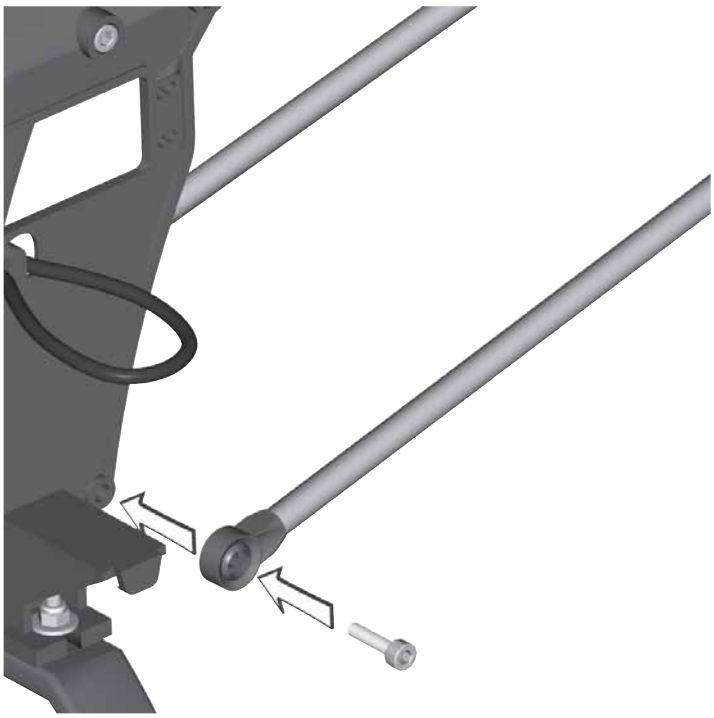
Bag 6 • Bag 11 • Bag 12

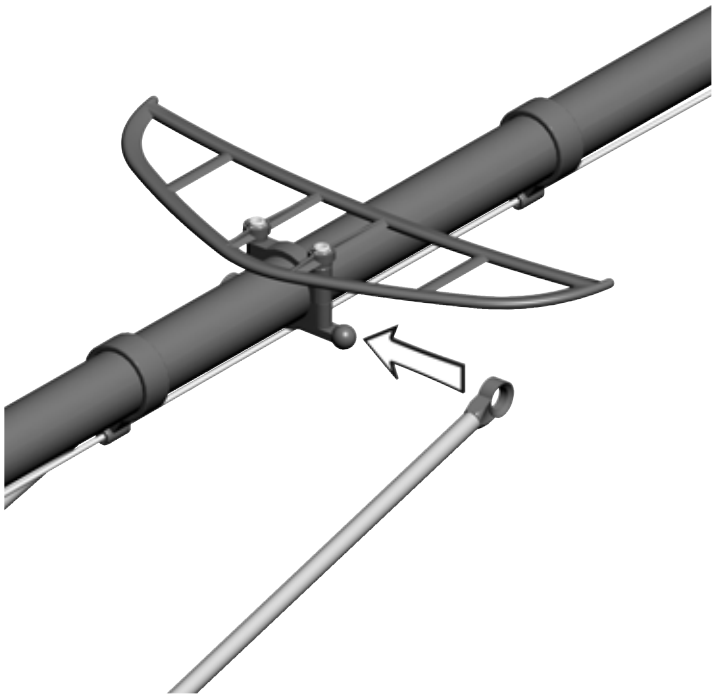


2x M3x12 #1954

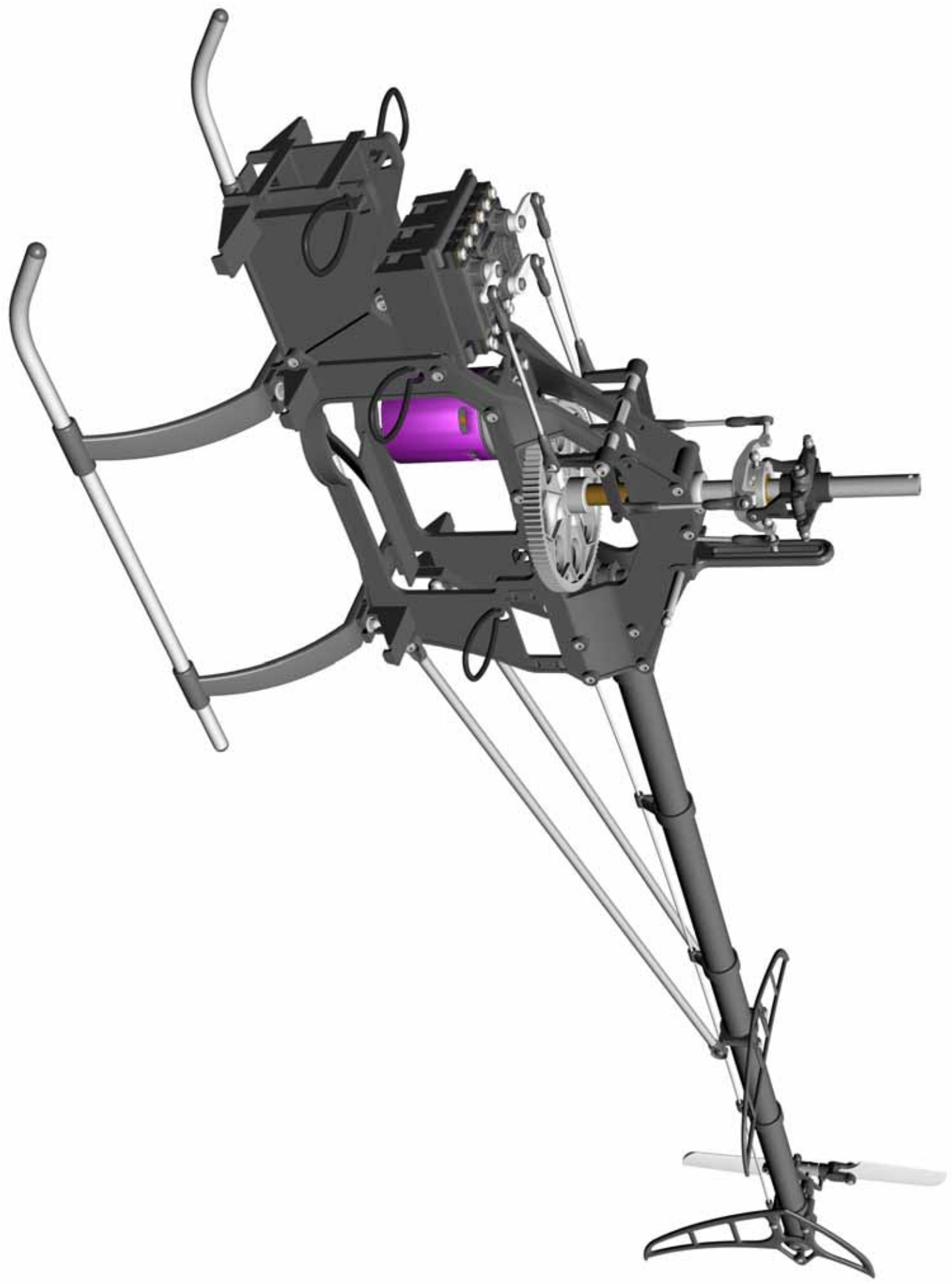








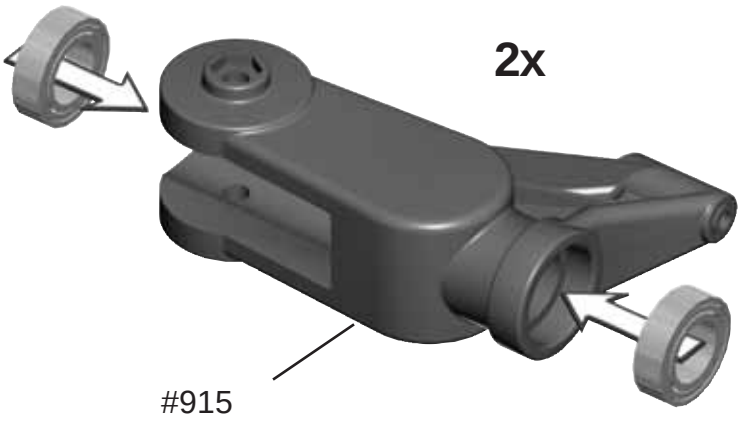
16 Finished Main Frame & Tail Boom



17.1 Blade Grips

Bag 7 • Bag 10

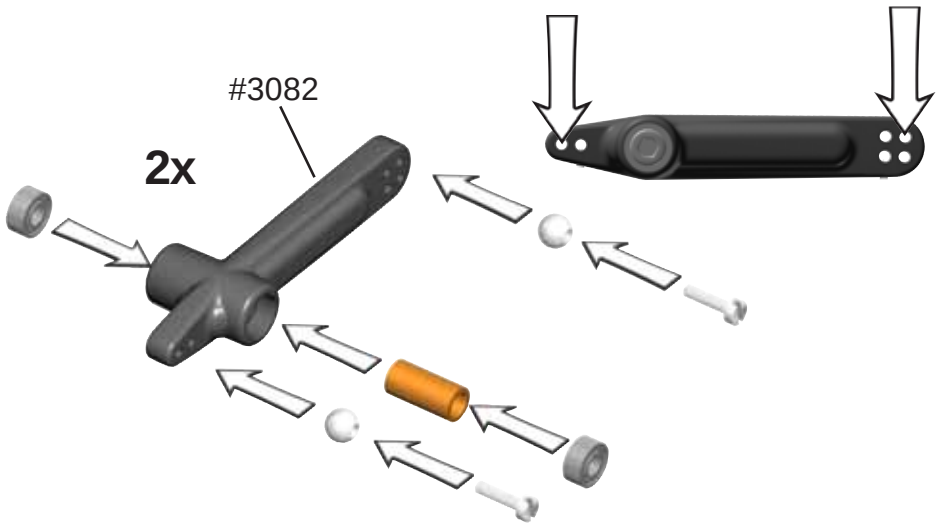
4x	8x16x5	#954

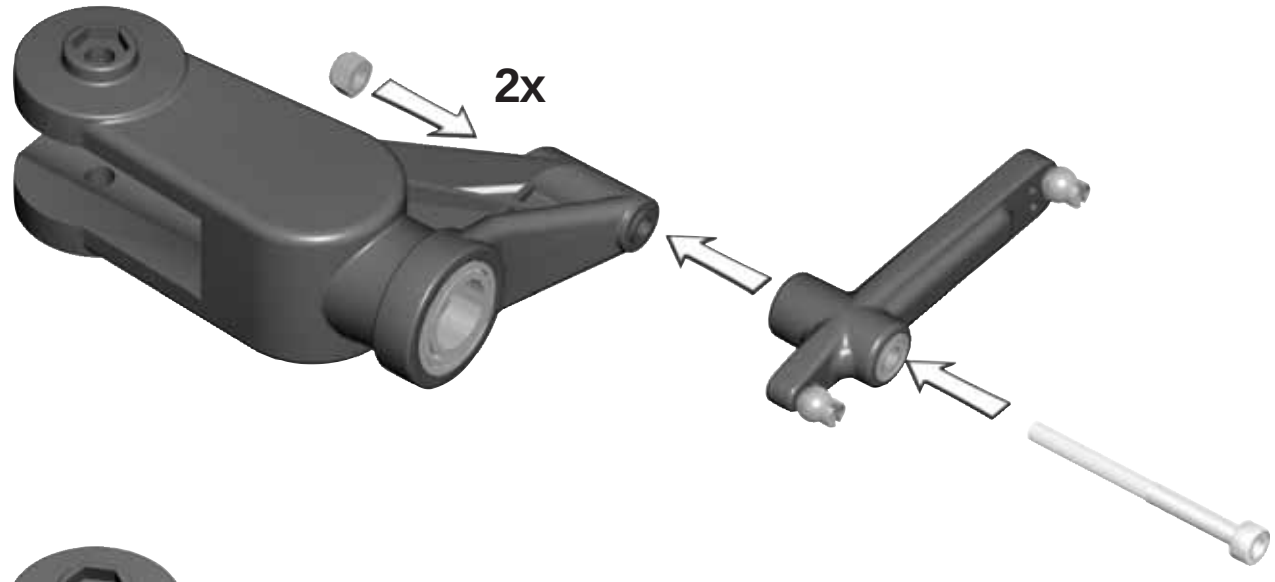


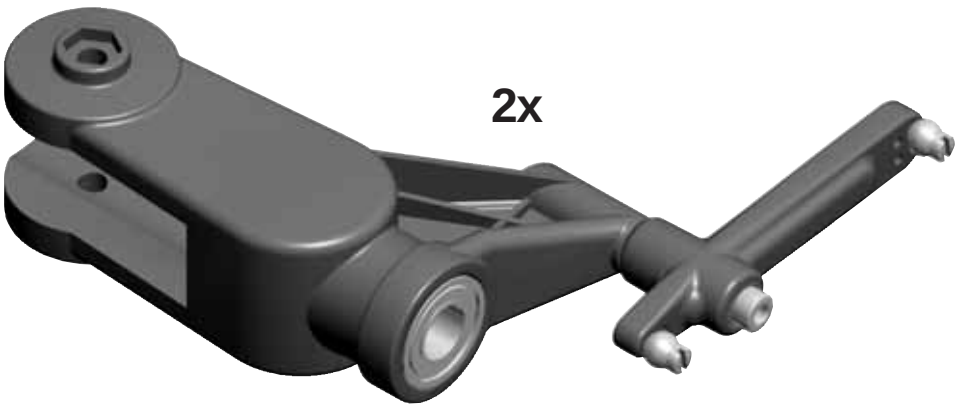
17.2 Mixing Arms

Bag 7 • Bag 12

4x	3x7x3	#930
2x	3x5x12	#3090
4x	Ø4,8 mm	#1570
4x	M2x8	#1902
2x	M3x35	#1961
4x	M3 Stopp	#2074



