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**JUNIAER**  
*Arte em Aeromodelos*

**EMB-312 T-27 TUCANO 20CC**

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JUN 020 Aeromodelo T-27 Tucano 20cc

[www.juniaer.com.br](http://www.juniaer.com.br)

A traditional 20cc sport/scale category model airplane!

Lots of incredible detail in this classic model airplane with scale, acrobatic and sport flight capabilities, bringing precise and smooth performance for the intermediate to advanced level model airplane pilot.



## Assembly instructions manual and guideline

### T-27 Tucano 20cc

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This is the T-27 Tucano 20cc ARF Juniaer, prepared for retracts installation, with flaps, with an exquisite finishing and many painting schemes available, very realistic and all detailed in relief, with rivets, antennas, side door with hinge and lock (not installed), panel lines, compartments, pitot tubes replicas, landing gear doors, paneled cockpit and clear canopy. Engine cowling in 2 parts with exhaust replicas. Model airplane made of high-quality epoxy resin with structural reinforcements, low weight and high resistance due to the FULL COMPOSITE high technology vacuum lamination technique. 2-piece wing (1 aluminum tube on the wing) laminated in fiberglass and epoxy resin with carbon fiber reinforcements and laser-cut plywood and balsa structures. Laminated stabilizer in fiberglass and epoxy resin with carbon fiber reinforcements and structures in plywood and balsa laser cut in a single piece to be permanently glued to the fuselage. Clear canopy, resin made canopy frame and cockpit with instruments panels. Ailerons, flaps e and elevators factory hinged in perfect align. Rudder to be epoxy glued in 3 hinge points provided with the kit. Servo tray and fuel tank tray made of laser cut plywood. Exquisite automotive painting finishing, scale decals and markings and varnished for long lasting. Stable, realistic and acrobatic flight pattern. Capable of many maneuvers such as slow rolls, rolls, Cuban eights, knife edge flight, inverted flight and much more. This model airplane was developed and built to provide a high performance both for pleasant flights as for wealth of details and realism. It's construction and made with specific high-quality materials and advanced composite lamination techniques to provide low weight and high structural strength.



#### IMPORTANT WARNINGS

The Juniaer model airplanes are painted and varnished with high quality and resistance products. Even so, some care must be taken to protect the paint: wipe your model with a cloth immediately after use with water sprays and neutral detergent. Fuels can damage the varnish if it penetrates punctures or damages to the plane's surface, as well as cuts in the engine's cowling. To prevent this kind of problem, we recommend brushing two-component PU varnish or applying epoxy to areas that are uncovered for any reason. Avoid exposing the model to direct sunlight as much as possible, especially the darker painted parts that accumulate and reflect a greater amount of heat, causing an internal and external temperature raising. The use of automotive wax for polishing is useful in preventing the accumulation of dirt and facilitates the cleaning and protection of the varnish. We suggest the use of fabric smooth covers for storage and transport, in order to protect against damage and risks. Be careful when handling your model airplane, especially the movable control surfaces. Never lift it by the two wing tips only, as the total weight is considerable to be supported only by 2 distant points. When checking the model airplane's balance through the center of gravity (C.G.) always support it by the roots of the wing at the indicated points.

Please read this manual to the end before doing anything on your model airplane, it contains important information regarding assembly and use, and it will also give you an overview of what should be done correctly and following the guidelines.

Please check and identify all parts of your model airplane when you receive it. If any parts are damaged or defective, please contact our customer service. Your model aircraft has a 90-day factory warranty against manufacturing defects. Juniaer Model Airplanes guarantees that this kit is free from manufacturing defects in both material and workmanship at the date of purchase. This warranty does not cover any components damaged by use or modifications. In no event will Juniaer's liability exceed the original cost of the kit purchased. In addition, Juniaer Model Airplanes reserves the right to change this warranty without prior notice. Since Juniaer Model Airplanes has no control over the final assembly or the equipment used for the final assembly, no liability will be assumed or accepted for any damages resulting from the user's use of the final product assembled by him or third parties. Through the act of using the assembled product by the user, he accepts all responsibility for the result. If the buyer is not prepared to accept responsibility for the use of this product, it must be returned immediately to the place of purchase in new and unused condition. This product is intended for persons over 18 years old and any procedure involved in its assembly and use must be monitored by an adult.

This is not a beginner's model aircraft, despite having a very stable flight performance and low speed stall point, it is a complex model with many mechanical and electronic devices and must be assembled and flown by someone with experience and knowledge in the area of model airplanes setup and flying. Never consider this product as a toy. If in any case you do not feel 100% sure of what you are doing, if there are any unanswered questions or any other problem, please DO NOT PROCEED!!! Look for our guidance or any professional in the field. Any equipment badly installed, or problematic may cause the total or partial loss of the model, and serious consequences for people and properties around the flight area. If you want more information about insurance, legislation, rules and security procedures, look for the Academy of Model Aeronautics [www.modelaircraft.org](http://www.modelaircraft.org) Telephones Tel.: (765) 287-1256 / (800) 435-9262 Fax.: (765) 289-4248, which may indicate clubs with a structure that includes qualified flight instructors accredited to issue the operational license for model pilots that includes insurance.

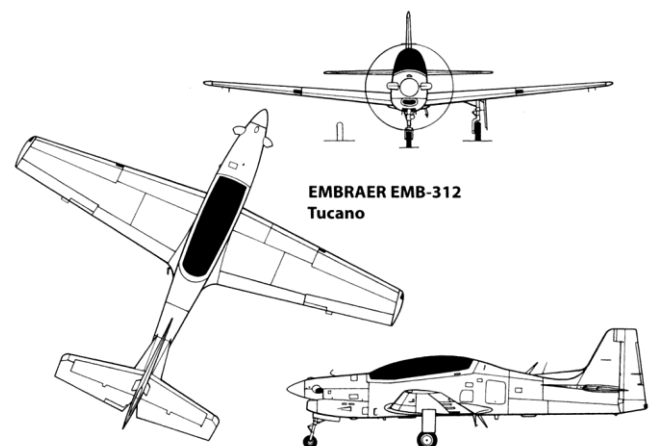
Always check the operation of the model aircraft before all flights to ensure that the equipment is working perfectly and that the structure is intact. Always check all links, connectors and control surfaces and replace any component that shows signs of fatigue or wear.

**VERY IMPORTANT:** Juniaer Modelismo provides a high-quality kit with instructions, but the quality of the finished model depends on how it is assembled, therefore, the manufacturer and its dealers cannot under any circumstances guarantee the performance of the completed model. No complaints will be accepted regarding the performance and safety of the model aircraft after it has been assembled. "Juniaer", "Juniaer Modelismo" and "Juniaer - Art in model airplanes", as well as the logo, are registered trademarks of Juniaer industry, commerce, importation and exportation of model airplanes Ltda. All rights reserved.

Juniaer Modelism

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### **Specifications:**

**Wingspan:** 1790 mm ( 70.47 in)

**Length:** 1400 mm; 1480mm with spinner (55.12 in; 58.27 with spinner)

**Wing Area:** 49,8 dm<sup>2</sup> (772 sq in)

**Wing Loading:** 90,36 g/dm<sup>2</sup> to 100,40 g/dm<sup>2</sup> (29.61 oz/sq ft to 32.83 oz/sq ft)

**Spinner:** 63,5 mm (2 1/2")

**Engines:** Gas burning 20cc 2 cycle, 90 to 100 glow 2 cycle, 100 to 125 4 cycle or electric proportional.

**Weight:** approx. 2,80 Kg (6,17 lb). Flying weight: 4,50 to 5,00 Kg (9,92 lb to 11 lb) (depends on installed accessories).

**Radio:** 7 channels minimum for limited installation. 9 or more channels for complete installation (not included).

**Servos: Electric motor or glow engine:** 6 standard size servos 4,5 kg-cm or more torque (in case of electric motor 5 standard servos) and 2 mini servos 4 kg-cm or more torque. Nylon gears can be used.

**Gas burning engine:** 6 standard servos 5 kg-cm torque and 2 mini servos 4 kg-cm or more torque.

**All servos shall be metal geared.**

## DISCLAIMER

In Brazil, model airplane activity for recreational purposes is regulated by ANAC (National Civil Aviation Agency) through the Special Brazilian Civil Aviation Regulation RBAC-E No. 94 that entered into force on July 1, 2021, or subsequent substitutive document.

Important information is contained in subparts **E94.3 Definitions; E94.103 General rules for the operation of unmanned aircraft; E94.301 Registration and cadastre and E94.501 General provisions.**

The Ministry of Defense, Aeronautics Command, Department of Air Space Control regulates the procedures and responsibilities necessary for access to Brazilian Air Space by unmanned aircraft with use exclusively for recreation, the so-called model aircraft through the **MCA 56-2** manual that entered into force on July 1, 2020, or subsequent substitutive document.

The radio control equipment used in model airplanes, according to the General Telecommunications Law (Law nº 9.472, of July 16, 1997) must be approved through a certification issued or accepted by ANATEL (National Telecommunications Agency). Information about this procedure can be obtained from the Certification and Numbering Management – ORCN ANATEL or by e-mail: [certificacao@anatel.gov.br](mailto:certificacao@anatel.gov.br).

We recommend reading the documents cited for legal information about the operation of your model aircraft and the use of Brazilian airspace. For residents in other countries, we recommend researching local legislation, regulations and safety recommendations. Also look for FAI - World Airsports Federation [www.fai.org](http://www.fai.org).

All images, drawings and photos are for illustrative purposes only. Appearance and features of the product depend on how it is assembled or used by the user. All specifications, features and models described and shown are subject to change without notice.

### Kit contents:

We recommend checking all items when you receive your model aircraft. Your T-27 Tucano 20cc Juniaer consists of the following items:

1 instruction manual containing disclaimer	1 left wing
1 fuselage	1 set of left-wing landing gear doors
1 set of front landing gear doors	1 right wing
1 upper engine cowling with 4 screws	1 set of right-wing landing gear doors
1 lower engine cowling	1 aluminum tube diameter 25.4 mm
1 rudder	1 set of clear lenses
3 pin hinges for rudder	2 pitot tubes replicas
1 fuselage side door	2 ¼" x ¾" Allen screws for wing attachment
1 fuselage side door hinge	2 washers ¼" for wing attachment
1 spring latch for fuselage side door	1 stabilizer
1 cockpit	1 laser cut plywood servo tray
1 canopy frame	1 laser cut plywood tank tray
1 clear canopy	

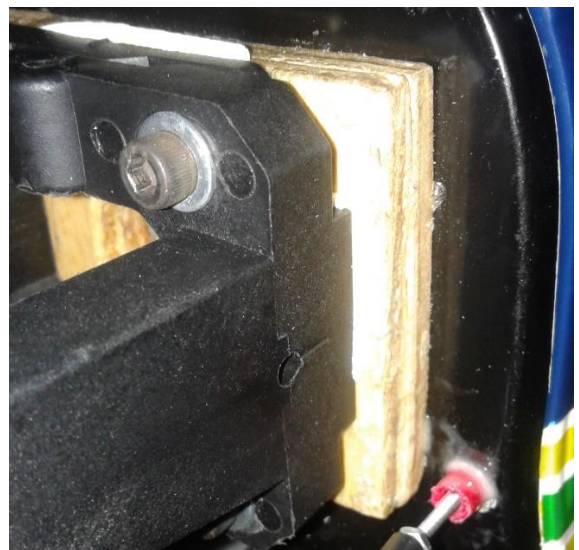
## Gas burning 2 cycle engine installation:



**Suggestion: DLE-20RA engine – perfect fit with stock muffler.**

Before installing your gas burning engine, please read the manufacturer's manual and all parts assembly recommendations carefully including exhaust, standoffs, ignition, installation, operation and maintenance. The information contained in this manual is extremely important.

The firewall of the model aircraft is provided in the correct location, with the correct angles for the engine installation and has markings for 4 engine mount holes. **The larger hole on the firewall is used for fuel lines and fuel tank ventilation passage and it is not centered, so the engine mount screws holes shall be aligned on the 4 4mm markings on the firewall.** It is provided a 10mm plywood square part to be used with DLE-20RA to position engine to the front, so the prop washer gets in correct alignment with the engine cowling. This plywood part shall be glued to the firewall using 30 to 40 minutes epoxy glue, keeping the 4 engine mount marking holes alignment. We recommend Great Planes 60 to 120 nylon adjustable mount (GPMG 1091) that includes screws, washers and lock washers to hold the engine to the engine mount. To secure the engine mount to the firewall and through the epoxy glued 10mm plywood part drill 4 5mm holes at indicated markings. Use 4 allen 10-32 x 1 ¼" screws (DUB 582), 4 10-32 blind nuts (DUB 584) and 4 washers on the screws.



Above: Great Planes adjustable engine mount with screws, washers and blind nuts (left) and engine mount in position at the firewall with the square 10mm plywood part (right).

Place the engine mount in inverted position (upside down) with the 4 10-32 x 1 ¼" screws with washers inside the holes through the square 10mm plywood part and the firewall until the inner side at the fuselage. Thread the 10-32 blind nuts on the 4 screws and tighten until the blind nuts gets started at the firewall by the inner side of the fuselage. Position the engine to the engine mount to obtain the throttle and choke pushrods passage location, marking the 2 points to allow pushrods passage without obstructions or curves. Mark the throttle and choke command location. Remove the engine. Loosen the 4 10-32 x 1 ¼" engine mount fixing screws and remove the engine mount. Drill 5mm holes on throttle and choke passage markings. Drill a 30 mm hole on the left inferior part of the firewall (looking from the front) as show in the photo to the engine spark plug passage. Apply 30 to 40 minutes epoxy glue around the blind nuts through the inner part of the fuselage to strengthen the plywood on fixing points to avoid the blind nuts to turn when tightening up the screws. Wait until full cure.



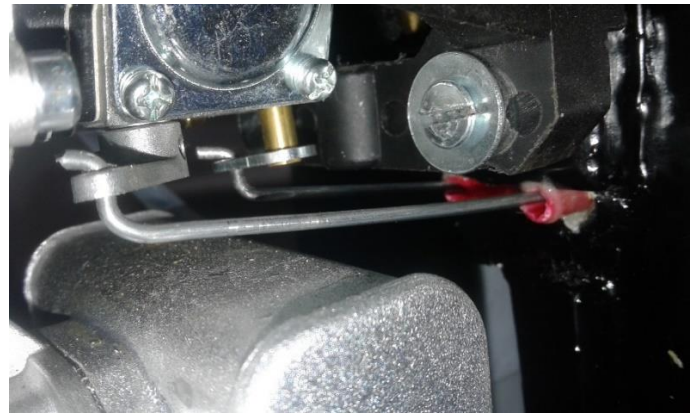
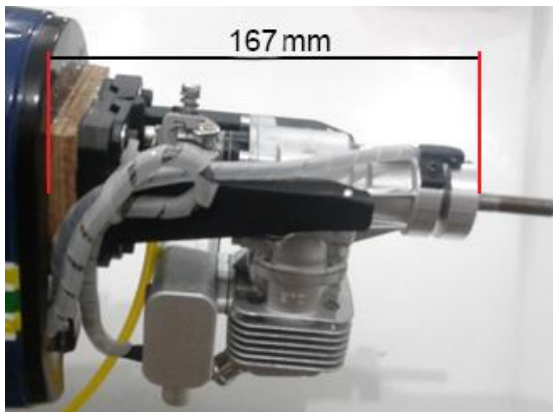
Above: 10-32 blind nuts started to the firewall from the inner side (left) and firewall with the 10mm plywood square part, holes for the engine mount screws, hole for passing the engine spark plug and holes for passage of the engine throttle and choke controls (right).

