

BUSH MULE _{V2}

1500MM TWIN ENGINED WORKHORSE OF THE SKY

PNF
VERSION



INSTRUCTION MANUAL

AVIGS



WARNING:

Read this instruction manual fully so as to become completely familiar with the features of this product before operating. Failure to operate this product correctly could result in damage to the product, personal property and cause serious injury. This is a sophisticated hobby product and is NOT a toy. It must always be operated with caution, common sense and some basic mechanical ability. This manual provides instructions as the the assembly, safe operation and maintainence of this hobby product. It is highly reccommended that you follow and read fully the instructions and warnings stated in this manual including safety, assembly, set-up and flying guidelines in order to operate this product correctly and avoid damage or serious injury.

SAFETY PRECAUTIONS:

As the user of this product you and you alone are responsible for operating it in a manner that does not endanger yourself and others around you or result in damage to the product or property of others. This product is operated via a radio controlled system that in some cases can be subject to interference from sources outside of your control. Interference may result in a momentary loss of control so it is always recommended that this product be used in a suitably open outdoors space.

- This is a radio controlled flying model and as such must always be flown with caution and care. This is not a toy.
- This model is designed for intermediate to advanced pilots.
- Always exersie great caution when using the recommended battery to power this product. For full safety notes and operating procedures, please see information provided by your battery supplier.
- Take great care when connecting/disconnecting the battery. See battery supplier for full safty procedures.
- Never power up the model in confined spaces and always keep the props clear of obstructions.
- This product is not a toy. Children must be accompanied by an adult at all times if operating this product.
- Only fly this model in an open area away from crowds, people, buildings, tree's, power lines and obstructions.
- Always put safety first when operating this model and consider the warnings stated above.
- The supplier/manufacturer accepts no responsibility for damage or injury caused through the use of the product. Not suitable for children under the age of 14. THIS IS NOT A TOY.

CONTENTS

INTRODUCTION	3
SPECIFICATION	3
CONTENT	4
ASSEMBLY	5
1. VERTICAL AND HORIZONTAL TAIL SURFACES.....	5
2. LANDING GEAR.....	5
3. INSTALLATION OF MAIN WING.....	6
4. ELECTRONIC AVIONICS SET UP.....	8
5. CONTROL SET-UP.....	8
6. CENTRE OF GRAVITY.....	11
7. HINTS.....	12
8. OPTIONAL SKIS.....	12
9. MODEL FLYING PRECAUTIONS.....	13
10. PRE-FLIGHT CHECKS.....	13
11. FLYING THE AVIOS BUSHMULE.....	14
12. FROM AVIOS TO THE CUSTOMER.....	14
SPARE PARTS LISTING	16
RECOMMENDED ACCESSORIES FOR THE AVIOS BUSHMULE V2:	18
TROUBLE SHOOTING.....	19

INTRODUCTION:

Thank you for purchasing the Avios BushMule V2, the ultimate utilitarian RC model airplane. The BushMule has been designed as an all-purpose, all terrain Short Take Off & Landing (STOL) machine. Prepare your bush landing strips, snow fields and water runways for this exciting workhorse of the sky. The Avios BushMule V2 is ready to take whatever you can throw at it. It is designed to perform many tasks, and takes everything in its stride, rough runways, water, snow, dropping cargo and FPV flying, the adventure starts today. The BushMule V2 is powered by two powerful brushless outrunner motors with reversing ESCs, these combine to create a solid, stable platform for all aspects of RC flight.

Being the V2, this version has the following upgrades:

- Upgraded servo connection for the steerable nose-wheel
- Re-positioned main landing gear, it has been moved further back
- Brass threads in the wing mounts
- Upgraded propellers and spinners from the popular Avios Albatross
- New color scheme

The Avios team know you will have many happy hours in the air with this reliable, robust airplane. Enjoy your Avios BushMule V2, Anytime... Anywhere...



SPECIFICATIONS:

Wingspan:	1500mm (59")
Length:	1095mm (43.1")
Flying weight:	2250g
Controls:	Minimum 6 channel (Ailerons, Elevator, Throttle, Rudder, Flaps and rear cargo door)
ESC:	2 x 30A Aerostar RVS (reversing ESC)
Motor:	2 x 35x36mm Aerostar 850kv Brushless Outrunner Motors
Landing gear:	Tricycle (Fixed with steerable nose wheel)
Props:	3 blade 10 x 8
Battery:	3000-4500mah 14.8V 4S lipo (20C min)
Radio system:	Minimum 5 channel Transmitter and receiver, 6 channels is preferable

CONTENTS:

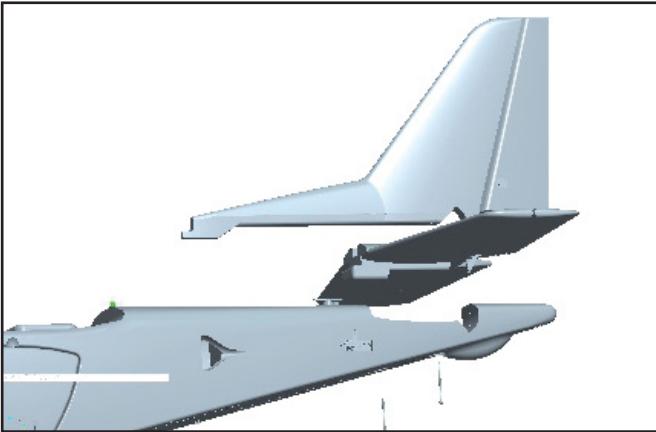


- | | |
|---------------------------|---|
| 1. Fuselage | 6. Hardware |
| 2. Centre and outer wings | 7. Propeller |
| 3. Tail assembly | 8. Landing gear / Ski's |
| 4. Sports Canopy | 9. Wing struts |
| 5. FPV canopy | 10. Auxiliary fins for use with optional floats |

ASSEMBLY:

