WHIPLASH TURBINE

MANUAL

Moser-Saege 5 - 83674 Gaissach - Germany - minair@miniatureaircraft.de

Kit Instroduction

Thank you for purchasing the X-Cell Whiplash Turbine by Miniature Aircraft. This model is the culmination of years of designing and manufacturing R/C helicopters. It is designed with the highest standards, and will provide years of enjoyment. Whether this is your first R/C model helicopter or you are an advanced R/C helicopter modeler, the X-Cell Whiplash is a fantastic choice for a “700 size” turbine powered model.

R/C Helicopter Safety

A radio controlled model helicopter is not a toy, but rather a technically complex device that must be built and operated with care. It is also a fascinating and challenging part of the R/C sport, the mastery of which is very rewarding. A model helicopter must be built exactly in accordance with the building instructions. The kit manufacturer has spent much time and effort refining this product to make it reliable in operation and easy to build. The bolt together construction can proceed quite rapidly. This give the builder a strong sense of accomplishment that encourages hasty progress from one construction phase to the next, so that the completed model can be more quickly seen and enjoyed. It is essential to recognize and guard against this tendency. Follow building instructions exactly. Vibration and stress levels are high and all fasteners and attachments must be secure for safe operation.Note that this is the first use of the word SAFETY in these comments. Previously the kit manufacturer’s efforts to ensure reliable operation were mentioned. That is ALL that he can do. Safe operation is the responsibility of the builder/flyer and starts with careful construction and continues with selection and installation of reliable radio equipment and power systems.

The need for safety is nowhere greater than at the flying field. A number of guidelines for safe flight have been developed by experienced flyers and are set down here. It is urged that they be read, understood and followed. Always have a ready to use CO2 fire-extinguisher (at least 2kg of CO2) next to the place where you start the Whiplash turbine engine.

Warning! – Risk of death or serious injury

Remote Control (“R/C”) Helicopters can be dangerous. Inexperienced pilots of R/C Helicopters should be trained and supervised by experienced operators. All operators should use safety glasses and other appropriate safety equipment. All operators should exercise necessary precautions when fueling, repairing, maintaining, flying and storing R/C Helicopters, and when using or storing R/C Helicopter accessories, equipment, fuels, and related materials. R/C Helicopters should be used only in open areas free of obstacles and far enough from people to minimize the possibility of injury from the helicopter or any of its components falling or flying in unexpected directions.

This helicopter is not a toy but a complex flying machine that must be assembled with care by a responsible individual. Failure to exert care in assembly, or radio or accessory installation, may result in a model incapable of safe flight or ground operation. Rotating components are an ever present danger and source of injury to operators and spectators. Since the manufacturer and his agents have no control over the proper assembly and operation of his products, no responsibility or liability can be assumed for their use.

INFORMATION

General Guidelines for Safe R/C Helicopter Flight

- Fly only at approved flying fields and obey field regulations. Fly only if there are other people at the field.
- Follow frequency control procedures. Interference can be dangerous to all.
- Know your radio. Check all transmitter functions before each flight.
- Be aware that rotating blades are very dangerous and can cause serious injury.
- Never fly near or above spectators or other modelers.
- If you're a beginner, get help trimming the model first and seek flight training later.
- Don't "track" the main blades by holding the tail boom. This is a temptation to builders who cannot hover yet and is very dangerous..

Academy of Model Aeronautics

Miniature Aircraft highly recommends joining the Academy of Model Aeronautics (AMA).

- AMA is the Academy of Model Aeronautics. • AMA is the world's largest model aviation association, representing a membership of more than 195,000 from every walk of life, income level and age group.
- AMA is a self-supporting, non-profit organization whose purpose is to promote development of model aviation as a recognized sport and worthwhile recreation activity. • AMA is an organization open to anyone interested in model aviation.
- AMA is the official national body for model aviation in the United States. AMA sanctions more than one thousand model competitions throughout the country each year and certifies official model flying records on a national and international level.
- AMA is the organizer of the annual National Aeromodeling Championships, the world's largest model airplane competition.
- AMA is the chartering organization for more than 2,500 model airplane clubs across the country. AMA offers its chartered clubs official contest sanction, insurance, and assistance in getting and keeping flying sites.
- AMA is the voice of its membership, providing liaison with the Federal Aviation Administration, the Federal Communications Commission, and other government agencies through our national headquarters in Muncie, Indiana. AMA also works with local governments, zoning boards, and parks departments to promote the interests of local chartered clubs.
- AMA is an associate member of the National Aeronautic Association. Through NAA, AMA is recognized by the Fédération Aéronautique Internationale (FAI), the world governing body of all aviation activity, as the only organization which may direct U.S. participation in international aeromodeling activities.

For more detailed information, contact the Academy of Model Aeronautics
5161 E. Memorial Drive, Muncie, Indiana, 47302
or telephone (800) 435-9262
You may also visit the AMA website at www.modelaircraft.org

INFORMATION

Kit Assembly

Your Whiplash kit will require a number of different supplies and tools to ensure the best final result. They are as follows:

Required Lubricants and Compounds:

1. Medium Strength Thread Locking Compound - Loctite Blue #243
2. Synthetic Grease (MA3200-06)
3. Retaining Compound - Loctite Green #648

Required Tools:

1. M4 Nut Driver
2. M5 Nut Driver
3. M5.5 Nut Driver
4. M7 Nut Driver
5. 1.5mm Allen Driver
6. 2.0mm Allen Driver
7. 2.5mm Allen Driver
8. 3.0mm Allen Driver
9. 4.0mm Allen Driver x2
10. 5.0mm Allen Driver
11. Needle Nose Pliers
12. Phillips Screwdriver
13. Razor Knife (X-acto)
14. 2x Ratchet & Socket M10, M13
15. Dail Gauge resolution of 0.01mm / 0.0004” or better

Other required components:

The X-Cell Whiplash is an airframe kit. To complete the model, several other items are required, but not included with the kit. There are many choices for these other required components, and any competent hobby retailer with R/C helicopter experience will be happy to make suggestions. You will need:

1. Engine: Xicoy engine X45H.
2. Cyclic servos (Miniature Aircraft recommends high quality brushless cyclic servos with no less than 80 oz. in. of torque.)
3. R/C helicopter flybarless system. If using a FBL system with rescue-functionality ask the manufacturer wheter it will work with turbine engine powered helicopters.
4. Rudder servo suitable for use with the gyro you choose. Digital servo is recommended.
5. R/C helicopter transmitter and receiver with at least 8 channels, telemetry capabilities are recomm.
6. 700-720mm Main Blades and 105-115mm Tail Blades.
7. R/C helicopter fueling equipment.
8. R/C helicopter engine governor (Futaba GV-1, GY701, CGY 760 or 750) are recommended.
9. CO2 fire-extinguisher for operating the turbine engine

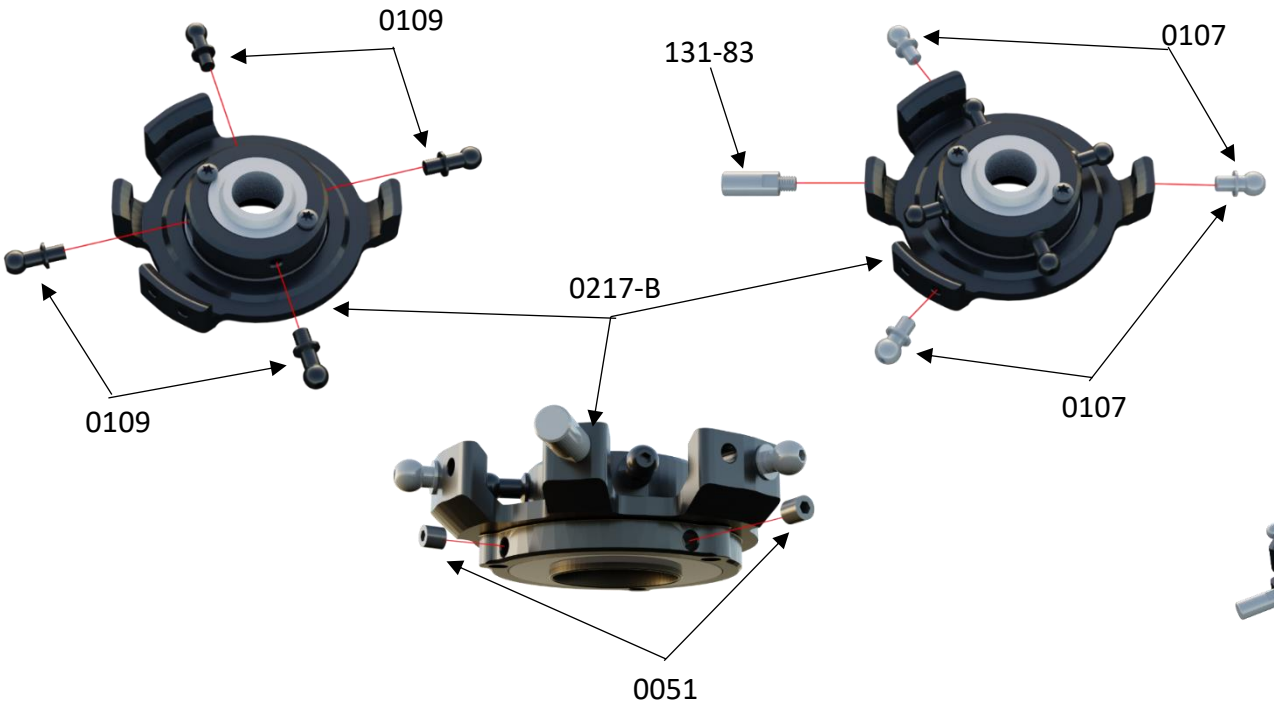
INFORMATION

Important Assembly Tips - Please Read

- Follow the instructions. The methods of construction documented in this manual have been proven to work. Do not rush the build of your model! You have purchased a world class model helicopter kit, take your time and realize that the final result is now up to you. Take the time to fully understand each step and if you are unsure please contact Miniature Aircraft, or a representative.
- Follow the order of assembly. The instructions have been organized into major sections and have been written in such a way that each step builds upon the work done in the previous step. Changing the order of assembly may result in unnecessary steps.
- Be sure not to overtighten bolts as damage to bearings and other components will occur.
- Use thread lock as indicated. Generally any bolt or screw that threads into a metal part requires thread lock. Model helicopters are subject to vibration and failing to use thread lock on any non-locking assembly may result in a part becoming loose or falling off in flight.
- Governor & FBL Setup
  Look at https://shop.miniatureaircraft.de/Settings for example Governor settings

  Recommend head speed
  * 1650rpm for hover
  * 1850rpm for sport flying
  * 2050rpm for 3d and fast forward flight

INFORMATION



0107

M3 x 6mm

0109

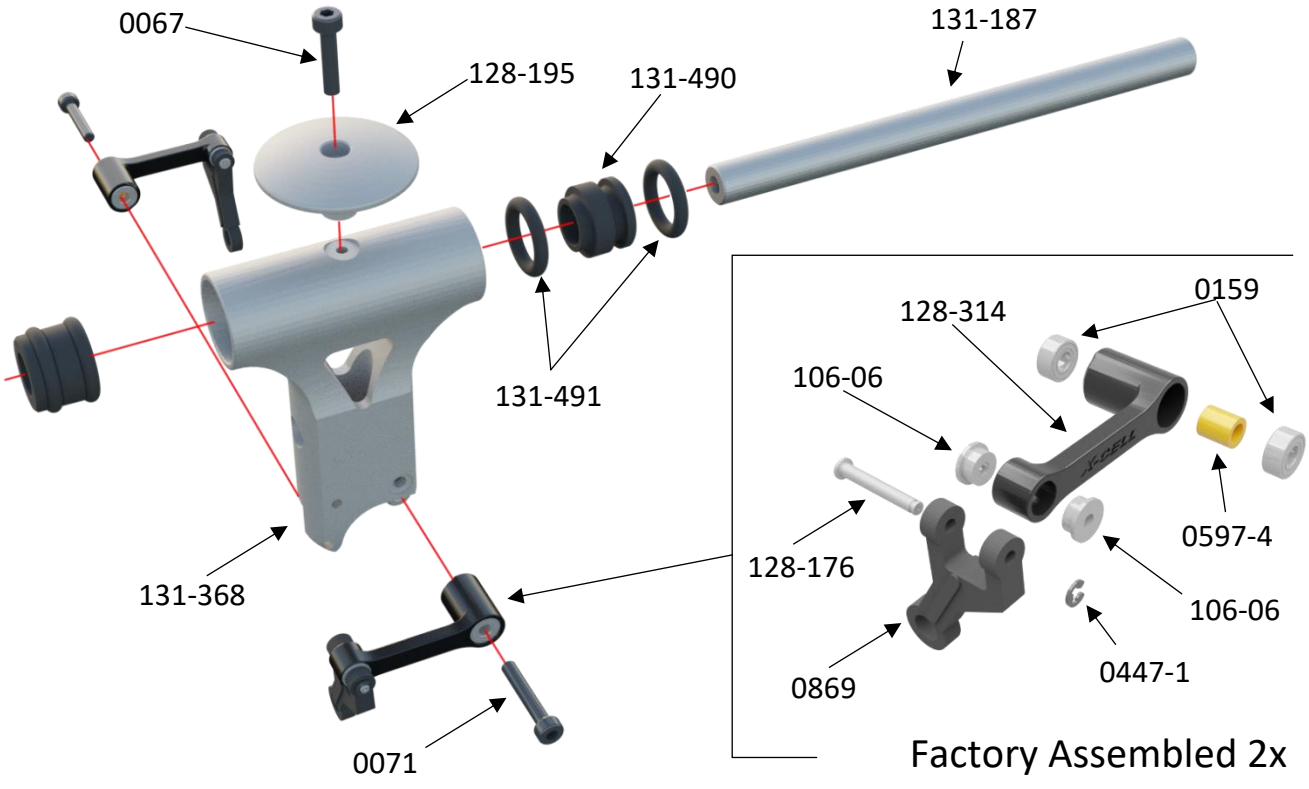
M3 x 8mm

0051

M3 x 3mm

Apply a small amount of medium thread lock when threading into metal parts.

Install MA0051 M3x3 Socket Set Screws only until they bottom out against the lower bearing. Do not overtighten or damage to swashplate bearing will occur. Note: these are used to adjust the bearing tolerance if it develops play over time.



0067

M3 x 14mm

0071

M3 x 18mm

Apply a small amount of medium thread lock when threading into metal parts.

The use of a light grease such as MA3200-11 Tri-Flow Synthetic Grease is required for damper/head axle lubrication and O-rings.

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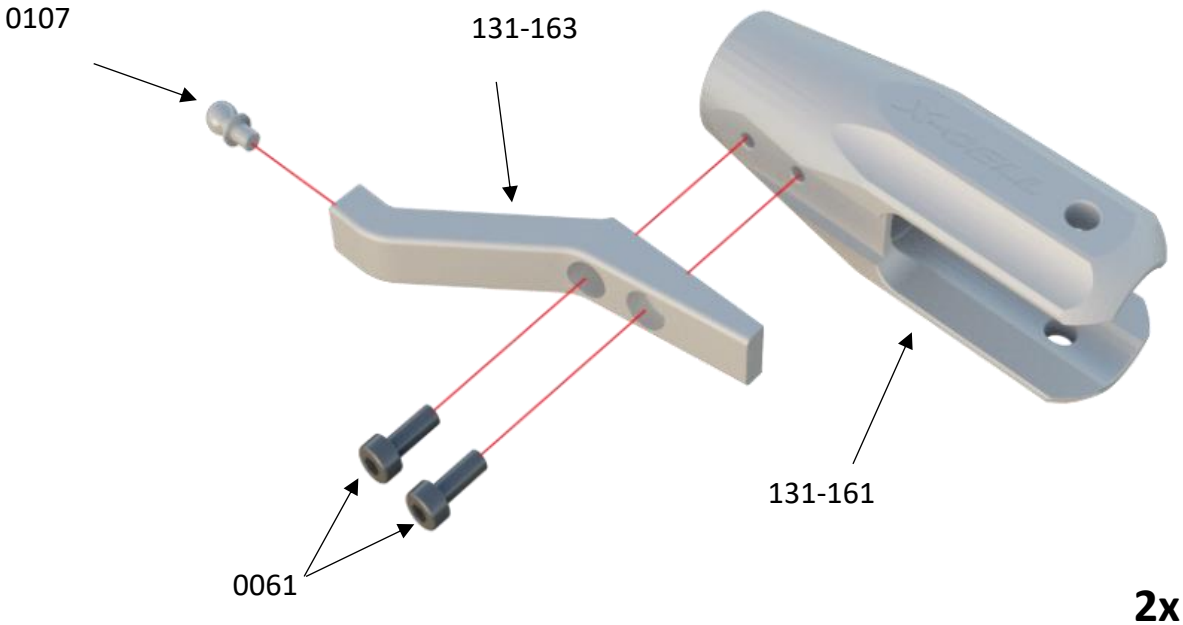
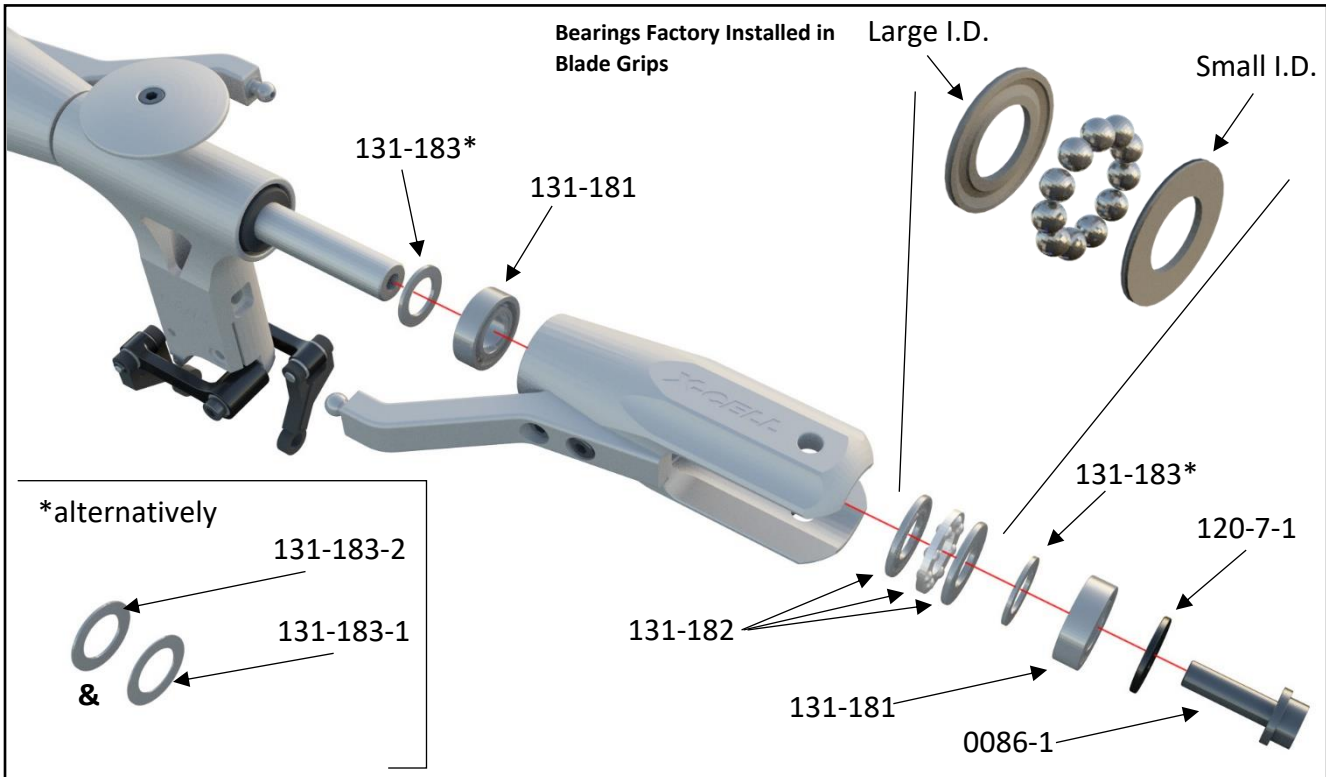


0061

M3 x 8mm

0107

M3 x 6mm



0086-1

M5 x 16mm

131-183

M9 x 14 x .8mm

131-183-1

M9 x 13 x .3mm

131-183-2

M9 x 13 x .5mm

3 piece thrust bearing (MA131-182) outer race with larger I.D. (inside diameter) installs closest to hub.

The use of a light grease such as MA3200-11 Tri-Flow Synthetic Grease is required for thrust bearing lubrication (pre-applied and assembled from factory).

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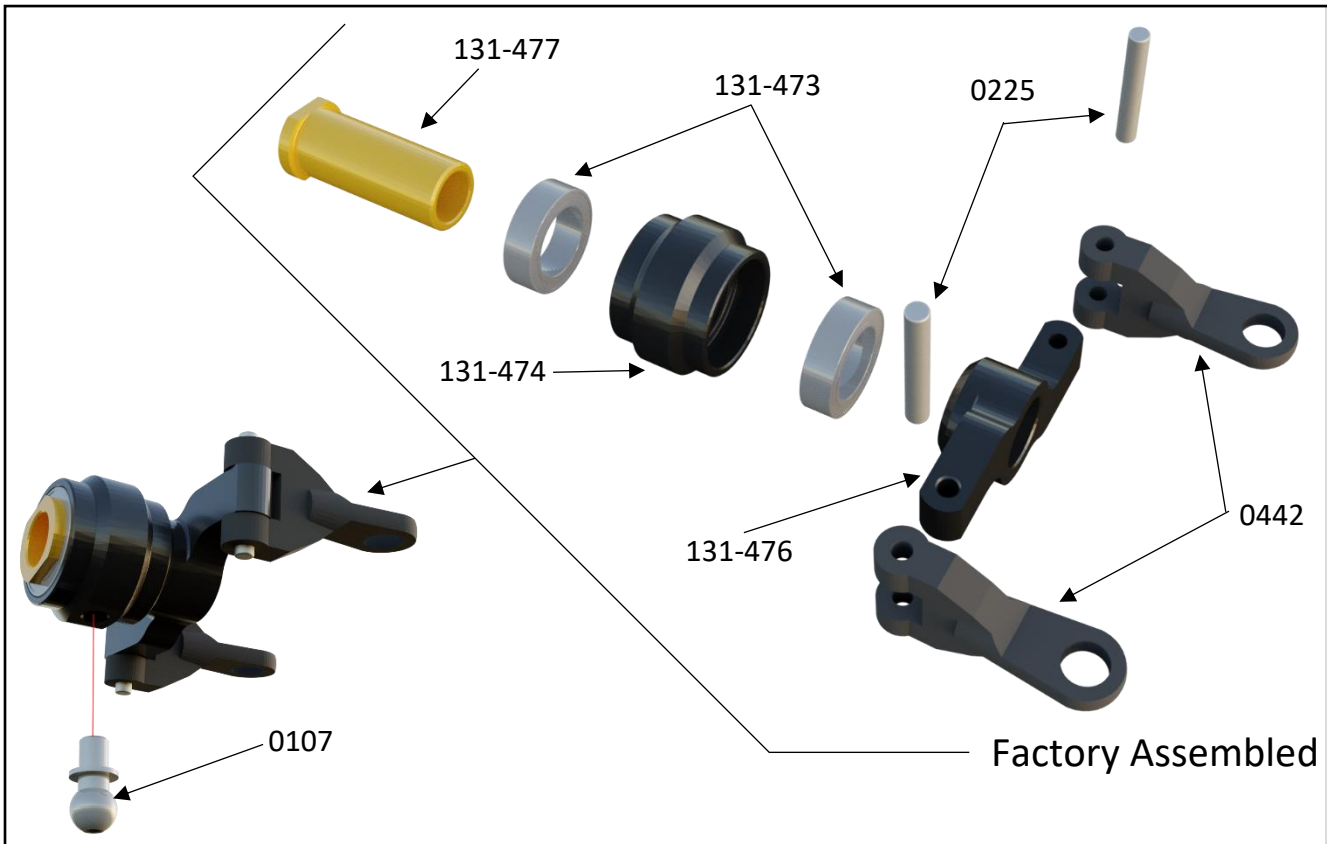


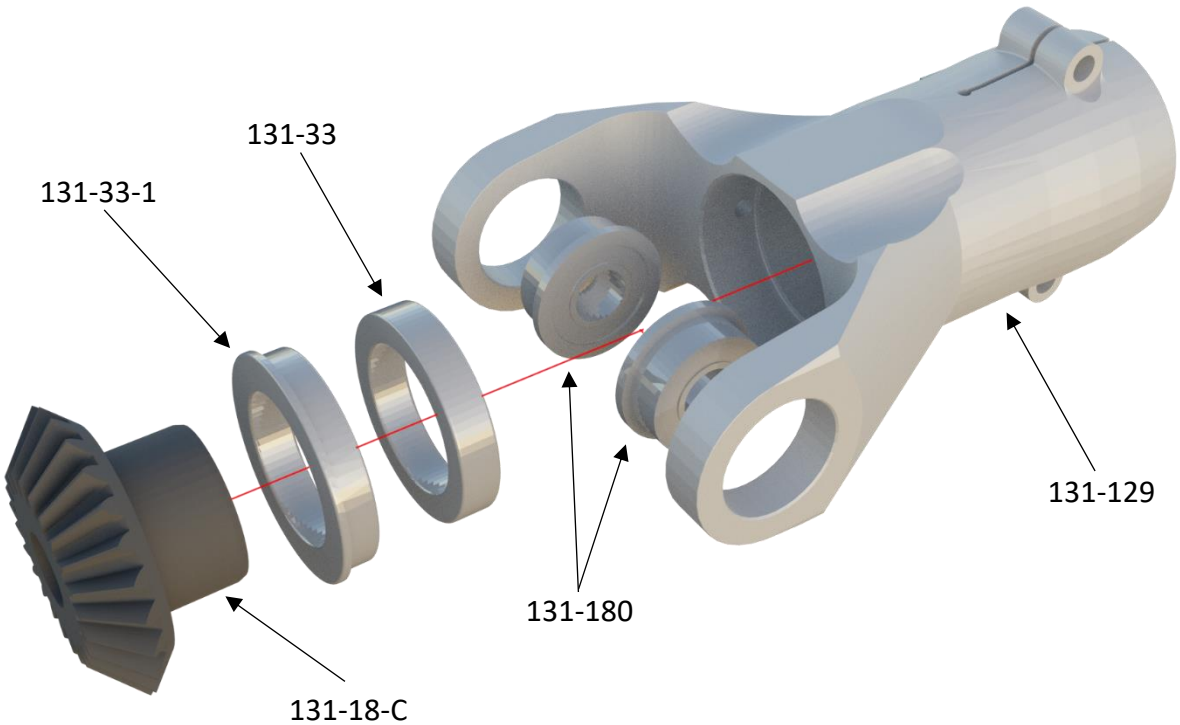
0107

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.

