



M138 LIZARD MANUAL

TURBINE VERSION

ANTARTICA

A TALE BY SAB



ANTARTICA – A TALE BY SAB

Year ZERO: TOTAL DESTRUCTION

In the 21st century, a nuclear war triggered by a group of cyber terrorists, caused the immediate destruction of a large part of the world's population.

The nuclear winter and the radioactive fallout drastically reduced the survivors and mankind found itself on the verge of extinction. Only a few well-organized groups of people survived in the southern hemisphere south of the 40th parallel.

Year 0-300: DARK CENTURIES

During the first three centuries, most of the planet was burned and became inhabitable. The widespread global fires generated large quantities of toxic gases that released nitrogen monoxide into the atmosphere depleting the ozone layer. Global warming was certain and inevitable.

Mankind found itself facing dark centuries, during which most of the technological advances civilization had achieved were lost; cultural knowledge and law and order were non-existent, even the most basic human rights were violated.

Year 300-400: A NEW OPPORTUNITY

As the polar ice caps started to melt, the human race found new hope.

The new climatic conditions of the Antarctic continent allowed for the growth of countless of settlements.

In the year 397, the city of Antarctica was proclaimed the capital of Newland and became the most important cultural, economic and commercial center on planet Earth.

Year 400-500: A NEW POLITICAL SYSTEM

The Antarctic continent was completely colonized by the state of Newland, which established a federation of three dependent states or protectorates: Sanave, Windbay and Stockland, with their own respective capitals of Novolez, Belgrano and New Antartica.

Thanks to its favorable geographical location, the Stockland protectorate had such an economic growth that, around the year 450, New Antartica, its capital became extremely important to the federal capital, Antarctica.

Year 512: THE REVOLUTION: HISTORY REPEATS ITSELF

The desire for freedom coupled with discontent due to the high taxation imposed on the protectorates by the state of Newland led to independence movements, which resulted in a declaration of independence of the Stockland protectorate on October 4th, 512. As tensions rised, a battle of independence was inevitable and on June 21st, 513, the Battle of Kemp, a violent air battle between the rebel legion of New Antartica and the elite army of Newland took place.

The arms race had begun.



TIPS & TRICKS VIDEO



SAB AVIO WEBSITE



LIZARD MANUAL

Release 1.0 - December 2019

SAB AVIO

www.sabavio.com

support@sabitaly.com



NAME: M138 LIZARD

VERSION: Robodrone

ROLE: Multirole fighter

MANUFACTURER: Mc Murdo Industries

Please read this user manual carefully, it contains instructions for the correct assembly of the KIT.

Please refer to the web site www.sabavio.com for updates and other important information.

VERY IMPORTANT

In the Manual bag you will find a product card with your serial number. Please take a moment to register your kit online via our website:

www.sabavio.com

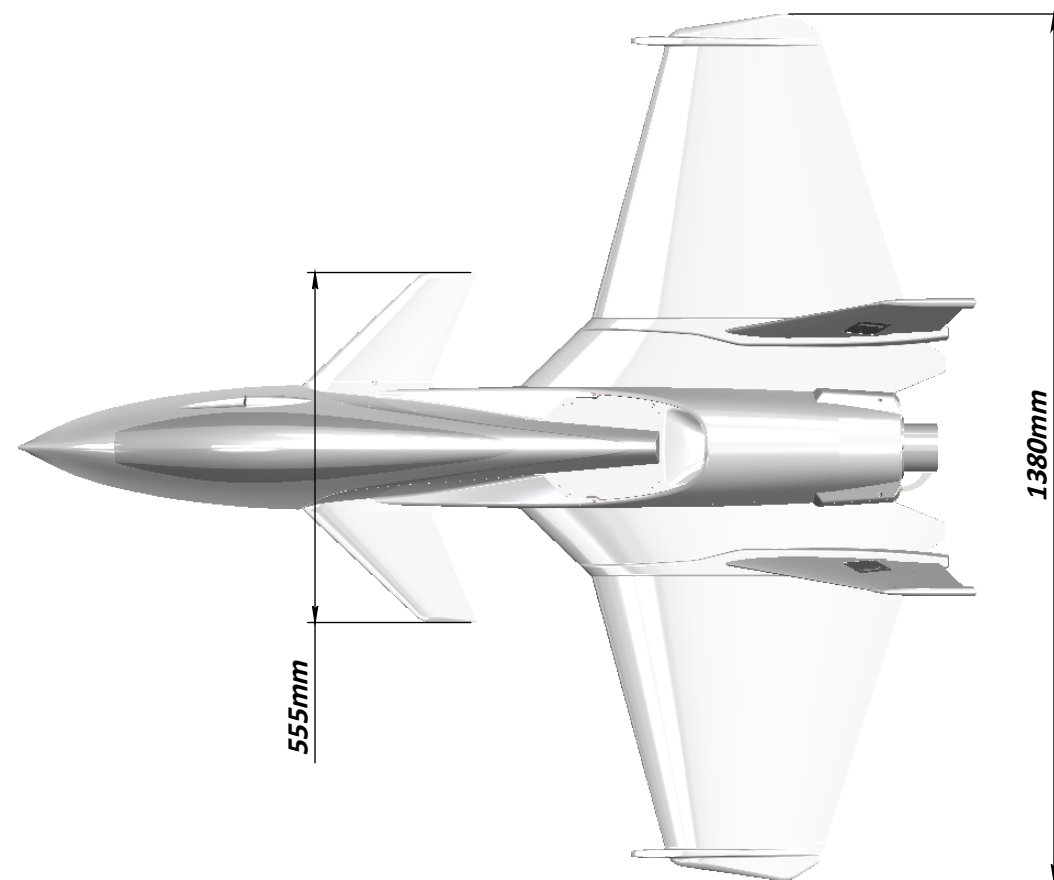
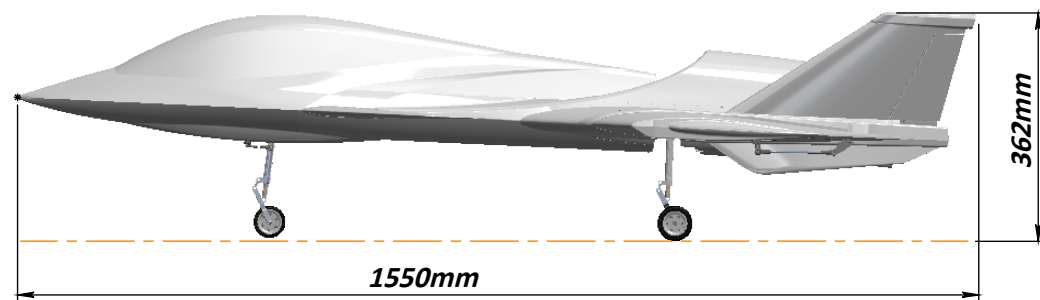
It is extremely important that you take a moment to register your airplane with us. This is the only way to ensure that you are properly informed about changes to your kit, such as upgrades, retrofits and other important developments. SAB Avio cannot be held responsible for issues arising with your model and will not provide support unless you register your serial number.

Thank you for your purchase, we hope you will enjoy your new LIZARD!

SAB Avio Team

SPECIFICATIONS

Wing Span	: 1380mm
Wing Area	: 32dm ²
Maximum Length	: 1550mm
RTF Weight (DRY)	: From 5.8 to 6.5 kg depending on equipment
Tank Capacity	: 2 liters
Turbine	: From 4.5 to 12kg



IMPORTANT NOTES

- *This radio controlled airplane is not a toy.
 - *This radio controlled airplane can be very dangerous.
 - *This radio controlled airplane is a technically complex device which has to be built and handled very carefully.
 - *This radio controlled airplane must be built following these instructions. This manual provides the necessary information to correctly assemble the model. It is necessary to carefully follow all the instructions.
 - *Inexperienced pilots must be monitored by expert pilots.
 - *All operators must wear safety glasses and take appropriate safety precautions.
 - *A radio controlled airplane must only be used in open spaces without obstacles, and far enough from people to minimize the possibility of accidents or of injury to property or persons.
 - *A radio controlled airplane can behave in an unexpected manner, causing loss of control of the model, making it very dangerous.
 - *Lack of care with assembly or maintenance can result in an unreliable and dangerous model.
- *Neither SAB Avio nor its agents have any control over the assembly, maintenance and use of this product. Therefore, no responsibility can be traced back to the manufacturer. You hereby agree to release SAB Avio from any responsibility or liability arising from the use of this product.**

SAFETY GUIDELINES

- *Fly only in areas dedicated to the use of RC model.
- *Follow all control procedures for the radio frequency system.
- *It is necessary that you know your radio system well. Check all functions of the transmitter before every flight.
- *The turbine of the model is very dangerous, be aware of the danger they pose and the damage they may cause.
- *Never fly in the vicinity of other people.

DAMAGE LIMITS

SAB AVIO SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

Further, in no event shall the liability of SAB Avio exceed the individual price of the Product on which liability is asserted. As SAB Avio has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly the user accepts all resulting liability. If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

LIMITED WARRANTY

SAB Avio reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER This warranty covers only those Products purchased from an authorized SAB Avio dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims.

(b) Limitations- SAB AVIO MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NONINFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- SAB Avio's sole obligation hereunder shall be that SAB Avio will, at its option, replace any Product determined by SAB Avio to be defective In the event of a defect, this is the Purchaser's exclusive remedy. Replacement decisions are at the sole discretion of SAB Avio. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance or attempted repair by anyone

ADDITIONAL COMPONENTS REQUIRED

- * Turbine from 4.5kg to 12kg. (with Accessories).
- * Landing gear system. (P/N S0303).
- * UAT. (P/N S0296).
- * Batteries for Turbine and RX / servos.
- * Radio power system.

- * 2 Wings servos (15x35 mm mini size, min. 10 KG/cm.
Possible to use also 20x40 standard size)
- * 1 Canard servo (20x40 mm standard size, min. 20 KG/cm).
- * 1 Steering system servo (15x35 mm Mini size, min. 6 KG/cm).

- * Optional 2 Rudder servos (10x30 mm mini Wing, min. 6 KG/cm).
- * Optional 2 Vector servos (15x35 mm mini size, min. 10 KG/cm).

- * Accessories, extensions, tubes.

TOOLS AND ADHESIVES


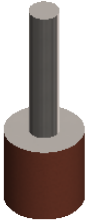




- * Drill with drill bits 2, 3, 4, 5mm.
- * Small milling cutter for drill.
- * Generic pliers.
- * Hexagonal driver, size 1.5, 2, 2.5, 3 mm.
- * Cyano-acrylate glue.
- * Epoxy glue.
- * Medium threadlocker (eg. Loctite 243).
- * Soldering equipment (for electric wiring).

NOTES FOR ASSEMBLY

Please refer to this manual for assembly instructions for this model. Follow the order of assembly indicated. The instructions are divided into chapters, which are structured in a way that each step is based on the work done in the previous step. Changing the order of assembly may result in additional or unnecessary steps.

Use thread lockers and retaining compounds as indicated. In general, each bolt or screw that engages with a metal part requires thread lock.

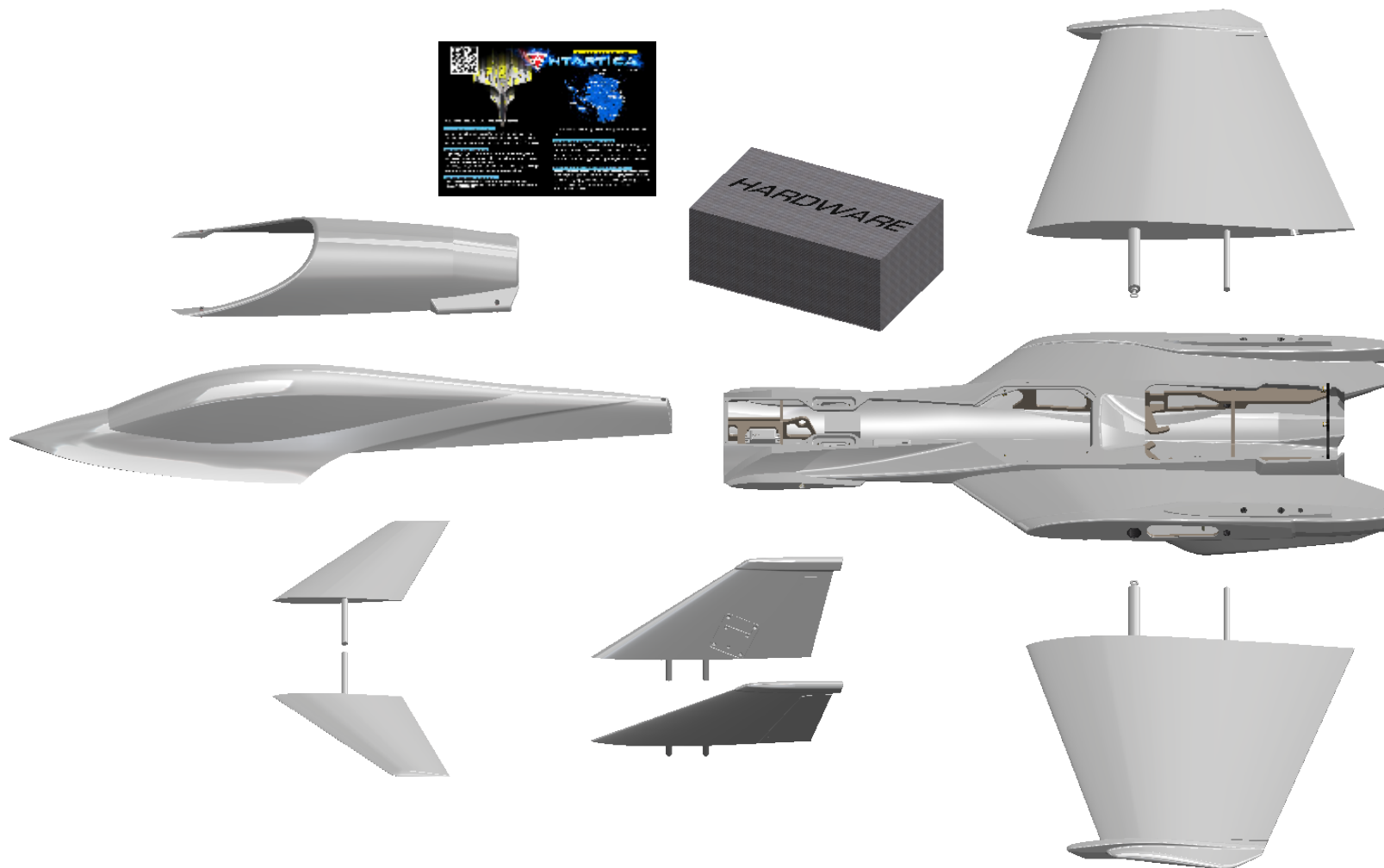
It is necessary to pay attention to the symbols listed below:

 <p>Important</p>	 <p>Sand and fit where necessary</p>	 <p>Use Thread Locker Medium Strength (SAB HA116-S)</p>
 <p>Use CA Glue</p>	 <p>Use Epoxy Glue</p>	 <p>Indicates that for this assembly phase you need materials that are: BAG xxx.</p>

The assembly process is described in the following chapters. Each chapter provides you with the bag number you will need for that chapter. The information is printed in a red box in the upper right corner of the page at the beginning of every chapter.

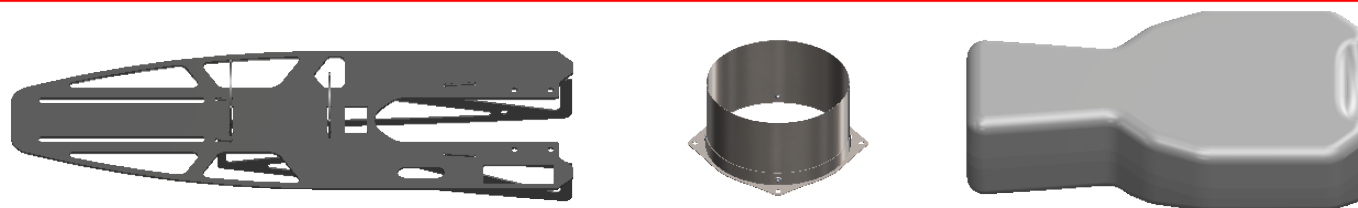
INSIDE THE BOX

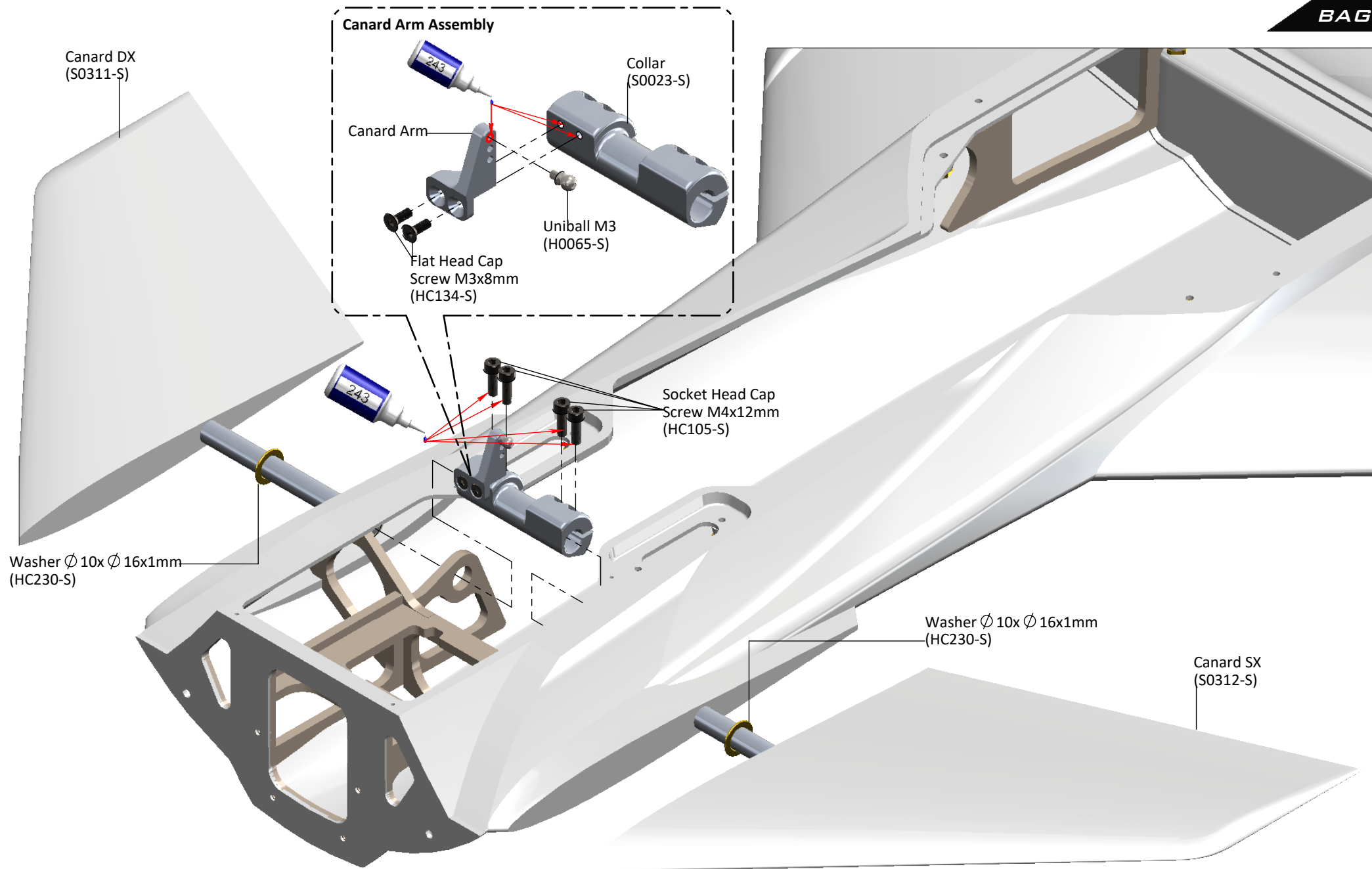
- * Main fuselage
- * Canopy
- * Turbine Cover
- * Left Wing
- * Right Wing
- * Left Rudder
- * Right Rudder
- * Left Canard
- * Right Canard
- * HARDWARE



CONVERSE TURBINE KIT (Optional , P/N S0305)

- * Tank.
- * Exhaust Pipe and Support.
- * Front Component Support.