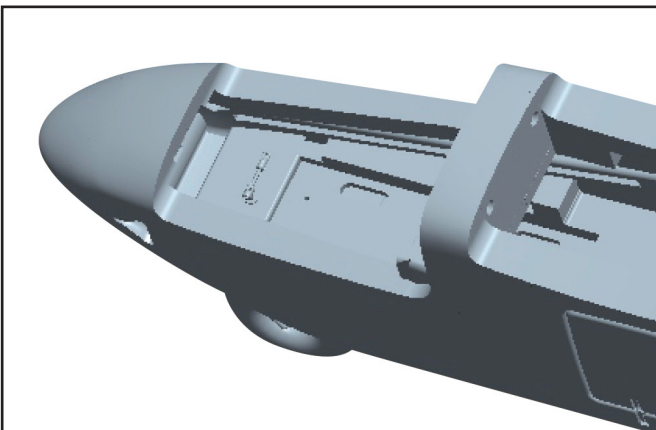
1. Vertical and Horizontal Tail Surfaces

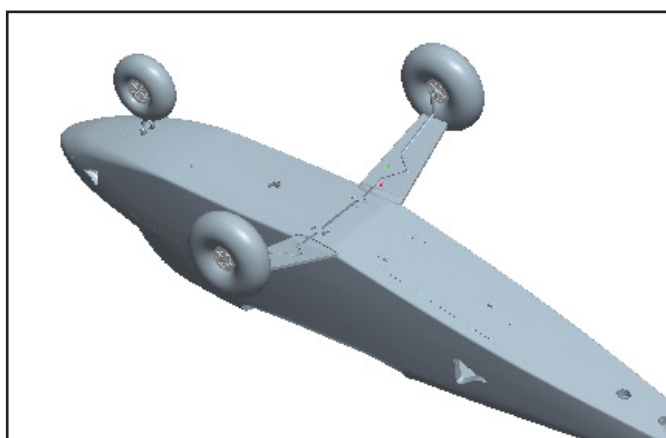
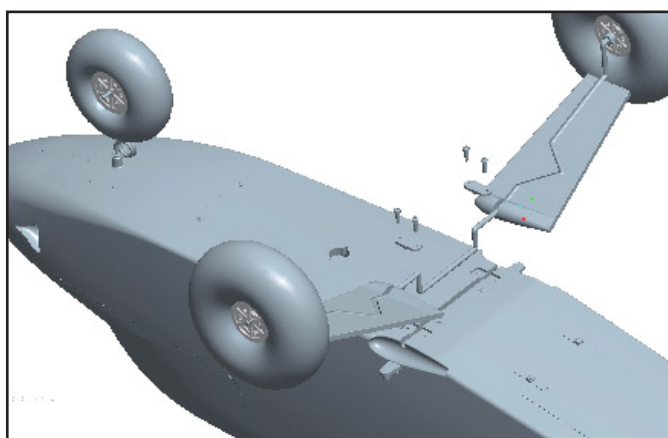
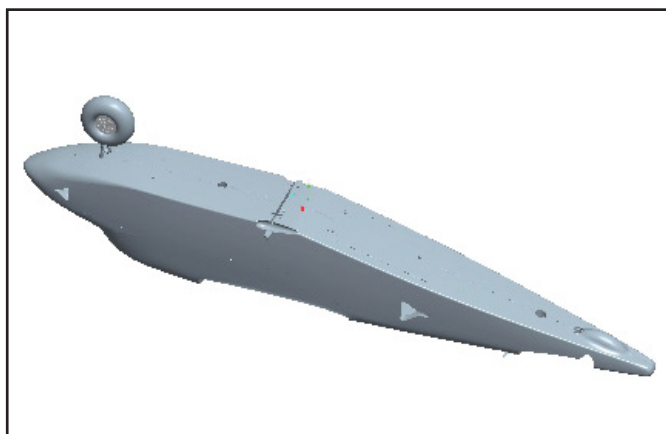
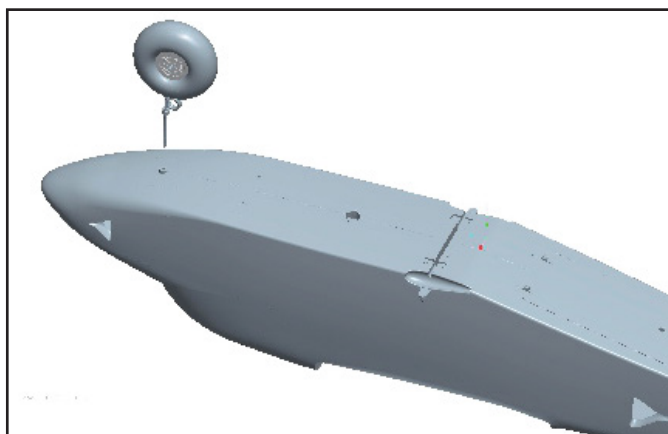
1. Flex all control surfaces (Elevator and rudder) to loosen the hinge joint.
2. Attach the horizontal stabilizer, and then insert the vertical stabilizer. Slot the front in first then push home the rear of the vertical stabilizer, make sure this is a secure firm fit. Use two 2mm x 45mm self-tapping screws to mount the tail surfaces to the rear of the fuselage.
3. If you have no need to remove these parts or if you are going to push the BushMule to its extreme flight envelope, the Avios team suggests that you apply either foam safe contact adhesive or a long set time 2-part epoxy on these tail surfaces.
4. Use a Servo tester to center your elevator and rudder servos, then adjust the clevises until you have a level and zeroed control service. (Hint: Placing some fuel tube or a small zip tie over the clevis will stop it opening, very good for security and peace of mind.)