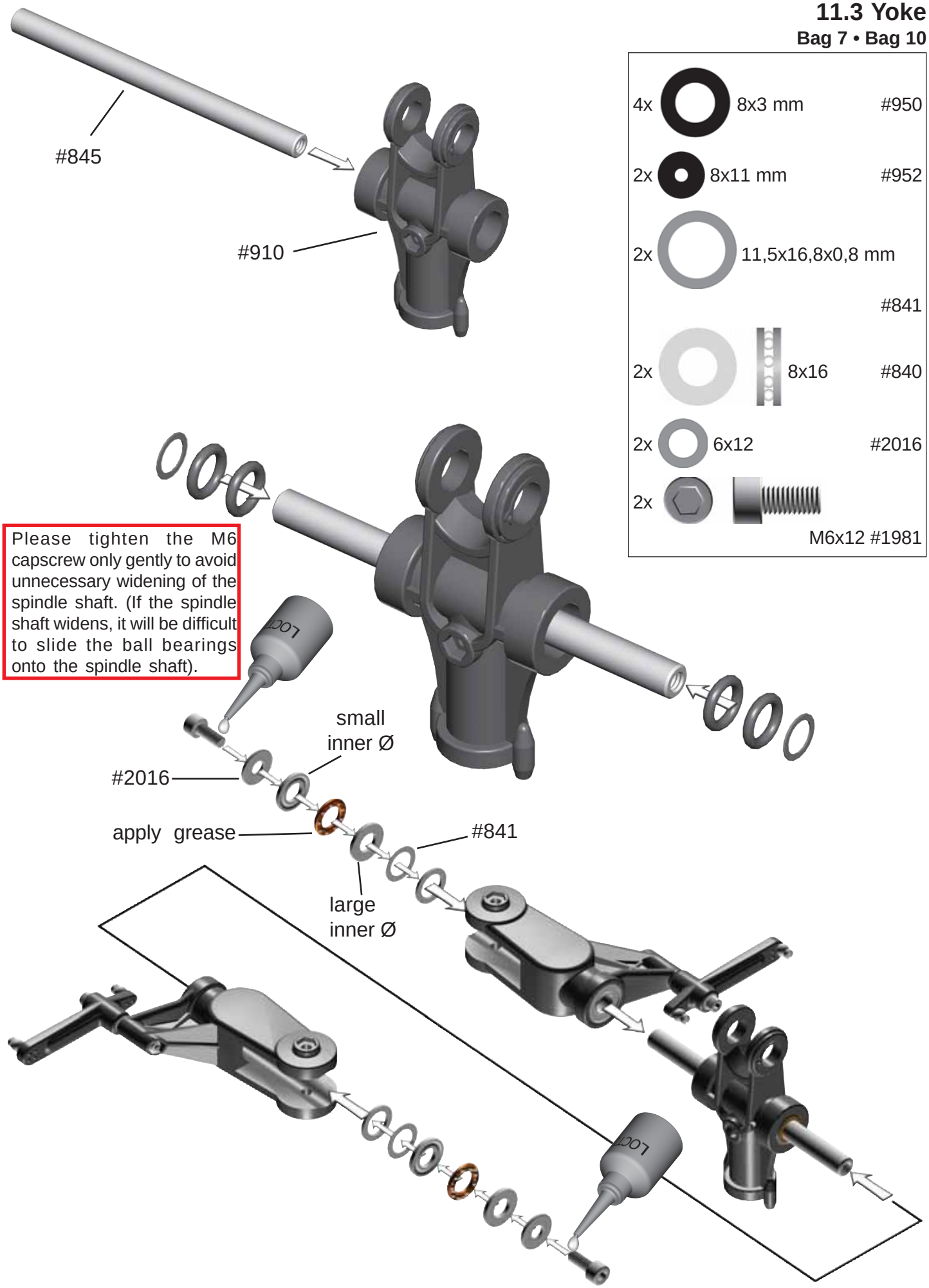




11.3 Yoke

Bag 7 • Bag 10

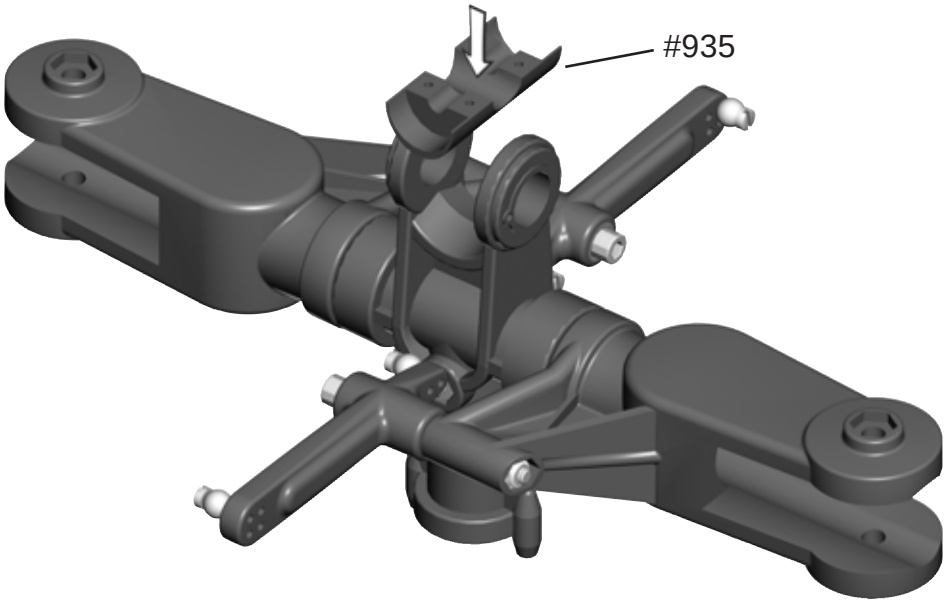
4x	8x3 mm	#950
2x	8x11 mm	#952
2x	11,5x16,8x0,8 mm	#841
2x	8x16	#840
2x	6x12	#2016
2x	M6x12	#1981

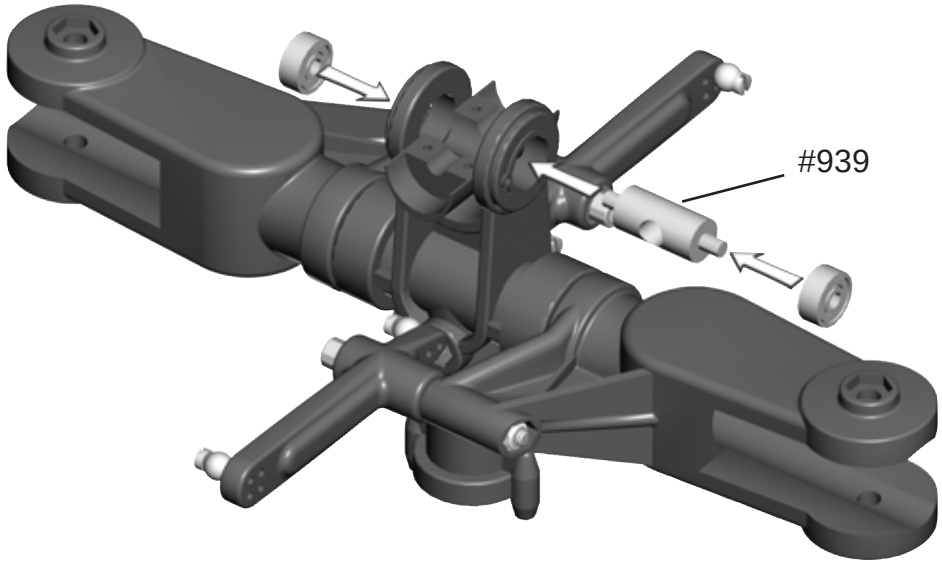


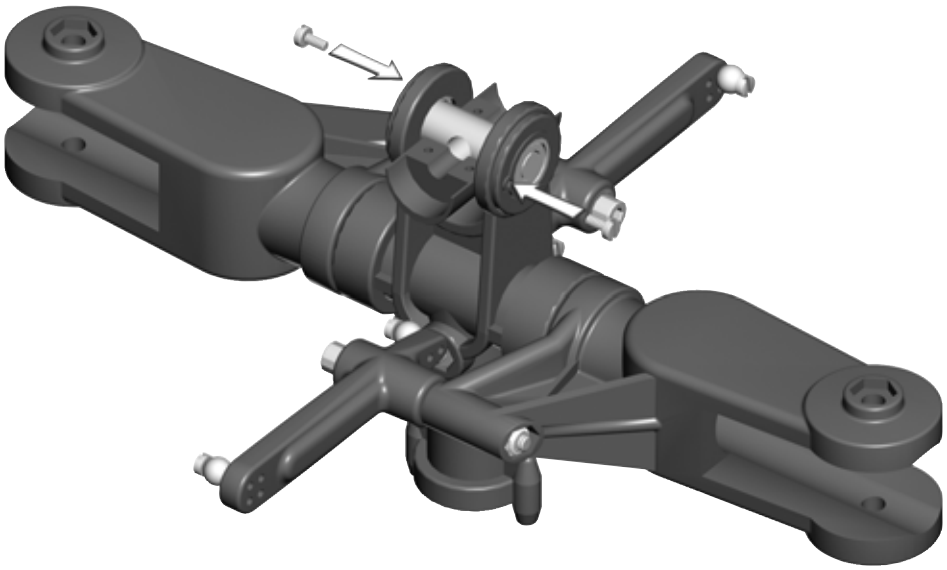
17.4 Seesaw

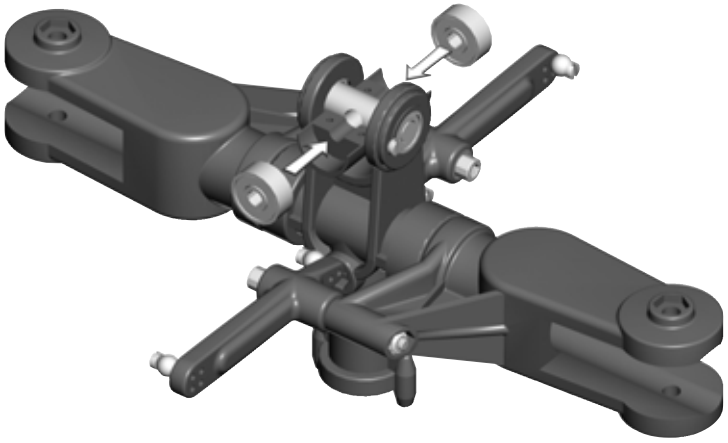
Bag 7 • Bag 10 • Bag 12

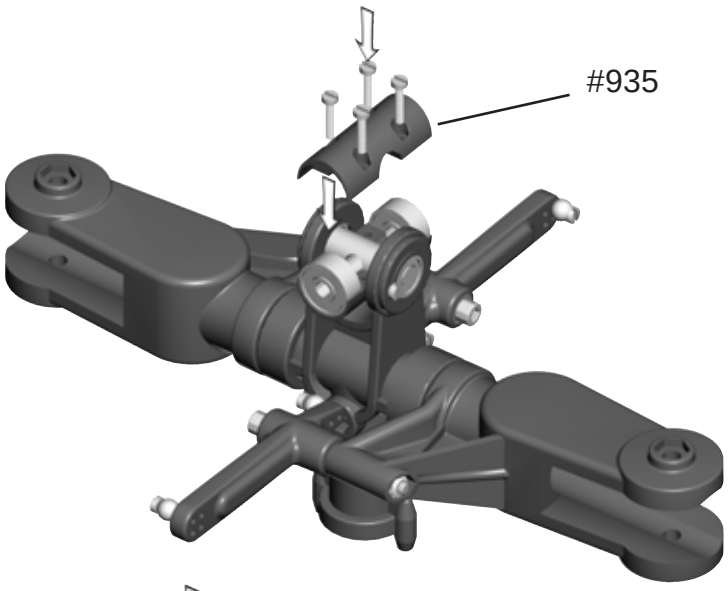
2x	4x13x5	#937
2x	4x10x4	#726
4x	M2x8	#1902
2x	M2x3	#1900