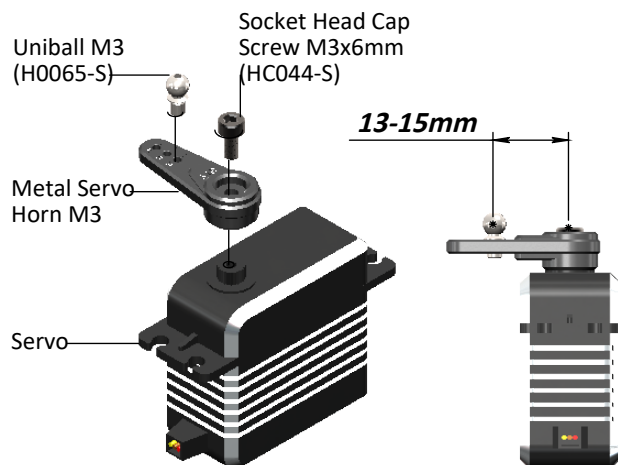


BAG 2

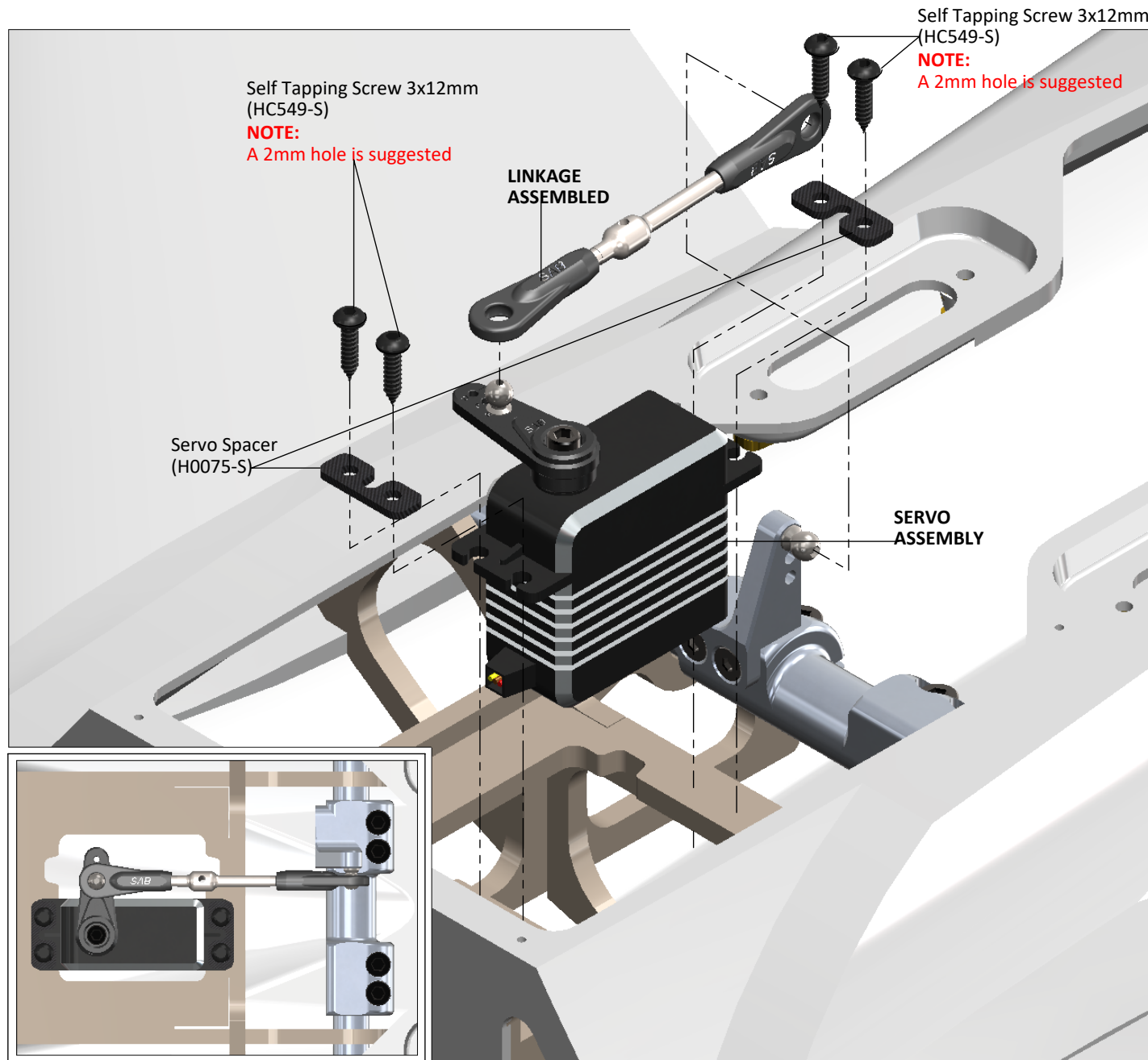
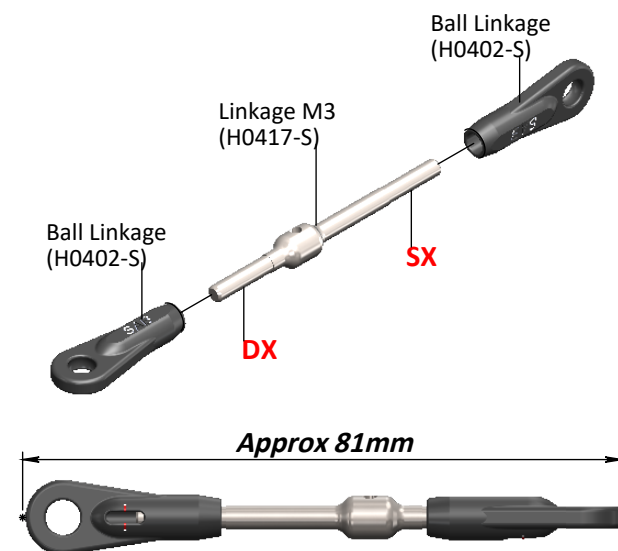
SERVO ASSEMBLY

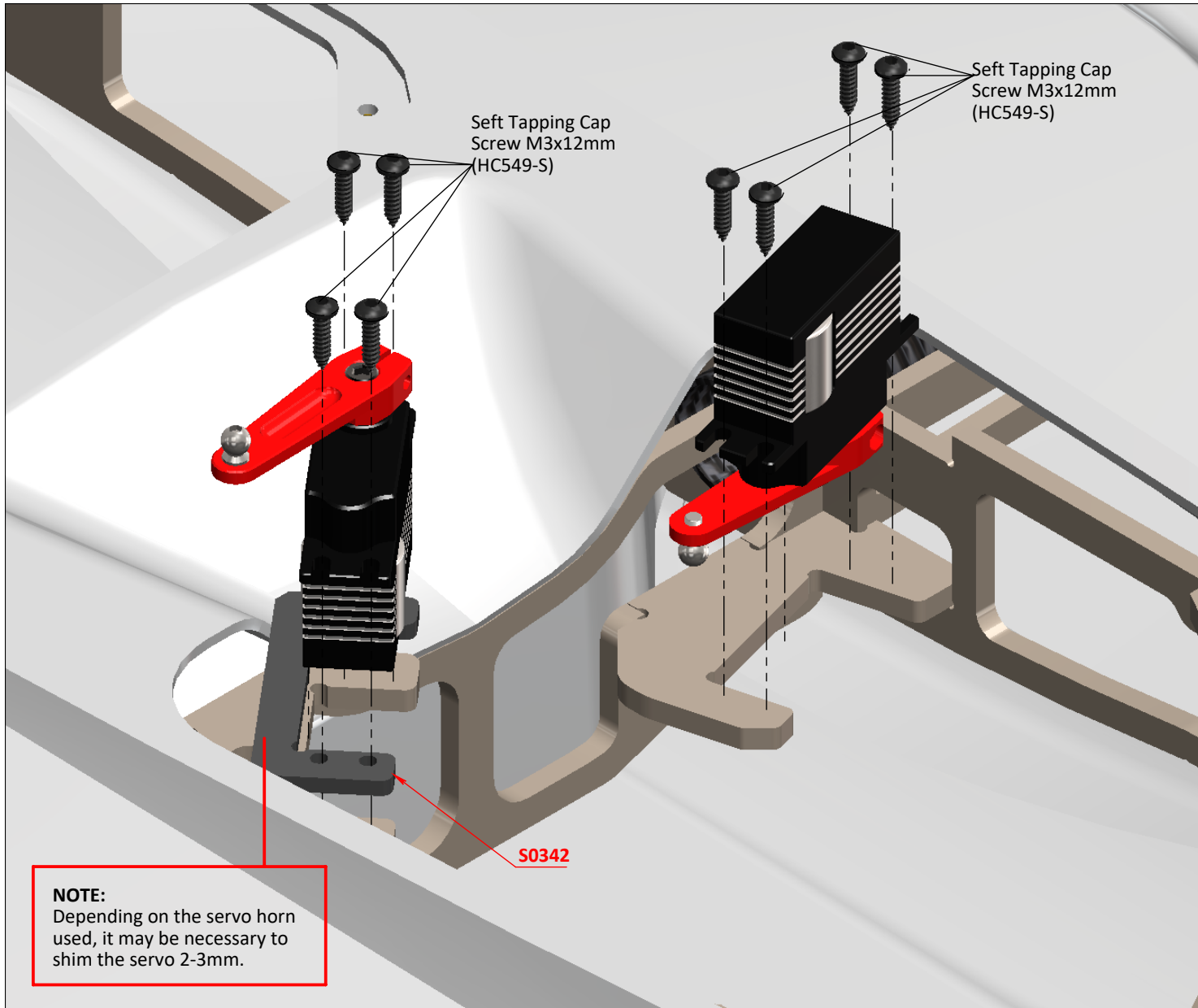
Standard Servo Size 20x40.

It is suggested to use metal servo horn with an M3 hole.

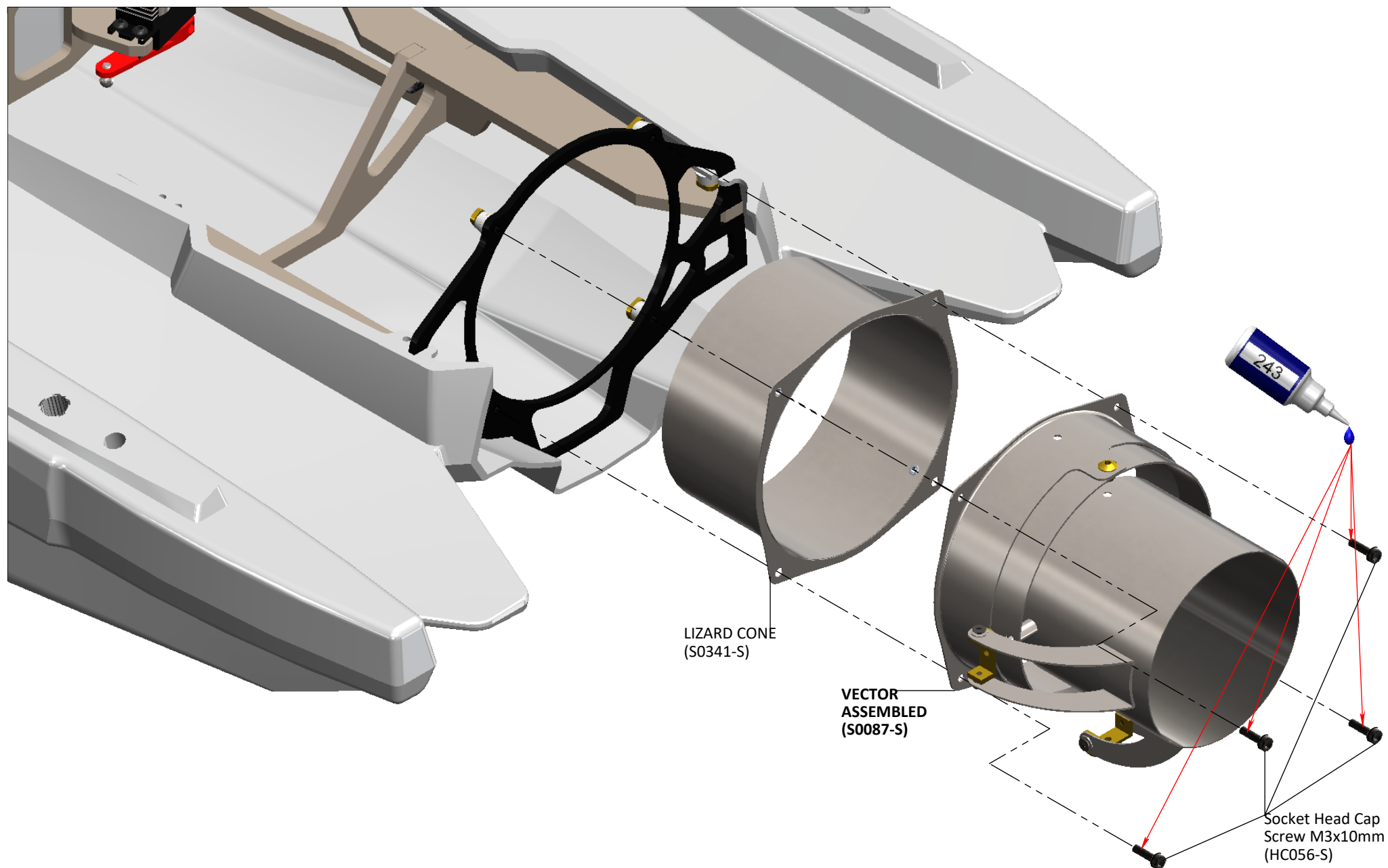


LINKAGE ASSEMBLY



BAG3

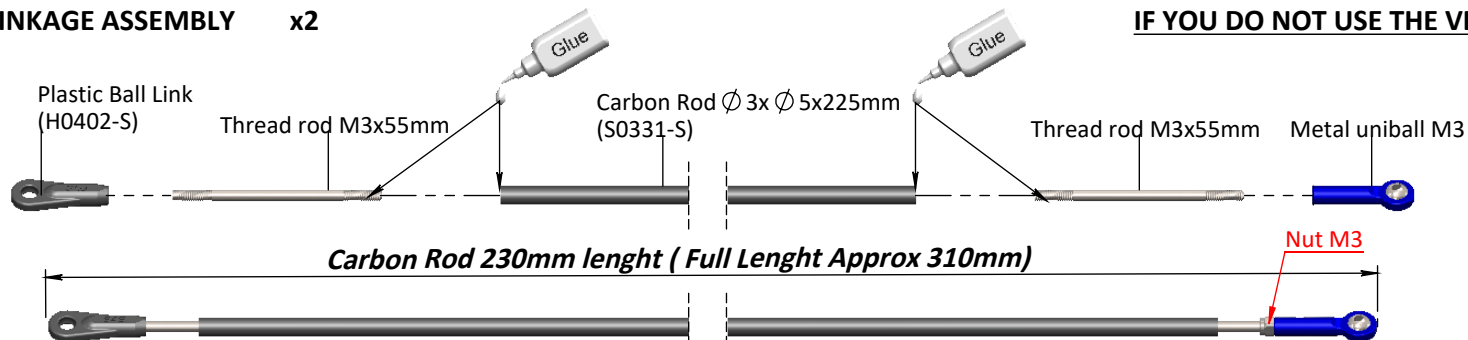
NOTE:
Depending on the servo horn used, it may be necessary to shim the servo 2-3mm.



VECTOR LINKAGE ASSEMBLY x2

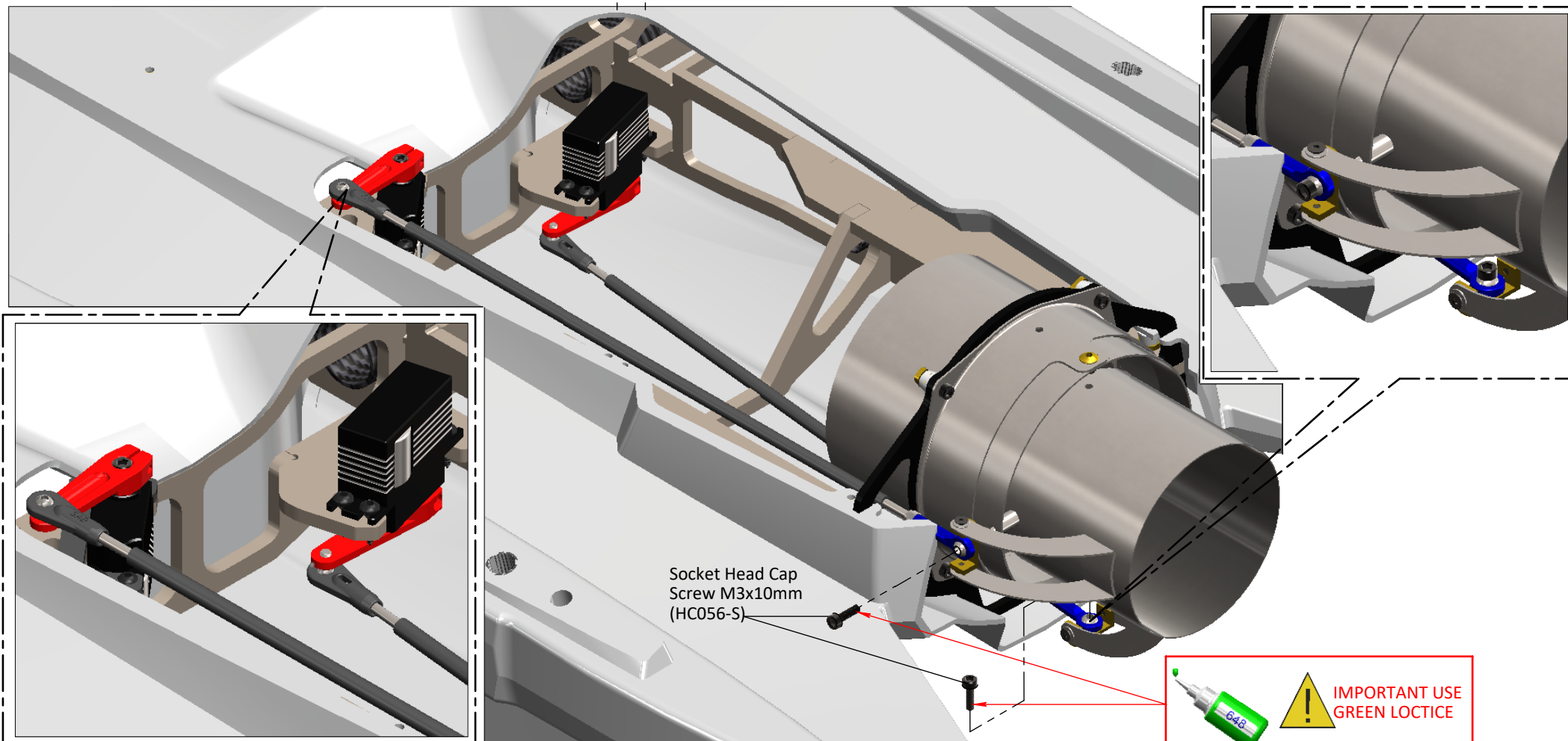
IF YOU DO NOT USE THE VECTOR SKIP THIS PAGE

BAG 3



NOTE:

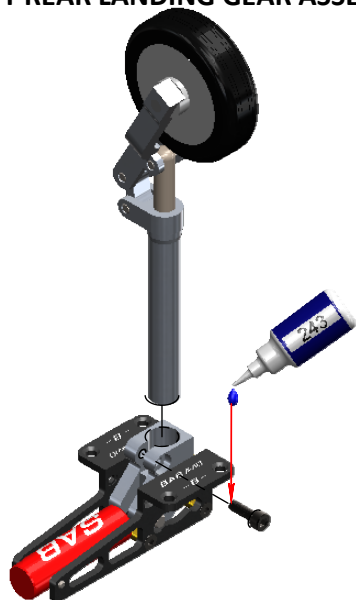
Please allow plenty of time for the glue to cure before inserting plastic ball link onto the threaded rod.