2. Landing Gear

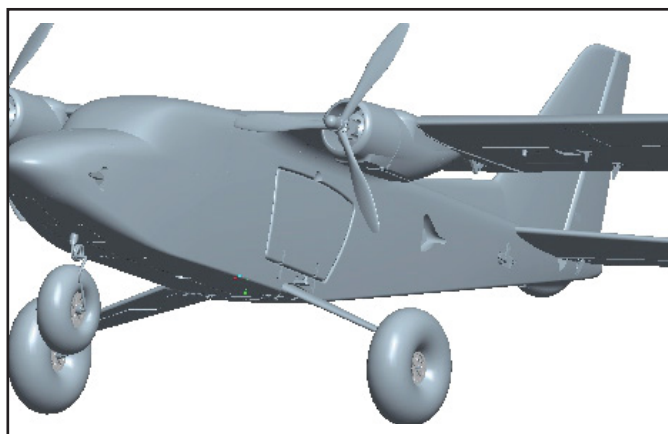
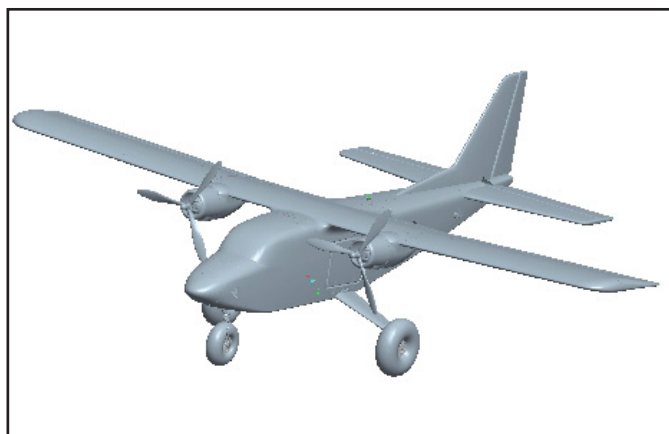
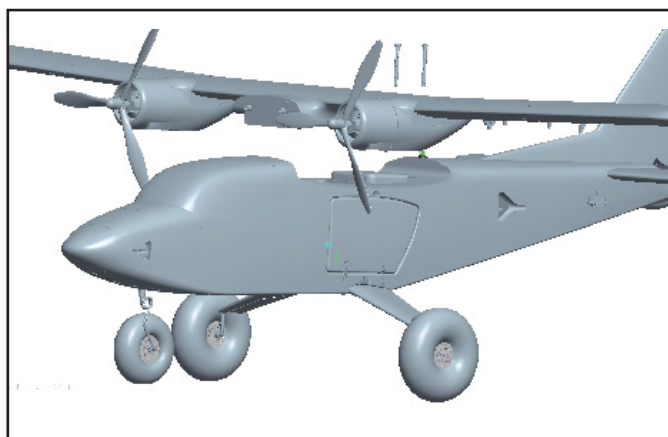
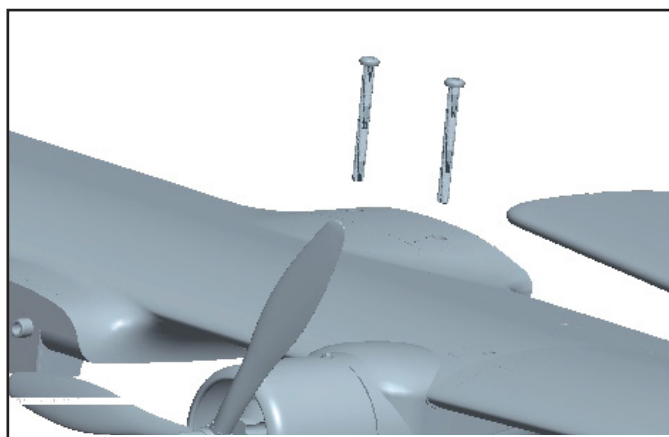
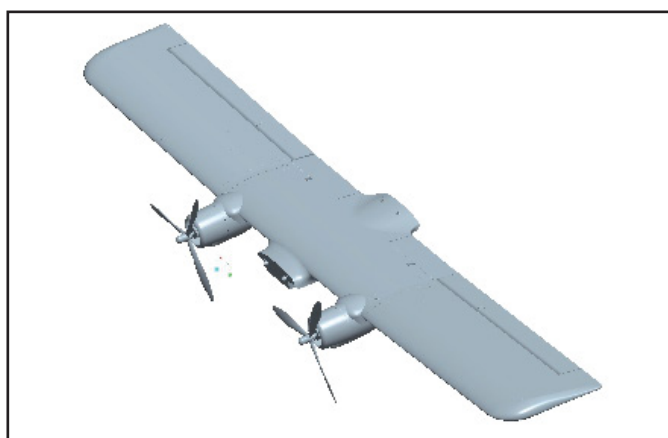
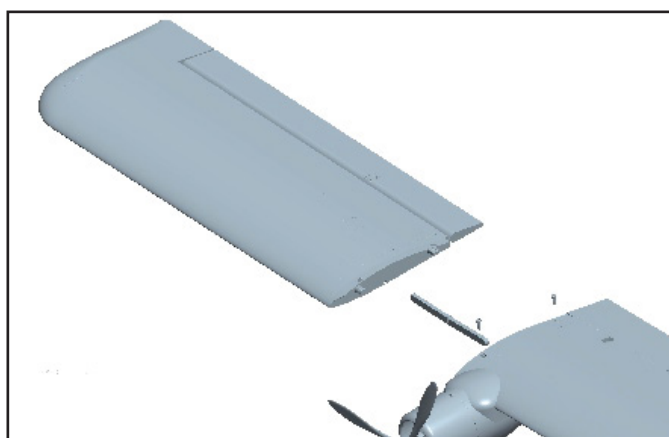
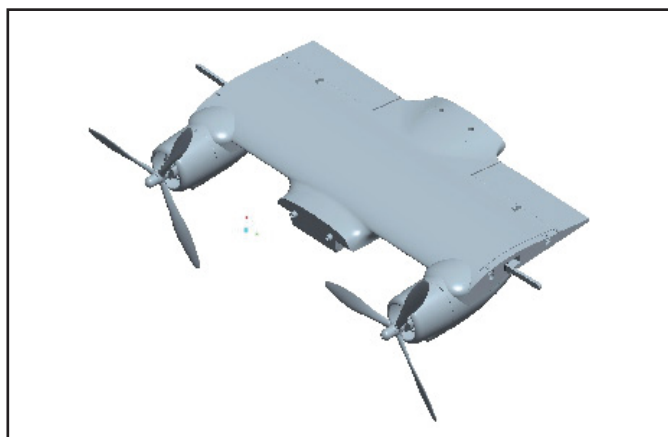
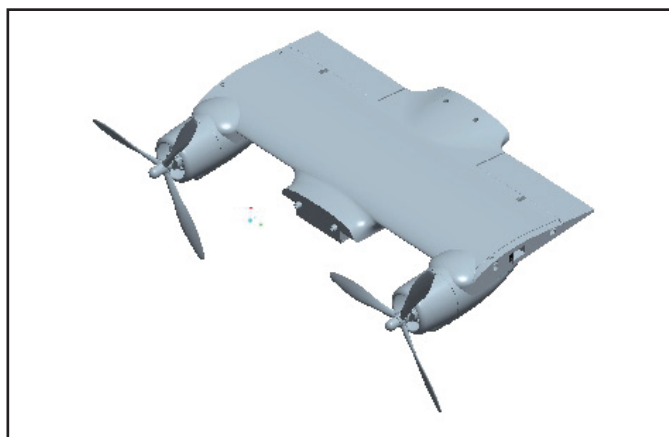
1. Insert the landing gear leg into the front mounting bracket. Centre the nose wheel and tighten the 1.5mm grub screw. (Use a thread lock and make sure the grub screw tightens onto the flat part of the shaft). The V2 has upgraded servo connection components.
2. Centre the nose wheel steering servo with a servo tester and attach the control rod from the servo arm to the connecting arm of the nose gear shaft.
3. Attach the main landing gear (re-positioned on the V2), simply insert the pre-bent wire of the landing gear into the slot in the center of the fuselage. Use the two mounting brackets and the four 2mm x 13mm self-tapping screws to secure the main gear.