Apply medium grade thread locker (removable) to the threads of the 10-32 x 1 ¼" screws and screw them with the engine mount into the blind nuts through the 10mm square plywood part and the firewall, ensuring that a solid, firm fixation with parallel alignment between the 4 screws.

Assemble all engine parts following the manufacturer's manual guidelines using a medium degree thread lock (removable) on the bolts threads to ensure that they do not come loose with vibration and engine operation. It is advisable to attach the throttle and choke control pushrods to the engine before definitively attaching it to the engine mount. We recommend the use of DUBRO Laser Pushrods (DUB 500 or DUB 501) as they are flexible, easy to install and non-metallic. Never use metal pushrods for throttle or choke commands of gas burning engines due to the high risk of noise and resonance that can affect your radio control system. Sand the ends of the outer tubes of the pushrods with coarse sandpaper (80 to 120 grit) to ensure better adhesion and glue them to the firewall in the holes with epoxy glue for 5 minutes. Mount the links to the internals of the pushrods ensuring they are secure and connect them to the engine throttle and choke control horns (ball links can also be used on these controls for ease of connecting/disconnecting the throttle and choke). Important: The plastic parts of the pushrods must stay inside the fire wall due to the heat of the engine. Connect the tygon tubes to the engine's gasoline inlet. Pass the tygon tube and the 2 pushrods through the holes in the firewall. To define the exact position of the engine on the upright, check the section "Installing the engine cowling" and observe the distances:

**Distance between firewall to prop washer: 167 mm (length)**

**Distance between the engine's center shaft to the end of engine's head: 93 mm (height)**



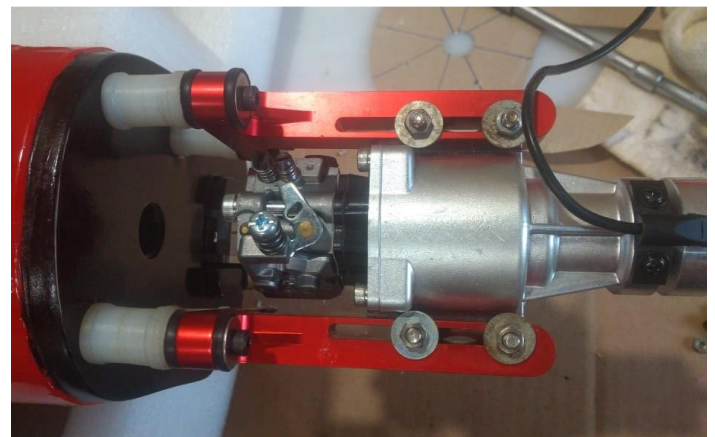
Above: installation of the DLE-20RA engine with Great Planes 60-120 adjustable engine mount (left) and installation of the engine throttle and choke pushrods (right).

The engine ignition module must be installed immediately behind the firewall and the spark plug wire passed through the firewall from the lower left side (viewed from the front) through the 30mm hole. It is recommended to protect the ignition module with foam and secure it with double-sided tape or Velcro securely.

Very important: all fuel lines and engine cables must not, under any circumstances, have contact with parts of the engine block that are very hot during and after operation. For this, we recommend fixing them to the upright with nylon cable ties firmly and without the possibility of moving. Other engine mounts can be used, since they are indicated for the engine used and are within the required mounting dimensions, such as anti-vibration engine mounts to reduce the general vibration level of the engine reflected in the model aircraft, but with a slight loss of power and maximum efficiency.



Above: installation of the ignition module behind the firewall on the side and flexible Dubro pushrods for throttle and choke control (left) and engine positioned correctly on the correct alignment (right).



Above: DLE-20RA engine installation on aluminum anti-vibration engine mount.

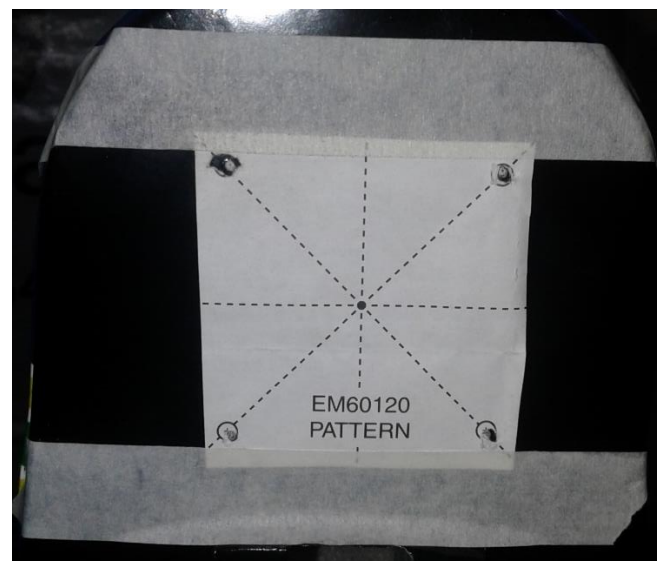
## 2 cycle glow engine installation:



**Suggestion:** OS 95 AX (left) and Slimline inverted pitts muffler (right).

Before installing your 2-stroke glow engine, please carefully read the manufacturer's manual and all parts assembly recommendations including muffler, engine mount, installation, operation and maintenance. The information contained in this manual is extremely important.

The firewall of the model aircraft is provided in the correct location, with the correct angles for the engine installation and has markings for 4 engine mount holes. **The larger hole on the firewall is used for fuel lines and fuel tank ventilation passage and it is not centered, so the engine mount screws holes shall be aligned on the 4 4mm markings on the firewall.** It is provided a 10mm plywood square part to be used with 2-cycle glow engines to position engine to the front, so the prop washer gets in correct alignment with the engine cowling. This plywood part shall be glued to the firewall using 30 to 40 minutes epoxy glue, keeping the 4 engine mount marking holes alignment. We recommend Great Planes 60 to 120 nylon adjustable mount (GPMG 1091) that includes screws, washers and lock washers to hold the engine to the engine mount. To secure the engine mount to the firewall and through the epoxy glued 10mm plywood part drill 4 5mm holes at indicated markings. Use 4 allen 10-32 x 1 1/4" screws (DUB 582), 4 10-32 blind nuts (DUB 584) and 4 washers on the screws.



Above: Great Planes adjustable engine mount with screws, washers and blind nuts (left) and original drilling template provided with the engine mount (right).

Place the engine mount in inverted position (upside down) with the 4 10-32 x 1 ¼" screws with washers inside the holes through the square 10mm plywood part and the firewall until the inner side at the fuselage. Thread the 10-32 blind nuts on the 4 screws and tighten until the blind nuts gets started at the firewall by the inner side of the fuselage. Position the engine to the engine mount to obtain the throttle pushrod passage location, marking the point to allow pushrods passage without obstructions or curves. Mark the throttle command location. Remove the engine. Loose the 4 10-32 x 1 ¼" engine mount fixing screws and remove the engine mount. Drill 5mm hole on throttle passage marking. Apply 30 to 40 minutes epoxy glue around the blind nuts through the inner part of the fuselage to strengthen the plywood on fixing points to avoid the blind nuts to turn when tightening up the screws. Wait until full cure.



Above: 10-32 blind nuts started to the firewall from the inner side (left) and firewall with screws and washers securing the engine mount (right).

Screw the 4 10-32 x 1 ¼" screws with the engine mount into the blind nuts through the firewall, ensuring a solid, firm fixation with parallel alignment between the 4 screws. It is advisable to attach the throttle control pushrod to the engine before definitively secure it to the engine mount. We recommend DUBRO Laser Pushrods (DUB 500 or DUB 501) as they are flexible and easy to install. If you prefer to use steel wire or another metallic pushrod, there are no restrictions in the case of glow engines, as they do not have electronic ignition. Sand the outer tube end of the pushrod with coarse sandpaper (80 to 120 grit) to ensure better adhesion and stick it to the firewall in the hole with 5 minutes epoxy glue. Mount the link to the inside of the pushrod ensuring it is secure and connect it to the engine throttle control horn. Important: The plastic parts of the pushrods must stay inside the firewall due to the heat of the engine. Connect the silicone tube to the engine's fuel inlet. Pass the silicone hose and pushrod through the holes in the firewall. To define the exact position of the engine on the engine mount, check the section "Installing the engine cowling" and observe the measurements:

**Distance between the firewall to the propeller washer: 167 mm (length)**

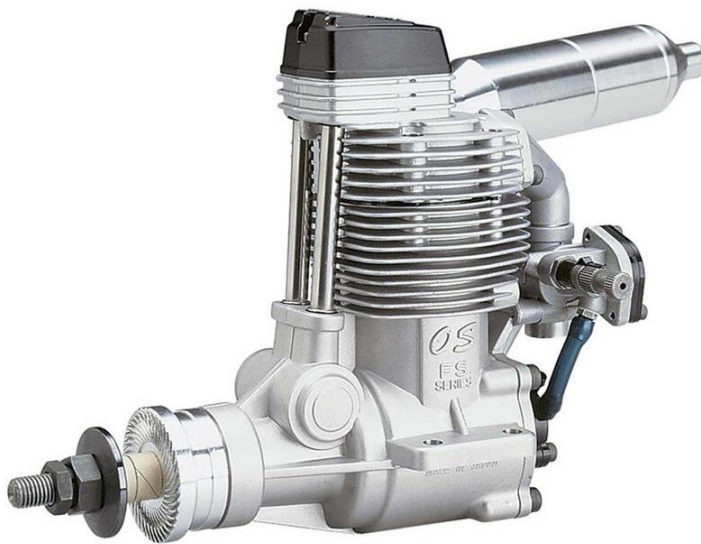
**Distance between the engine's center shaft to the end of engine's head: 81,3 mm (height) (OS 95AX)**

The 2-stroke glow engines are designed with very bulky exhausts and positioned on the side of the engine, which becomes a big nuisance when you think about the scale and realistic appearance of a model aircraft. We recommend the use of an inverted pitts muffler, for installation at the rear of the engine with the exhaust pipes positioned downwards, maintaining a good appearance of the aircraft nose and reducing the noise level emitted by the engine operation. Be sure to purchase a model sized for the engine to be used.



Above: OS 95AX with inverted pitts muffler installation.

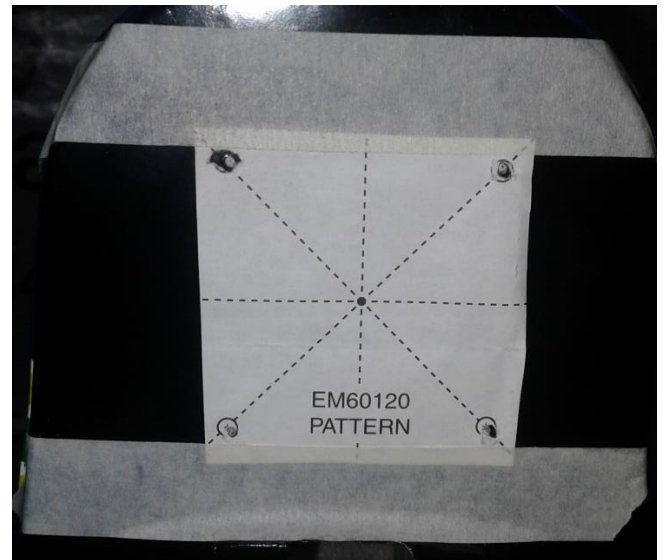
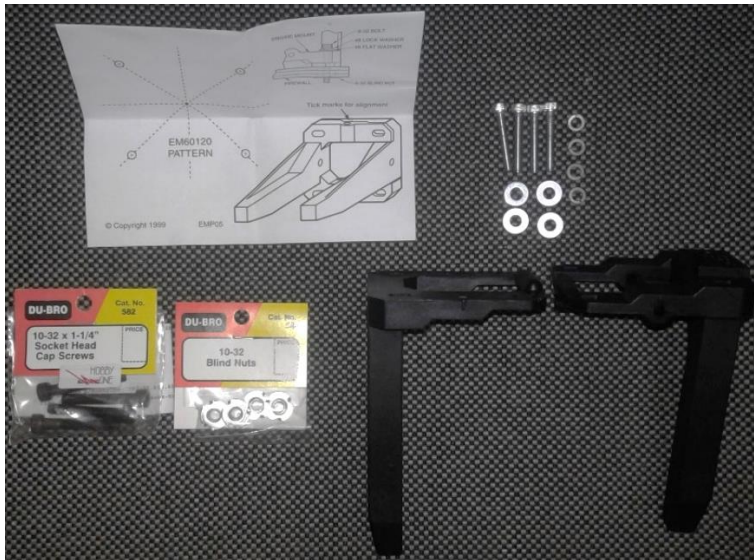
#### 4 cycle glow engine installation:



**Suggestions:** OS 120 SIII with fuel pump (left) and Saito 125A Golden Knight (right).

Before installing your 2-stroke glow engine, please carefully read the manufacturer's manual and all parts assembly recommendations including muffler, engine mount, installation, operation and maintenance. The information contained in this manual is extremely important.

The firewall of the model aircraft is provided in the correct location, with the correct angles for the engine installation and has markings for 4 engine mount holes. **The larger hole on the firewall is used for fuel lines and fuel tank ventilation passage and it is not centered, so the engine mount screws holes shall be aligned on the 4 4mm markings on the firewall.** In the case of a 4-cycle glow engine it is not necessary to use the 10mm plywood part provided with the kit. We recommend Great Planes 60 to 120 nylon adjustable mount (GPMG 1091) that includes screws, washers and lock washers to hold the engine to the engine mount. To secure the engine mount to the firewall drill 4 5mm holes at indicated markings. Use 4 allen 10-32 x 1 ¼" screws (DUB 582), 4 10-32 blind nuts (DUB 584) and 4 washers on the screws.



Above: Great Planes adjustable engine mount with screws, washers and blind nuts (left) and original drilling template provided with the engine mount (right).

Place the engine mount in inverted position (upside down) with the 4 10-32 x 1 ¼" screws with washers inside the holes in the firewall until the inner side at the fuselage. Thread the 10-32 blind nuts on the 4 screws and tighten until the blind nuts gets started at the firewall by the inner side of the fuselage. Position the engine to the engine mount to obtain the throttle and choke pushrods passage location, marking the 2 points to allow pushrods passage without obstructions or curves. Mark the throttle command location. Remove the engine. Loosen the 4 10-32 x 1 ¼" engine mount fixing screws and remove the engine mount. Drill 5mm holes on throttle passage markings. Apply 30 to 40 minutes epoxy glue around the blind nuts through the inner part of the fuselage to strengthen the plywood on fixing points to avoid the blind nuts to turn when tightening up the screws. Wait until full cure.

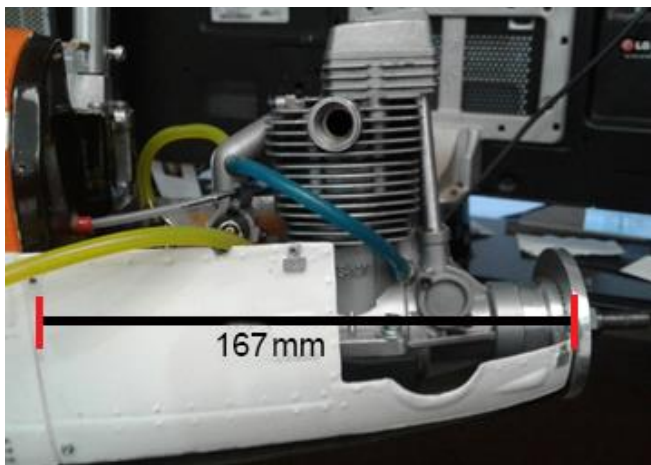


Above: 10-32 blind nuts started to the firewall from the inner side (left) and firewall with screws and washers securing the engine mount (right).