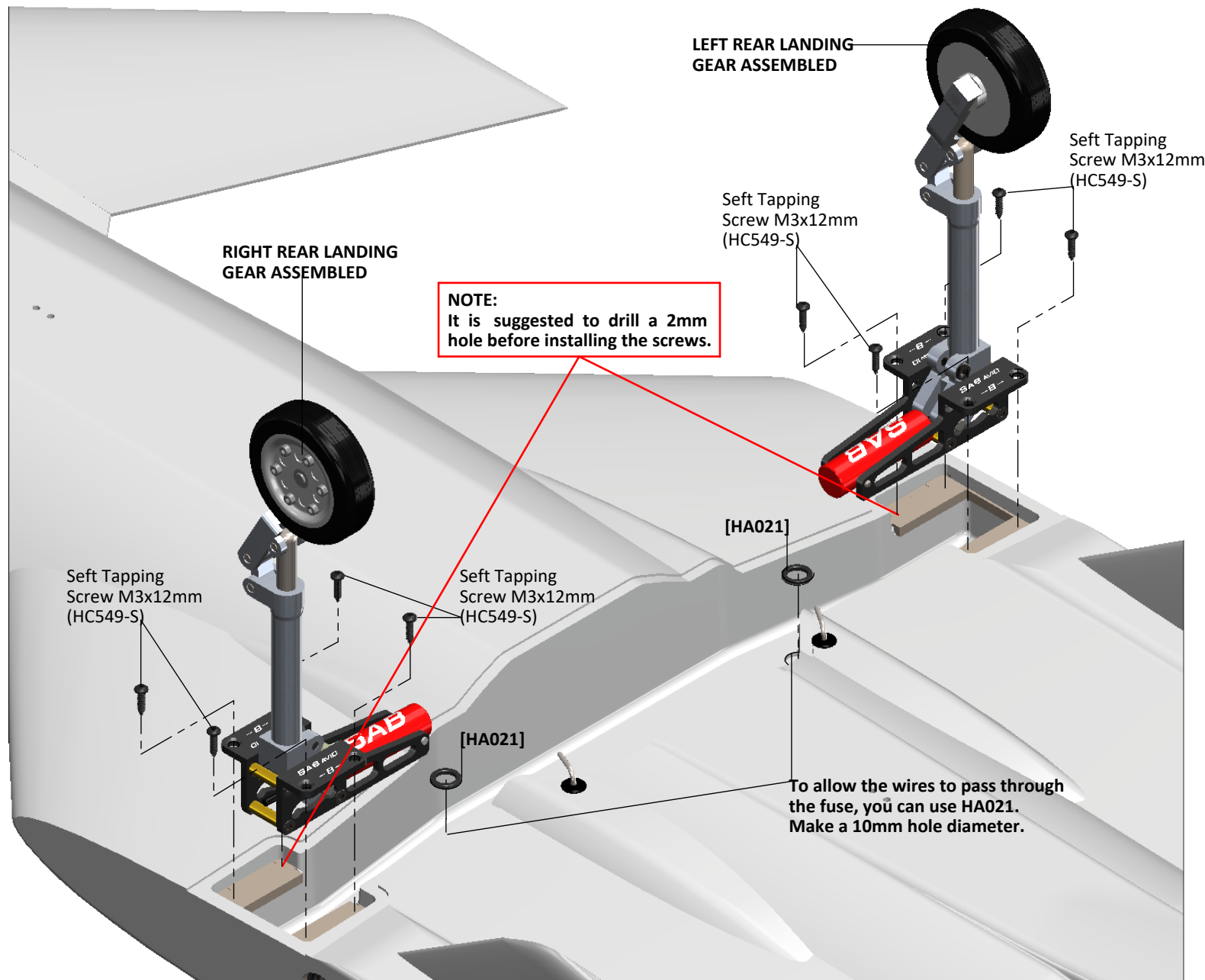
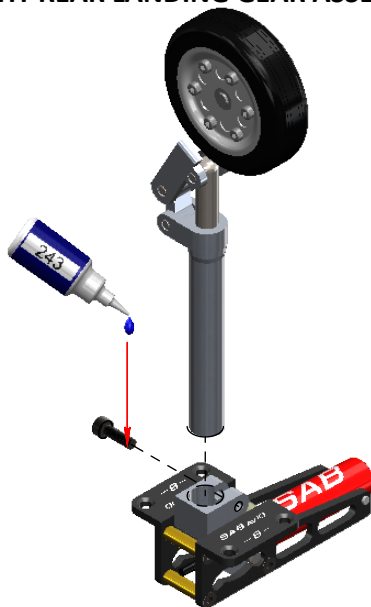
RETRACT BOX, BAG4

These 2 pages show the assembly of the SAB landing gear p/n S0303. (Optional not included in the basic KIT)

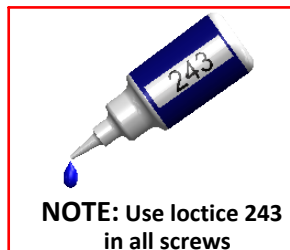
LEFT REAR LANDING GEAR ASSEMBLY



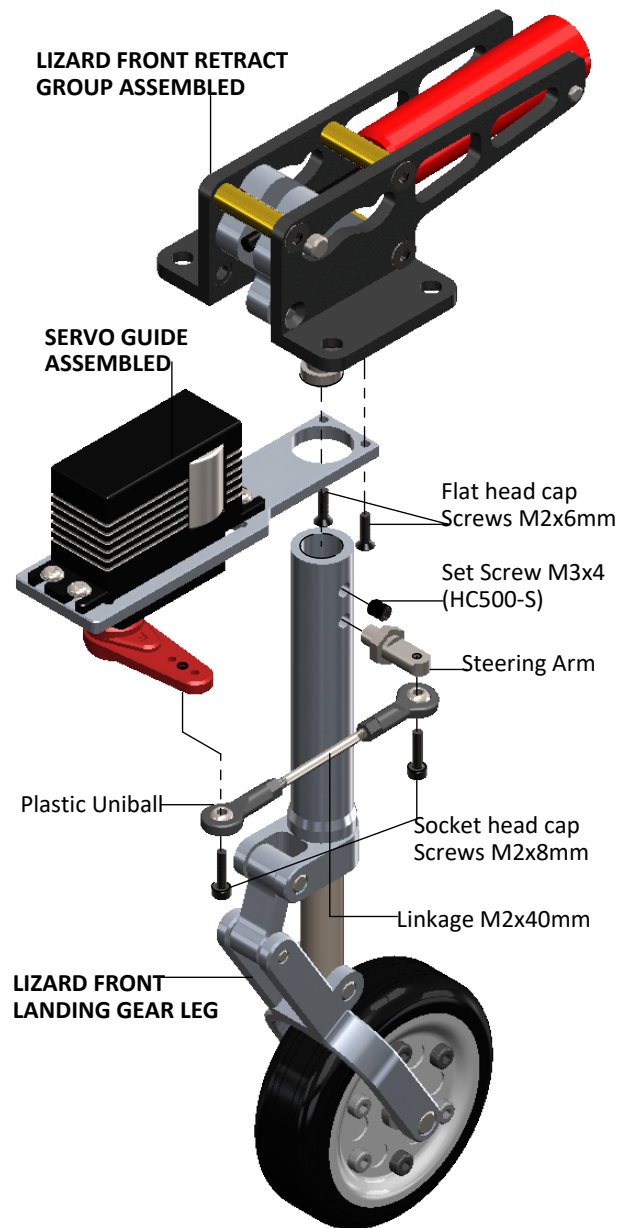
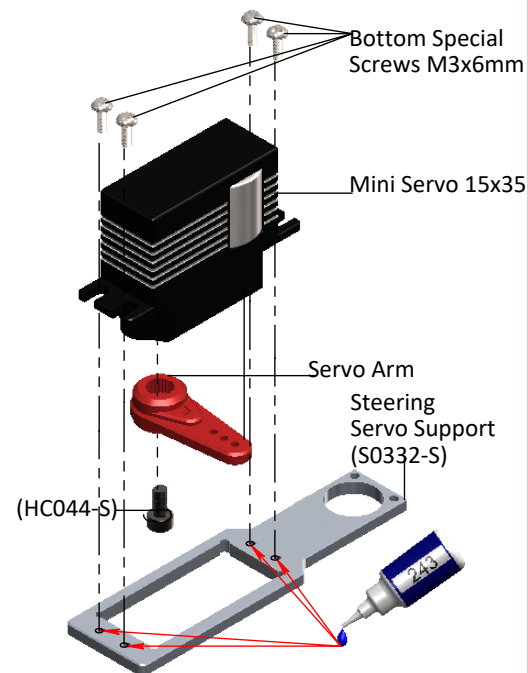
RIGHT REAR LANDING GEAR ASSEMBLY



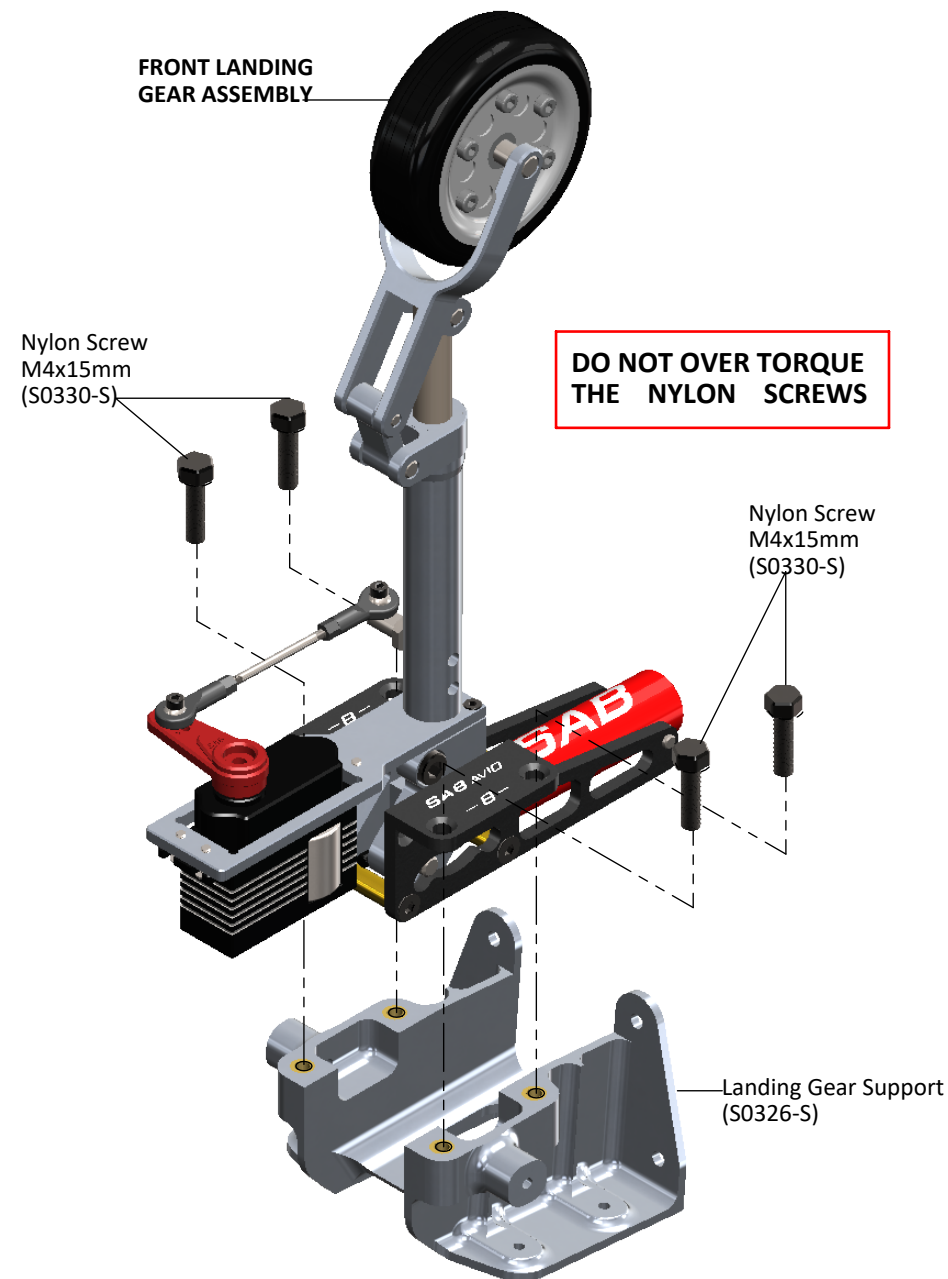
FRONT LANDING GEAR ASSEMBLY



SERVO GUIDE ASSEMBLY

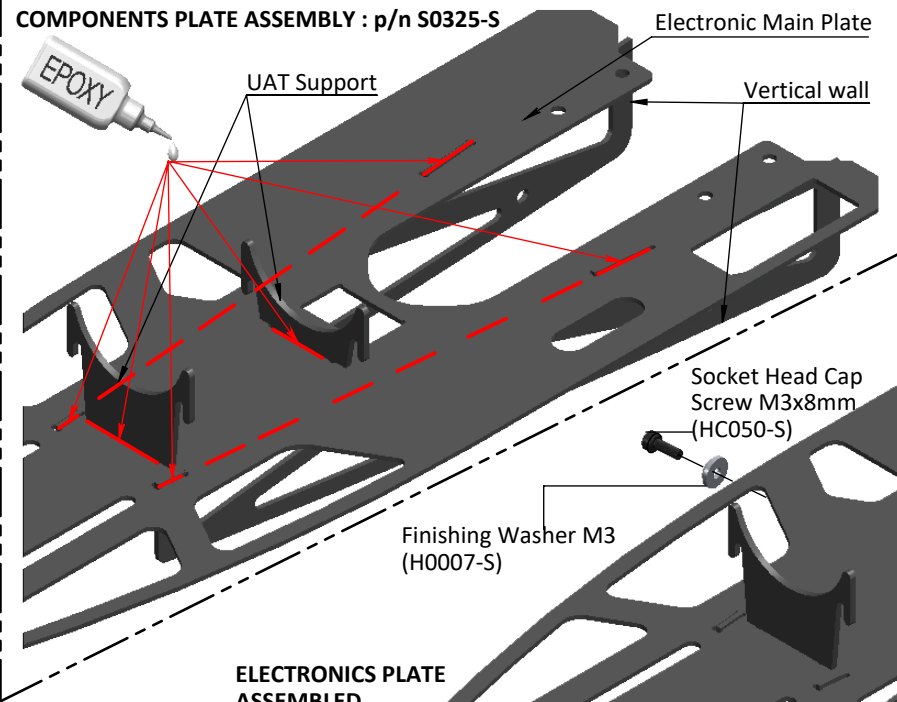


RETRACT BOX, BAG4



BAG4T

COMPONENTS PLATE ASSEMBLY : p/n S0325-S



ELECTRONICS PLATE ASSEMBLED

Finishing Washer M3 (H0007-S)

Socket Head Cap Screw M3x8mm (HC050-S)

Socket Head Cap Screw M3x8mm (HC050-S)

Finishing Washer M3 (H0007-S)

Soft Tapping Screw M3x12mm (HC549-S)

Finishing Washer M3 (H0007-S)

Socket Head Cap Screw M3x8mm (HC050-S)