Important: 131-477 and 131-476 have left hand thread

Factory Assembled



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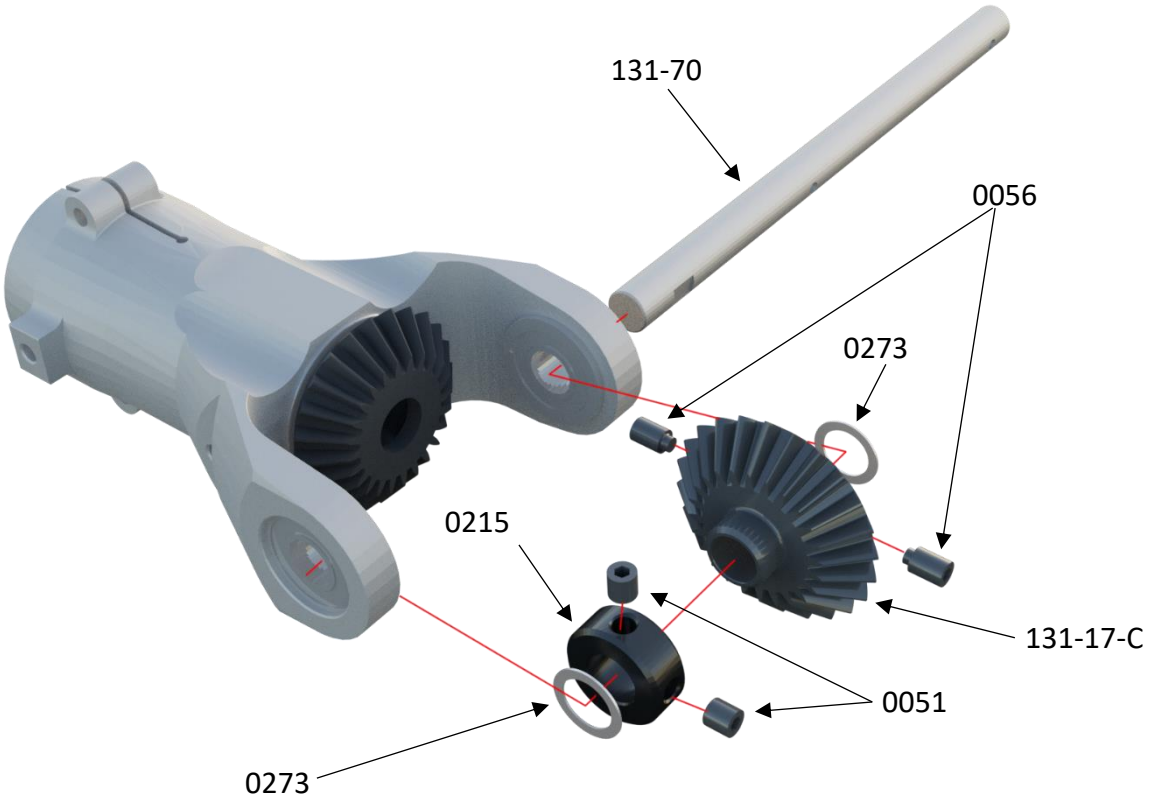


0051

M3 x 3mm

0056

M3 x 5mm

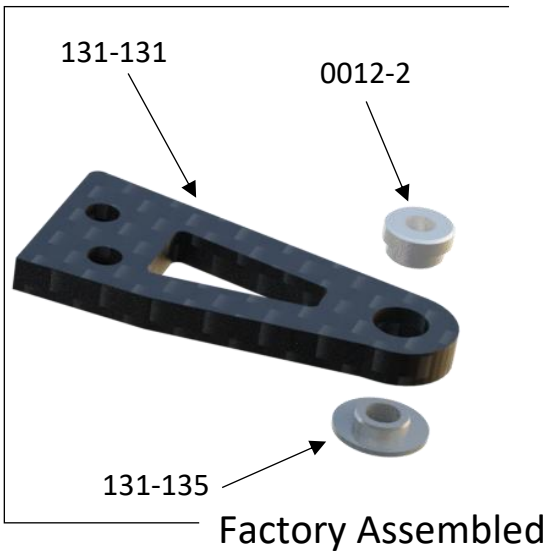
0273

M6 x 10 x .28mm

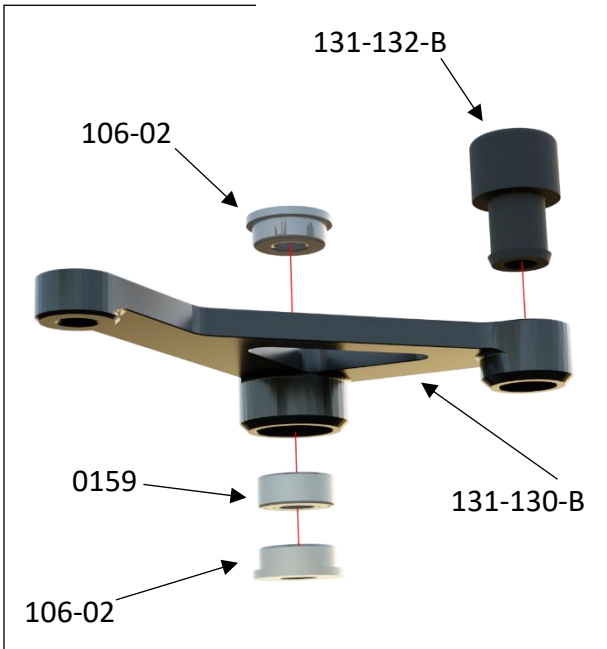
0273-1

M6 x 10 x .1mm

Use 0273-1 / 0273-1 /0273-2 or any combination of them to adjust the gear mesh between 131-17-C and 131-18-C. Because 131-18-C will expand in flight so take care that the gear mesh never is set to zero.



Factory Assembled



Factory Assembled

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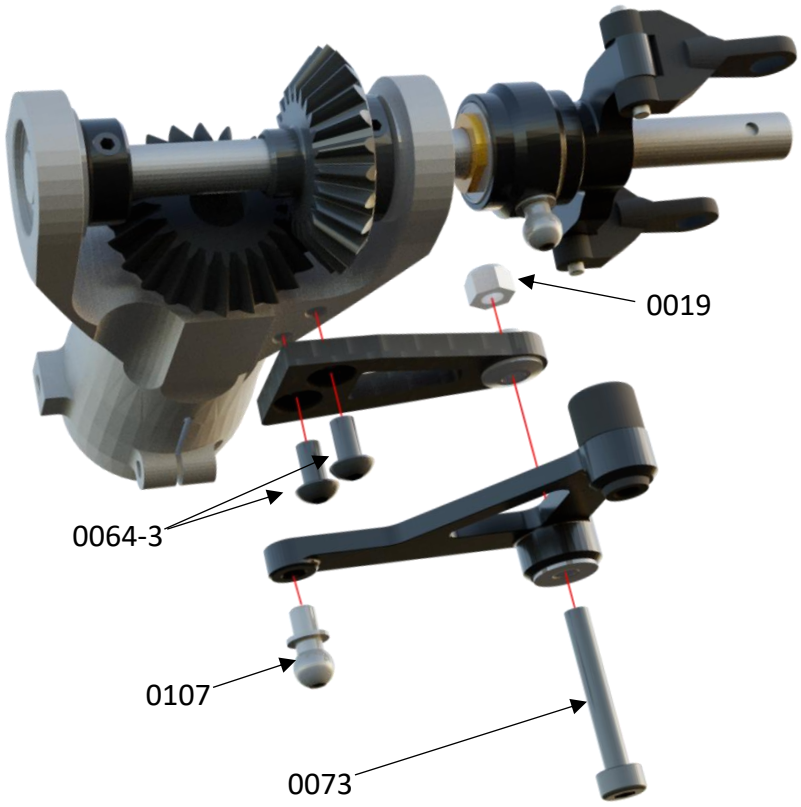


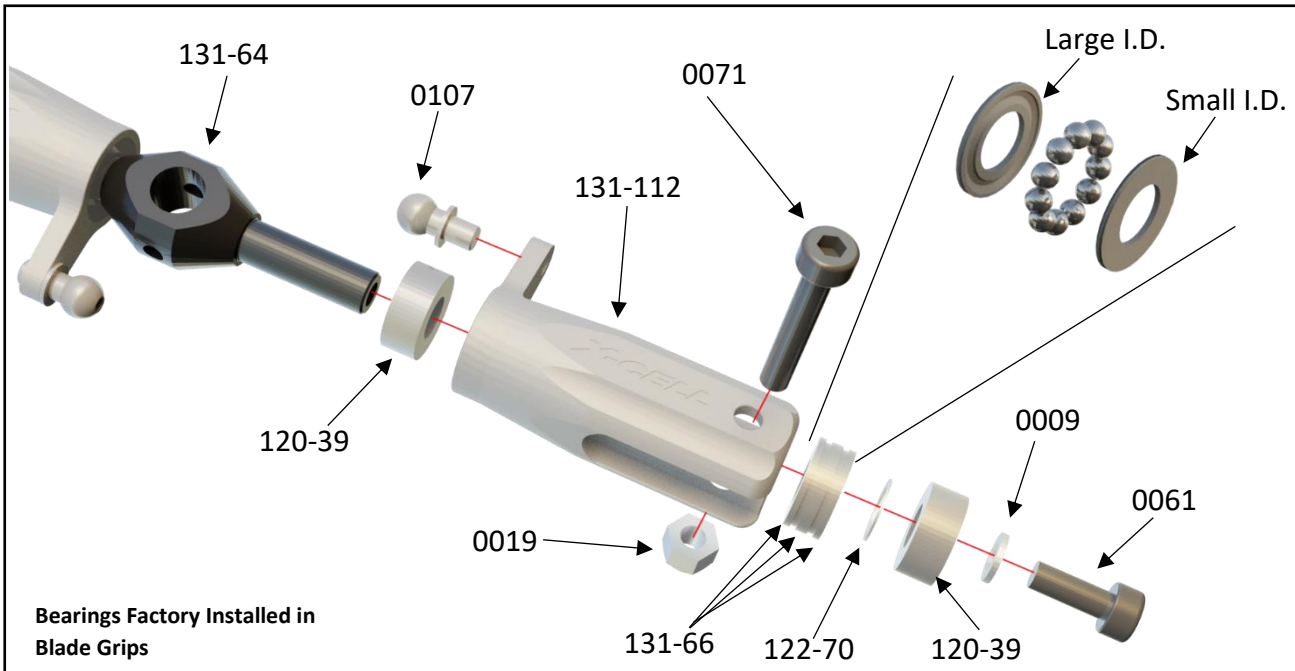
0073
M3 x 20mm

0107
M3 x 6mm

0064-3
M3 x 6mm

0019
M3

The use of a light oil such as MA3200-12 Tri-Flow Oil is required for tail rotor output shaft/pitch slider lubrication.



Bearings Factory Installed in Blade Grips

0071
M3 x 18mm

0107
M3 x 6mm

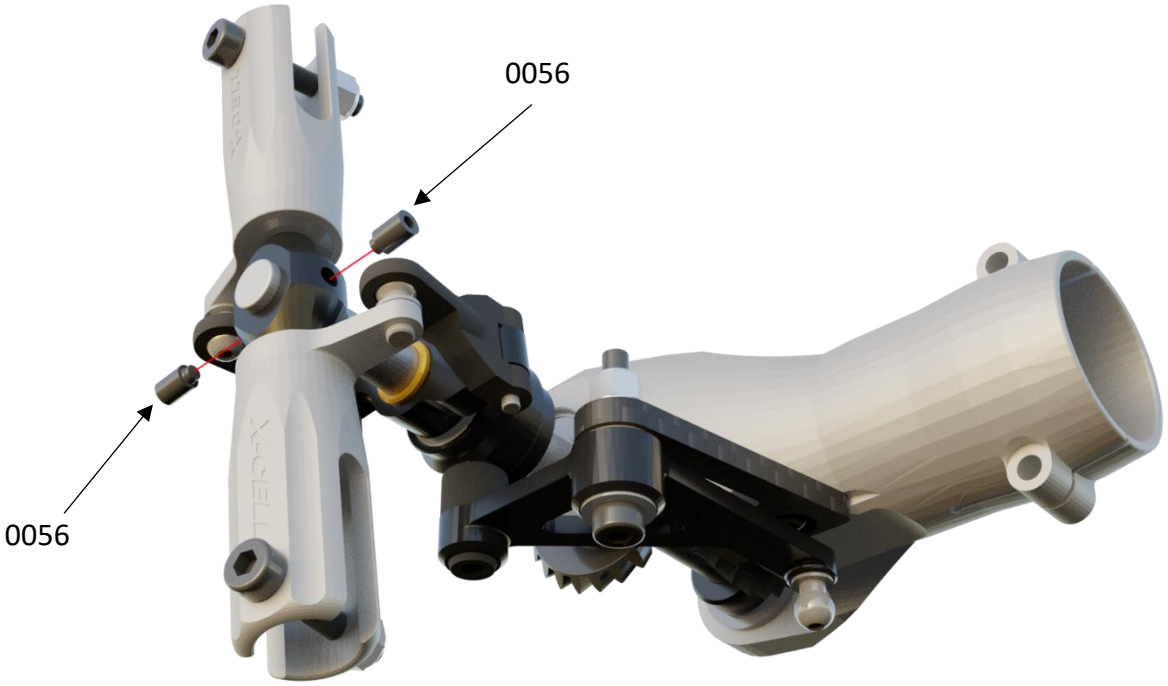
0019
M3

0061
M3 x 8mm

122-70
M5 x .25mm

0009
M3 (small)

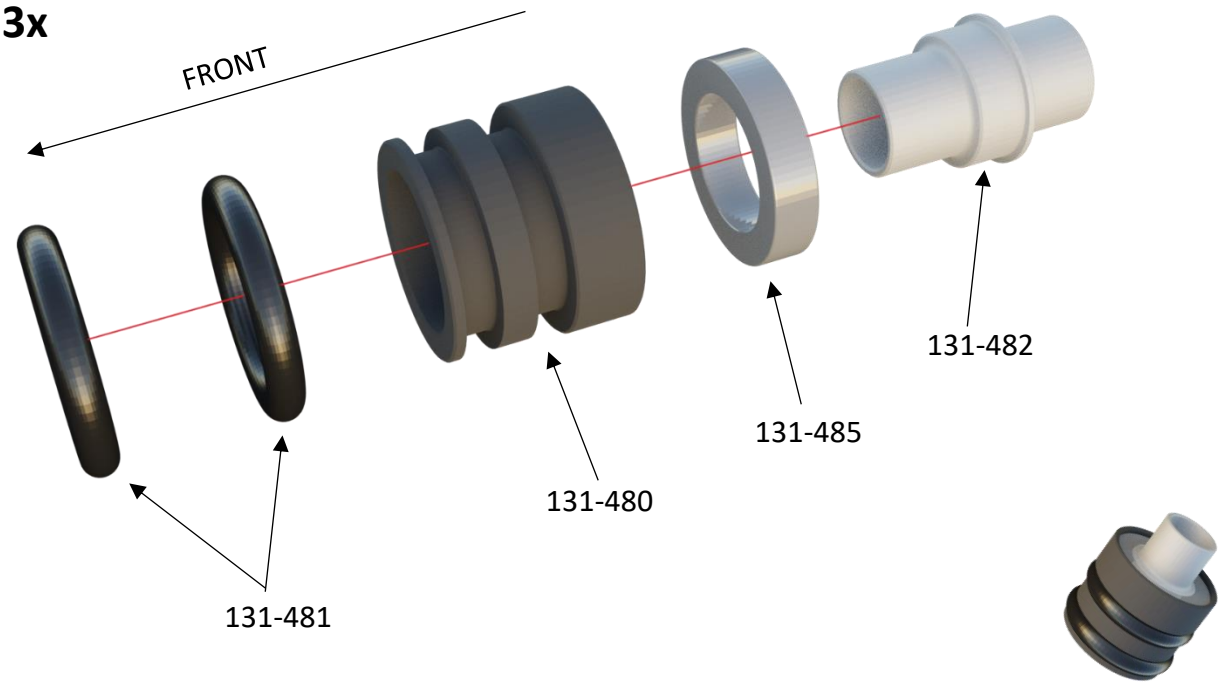
3 piece thrust bearing (MA131-66) outer race with larger I.D. (inside diameter) installs closest to hub.
Grease the center ball cage of the thrust bearing. We recommend using MA3200-11 Tri-Flow synthetic grease.
Only hand tighten MA0061 Socket Bolt until it is moderately tight. Do not overtighten bolt or it may result in fatigue to bolt.



0056

M3 x 5mm

Ensure the dog point tip is seated into the dimples on the tail rotor shaft.



Take care about the orientation of guide edge of the sleeves, one facing to the front, one one facing to the tail.

Install both bearing cup assemblies facing the same direction on torque tube.

Apply a small amount of green Loctite 648 when mounting the bearing cup assemblies on the torque tube.

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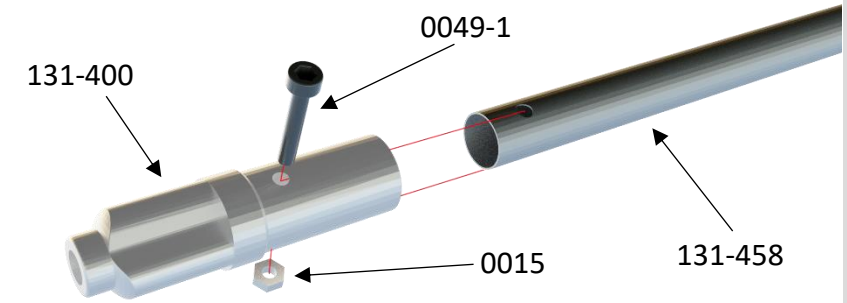
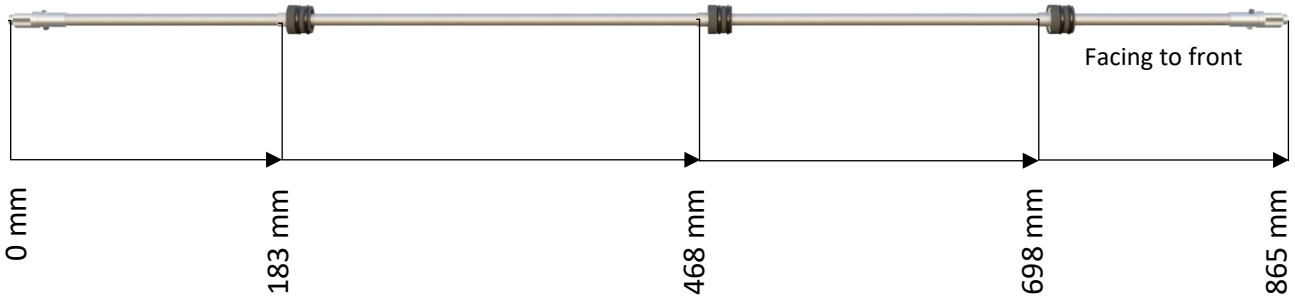


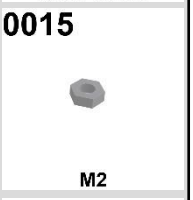


ONLY use Loctite #648 to glue TT ends to tube.

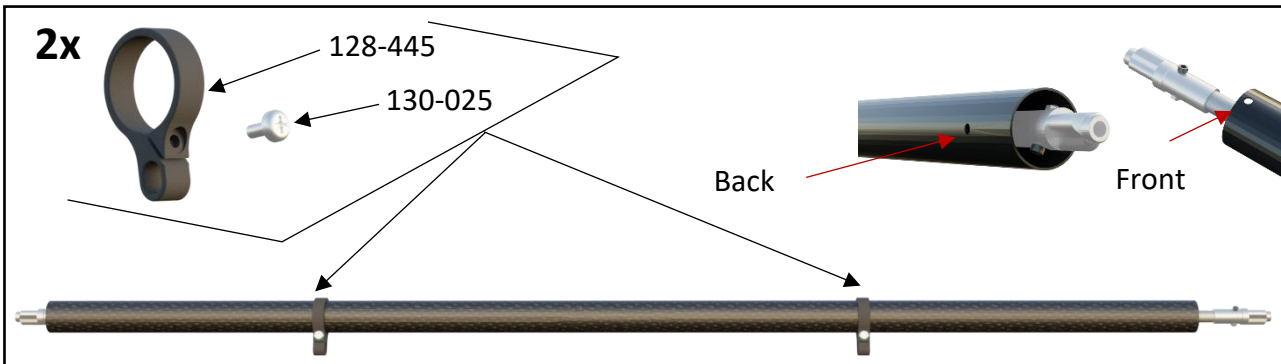
Do not overtighten 0049-1 socket bolts as it is possible to crush torque tube.

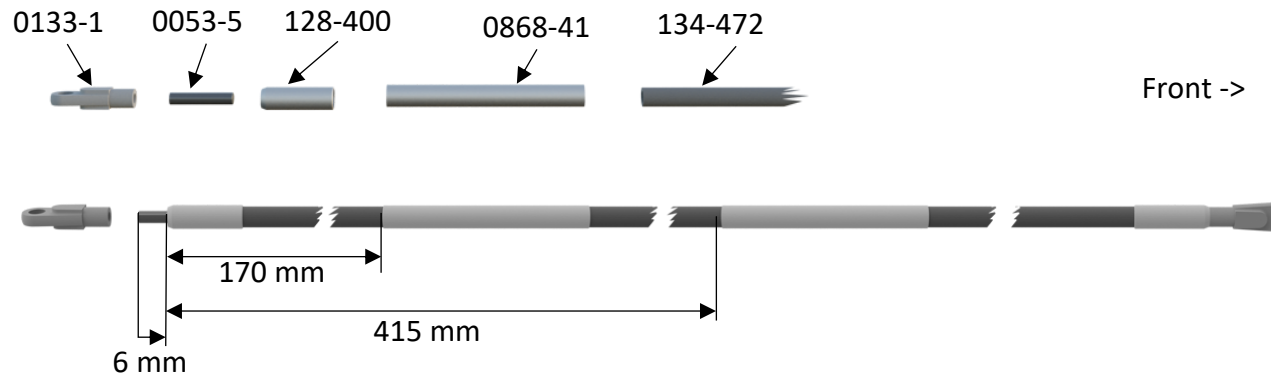
Apply a small amount of green Loctite 648 when mounting the bearing cup assemblies on the torque tube.

NOTE: Carefully glue bearing assemblies to torque tube making sure bearing locations are NOT equal distances from torque tub ends. Allow Loctite 648 to dry (about 2 hours) before installing into tail boom.



Apply a small amount of medium thread lock when threading into metal parts.





Pour some light oil such or tallow into tail boom to ease installation of torque tube assembly.Install the torque tube with the open ends of the bearing cups towards the front of the tail boom assembly.
Use high quality epoxy to glue 128-400 and 0053-5 at the carbon push rod.