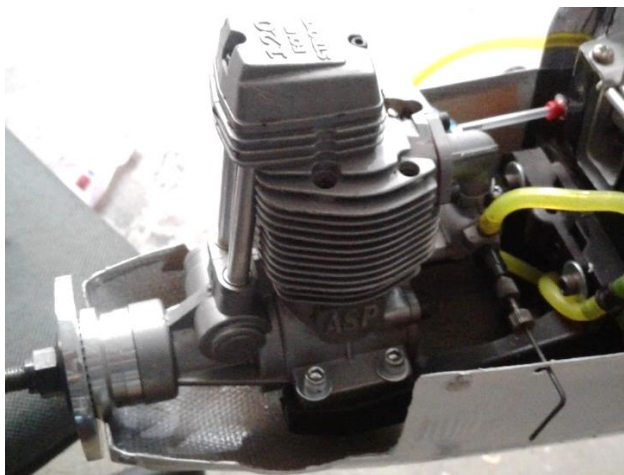
Screw the 4 10-32 x 1 ¼" screws with the engine mount into the blind nuts through the firewall, ensuring a solid, firm fixation with parallel alignment between the 4 screws. It is advisable to attach the throttle control pushrod to the engine before definitively secure it to the engine mount. We recommend DUBRO Laser Pushrods (DUB 500 or DUB 501) as they are flexible and easy to install. If you prefer to use steel wire or another metallic pushrod, there are no restrictions in the case of glow engines, as they do not have electronic ignition. Sand the outer tube end of the pushrod with coarse sandpaper (80 to 120 grit) to ensure better adhesion and stick it to the firewall in the hole with 5 minutes epoxy glue. Mount the link to the inside of the pushrod ensuring it is secure and connect it to the engine throttle control horn. Important: The plastic parts of the pushrods must stay inside the firewall due to the heat of the engine. Connect the silicone tube to the engine's fuel inlet. Pass the silicone hose and pushrod through the holes in the firewall. To define the exact position of the engine on the engine mount, check the section "Installing the engine cowling" and observe the measurements:

**Distance between the firewall to the propeller washer: 167 mm (length)**

**Distance between the engine's center shaft to the end of engine's head: 116 mm (height) (OSFS-120S)**



Above: 120 4 cycle engine installation on Great Planes 60-120 adjustable engine mount.



Above: 120 4 cycle engine installation on Great Planes 60-120 adjustable engine mount.

**Very important:** all engine fuel tubes must not, under any circumstances, have contact with parts of the engine block that are very hot during and after operation. For this, we recommend the positioning and length of them in a simple and direct way, without the possibility of touching the engine except for the fuel and ventilation connections.

Other engine mounts can be used, since they are indicated for the engine used and are within the required mounting dimensions, such as anti-vibration amounts to reduce the general vibration level of the engine reflected in the model aircraft, but with a slight loss of power and maximum efficiency.

## Electric motor installation:



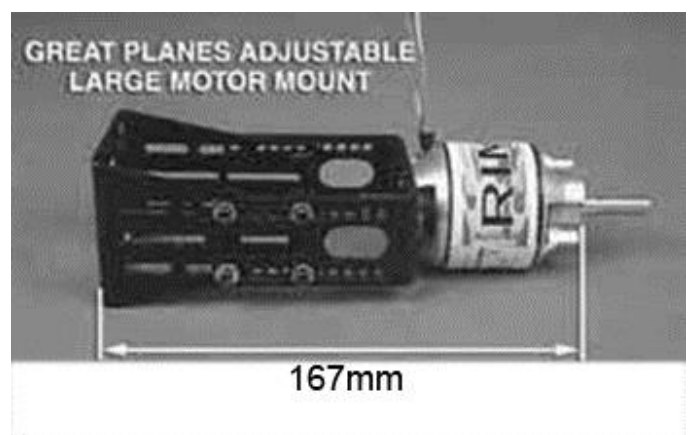
**Suggestions:** RIMFIRE 1.20 Great Planes and ROTOMAX 1.20 Turnigy.

Before installing your electric motor, please carefully read the manufacturer's manual and all parts assembly recommendations including speed control, engine mount, installation, operation and maintenance. The information contained in this manual is extremely important.

The firewall of the model aircraft is provided in the correct location, with the correct angles for the engine installation and has markings for 4 engine mount holes. **The larger hole on the firewall is used for speed control wires and it is not centered, so the engine mount screws holes shall be aligned on the 4 4mm markings on the firewall.** In the case of an electric motor, it is not necessary to use the 10mm plywood part provided with the kit. We recommend Great Planes large adjustable mount (GPMG 1260) that includes screws, washers and lock washers to hold the engine to the engine mount. To secure the engine mount to the firewall drill 4 5mm holes at indicated markings. Use 4 allen 10-32 x 1 ¼" screws (DUB 582), 4 10-32 blind nuts (DUB 584) and 4 washers on the screws.

To define the exact position of the engine on the engine mount, check the section "Installing the engine cowling" and observe the measurement:

**Distance between the firewall to the propeller washer: 167 mm (length)**



Above: Great Planes brushless adjustable motor mount large (GPMG 1260) (left) and adjust distance of motor mount (right).

The speed control (ESC) can be installed inside the motor mount. **Very important:** all motor and speed control wires must not, under any circumstances, have contact with parts of the motor and speed control that are very hot during and after operation. We recommend fixing them to the mount with nylon cable ties firmly and without the possibility of moving them so that they are routed inside the model aircraft through the hole in the firewall. It is recommended that the ESC (speed controller) be cooled by an air flow when in flight for best performance.



Above: electric motor on Great Planes adjustable motor mount (left) and with custom made stand-offs (right).



Above: Rimfire 1.20 brushless electric motor on Great Planes adjustable motor mount.



Above: brushless electric motor in custom made stand-offs (right).

## Engine cowling installation

The engine cowling is supplied in 2 parts (upper and lower). The parts fit perfectly with each other and on the fuselage, providing correct alignment according to the center between the mounting holes of the engine mounts and the angles of the firewall, for both gasoline/glow engines and electric motors. Using the spinner rear plate (2 ½") positioned on the engine prop washer, position the lower part of the engine cowling to center the spinner rear plate with the circumference formed by the cowling, leaving a space of 1 to 2 mm between the rear plate of the spinner and the cowling so that they do not touch in any position.

To fix the cowling to the fuselage, apply epoxy glue to 4 10mm hard wood cubes and glue them to the inside of the fuselage, in order to make a solid fixing point where the fixing screws will be inserted. Do the same for the attachment points on the underside of the cowling or use screws with self-locking nuts to ensure attachment even with high levels of vibration. With the correct alignment of the set, definitively screw the cowling parts together and in the fuselage using washers to increase the contact area with the cowling parts, avoiding cracks due to vibration. The screws to be inserted in the wooden cubes must be locked with a drop of medium CA glue or epoxy glue to reinforce the locking and guarantee greater strength.

The horizontal and vertical alignment of the spinner rear plate and the front of the cowling must be equal, parallel and centered.



Above: up (left) and down (right) engine cowling installation in correct alignment.



Above: spinner/cowling parallel alignment.

In the case of gasoline and glow engines, an efficient flow of cold air is recommended for engine cooling. The air inlet in the lower part of the cowling is sufficient for the air flow, however it is necessary to make room for the air outlet, which must be done in the lower rear part of the cowling, taking advantage of the holes for the engine exhaust pipes. The air outlet area must be 2 times larger than the front air inlet area. In gas burning engines we recommend the use of a “velocity stack”, which extends the distance from the carburetor air intake, causing the air to be captured inside the fuselage, through the firewall.

After making the cuts in the cowling to accommodate the engine and exhaust parts and having access to the engine adjustment needles (gasoline or glow) be sure to apply 5 minutes epoxy glue or medium CA on the cut parts in order to seal the surfaces. between the layers of paint and varnish so that they do not get fuel, oil and other engine residues.



Above: inferior cowling installation with 120 4 cycle glow engine (left and center) and with DLE-20RA muffler exhaust exits and ventilation (right).



We offer custom-made wooden propellers for the T-27 Tucano 20cc Juniaer (sold separately). Always consult the engine instruction manual to decide on the size and pitch of a propeller and consider the desired performance according to the characteristics of your model airplane. 2 blade propellers are ideal for engine break-in and flight tests, as they provide higher RPM and greater speed of response to engine acceleration, while 3 blade propellers provide lower RPM, being very suitable for scale models, however, they present a lower speed of response to engine acceleration.

The JC Super Props are factory balanced, painted and varnished, contributing to the good performance and scale visual of your T-27 Tucano 20cc Juniaer.

Be sure to check the propeller balance to be used, always check the propeller for cracks or signs of fatigue before use and check the general tightness of the spinner/propeller assembly to the engine.



Above: 2 blade wooden propellers for gas burning 20cc engines 14x10 or 15x8.



Above: 3 blade 14x9 propellers for gas burning engines (left) and electric motors (right).

## Fuel tank installation

To install the fuel tank, first fix the front plywood tray supplied with the model airplane with 30 to 40 minutes epoxy glue on the wooden rails inside the fuselage. The tray has openings for fixing the tank and batteries with nylon or Velcro clamps. Assemble the tank connections according to the manufacturer's instructions, considering the chosen fueling system (read below), checking that it is free of leaks and with the clunk(s) free in all possible positions. Main fueling options: **Filling valve:** we recommend Kwik Fill DUBRO (DUB 335) connected between the fuel tank and the fuel inlet of the engine. In this case, the tank needs only 2 entry and exit routes: a clunk that fills/empty the tank and sends fuel to the engine and vent line for air and excess fuel indicating a full tank; **"T" connector:** we recommend Hangar 9 (HAN 116) connected between the fuel tank and the engine's fuel inlet. In this case the tank needs only 2 ways of entry and exit: clunk that fills/empty the tank and sends fuel to the engine and vent line for air and excess fuel indicating full tank and **Third way of the tank:** we recommend DUBRO (DUB 840) connected directly to the fuel tank via a third way, with an independent clunk. In this case the tank needs 3 ways of entry and exit: clunk 1 that fills/empty the tank, clunk 2 that sends fuel to the engine and vent line for the exit of air and excess fuel indicating full tank. The fuel valve or the support of the fueller cap must be fixed to the firewall in plywood glued with 30 to 40 minutes epoxy or in the engine cowling, with easy access.

We recommend the 16oz DUBRO (DUB 416) tank (480cc) for 8 to 10 minute flights. It is necessary to change the original sealing rubber of the 16oz tank to use gasoline. Use the DUBRO DUB 400 rubber. If a longer flight time is desired, the 20oz DUBRO tank (DUB 420) (600cc), also changing the original sealing rubber to use gasoline. For tank fuel connections, we recommend 3/32" tygon tubes (DUB 800) and safety clips (DUB 677). Position the tank and batteries as far forward as possible and check that they are securely attached. Use a fuel filter (DUB 340).

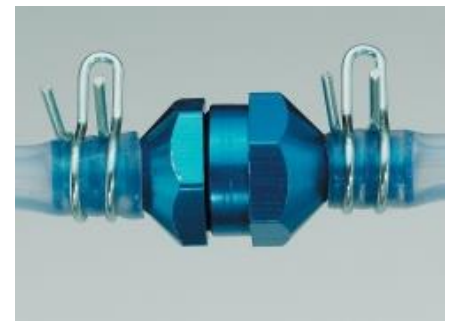
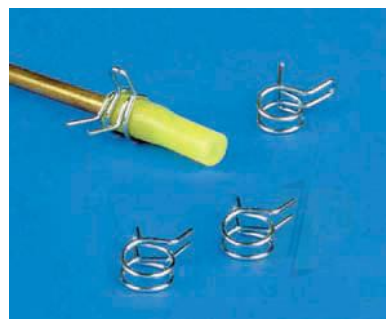
When using glow fuel, we recommend 3/32" silicone tubes (2.3mm) (DUB 222). Other fuel tanks from other manufacturers can be used since they meet the required capacities and dimensions. Transparent tanks are very suitable to facilitate the inspection of the internal connections, clunks and tubes, as well as the amount of fuel.



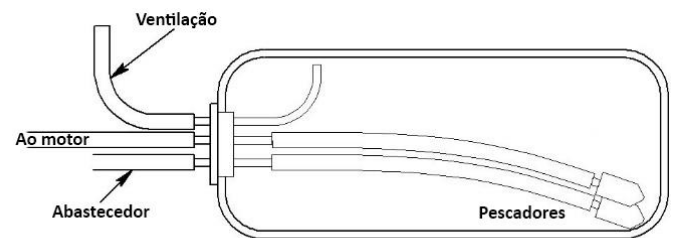
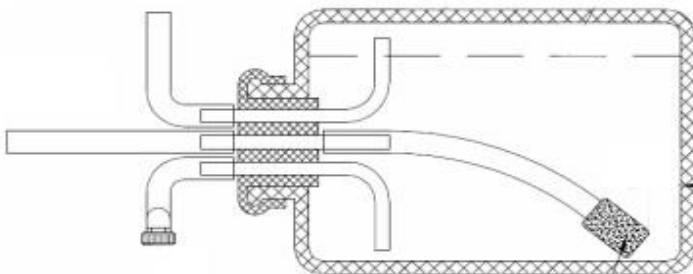
Above: fuel tank with tygon tubes fixed to the fuel tank tray with nylon ties (left) and positioned on rails inside the front of the fuselage (right).



Above: Typical fuel tank position(left) and throttle servo position with fuel tank to the right side (center). Aluminum fuelers (right).

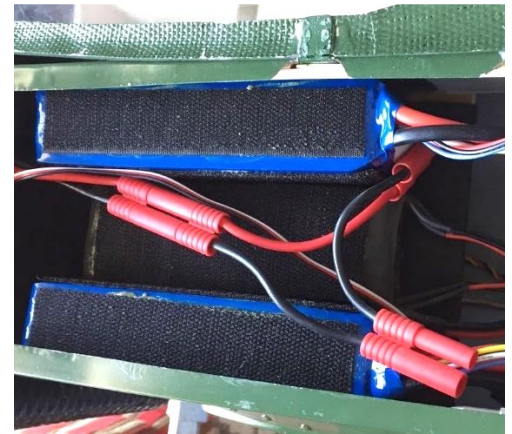


Above: internal fuel tank connections (left), safety clips for connections (center) and fuel filter with safety clips on connections(right).



Above: fuel tank assembly scheme with 1 clunk, vent line and third line for fueling (left) and with 2 clunks (right).

### Li-Po batteries for electric motors



Above: Li-Po batteries used in electric motorization. Final position to be defined after correct C.G. balance.

## Servos, linkage, hard points and commands

**In case of using gas burning engine:** All servos must be metal geared (not included). **6 standard servos** with 5Kg-cm or more torque for flight command surfaces and throttle: 2 for ailerons, 2 for flaps, 1 for rudder and 1 for throttle. Suggestions: SAVOX SAVSC0252MG, SAVOX SAVSC0254MG, SPEKTRUM SPMSA6180. And **2 mini servos** with 4kg-cm or more torque for elevators. Suggestions: SAVOX SAVSV1250MG, SPEKTRUM SPMSA5040.

Choke command installation by servo is optional and it is not recommended due to weight raising. If you wish to make this installation it is necessary 1 more standard servo with 4Kg-cm or more torque.