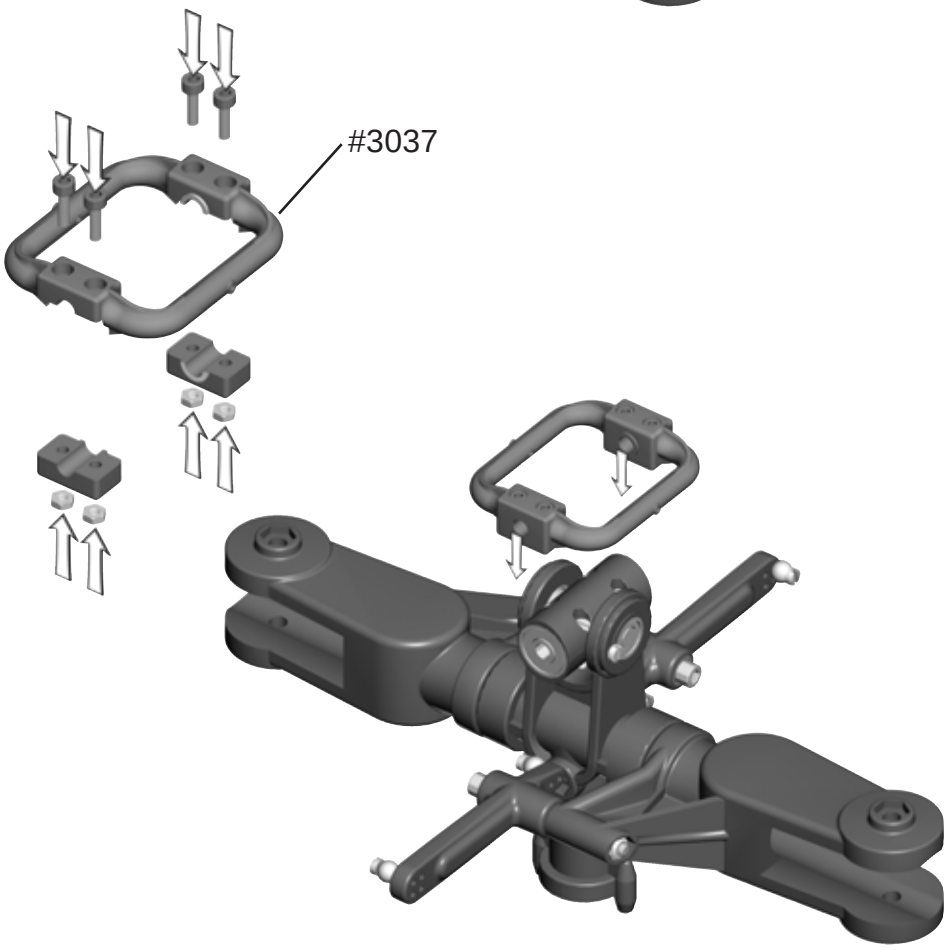












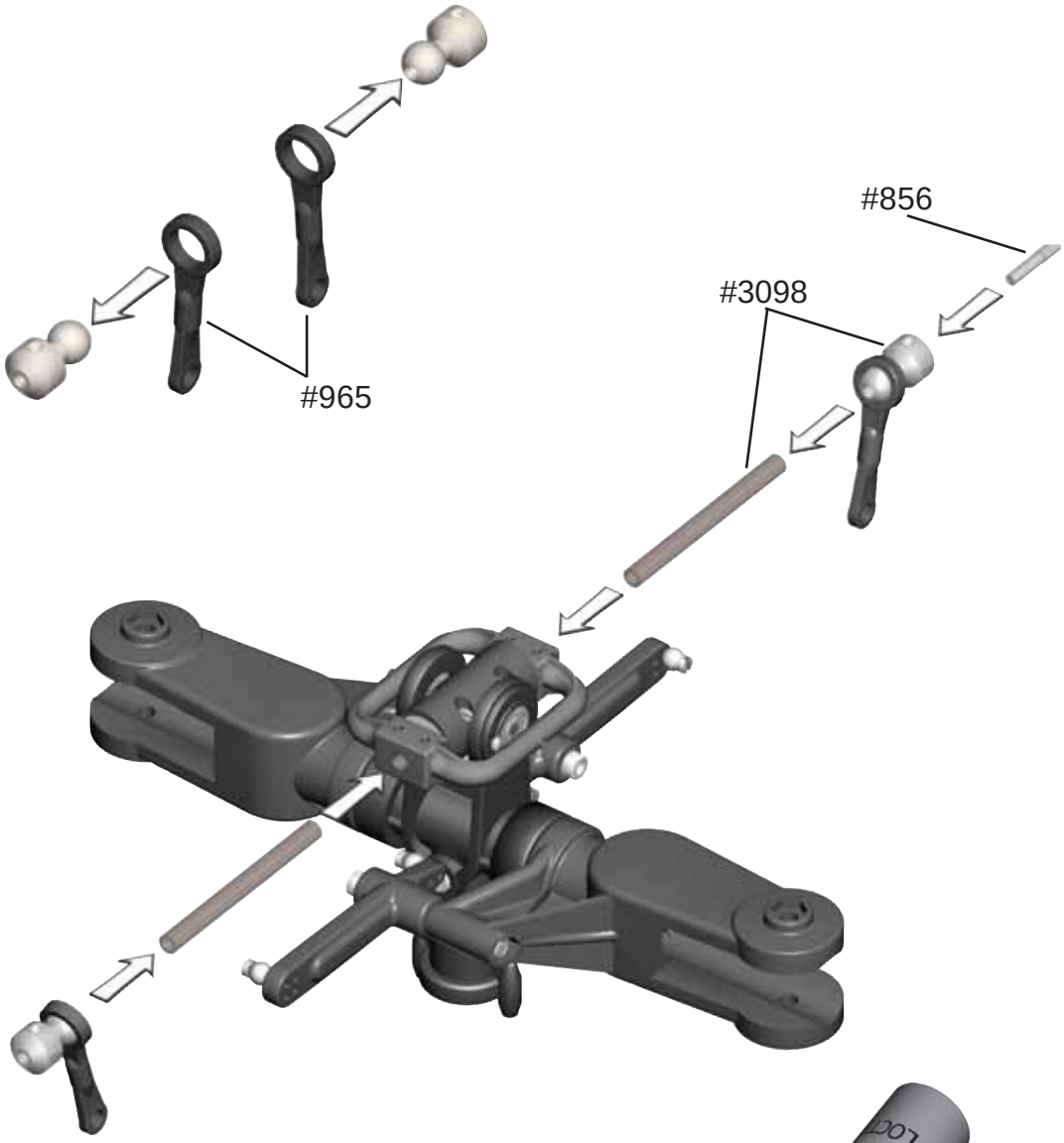
17.5 Flybar Control Bridge

Bag 7 • Bag 10

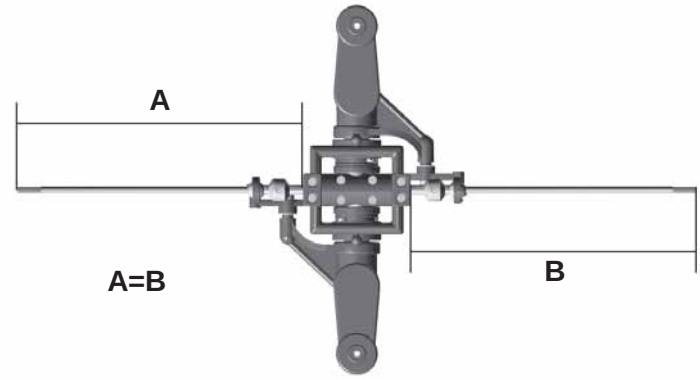
4x	M2x10	#1939
4x	M2	#2070

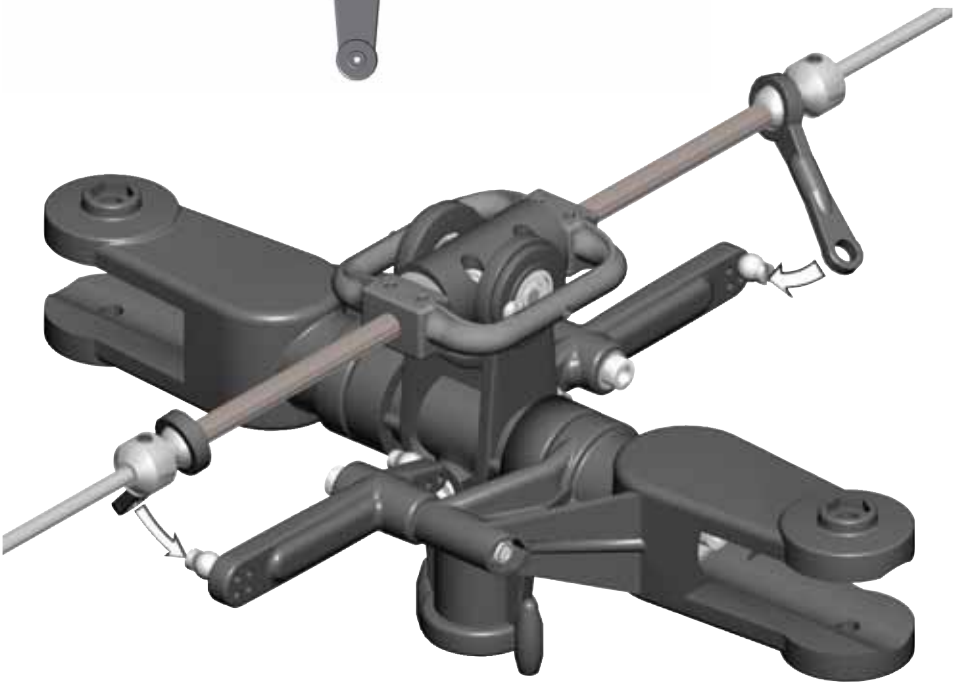
17.6 Flybar

Bag 7 • Bag 11



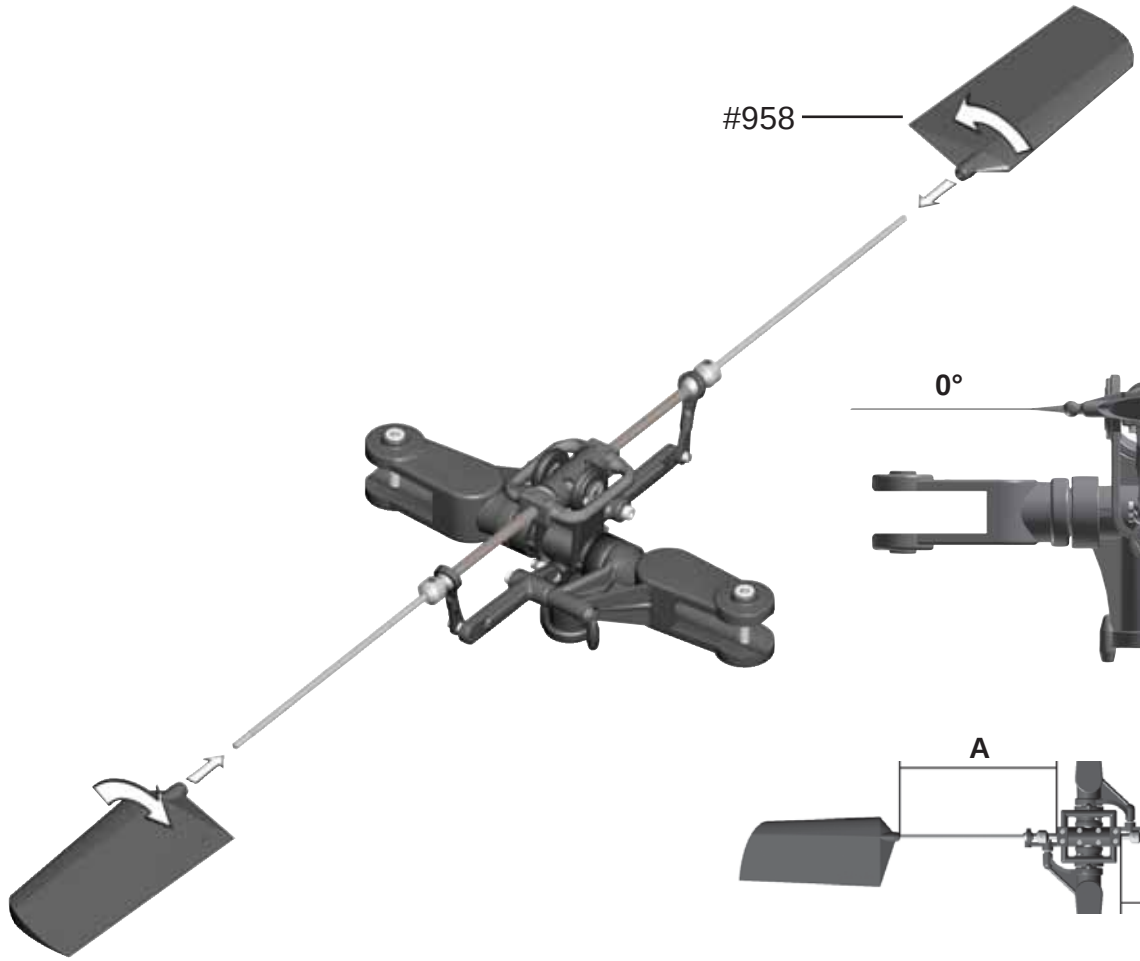
2x	M3x3	#1920





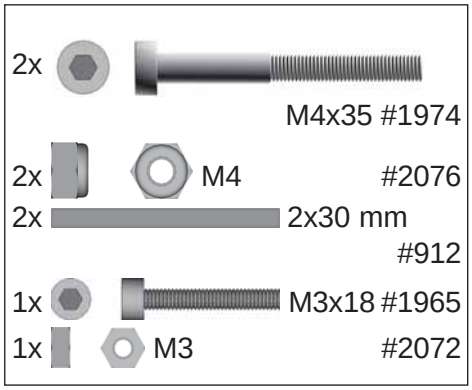
17.7 FlybarPaddles

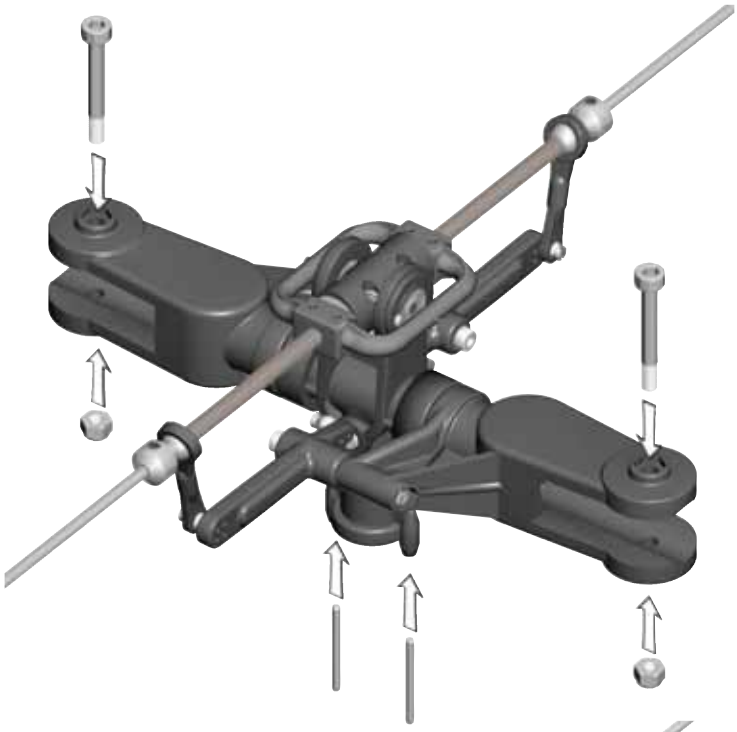
Bag 7

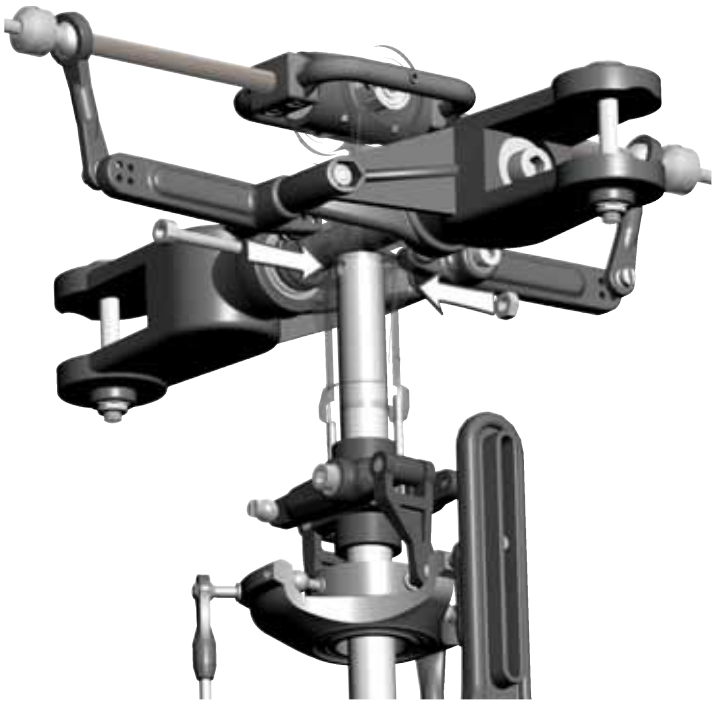


17.8 Final Assembly

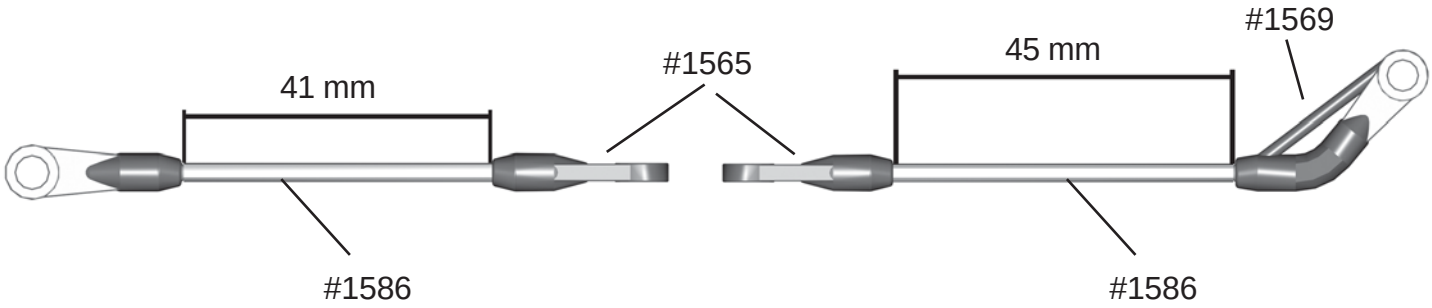
Bag 7 • Bag 12



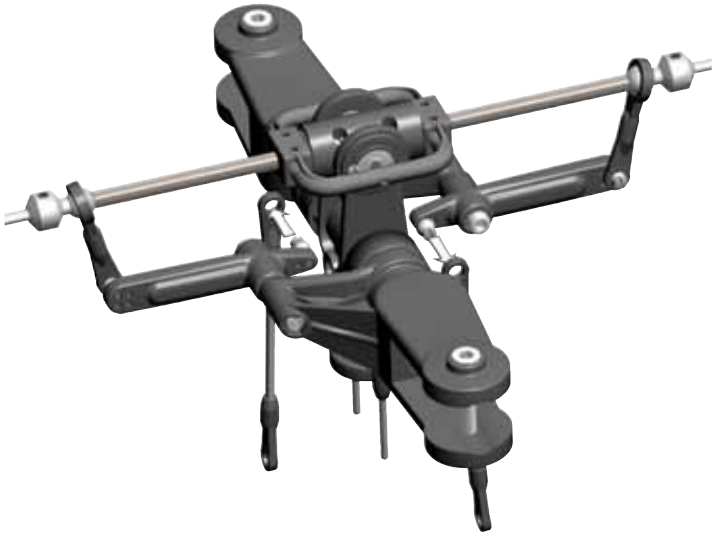




17.9 Rotor Head Linkage
Bag 7 • Bag 12

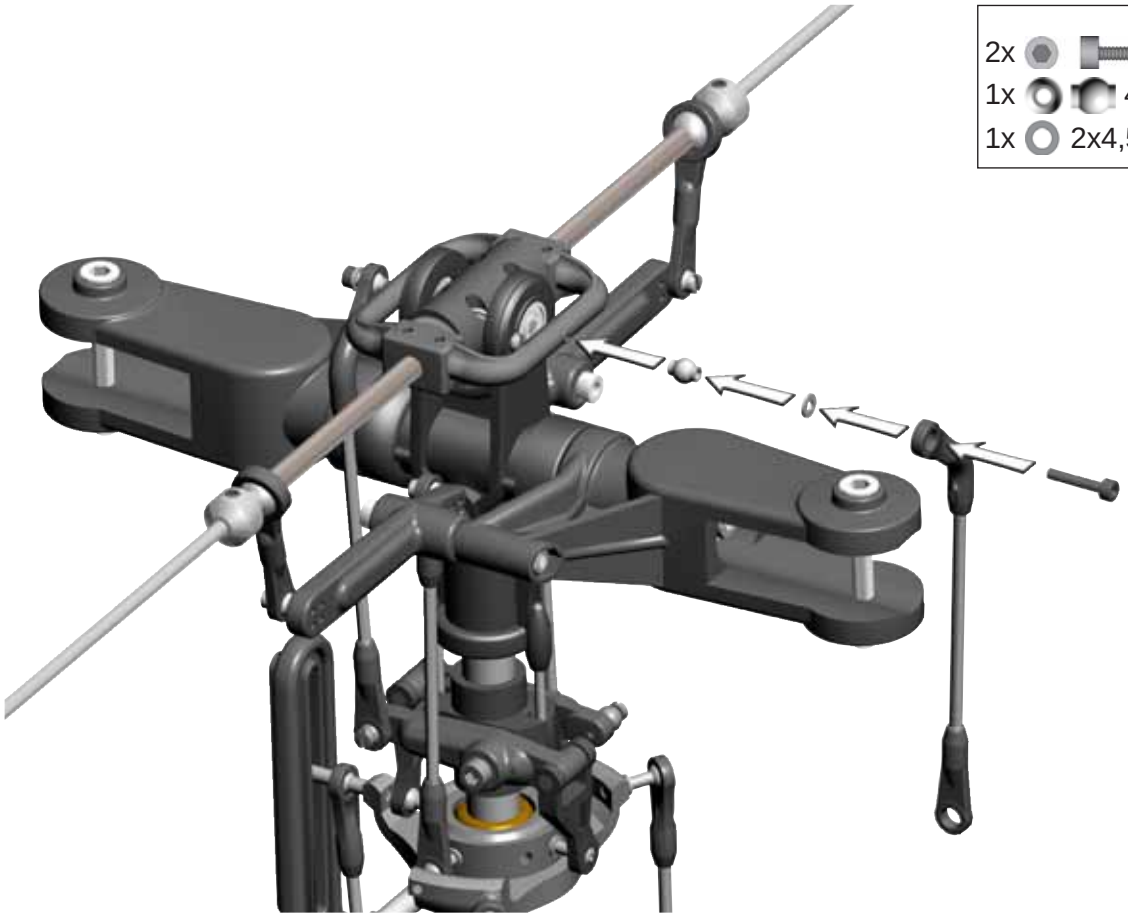


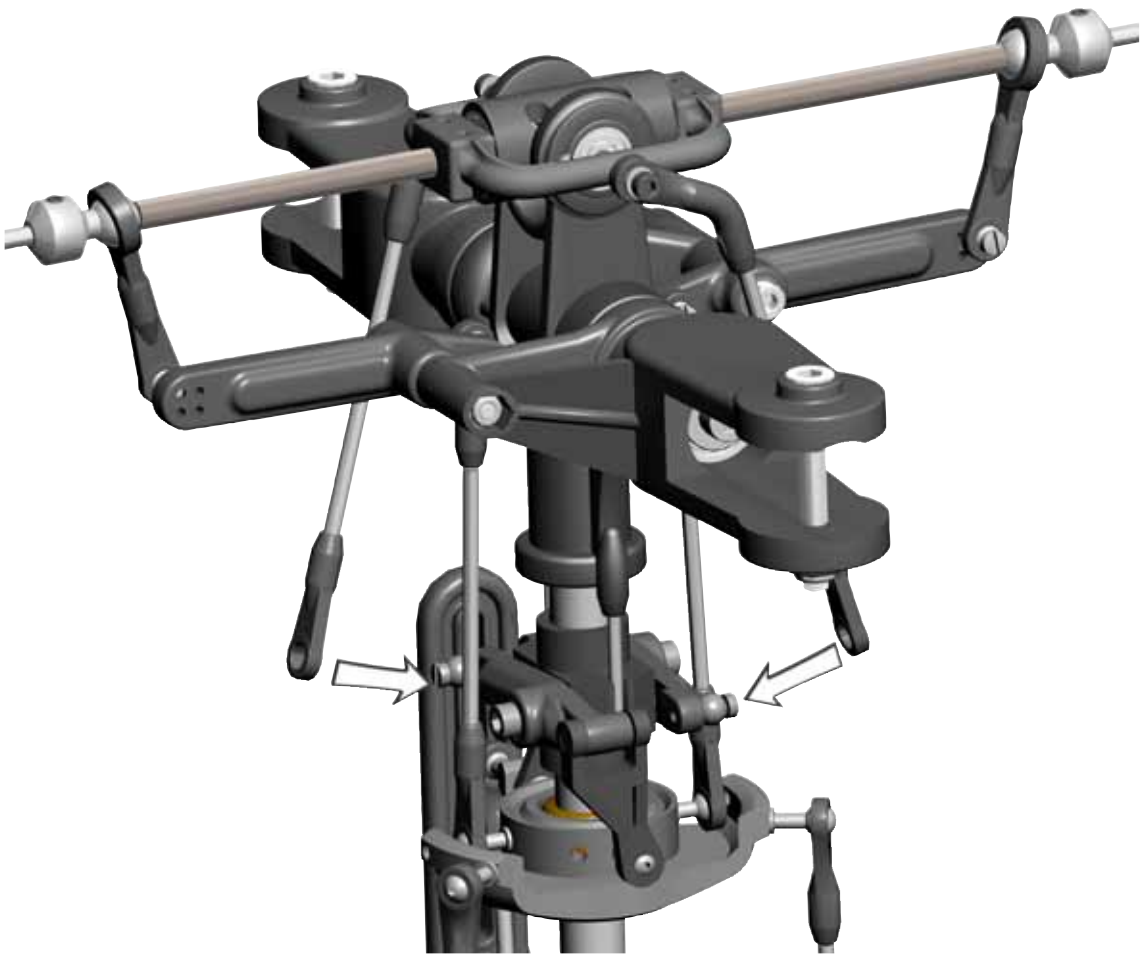
Next mount the length-adjusted fly-bar control linkages. The ball links are attached to the balls more easily when the text on them points away from the helicopter.