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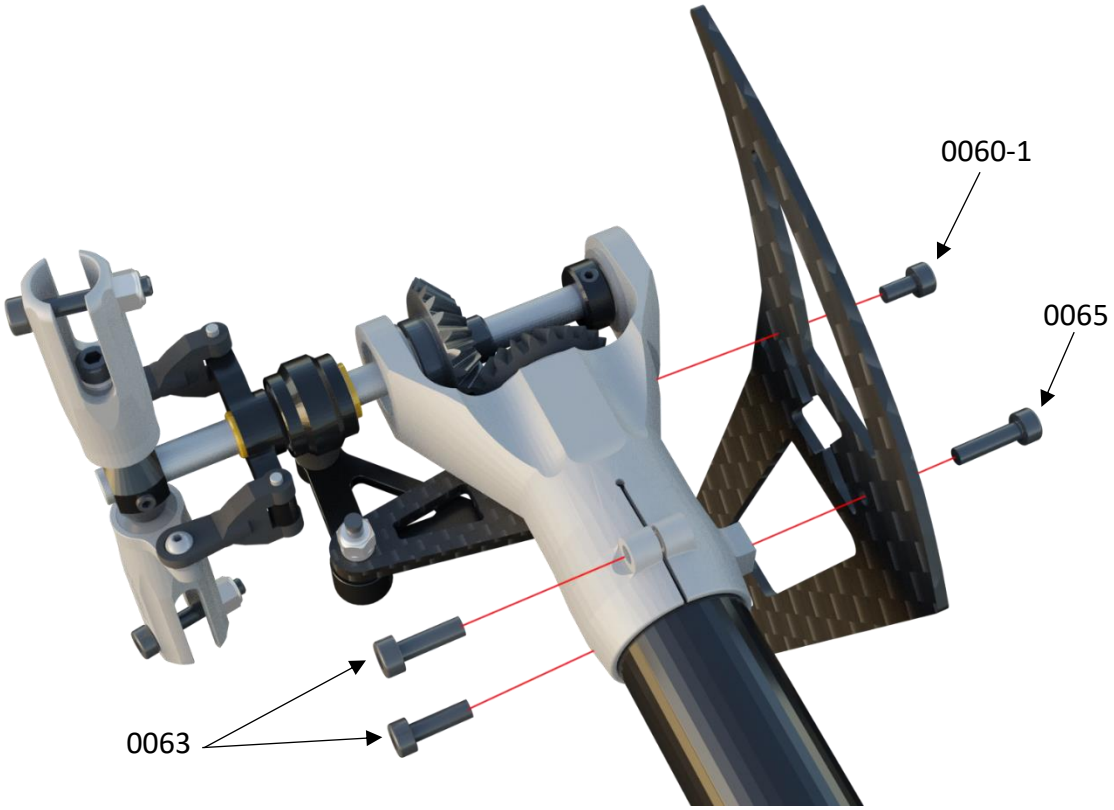


0060-1

M3 x 6mm

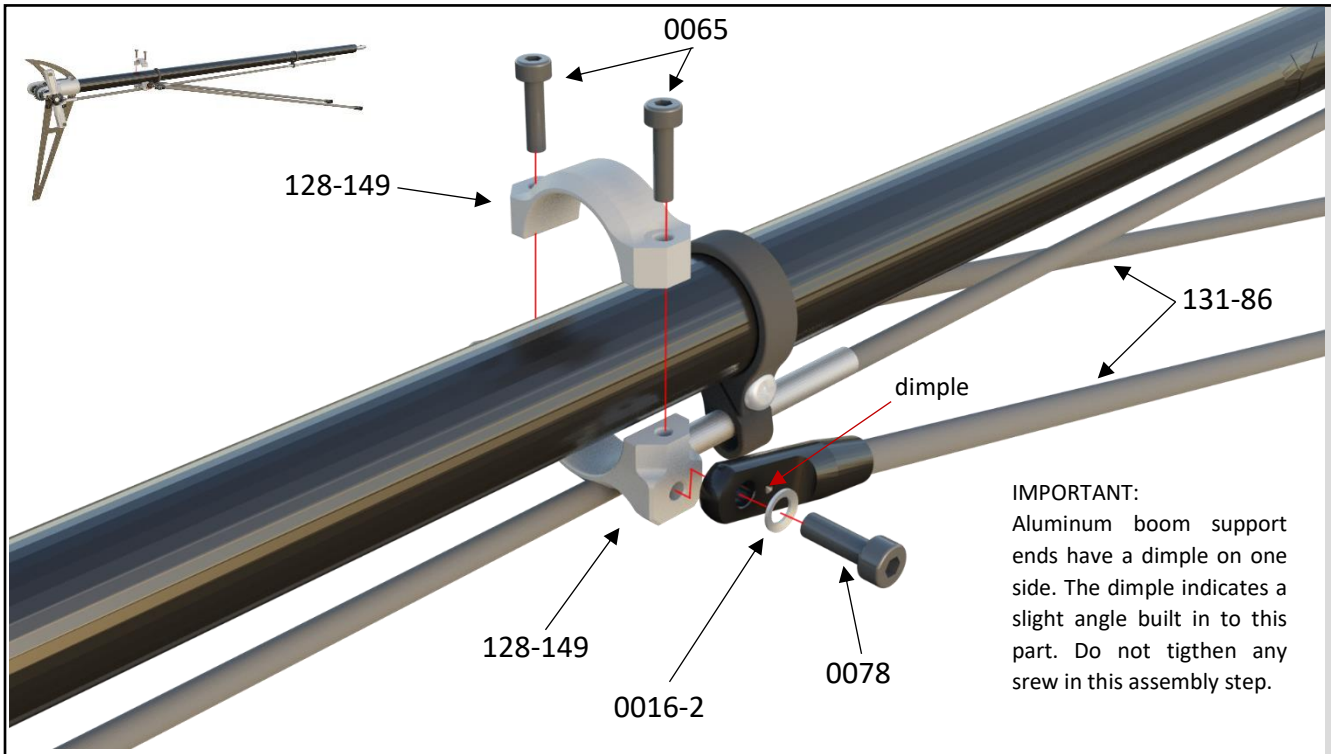
0063

M3 x 10mm

0065

M3 x 12mm

Apply a small amount of medium thread lock when threading into metal parts.



IMPORTANT:
Aluminum boom support ends have a dimple on one side. The dimple indicates a slight angle built in to this part. Do not tigthen any srew in this assembly step.

0065

M3 x 12mm

0078

M4 x 12mm

0016-2

M4

Not tighten in this step the screws 0065 and 0078.

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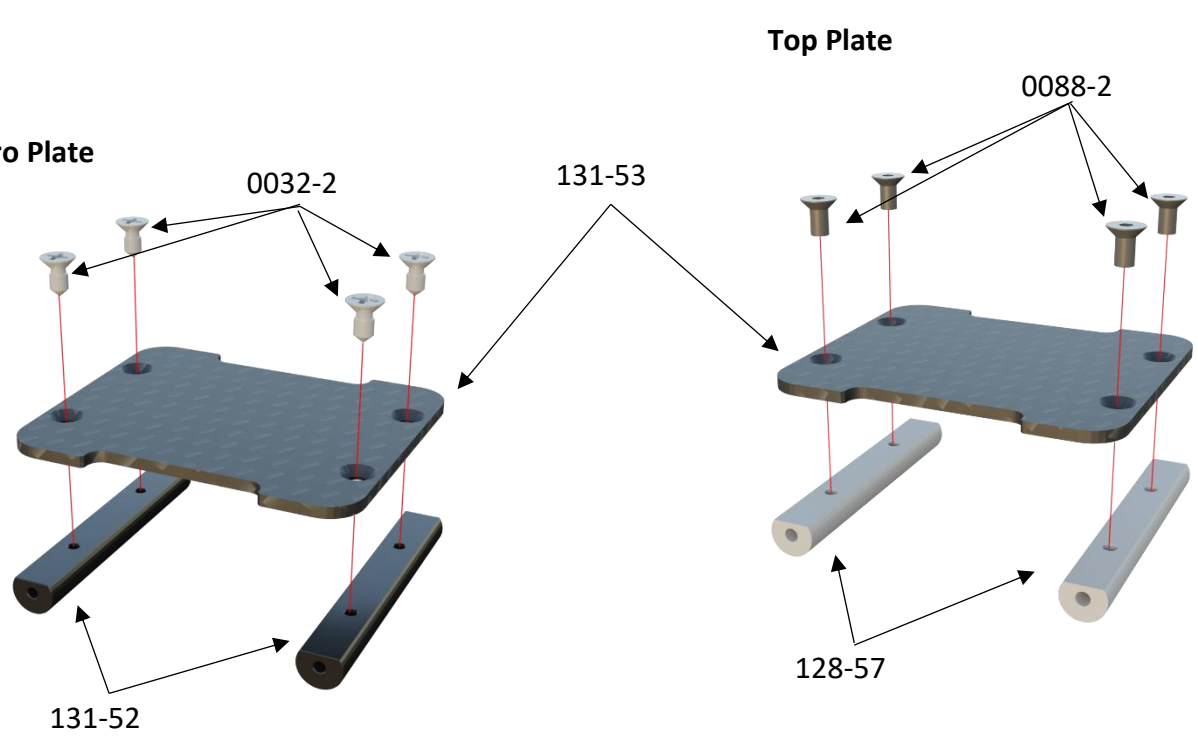


0088-2

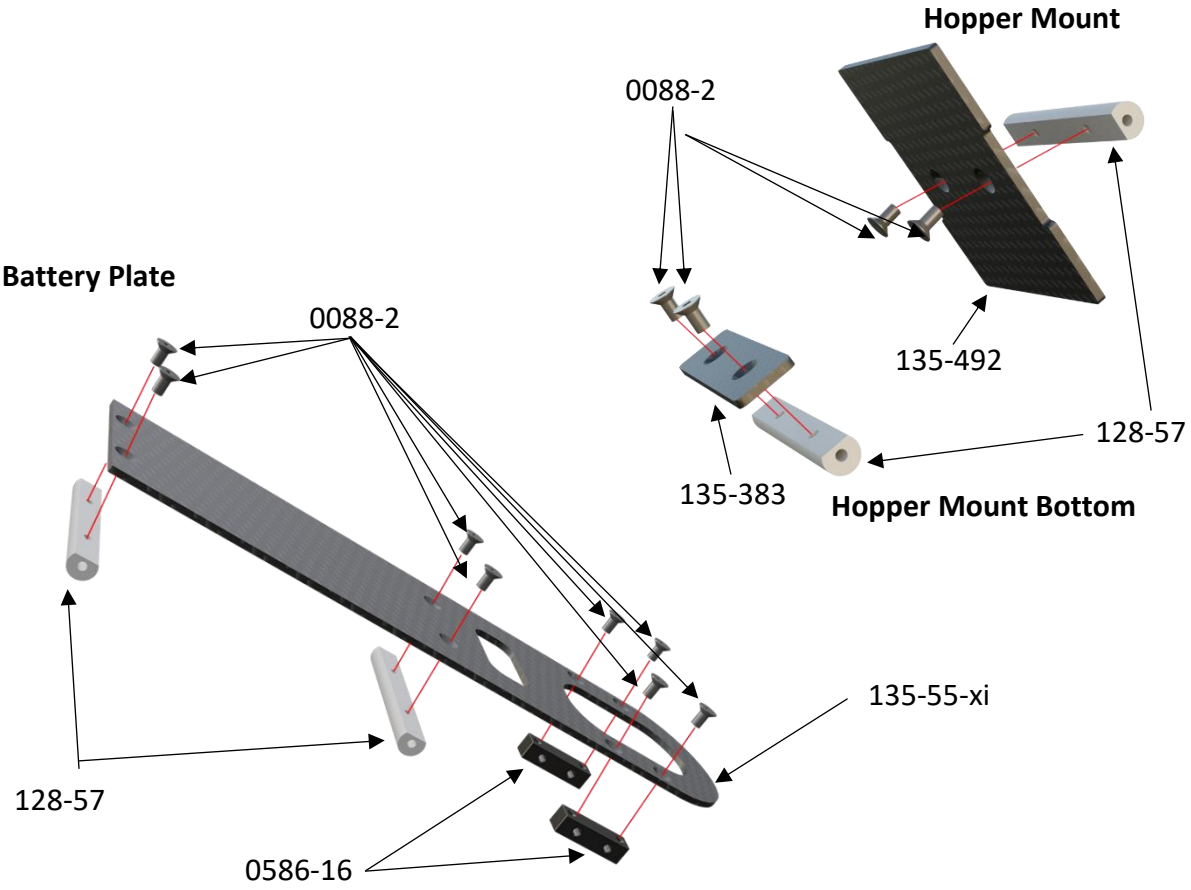
M3 x 6mm

0032-2

M3 x 8mm

Apply a small amount of medium thread lock when threading into metal parts.

Do not overtighten MA0032-2 Self Tapping Screw into MA131-52 Delrin Tray Mount.



0088-2

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.

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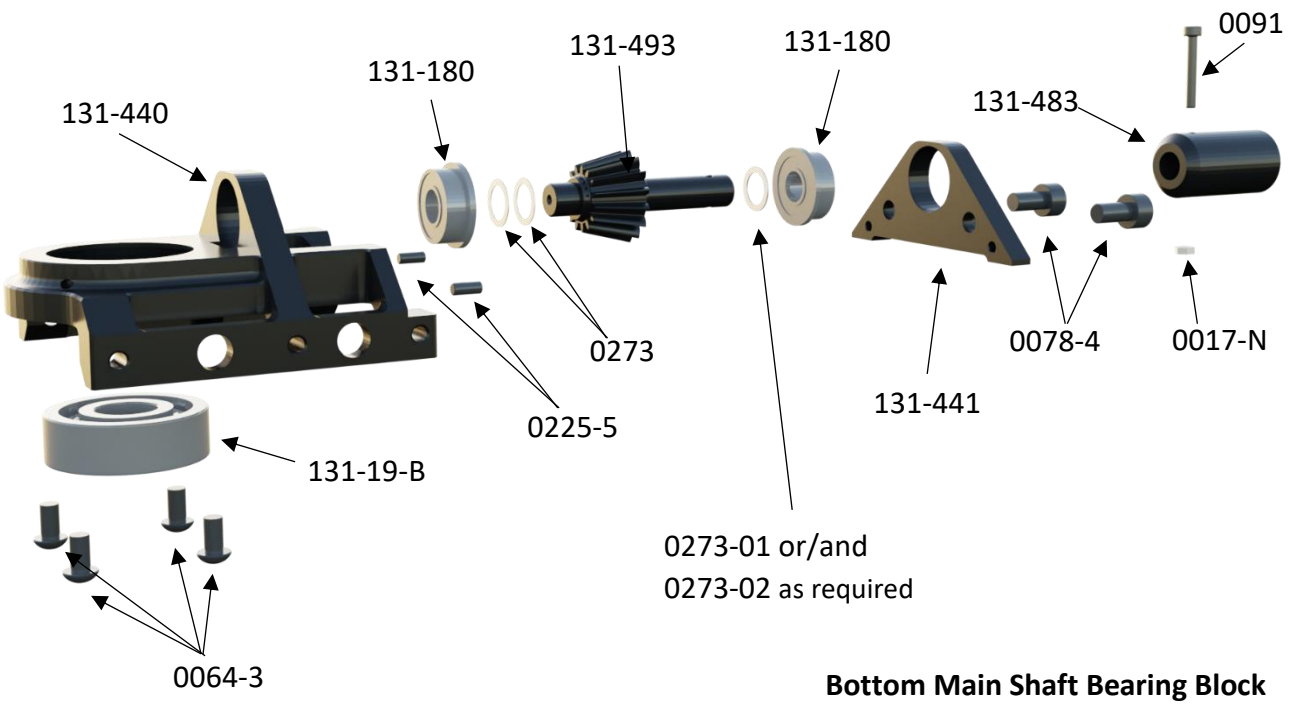
Factory Assembled



Bottom Main Shaft Bearing Block

0078-4

M4 x 8mm

0064-3

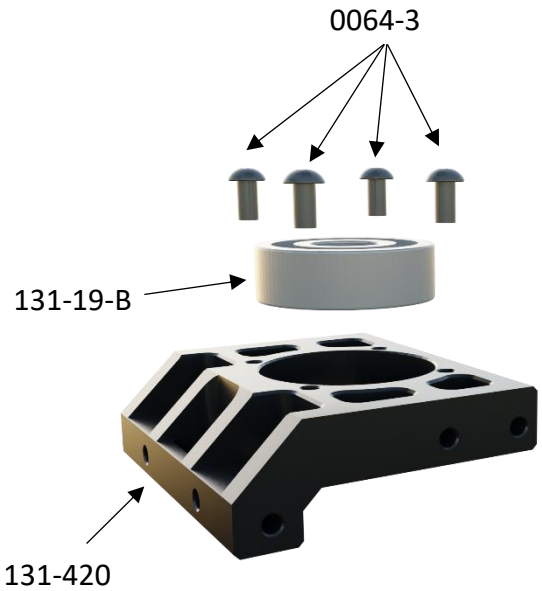
M3 x 6mm

0091

M3 x 16mm

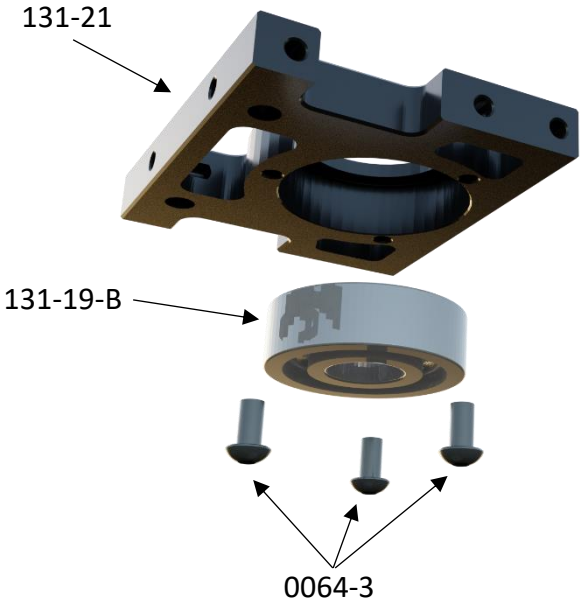
Apply a small amount of medium thread lock when threading into metal parts.

Factory Assembled



Middle Main Shaft Bearing Block

Upper Main Shaft Bearing Block



Factory Assembled

NOTE:
Upper bearing block features smooth, wrench access hole

Middle bearing block features threaded holes.

0064-3

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.

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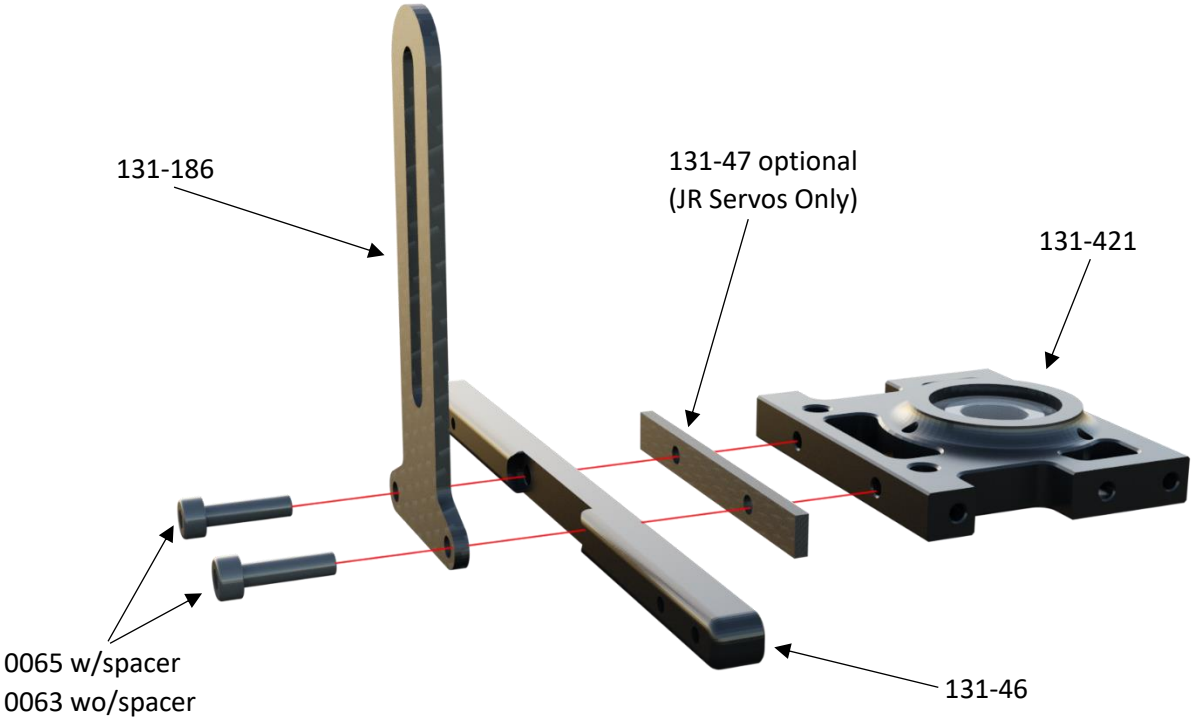


0063

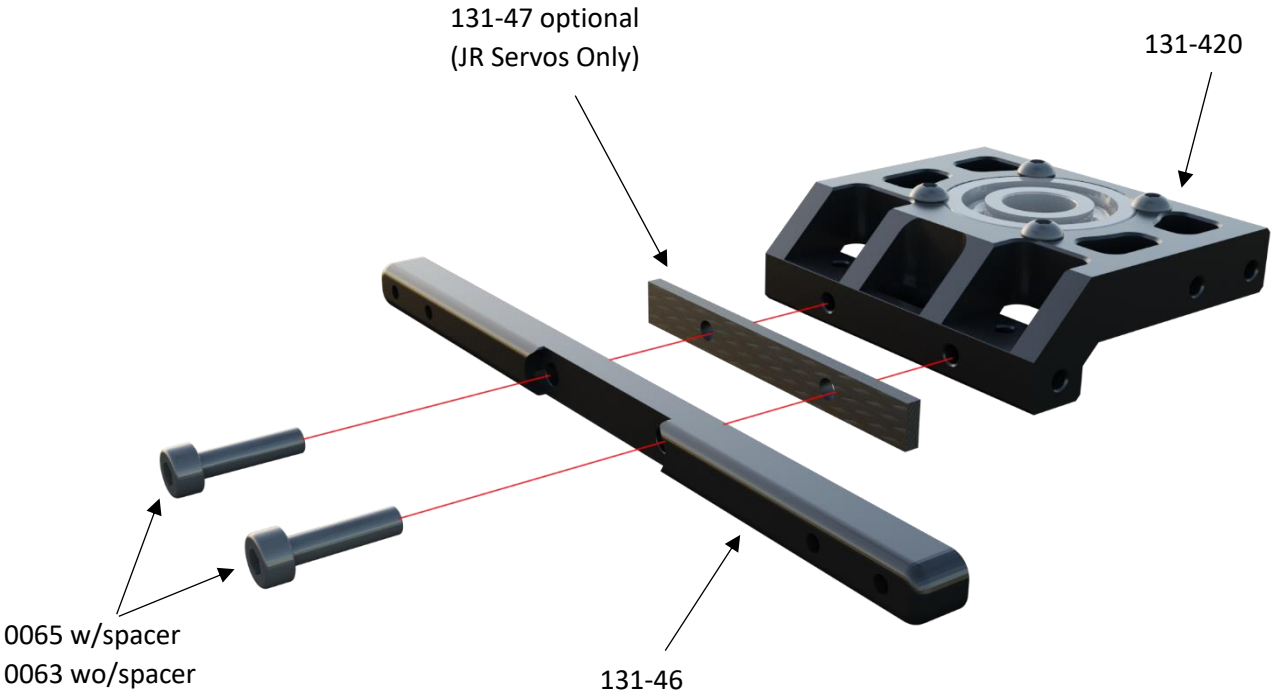
M3 x 10mm

0065

M3 x 12mm

Apply a small amount of medium thread lock when threading into metal parts.

If using JR brand servos or other “tall” servos, MA131-47 Servo Rail Spacers are included for proper servo linkage alignment, if required.



0063

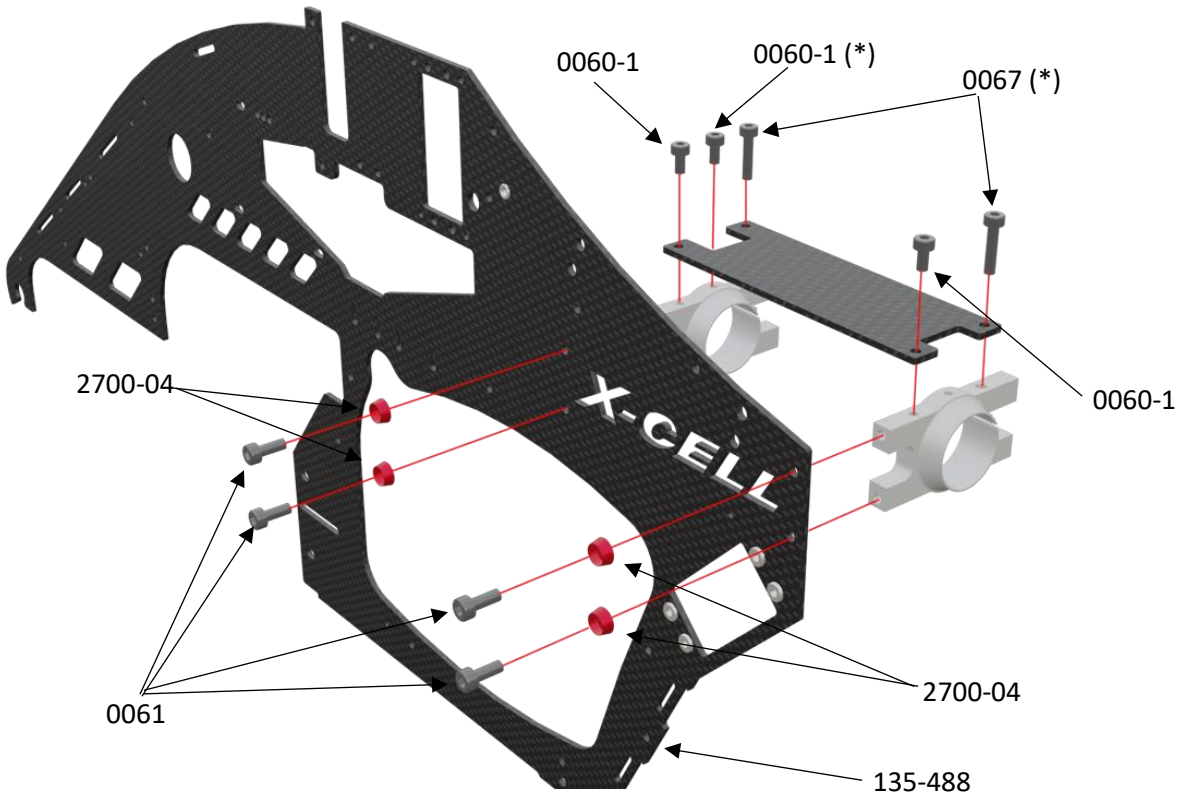
M3 x 10mm

0065

M3 x 12mm

Apply a small amount of medium thread lock when threading into metal parts.

If using JR brand servos or other “tall” servos, MA131-47 Servo Rail Spacers are included for proper servo linkage alignment, if required.