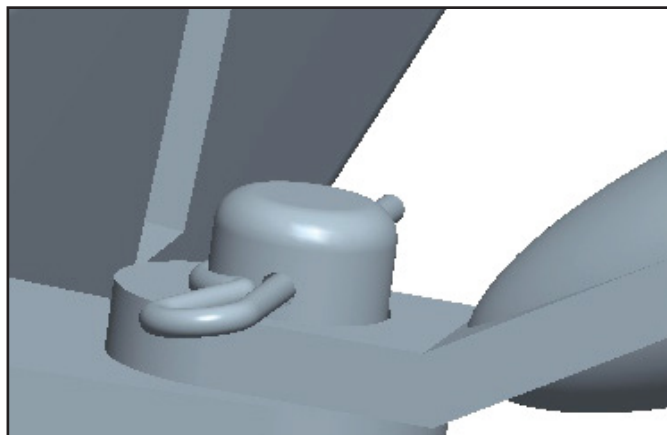
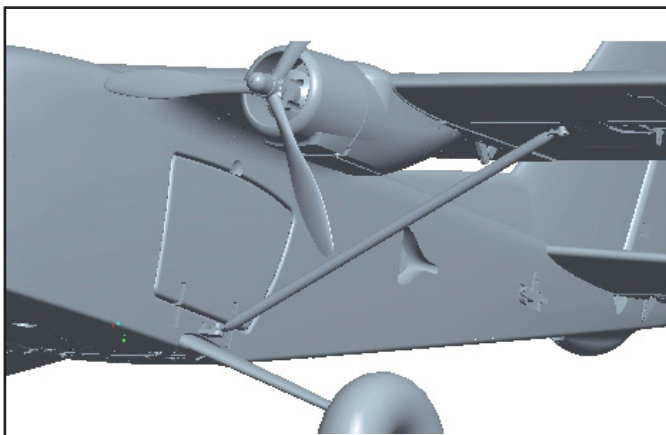




3. Installation of main wing

1. The main wing center piece houses the motors, ESC's, flaps, flap servos and main wiring harness.
2. Please center all servos, and flex the ailerons on the outer wing panels.
3. Connect all control rods to the control horns with the supplied hardware to the flaps and ailerons.
4. Label the wiring harness and bundle them together to keep the wiring harness from getting caught between the main center wing and fuselage.
5. Use the two M4 x 55mm main wing machine screws to secure the main center wing section to the fuselage (with the V2 these will be screwing into brass threads).
6. Slide the two square machined aluminum wing spars into the main wing section, attach the servo extension leads to power your lights and ailerons.
7. Once the outer wing panels are fully home on the center section, use the four 2mm x 15mm selftapping screws to fasten the outer wing sections to the main center wing section.
8. Attach the wing strut support with the 4 supplied split pins. Please check the wing at this point to make sure the dihedral angle is the same for both outer wing sections.





4. Electronic avionics set up

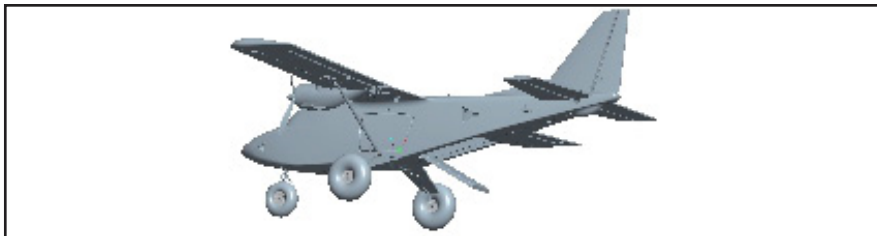
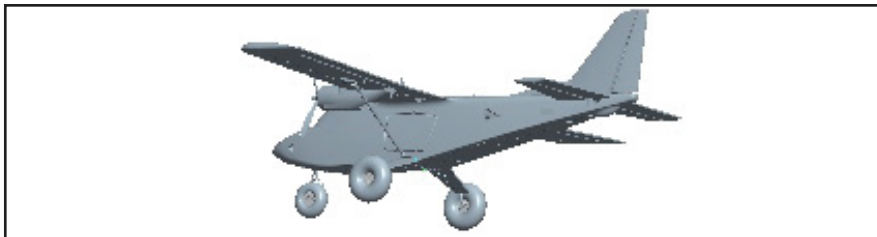
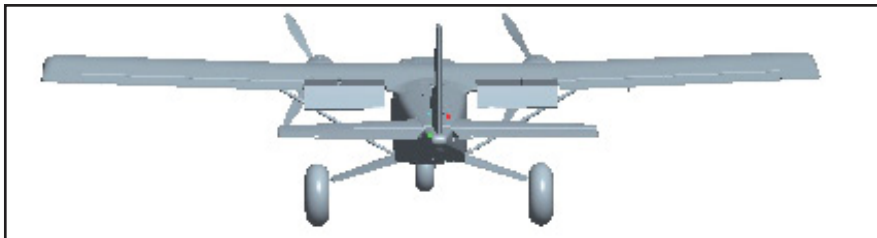
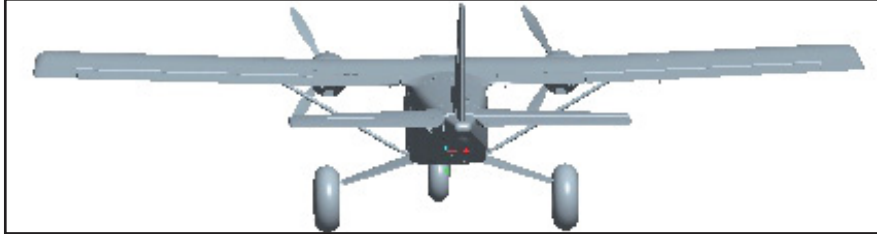
1. The BushMule V2 ideally uses a 6 channel receiver as a minimum to get the best from the model. Bind your chosen receiver to your transmitter, and plug in all the servos to the corresponding channels.
2. These controls consists of the Throttle, Ailerons, Elevator, Rudder, Flaps and Cargo Door.
3. Plug your 4S LiPo flight battery into the XT-60 battery connector that powers up your BushMule V2.
4. Check the rotation of the out-runner motors, they should both spin in opposite directions, and both should rotate inwards towards the fuselage.
5. Check all your control services and make sure they are all operating the correct way without any binding issues. Adjust mechanically the length of the servo push-rods to center all the control surfaces.