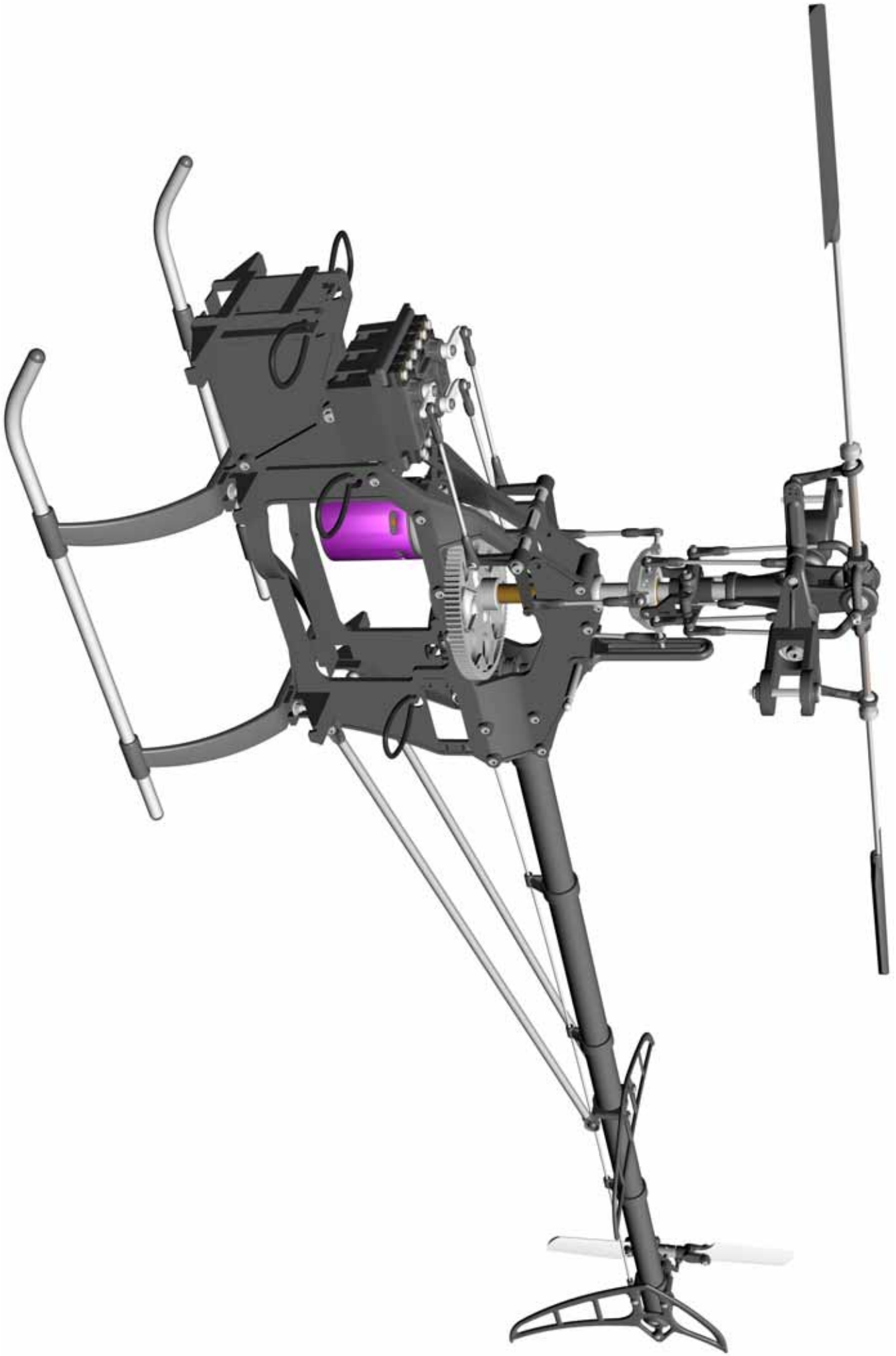
17 Main Rotor Head

2x	M2x12	#1942
1x	4,8	#1571
1x	2x4,5x0,5	#2018

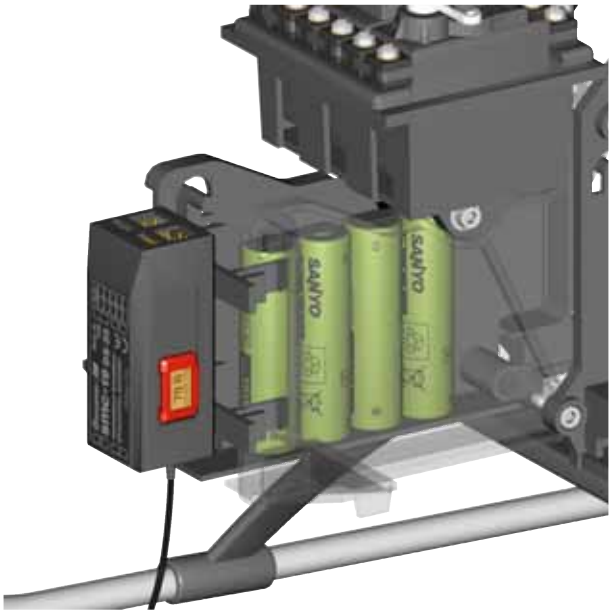




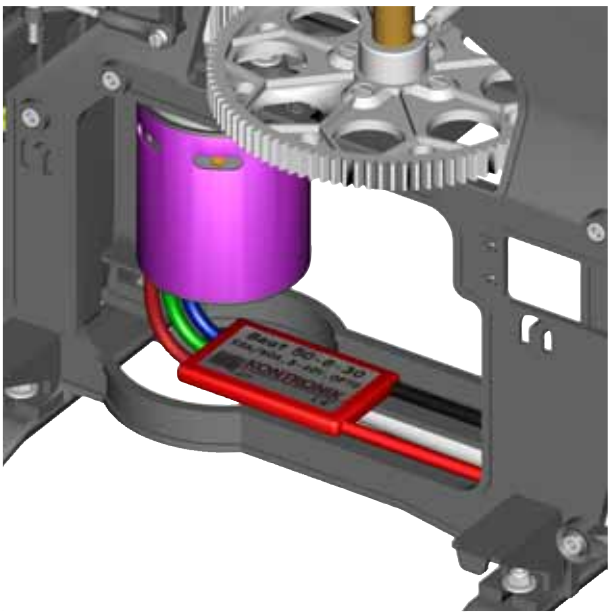
17.10 Logo 10 assembled



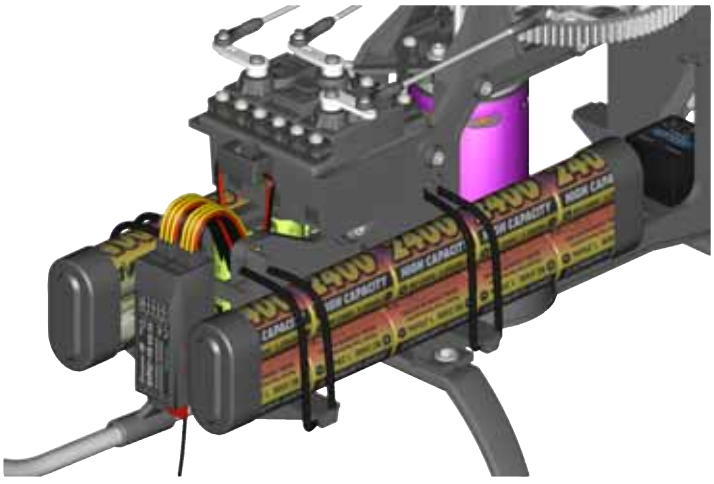
Receiver



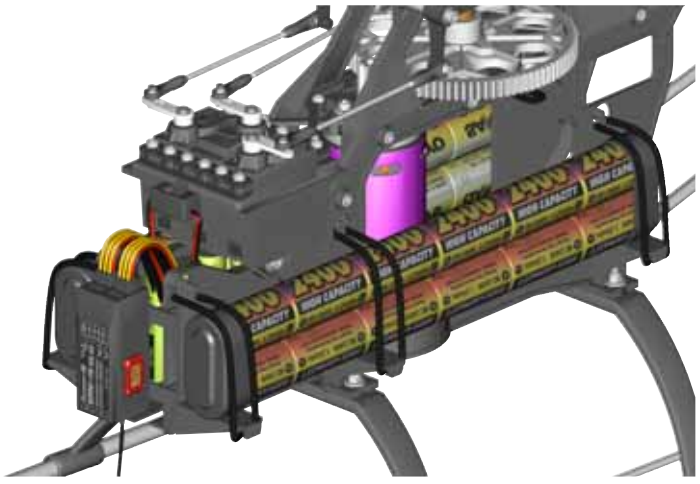
Receiver Battery



Speed Controller



Mounting of 20 cells

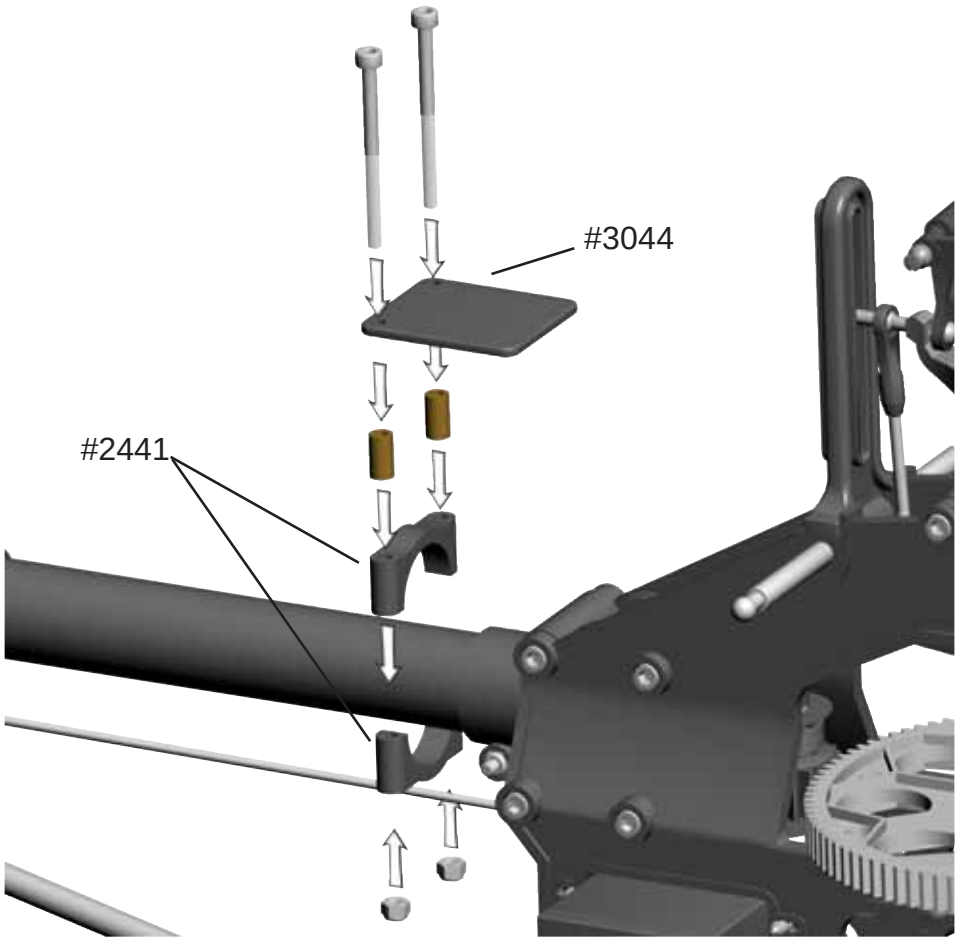


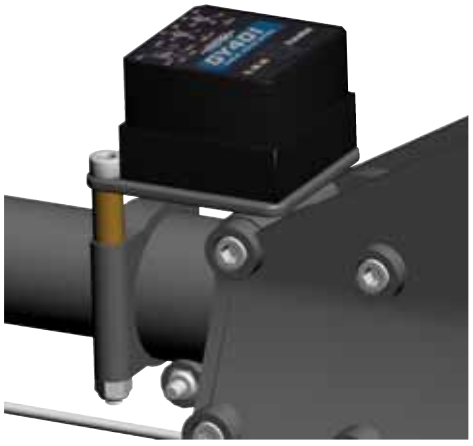
Mounting of 24 cells

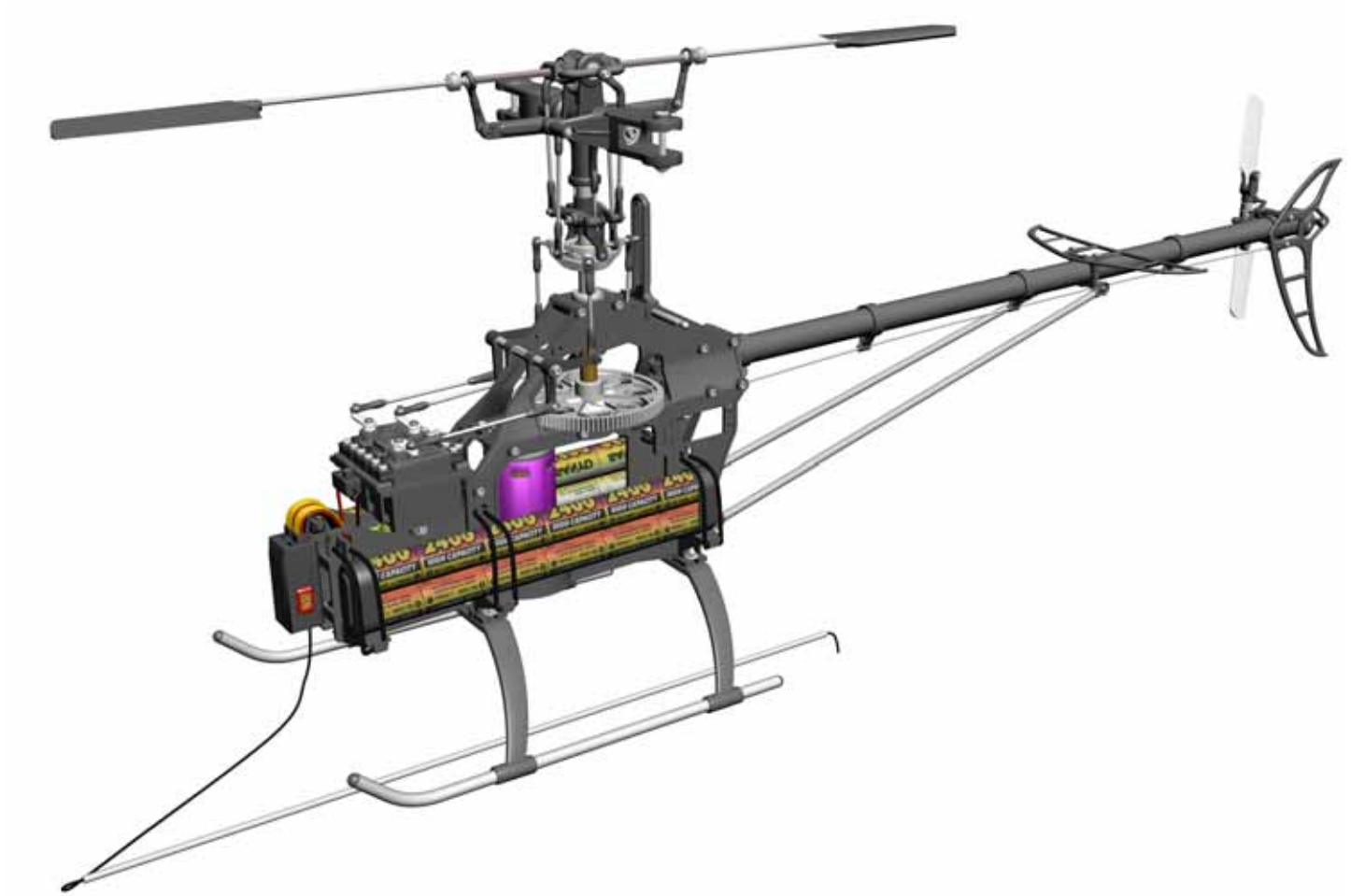
18.1 Gyro Support Plate

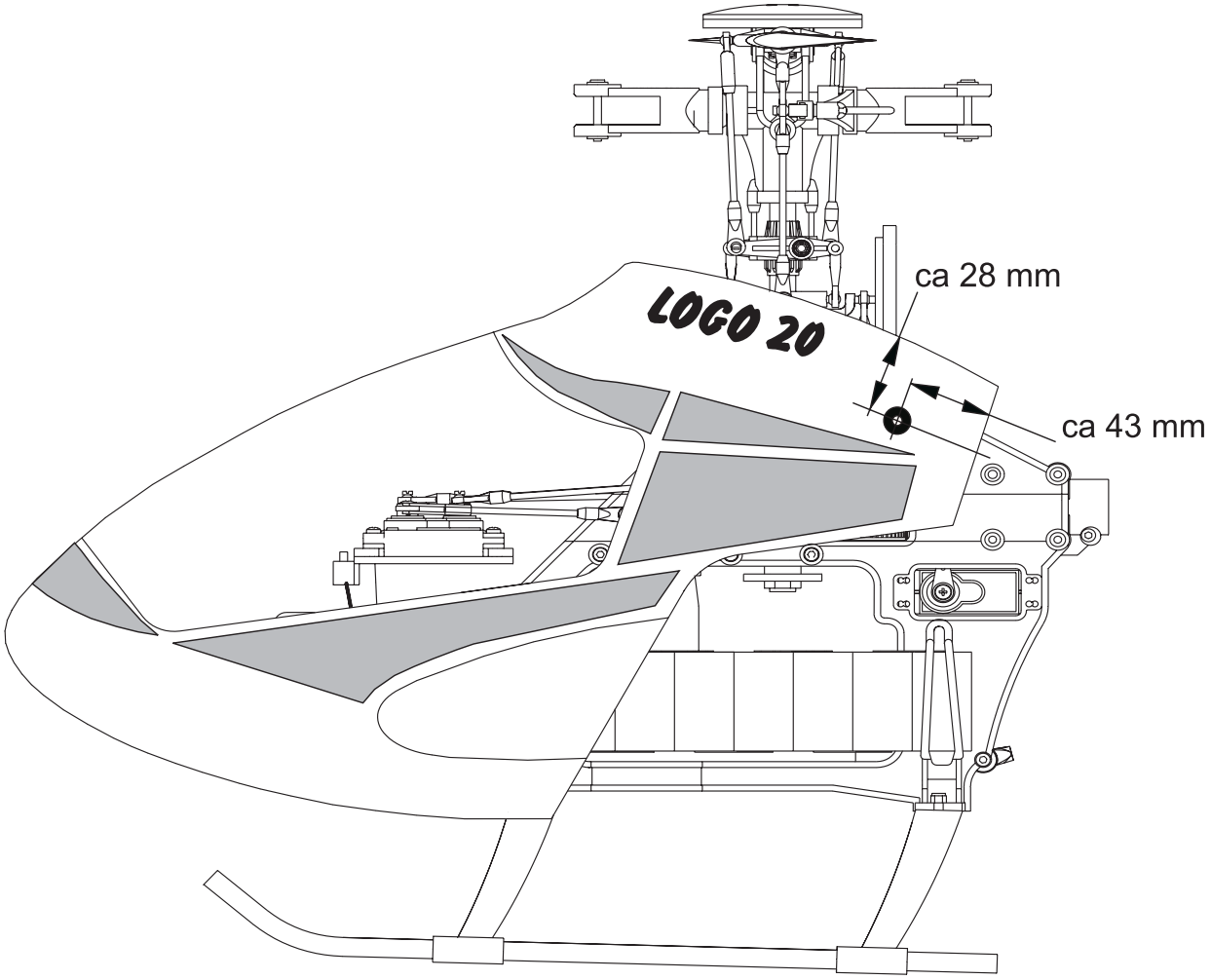
Bag 6 • Bag 12

2x	M3x35	#1961
2x	M3 Stopp	#2074
2x	3x5x9mm	#3043








LOGO 20
ca 28 mm
ca 43 mm

20 How to avoid interference

Please read these guidelines carefully in order to fly safely and without electrical interference.
Flying an electric helicopter means putting several electric components to use. It is essential to avoid that these components create disturbances for one another. The following guidelines tell you how this is achieved.

1. Placement of cables
- The wires connecting the motor with the speed controller should be as short as possible. However: Do NOT cut the motor cables (you won't be able to re-solder the connectors properly). But DO shorten the speed controller wires.
- Do not place any wires (servo wire, gyro wire, or antenna wire) in the neighborhood of the speed controller or close to the wires which lead from the speed controller to the motor.
- All wires leading to the receiver should be shortened in such a way that the wires from the servos, gyro and the on/off switch lead to the receiver following the shortest distance possible. Any excess wire will be a source for electrical interference.
- The wires connecting the speed controller with the receiver should be placed at as far away from the motor and from all other electric leads as possible. If you use a Kontronik Tango motor you must use the Kontronik ferrite ring. This is because this motor is operated at a high frequency. If you use any other motor, the use of the ferrite ring is recommended.
- Never place any wires in the direct neighborhood of the tooth belt or the drive pulley.

2. Gyro
- Comparison of several gyros has shown that they react differently to the fields generated by the speed controller. Many piezo gyros, in particular the less expensive ones, are quite likely to pick up disturbances. This may result in continuous wiggling or sudden turns of tail. At MIKADO we have found that the new Futaba gyros GY240 and GY401 do not show these problems and that they also work excellent in all other respects.
- Gyros will be sensitive to electric fields when they are placed in the neighborhood of the speed controller, or when the gyro cables are close to the motor or speed controller. It is therefore recommended that you place the gyro on top of the tail boom holder. You may order a special gyro mounting plate from MIKADO (part no. 2486). The GY401, and GY240, due to their smaller size, may also be placed within the RC-frame below the servos.