If using pneumatic retracts it is necessary 1 more standard servo with 4Kg-cm or more torque to actuate at the air valve. If you wish to make the front wheel steering command by an independent servo from rudder it is necessary 1 more standard servo with 4Kg-cm or more torque.

**In case of using glow engine:** all servos should be nylon geared (not included). You will need **6 standard servos** with 4,1 Kg-cm or more torque for flight command surfaces and throttle: 2 for ailerons, 2 for flaps, 1 for rudder and 1 for throttle. Suggestions: FUTABA S-3004, HOBBICO CS-64, HOBBICO CS-126, SAVOX B06KG, SAVOX SAVSC0253MG. And **2 mini servos** with 4kg-cm or more torque for elevators. Suggestions: SAVOX SAVSV1250MG, SPEKTRUM SPMSA5040.

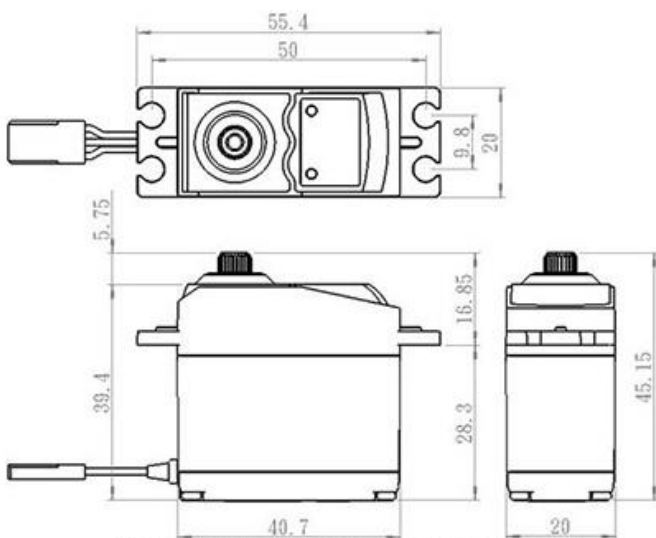
If using pneumatic retracts it is necessary 1 more standard servo with 4Kg-cm or more torque to actuate at the air valve.

If you wish to make the front wheel steering command by an independent servo from rudder it is necessary 1 more standard servo with 4Kg-cm or more torque.

**In case of electric motorization:** all servos should be nylon geared (not included). You will need **5 standard servos** with 4,1 Kg-cm or more torque for flight command surfaces: 2 for ailerons, 2 for flaps and 1 for rudder. Suggestions: FUTABA S-3004, HOBBICO CS-64, HOBBICO CS-126, SAVOX B06KG, SAVOX SAVSC0253MG. And **2 mini servos** with 4kg-cm or more torque for elevators. Suggestions: SAVOX SAVSV1250MG, SPEKTRUM SPMSA5040.

If using pneumatic retracts it is necessary 1 more standard servo with 4Kg-cm or more torque to actuate at the air valve.

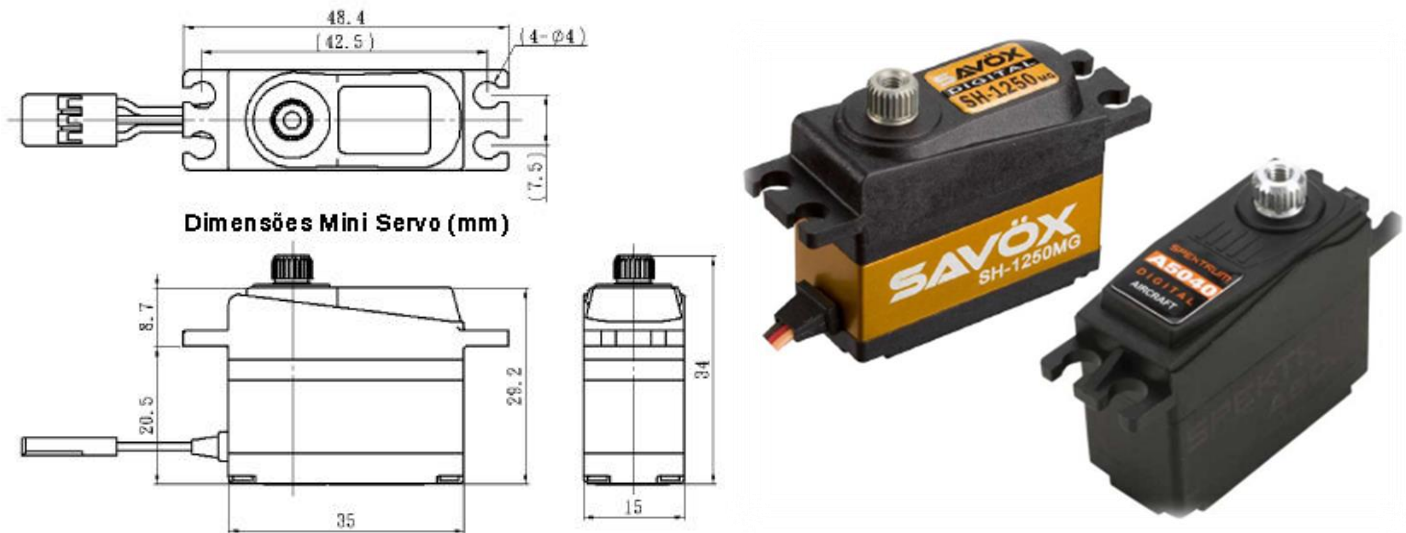
If you wish to make the front wheel steering command by an independent servo from rudder it is necessary 1 more standard servo with 4Kg-cm or more torque.



Dimensões servo standard (mm)



Above: standard size servo dimensions (left) e examples of indicated servos (right).



Above: mini servo sizes dimensions (left) e examples of indicated mini servos (right).



### IMPORTANT WARNINGS

**WE DO NOT RECOMMEND INTERNAL LINKAGE INSTALLATION BECAUSE IT DAMAGES IMPORTANT STRUCTURAL PARTS THAT MAY RESULT IN ACCIDENTS AND TOTAL OR PARTIAL LOSS OF THE MODEL AIRPLANE, OFFERING RISKS TO PEOPLE AND PROPERTIES AROUND THE FLYING AREA. THE WING TRAILING EDGES AT THE AILERONS AND FLAPS AND THE STABILIZER TRAILING EDGE ON ELEVATORS MAY NOT BE DRILLED, CUT OR PERFORATED UNDER NO CIRCUMSTANCES.**



Above: gray areas (trailing edges) on stabilizer shall not be drilled or cut.



Above: gray areas (trailing edges) on ailerons (right) and flaps (left) shall not be drilled or cut.

The model airplane has structural reinforcements of high rigidity for installation of the ailerons, flaps, elevators and rudder controls control horns. These points measure 30mm x 30mm (1,18 x 1,18 inches), are positioned in strategic locations and must be identified according to the instructions below. If you want to modify or adapt equipment that requires modifications to the original design, never do this on your own. Please contact Juniaer through our service channels to check on the possibility of installation.

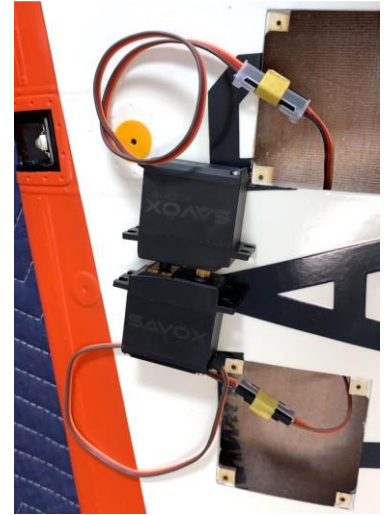
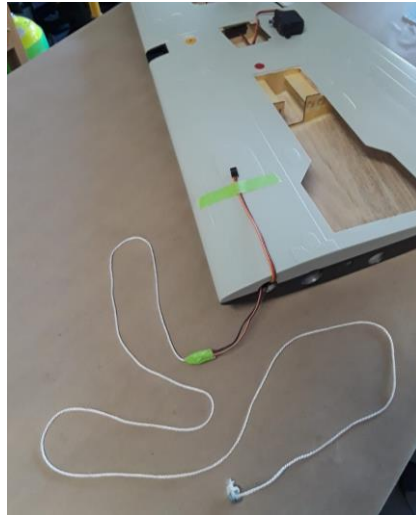
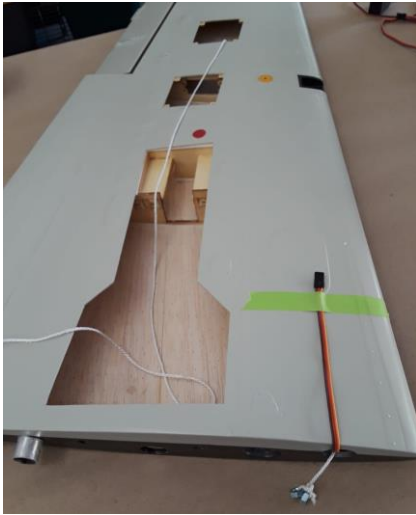
All horns must be heavy duty and suitable for 1/7 to 1/8 scale model aircraft or for 20cc scale model aircraft. All servo arms must be heavy duty and suitable for 1/7 to 1/8 scale model aircraft or for 20cc scale model aircraft. All linkage must be steel, with thread and diameter 2-56 or greater. All servo links and connectors must be heavy duty and suitable for 1/7 to 1/8 scale model aircraft or for 20cc scale model aircraft.

We offer (sold separately) the sets of custom fiberglass horns for the T-27 Tucano 20cc Juniaer, in standard version (single horns). To install it is necessary to make a slot with a sharp knife or drill with a 1mm drill so that the horns are inserted inside the rigid points of reinforcement up to their bases. After obtaining the correct fit, apply 30 to 40 minutes epoxy glue for permanent fixation. The connection point of the horns with the links must be centered with the hinge line of the control surfaces.

**Ailerons:** 2 simple horns with a height between 15mm to 20 mm are required. The servo arms (length between 20mm to 25mm (1") from the center to the end) must be positioned to the side of the wing root. Note that the two sides of the wing have the same position. The horn reinforcement is centered with the line formed by the slot where the servo arm is exposed. Distance between the center of the control arm and the hole of the horn (in neutral position): 84mm. The servos must be screwed directly to the ribs inside the wing, which are previously drilled. Before definitively screwing the servos, apply a drop of medium CA glue or epoxy glue to each hole. It is necessary to open a slot in the servo compartment cover to pass the servo arms as shown in the photos. To fix the servo compartment cover, apply a drop of medium CA glue or 5-minute epoxy glue in each hole for better fixation and resistance to vibration. Recommended deflection: Between 10mm (low rate) to 15mm (high rate) – up and down. To measure the deflection, place a ruler at the end of the control surface and move it.

**Flaps:** 2 simple horns with height between 15mm to 20mm are required. The servo arms (length between 20mm to 25mm (1") from the center to the end) must be positioned to the side of the wing root on one side and to the wing tip on the other side, as well as shipped from the factory. The horn reinforcement is centered with the line formed by the frieze where the servo arm is exposed. Distance between the center of the control arm and the hole of the horn (in neutral position): 79mm . The servos must be screwed directly into the ribs inside the wing, which are previously drilled. Before definitively screwing the servos, apply a drop of medium or epoxy CA glue to each hole. It is necessary to open a frieze in the lids of the servo boxes to pass the servo arms as shown in the photos. To fix the servo box lids, apply a drop of medium CA glue or 5 minutes epoxy glue in each hole for better fixation and resistance to vibration. Recommended deflection: Between 0º to 10º for takeoff and between 25º to 30º for landing. To measure deflection, place a protractor on the leading edge of the flap and move it.

To pass the servo extensions inside the wing, position it with the tip upwards and insert a thread with a weight tied at the end through the aileron servo box, passing through the hole in the wing spar to the leading edge until exit through the front hole of the wing root. Connect the extensions to the servos (aileron and flap) and lock the connectors so that they do not come loose in any situation. Tie the end of the aileron servo extension to the end of the thread in the aileron servo box and carefully pull the connector to the wing root. Attach the outer tip of the extension to the root of the wing with adhesive tape. Repeat the same process for the flap servo extension. Repeat the same process for the other half of the wing.



Above: thread and extensions passing process on wing (left) and connected and locked servos (right).

Before definitively screwing the servos, apply a drop of medium CA glue or 5 minutes epoxy glue to each hole in the ribs where they will be fixed. To screw the flap and aileron servos onto the internal ribs of the wing, use a short screwdriver to keep the screw angle at 90° in relation to the ribs, as there is little internal space. It is necessary to open a slot on the servo compartment covers to pass the servo arms as shown in the photos. To fix the servo compartment covers, apply a drop of medium CA glue or 5 minutes epoxy glue in each hole for better fixation and resistance to vibration.



Above: Short screwdriver and correct position to screw the wing's servos.



Above: right wing half with servo compartment covers and horns reinforcements places (30mm x 30mm) on aileron and flap marked in white.



Above: right wing half with open aileron and flap servos compartment covers showing servo fixation points at the ribs.



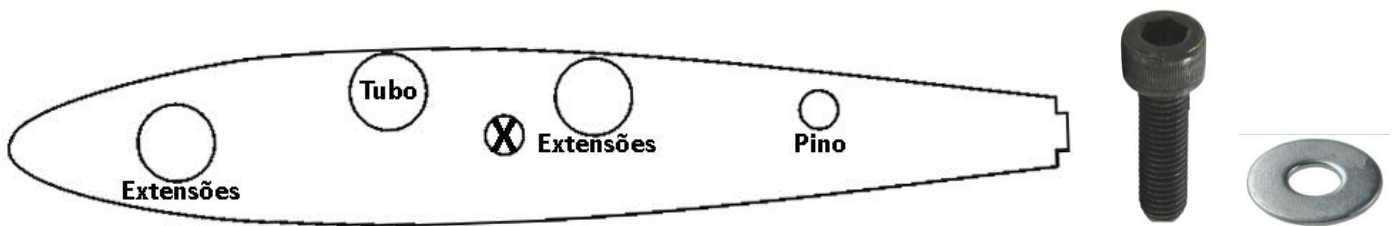
Above: aileron and flap servos installed on the ribs for attachment (left) and position of the horns, servo arms and aileron and flap controls (right).



Above: Location of servo access covers, servo arms, horns, and aileron and flap linkage.

To assembly the two wing halves to the fuselage, an aluminum tube with an external diameter of 3/4" (19.05mm) x 1mm thick x 648mm long is used. The wing/fuselage assembly is factory preset and uses 2 1/4" x 3/4" allen screws and 2 washers (supplied with the kit), 1 screw with washer on each side. Insert the tube into the fuselage until it is centered. The wing halves have 3 holes at the root, the front one to allow the passage of the ailerons, flaps and lights servo extensions into the fuselage, the central one where the tube must be inserted and the rear one, to allow the passage of the retractable extensions and servos. At the rear is a rigid wooden dowel to align the wing halves at their correct angle of incidence (0 degrees). The drawing below shows the position of the 3 holes and pin. Insert the wing halves.

Check that the wing roots are perfectly aligned with the shape of the wing on the fuselage. Insert screws with washers through the retracts compartment at the bottom of the wing halves into the holes identified below by the letters X and tighten them until they are tight. We recommend the use of a medium grade thread locker (removable).