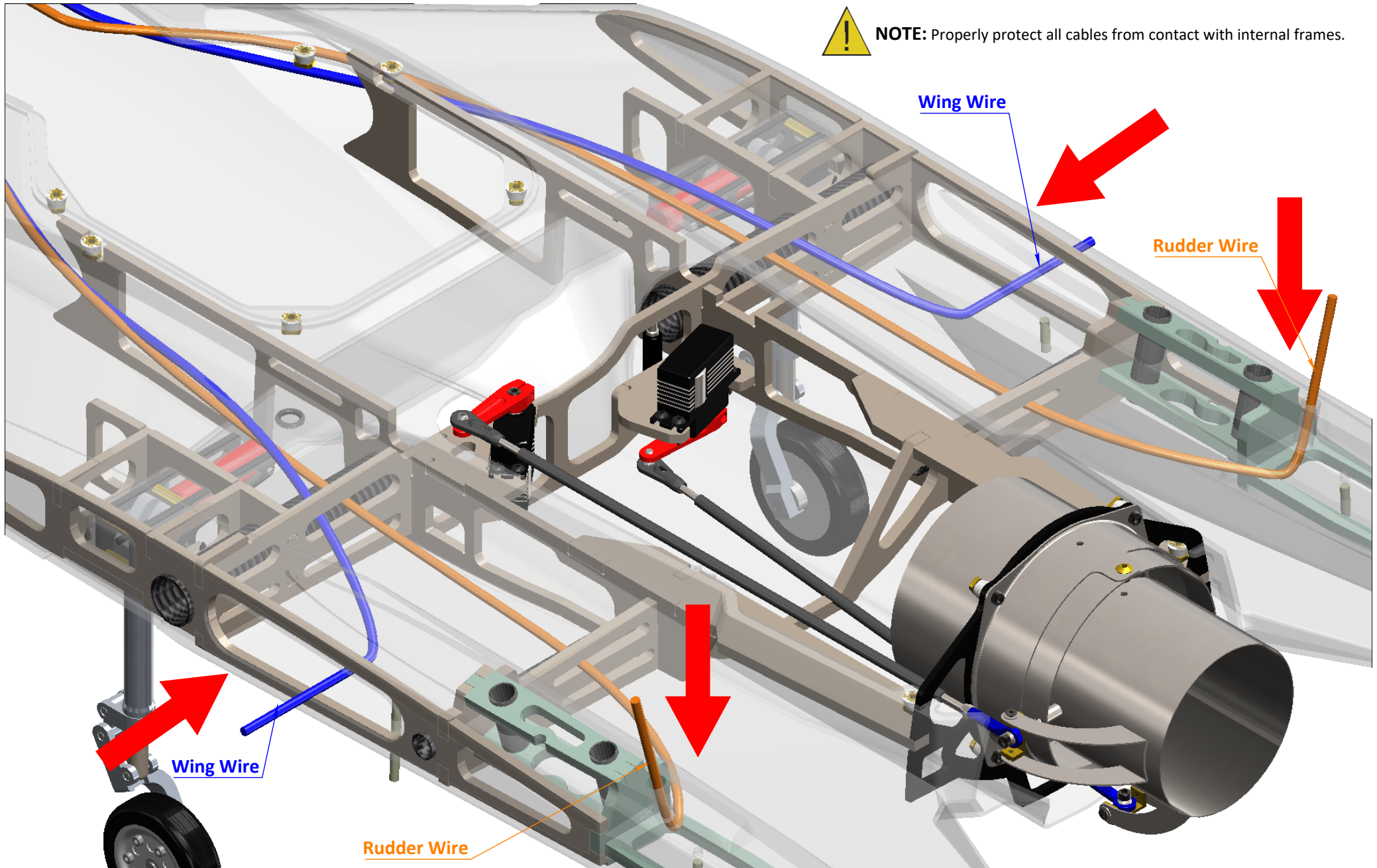
LANDING GEAR ASSEMBLED

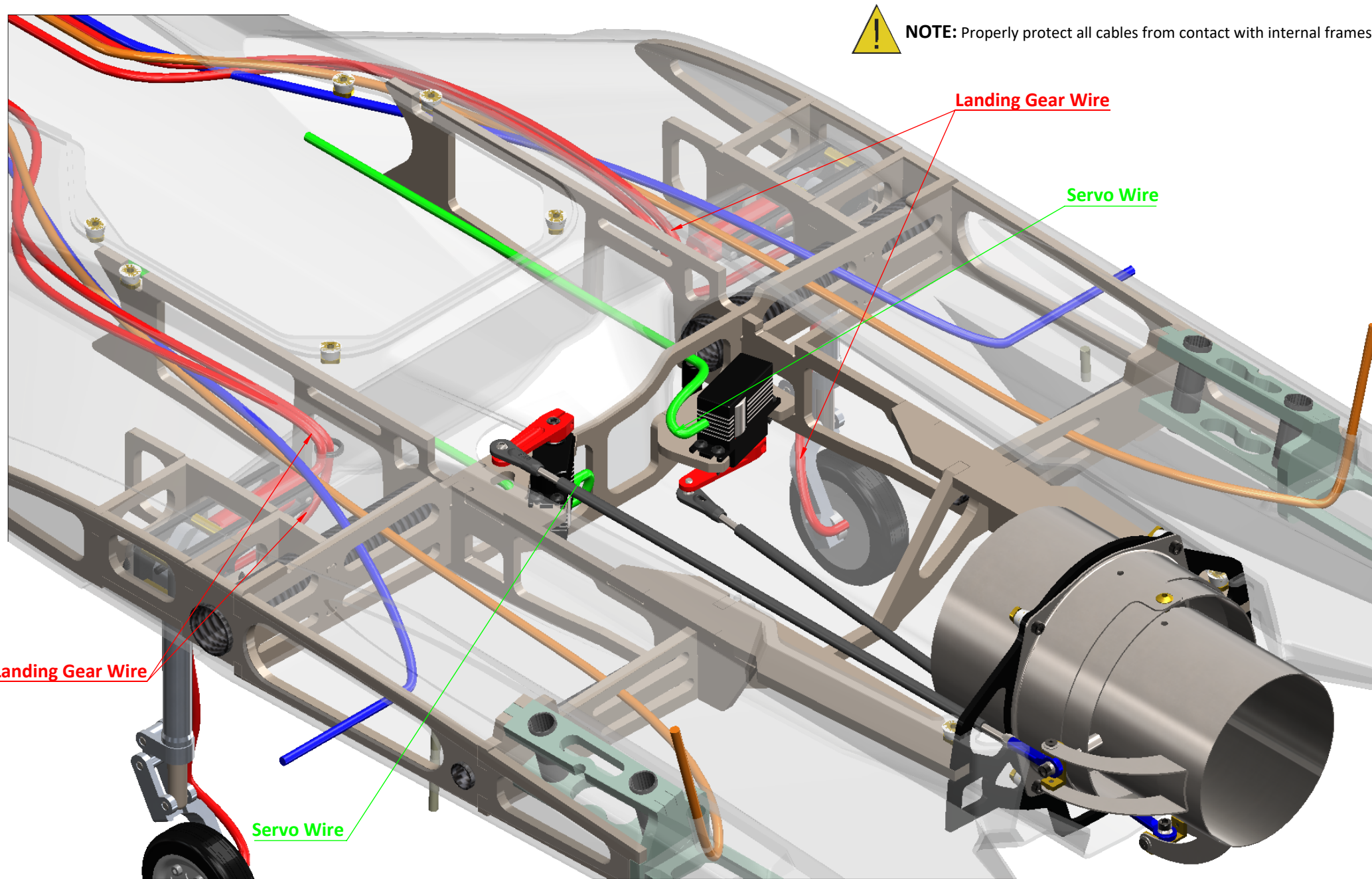


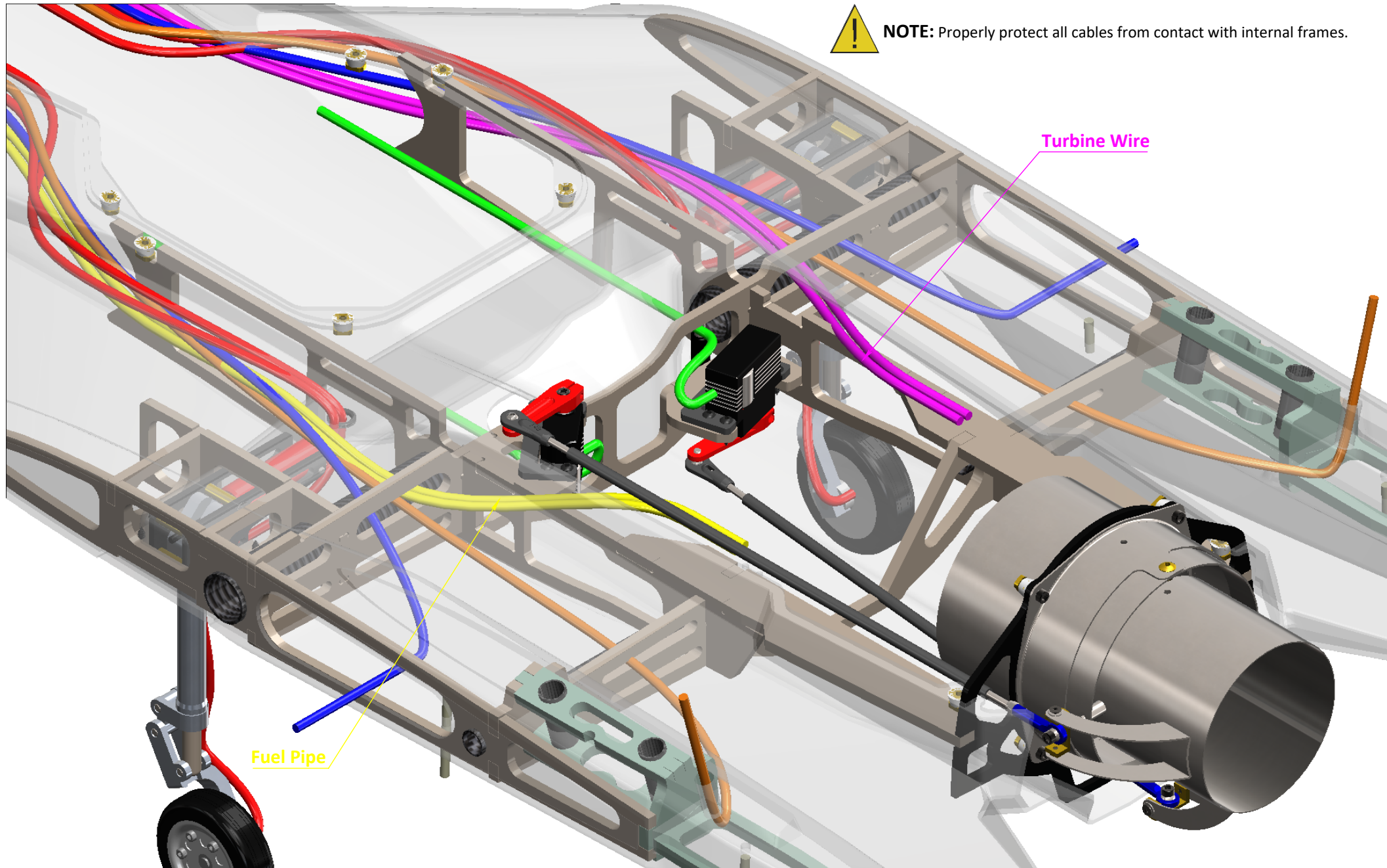
NOTE: Use loctice 243 in all screws



NOTE: Properly protect all cables from contact with internal frames.

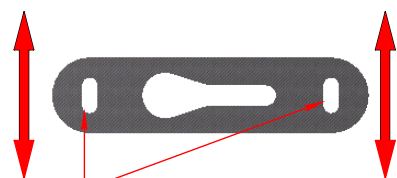






BAG 5

You can adjust the canopy Clamp plate to get the perfect match with the canopy.



NOTE

Soft Head Cap
Screws M3x10mm
(HC136-S)

[HA010]

Component Plate
(S0325-S)

Washer
 $\varnothing 3.2 \times \varnothing 6 \times 0.5 \text{mm}$

Socket Head Cap
Screws M3x10mm
(HC056-S)

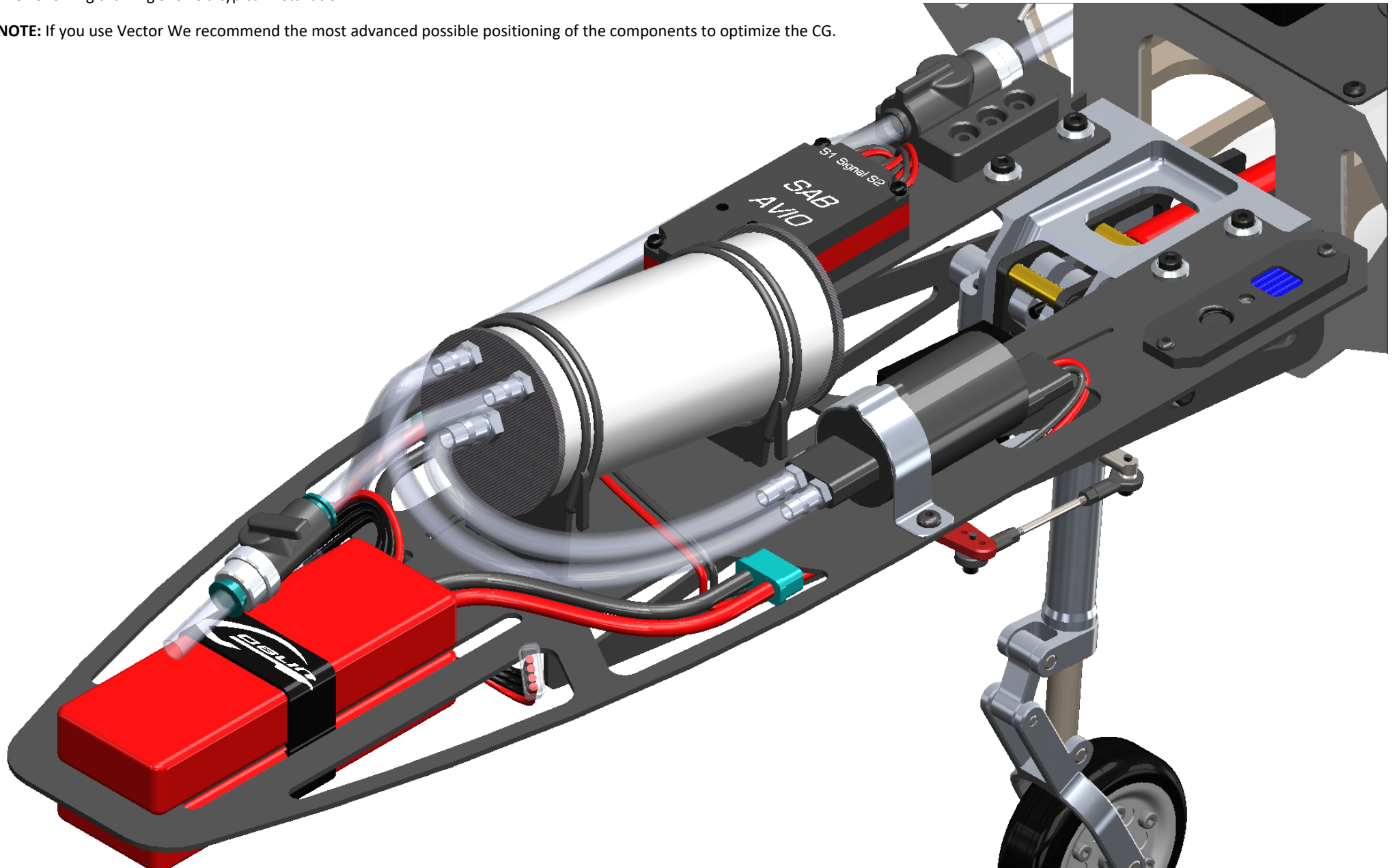
Socket Head Cap
Screws M3x10mm
(HC056-S)

Washer
 $\varnothing 3.2 \times \varnothing 6 \times 0.5 \text{mm}$

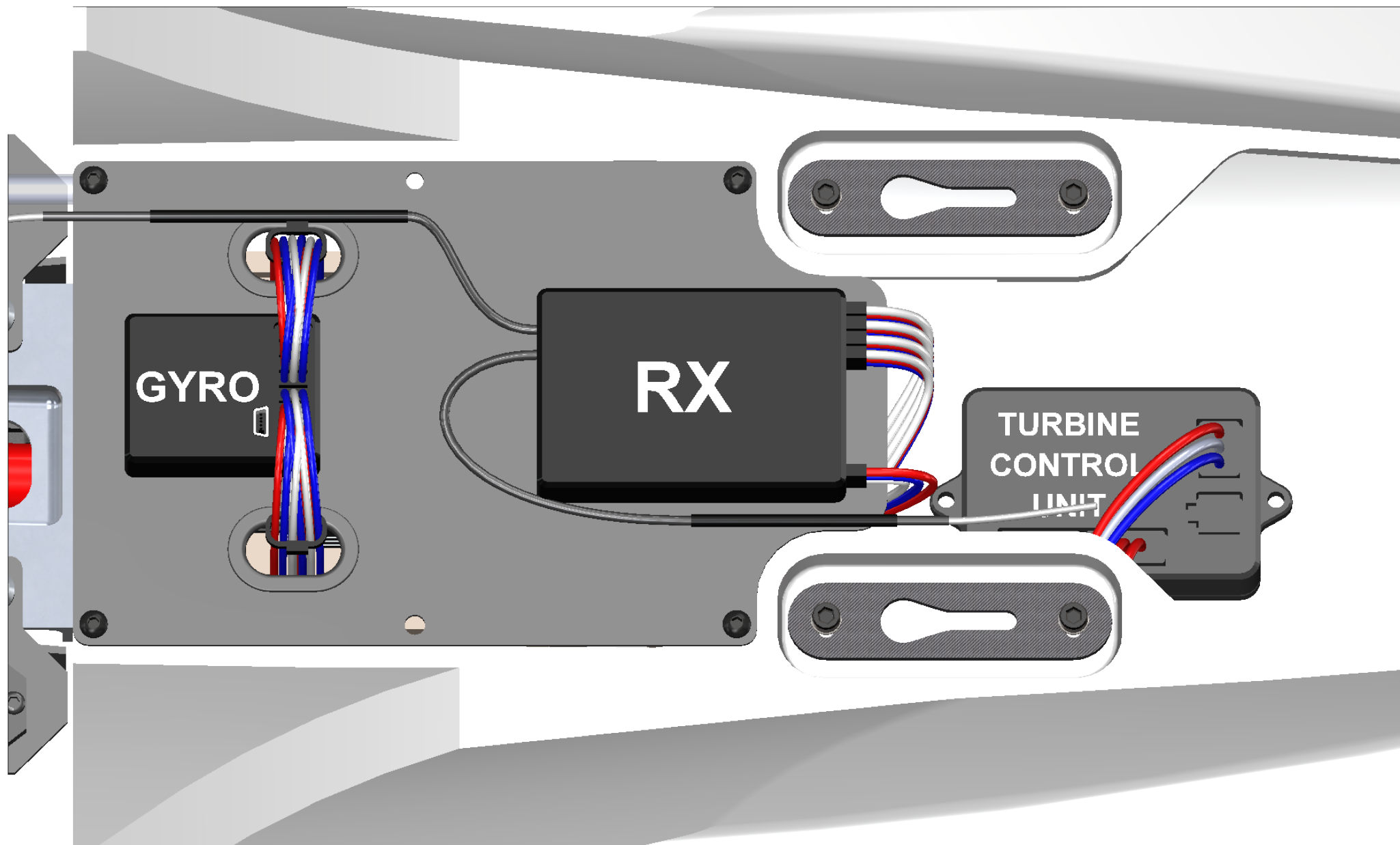
Canopy Clamp
(S0327-S)

The Following drawing shows a typical installation.

NOTE: If you use Vector We recommend the most advanced possible positioning of the components to optimize the CG.

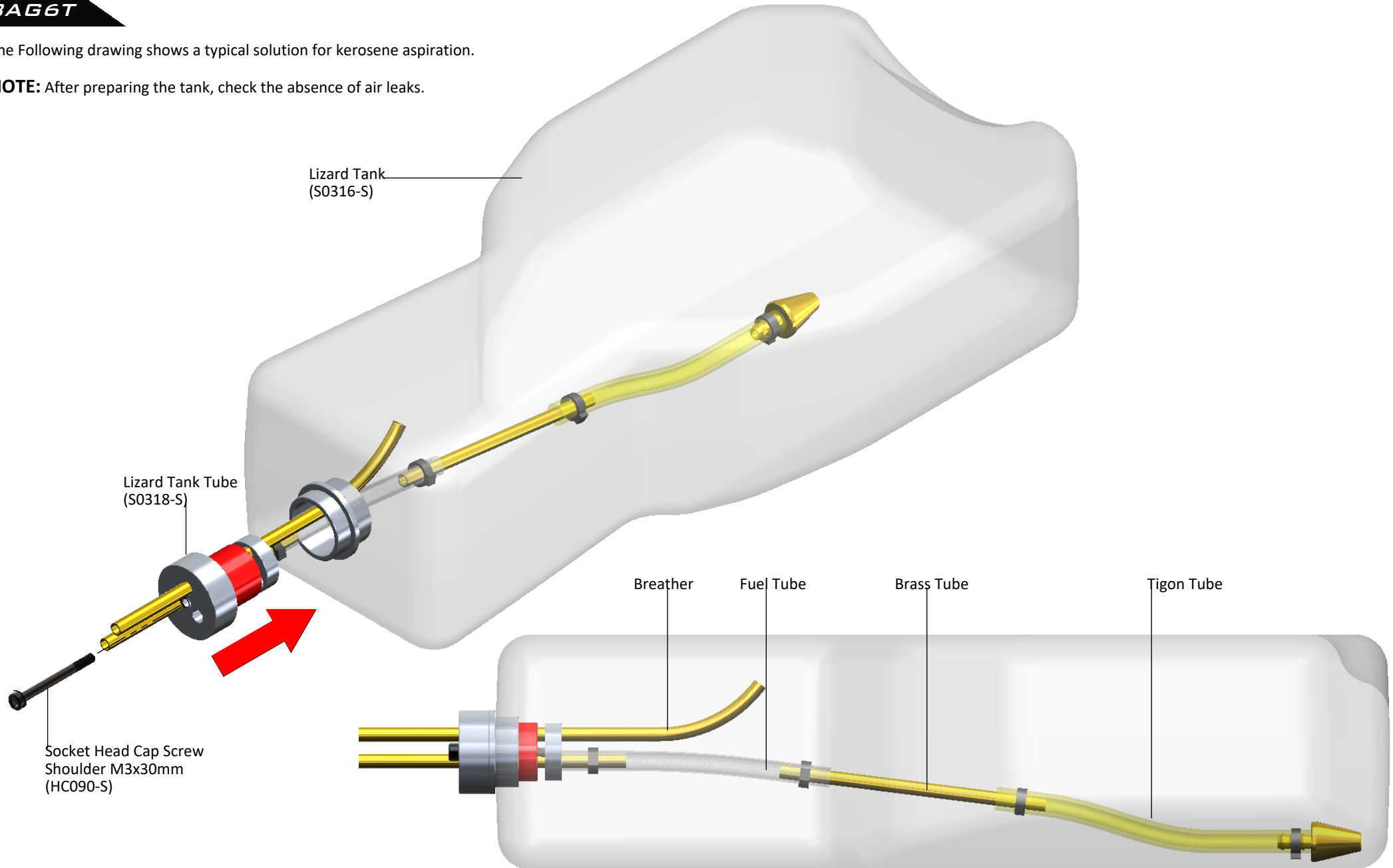


The Following drawing shows a typical installation.

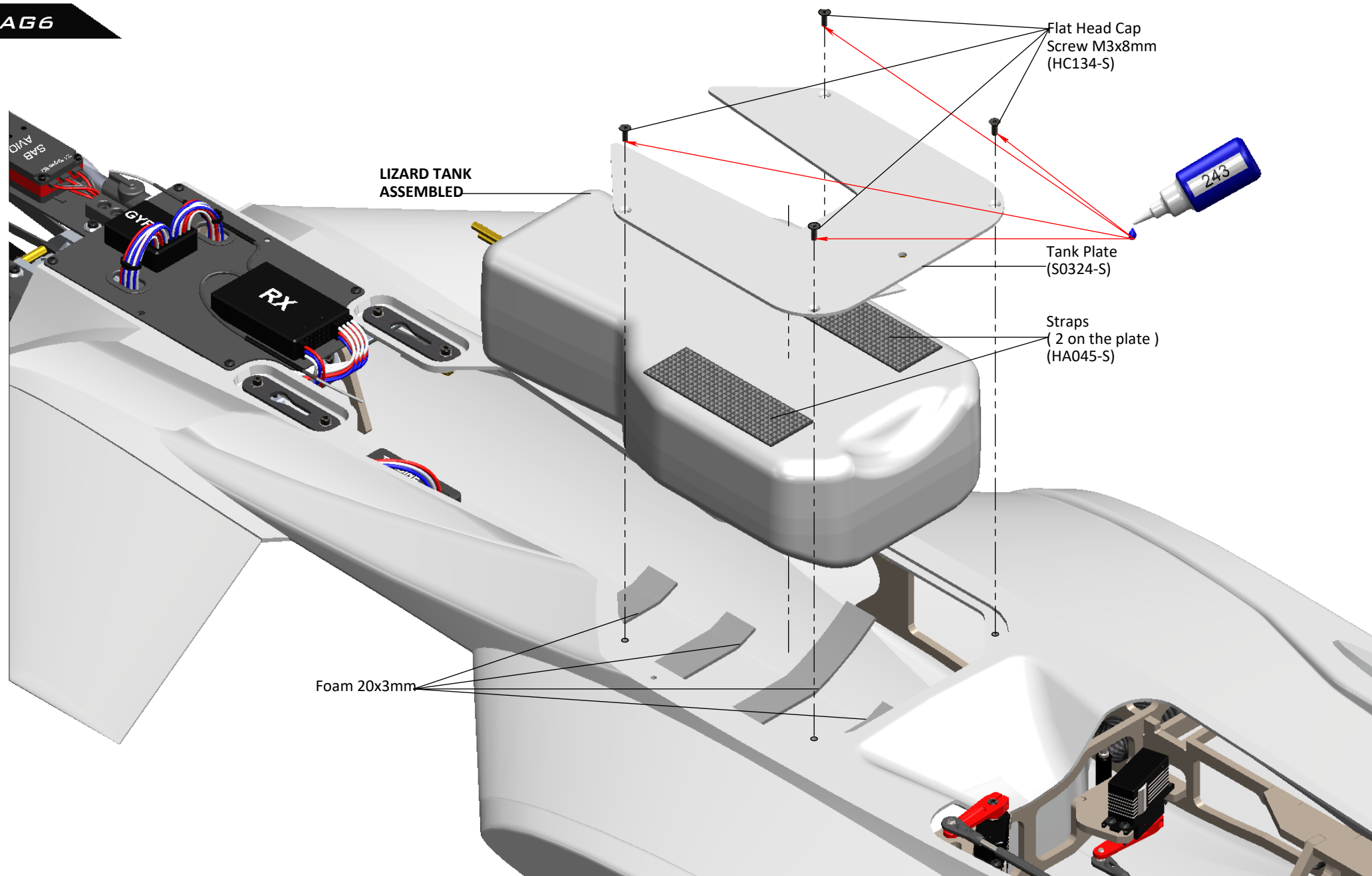


The Following drawing shows a typical solution for kerosene aspiration.