- As with all cables, place gyro cables away from motor and speed controller.
- Note that if your helicopter appears shaky this is not necessarily due to disturbances. Another source could be that tail pitch slider can't move freely. Check regularly (every 10 flights).

3. Antenna (very important!)
- The receiver must be placed in the front of the chassis. The antenna leads through the canopy in a line leading forward (drill small hole through canopy). Get a wire tube and attach it to the landing-bow on one side. Lead the antenna back through the tube. The front part of the tube will stick out in front of the landing bow at least 10 inches. Of the antenna, when it comes out of the tube, only 2 to 3 inches will stick out. In other words, if any part of the antenna is hanging lose, it hangs in front of the nose.
- It is best to attach the atenna tube at the lower antenna holders on the landing bow. Such placement of the antenna will increase the distance between the antenna and other electrical components such as motor, controller and batteries. In this way, reliable performance of the helicopter in all flight positions is ensured.

4. Receiver
- Use up-to-date and first-rate dual conversion receivers. Here at MIKADO we use the Graupner JR receiver type DS19 (FM/PPM) or SMC19 DS or SMC20 DS (both SPCM).
- On choice of PCM or PPM: In general, we suggest to use PCM receivers. They have optimal range and they allow for flight without disturbances when all of the above guidelines have been followed. If you are uncertain whether your heli is disturbance-free, it is recommended that you fly PPM first. This allows you to diagnose any potential disturbances.

5. Battery packs
General rule: The more voltage, the more potential for disturbances. Thus, the more cells you fly, the more preventive care should be taken against disturbances. You should use inline battery packs (soldered or connected), because they have both cables in the back (which avoids excess wiring in the front of the helicopter).

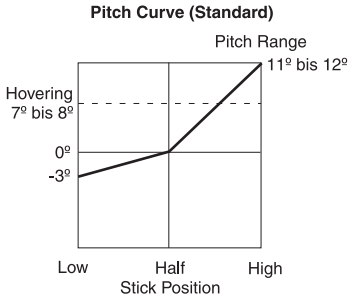
120° Swashplate Mixing (120° CCPM)

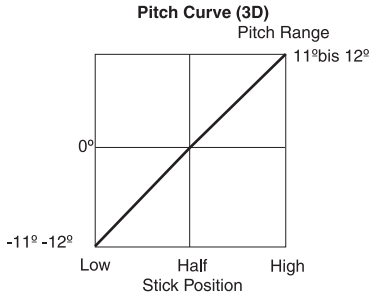
The LOGO 10 swashplate is designed to be controlled via electronic CCPM. Thus the corect control inputs of the three swashplate servos are automatically mixed by the R/C transmitter. If you have never programmed 120° CCPM before, please read this introductory text carefully.

Collective (Pitch)

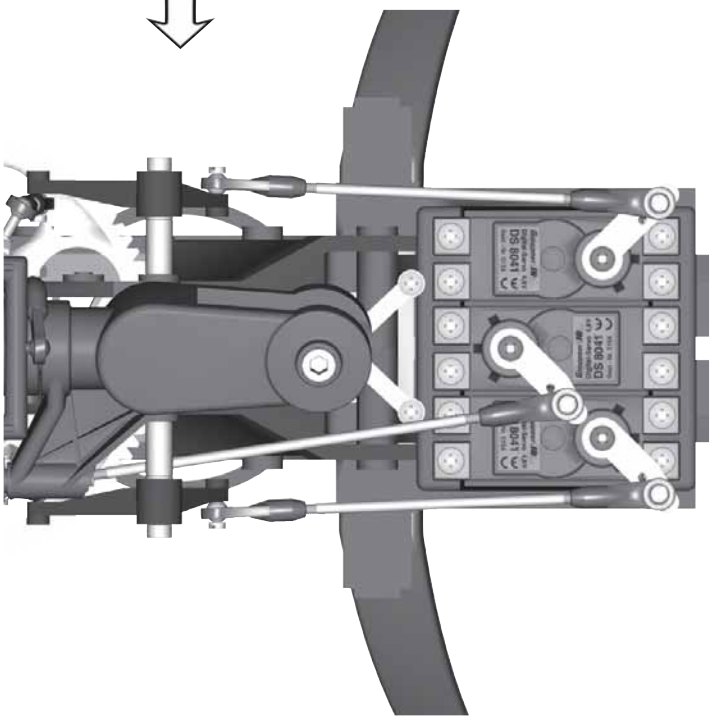
Pitch function is used to control the lift or sink of the helicopter. When pitch input is given, all three swash-plate servos travel together in the same direction and the same amount. As a result the swash-plate moves up or down on an even level.

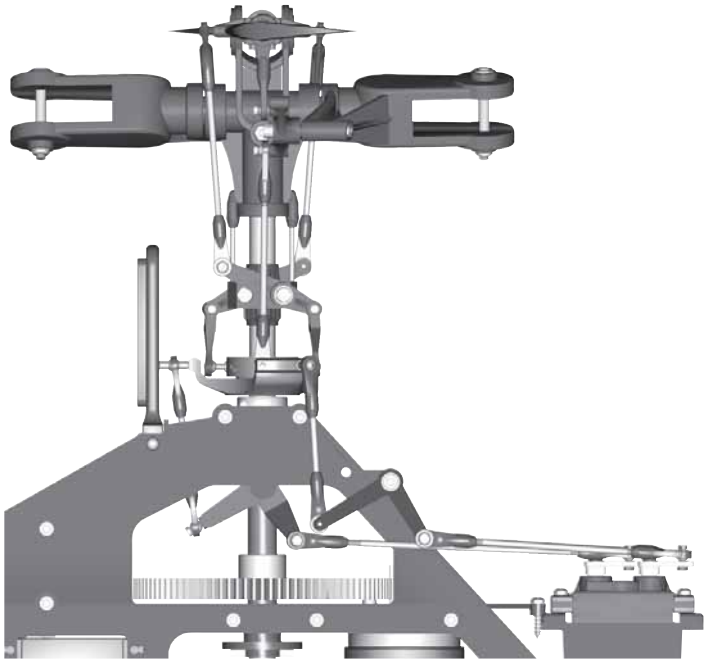
We strongly recommend to use a pitch gauge for adjusting the pitch values. If you do not wish to use the full pitch range (-12° to +12°), you may set the pitch values for minimum and maximum pitch separately in the R/C transmitter. If you are new to the hobby, we recommend to set minimum pitch at 3°.