**IMPORTANT: THE WING FIXING SCREWS MUST BE INSERTED FROM THE OUTSIDE OF THE FUSELAGE IN AND NEVER FROM THE INSIDE OUT.**

**Elevators:** 2 simple horns with height between 15mm to 20mm required. The servo arm (length between 20mm to 25mm from center to end) should be positioned with the control arm centered on the bottom of the stabilizer. The horn hard points are centered with the straight line formed by the rib where the servo arm is exposed. Mini servos installed on laser cut plywood structural ribs with servo box covers.



Above: Location of servo access covers and position of elevator horns.

Before definitively screwing the mini servos, apply a drop of medium CA glue or epoxy to each hole in the ribs where they will be fixed. To screw the mini elevator servos to the inner ribs of the stabilizer, use a short wrench to keep the screw angle at 90° in relation to the ribs, as there is little internal space. It is necessary to open a slot on the covers of the servos boxes to pass the mini servos arms as shown in the photos. To fix the servo box covers apply a drop of medium CA glue or epoxy 5 minutes in each hole for better fixation and vibration resistance and then screw.



Above: Servo position on stabilizer rib (left) and position of servo arm, horn and elevator command.

The hole in the lower center of the stabilizer is necessary to pass the 2 mini servo extensions that will be connected to the receiver, connect the extensions to the servos with locks so that they do not come loose.



Above: Servo position on the stabilizer rib (left) and elevator servo extensions passing through the lower center of the stabilizer (right).

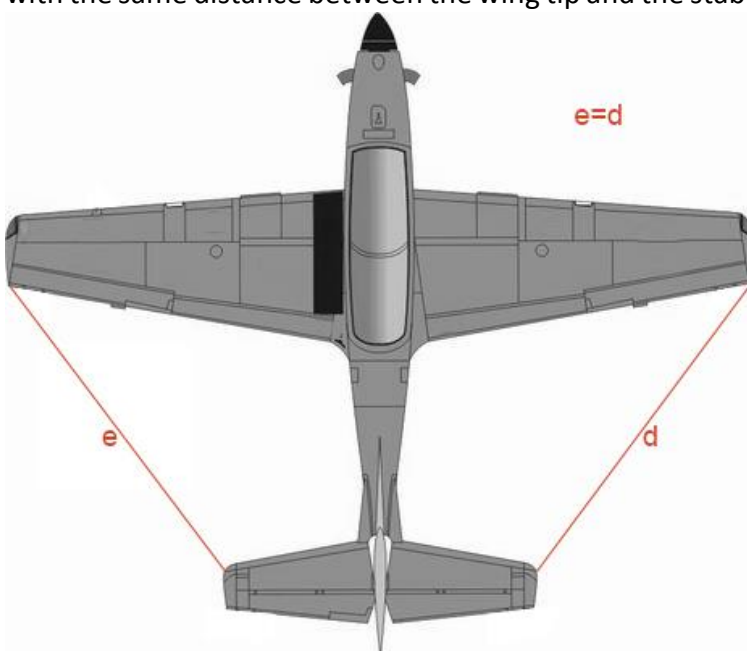
To assembly the stabilizer to the fuselage it is necessary to permanently glue it with 30 to 40 minutes epoxy glue. This procedure must be done very carefully as it is a very important structural part of the model aircraft. Start by testing the fit of the stabilizer to the fuselage and sand where you think it is necessary so that the stabilizer is inserted from the back to the front of the fuselage, filling in the side spaces and touching the stabilizer fins that are already glued to the fuselage at factory.

Once satisfied, remove the stabilizer and sand the top and bottom center with coarse sandpaper (60 or 80 grit) to increase the adhesion of the epoxy glue on the surface. Drill a hole in the fuselage, at the bottom where the stabilizer will be glued, allowing the passage of the elevator mini servos extensions into the model aircraft. Also sand the part where the stabilizer will enter the fuselage, at the top and bottom. Before gluing, apply adhesive tape (masking tape) on the parts close to the gluing area, both on the fuselage and on the stabilizer, to later remove the excess that will come out when sliding the stabilizer on the fuselage with glue.



Above: Gluing areas of the stabilizer and fuselage sanded for better adhesion (left) and stabilizer fully inserted into the fuselage (right).

Apply 30 to 40 minutes epoxy glue on the upper and lower parts of the stabilizer, on the glued area on the fuselage and on the slots where the fins already glued to the fuselage will be inserted, spreading evenly. Insert the extensions with the locks through the hole made at the bottom of the glue area on the fuselage and slide the stabilizer, forcing the model aircraft's vertical stabilizer upwards so that the glue remains in all areas. Once fully inserted, remove any excess glue with a cloth dampened with alcohol. Note the alignment between the stabilizer and the wing and correct them so that they are horizontally parallel when viewed from the rear and with the same distance between the wing tip and the stabilizer on both sides as shown in the illustrations below:



**Rudder:** 1 double horn required (with command for both sides) with a total length between 60mm to 70mm. The servo arm must be double (with command to both sides) with a total length between 30mm to 36mm. The horn reinforcements are centered with the fuselage pushrod outlets, through which the steel cables pass to drive the rudder to both sides. Servo installed inside the fuselage on a plywood servo table supplied with the model aircraft, acting with “pull-pull” steel cables.

To assembly the rudder, 3 hinges points (supplied in the kit) are required. Fill the 3 holes in the rudder with 30 to 40 minutes epoxy glue with a toothpick, filling all contact areas and insert the 3 hinges until the hinge center is aligned with the rudder deflection line. Check that the hinges are all correctly aligned including the deflection angle. Remove any excess glue with a cloth dampened with alcohol. Check that there is no glue in the center of the hinges (moving part). Fill the trailing edge of the vertical stabilizer with 30 to 40 minutes epoxy glue with a toothpick in all contact areas and insert the previously glued hinges on the rudder. Note the alignment between the rudder and the vertical stabilizer so that they are as close as possible, parallel at the edges and with full deflection capability.



Above: Sequence of gluing the rudder hinges with epoxy glue.



Above: stabilizer and rudder in final position (left) and rudder and elevator control horns (right).

**Recommended Control Surface Deflections: (Measure with ruler at end of surface)**

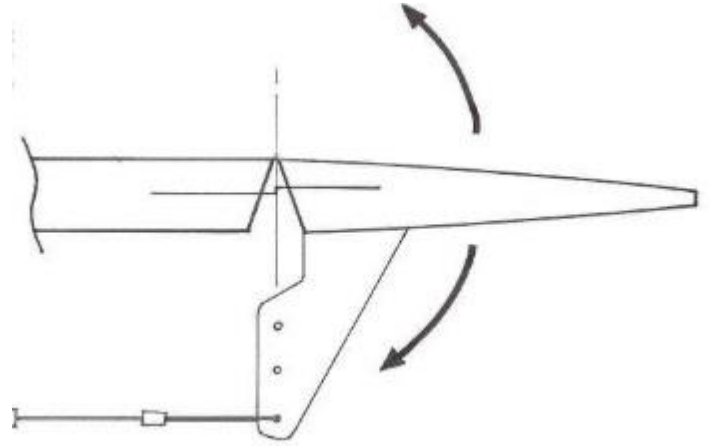
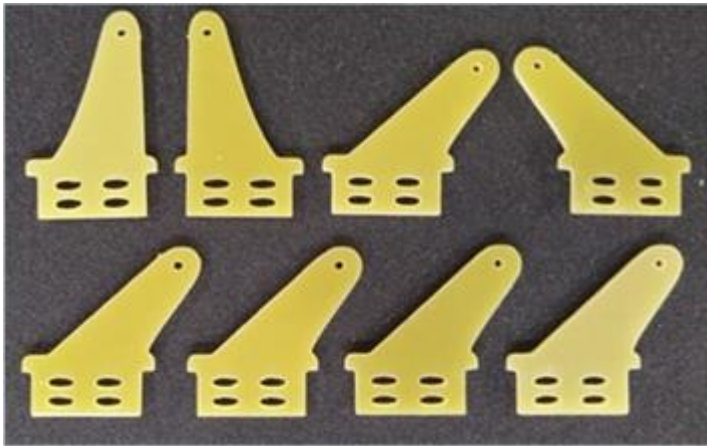
**Ailerons:** Between 10mm (low rate) to 15mm (high rate) - up and down

**Elevators:** Between 10mm (low rate) to 15mm (high rate) - up and down

**Rudder:** Between 30mm (low rate) to 45mm (high rate) - left and right

**Flaps:** Between 0° to 10° for take-off (we recommend 0°) and between 25° to 30° for landing

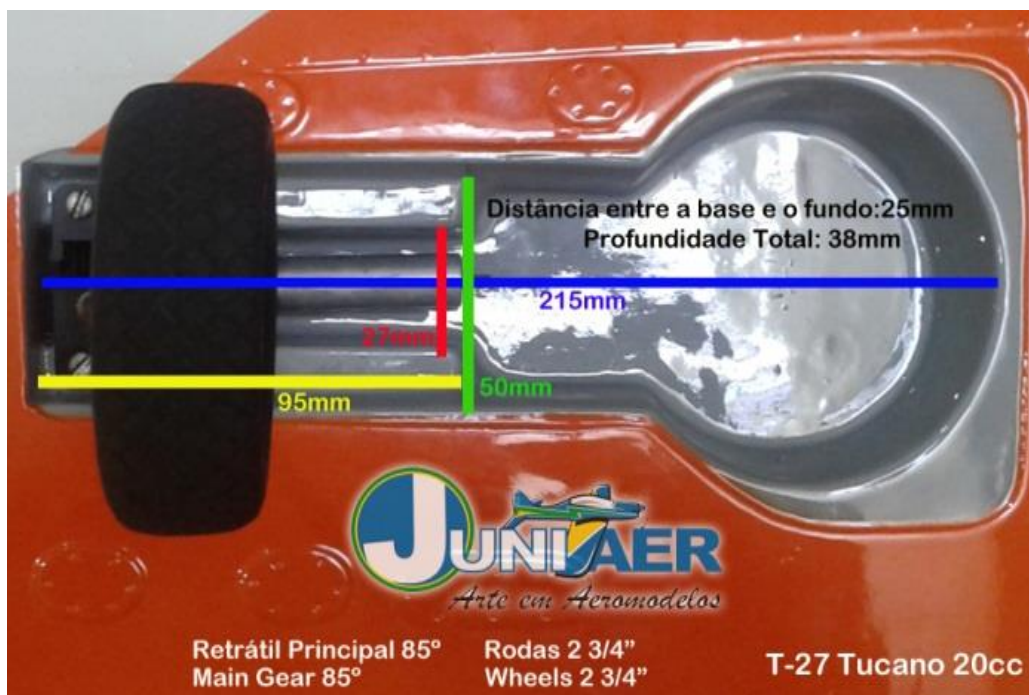
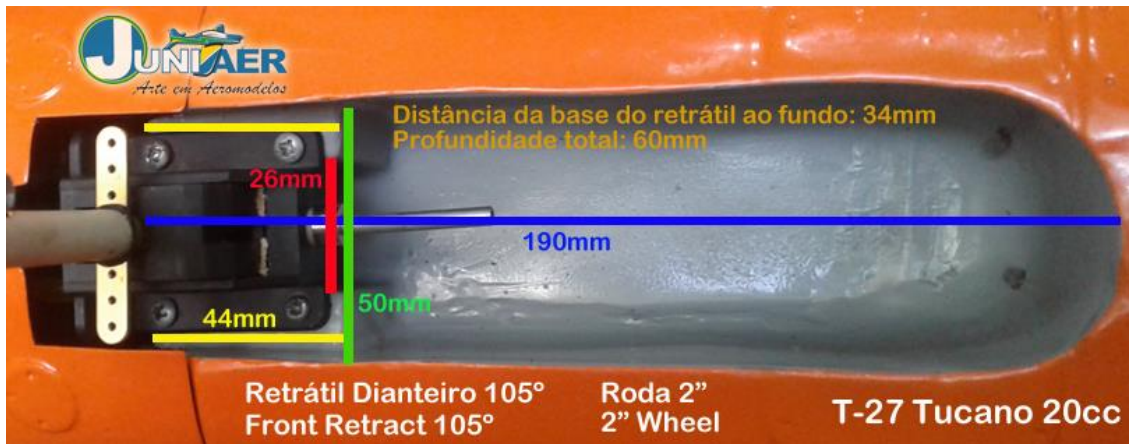
**Standard fiberglass horn set**



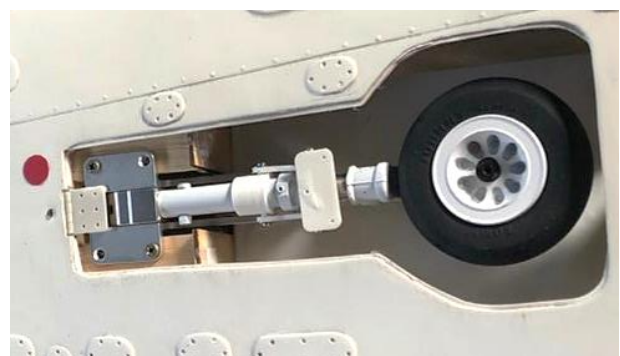
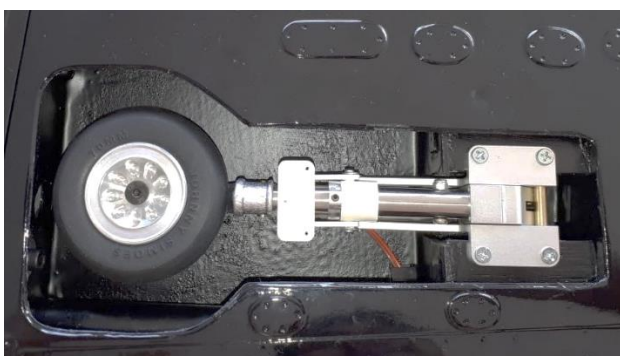
Above: Fiberglass horn set (left) and alignment of the horn holes with the command surface hinge line (right).



Above: Dual rudder horns (left) and rudder servo position inside fuselage (right).

