SAWN CRAFT

"SINCE 1958"

Mini Mana-Tee Assembly and Setup Manual

Specifications	
Wingspan	**18"**
Overall Length	**12.69"**
Wing Area	**217.5 in^2**
Flying Weight	**3.125oz / 89g**
Intended Use	**In/Outdoor/Combat**

Recommended Power System (Click here to purchase)			
Motor	10g to 15g, 2000kv Brushless Outrunner		
ESC	6A Brushless	**Servos**	2x 3.6g servos
Prop	5"x3" Electric		
Receiver	At least 4-channel		
Battery	300mAh to 450mAh 2S 25C+ LiPo		

Revised 2014-10-27

SAWN CRAFT

"SINCE 1958"

Thank you from Sawn Craft.

Thank you for purchasing the Sawn Craft Mini Mana-Tee aircraft. This model has been the result of numerous design revisions that now deliver a fantastic-flying plane that is more shark than manatee in the air! The lightweight and rigid XPS and carbon construction makes it possible for you to experience a wide performance envelope. This means that no matter how you like to fly, you'll enjoy both stability and maneuverability without any sacrifice in precision or control feel.

Your Sawn Craft Mini Mana-Tee aircraft represents the benchmark of small-sized electric combat performance and aerobatic versatility. All you have to do next is read and apply the information presented in this instruction manual.

I sincerely hope that you enjoy building and flying your model as much as we do! If you have any troubles with these instructions or in the setup of your model feel free to contact us and we will provide you with the service you expect from a hobbyist-owned and operated business.

Jonathan Sawn

Owner, Sawn Craft

Jonathan@Sawn-Craft.com

Table of Contents

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"SINCE 1958"

1 Introduction

The contents of this manual assume the operator will have the following prerequisites:

- Understanding of all appropriate safety procedures and requirements
- The ability to follow written procedures and possess basic hobby building skills

1.1 Style Conventions

Below are the important style conventions that will be used throughout the guide.

Note: Key points or hints for success will be formatted in this manner.

Warning: Any area that poses either a physical hazard or the danger will be formatted in this manner.

Arrows inform where to perform the specified operation.

Circled items inform of items of interest for the specified operation. Circled items will typically be accompanied by text further identifying the region of interest.

1.2 Required Tools & Supplies

The list below contains all of the required tools and supplies that are required for the assembly and tuning of this model.

- Clean, flat work surface
- #11 hobby knife
- Straight-edge ruler
- Soldering iron & solder
- Heat gun
- Wire cutters
- Beacon Foam-Tac
- 3M Blenderm Hinging Tape
- 200-grit Sandpaper on sanding block
- Clear packing tape

Sawn Craft recommends the use of Beacon Foam-Tac adhesive and 3M Blenderm Hinge Tape for the construction of this model due to its strength, light weight, and easy use. Both Blenderm and Foam-Tac can be purchased by visiting the Building Supplies tab on Sawn-Craft.com

1.3 Required Components/Parts for Completion

The list below contains all of the required and recommended parts for the successful operation of this model.

- **Sawn Craft Mini Completion Kit**
  - **Turnigy C1822 2100kv motor**
  - **6A Brushless ESC**
  - **2x 3.6g Servos**
  - **6-Channel DSM2 Receiver**
  - **5”x3” Electric Prop**
  - **2mm Bullet Connectors**
  - **JST Female Pigtail**
  - **Shrink tube, etc.**
- **300mAh to 450mAh 2S 25C LiPo Battery**

Please note that other power systems and components may be compatible and may work without issue, but the listed components have been tested successfully by Sawn Craft.