NOTE: After preparing the tank, check the absence of air leaks.



BAG 6



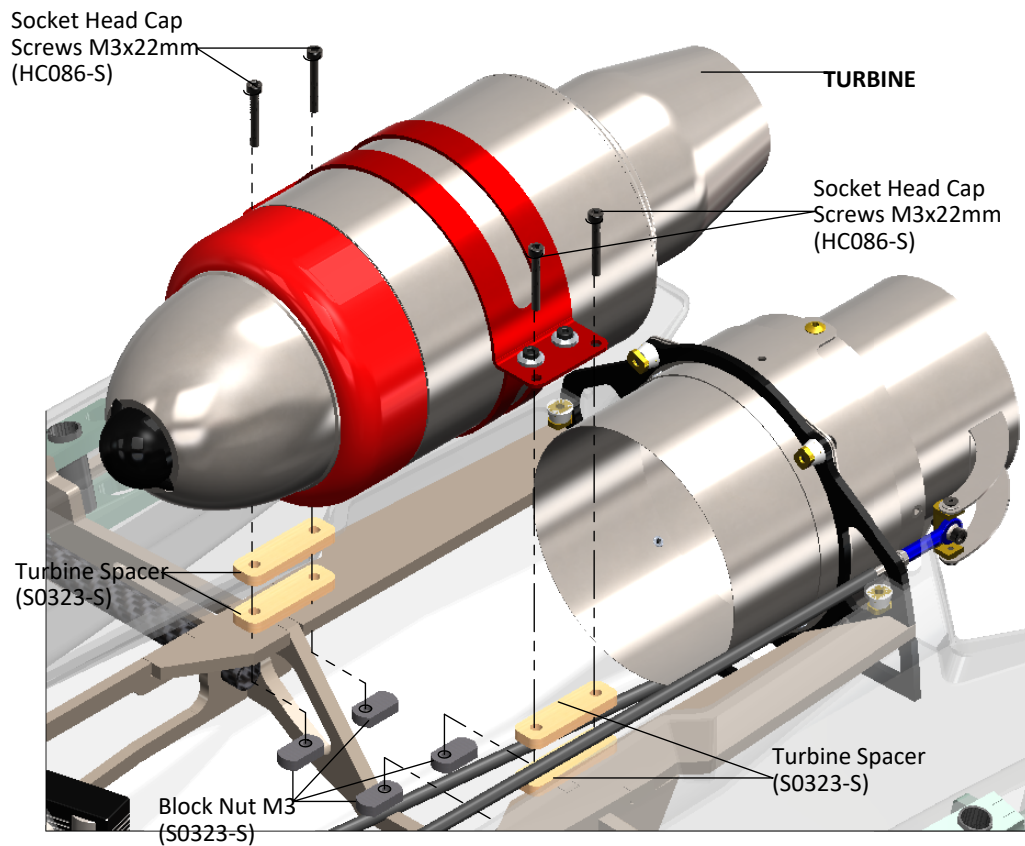


Check the assembly center point of your own turbine. Use this dimension to define the drilling position. Use the wood spacer to find the correct height position.

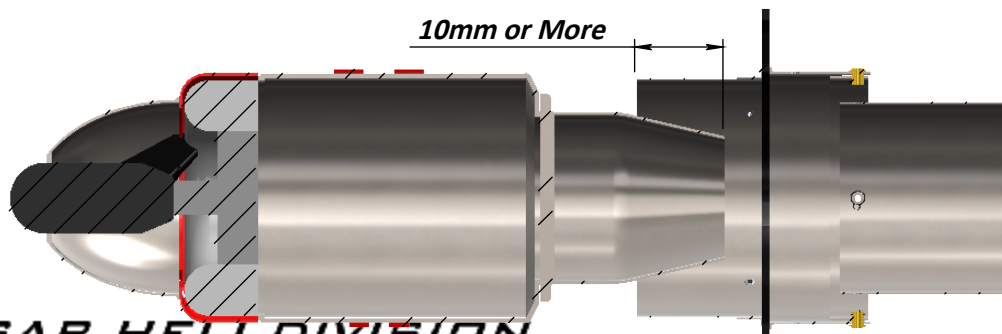
NOTE: We recommend installing the turbine as far forward as possible to optimize CG.

BAG 7

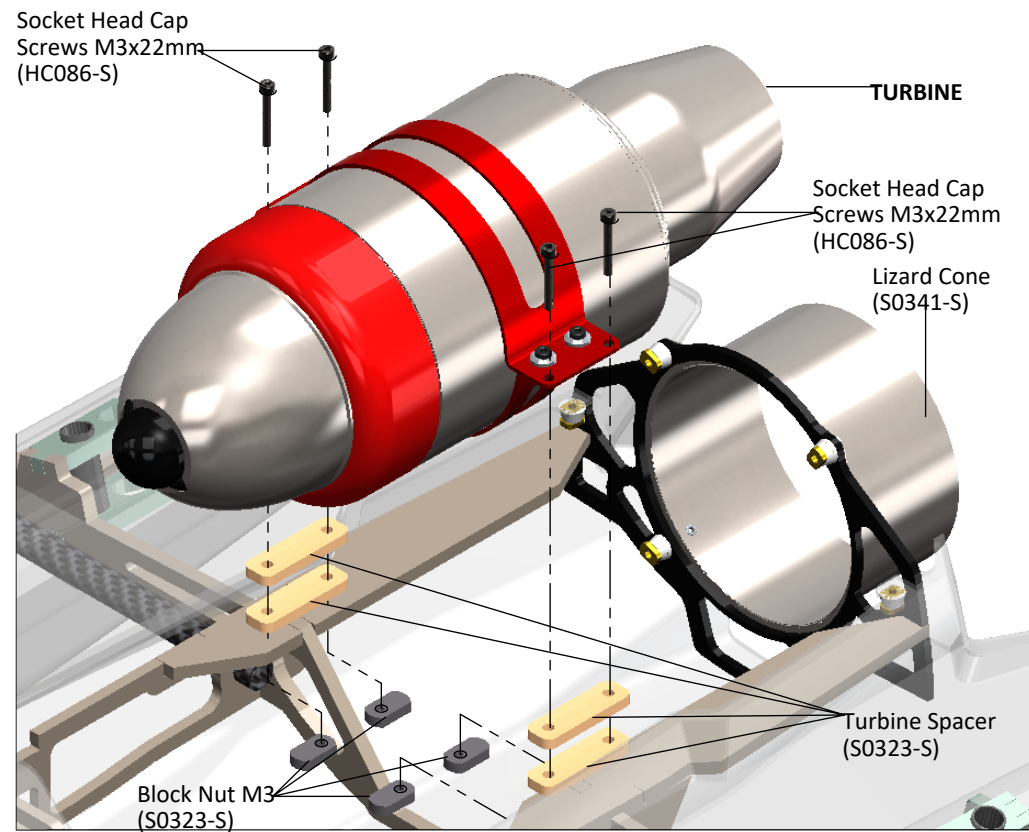
VECTOR



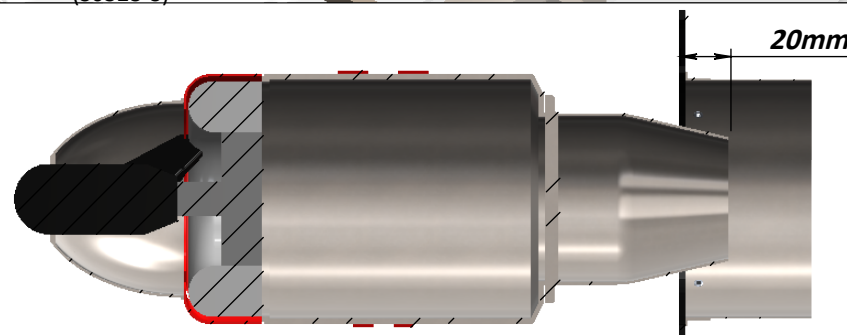
10mm or More



NO VECTOR



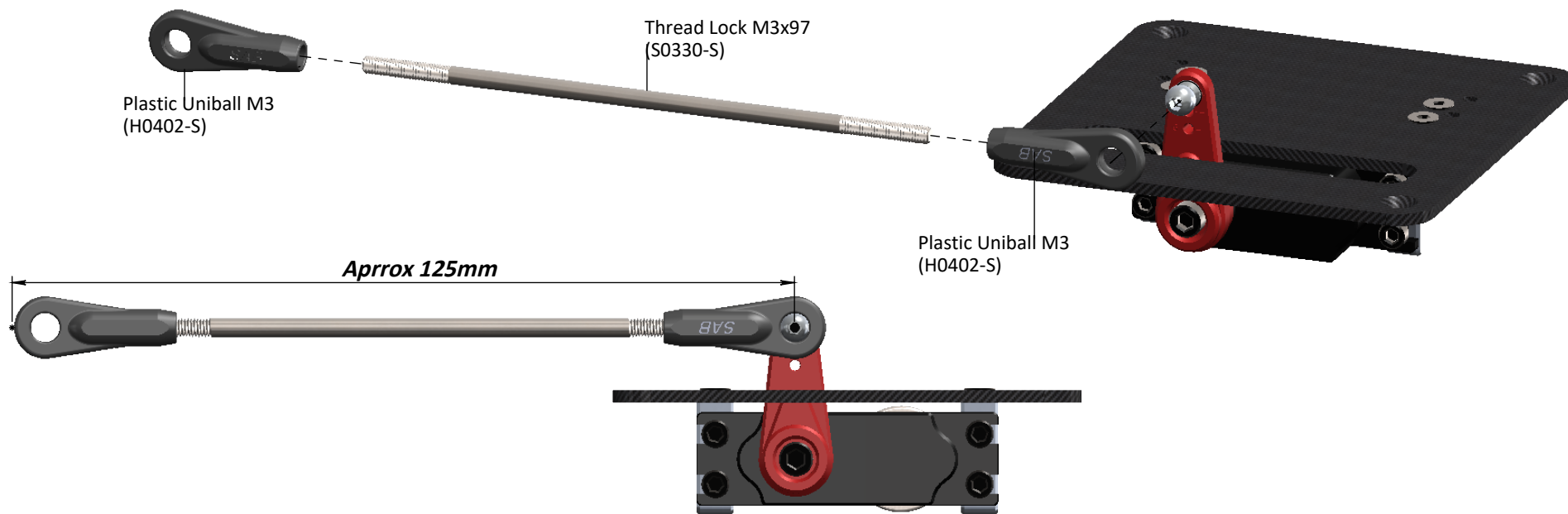
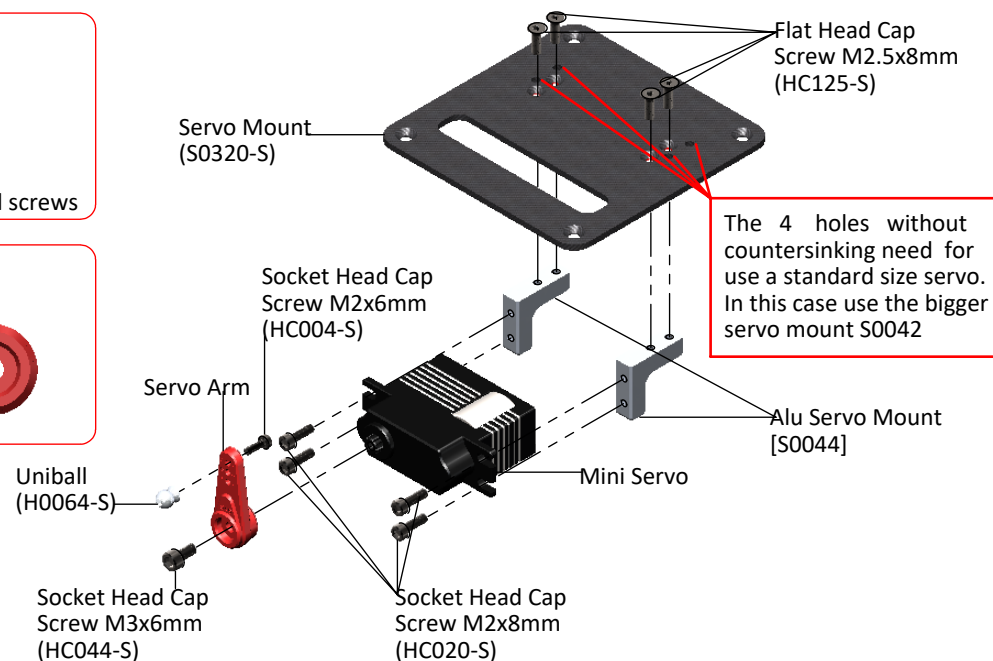
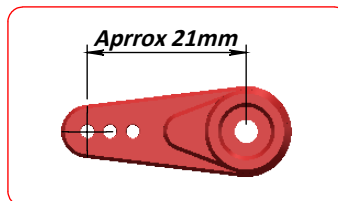
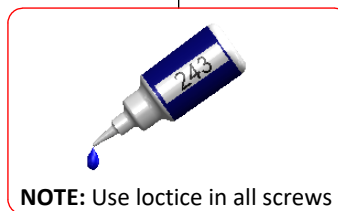
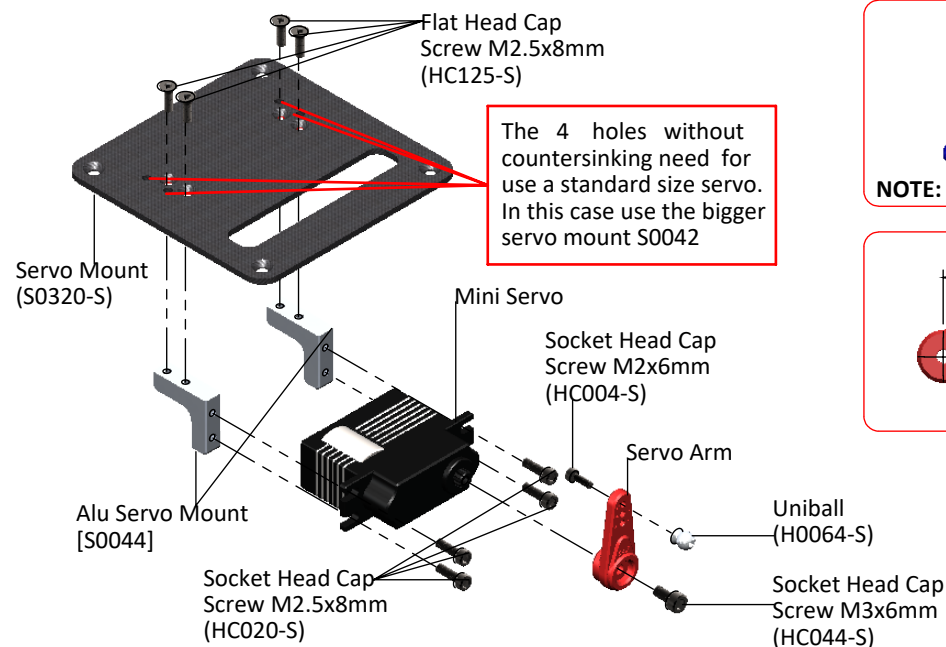
20mm