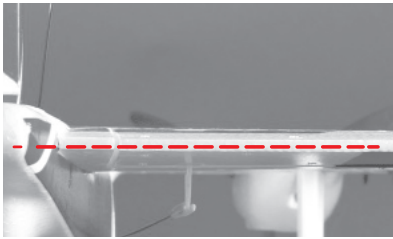
5. Control Set-up

1. The Avios BushMule V2 handles extremely well, is very maneuverable through all ranges of the flight envelope. In saying this, your Avios BushMule V2 needs setting up before your initial maiden flight. After the first flight, then you can adjust the control surfaces to suit your own preferences.

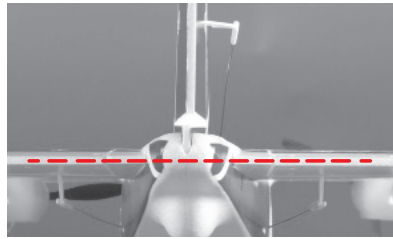


**Basic assembly of your BushMule V2 is complete.
Now perform a final check on all screws, bolts and components,
ensuring all are secure and firmly in place.**

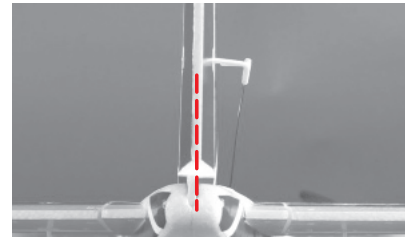





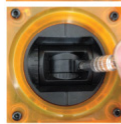
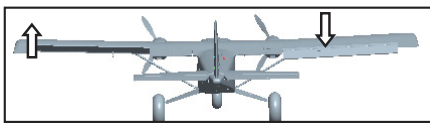
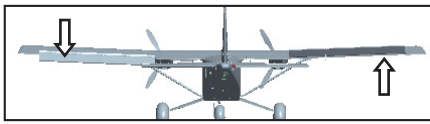


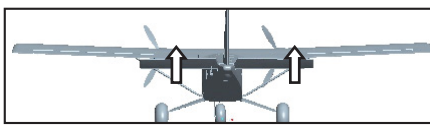
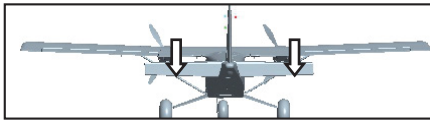


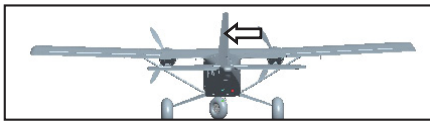
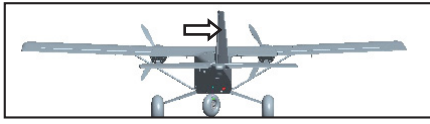
Aileron



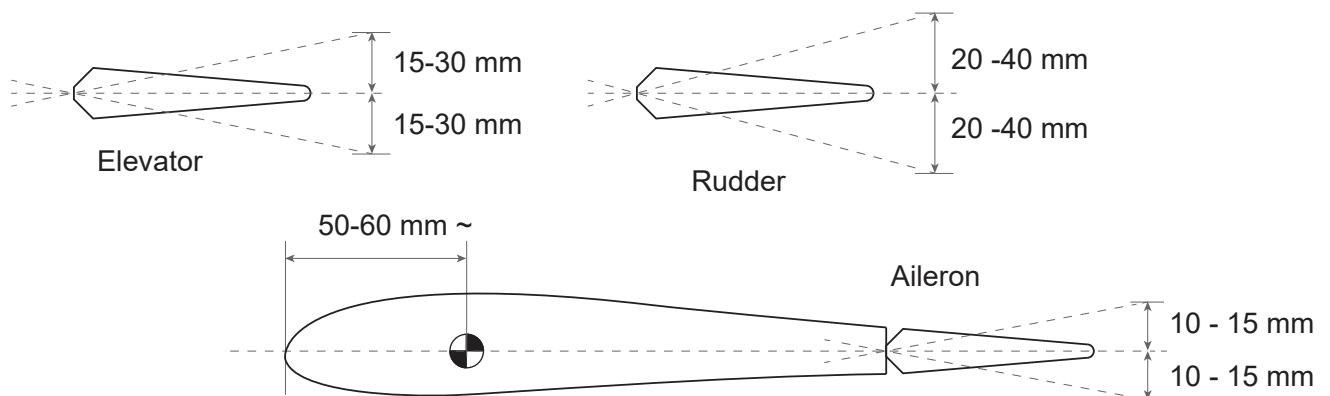
Elevator



Rudder

 	<p>Roll left</p> <p>Roll right</p>	 	<p>Aileron (Roll)</p>
 	<p>Pitch up</p> <p>Pitch down</p>	 	<p>Elevator (Pitch)</p>
 	<p>Yaw left</p> <p>Yaw right</p>	 	<p>Rudder (Yaw)</p>

CONTROL THROWS:



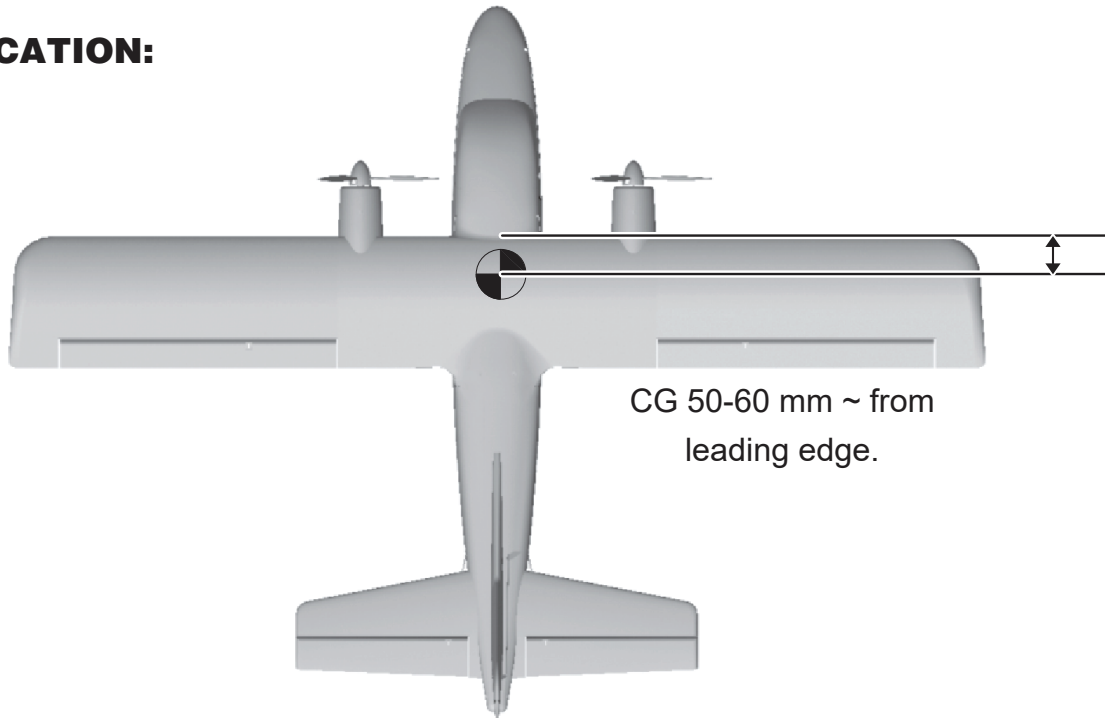
- * Elevator 'low rates' 15mm 'high rates' 30mm in either direction from neutral.
- * Aileron 'low rates' 20mm 'high rates' 40mm in either direction from neutral.
- * Rudder 'low rates' 10mm 'high rates' 15mm in either direction from neutral.

6. Centre of Gravity

The centre of gravity or CoG is the most important measurement for a successful maiden flight of any model airplane.

The suggested CoG for the Avios BushMule V2 is 50-60mm from the leading edge of the wing with your flight battery installed. We suggest aiming for the 50mm forward position for initial flights.

CG LOCATION:



With assembly and set-up now complete, your Avios BushMule V2 should be ready for flight. However we recommend you read and follow the advice given in the next stage of this manual before flying your model.



7. Hints

We have a few hints to help when flying the Avios BushMule V2, when measuring the CoG take some time to adjust this to match your flying style. Moving the battery to adjust the CoG forward and aft to find your personal balance point. Once again we suggest keeping in near the forward mark for initial flights.

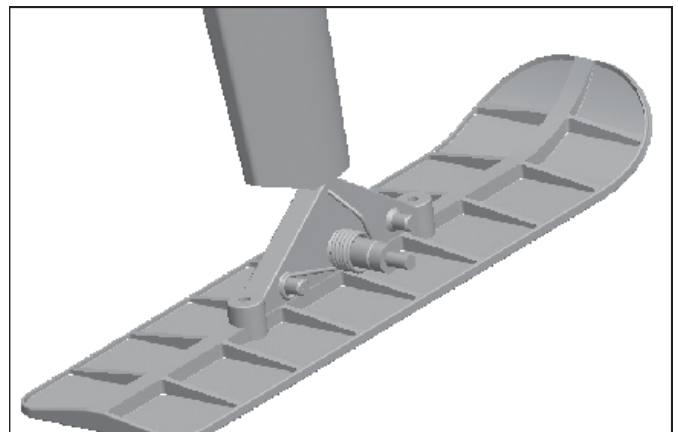
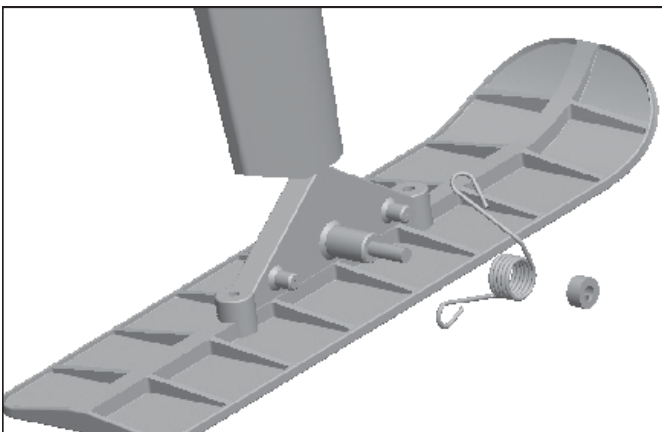
Another great tip is to balance your new plane laterally (wing tip to wing tip) this is sometimes looked over, but is an important step before you fly.

Balancing the 3 bladed propellers helps to keep vibration to a minimum, and helps with efficiency of the drive train. With your Avios BushMule V2 fully built and ready for flight now is a perfect time to go over your model once more to make sure nothing has been overlooked, check that all screws, nuts and bolts are secure, and that your flight control surfaces are set correctly and secure.

8. Optional Skis

Your BushMule V2 comes supplied with high quality plastic skis for use on snow and even on sand. These skis add greatly to the versatility of the BushMule V2, and are very straight forward to install. They add a fun and exciting aspect to flying the model, please follow the guide below when installing the skis.

With all wheels removed from the undercarriage slide each ski onto the wheel axles followed by the tension spring. Ensure the loop at the rear of the spring is correctly located onto the plastic post as shown. With the spring located and installed, secure each ski to the axle with the wheel collars. Note, when not on the ground all skis should spring forward/upwards, this is normal.