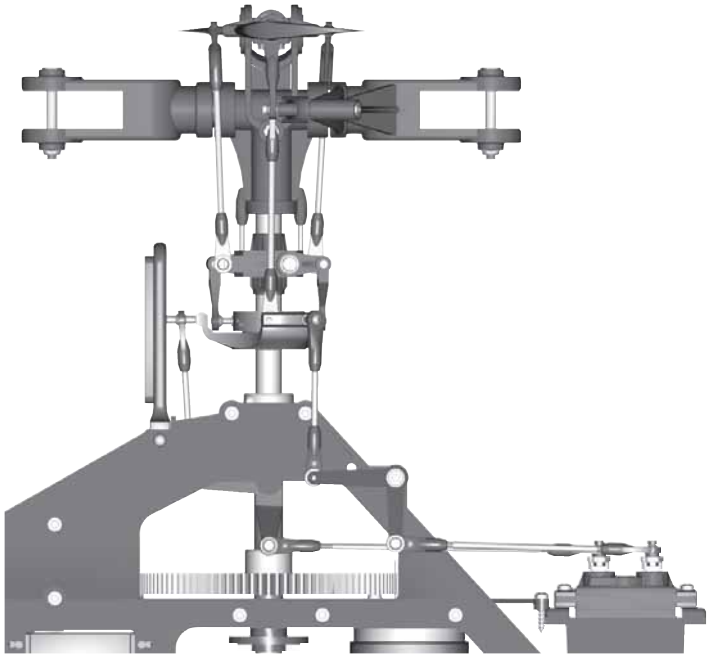


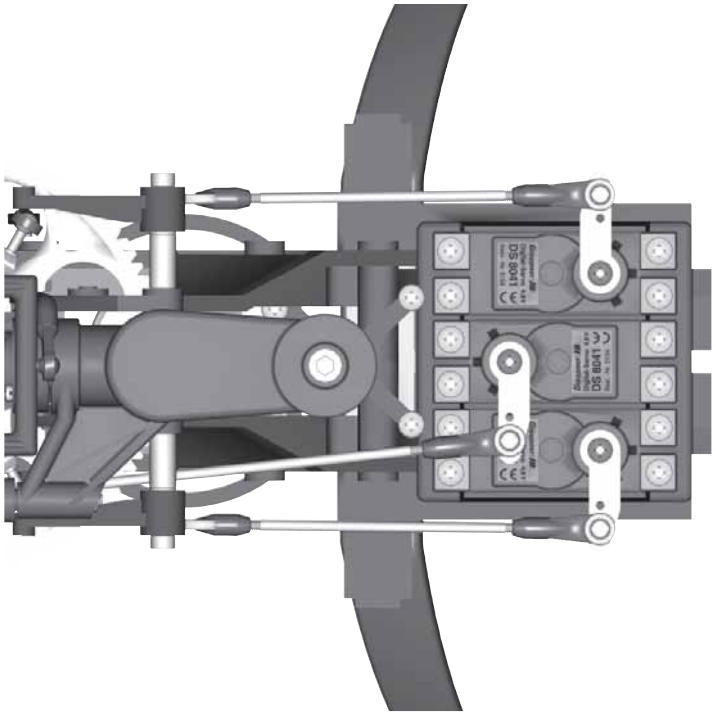
Minimum Pitch



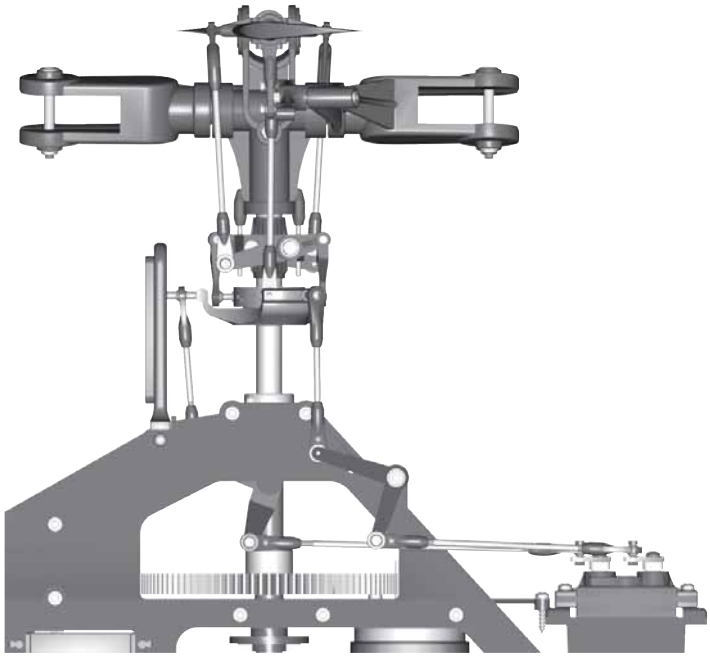


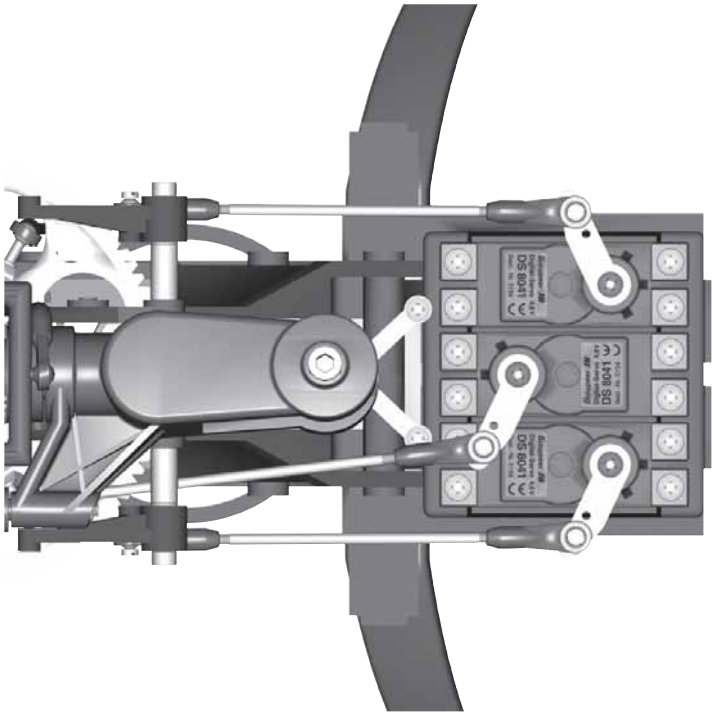
Neutral Pitch (0°)





Maximum Pitch





Programming 120° CCPM Programming 120° CCPM

As the programming procedure varies with different types of R/C systems, it is necessary for you to refer to the instruction manual of your R/C system. Here are only a few general guidelines which apply to most systems.

Servo Centering with Sub-Trim Function

As indicated in the above sections on mounting the servos, it is important that the servo arms are exactly centered. You should use the servo sub-trim function of your R/C system for this purpose.

Activating 120° CCPM

Likely, the 120° CCPM function is initially disabled in your R/C transmitter software and needs to be separately activated. Please refer to your R/C system manual, where you will also find information on which channels should be used for the elevator servo and the two roll servos. It is important that you stick with the requirements stated in the manual. Otherwise the 120° CCPM will not function properly.

Your R/C may support various different CCPM mixings. For Logo 20 choose the 120° mixing with two roll servos in the front and one elevator servo in the back.

Use the relevant menus for setting the mixing proportions for roll, elevator and pitch functions. Begin by setting the mix values to 50% each. Higher mix values give higher servo travel for that function This can have the unwanted result that the swashplate reaches its limits and causes damage to the servos or rods or to the swash-plate itself.

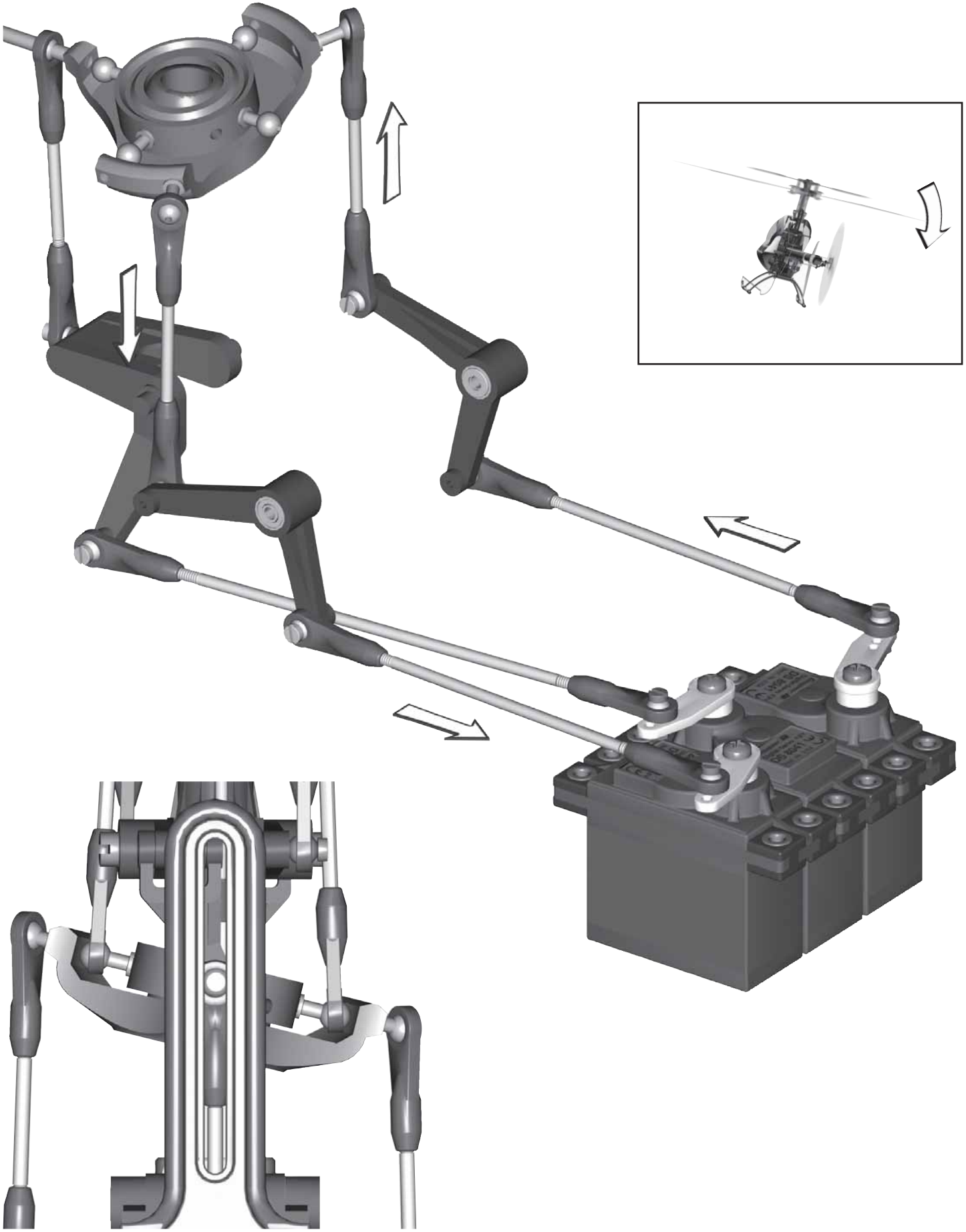
If necessary, you may use the CCPM menu to reverse the direction of the function. This is necessary, for example, if the swash-plate tilts to the wrong side or the pitch function is inverted. The menu for reversing servo functions can be used for reversing the movements of individual servo arms, but not for reversing the entire control function and of all the involved servos.

Aileron and Elevator Travel

The travel range of the aileron and elevator servos are limited by the swashplate’s mechanical limits. Please take care that the swashplate does not hit the maximum of its travel. This can have the unwanted result that the swashplte reachies its mechanical limits and causes damage to the servos or rods or to the swashplate itself. e Gestänge und die Taumelscheibe.
If you desire more agility for your helicopter, use lighter flybar paddles.

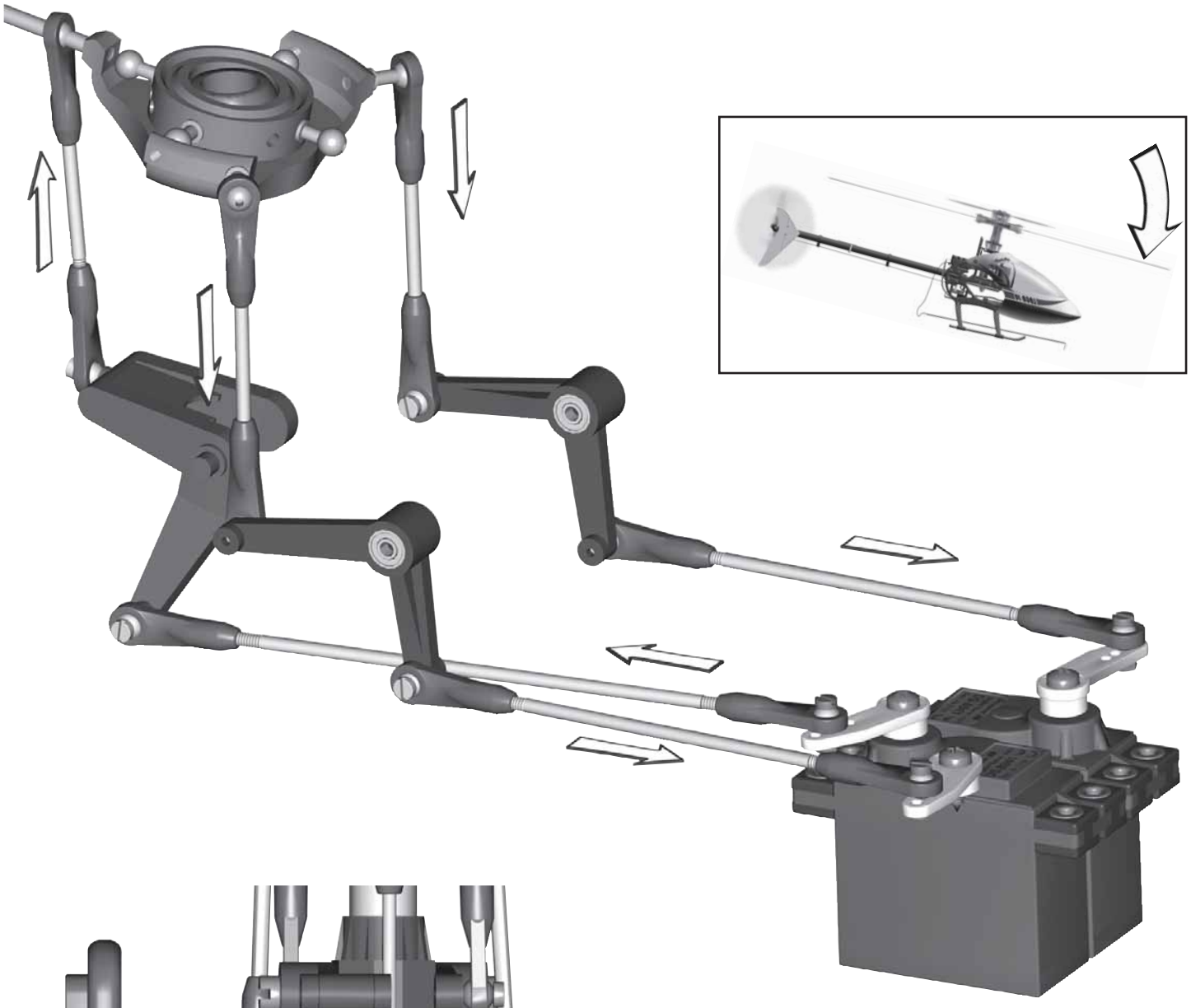
Aileron (Roll)

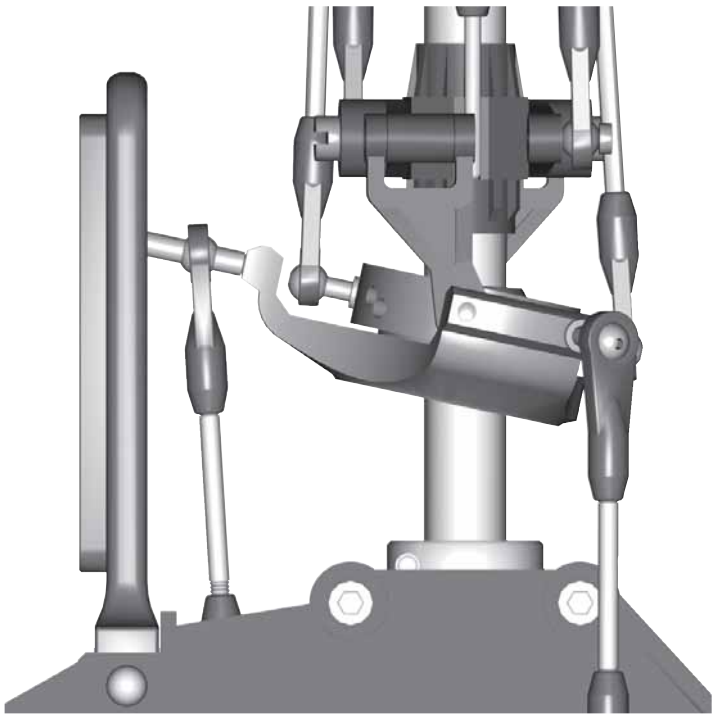
Aileron (roll) is used to control the helicopter's movements around its longitudinal axis. When aileron (roll) input is given, the two roll servos (in the front of the swashplate) travel in opposite directions. As a result the swash-plate tilts to the right or to the left.



Elevator (Tilt)

For tilting the helicopter, use the elevator function. For tilting forward, the two aileron servos move downward and the backward elevator servo moves upward. The elevator servo moves twice as much as the two aileron servos.





Aileron and Elevator Travel

The travel range of the aileron and elevator servos are limited by the swash-plate's mechanical limits. Please take care that the swash-plate does not hit the maximum of its travel. This can have the unwanted result that the swashplate reaches its mechanical limits and causes damage to the servos or rods to the swash-plate itself. If you desire more agility for your helicopter, use lighter flybar paddles.