BAGB

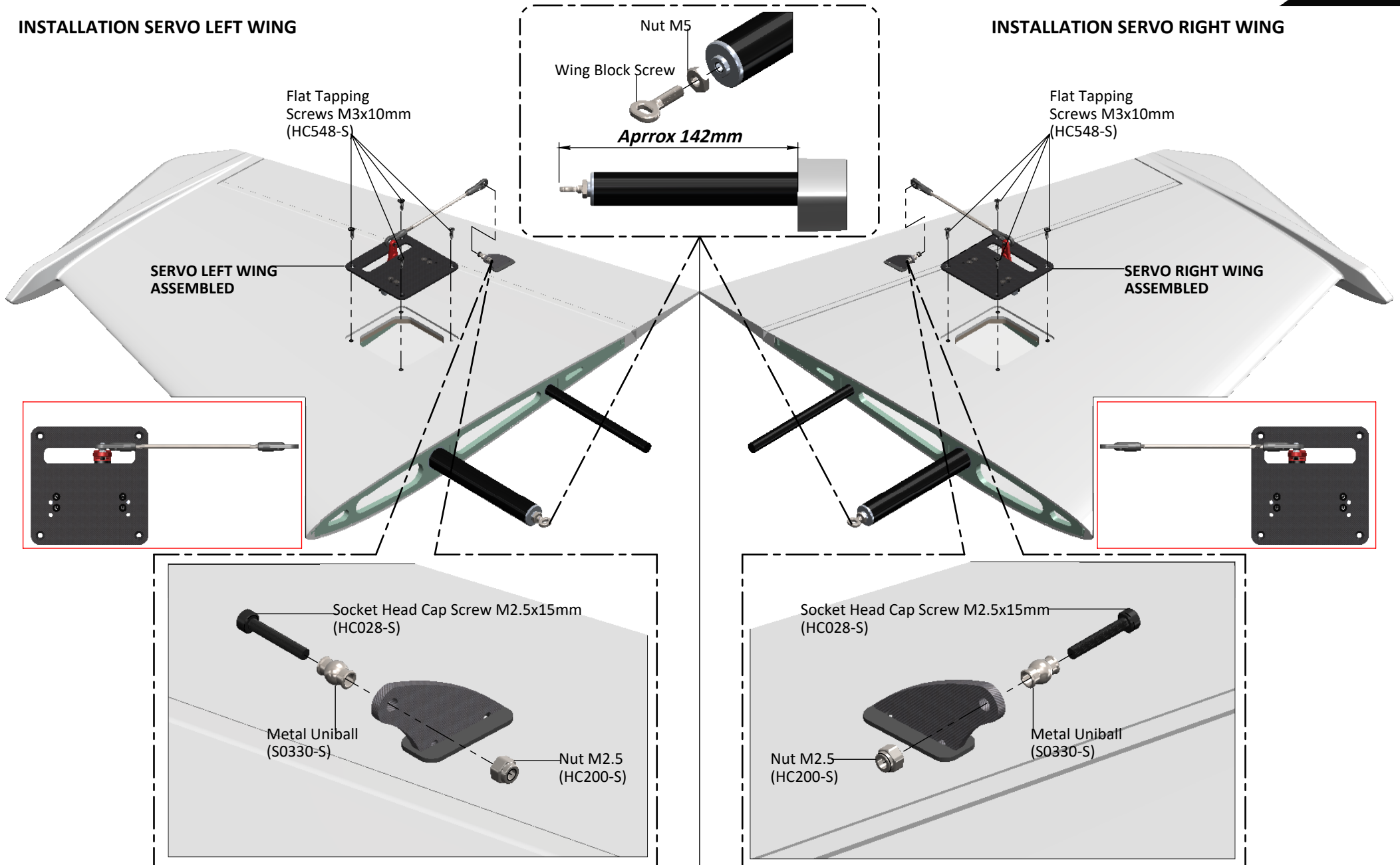
SERVO RIGHT WING ASSEMBLY

SERVO LEFT WING ASSEMBLY



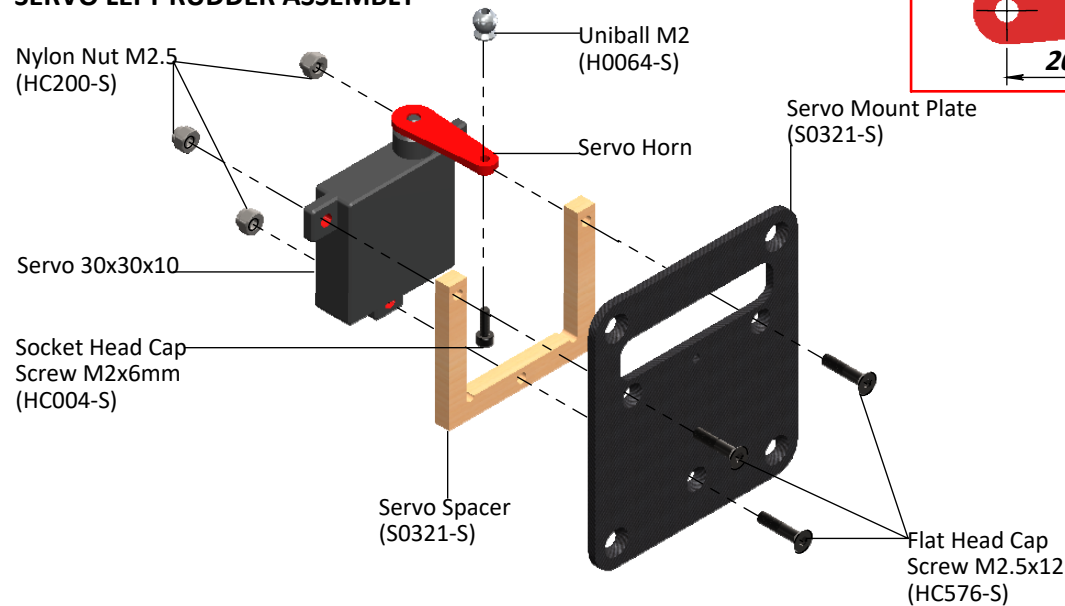
INSTALLATION SERVO LEFT WING

INSTALLATION SERVO RIGHT WING

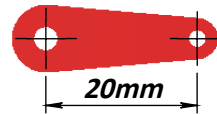


BAG 9

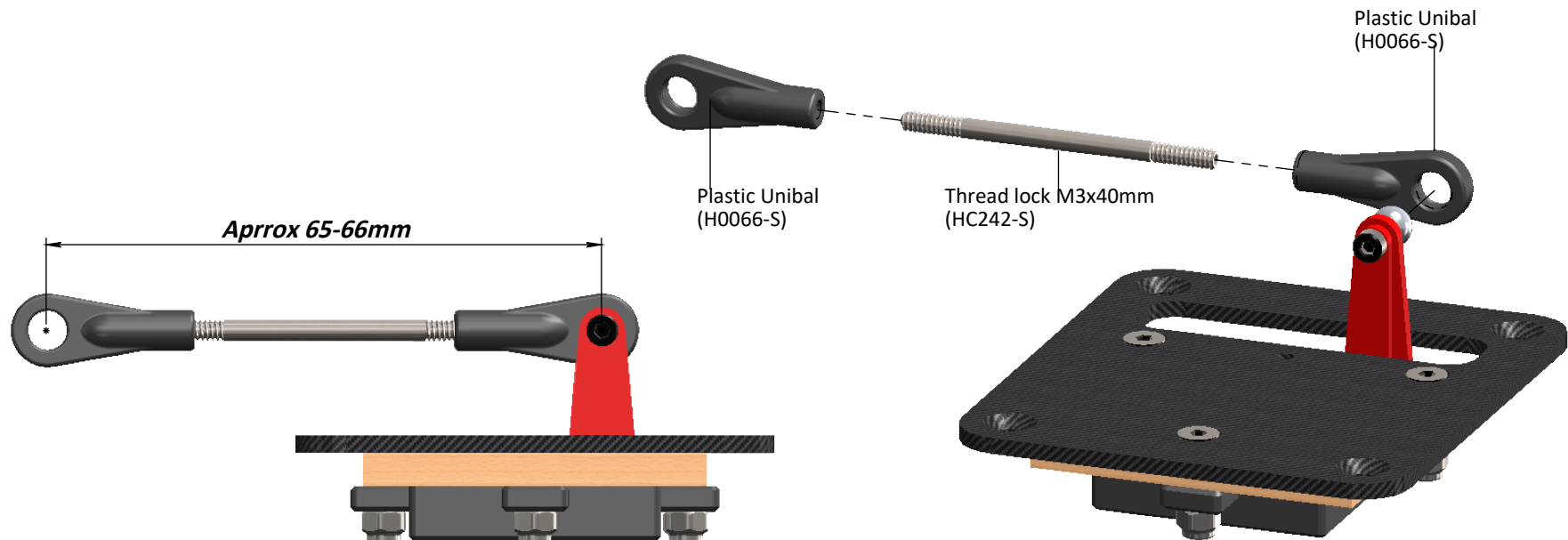
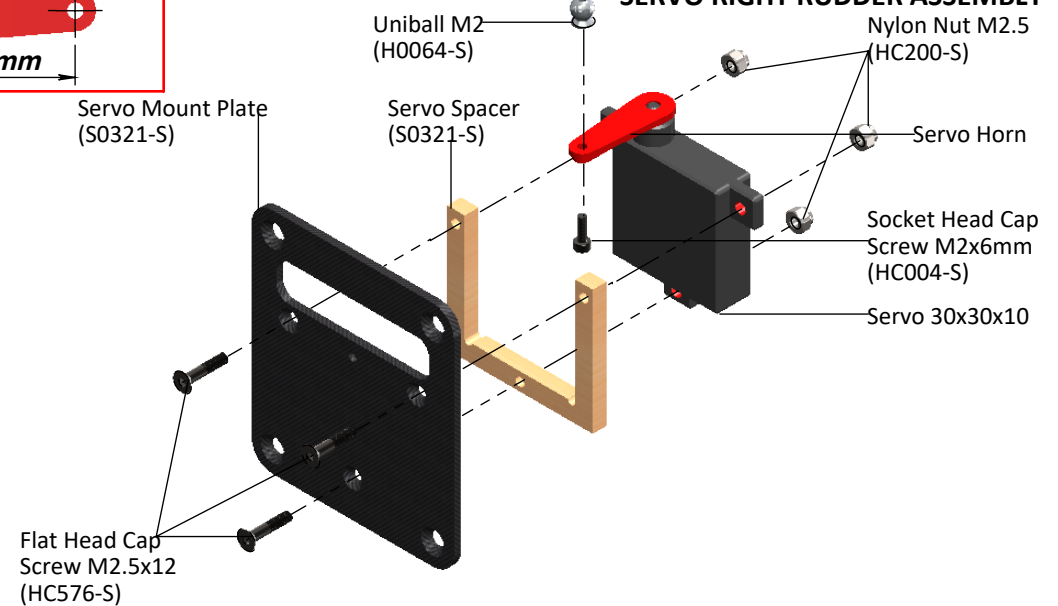
SERVO LEFT RUDDER ASSEMBLY



Servo Horn Suggested

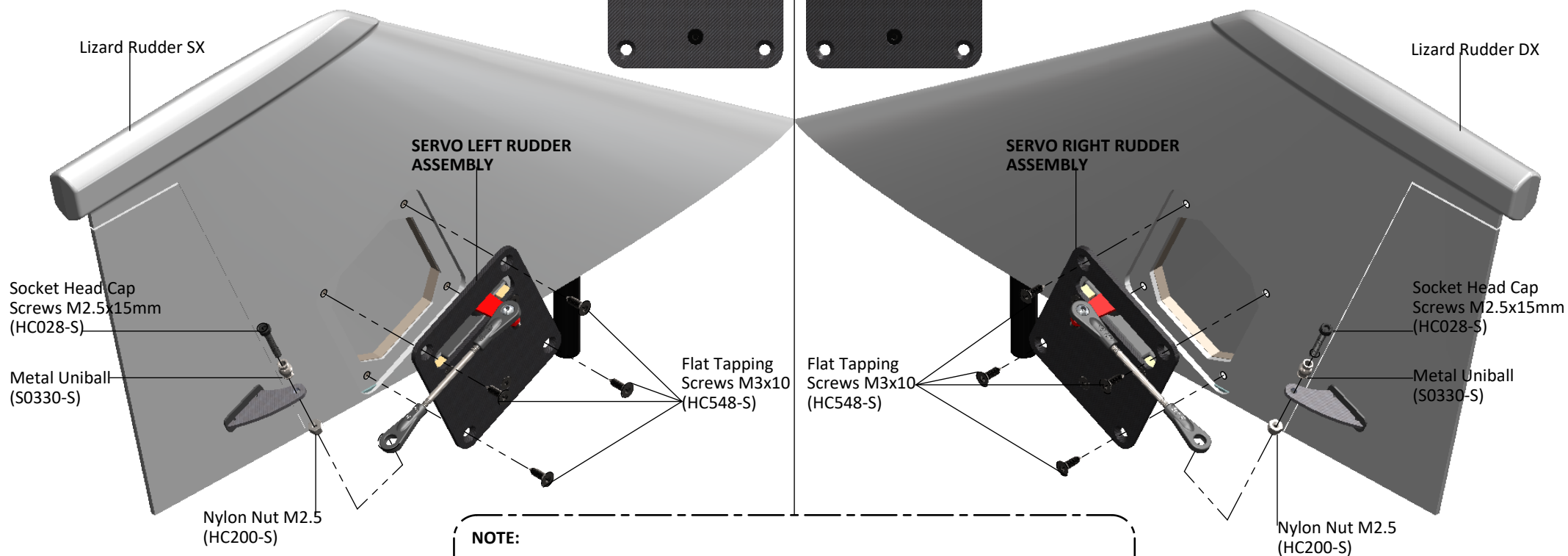


SERVO RIGHT RUDDER ASSEMBLY



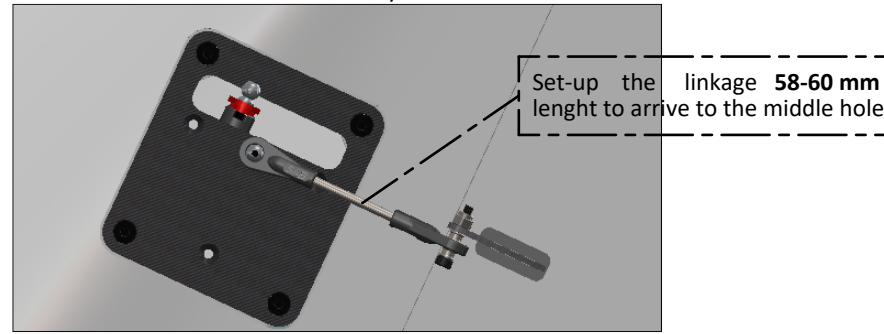
LEFT RUDDER ASSEMBLY

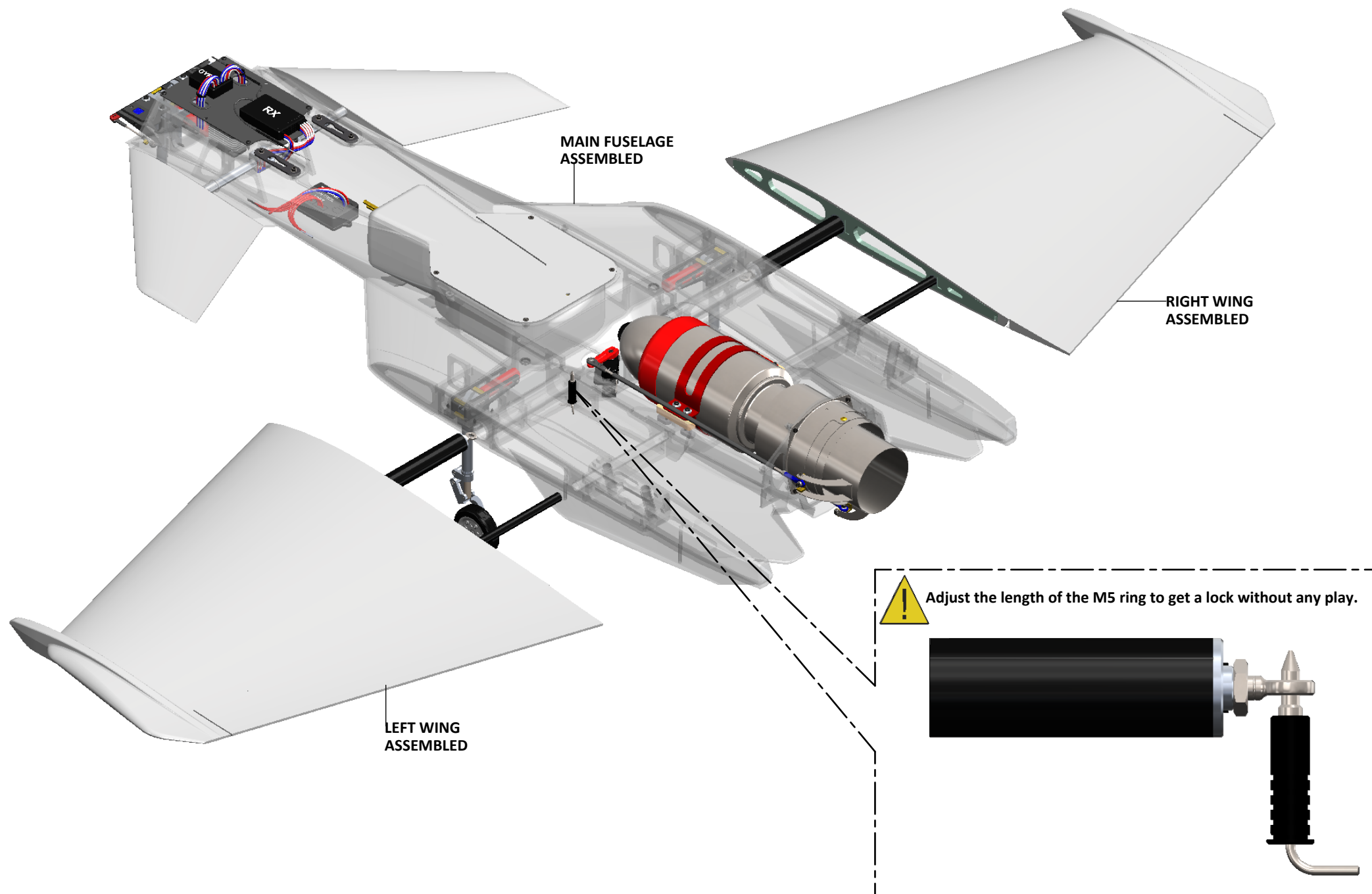
BAG9 RIGHT RUDDER ASSEMBLY



NOTE:

The Lizard can fly even without a rudder function, especially when using the vector. In this case the central hole can easily be used to block the rudder.

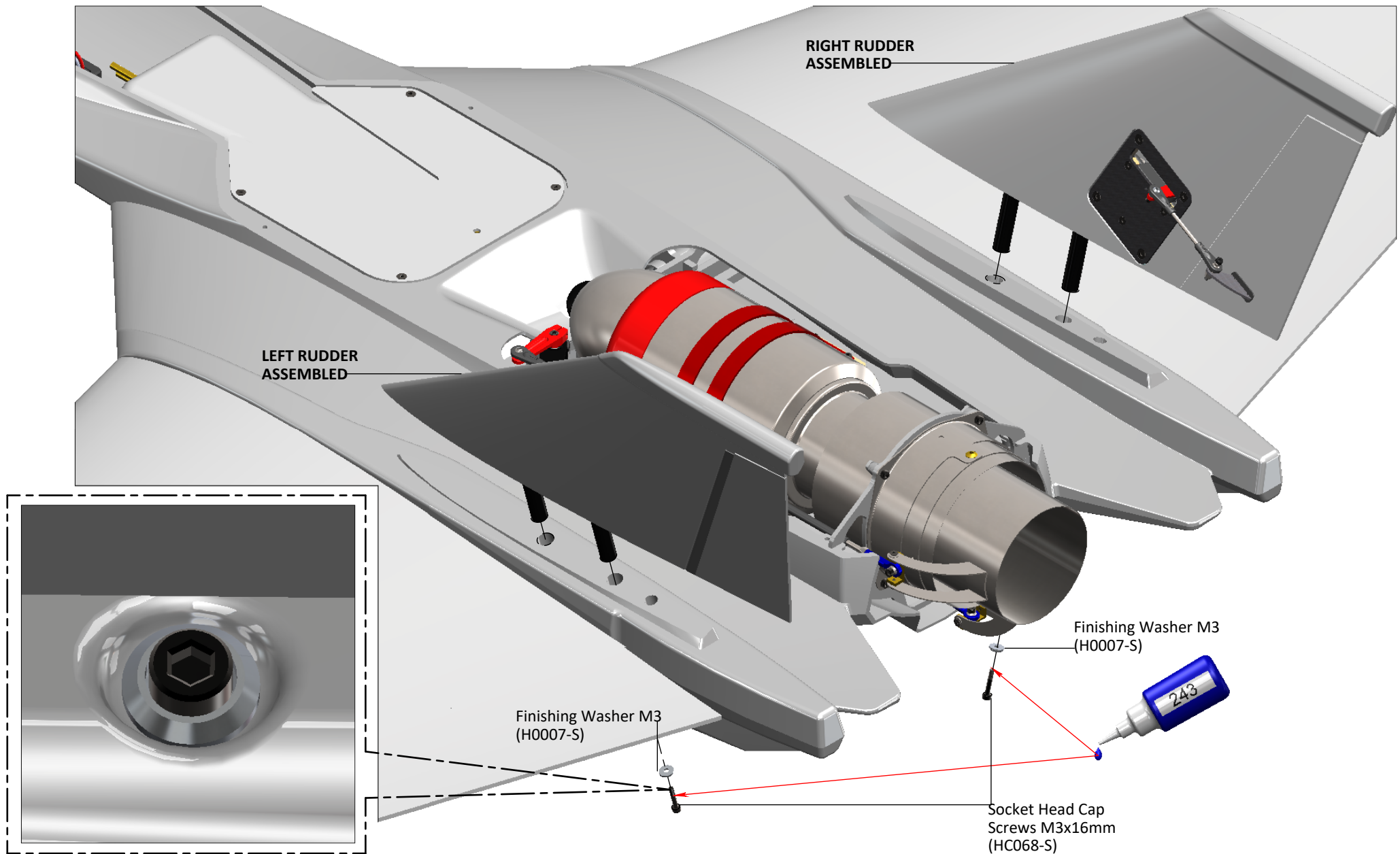




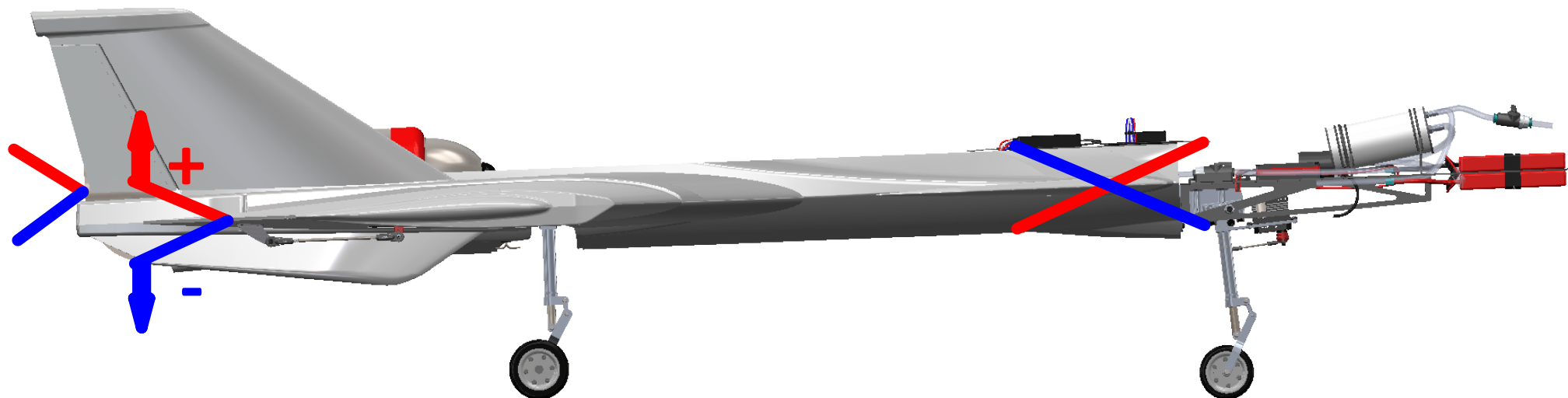
RUDDERS INSTALLATION

To secure the 2 Rudder in position use the 2 M3x16 screws.

BAG 10



AILERON, ELEVON, CANARD SETUP



Mix the canard rotation with elevon and vector deflection.

When the elevon surface goes up, the vector should point up. The canard should increase it's angle as shown in the figure.

Set minimum two flight conditions, indicated in table below.