Optional Parts for Completion

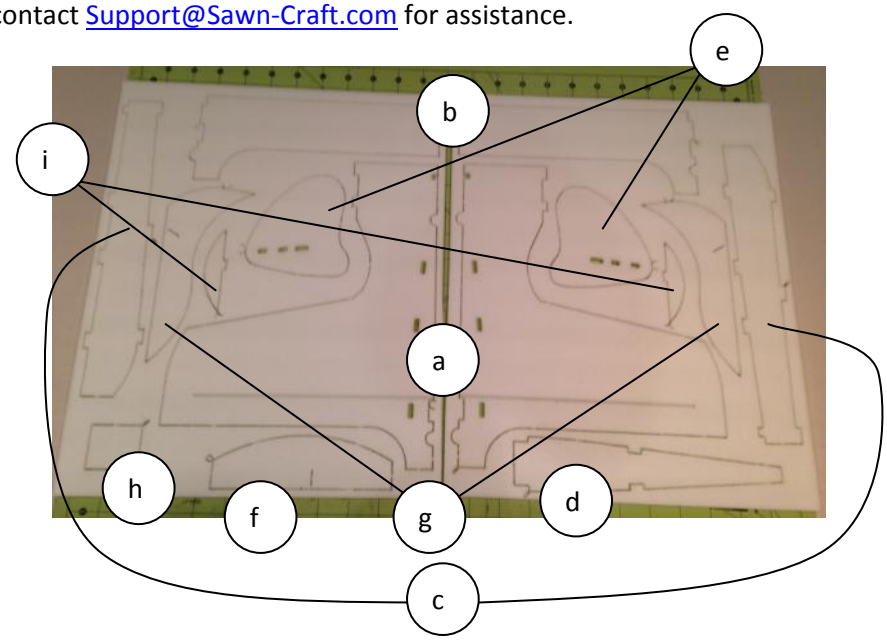
To make your build easier and ensure the nicest looking finished product, the following products are offered on Sawn Craft.com. See the Building Supplies tab for these products.

- **Colored Packing Tape**

1.4 Included Parts Description

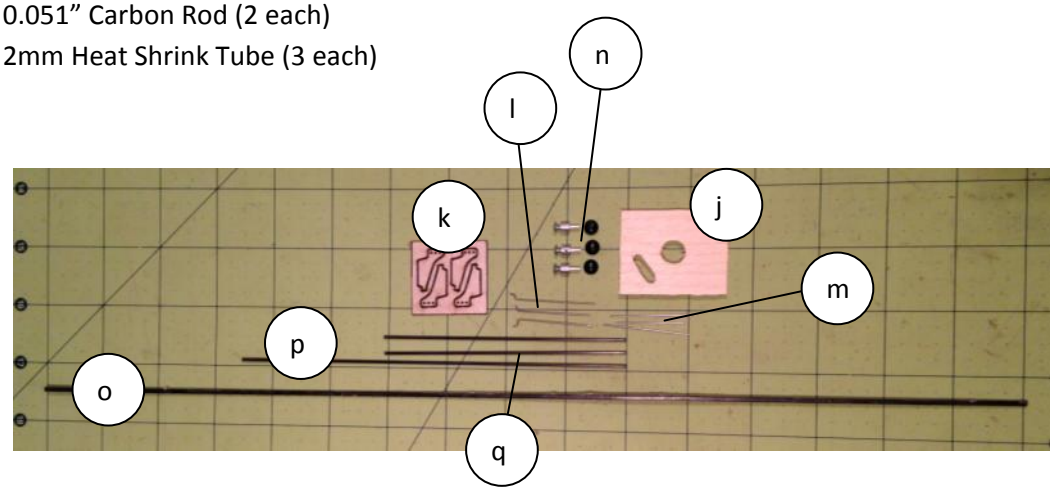
Please inspect your kit and ensure that all listed parts are present and undamaged. If you find missing parts or signs of damage please contact Support@Sawn-Craft.com for assistance.

a) Main Wing Half (2 each)
b) KF Step Half (2 each)
c) Fuselage Half (2 each)
d) Fuselage Bottom
e) Vertical Stabilizer (2 each)
f) Elevator
g) Aileron (2 each)
h) Battery Tray
i) Winglet (2 each)



Component Bag:

j) Mini Mana-Tee 1/8” Plywood Firewall
k) Micro Control Horn (4 each)
l) Micro Z-Bend (3 each)
m) Micro Straight Control Wire (3 Each)
n) Micro EZ-Connector (3 each)
o) 16” 0.083” Carbon Rod
p) 6.5” 0.051” Carbon Rod
q) 4” 0.051” Carbon Rod (2 each)
r) 2” 2mm Heat Shrink Tube (3 each)