**Retracts installation (105 degree on front and 85 degree on mains)**

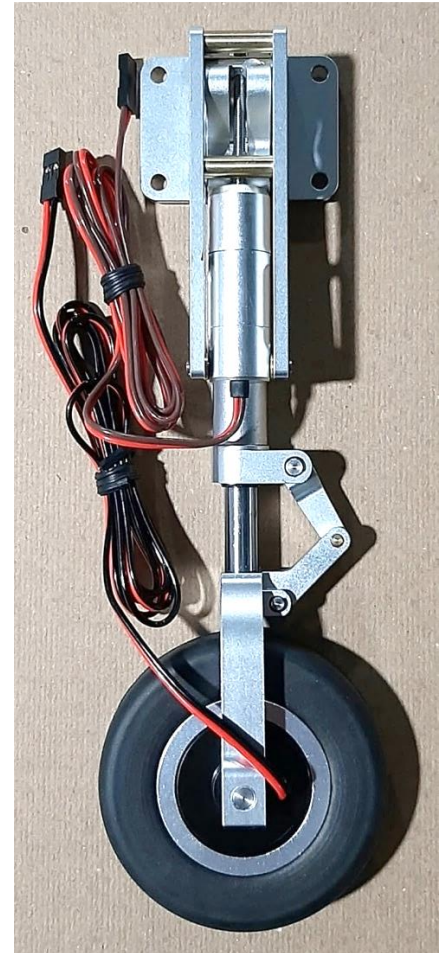
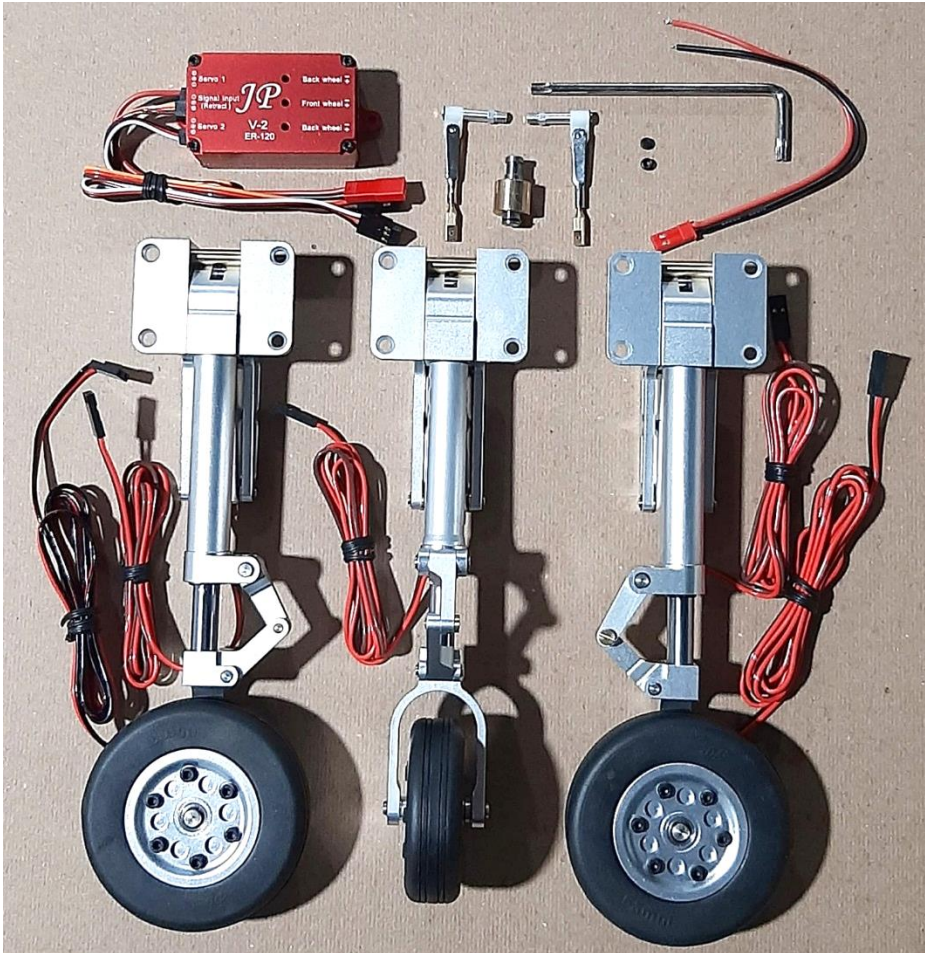
The T-27 Tucano 20cc Juniaer is prepared for easy installation of retracts, which can be pneumatic (actuated by compressed air) or electric (actuated by electric motors). The photos above show the measurements of the retracts bases and compartments. The wing retracts fixing bases are made in 10mm plywood and the front ones in epoxy resin with 10mm plywood and are solid enough to withstand the efforts required by the normal performance of the model aircraft. When defining the drilling locations for fixing the retracts to the bases, check that the wheels are centered in the compartments when retracted and that the tire alignment is parallel on the 2 sides of the wing and on the front.



Above: Position of the main retracts on the wing



JP retract set with electromagnetic brakes



CNC machined. Aluminum cubes and bearings 65mm wheels on mains and 50mm wheel on front. Smooth acting oleo shock absorbers. Supplied with 90-degree machines, no painting. Perfect fit for your T-27 Tucano 20cc Juniaer mounting dimensions. Electromagnetic brakes on the 2 main wheels. Includes 2 front wheel control arms and metal pull-pull controls, 1 replacement bushing for the front landing gear and 1 allen wrench.

**Front retract weight: 185g**

**Main retract weight 246g (each)**

**Controller weight: 48g**

**Set total weight: 725g**

**JP ER-120 V-2 HV controller with door sequencer and brake actuator**

**Input voltage: 7.4V to 8.4V (2S LiPo)**

**Dimensions: 52 x 32 x 21 mm (length width height)**

**Plugs compatibility: Futaba, Jr, Graupner**

The electronic controller is supplied with electromagnetic brakes controller and landing gear doors sequencer in version 2, with the same opening and closing routine necessary for the T-27 Tucano (see page 36 and 39). It has 2 servo access doors via standard 3-way servo plugs (+ / - / signal) and 3 retracts access ports (main and front) via 2-way JST plugs (+ and -).

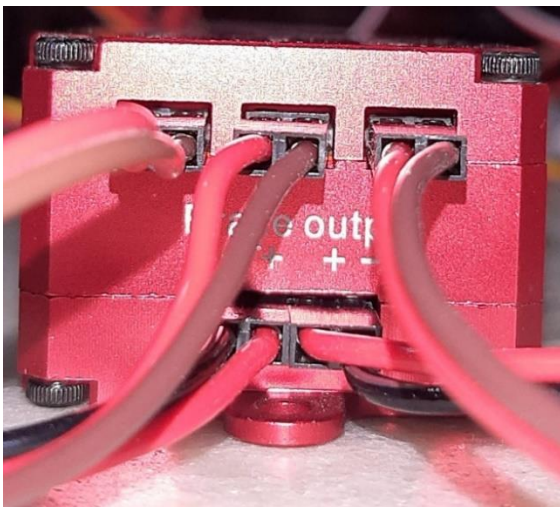
The controller requires a battery to power the retracts system. The manufacturer recommends using a good quality LiPo 2S 7.4V battery. The approximate consumption of the retractable system is 75mAh per retract/extend cycle. Thus, a 1500mAh battery is capable of retracting and extending the retractable fully 20 times, approximately, under normal operating conditions.

**VERY IMPORTANT: Landing gear door servos should be high voltage (7,4V). Check the proper voltage for both the controller and the servos used.**

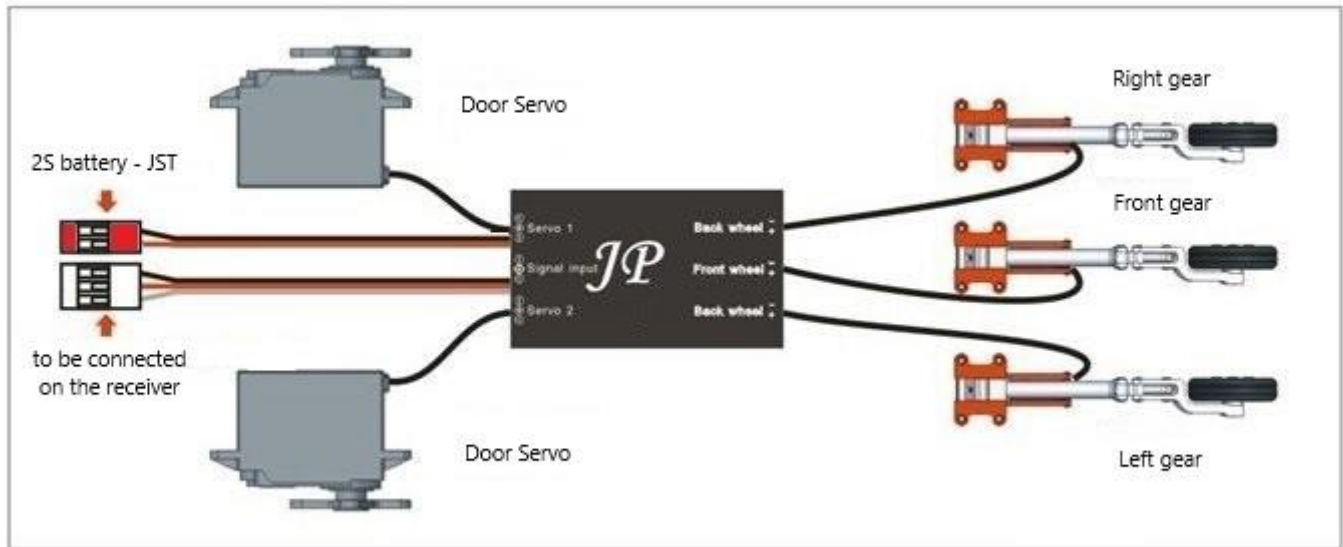
It is necessary to connect the electronic controller to a designated receiver channel to control the landing gear position (extended or retracted) via standard 3-way servo plug (+ / - / signal). The channel assigned to the retracts command must be set to 100% travel (EPA or ATV) in both positions.



Above: JP ER-120 V2 controller with brakes showing retracts connections on upper side and brakes outputs on lower side (left photo). Power wire (red and black) retracts radio signal wire (yellow, red and brown), brakes radio signal wire (red, black and white) and gear doors servos connections (right photo).



Above: JP ER-120 V2 controller with brakes showing retracts connections on upper side and brakes outputs on lower side. Note the correct polarity of wires as written at controller case.



Above: JR ER-120 V2 controller installation diagram.

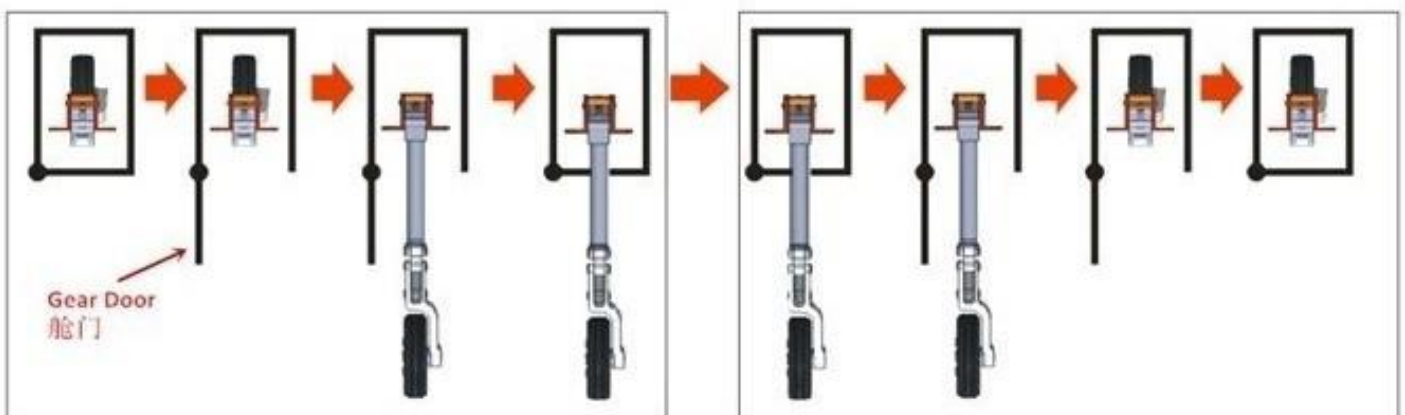


### IMPORTANT WARNINGS

**BE SURE TO PLUG THE BATTERY TO THE CONTROLLER IN CORRECT POLARITY (+ RED WIRE AND – BLACK WIRE). IF POLARITY IS INVERTED THE CONTROLLER WILL BURN AND BE UNUSABLE, AND THE PRODUCT WARRANTY WILL BE LOST. USE A RELIABLE JST PLUG IN YOUR BATTERY WITH ADEQUATE FITTING WITH NO POSSIBILITY OF BEING PLUGGED INVERTED. DO NOT PLUG THE RETRACTS DIRECTLY IN THE RECEIVER WITHOUT CONNECTION TO THE CONTROLLER, OR THE ELECTRIC MOTORS MAY BURN OUT, VOIDING THE PRODUCT WARRANTY.**

Retract set operation sequence with the V-2 controller option:

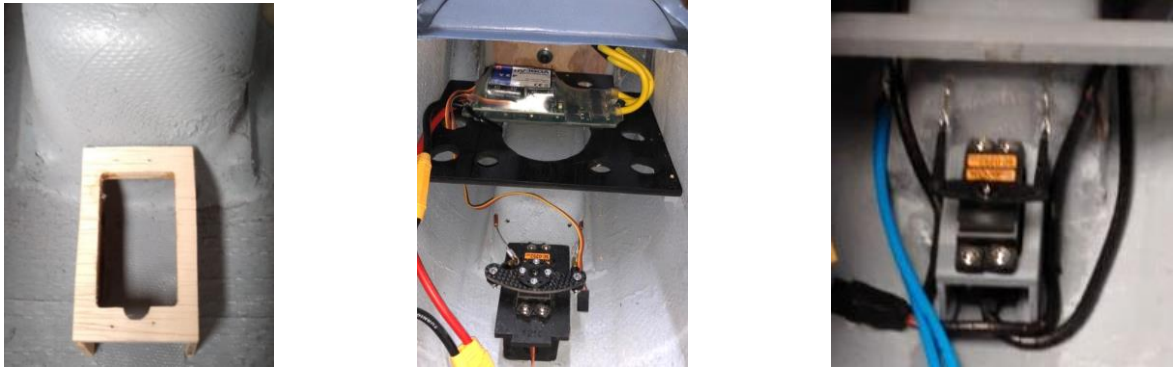
- 1) Turn on radio and receiver setting EPA or ATV to 100% in both switch positions.
- 2) Plug the 7,4V 2S Li-Po battery to the controller by the JST plug.
- 3) Set the retracts switch to close retracts. The controller will open the gear doors then close the landing gears and then close the gear doors.
- 4) Move the retracts switch to open position. The controller will open the gear doors, then open the landing gears and then close the gear doors.



Above: retract set operation sequence diagram with the V-2 controller option.

There are other retracts options with suitable specifications, but their parts are purchased separately, adaptations are required for installation and require more assembly time, requiring specialized service.

The front wheel steering for taxi (left / right) can be done through an independent servo or with the same rudder servo. With 1 independent servo, the intensity and trembling of the front wheel control can be adjusted separately and can be turned off by mixing so as not to act when the retracts are retracted. On the other hand, 1 more servo increases the flying weight. The front wheel control servo must be attached to a centralized plywood base just behind the front landing gear compartment on the inside of the fuselage. In both cases, we recommend pull-pull linkage with steel cables and double front wheel control arm. To pass the steel cables from the inside of the fuselage to the front landing gear compartment, drill 2 small holes with a 2mm drill bit, 1 on the left side and one on the right side allowing double control without resistance or friction.



Above: servo tray for fixation(left) and steering servo with pull-pull linkage for independent front wheel steering (center and right).

### Landing gear doors installation

The landing gear doors are supplied in unique pieces that need to be cut and reinforced for installation. The landing gear doors are exposed to situations of high vibration and air displacement, so they must be installed in a very safe way to avoid risks of malfunction of the retracts and / or loss of aerodynamic performance due to drag. To cut out the 6 landing gear doors of your T-27 Tucano 20cc Juniaer use a very sharp blade, metal ruler or very sharp scissors. Protect the outside of the parts with adhesive tape to prevent damage to the paint. To reinforce them, use balsa wood or light plywood of 2mm (not supplied) to be glued with 5 minutes epoxy glue.

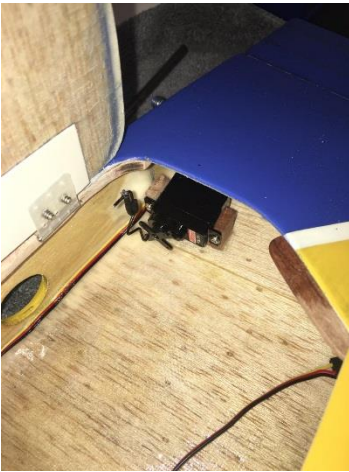
### Main landing gear doors

Cut out the 2 parts of the main landing gear doors (wing) with a blade and ruler, thus obtaining 4 pieces (2 internal doors and 2 external doors). External and internal doors must be glued to the wing with 30 to 40 minutes epoxy, using 2 nylon hinges (we recommend DUBRO DUB 116) on each door or 2 compartment door hinges ROBERT (ROBQ 350). Remember to check the correct alignment of the doors in the closed position to permanently glue.