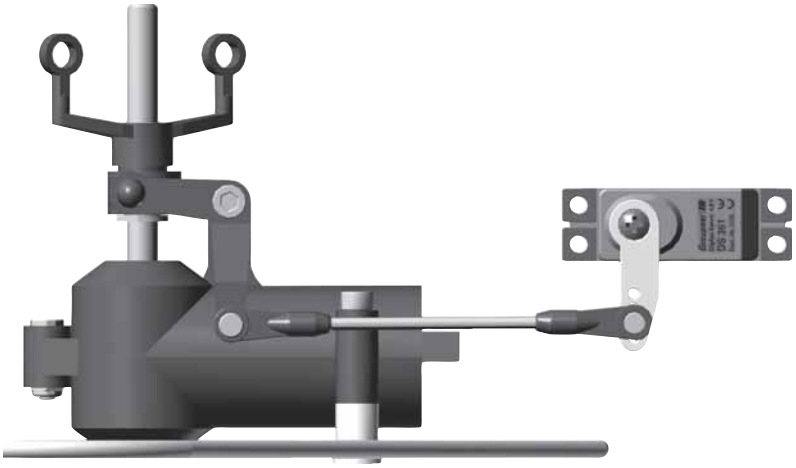
Tail rotor settings

When the servo arm of the tail rotor servo is in the center, the tail rotor lever and the servo arm should be perpendicular with respect to each other. The tail rotor pitch lever should never reach its mechanical limits.

In case the servo travel is too large, you have the following options for correcting this:
1. Move the ball end of the tail rotor servo closer to the center of the servo arm.
2. Reduce the servo travel in your R/C system using ATV.
3. Reduce the servo travel in your gyro (not all gyros have this option).

In case the servo travel is too small, you have the following options for correcting this:
1. Move the ball end of the tail rotor servo further away from the center of the servo arm.
2. Increase the servo travel in your R/C system using ATV.
3. Increase the servo travel in your gyro (not all gyros have this option).

Ensure that the tail rotor servo turns in the correct direction. If necessary, reverse the direction of the tail rotor servo function in your R/C system.



Adjust the tail rotor linkage in length such that the tail rotor servo arm and the tail rotor lever are at 90 with respect to each other.
All parts serving the tail rotor movements must move smoothly. When there is too much resistance, the tail rotor will not react to subtle input and the gyro's maximum sensitivity cannot be fully exploited.

Revo-Mix/Gyro

It is necessary to compensate for the torque created by the motor during flight (but not during autorotation). This compensation is done by adjusting the tail rotor pitch. There are two options for achieving this:

1. Using normal gyro mode
Please refer to your R/C system manual for activating the revolution mixing function and for setting all parameters correctly. Final settings should be trimmed during test flights.

2. Using a gyro in Heading-Hold mode
The Heading-Hold gyro mode compensates automatically the deviation caused by the motor torque. Therefore, if Heading-Hold mode is used, revo-mix should not be programmed additionally.

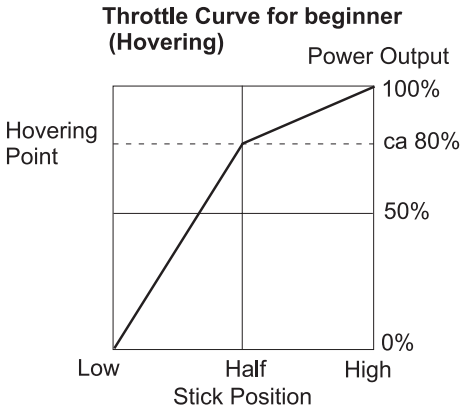
Important: Check to ensure that the tail rotor assembly moves smoothly and without play. Otherwise the gyro and servo will not compensate the torque properly.

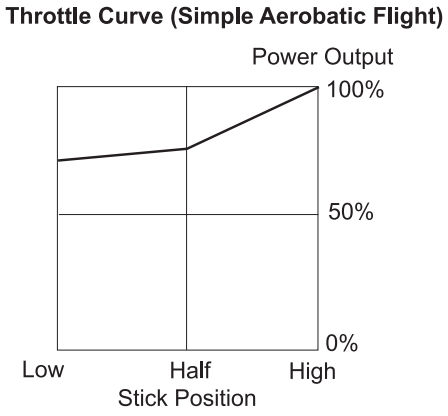
Rotor Head RPM control

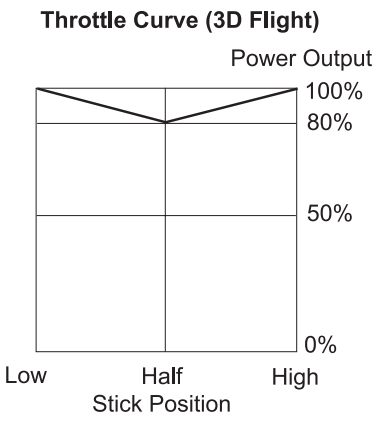
LOGO 20 is designed to be flown with constant rotor head speed. Irrespective of flight attitude (ascending, descending, hovering), rotor speed should be kept roughly constant. There are two different methods for obtaining constant rotor speed:

Rotor speed control with speed controller
All speed controllers can be used in this mode. With speed controller it is necessary to program a throttle curve (see manual). Programming of throttle curve requires that you associate a given throttle value with a particular pitch value. In this way, the rotor speed is held almost constant with all pitch values.

Throttle curve programming depends on the type and quality of the R/C system. Simpler, inexpensive R/C systems designed for model helicopters usually have a 3-point throttle curve. High-end R/C systems typically have throttle curves with more configurable points (up to 9). Fine tuning of throttle curves will be necessary during test flights.

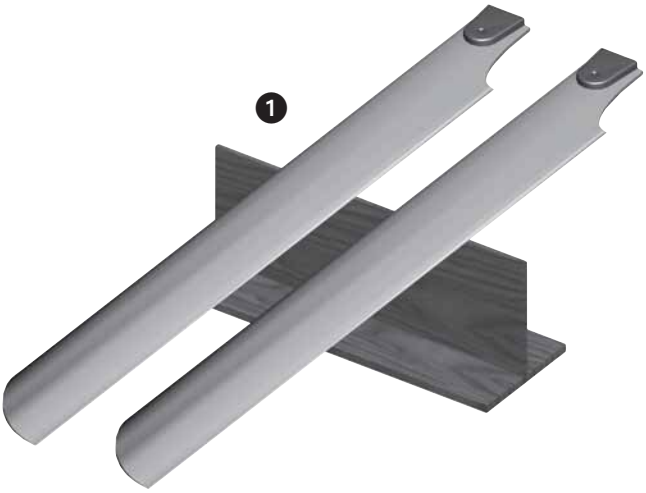






Note that an incorrectly programmed throttle curve reduces performance and can lead to overheating of the motor and the speed controller.

Rotor speed control with governor (RPM regulation mode)
A speed controller with governor function keeps the rotor head speed constant, independent of flight attitude (ascending, descending, hovering). It is not necessary to program a throttle curve. The head speed is simply controlled on the radio transmitter using a switch or lever.
Important:
1) Governor mode must be activated in the speed controller first (see manual of the speed controller)
2) In governor mode, the servo wire of the speed controller must not be connected to the throttle channel. Use a free channel in your radio to connect the servo wire.

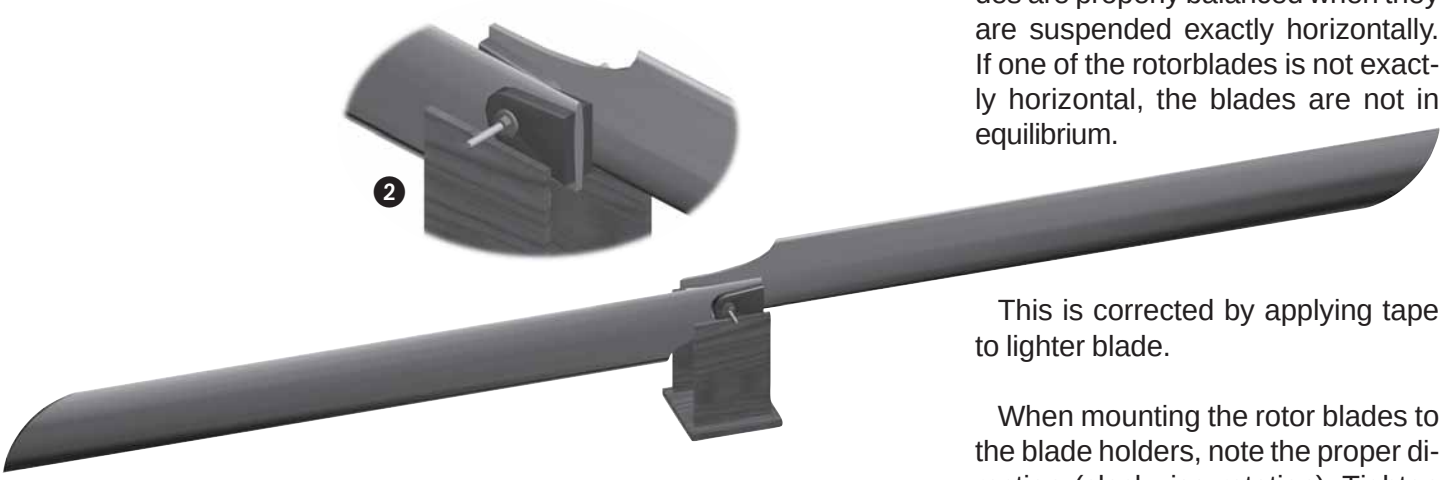


22.1 Balancing of Rotor Blades (Center of Gravity)

Place each rotor blade over an edge as shown in picture (1). Adjust the blades so that they are in equilibrium. If the center of gravity is not in the same place in each blade, this needs to be corrected using tape. Apply as much tape as necessary until both blades show their center of gravity in the same place.

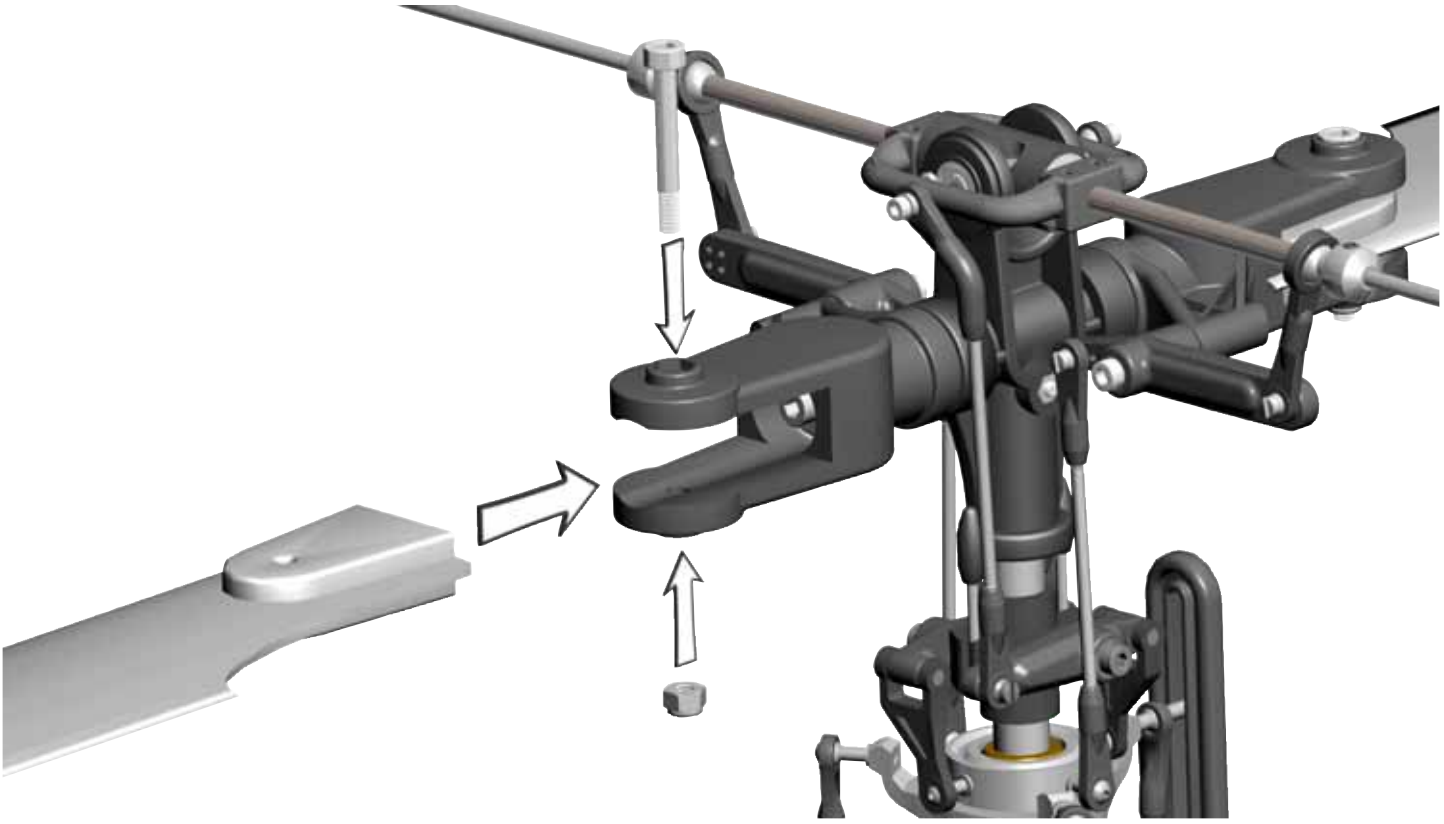
23.2 Static balancing

Screw the rotor blades together as shown in picture (2). The rotor blades are properly balanced when they are suspended exactly horizontally. If one of the rotorblades is not exactly horizontal, the blades are not in equilibrium.



This is corrected by applying tape to lighter blade.

When mounting the rotor blades to the blade holders, note the proper direction (clockwise rotation). Tighten the cap screws holding the rotor blades, so that the blades cannot move easily in the blade holders.



23 Final Pre-Flight Check

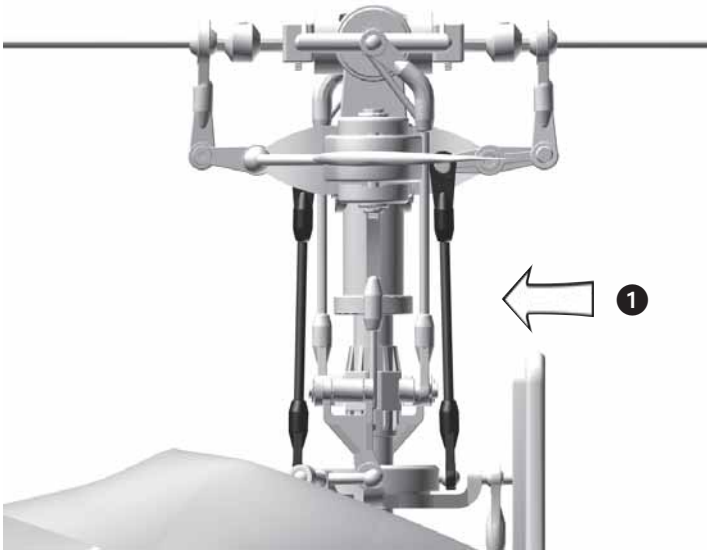
23.1 Direction of Main and Tail Rotation

Prior to the first flight double-check the direction of rotation of the main rotor head and the tail rotor. For this, turn the main gear clock-wise.

23.2 Blade Tracking Adjustment

False

OK

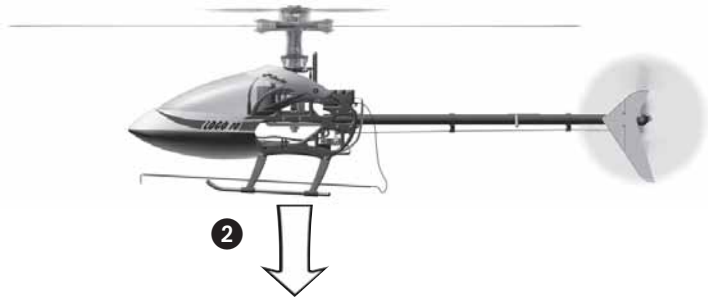


Prior to the first flight the tracking of the rotor blades needs to be adjusted. If the tracking is not adjusted properly, this can cause vibrations and lead to instability of the helicopter.

Apply colored tape to the tip of one of the rotor blades. Apply tape of a different color to the tip of the other rotor blade. When you are ready for your first flight, increase the rotor speed to just before lift-off. From a safe distance, check the rotor disk at eye-level. Very likely, one rotor blade will move below the other.

Make a note of the color of the low-moving blade. Then turn off the motor and wait until the rotor head has come to a halt. Lengthen the linkage (1) of the rotor blade which was moving low by unscrewing the ball links somewhat. Repeat the checking procedure until both rotor blades move on the same level.