2 Assembly Instructions

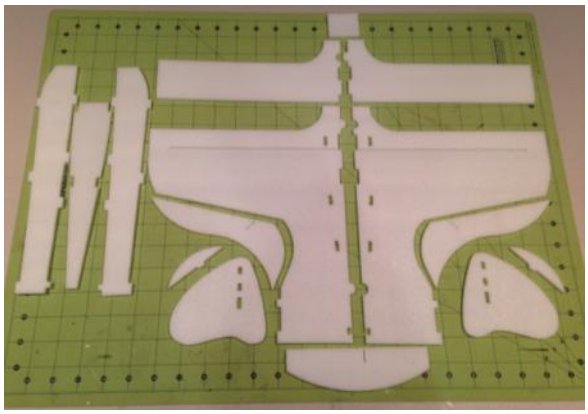
The order of assembly presented in this instruction has been tested and it is recommended that you do not differ from them to provide the most accurate and easiest assembly possible.

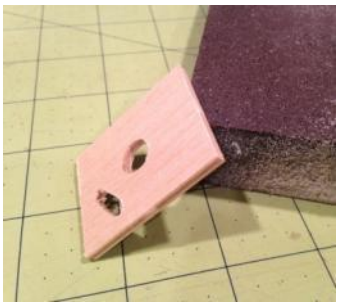
2.1 Parts Preparation

- **Parts Required:**
  - All Foam Parts
  - Plywood Firewall
- **Tools Required:**
  - Hobby Knife

Warning: This process involves using extremely sharp cutting blades. Care must be taken to avoid injury.

1) Using your hobby knife, carefully cut all of the small holding tabs that are keeping the parts together inside the sheets. The tabs are less than full-foam thickness and will not require much force to cut.
2) Take the 200-grit sandpaper and smooth the holding tabs and the edges of the Plywood Firewall.

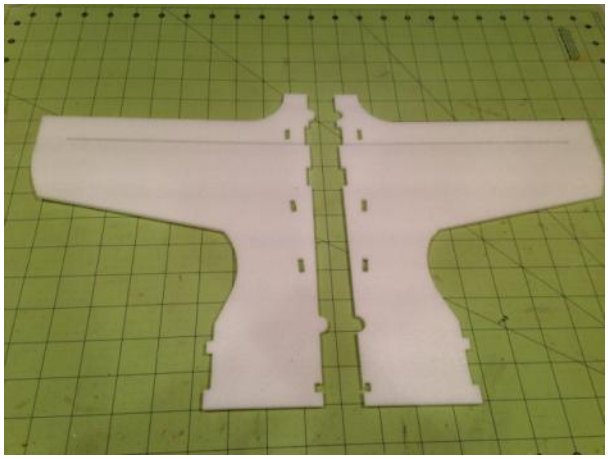


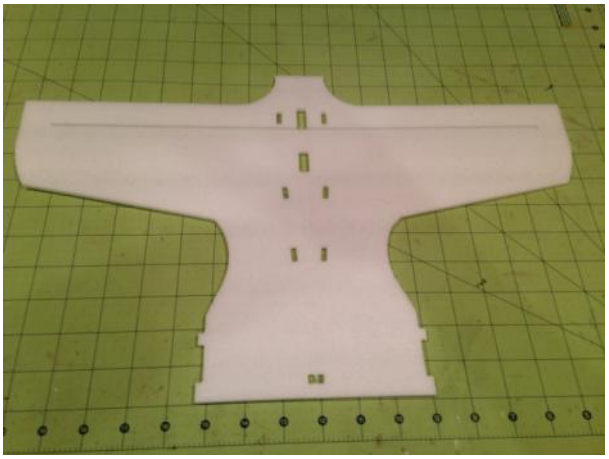


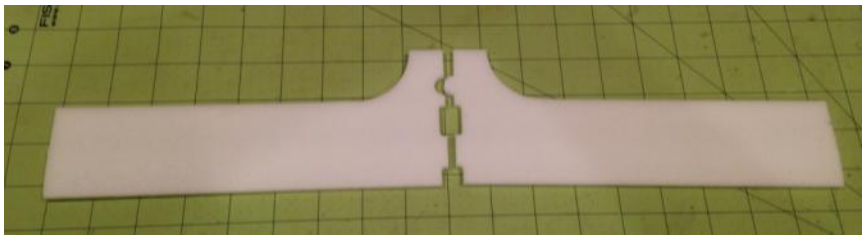
2.2 Main Wing Half & KF Step Half Joining