9. Model Flying Precautions

1. Select your flying area carefully. Always choose an open space that is unobstructed from trees and buildings and away from crowded areas. Avoid flying in areas with roads, electric or telephone poles and wires, and water, nearby or within close proximity to full size controlled airspace.
2. Do not fly this model in poor weather. This includes high winds, low visibility, inclement weather, rain and storms are to be avoided.
3. Never attempt to catch the model whilst in flight, even a slow-moving model can cause harm to yourself and/others, and risks damage to the model.
4. This model is recommended for children no younger than 14 years old. All children, no matter what age, should always be supervised by a capable and responsible adult when operating this model.

Always unplug your models flight battery when not in use, never leave the battery installed in your model. Please remember to keep clear of the propellers at all times when your flight battery is connected. Before flying, always turn on your transmitter first then plug your flight battery into your model. After flying, always unplug your flight battery first then turn off your radio transmitter. Exercise caution when charging your batteries and follow in full your battery manufacturers safety guidelines when doing so.

10. Pre-flight Checks:

- Always perform a range check between your Transmitter (TX) and Receiver (RX). Please follow your Transmitter manufacturers guidelines for performing this important check.
- Check all screws, nuts, bolts, grub screws and ensure all mounting points are firmly secured, including control horns and clevises.
- Only fly with fully charged batteries (both flight batteries and transmitter batteries) Failure to do so could result in loss of control, and possible damage to persons and property. Always check your batteries and have a system that works for you with flat and fully charged batteries.
- With your BushMule V2 powered up check all your control surfaces are free from damage/ obstructions and moving in the correct directions.
- Always inspect the model and propellers for any damage that may have occurred during transit and listen for any unusual sounds from the electronics when powering up. If in any doubt about any aspect of your model then do not fly it.
- With your model held securely, and the propellers free from obstructions, increase the throttle to confirm the rotation is in the correct direction.
- If this is the first flight with your BushMule V2, double check the CoG is at the correct position. If not adjust the battery position inside the battery area to achieve the required balance point.
- If you are an inexperienced RC pilot then please seek the help and assistance of an experienced RC pilot, to help and confirm these final checks, and to test fly the model for you.

11. Flying The Bushmule:

- Your Avios BushMule V2 is one of the most versatile, stable and predictable RC airplanes to fly. It is a fantastic introduction to the world of twin motored RC flying.
- When flying, the counter rotating propellers will give the model zero, or limited torque effect as the motors are spinning in opposite directions.
- The BushMule V2 has a very wide flight envelope, and will happily fly very slowly with the help of the large barn door style flaps, the BushMule V2 is a true STOL (Short Take Off and Landing) workhorse. But, when you open the throttle, the power is perfectly distributed from the 4S flight battery to the twin 30A ESC's and the powerful, and reliable brushless outrunner motors. Spinning two 10 inch propellers the power is converted to a stampeding barnstorming utility thoroughbred. No horsing around, the Avios BushMule V2 is a great flying RC platform.
- Changing the large "Tundra" like wheels to skis or optional floats make this RC airplane a special and unique kind of animal.
- With your additional FPV (First Person View) equipment, the BushMule V2 converts easily to a FPV superstar. Pan and tilt cameras, flight cameras, and VTX's will easily fit in the well thought out positions, and huge fuselage spaces.

12. From Avios to the customer:

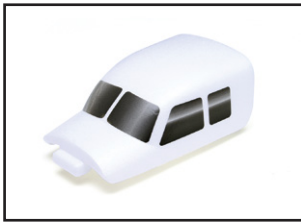
- Firstly, thank you for purchasing the Avios BushMule V2 and welcome to the adventure of all terrain flight, "Anytime, Anywhere".
- Whilst not essential to flying, the use of coordinated rudder in flight will add to the general handling through to slow speed manoeuvres, will improve your flying skills and let you explore the full potential of this fine model. A mix of 40% aileron-rudder is recommended as a good starting point. From there you can adjust this mix to suit your flying style.
- Although it can be, the BushMule V2 doesn't need to be flown at full throttle all the time. Dropping back on the throttle will not only let you enjoy it at a more relaxed pace, but will also result in longer flight times, reduce the risk of the motors and ESC's over heating in hot weather, and will increase the life of your flight pack.
- Flight packs of 20C discharge rate or above are recommended to ensure optimal performance in flight.
- Keep all leads within the fuselage area as tidy as possible. Tidy wires not only look better but also allow for easier access to all internal components, increase airflow around electronics, and reduce the risk of electronic interference.
- Inspect the propellers, and mounting nut/bolts frequently, especially if you've suffered a hard landing or a prop has been knocked.

- Inspect the propellers, and mounting nut/bolts frequently, especially if you've suffered a hard landing or a prop has been knocked.
- If you intend to use the supplied skis on snow, and sand, or you wish to fit the optional floats, and fly off of water, it is recommended that you add a coat of clear acrylic varnish to the applied decals. Prolonged exposure to water may cause the decals to lift from the surface, leaving a tired appearance, let's face it, no one likes a tired looking ass. Please, test your varnish on a scrap piece of EPO first to ensure it does not react to the foam.
- Our final suggestion is to add a mixture on your Transmitter to enable throttle to be mixed with your rudder inputs. Even though the optional floats have the provision for a water rudder it's a lot easier to taxi on water, snow or rough fields with this additional mix. Flying the BushMule V2 with this throttle / rudder mix also opens up the Bushmule's wild side with flat spins and crazy antics. (please check your transmitters owner's manual for the mixing instructions.)