(*) do not tigthen the screws at this assembly step

0061

M3 x 8mm

0063

M3 x 10mm

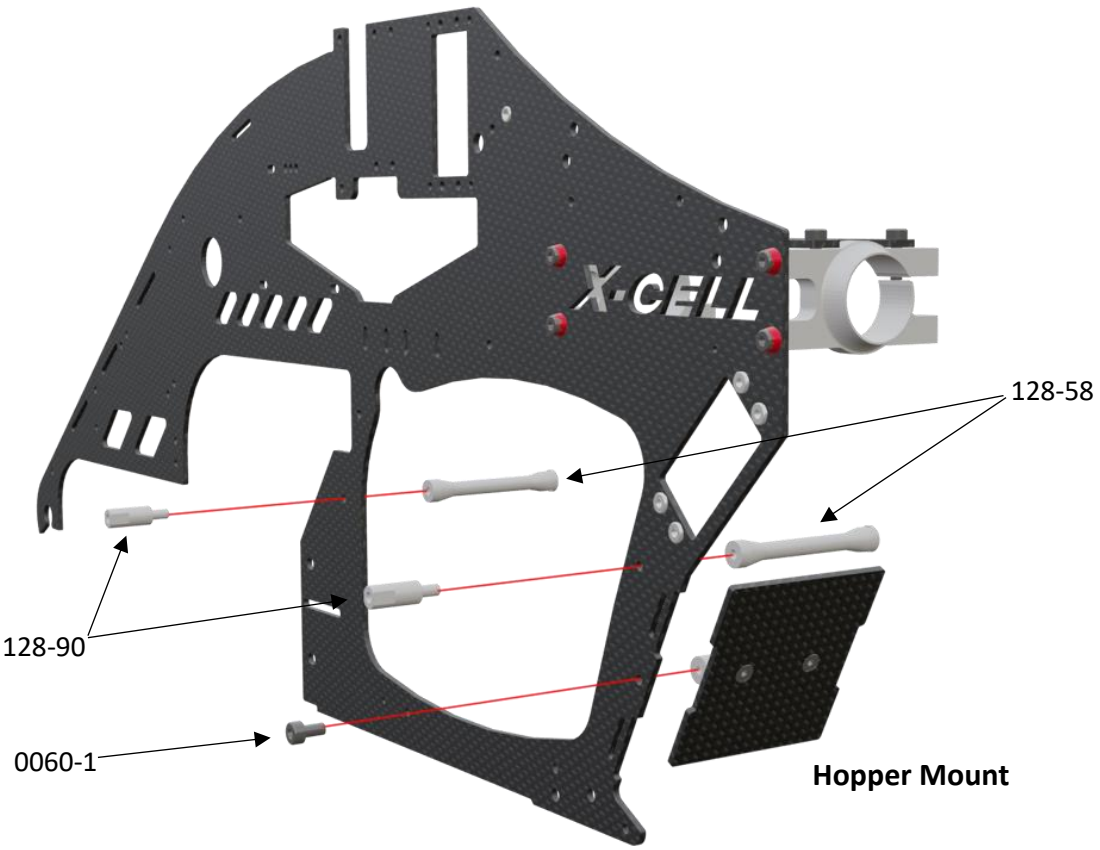
0067

M3 x 14mm

2700-04

M3 (red)

Apply a small amount of medium thread lock when threading into metal parts.

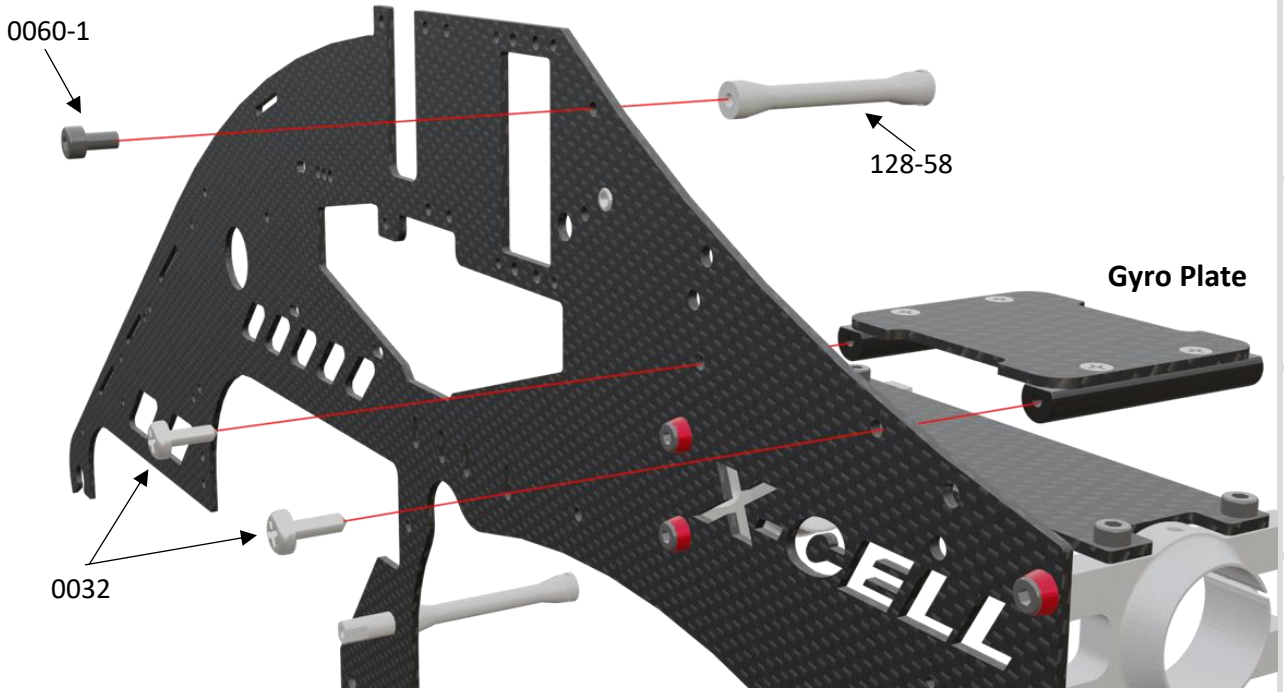


Hopper Mount

0063

M3 x 10mm

Apply a small amount of medium thread lock when threading into metal parts.



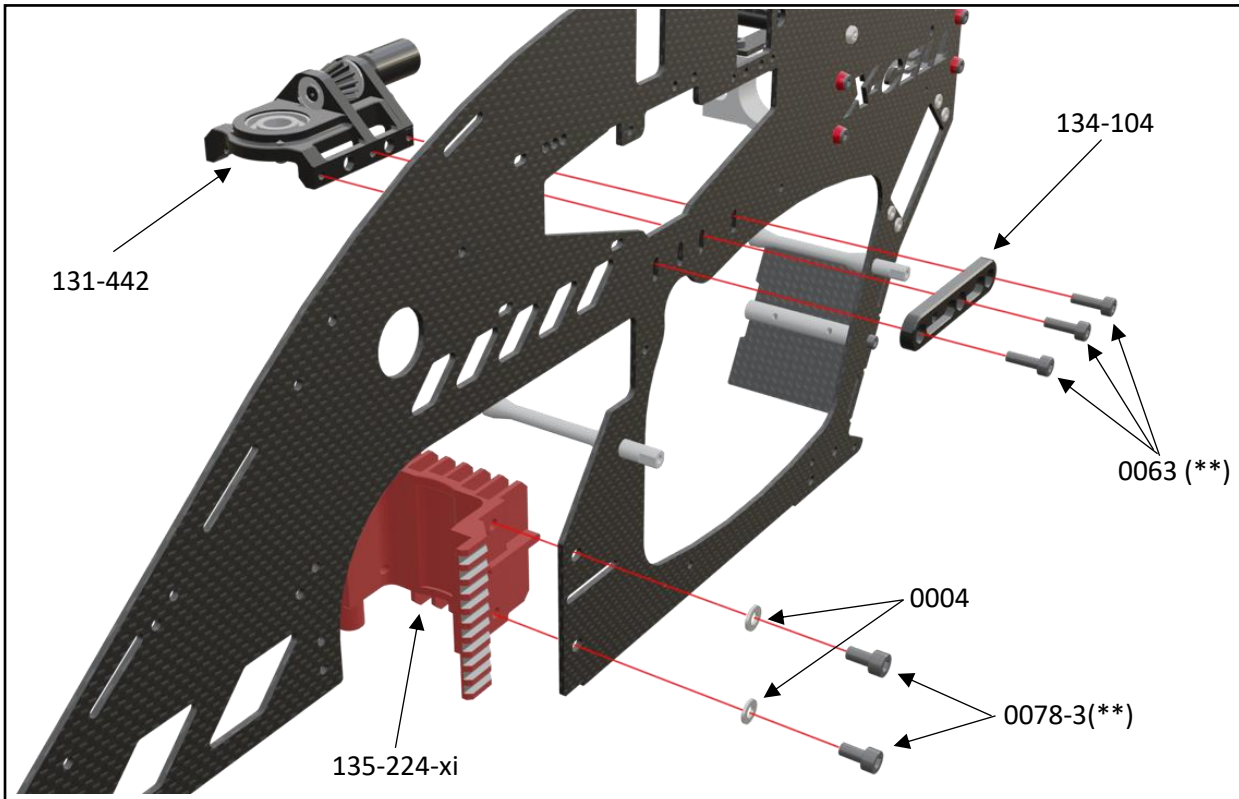
0063

M3 x 10mm

0032

M2.9 x 9.5mm

Apply a small amount of medium thread lock when threading into metal parts.



0063

M3 x 10mm

0078-3

M4 x 6mm

0004

M4

Apply a small amount of medium thread lock when threading into metal parts.

Do not supply thread lock at screws marked with a (**) at this assembly step.
They will be removed again later.

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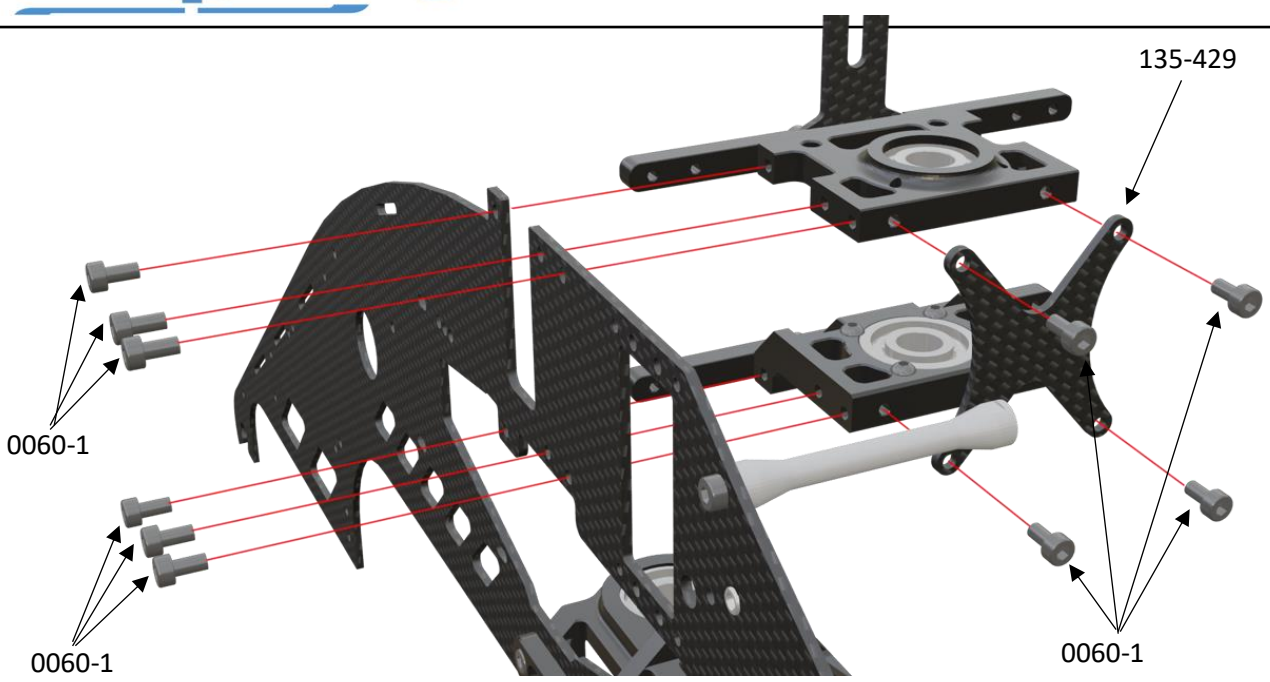
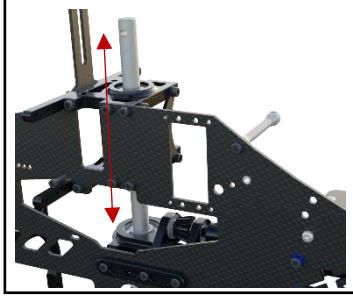


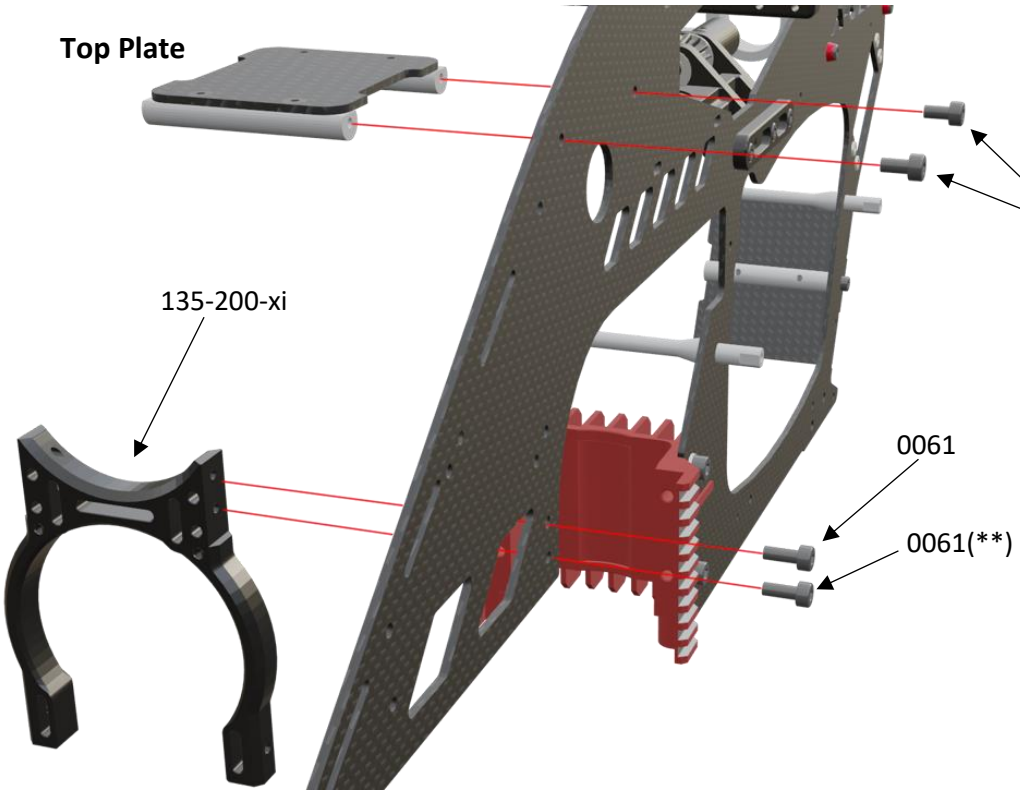


Use the mainshaft when you mount the bearing blocks. The main rotor shaft must pass smoothly through the bearing blocks when the screws are tightened.

0060-1

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.



0060-1

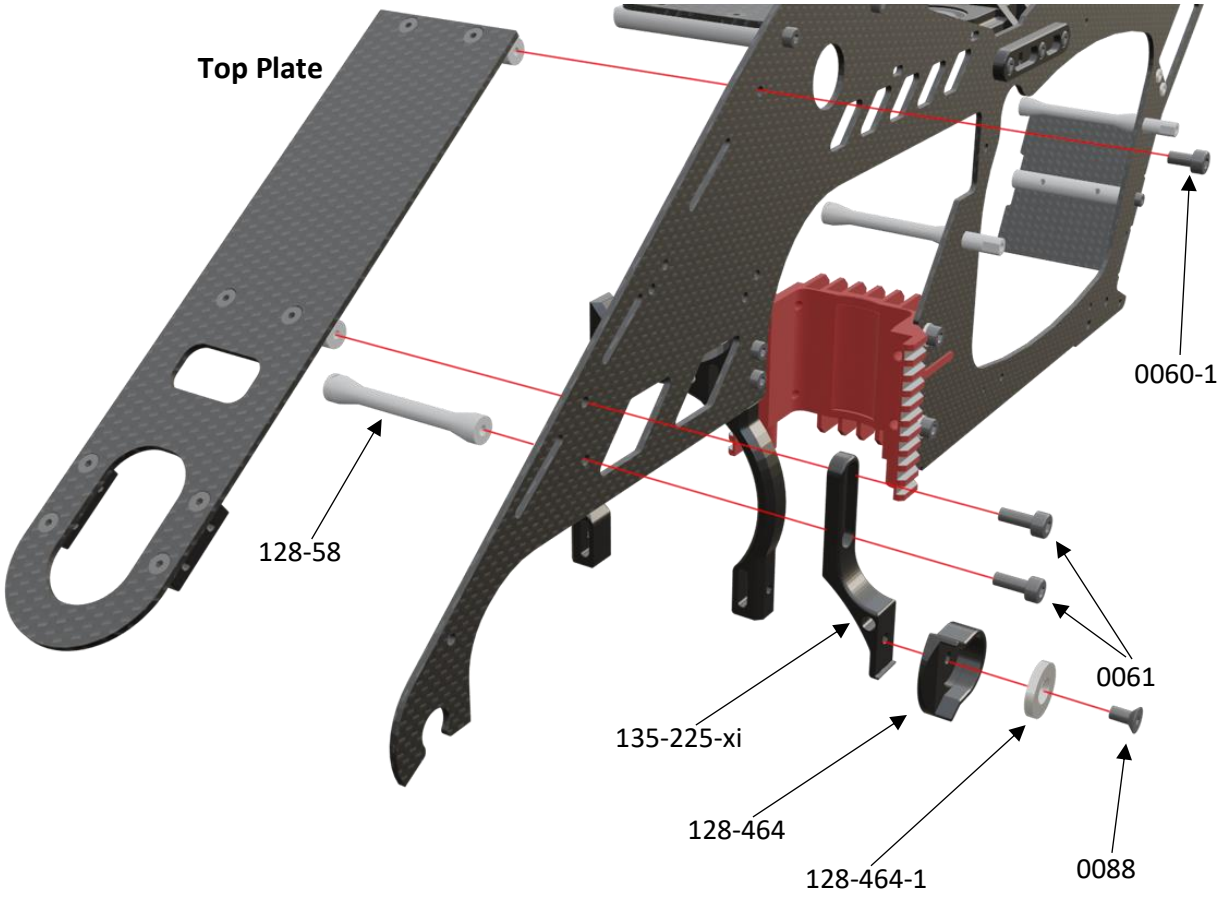
M3 x 6mm

0061

M3 x 8mm

Apply a small amount of medium thread lock when threading into metal parts.

Do not supply thread lock at screws marked with a (**) at this assembly step.
They will be removed again later.



0061

M3 x 8mm

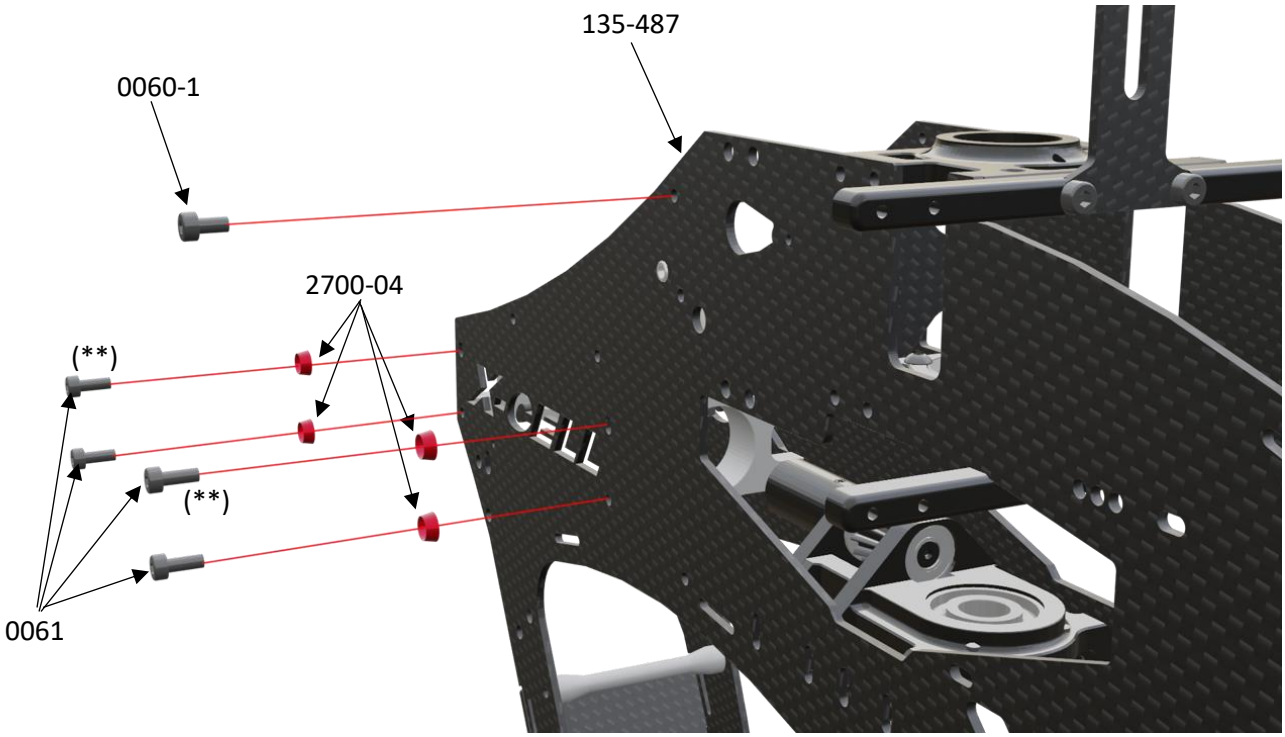
0060-1

M3 x 6mm

0088

M3 x 8mm

Apply a small amount of medium thread lock when threading into metal parts.



0061

M3 x 8mm

0060-1

M3 x 6mm

2700-04

M3 (red)

Apply a small amount of medium thread lock when threading into metal parts.

Do not supply thread lock at screws marked with a (**) at this assembly step.
They will be removed again later.

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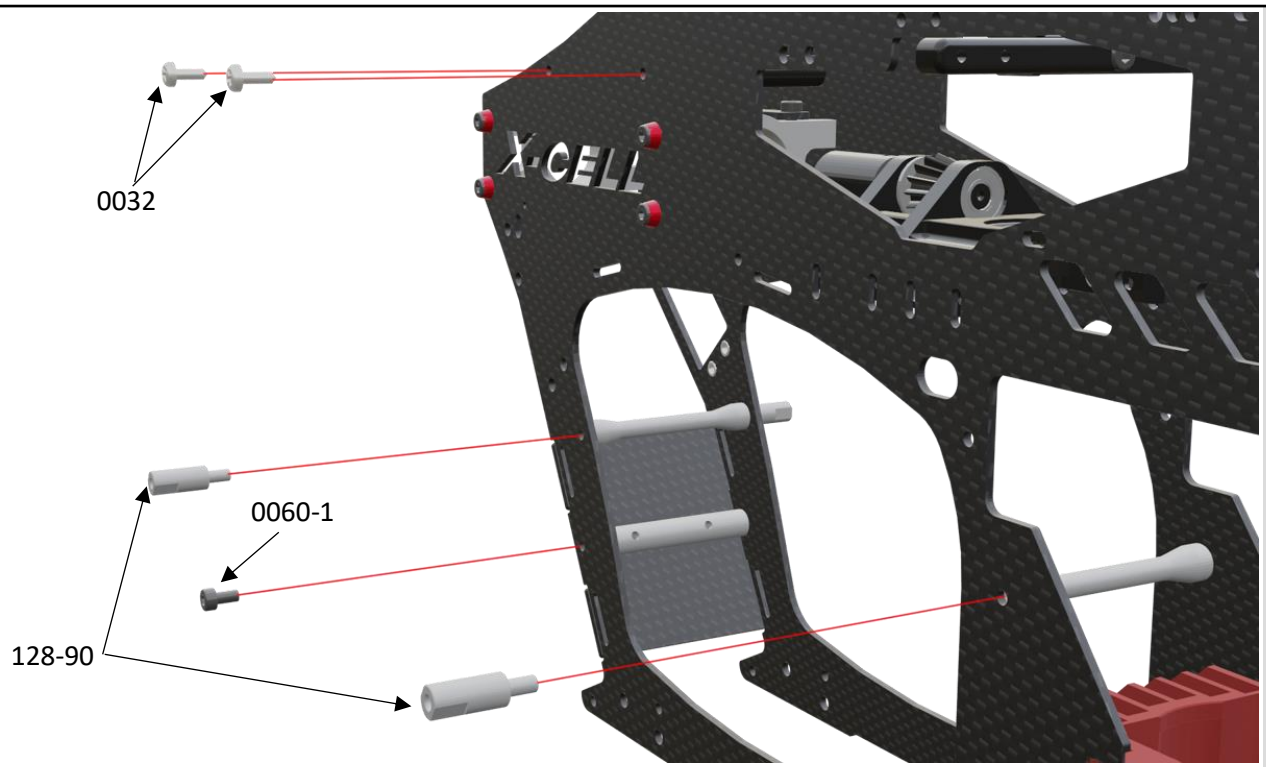


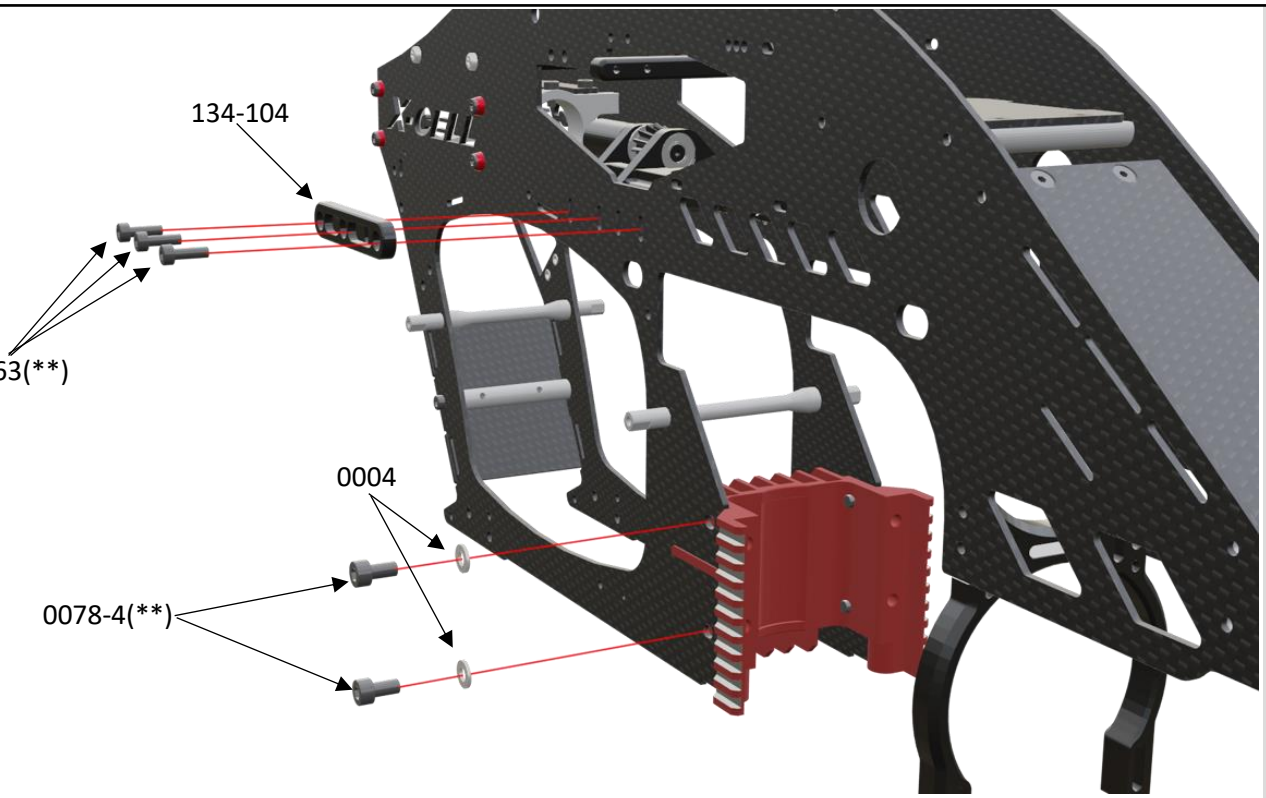
0060-1

M3 x 6mm

0032

M2.9 x 9.5mm

Apply a small amount of medium thread lock when threading into metal parts.