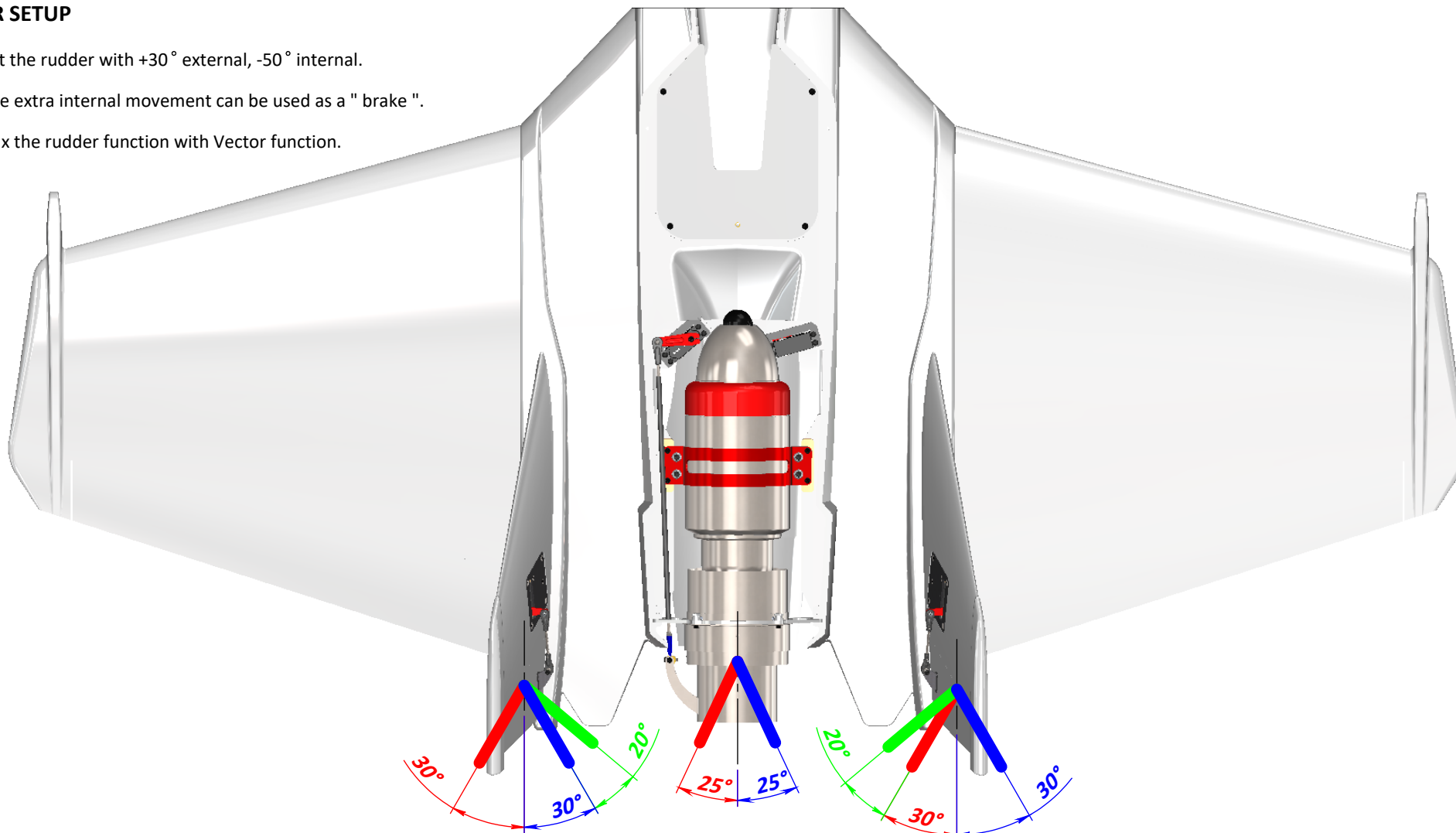
	LOW SPEED CONDITION		HIGH SPEED CONDITION	
	Deflection	Exponential	Deflection	Exponential
Ailerons	-15mm / +15mm	20%	-10mm / +10mm	40%
Elevon	-20mm / +30mm	20%	-10mm / +10mm	40%
Canard	±40mm	-	±25mm	20%
Vector	±25°	0	±10°	

RUDDER SETUP

Set the rudder with $+30^\circ$ external, -50° internal.

The extra internal movement can be used as a "brake".

Mix the rudder function with Vector function.

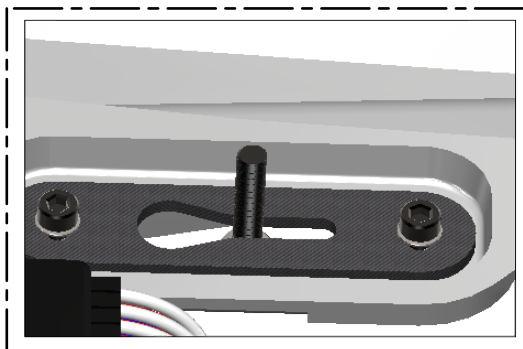


	LOW SPEED CONDITION		HIGH SPEED CONDITION	
	Deflection	Exponential	Deflection	Exponential
RUDDER	$+30^\circ / -30^\circ / -20^\circ$	20%	$+20^\circ / -20^\circ$	20%
VECTOR	$\pm 25^\circ$	0%	$\pm 10^\circ$	0%

BAG 10

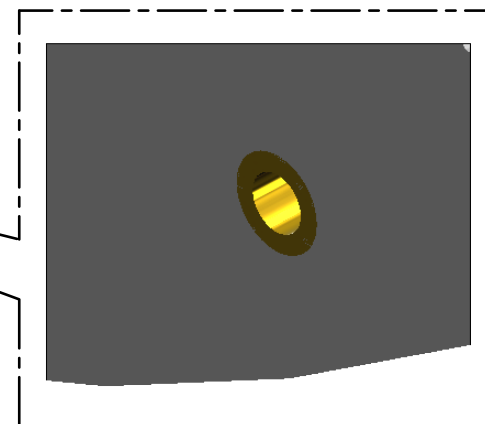
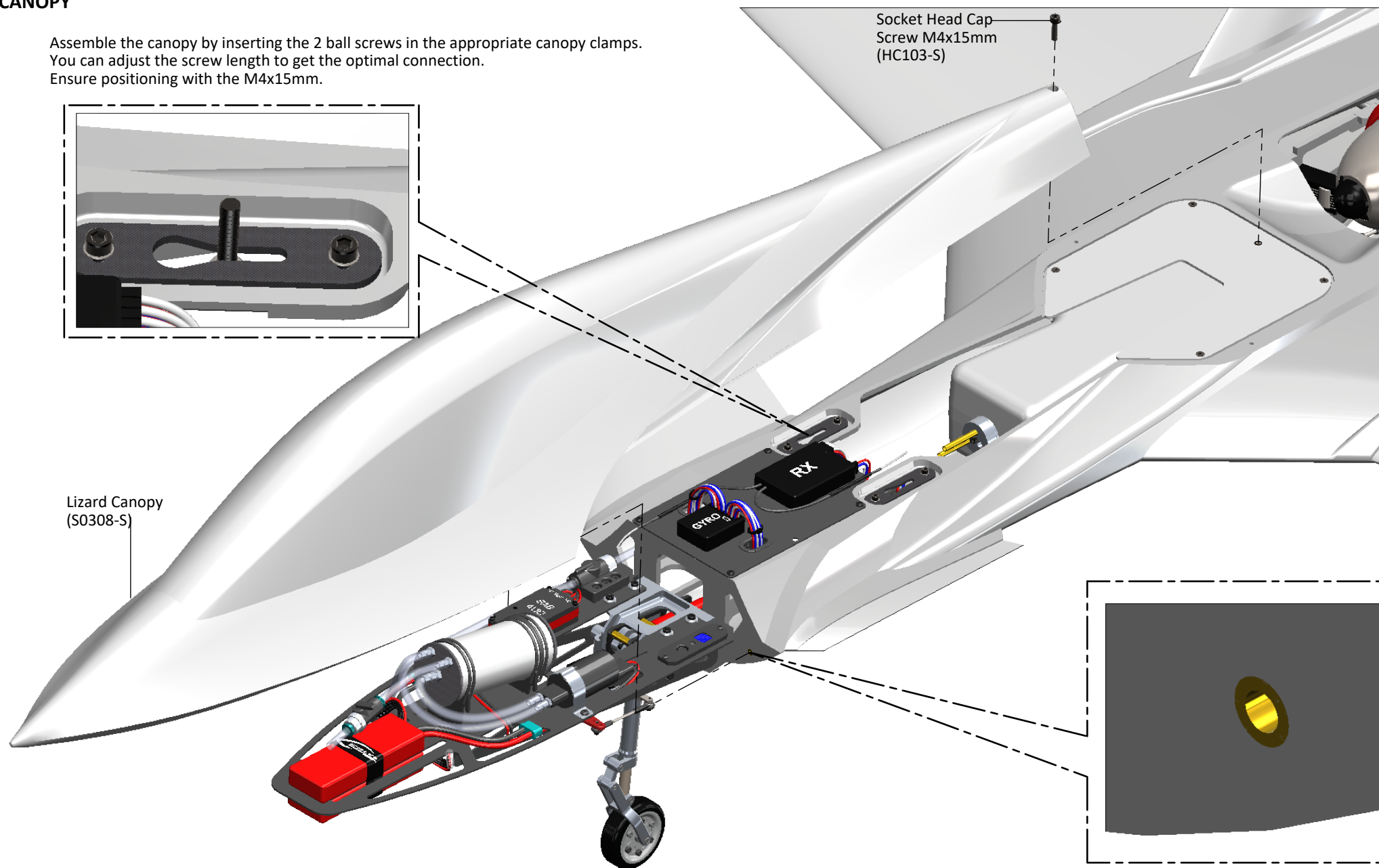
CANOPY

Assemble the canopy by inserting the 2 ball screws in the appropriate canopy clamps. You can adjust the screw length to get the optimal connection. Ensure positioning with the M4x15mm.



Socket Head Cap
Screw M4x15mm
(HC103-S)

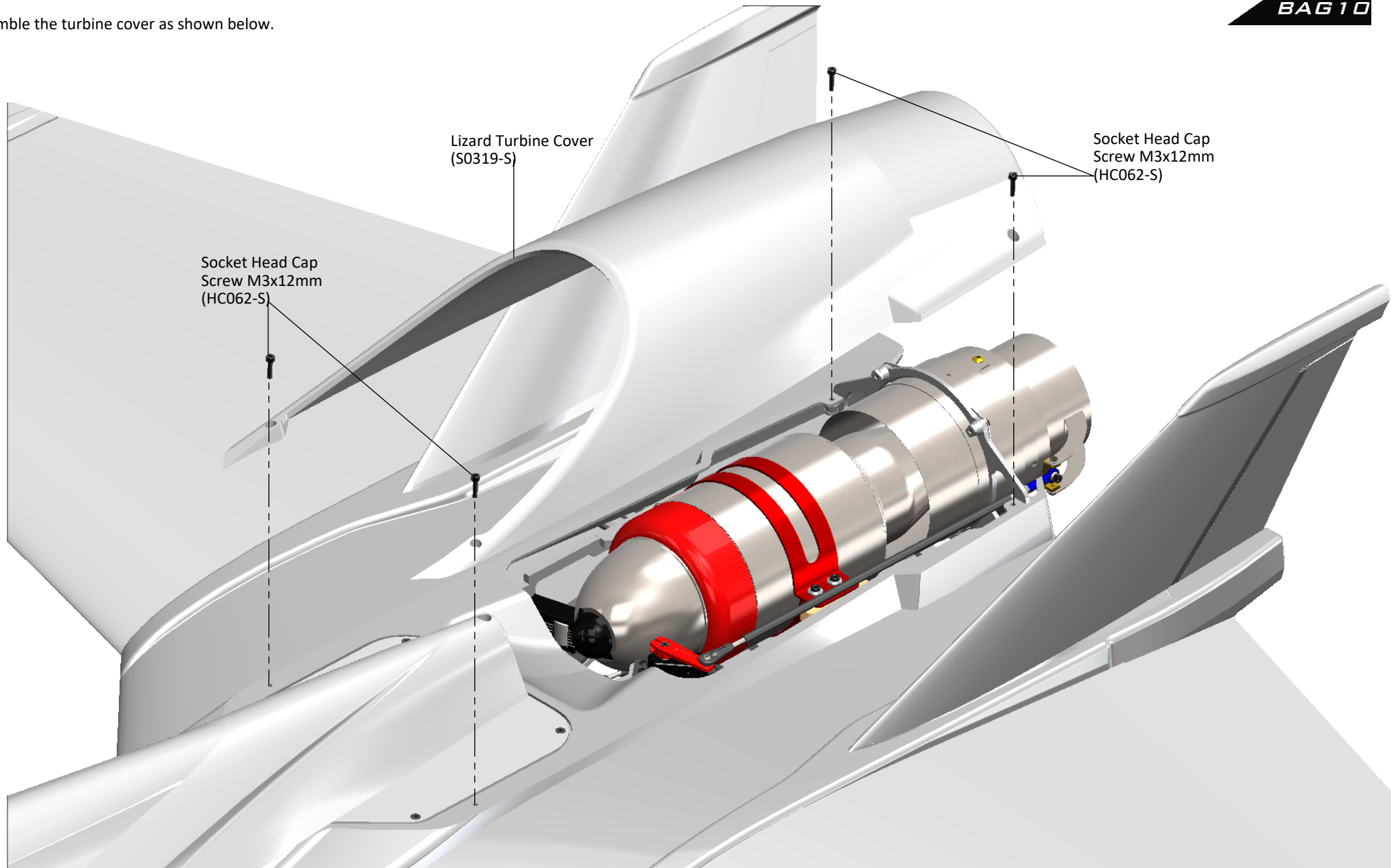
Lizard Canopy
(S0308-S)



TURBINE COVER

Assemble the turbine cover as shown below.

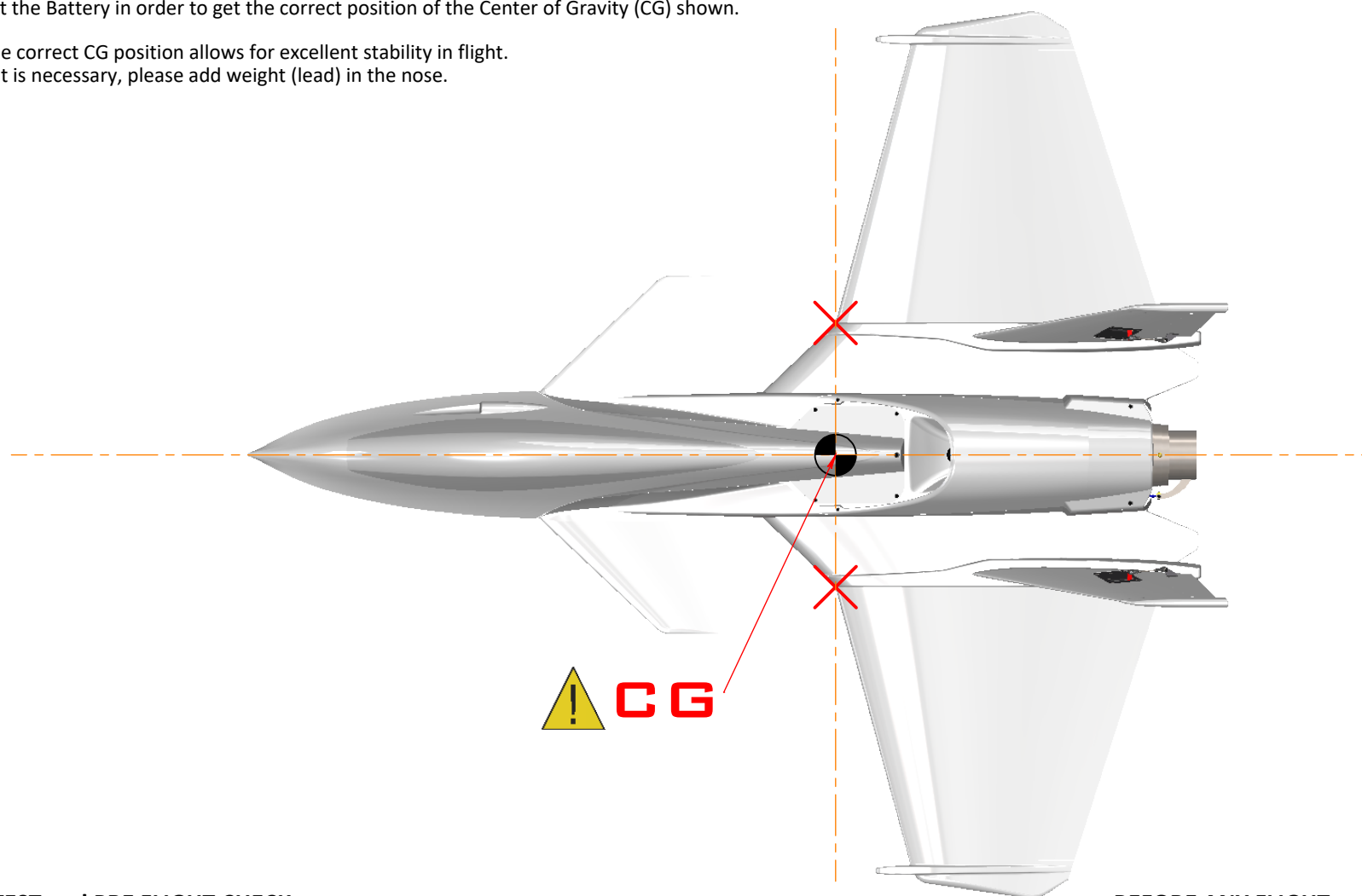
BAG 10



CENTER OF GRAVITY POSITION

Set the Battery in order to get the correct position of the Center of Gravity (CG) shown.

The correct CG position allows for excellent stability in flight.
If it is necessary, please add weight (lead) in the nose.



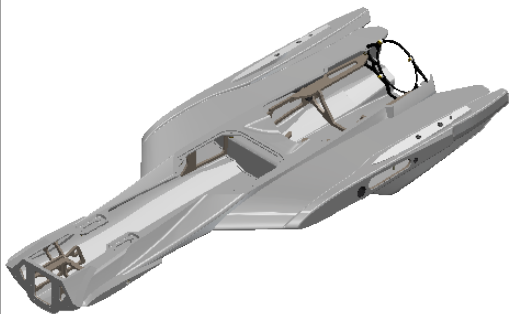
RADIO TEST and PRE FLIGHT CHECK

- *Set up the remote control, RX and if you use Gyro with Care.
- *Check that all wiring is well isolated. It is good practice to protect them at the most risky points.
- *Check the Radio and check the reception on distance.
- *Check the movement of all parts.
- *Before the first flight, do accurate check of CG position!

BEFORE ANY FLIGHT

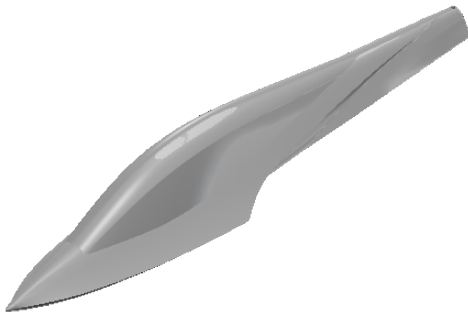
- *Check that all wiring are well connected
- *Check the movement of all parts.
- *Before any flights, consider if CG position can be changed.
- *After any flight, do a general check of the airplane.

LIZARD FUSELAGE
(S0307-S)



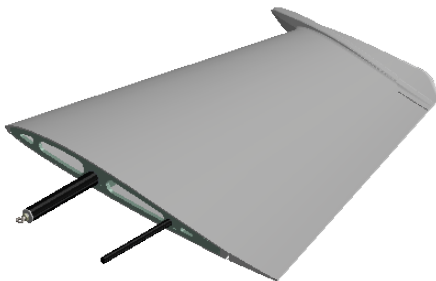
- 1 x Lizard Fuselage.

LIZARD CANOPY
(S0308-S)



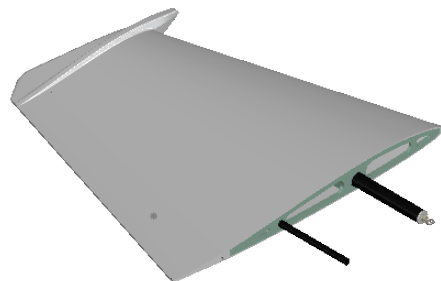
- 1 x Lizard Canopy.

LIZARD WING DX
(S0309-S)



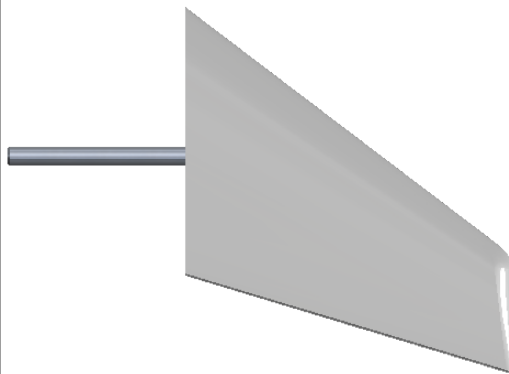
- 1 x Lizard Wing DX.

LIZARD WING SX
(S0310-S)



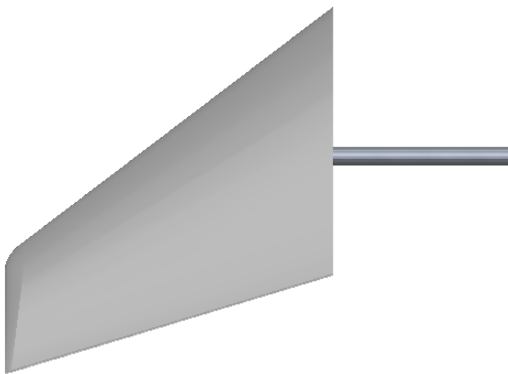
- 1 x Lizard Wing SX.