The mechanism for opening and closing the internal doors of the main landing gear can be made with micro or mini servos (must be with metal gears and with 2 kg/cm or more of torque) or with pneumatic pistons. It is necessary to install a short horn at the front for linkage.



Above: Landing gear door set (left) and main landing gear doors closed with installed hinges (right).



Above: Dubro hinges installed on the inner door and micro servo position.



Above: Micro servo installed with linkage and horn for actuation of the mechanism.



Above: Hinges on door and micro servo installed with linkage.

The external doors are attached to the wing in the same way as the inner doors, with hinges, and to the main landing gear legs with hinged brackets that open and close the doors. To attach them to the external doors, glue them with 30 to 40 minutes epoxy glue, as shown in the pictures below.

A simpler installation option is to attach the outer doors directly to the main landing gear struts. To do this, it is necessary to divide the door into 2 parts, 1 being fixed on the retract base and remaining fixed and the other fixed to the retract strut, with 2 supports to ensure good fixation (photos below).



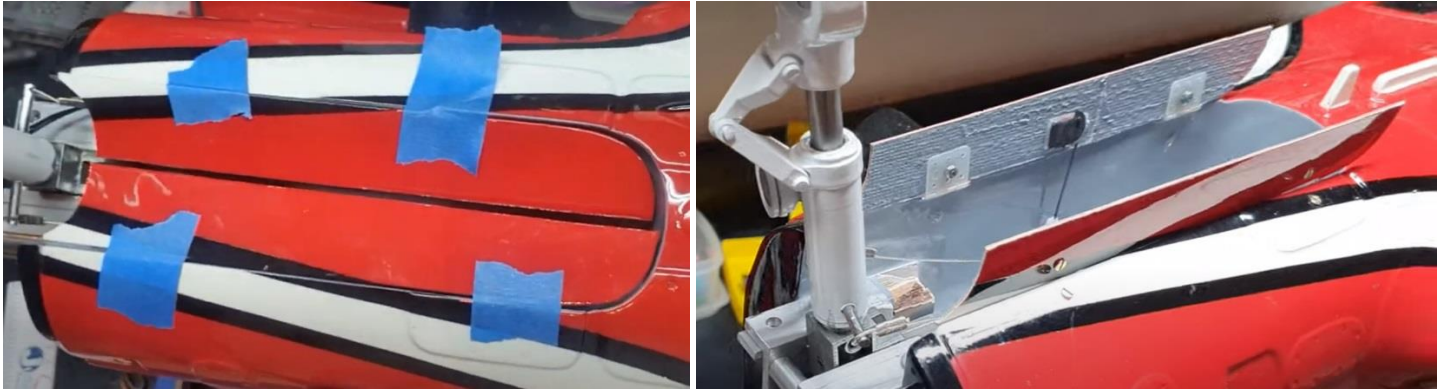
Above: Detail of the attachment of the hinged brackets to the external landing gear door and the closed external landing gear door.



Above: Detail of the fixing of the external door divided into 2 parts with supports on the strut.

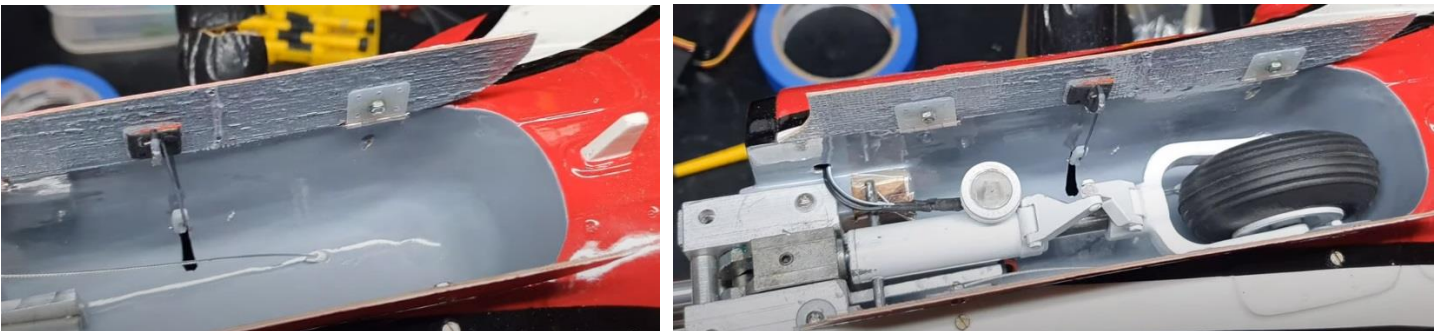
## Front landing gear doors

Cut the 2 front landing gear doors from the single piece provided as shown in the photos below, with a sharp knife or scissors. Test the placement of the doors with masking tape. The front doors must be glued to the fuselage with epoxy glue for 30 to 40 minutes, using 2 nylon hinges (We recommend DUBRO DUB 116) on each door or 2 compartment door hinges. We recommend ROBART (ROBQ 350). Remember to check the correct alignment of the doors in the closed position to permanently glue. It is recommended to fix with screws to reinforce.



Above: Positioning of the front doors on the fuselage (left) and complete installation of the 2 front doors with control horns for opening and closing (right).

The opening and closing mechanism of the front landing gear doors can be done with 2 micro or mini servos (must be with metal gears and with 2Kg/cm or more of torque) or with pneumatic pistons. It is necessary to install a short horn on the front or center of the doors for the linkage.



Above: The 2 front doors of the front landing gear in open position with the front retract extended (left) and with the front retractable retracted (right).

To sequence the opening and closing of the landing gear doors, it is necessary to have a landing gear door sequencer or, if available, to mix through the radio channels. The scheduling sequence should be like the routine below:

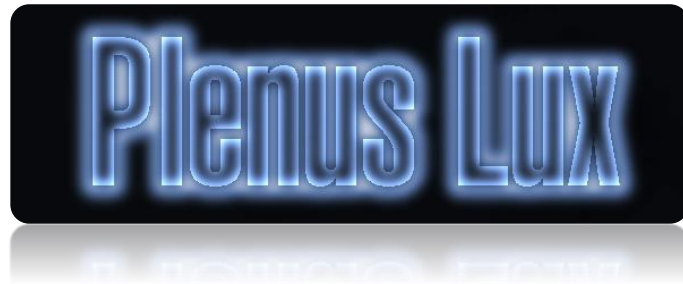
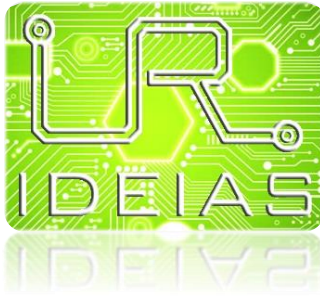
1. Landing gear and doors fully closed.
2. Opening of the 2 landing gear doors of the front landing gear and the 2 internal landing gear doors of the main landing gear.
3. Extension of the 3 landing gears (and mechanically the 2 external doors of the main landing gear).
4. Closing the 2 internal doors of the main landing gear and the 2 doors of the front landing gear.
5. Opening the 2 internal doors of the main landing gear and the 2 doors of the front landing gear.
6. Retraction of the 3 landing gears (and mechanically the 2 external doors of the main landing gear).
7. Closing the 2 doors of the front landing gear and the 2 internal doors of the main landing gear.

## C.G. (Center of Gravity)

The C.G. range of the model airplane is between 95 mm and 105 mm from the leading edge of the wing and the C.G. point is 100 mm (3 15/16") from the leading edge, measured at the root of the wing. To check the balance, hold the model in the inverted position by the wing root part at the indicated point, without fuel. Retracts must be retracted. The model airplane must have a nose weight tendency. Never support the model aircraft supported only by the wing tips, always by the roots (closest to the fuselage). Never take off your model airplane without checking that at the C.G. point the balance has a nose weight tendency because a tendency for tail weight will cause the model not to fly properly, which may cause damage and / or accidents including total loss of equipment and risks to people and property.



Notes: model airplanes with artistic painting that require greater paint overlapping and more adhesives have a greater total weight. In the case of electric motorization, it is not necessary to add weight to obtain the correct balance of the C.G., and the position of the Li-Po batteries must be defined at the end of the assembly. In the case of gas burning engines, balancing is more delicate, making it necessary to position batteries and ignition module close to the fire wall from the inside of the fuselage. All fuselage servos and equipment in general should be positioned as far forward as possible, except for the receiver(s) which must be at least 50cm away from the ignition module to avoid noise or resonance that may cause interference, malfunction or loss of signal. We do not recommend using large equipment trays inside the model airplane, especially at the rear of the cockpit area. It may be necessary to add extra weight to the nose of the model airplane to achieve the correct C.G. balance depending on the total weight and positioning of the equipment in front of or behind the C.G. If necessary, add weight with lead bars until you reach the correct balance of your model as described above. Note that in the case of vertical acrobatic performance it is very important to define a very sharp nose weight tendency to allow for the recovery of flat screws, lomcevaks, stall turns and other vertical maneuvers safely.



We offer (sold separately) the custom scale lighting kit for the T-27 Tucano 20cc Juniaer, in version Plenus Lux (standard).

#### PLENUS LUX - Specifications:

Voltage: 12v Recommendations: Li-Po 3S 11.1V 850 mAh to 1350mAh.

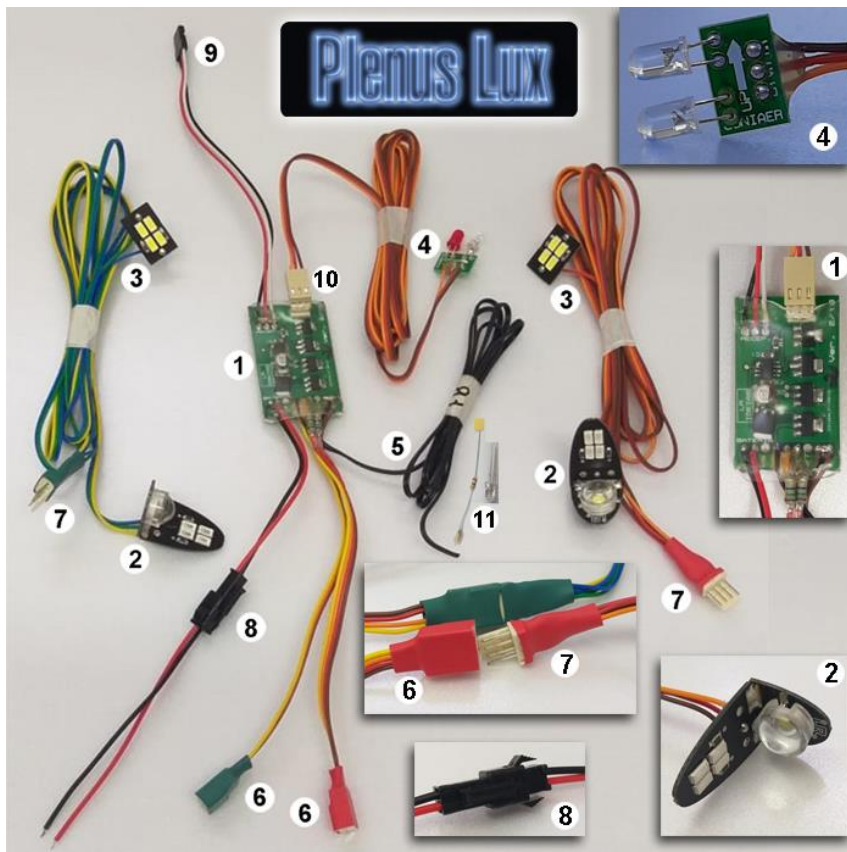
Receiver independent power supply, exclusive battery for the system.

Current consumption: 400ma - peaks of 730ma Minimum recommendation: li-po 3S 650ma 5c

Activation: Activated by PWM-Pulse Width Modulation, connected to a receiver channel. Compatible with all radio brands. Anti-interference filter.

Strobo Leds: Type SMD-Surface Mount Device (Surface Mount Components), 11,000K white light, 3w light emitting power, with 120 ° lens. 1 led is used on each side of the wing.

Leds wing landing lights: Type SMD white light 11,000K, light output power 2W each. 2 leds are used on each side of the wing. Left side navigation LEDs: SMD type red light, light output power 2W each. 2 leds are used on each wing tip. Right side navigation LEDs: SMD type green light, power output 2W each. 2 are used on each wing tip. Left and right identification printed on the board. Led front landing light: Led Top 5mm, white light 11.000K power 1 / 2w. Rudder navigation LEDs: 2 5mm hat-type LEDs, white and red light, 11,000K, power 1 / 2W. Identification with up arrow printed on the board. It is recommended to disconnect the battery from the circuit when not using the model aircraft for more than 5 days.



**Main board (1)** 50x36mm lighting system. 150mm wires and universal plugs for battery (8) and receiver (9), 1000mm led wire to front landing light (5) (led and resistor sent without soldering) (11) and rudder extension plug (10).

**Left side extension (wing tip 1250mm and landing lights 550mm).** 3-pin plug to main board (7).

**Right side extension (wing tip 1250mm and landing lights 550mm).** 3-pin plug to main board (7).

**Wing Tip Boards (2):** 35x22x20mm-correct format for installation. Landing lights boards (3): 18x11mm

**Rudder extension 1700mm.** 3-pin plug to main board (10). Rudder main board (4): 18x19mm.

It is necessary to connect the circuit to a receiver channel controlled by a 3-position switch on the radio. When the system is connected to the battery, the circuit performs a self-test by turning on all the lights for 1 second, indicating its perfect functioning. The radio control switch in the maximum position turns on the circuit, turning on all the lights (fixed and flashing), in the middle position, it turns off only the landing lights and keeps the navigation lights on and in the minimum position turns off the circuit, turning off all the lights.

Note that the boards are labeled on the right (green light) and on the left (red light). To pass the lighting kit wires inside the wing, position it with the tip up and insert a thread with a weight tied to the tip through the hole in the wing tip until it comes out through the front hole in the wing root. Tie the connector of the wing light extension to the end of the thread at the end of the wing and carefully pull the connector to the root of the wing, leaving the light board of the wing tip on the outside. With a 90° bent wire, pull the wires from the landing light board through the opening in the leading edge of the wing and pull the plate to the outside. Repeat the same process for the other half of the wing.



Above: weight on thread tip to pass the wires and wire to pull the wing landing light plates (left).

To fix the main board on the model airplane, the boards on the wing tips, landing lights and rudder board, use 3M high-adhesion double-sided tape (red). Before gluing the tapes, apply 3M 8250 adhesion promoting primer to the contact surfaces for a good result. The landing light led and resistor are shipped without soldering as an option (see details in the enclosed leaflet). With Johnny Simões scale retracts the led is included and installed, requiring only welding the wires.