0063

M3 x 10mm

0078-4

M4 x 8mm

0004

M4

Apply a small amount of medium thread lock when threading into metal parts.

Do not supply thread lock at screws marked with a (**) at this assembly step.
They will be removed again later.

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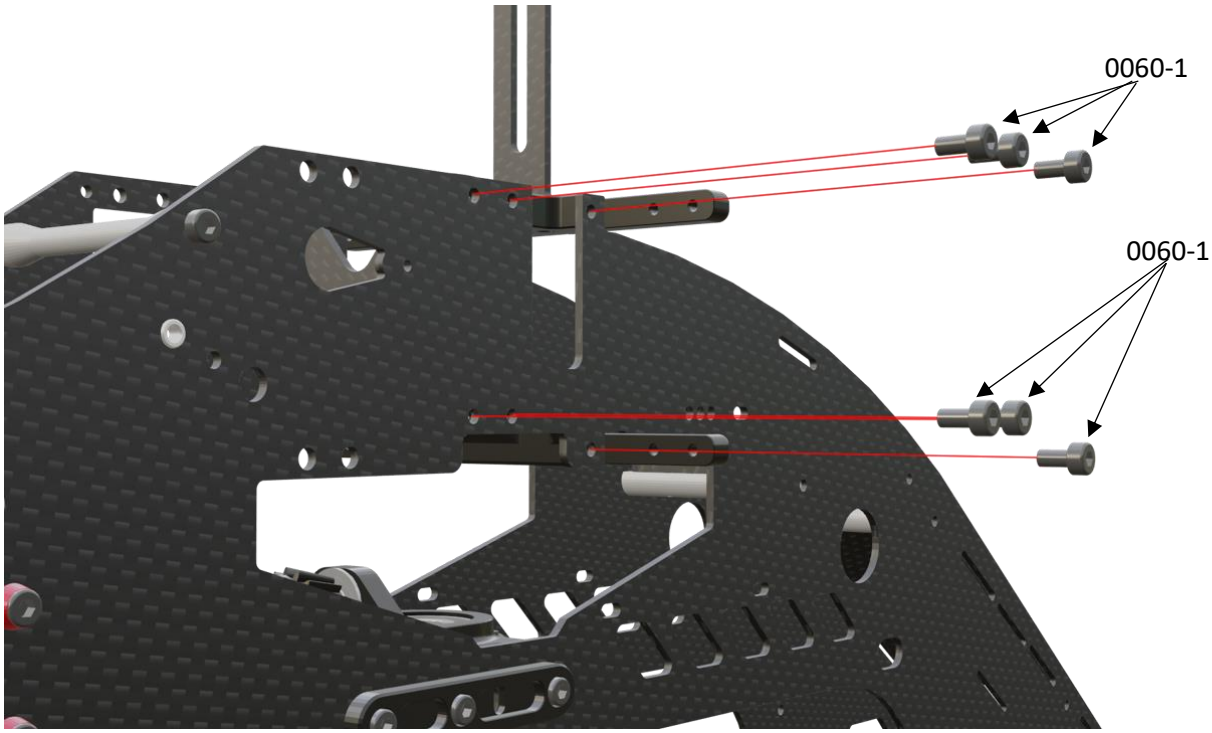
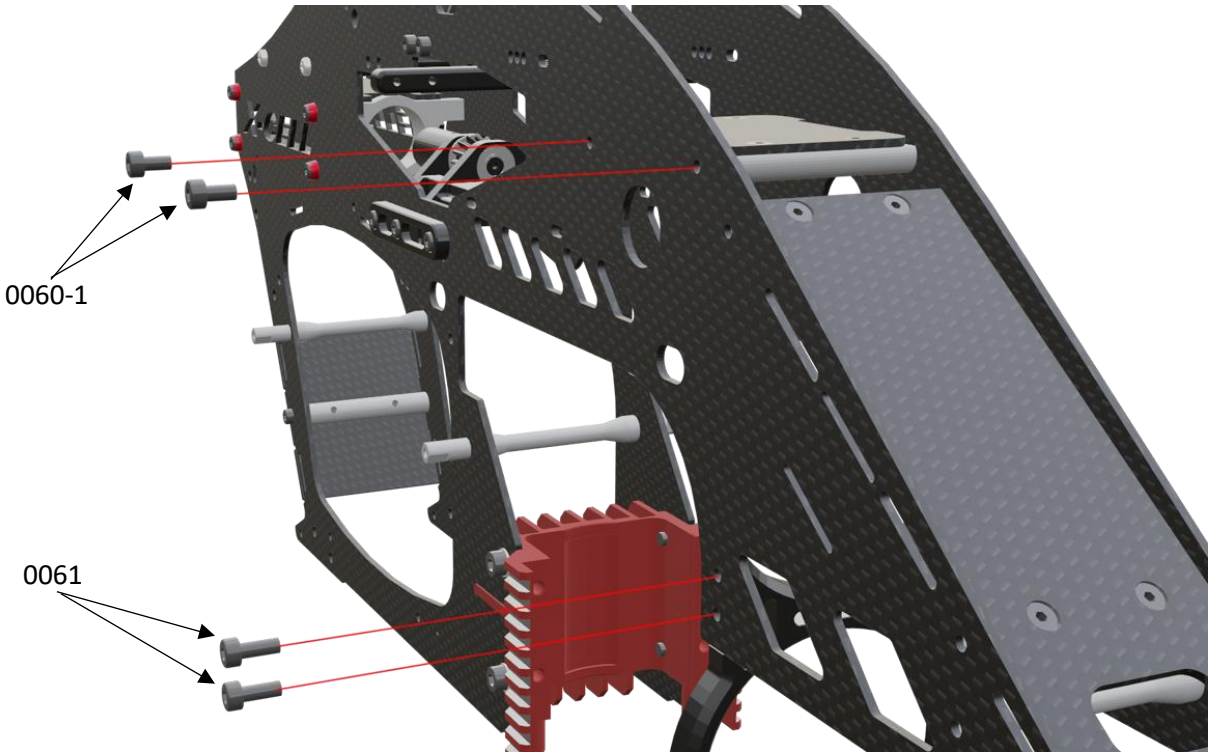


0060-1

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.



0061

M3 x 8mm

0060-1

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.

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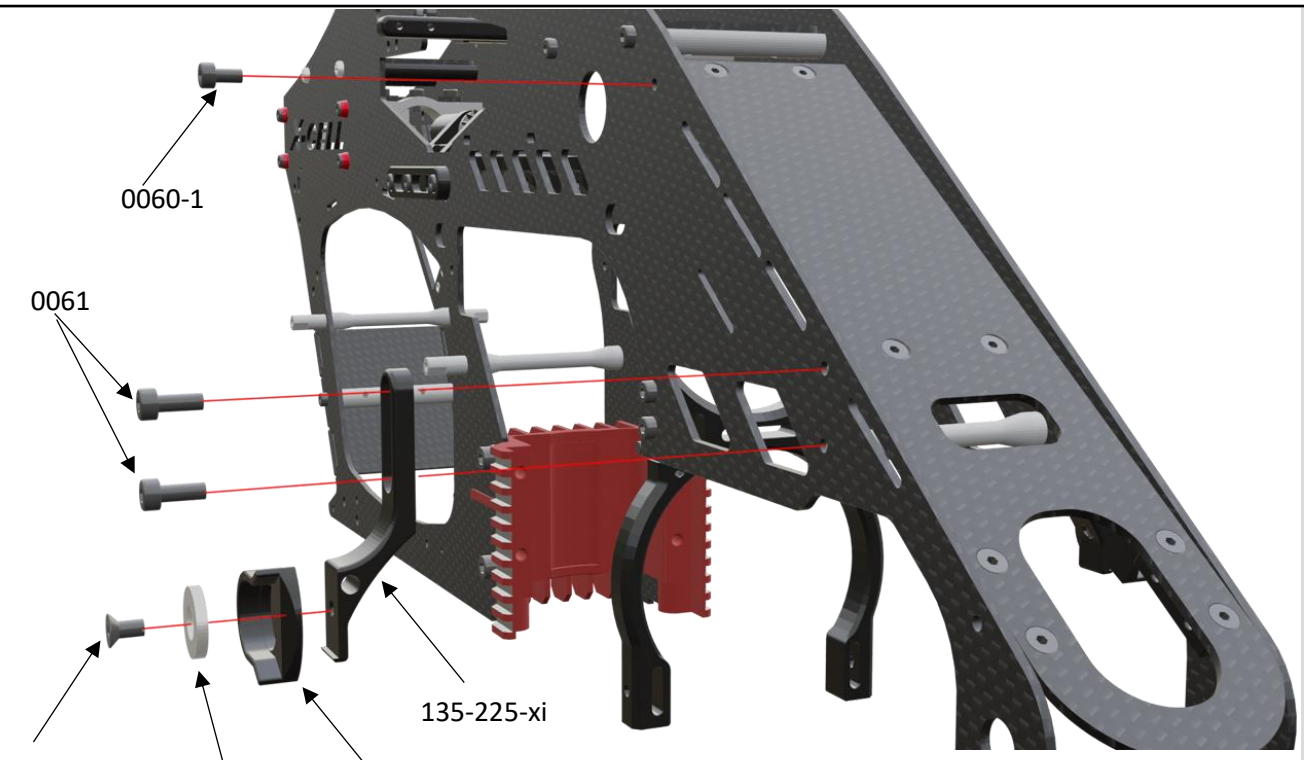


0061

M3 x 8mm

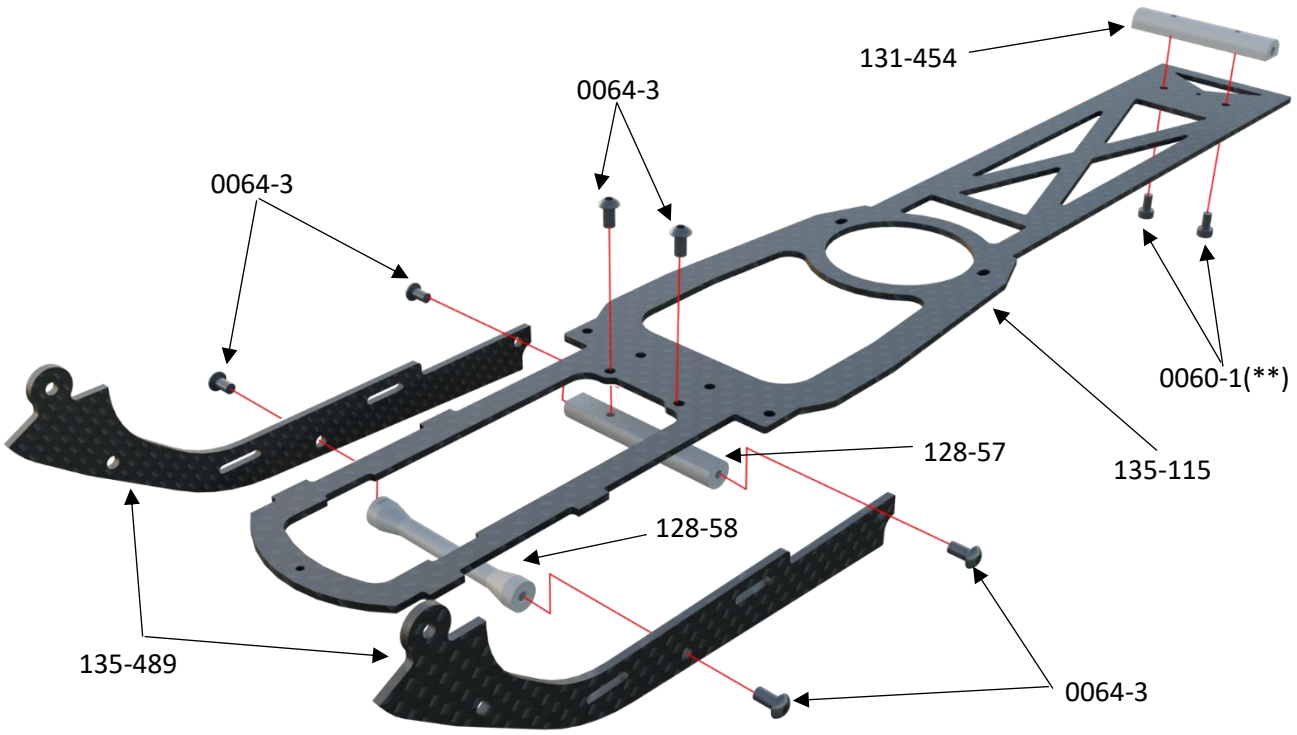
0060-1

M3 x 6mm

0088

M3 x 8mm

Apply a small amount of medium thread lock when threading into metal parts.



0060-1

M3 x 6mm

0064-3

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.

Do not supply thread lock at screws marked with a (**) at this assembly step.
They will be removed again later.

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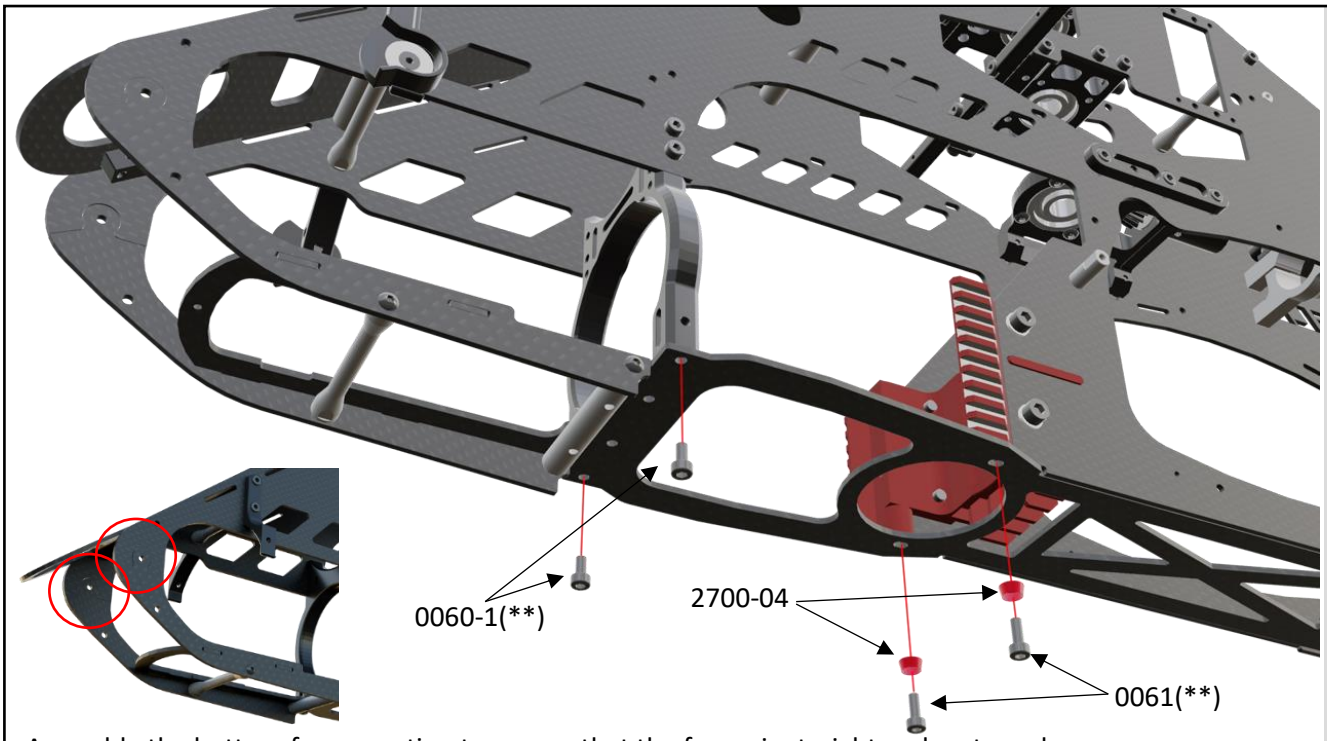


0061

M3 x 8mm

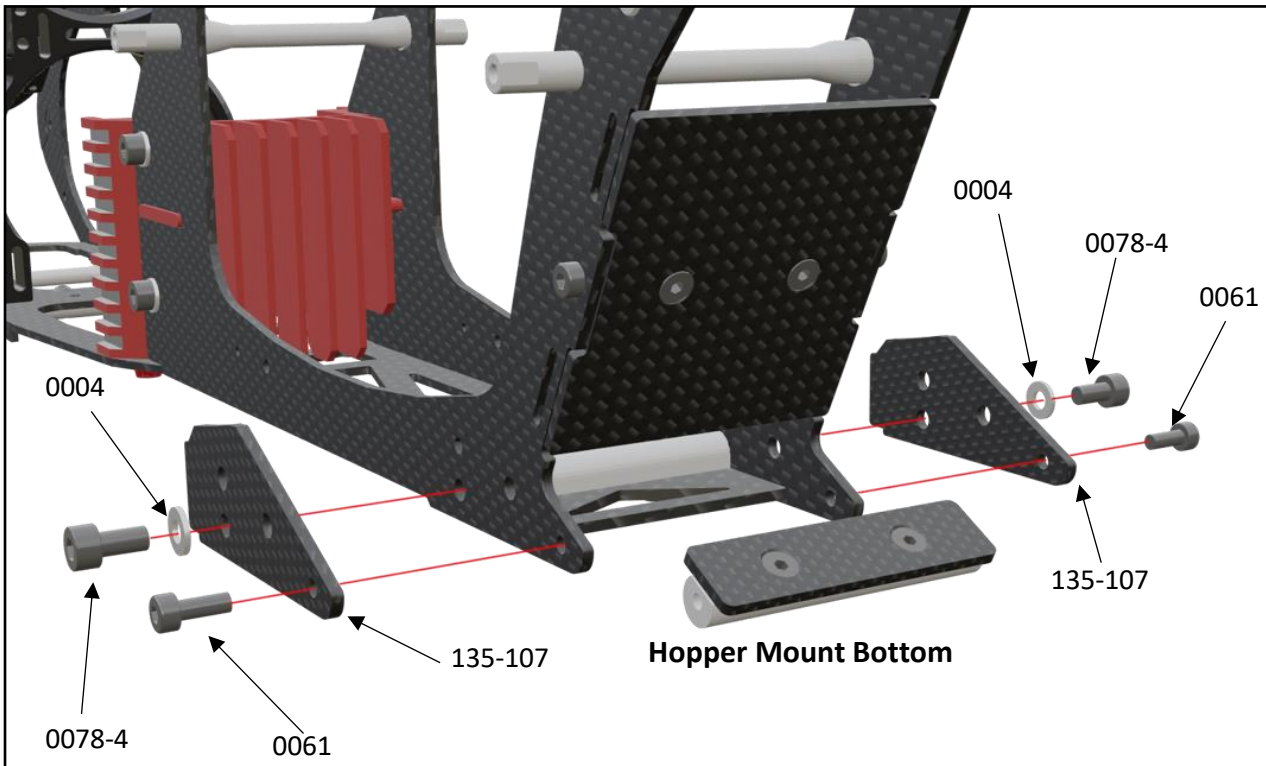
0060-1

M3 x 6mm

2700-04

M3 (red)

Assemble the bottom frame section to ensure that the frame is straight and rectangular.
The front section of bottom frame and main frame shall fall in line (see picture with the red circle).
If they don't so open some screws of the main frame bearing blocks and spacers and align the complete frame. Don't forget to refresh thread lock.
Do not supply thread lock at screws marked with a (**) at this assembly step.
They will be removed again later.



Hopper Mount Bottom

0061

M3 x 8mm

0078-4

M4 x 8mm

0004

M4

Apply a small amount of medium thread lock when threading into metal parts.

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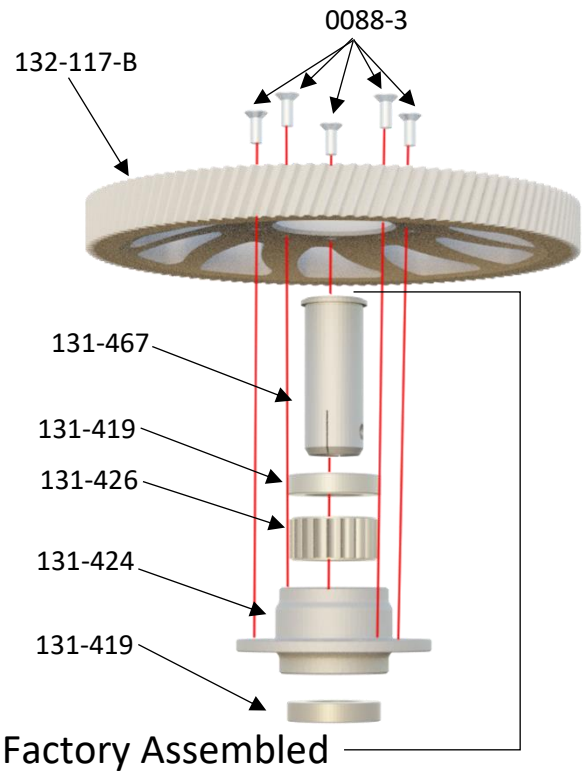
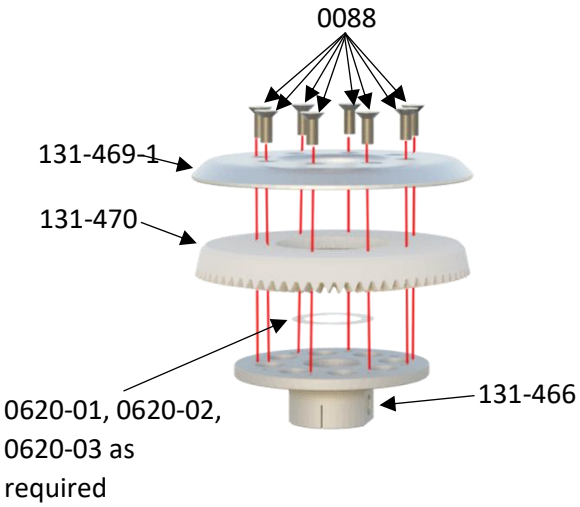




0088

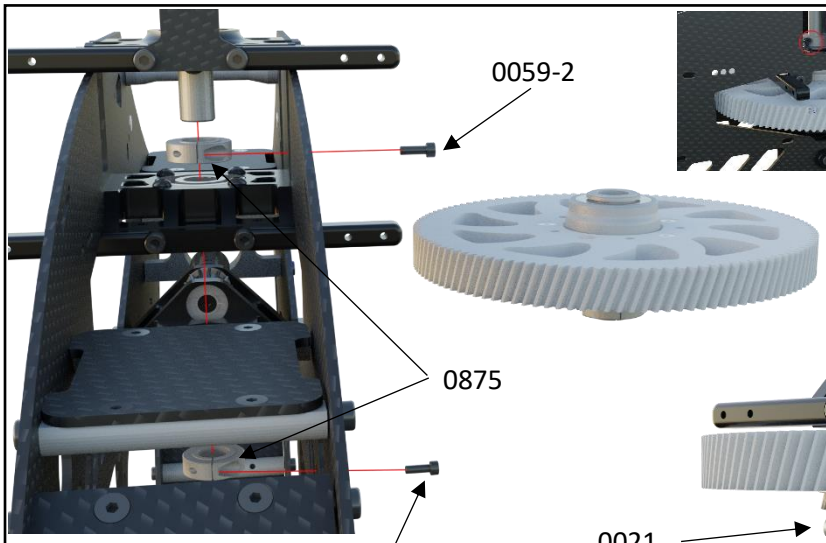
M3 x 8mm

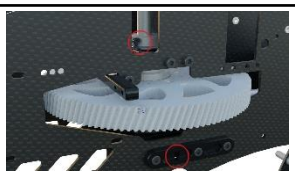
0088-3

M3 x 7mm

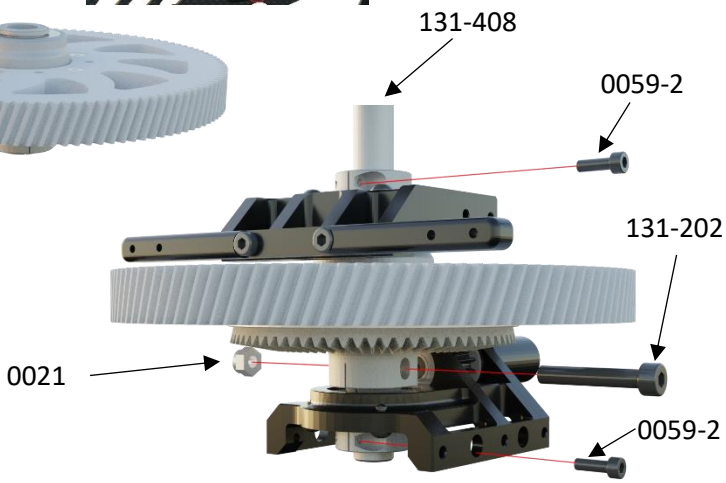
Apply a small amount of medium thread lock when threading into metal parts.