**Thank you again for purchasing the Avios BushMule V2.
We hope you'll have many happy days of flying in wide open skies
Don't forget, spare parts are available for this model.**

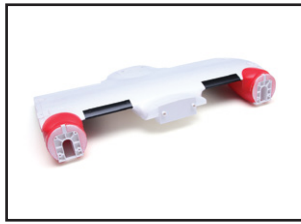


SPARE PART LISTING 1:



BushMule V2 Canopy w/
Decals :

Part No.
9310000453-0



BushMule V2 Wing Center
Section:

Part No.
9310000448-0



FPV Canopy Hatch:

Part No.
9310000311-0



Black Foam Nose Cone:

Part No.
9310000332-0



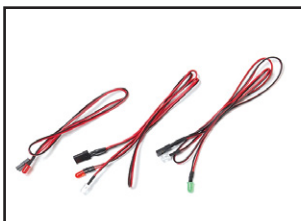
Foam Wheel Set (EPO)
w/Plastic Hubs:

Part No.
9310000312-0



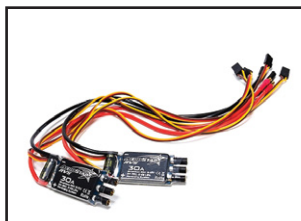
AeroStar 3536-850KV
Brushless Motor w/X Mount:

Part No.
9310000315-0



LED Light Set:

Part No.
9310000319-0



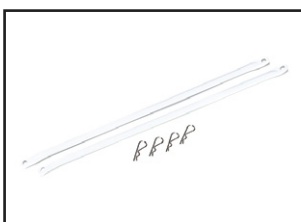
AeroStar 30A RVS ESC
Set (with Reversing):

Part No.
9310000316-0



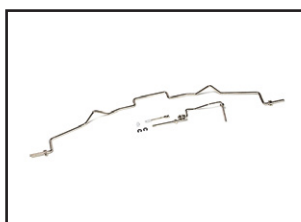
Outer Wing Spars:

Part No.
9310000313-0



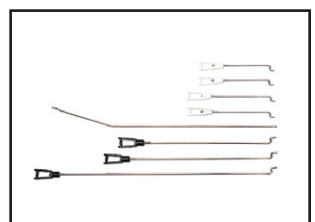
Wing Strut Set:

Part No.
9310000314-0



Landing Gear Wire:

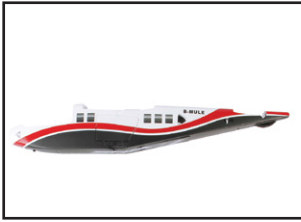
Part No.
9310000317-0



Control Rods w/Clevises:

Part No.
9310000318-0

SPARE PART LISTING 2:



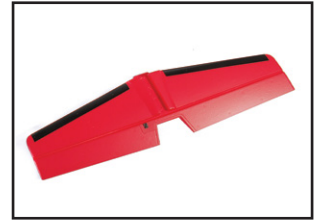
BushMule V2 Fuselage w/
Decals

Part No.
9310000447-0



BushMule V2 Outer Wing
Panels w/Decals

Part No.
9310000449-0



BushMule V2 Horizontal
Stabilizer w/Decals

Part No.
9310000450-0



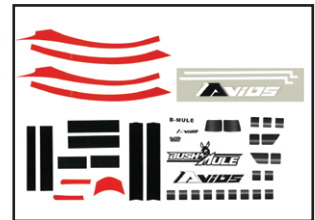
BushMule V2 Vertical
Stabilizer w/Decals

Part No.
9310000451-0



BushMule V2 Motor
Cowl Set

Part No.
9310000452-0



BushMule V2 Decal Set

Part No.
9310000454-0

OPTIONAL ACCESSORIES:



BushMule Float Set

Part No.
9306000269-0



Note:

If using the optional float set, then it is recommended that you fit the auxiliary fins to enhance the lateral stability.

RECOMMENDED ACCESSORIES FOR THE AVIOS BUSHMULE V2:



OrangeRx Tx10i 10ch 2.4GHz
DSMX Radio System

Part No.
9171001399-0



Turnigy T6A-V2 AFHDS 2.4GHz
6Ch Transmitter w/Receiver

Part No.
9114000074-0



RADIOMASTER TX16S 2.4GHz
16ch Multi-Protocol OpenTx Transmitter

Part No.
9914000015-0



ZIPPY Compact 3000mAh
4S1P 20C LiPo Pack w/XT60

Part No.
9067000493-0



ZIPPY Compact 3300mAh 4s 40c
Lipo Pack

Part No.
9067000036-0



Turnigy Nano-Tech 4000mAh
4S 30C Lipo Pack w/XT60

Part No.
9210000279-0



Turnigy nano-tech 4500mAh 4S
35~70C Lipo Pack w/XT-90

Part No.
9210000220-0



Rhino 4000mAh 4S 50C
Lipo Battery Pack w/XT90

Part No.
9952000029-0



XT90 male to XT60 female 2pcs

Part No.
258000140-0

TROUBLE SHOOTING:

Problem	Cause	Solution
Motors do not turn	<ol style="list-style-type: none"> 1. Battery is not fully charged. 2. Transmitter battery low. 3. Motors not connected. 4. The motor is damaged. 5. Receiver is not bound to Tx. 6. ESC in set-up mode. 	<ol style="list-style-type: none"> 1. Charge the batteries. 2. Install a full charged battery. 3. Check for connection between the ESC and motor. 4. Replace motor. 5. Consult Radio manual and go through bind procedure again. 6. Hold model and move throttle to full position then back down to idle.
Model moves backwards	<ol style="list-style-type: none"> 1. Props installed incorrectly 	<ol style="list-style-type: none"> 1. Swap the props around.
Control surfaces not moving with stick input	<ol style="list-style-type: none"> 1. The servo lead is connected to \ Rx incorrectly. 2. The servo is damaged. 	<ol style="list-style-type: none"> 1. Make sure the servo leads are connect properly. 2. Replace servo.
Model doesn't fly straight	<ol style="list-style-type: none"> 1. Control surfaces not centered. 2. CoG is not in the correct position. 	<ol style="list-style-type: none"> 1. Adjust the trims on the transmitter. 2. Re-position lipo as suggested.
Model does not climb well	<ol style="list-style-type: none"> 1. The battery is not fully charged. 2. Elevator servo is reversed. 3. CG too far backwards. 	<ol style="list-style-type: none"> 1. Charge the battery. 2. Change servo direction via Tx. 3. Move battery forwards.
Limited Radio range	<ol style="list-style-type: none"> 1. Transmitter/Receiver batteries are flat. 	<ol style="list-style-type: none"> 1. charge/replace batteries.

CONTACT:

For more information on this model and the entire range from Avios please visit us at:

- hobbyking.com

Or see our Facebook page at:

- [Facebook.com/hobbyking](https://www.facebook.com/hobbyking)

And don't forget you can see the product video for this model and the entire Avios range at:

- [youtube.com/hobbykinglive](https://www.youtube.com/hobbykinglive)

For your next Avios purchase be sure to visit:

- hobbyking.com



Made in China