24.1 Pitch/Throttle



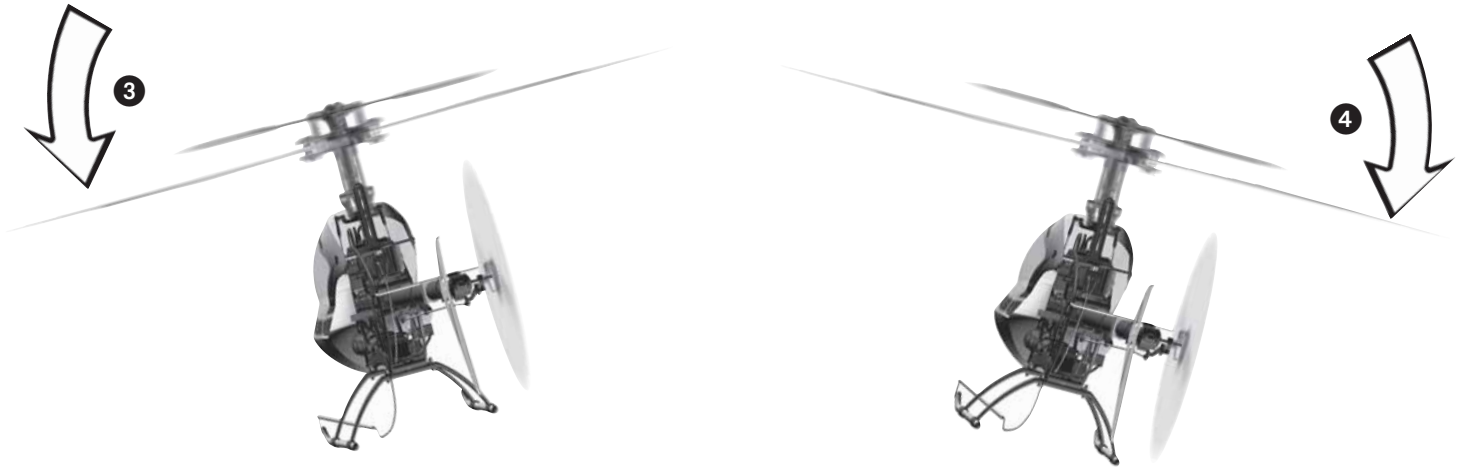
You may want to program a different stick mode than the one shown. Please check which stick mode is used by other local pilots. Use the same one, so fellow pilots can assist you on the field.

Important: Flying a model helicopter requires many hours of training. During your first attempts, while familiarizing yourself with the different control movements, keep the helicopter low above the ground (just a few centimeters/a couple of inches.)

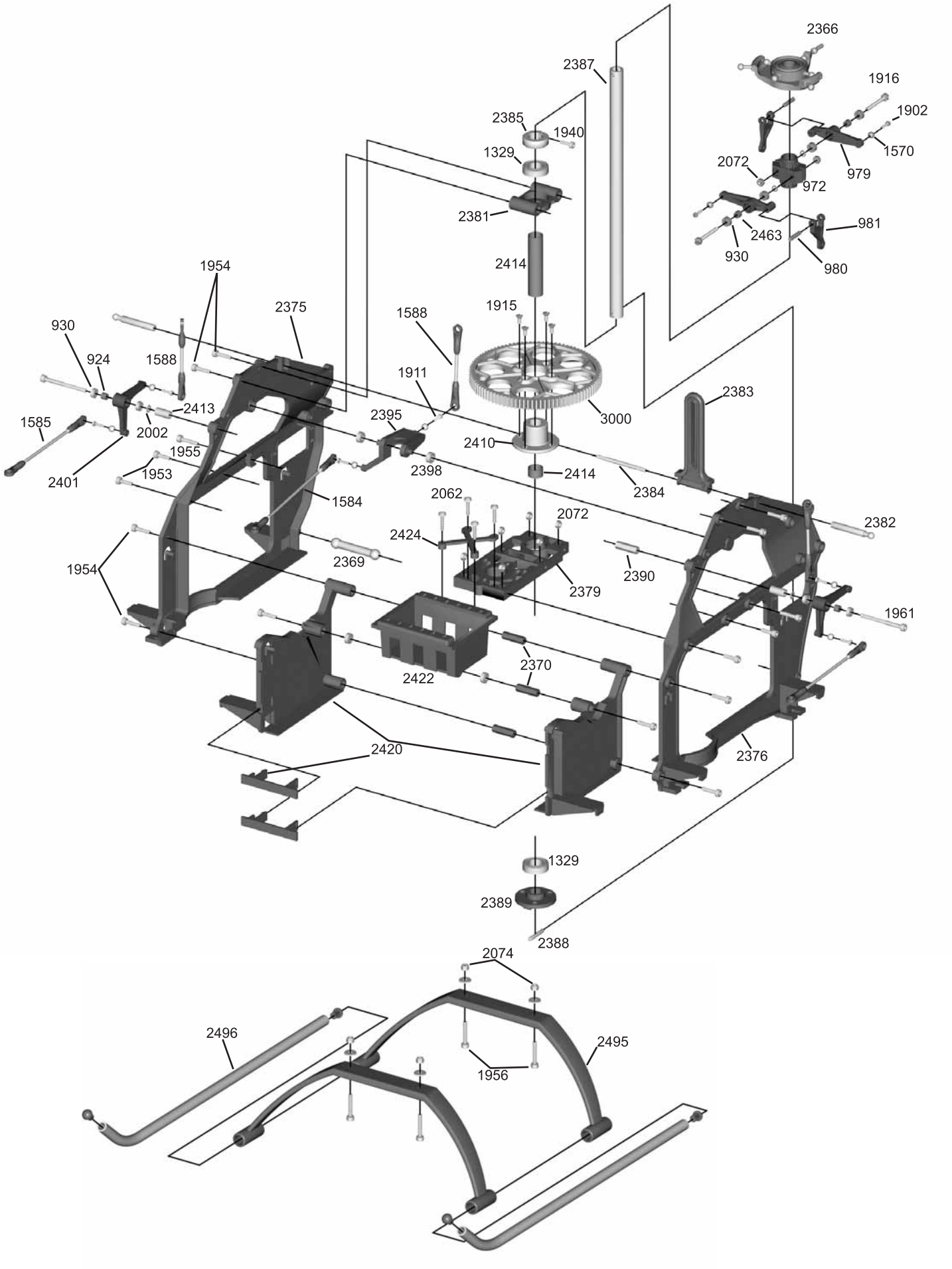
24.2 Rudder

24.3 Elevator

24.4 Aileron



25.1 Chassis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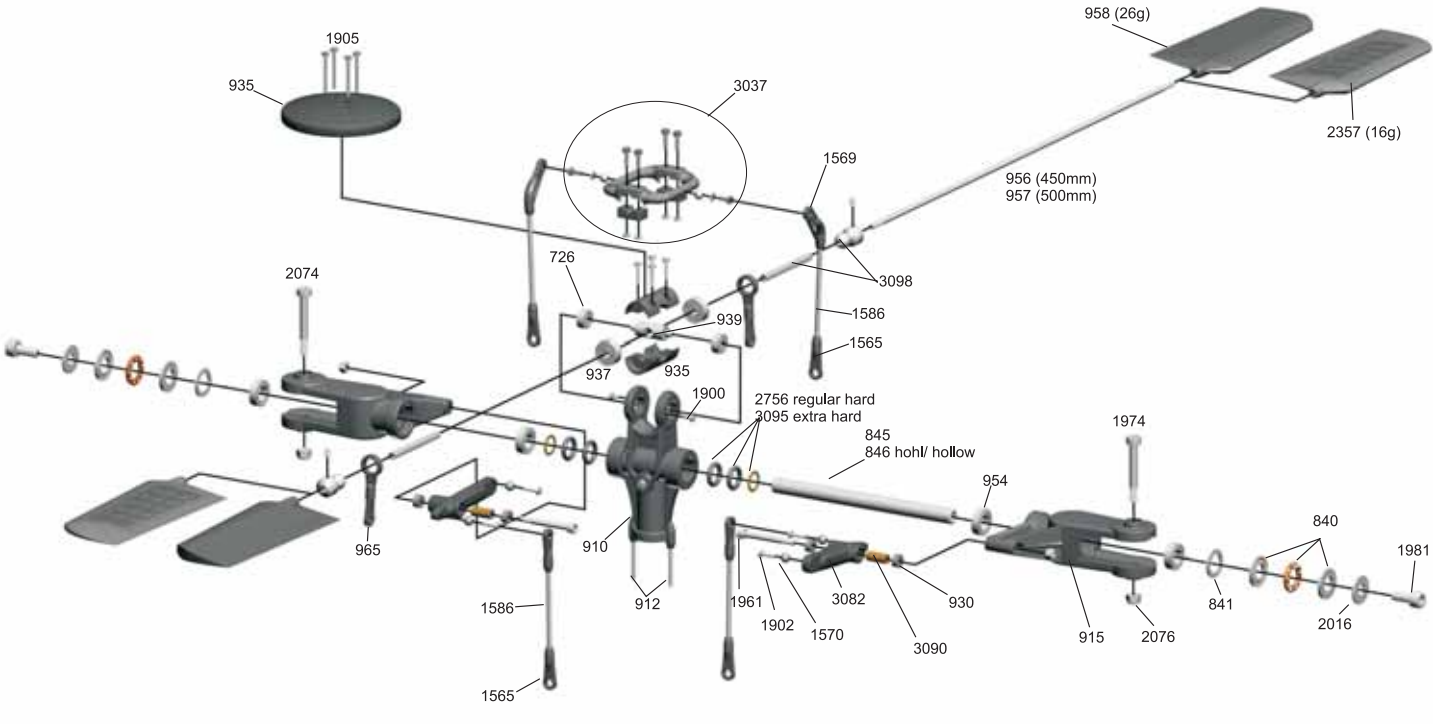
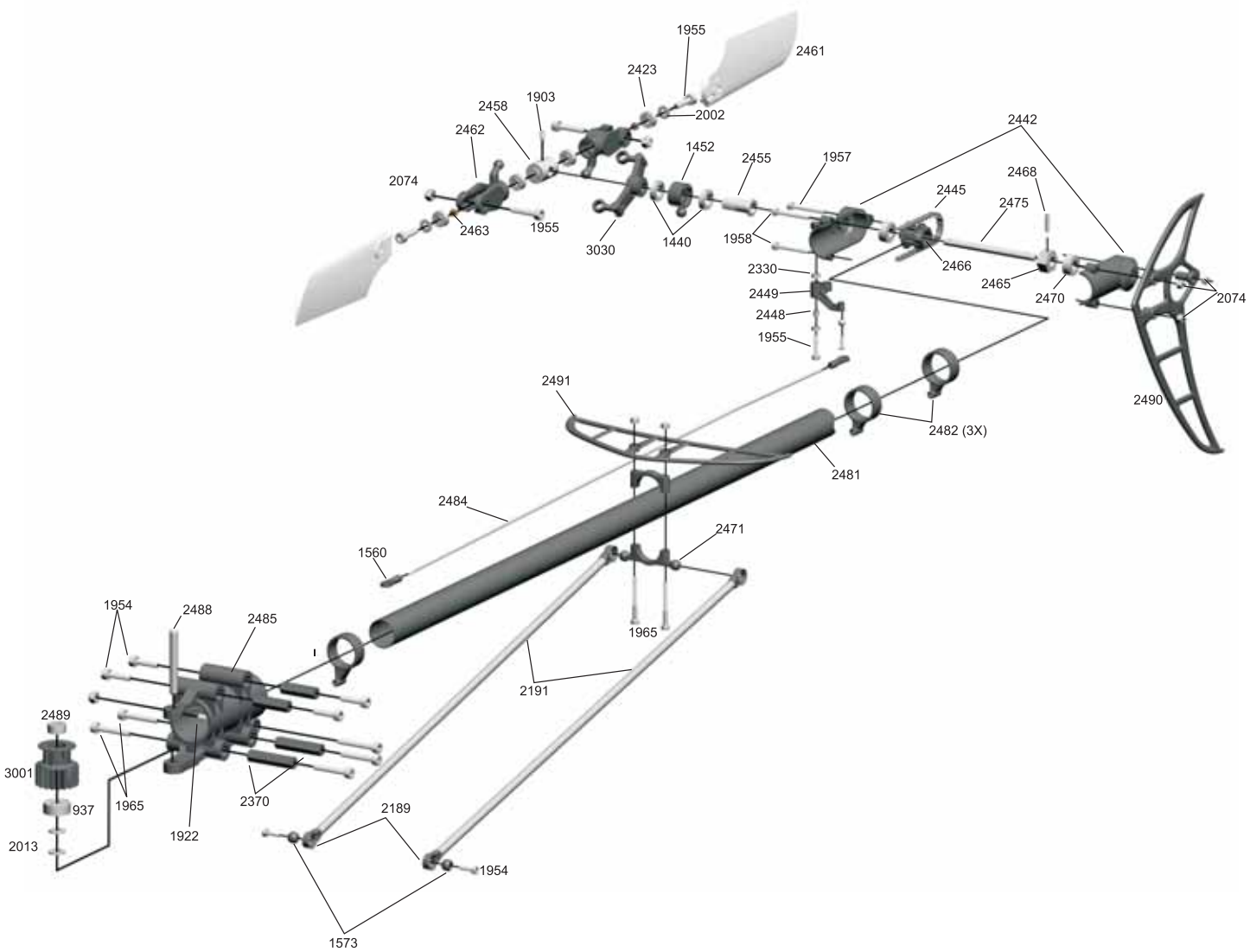
25.2 Rotor Head



25.3 Tail Boom/Tail Rotor



carbon main frame up-grade set #850

canopy LOGO 24 #852 (must be used with LOGO 24 main frame #850)

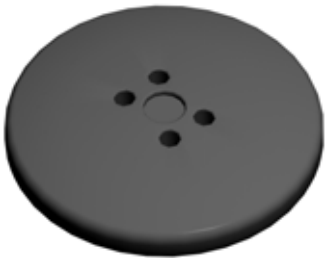
carbon servo holder for tailboom #828

Alu washout unit #973

Carbon tail rotor upgrade set #3062

Alu motorplate #3061

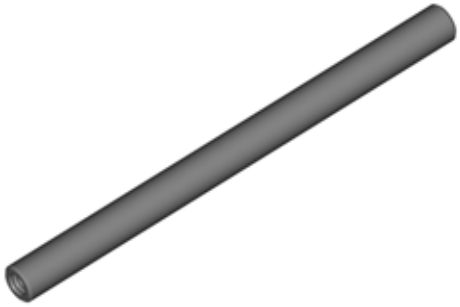
Rotor disk #932



light paddles #2357

carbon tail boom #832

hollow spindle shaft #846

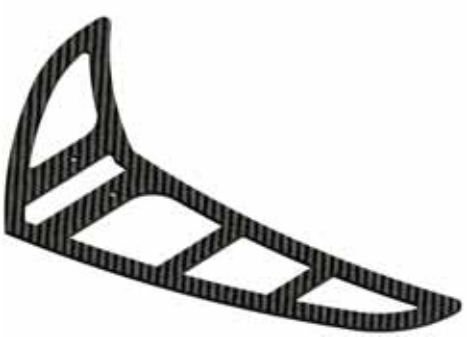


Carbon rotor blades 600 mm #1050

semi-symmetrical glass-fibre rotor blades 600mm #1048

Carbon horizontal fin #2494

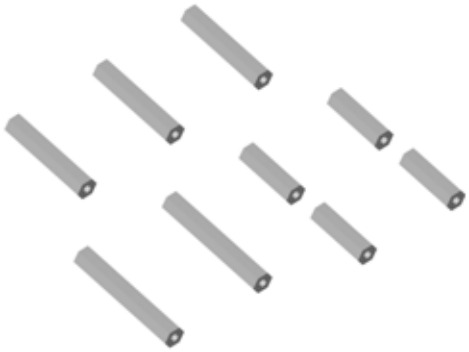
carbon vertical fin #2493



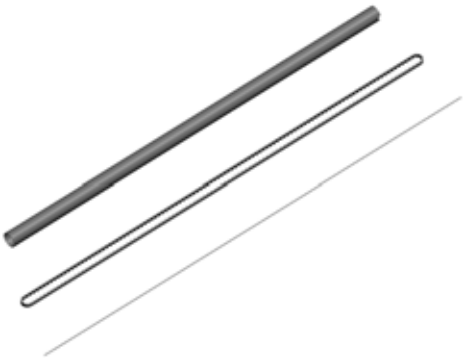
carbon base plate #2378

carbon elevator lever #2396

alu hex bolts #2372



Tail boom for 600 mm rotor blades #2479



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