Assemble main gear and crown gear at the corresponding hubs.





The red circles show how to reach the screws of the collars (0875).



0059-2

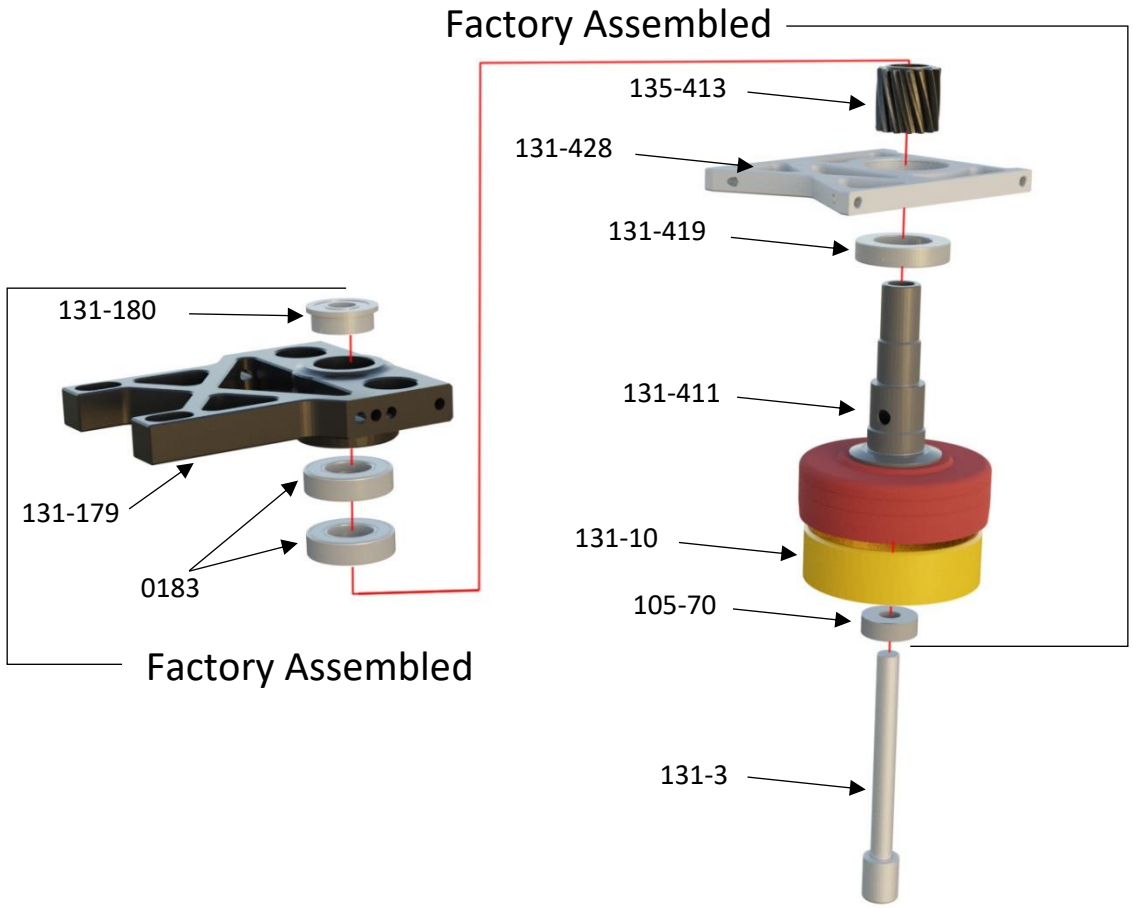
M2.5 x 8mm

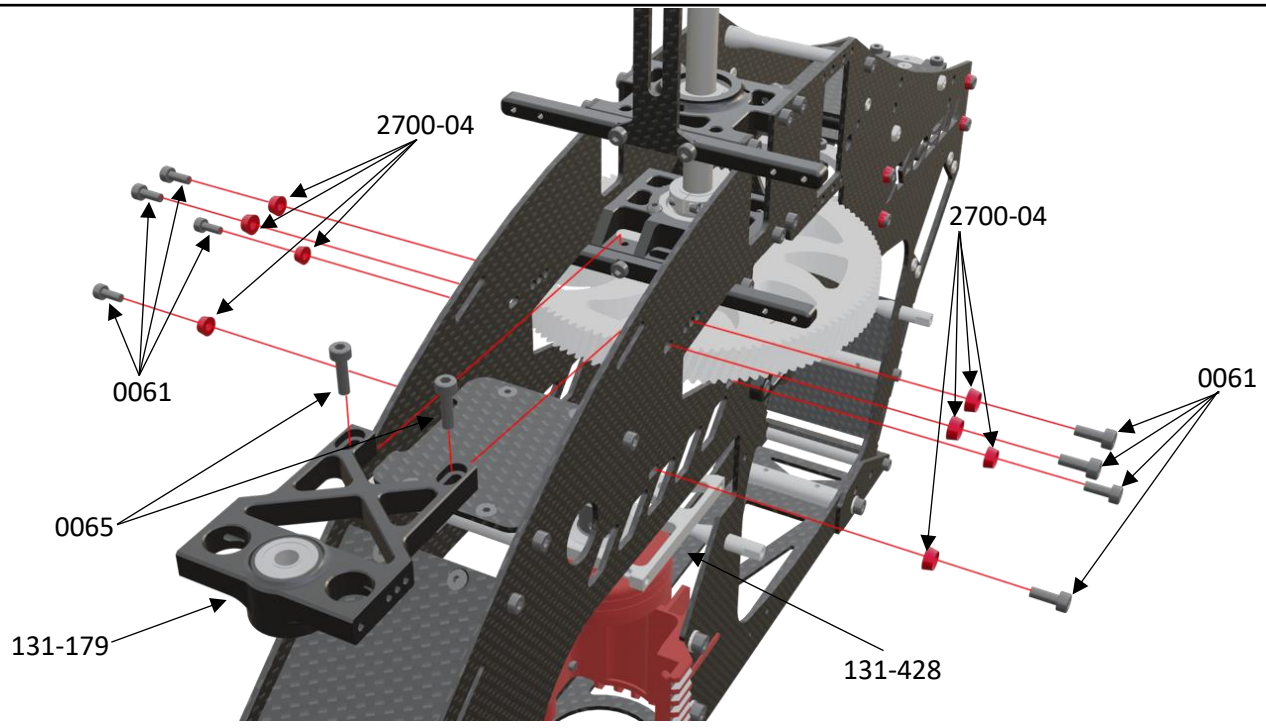
0021

M4

Apply a small amount of medium thread lock when threading into metal parts.

Install front drive assembly and one way hub with main gear at the frame and insert mainshaft with collars.
Push bottom bearing block up and tighten screws. Take care that it is aligned horizontal
Install jesus bolt, push crown gear up and tighten jesus bolt.
Then pull mainshaft to the top and tighten upper collar.
Check gear mesh of crown gear. If it is too much then insert a 0620-0x shim. If the play is too less, remove one 0620-0x shim. At least one shim has to be installed.
Press bottom collar up and tighten it





0061

M3 x 8mm

0065

M3 x 12mm

2700-04

M3 (red)

Apply a small amount of medium thread lock when threading into metal parts.

Install 131-179 but do not tighten bolts 0061 now. Install clutch bell assembly and check gear mesh of main gear. 131-179 can be moved 0.2mm back and forward to adjust gear mesh. Tighten bolts if gear mesh is okay.

Tighten bolts 0061 of the clutch bell assembly.

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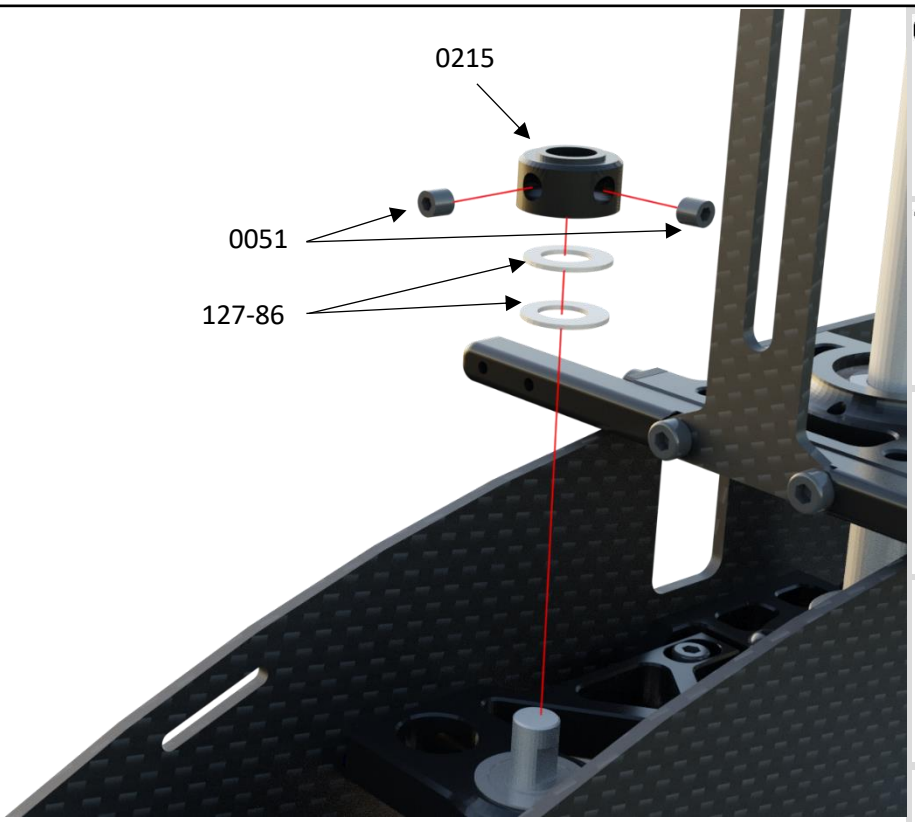


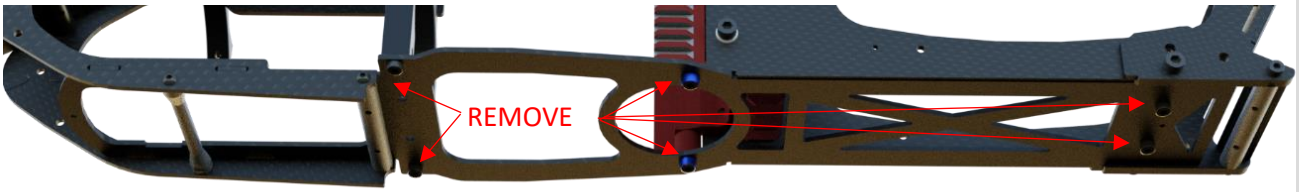
0051

M3 x 3mm

127-86

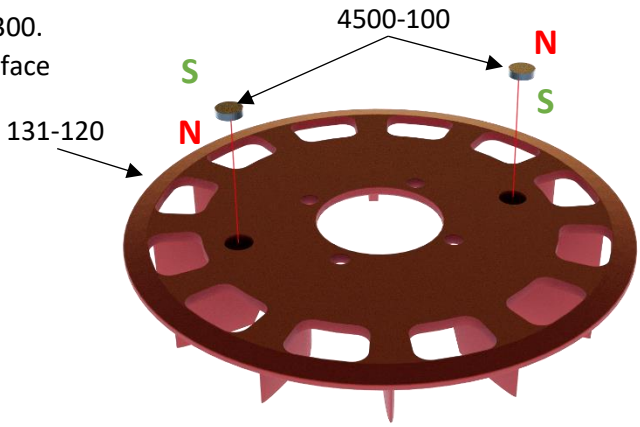
M6 x 9.7 x 1mm

Pull shaft 131-3 up and install 0215 and shims (127-86) as needed.



Remove bottom frame section as show

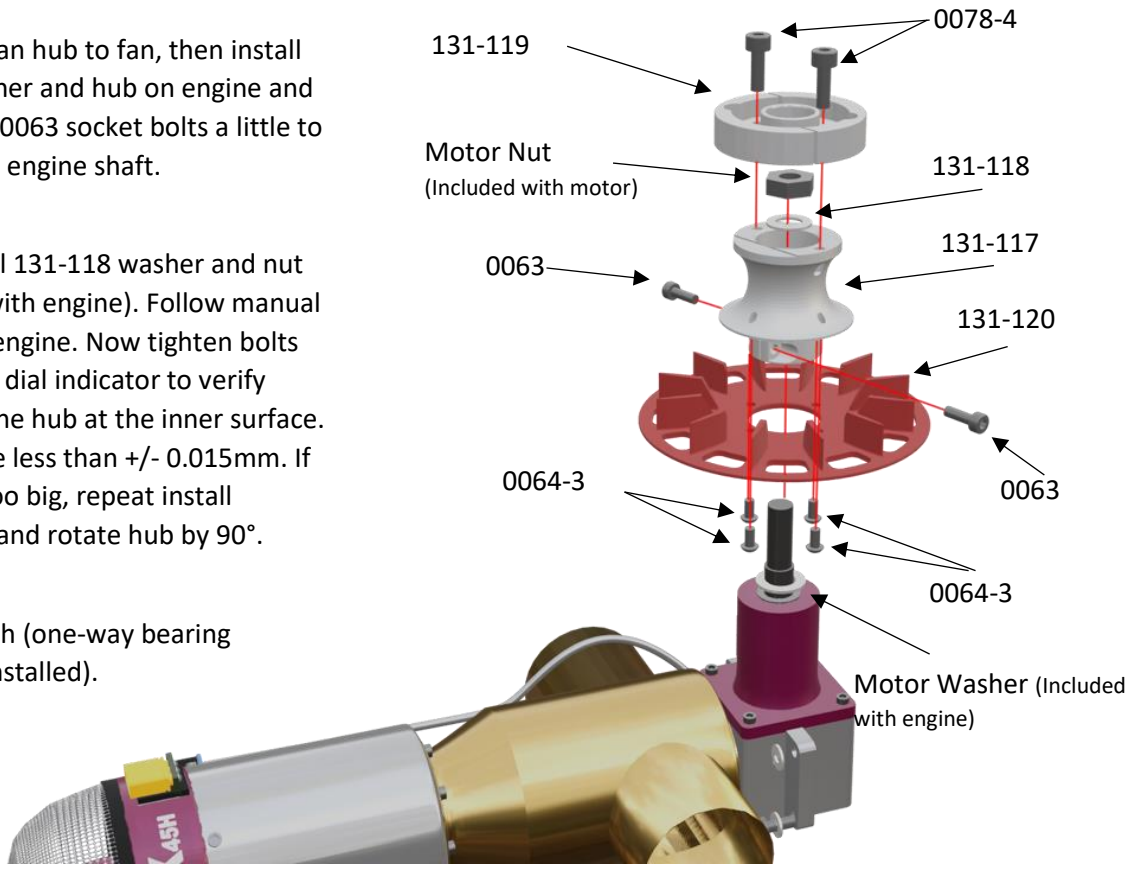
Install the magnets at the fan using epoxy like UHU 300. Follow instructions of the glue. One mangent has to face by 'N' to the top of the fan the other by 'S' (north and south pole of magnet.



Assemble fan hub to fan, then install motor washer and hub on engine and tighten MA0063 socket bolts a little to clamp onto engine shaft.

Next, install 131-118 washer and nut (included with engine). Follow manual of turbine engine. Now tighten bolts 0063.Use a dial indicator to verify runout of the hub at the inner surface. It should be less than +/- 0.015mm. If runout is too big, repeat install procedure and rotate hub by 90°.

Install clutch (one-way bearing is factory installed).



0078-4

M4 x 8mm

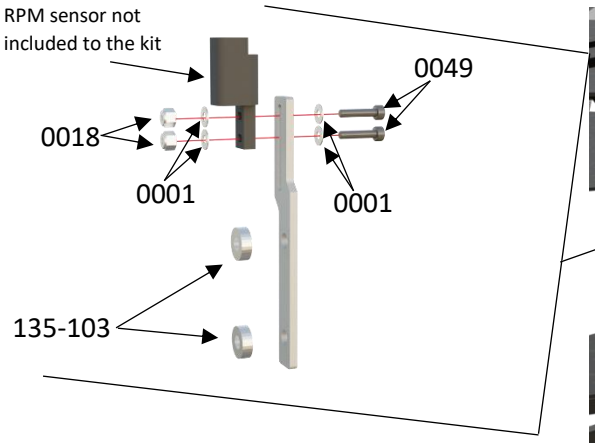
0063

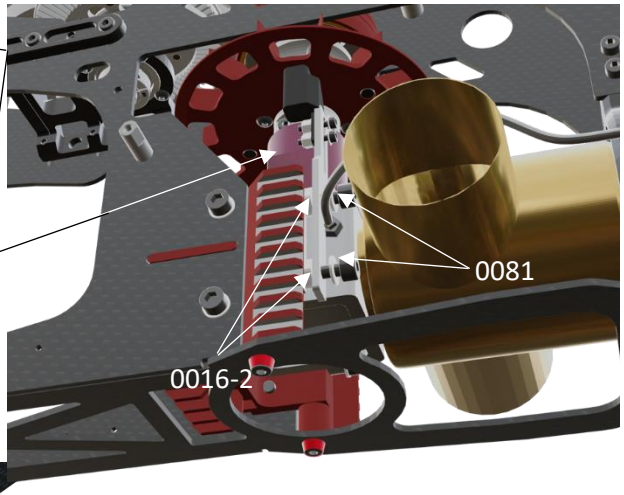
M3 x 10mm

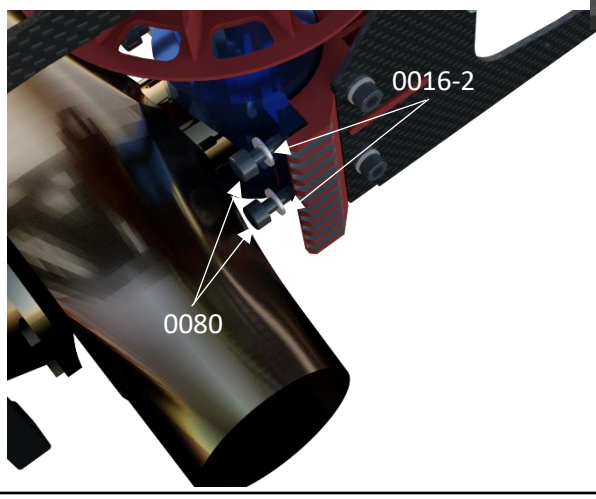
0064-3

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.







0080

M4 x 14mm

0081

M4 x 16mm

0016-2

M4

0049

M2 x 10mm

Apply a small amount of medium thread lock when threading into metal parts.

0001

M2

0018

M2

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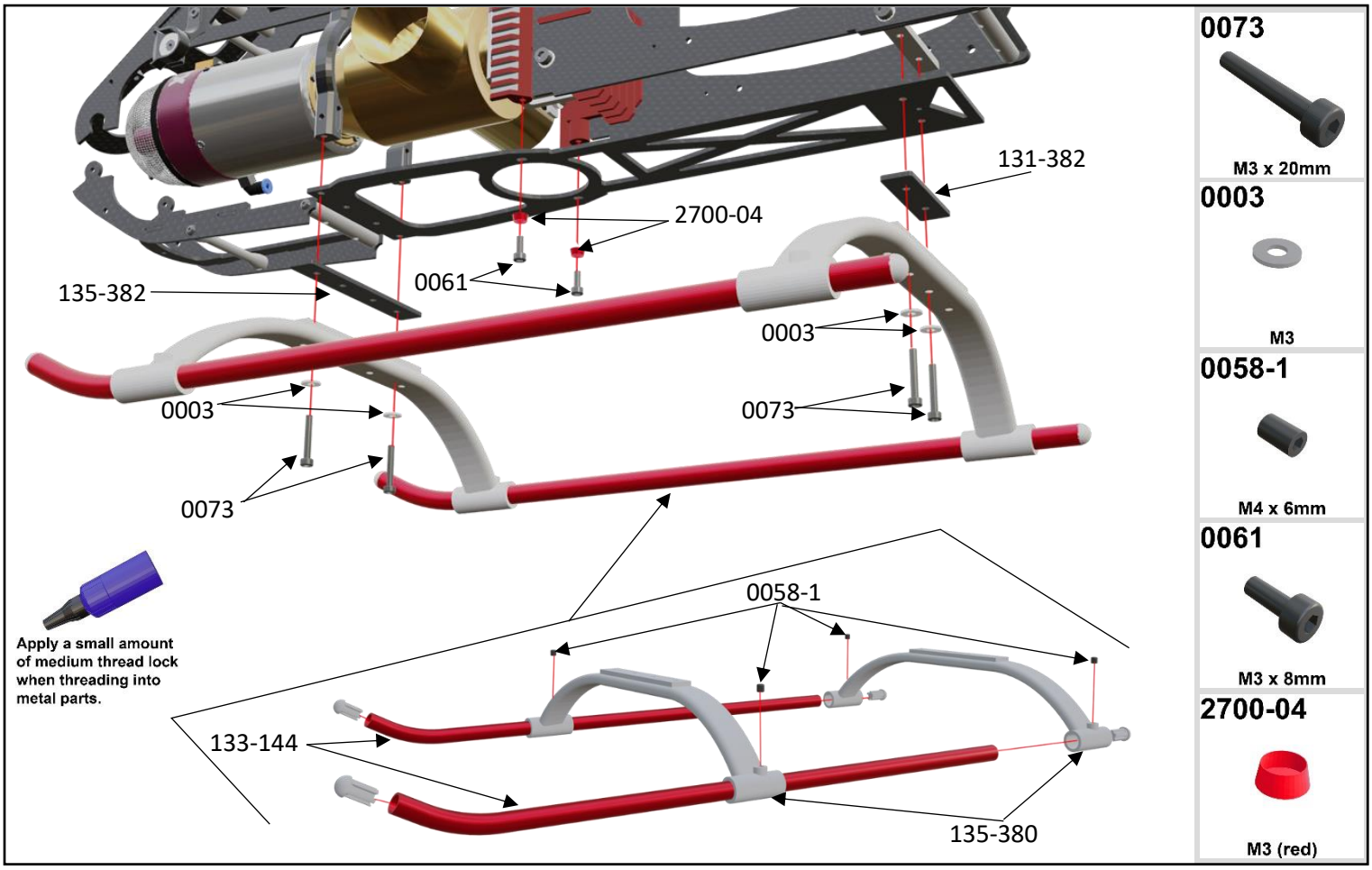

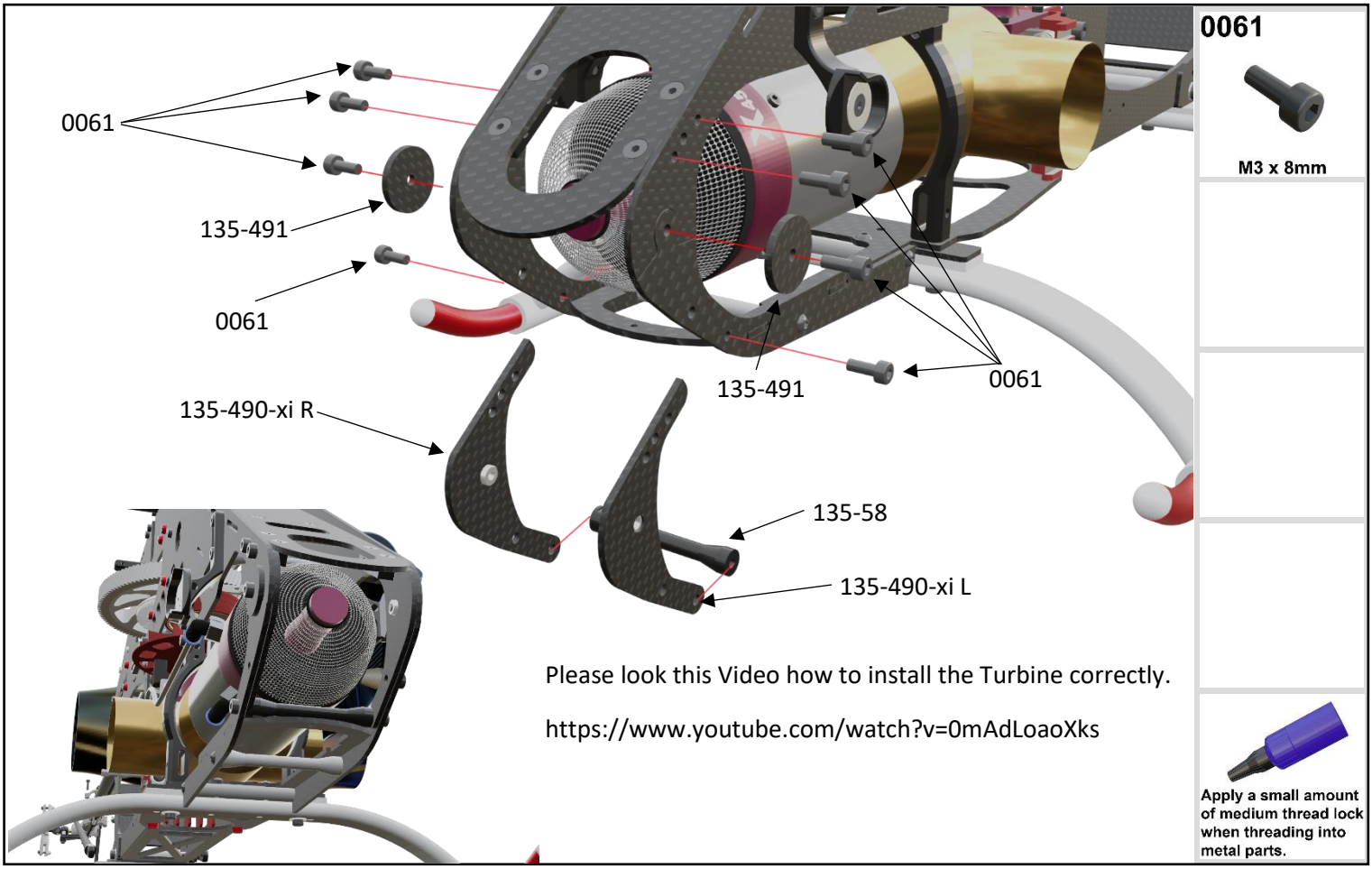

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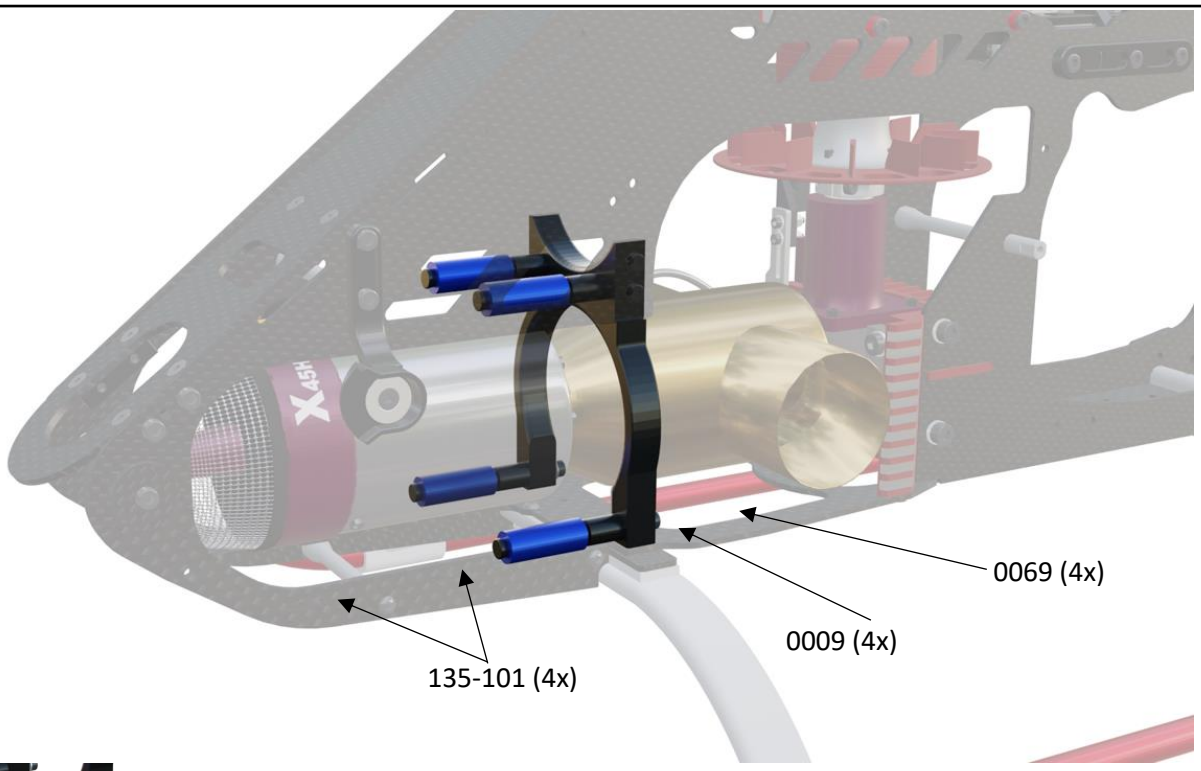


Install turbine supports (135-101). The supports shall only 'touch' the engine. They shall not supply pressure to the engine body.