LIZARD CANARD DX
(S0311-S)



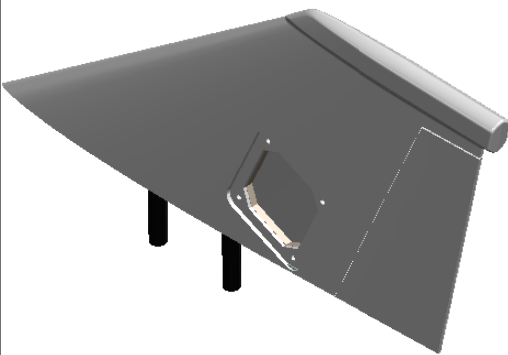
- 1 x Lizard Canard DX.

LIZARD CANARD SX
(S0312-S)



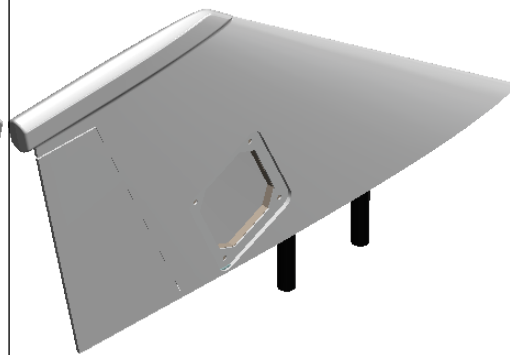
- 1 x Lizard Canard SX.

LIZARD RUDDER DX
(S0313-S)



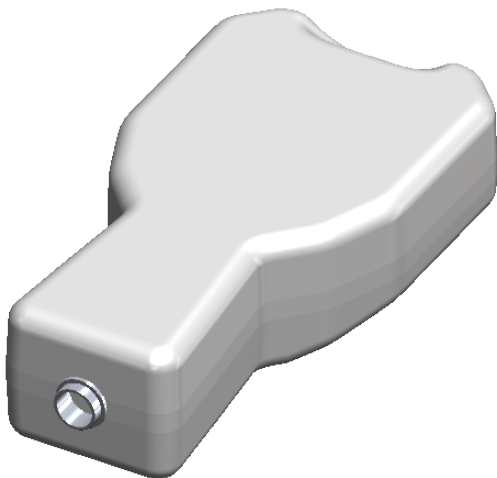
- 1 x Lizard Rudder DX.

LIZARD RUDDER SX
(S0314-S)



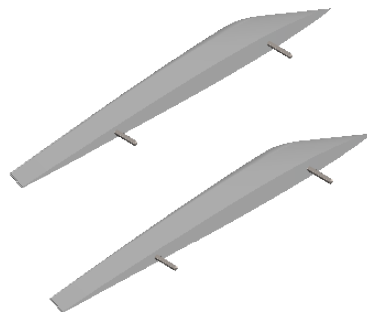
- 1 x Lizard Rudder SX.

**LIZARD TANK
(S0316-S)**



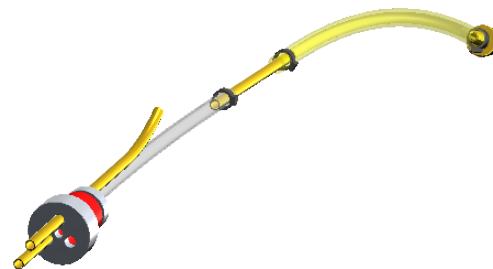
- 1 x Lizard Tank.

**LIZARD BOTTOM STABILAZERS
(S0317-S)**



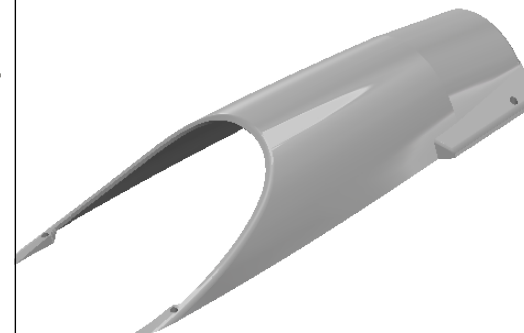
- 2 x Lizard Bottom Stabilizers.

**LIZARD TANK TUBE SET
(S0318-S)**



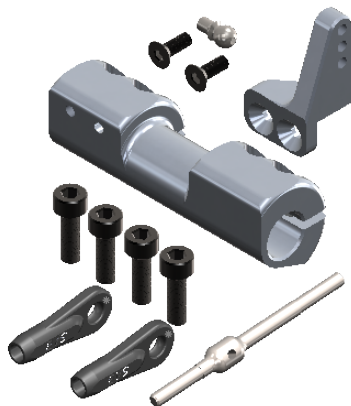
- 1 x Lizard Tank Tube SET.

**LIZARD TURBINE COVER
(S0319-S)**



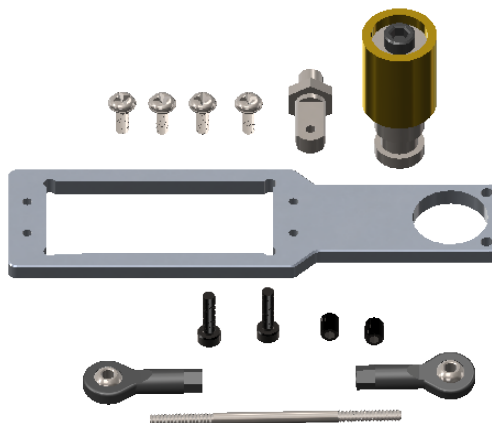
- 1 x Lizard Turbine Cover.

**CANARD MACHENICAL
(S0023-S)**



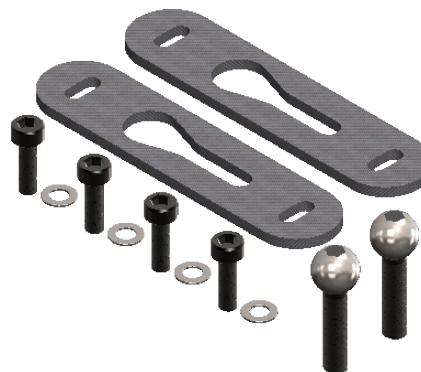
- 1 x Collar.
- 1 x Canard Arm.
- 1 x Uniball M3.
- 2 x Plastic Ball Link.
- 1 x Linkage.
- 2 x Flat Head Cap Screw M3x8mm.
- 4 x Socket Head Cap Screw M4x12mm.

**STEERING HARDWARE
(S0332-S)**



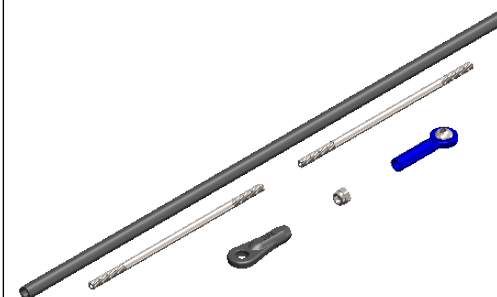
- 1 x SET Steering Hardware.

**CANOPY CLAMP
(S0237-S)**



- 1 x Canopy Clamp.
- 4 x Washer $\varnothing 3.2 \times \varnothing 6 \times 0.5 \text{mm}$.
- 4 x Socket Head Cap Screw M3x12mm.
- 2 x Ball Screw M4.

**VECTOR LINKAGE
(S0331-S)**



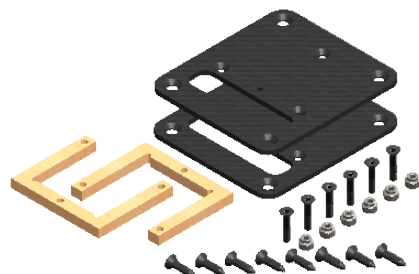
- 1 x Carbon Rod $\varnothing 3 \times \varnothing 5 \times 225 \text{mm}$.
- 2 x Thread Rod M3x97mm.
- 1 x Plastic Ball Link.
- 1 x Metal Ball Link.
- 1 x Nylon Nut M3.

LIZARD WING SERVO SUPPORT (S0320-S)



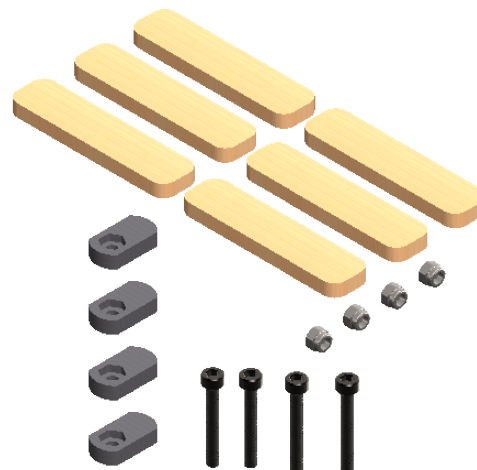
- 2 x CF Servo wing support.
- 4 x Aluminum Servo Wing Mount Big.
- 4 x Aluminum Servo Wing Mount Small.
- 4 x Servo Spacer.
- 8 x Socket Head Cap Screws M2.5x10mm.
- 8 x Flat Cap Screws M2.5x8mm.
- 8 x Flat Self Tapping Screw M3x10mm.

LIZARD RUDDER SERVO SUPPORT (S0321-S)



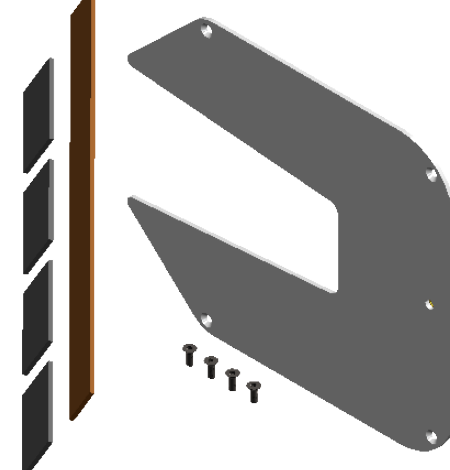
- 2 x CF Servo Mount.
- 2 x Servo Spacer.
- 6 x Flat Head Cap Screw M2.5x12mm.
- 6 x Nylon Nut M2.5.
- 8 x Flat Self Tapping Screw M3x10mm.

LIZARD TURBINE HARDWARE (S0323-S)



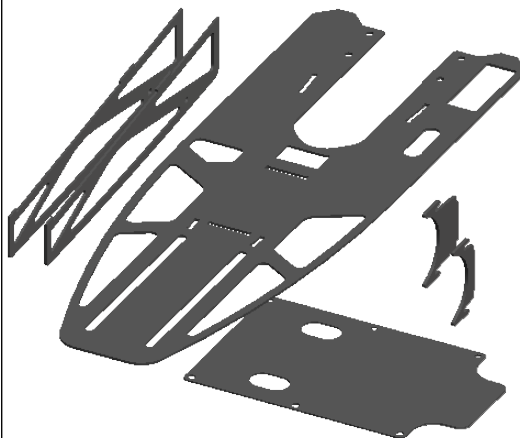
- 6 x Turbine Spacer.
- 4 x Nylon Nut M3.
- 4 x Socket Head Cap Screws M3x22mm.
- 4 x Block Nut M3.

TANK PLATE + CANOPY BLOCK (S0324-S)



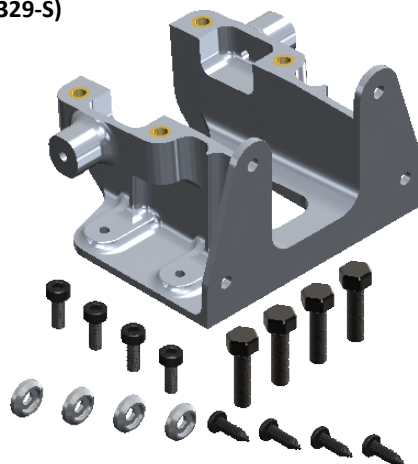
- 2 x CF Tank Plate With M4 insert.
- 4 x Flat Head Cap Screw M3x8mm.
- 4 x Straps.
- 1 x Foam 20x5x200mm.

CF ELECTRONIC FLATE (S0325-S)



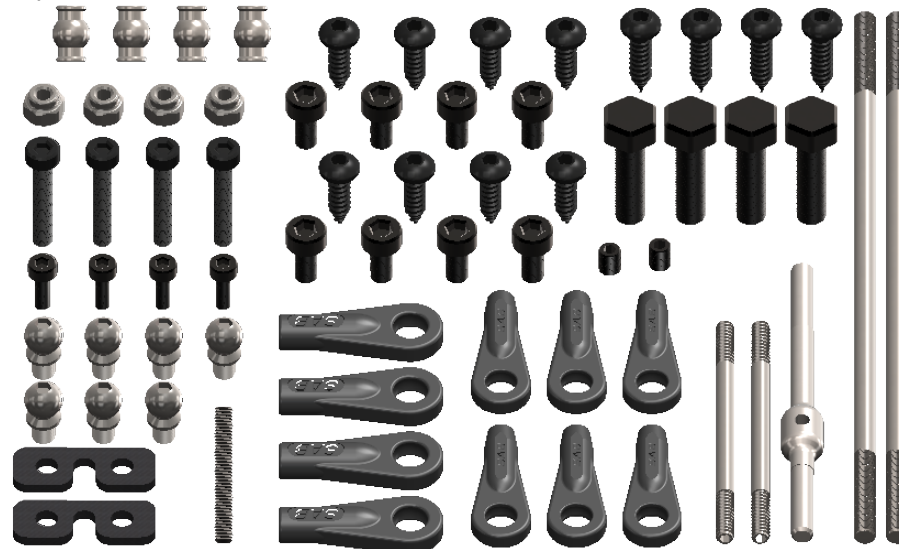
- 1 x CF Main Component plate.
- 2 x Vertical Plate.
- 1 x Small Component plate.
- 1 x High UAT support.
- 1 x Low UAT support.

FRONT LANDING GEAR BLOCK (S0329-S)



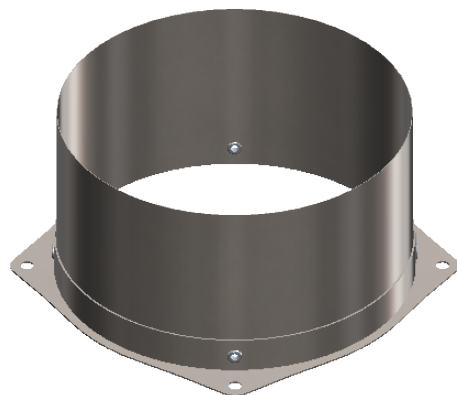
- 1 x Front Landing Gear Block.
- 4 x Finishing M3.
- 4 x Socket Head Cap Screw M3x8mm.
- 4 x Nylon Screw M4x15mm.
- 4 x Self Tapping Screw M3x10mm.

SERVO HARDWARE (S0330-S)



- 1 x SET Servo Hardware.

EXHAUST PIPE
(S0341-S)



- 1 x Lizard Cone.

LANDING GEAR RETRACT (5 - 10 kg)
(S0303-S)



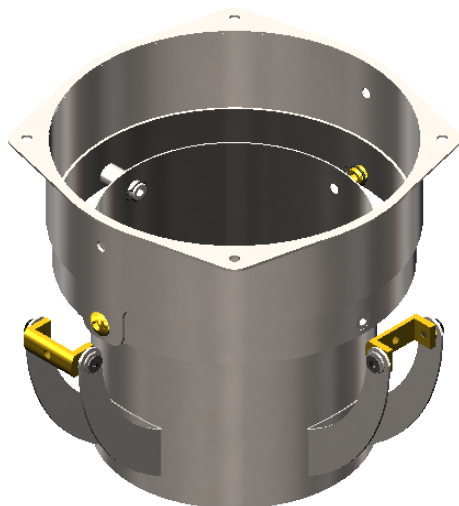
- 1 x Landing Gear Retract SET.

UAT 120cc
(S0296-S)



- 1 x SET UAT 120cc.

VECTOR
(S0087-S)



- 1 x Vector SET.

CARRY BAGS FOR WING
(S0302-S)

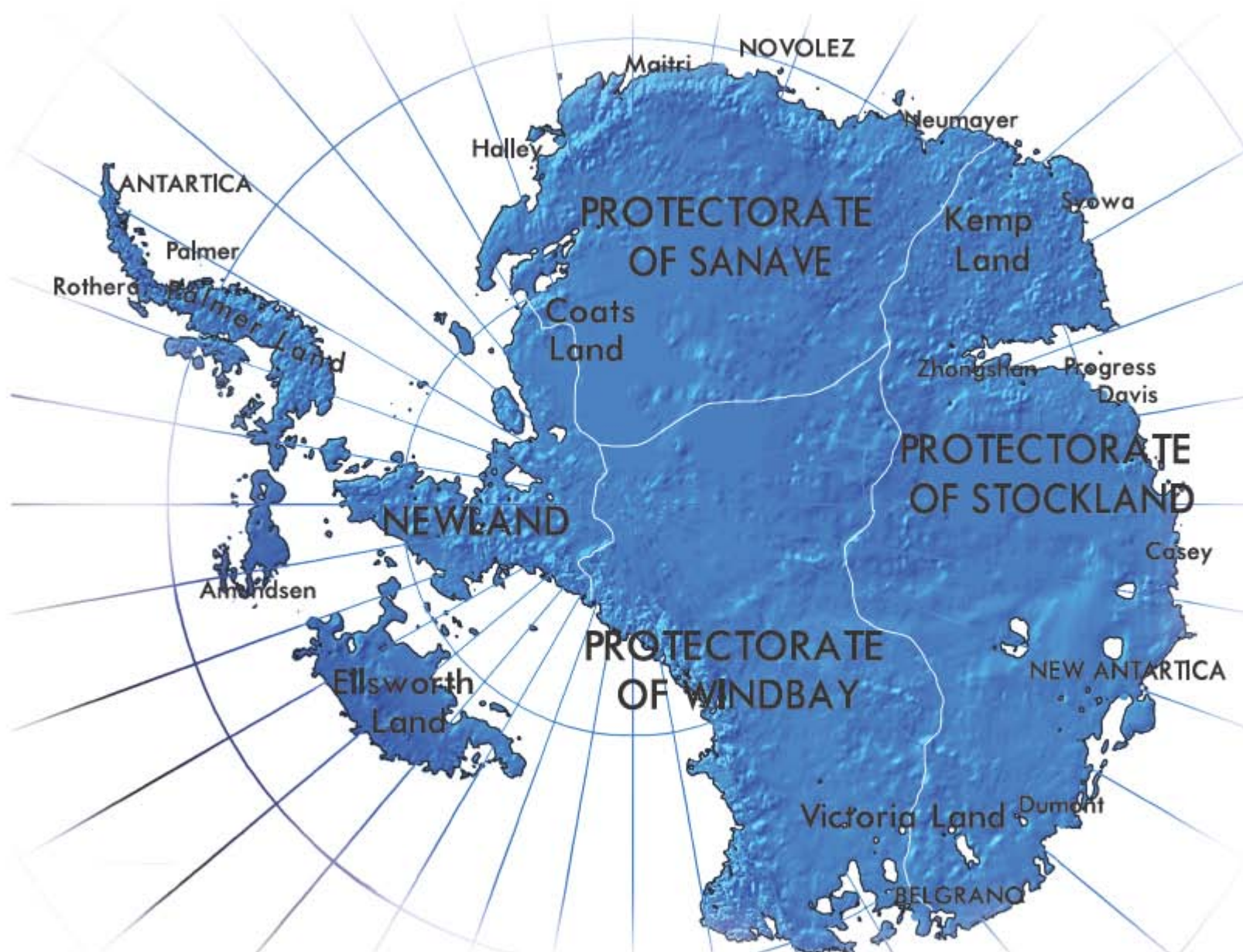


- 2 x Carry Bags.

WING ROCKETS
(S0304-S)



- 1 x Wing Rocket.



KEMP BATTLE

Year 513: THE BATTLE OF KEMP

After months of bankruptcy negotiations, the state of Newland organized a surprise attack with the purpose of destroying the military bases of Syowa, Progress and Davis and regain control of the self-proclaimed state of Stockland. The attack was scheduled for June 21st, 513, the first day of winter which later became famous as "dark day".

Thanks to intelligence acquired by the secret service of New Antarctica, the rebel

legion had prepared itself ahead of the attack and this led to the historic sky battle of Kemp.

On June 21st, Newland forces comprised of Robodrone Tortuga and Drake Bombers faced the Havok Multirole Fighter of the rebel brigade of Stockland.

The fierce battle caused serious losses to both sides without declaring a real winner.

Huge investments were later made by both parties to increase their arsenal and strengthen their fleet.



NAME: **KR64 TORTUGA**
VERSION: Robodrone
ROLE: Reconnaissance and attack
MANUFACTURER: Kruger Industries



NAME: **M138 LIZARD**
VERSION: Robodrone
ROLE: Multirole fighter
MANUFACTURER: Kruger Industries



NAME: **K175 DRAKE**
VERSION: Robodrone
ROLE: Multirole fighter
MANUFACTURER: Kruger Industries



NAME: **M169 HAVOK**
VERSION: Robodrone
ROLE: Multirole fighter
MANUFACTURER: McMurdo Industries

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