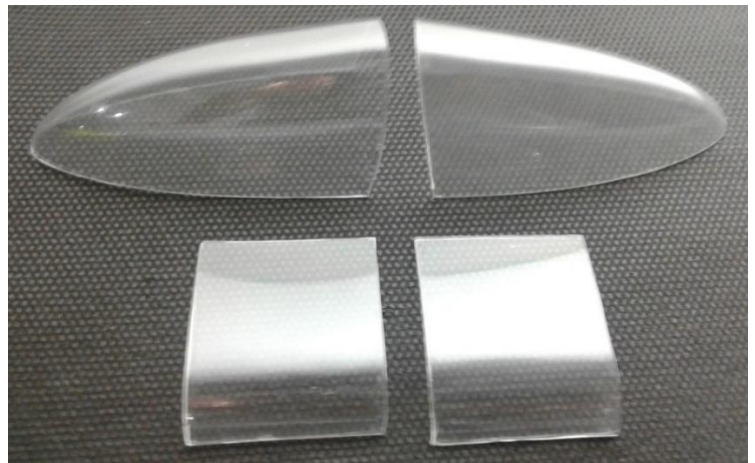
Above: Correct locations for fixing wingtip light boards (left) and landing lights (right).

The clear parts for navigation lights and wing landing lights are supplied in a thermoformed set. Cut out the parts of the set with very sharp scissors and then remove the back and sides following the embossed reference line. With a 280 to 320 fine grit sandpaper, finish the cut parts, sand the inner ends of the clear parts without excess and in the places of the wing where the parts will be glued for better adhesion. Note that there are 2 right parts and 2 left parts. To glue after installing the light kit, use white canopy glue and attach the clear parts with good adhesion masking tape, allowing to cure for 12 hours. After curing, remove the tapes and clean any

tape or glue residue. We recommend ZAP Formula 560 (PT-56). Never use CC glue to glue these parts, as the evaporated gases stain and damage the clear plastic material.



Above: Parts cut from set.

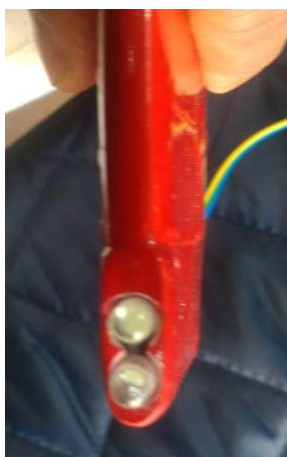


Above: desired parts shape.



Above: clear plastic parts glued at correct places

To pass the rudder wires inside the fuselage, position it with the rudder facing upwards and do the same process used on the wing through the lower rear part of the rudder until it comes out. Tie the rudder board to the thread and carefully pull it until the 2 leds are on the outside.



Above: rudder lights board installed at the bottom rear

## Fuselage on-board equipment

The T-27 Tucano 20cc Juniaer has enough internal space to accommodate on-board equipment such as receiver, retractable controller, light controller, landing gear door sequencer, among others. We do not recommend the installation of very large or heavy trays at the rear of the fuselage when gas burning engine is used for correct C.G. balance. Below are some examples of assemblies and installations of this equipment. Always remember to fix all components very well and lock all splices and servo connections and equipment extensions as they will be subjected to high levels of vibration due to the operation of the gas burning engine. Test the functioning of all components of your model aircraft before flying.



Above: equipment installation examples in the fuselage interior.



Above: equipment installation examples in the fuselage interior.



Above: equipment installation examples in the fuselage interior on electric version and Li-Po batteries.

### Fuselage side door

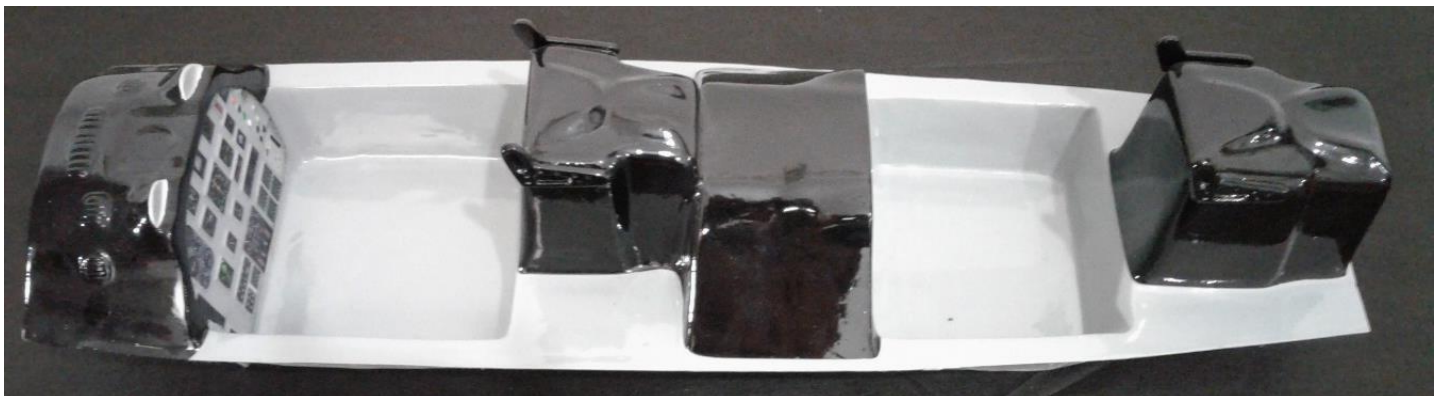
Your T-27 Tucano 20cc Juniaer has a side door where the luggage compartment is on the aircraft. The door must be installed with a hinge and lock (supplied with the kit). Inside there is enough space to easily install on / off switches, air supply, pressure gauges, tachometer, access to charge batteries, voltage monitors, etc.



Above: internal compartment of fuselage side door installed accessories examples.

### Cockpit and canopy installation

The stock cockpit fits perfectly in the fuselage and is removable. It is not necessary to glue or attach to the fuselage. The canopy frame will keep you in the correct position.



Above: stock cockpit.

To glue the instruments panels adhesives, use the drawings below as reference:



Above: front instruments panel (left) and rear instruments panel (right) T-27 Tucano.

### Juniaer's pilot busts

We offer (sold separately) custom made pilot busts for your T-27 Tucano 20cc Juniaer, made of fiberglass with epoxy resin, low weight, painted and varnished according to the painting scheme for greater realism. Base width: 7cm; base length: 3.7cm; height: 6,5cm and weight: 17g. To glue the pilot bust to the cockpit, use 5 minutes epoxy glue, applying it to the inner bottom of the base and fixing it to the desired location with good adhesion masking tape until the glue is fully cured.



Above: pilot busts in different painting schemes.



Above: pilot busts in detailed cockpit with canopy opened.



We offer (sold separately) custom cockpits for your T-27 Tucano 20cc Juniaer, extremely detailed and realistic, ready for installation to replace the stock cockpit. Available in shallow cockpit, for pilot's busts.



T-27 Tucano 20cc Cockpit raso  
Shallow cockpit

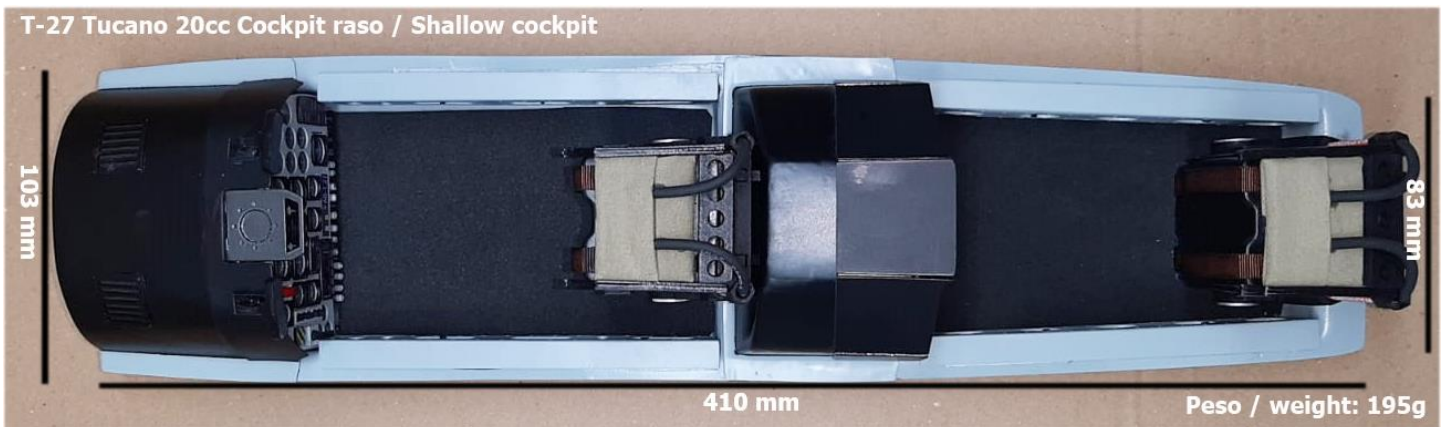
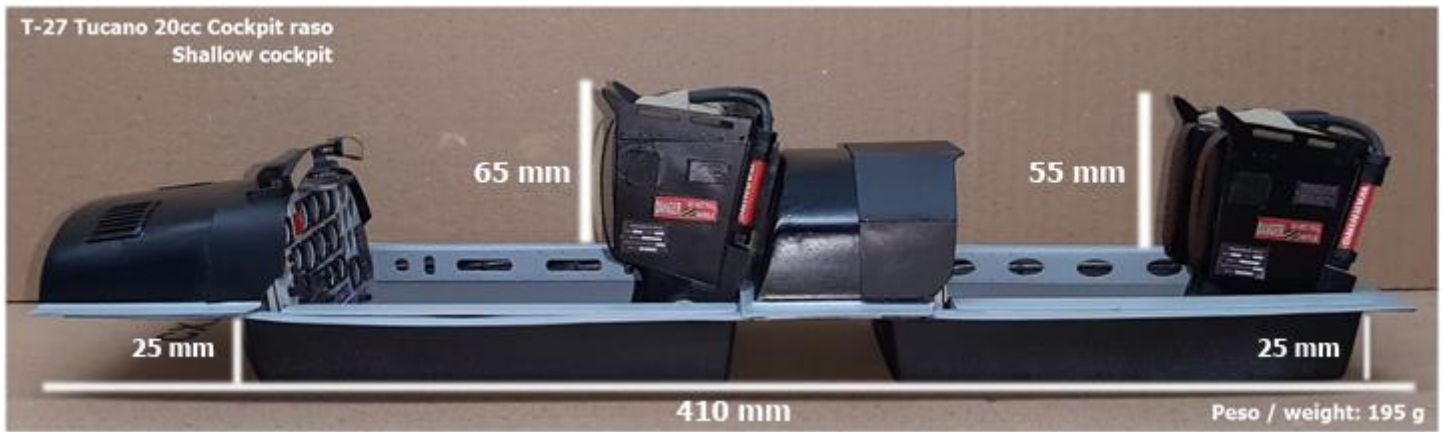


Divisor de cockpit  
Cockpit divider

Cockpit weight: 188 g

Cockpit divider weight: 7 g

Total weight: 195 g



The clear canopy is supplied in a thermoformed part. Cut out the canopy in the correct shape with very sharp scissors, remove the back and front following the embossed reference line. Finish with a fine sandpaper 280 to 320. Sand the inner edges of the canopy without excess sand and at the contact points of the canopy frame where the canopy will be glued for better adhesion. To glue, use white canopy glue and attach the canopy set / canopy frame to the fuselage with good adhesion masking tape, allowing to cure for 12 hours. After curing, remove the tapes and clean any tape or glue residue. We recommend ZAP Formula 560 (PT-56). Never use CA glue to glue these parts, as the evaporated gases stain and damage the clear plastic material. Use automotive wax to clean, remove small scratches and increase transparency of the canopy.



Above: correct desired shape of the clear canopy after cutting.



Above: position of the canopy frame on the fuselage and fixing in place with adhesive tape all around.



Above: Sand the contact area of the frame to increase glue adhesion (left) and apply white glue to the entire contact area (right).



Above: canopy and frame position in the fuselage fixed in place with adhesive tape all around it and also vertically, in order to obtain the correct position between the 3 pieces.

If there are any areas where the adhesion was not satisfactory, apply more glue and repeat the procedure.

To make the canopy / frame set with side opening there are 2 hinge options: internal or external. The opening is made from left to right, so the hinges must be attached to the right side of the fuselage. With internal hinges, 2 door/compartments hinges are used. We recommend ROBART (ROBQ 350). The attachment locations of the hinges on the canopy frame must be on the same line to allow opening and closing without friction or deformation (see photos below). Make a simulation of opening and closing before fixing the hinges permanently. If necessary (depending on the hinges used) make slots on the fuselage edge to allow full movement of the hinges during the opening and closing of the canopy. It is very important that the hinges are securely attached to both parts. Apply 30 to 40 minutes epoxy glue and screw the hinges to the frame locking with self-locking nuts (parlock).



Above: canopy/frame assembly with external Dubro hinges DUB 116.

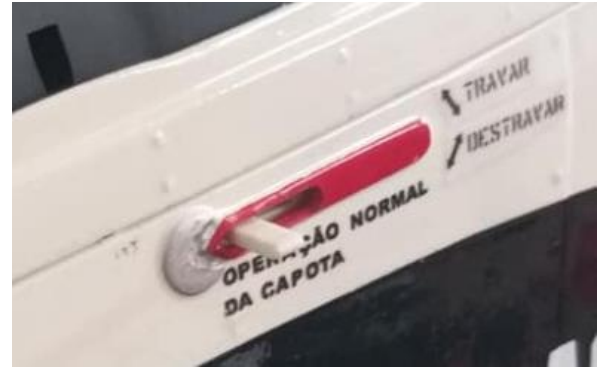


Above: canopy/frame assembly with internal hinges.

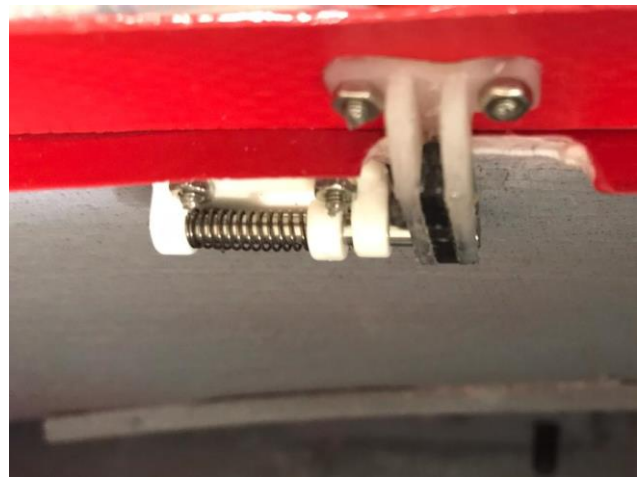


Above: Fixing of the internal hinges for the side opening of the canopy.

To lock the canopy / frame assembly in the closed position on the fuselage, use a piece of horn or servo arm with a hole to be fixed on the canopy frame and a spring-loaded lock as shown in the photos below. You can take advantage of the location of the replica of the canopy opening lever (see photos below). Make a slot to allow the lever to pass outside the fuselage and fix the lock on the inside with 30 to 40 minutes epoxy glue, considering the position of the horn or servo arm so that the closing is very tight and secure.



Above: lock position of the canopy / frame assembly on the fuselage.



Above: locking the canopy assembly / canopy frame inside the fuselage..

### Pitot tubes replicas

The two pitot tubes replicas must be glued with 5 minutes epoxy glue to the bottom of the wing at the locations outlined with the shape of the base, 1 on the right and 1 on the left, with the tip of the tube facing forward.



**T-27 Tucano 20cc transport and protection covers**

We provide (sold separately) protective and transport covers made of durable padded material. Wing covers with zippers and handles, with wing tube housing. Stabilizer covers with zipper and fuselage cover with velcro. Custom-made for your T-27 Tucano 20cc Juniaer.


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