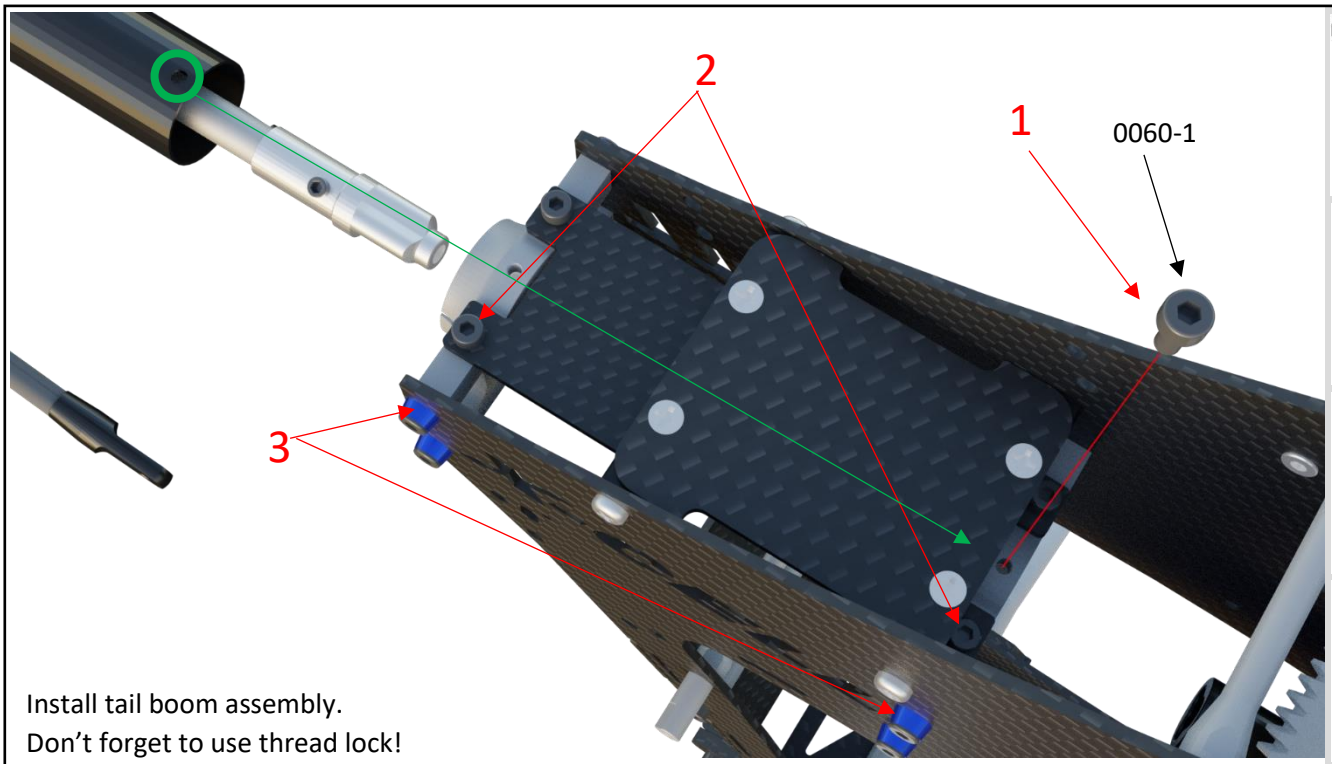
0069

M3 x 16mm

0009

M3 (small)

Apply a small amount of medium thread lock when threading into metal parts.



Install tail boom assembly.
Don't forget to use thread lock!

1 – tigthen the screw (0060-1) first to fix the tail boom in position

2 – tigthen this 2 screws to clamp the tail boom. Please look that the tail fin is 90 degress

3 tigthen this 2 screws at the last to fix all

0060-1

M3 x 6mm

Apply a small amount of medium thread lock when threading into metal parts.

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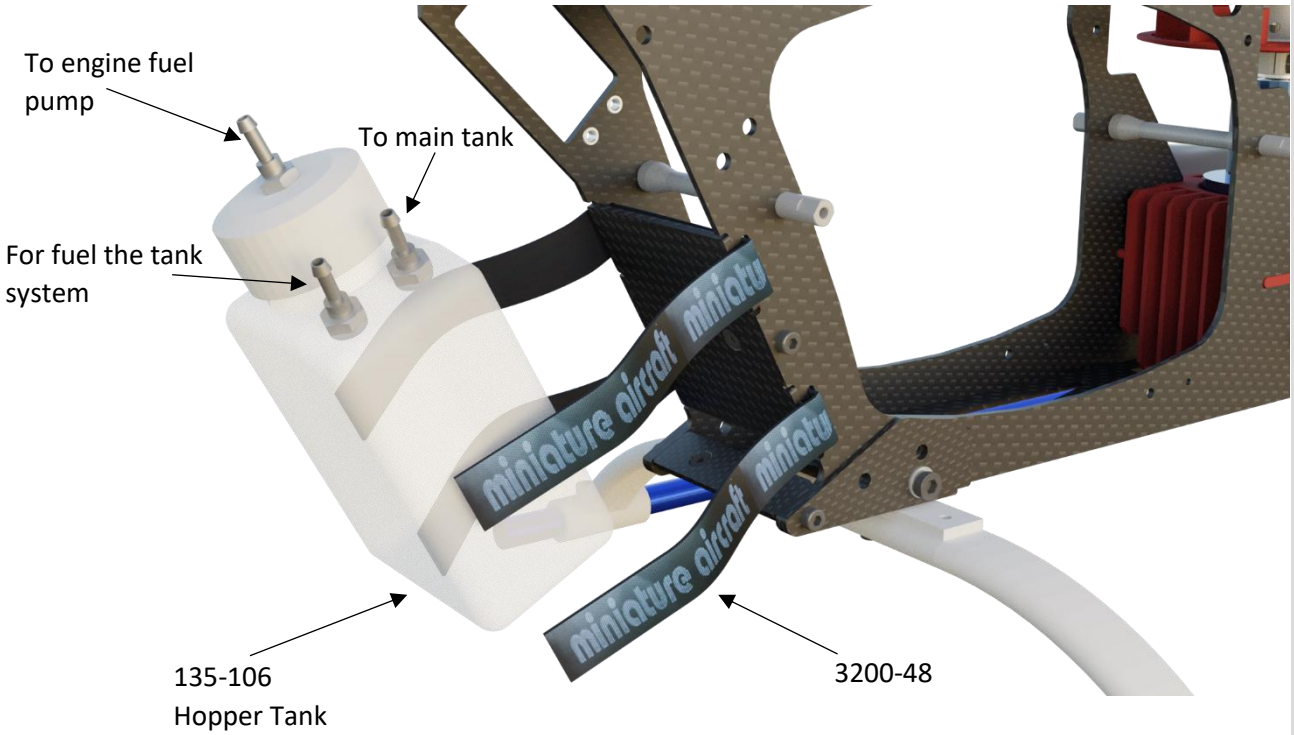
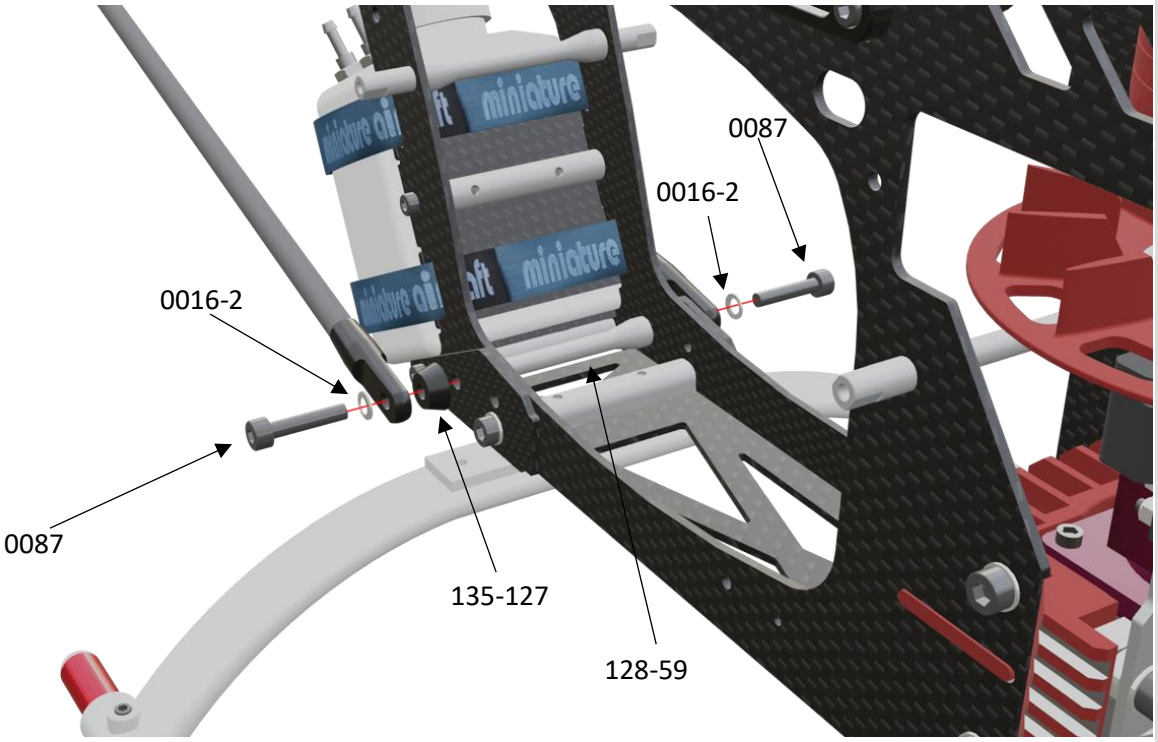


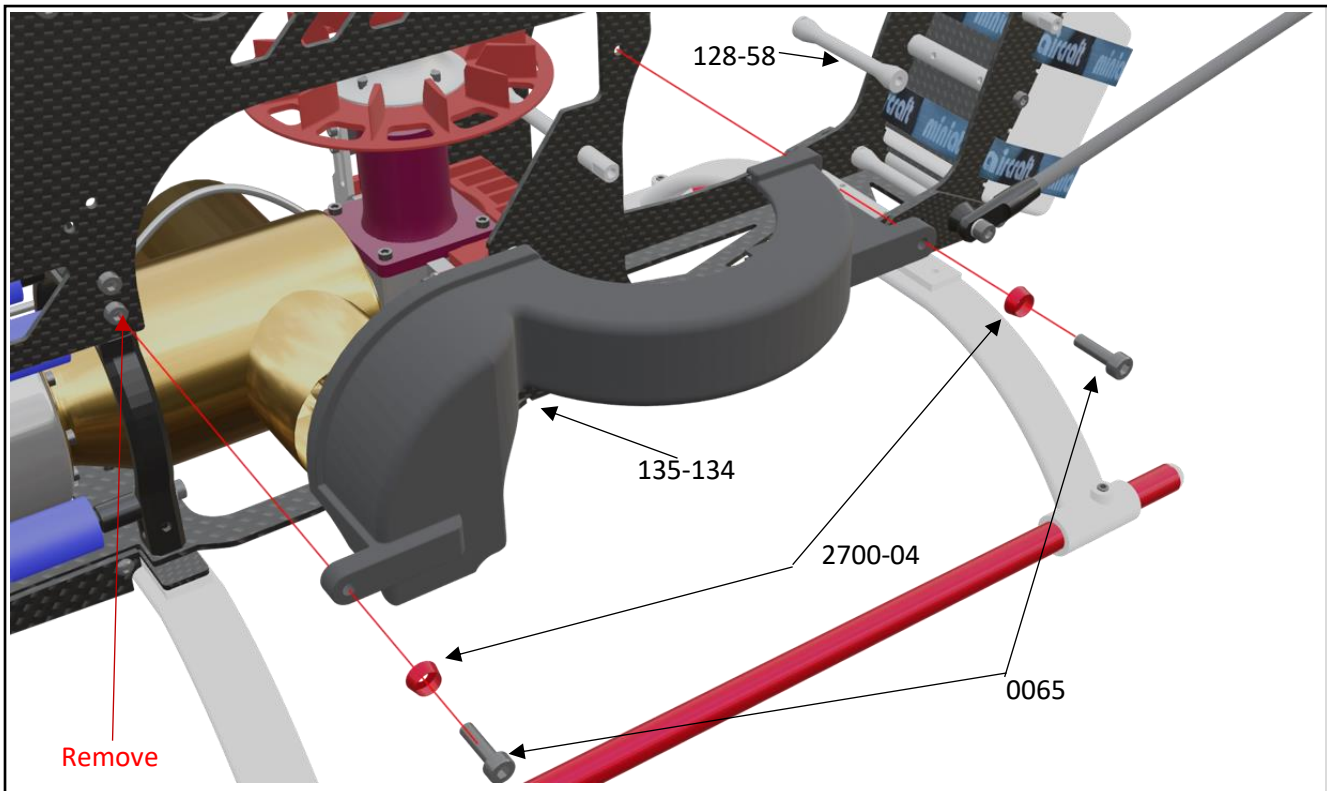
Install header tank using double sided tape and hook & loop tape to secure it. The center nipple is connected to the engine fuel pump. The right nipple is connected to the main tank. The left nipple is used to fuel the tank system.



Apply a small amount of medium thread lock when threading into metal parts.

In this step tighten the screws from the rear Boom Support Mount and the Support ends.
The use of thread lock MA3200-20 (loctite #243) is recommended on MA0078 Socket Bolts.

Do not overtighten MA0065 Socket Bolts on the Rear Boom Support Mounts.



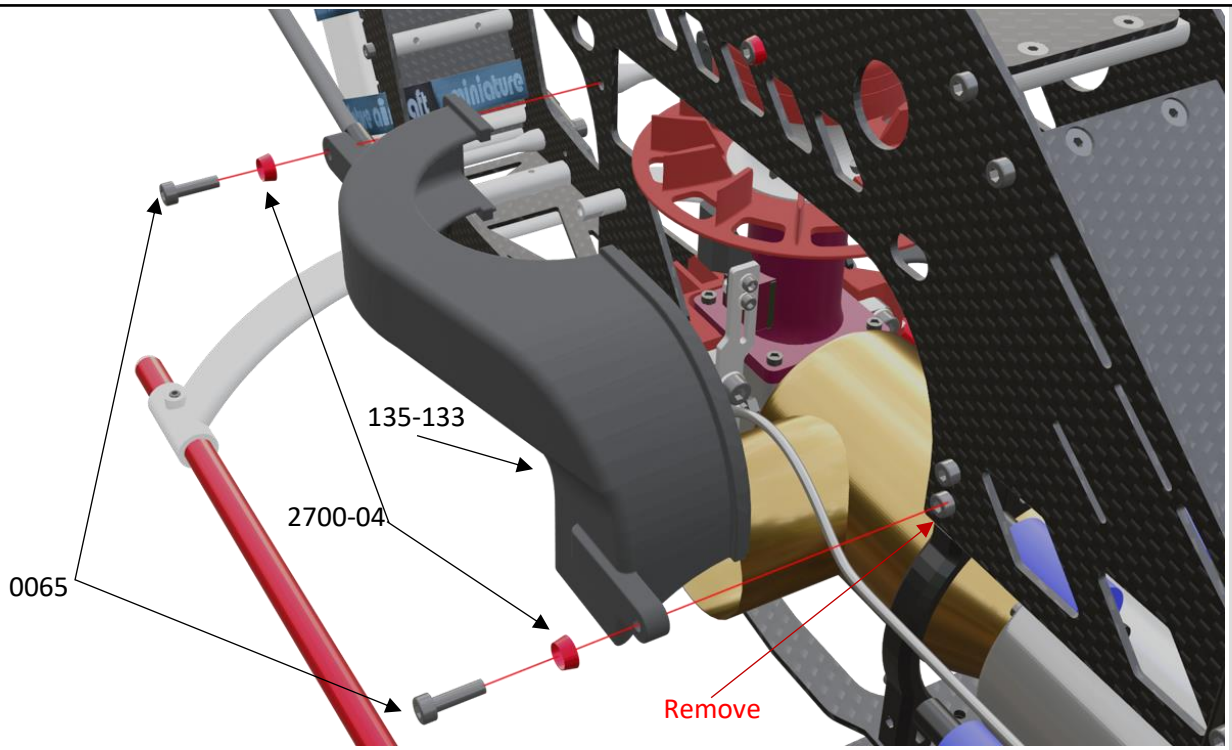
0065

M3 x 12mm

2700-04

M3 (red)

Apply a small amount of medium thread lock when threading into metal parts.



0065

M3 x 12mm

2700-04

M3 (red)

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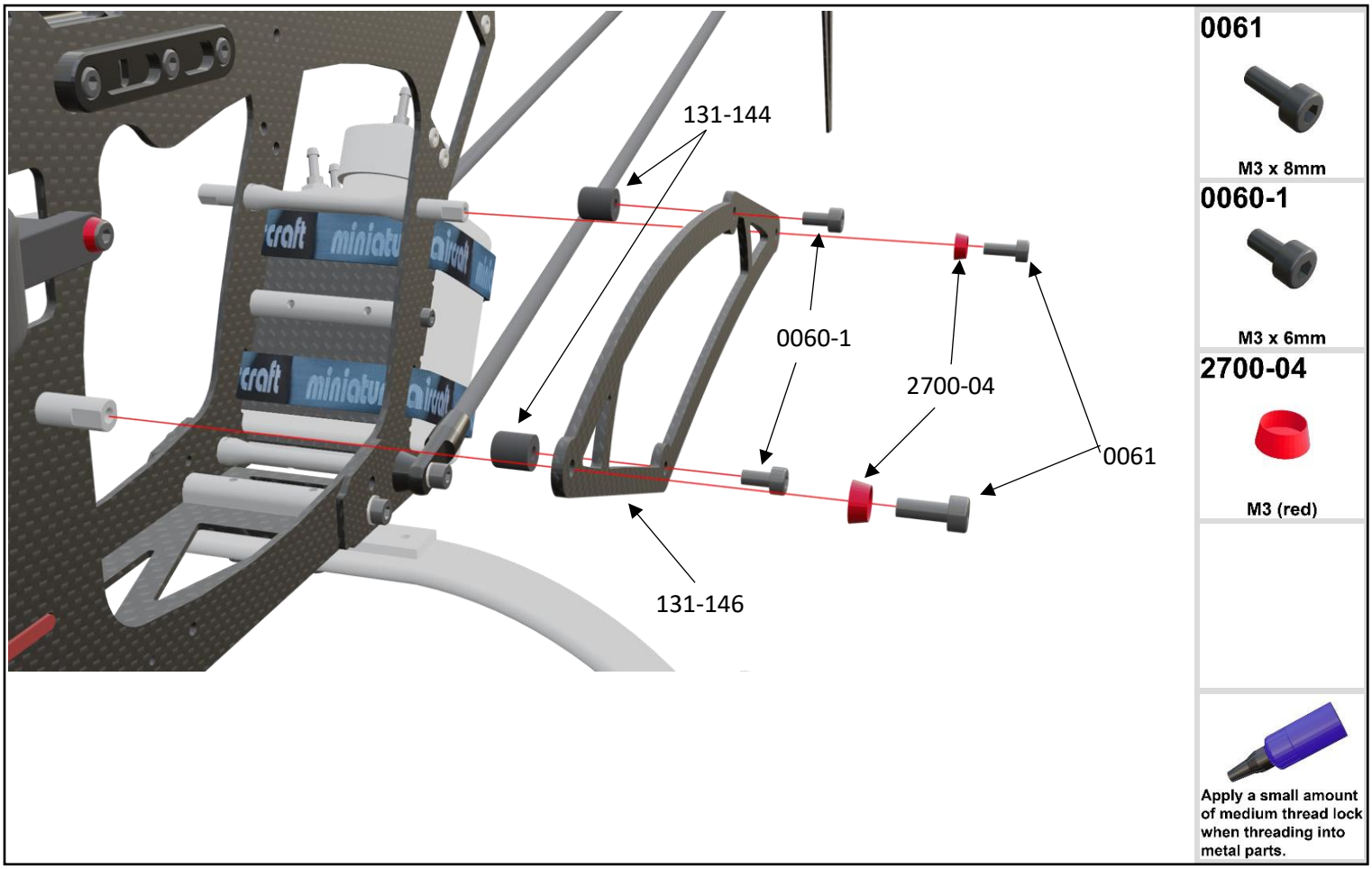