- **Parts Required:**
  - 2x Main Wing Half
  - 2x KF Step Half
- **Tools Required:**
  - Beacon Foam-Tac

1) Lay both Main Wing Halves on a flat surface with the machined carbon spar channel facing up. Apply glue to the entire mating surface of one of the halves then join the two, making sure that the alignment arcs are located properly and the halves fit nicely together. Allow assembly to cure while on the flat surface to ensure a straight wing.
2) Lay both KF Step Halves on a flat surface. You will see the only way to assemble the two halves is by aligning the alignment arcs properly. Apply glue to the entire mating surface of one of the halves then join the two, making sure that the halves fit nicely together. Allow assembly to cure while on the flat surface to ensure a straight wing.





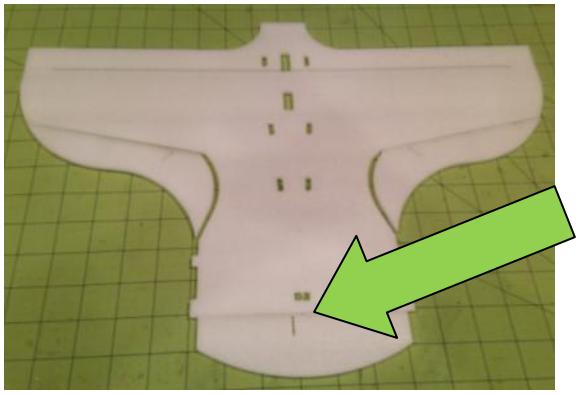


2.3 Control Surface Installation

- **Parts Required:**
  - Main Wing Assembly
  - Elevator
  - 2x Ailerons
- **Tools Required:**
  - Hobby Knife
  - Straight-edge Ruler

Warning: This process involves using extremely sharp cutting blades. Care must be taken to avoid injury.

1) Lay the elevator on the table with the leading edge facing you and the control horn slot to the left. Use a hobby knife and ruler to cut a ~45° bevel into the leading edge of the elevator.
2) Lay the aileron on the table with the leading edge facing you. Both ailerons are mirrors of each other so orientation (L or R) doesn't matter as long as you cut the bevel properly for the side. Use a hobby knife and ruler to cut a ~45° bevel into the leading edge of the aileron. Repeat for the other aileron.
3) Place the Main Wing Assembly on the table with top side up. Align the ailerons and elevator to their locations with their bevels facing down. The ailerons are aligned to the edge of the wing and the elevator is aligned by lining up the small tick mark in the leading edge to the center seam of the Main Wing Assembly. Using Blenderm tape, apply 2x 1" strips to either end of the control surfaces.



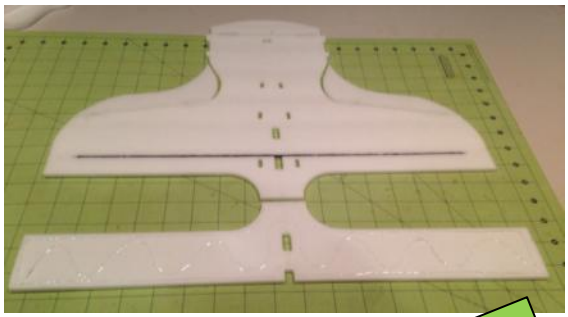
2.4 Carbon Spar & KF Step Installation

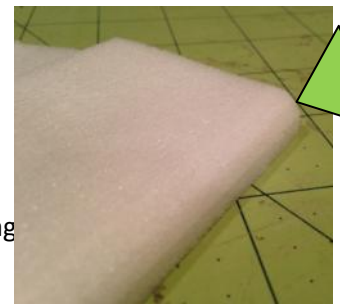
- **Parts Required:**
  - Main Wing Assembly
  - KF Step Assembly
  - 16” Carbon Spar
- **Tools Required:**
  - Beacon Foam-Tac
  - 200-grit Sandpaper

1) Lay the Main Wing Assembly on the table facing up. Apply a bead of glue the entire length of the carbon spar recess in the wing. Place the carbon spar into the recess, ensuring that it seats evenly in the slot and has adequate glue to secure it. Allow the glue to cure for a few minutes before proceeding.
2) Decide which side of the KF Step Assembly will be faced down and apply glue around the entire perimeter of the part as well as a zigzag down the center. Place the KF Step Assembly onto the Main Wing Assembly, ensuring to line up all edges. Allow the glue to cure for a few minutes before proceeding.
3) Use the sandpaper to gently round both sides of the leading edge of the new assembly to your liking.