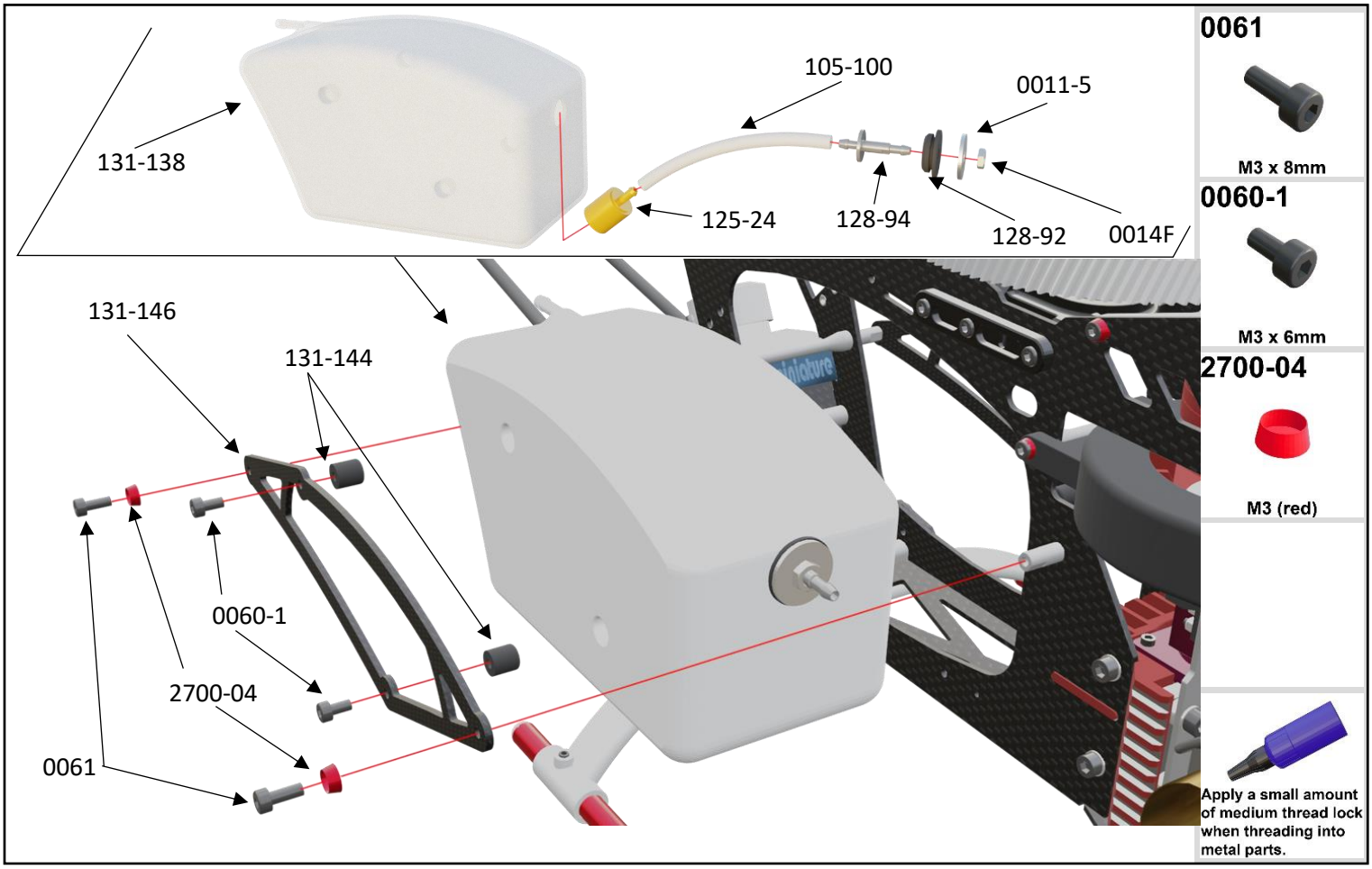

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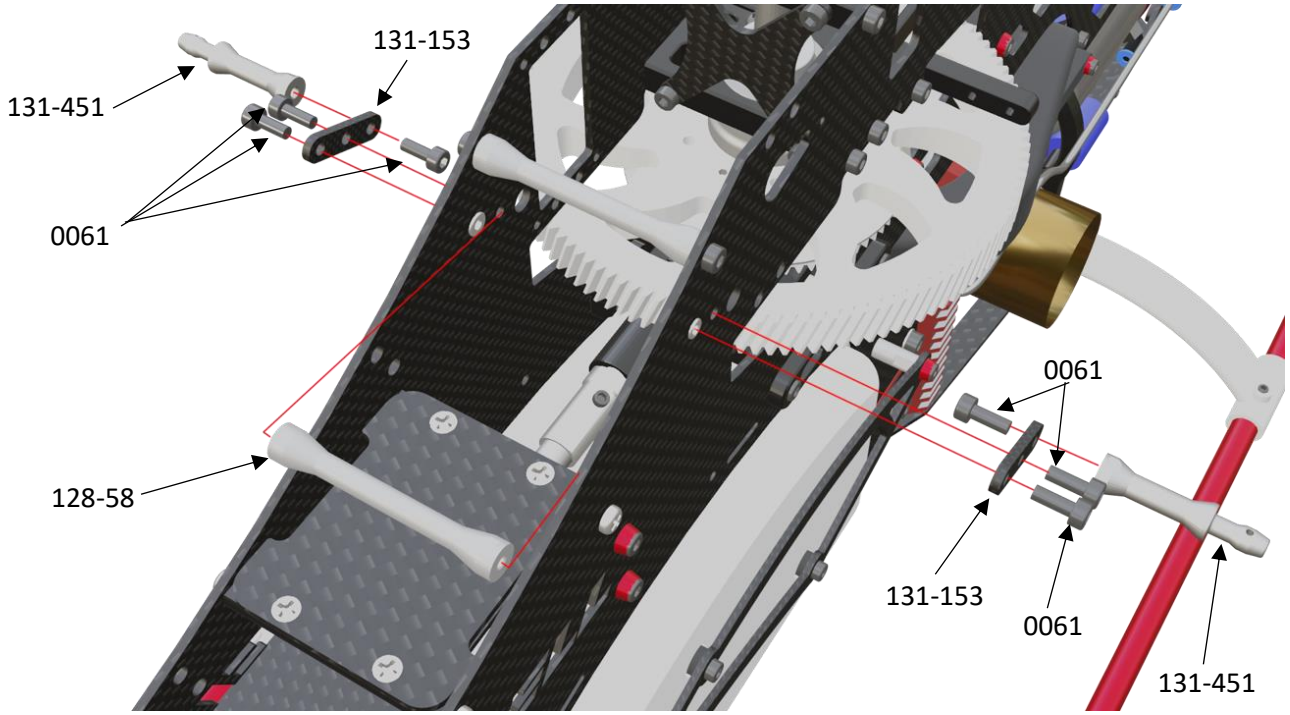
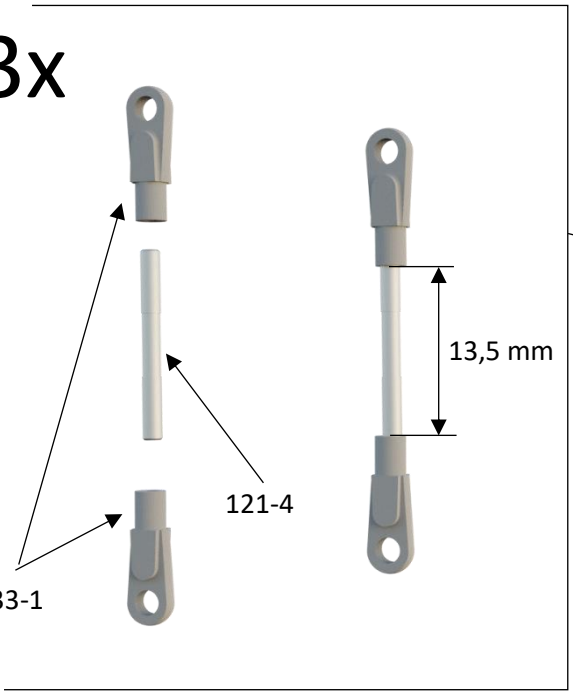


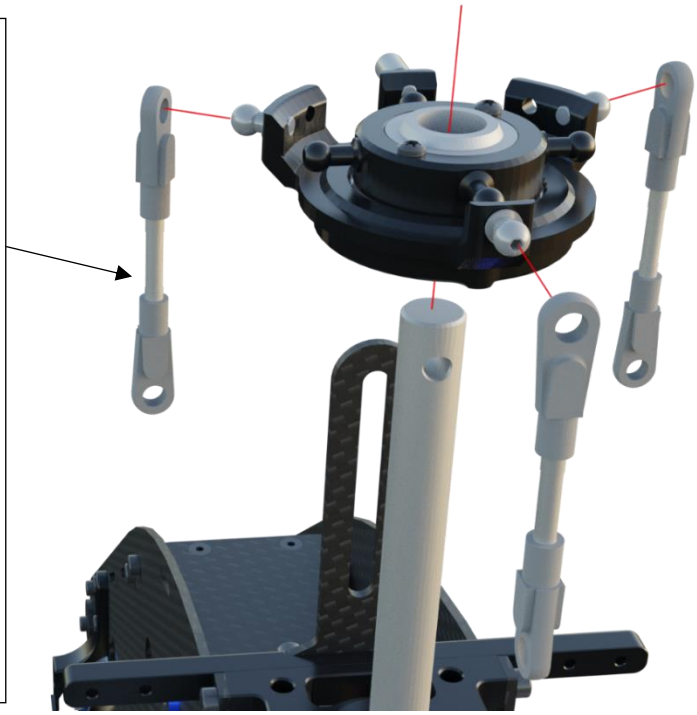
0061

M3 x 8mm

Apply a small amount of medium thread lock when threading into metal parts.

3x





0133-1

M3 x 21.2mm

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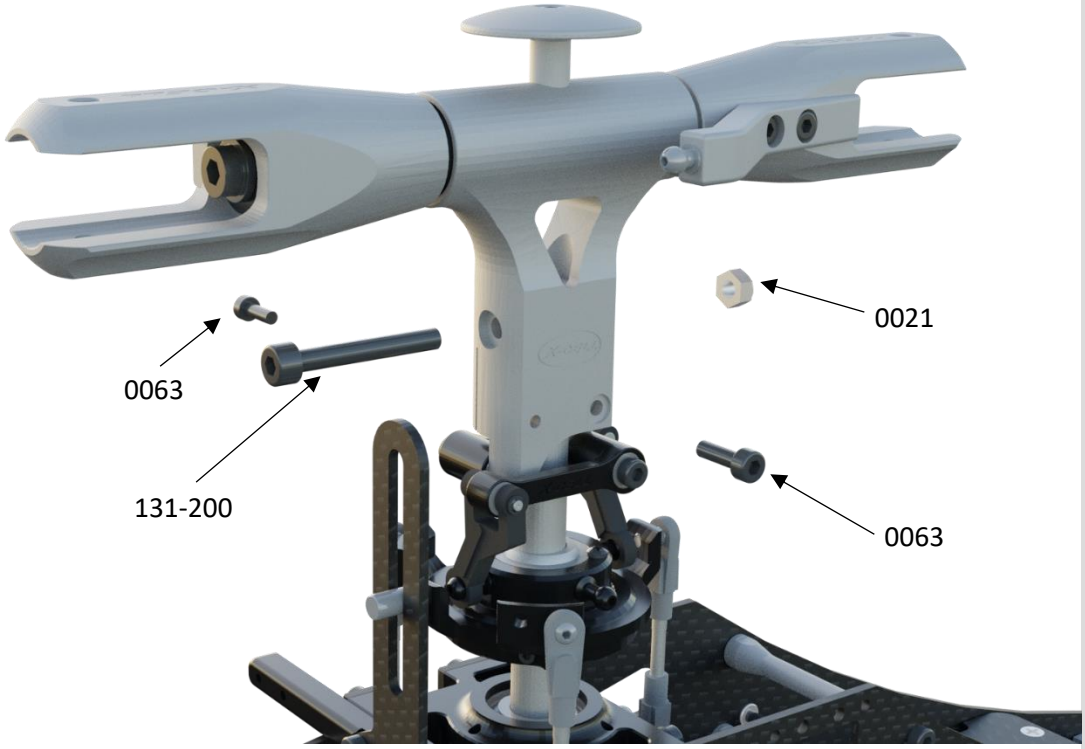
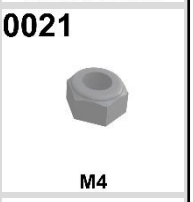
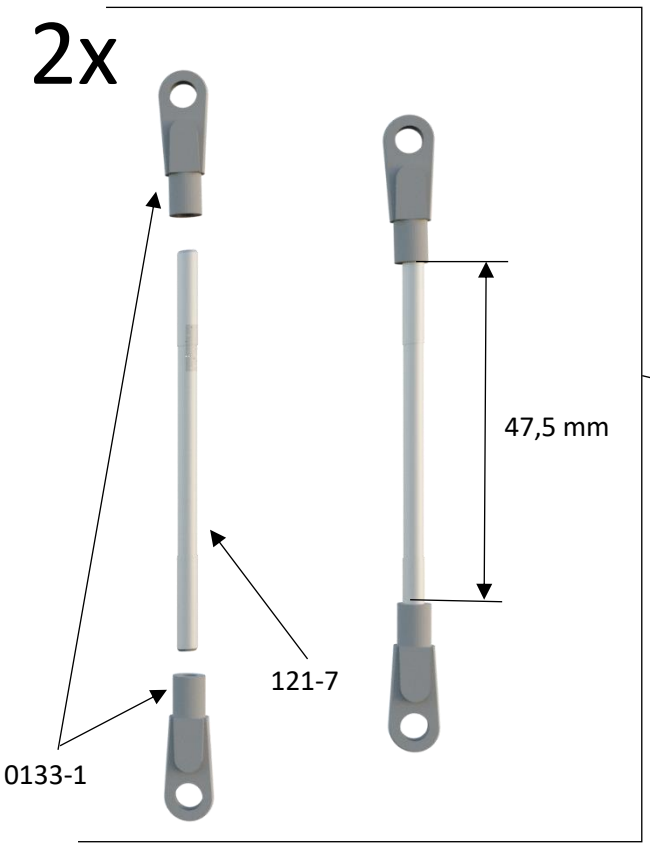
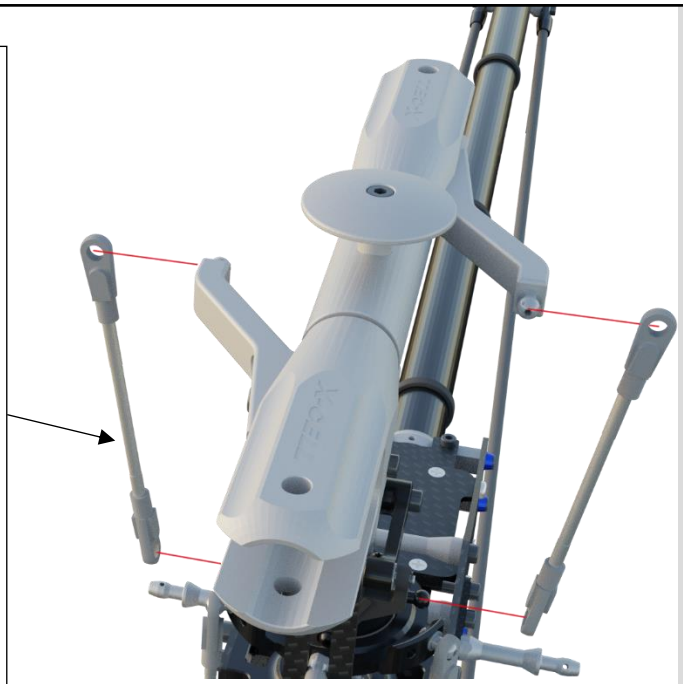


Please tighten the 0063 screws evenly and alternately







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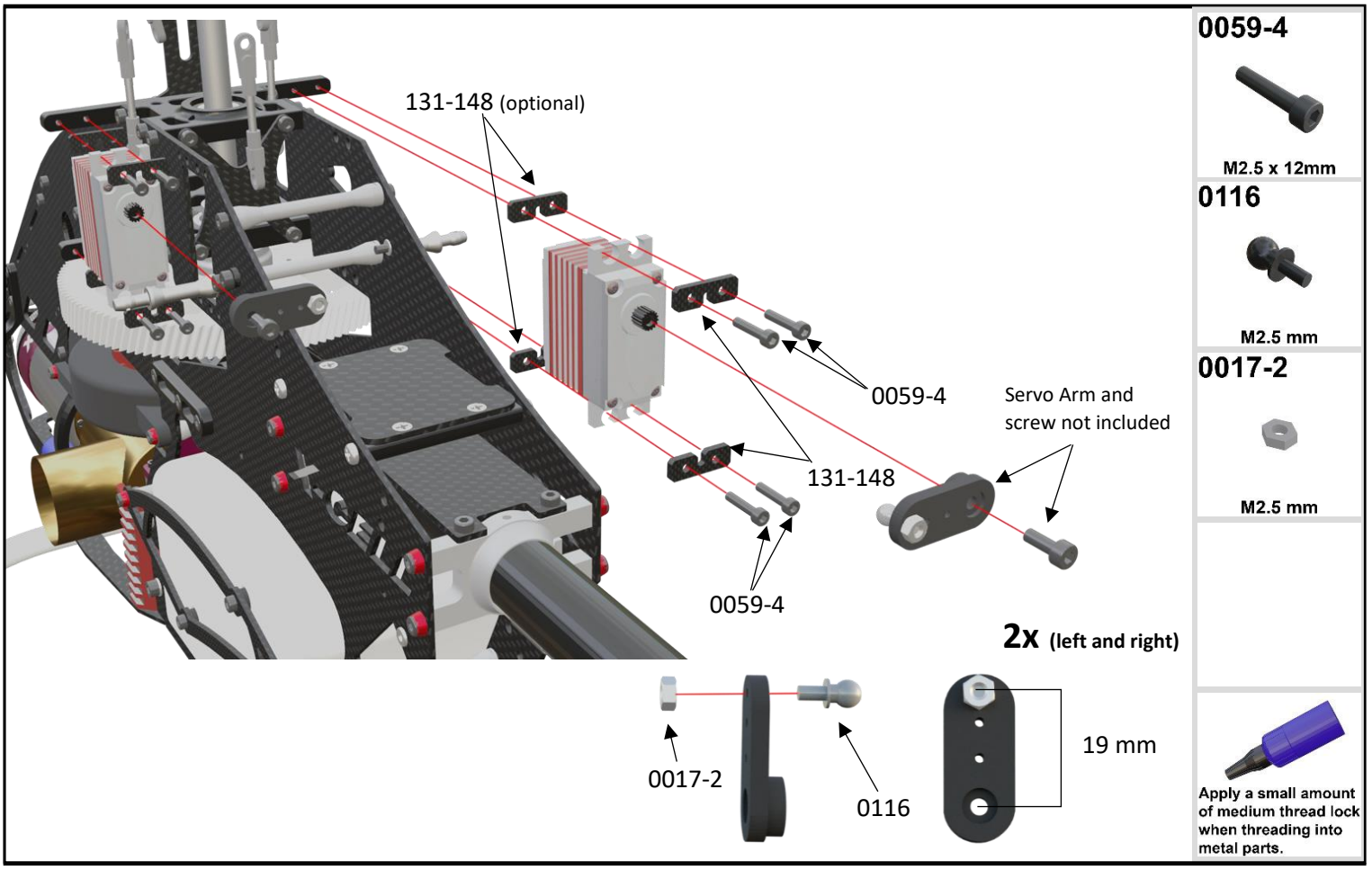

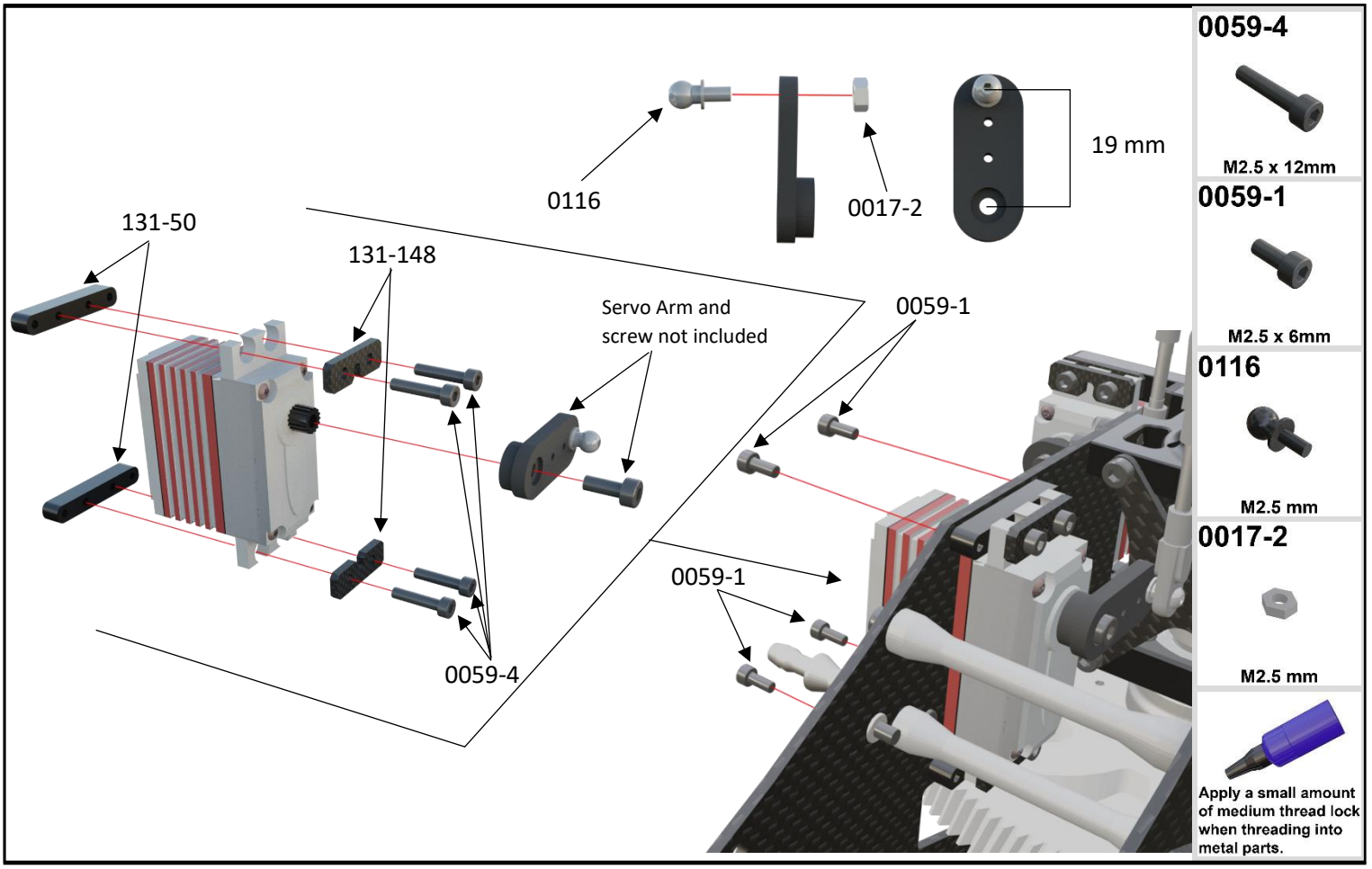

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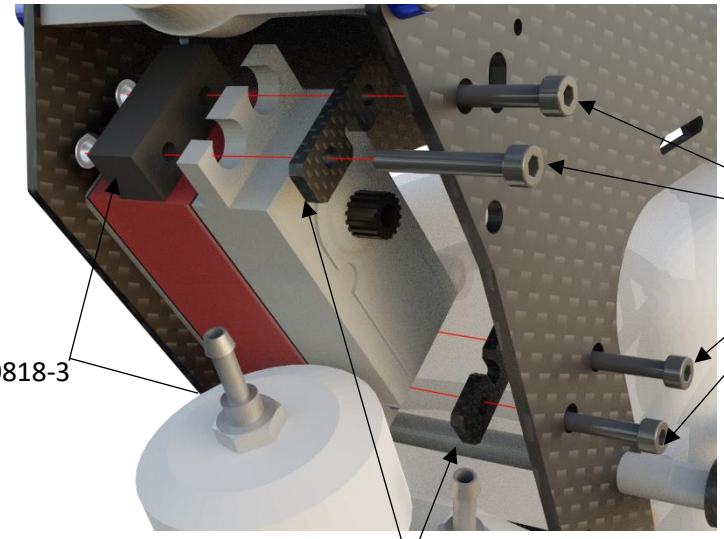

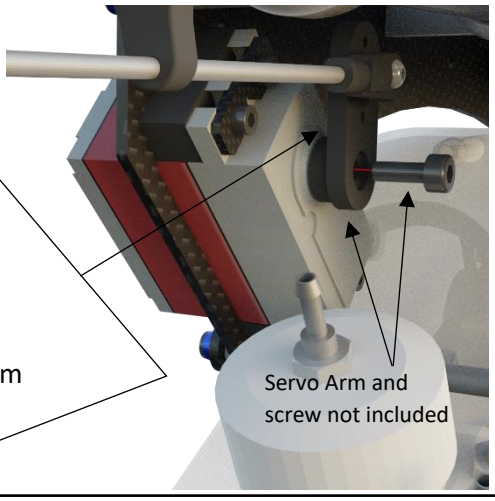

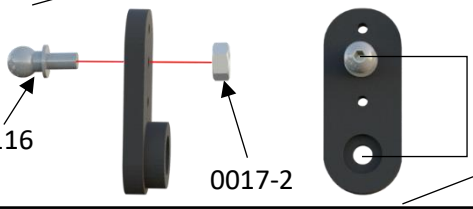

0059-7

M2.5 x 20mm

0116

M2.5 mm

0017-2

M2.5 mm

Apply a small amount of medium thread lock when threading into metal parts.

131-452

RC Clip

106-22

M5 x 11mm

120-99

Canopy Knobs

128-463

Magnet

Use the splints to secure the canopy.
At the front the canopy is held by the magnet system.

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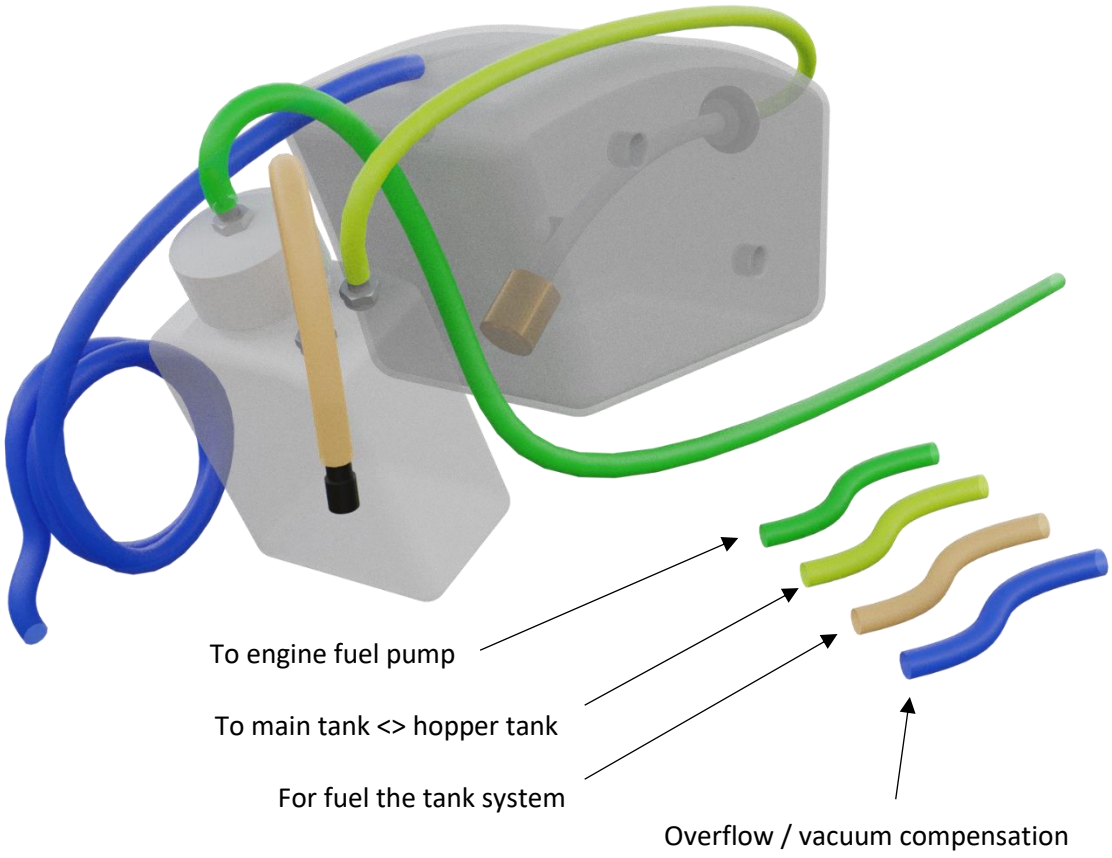

Apply a small amount of medium thread lock when threading into metal parts.

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