This is an ideal time to decorate the parts as they are still flat and will be easier to handle. We recommend using colored packing tape as it will add strength and durability as well as vivid color. See Section 3.5 for more detail.



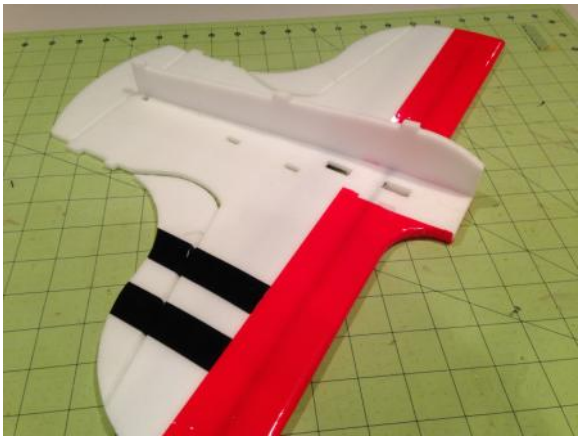





2.5 Fuselage Installation

- **Parts Required:**
  - Main Wing Assembly
  - Fuselage Half (2 each)
- **Tools Required:**
  - Beacon Foam-Tac
  - Clear packing tape

1) Turn the Main Wing Assembly such that the KF Step is facing down. Dry-fit both fuselage halves into their mating slots in the Main Wing Assembly to ensure a good fit.
2) Apply a bead of glue down the entire length of the flat edge of the fuselage half. Press the glued side of the fuselage half onto the main wing assembly, aligning all of the tabs with the slots in the main wing. Repeat this process for the other fuselage half.



3) Add clear packing tape to the front half of the fuse side and bottom as it will give strength and protection from landing abrasion without much added weight.

2.6 Servo Installation

- **Parts Required:**
  - Main Wing Assembly
  - Servo (2 each)
- **Tools Required:**
  - Beacon Foam-Tac

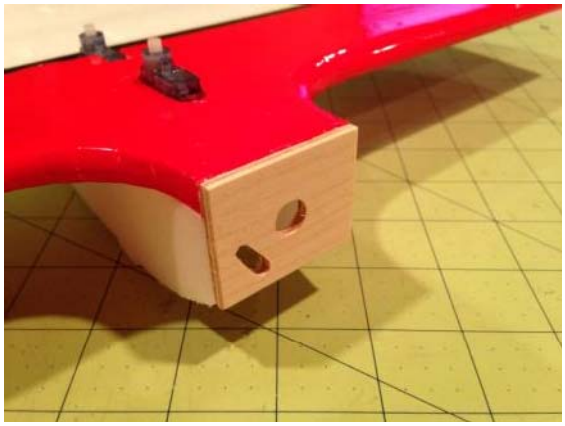
1) Apply a bead of glue on the bottom of the servo mounting tabs. Install the servos into the slots cut in the main wing, with the servo output spline facing toward the back of the plane.

2.7 Battery Tray & Firewall Installation

- **Parts Required:**
  - Main Wing Assembly
  - Mini Mana-Tee 1/8” Plywood Firewall
  - Battery Tray
- **Tools Required:**
  - Beacon Foam-Tac

1) Apply Foam-Tac to the battery tray and install it in front of the aileron servo such that it is centered side-to-side and the notch is aligned with the front of the servo. Ensure that it is flush with the leading edge of the fuselage sides and the main wing. If desired, you can apply packing tape to the battery tray on one side to give a solid base for mounting Velcro for the battery.

2) Apply Foam-Tac to the leading edge of the main wing assembly where the firewall will be attached. Take note of which side you would like your motor wires to enter through the slot, and press the firewall onto the front of the fuselage, ensuring that all of the firewall edges are flush with their mating foam surfaces. Allow glue to cure fully before installing motor.



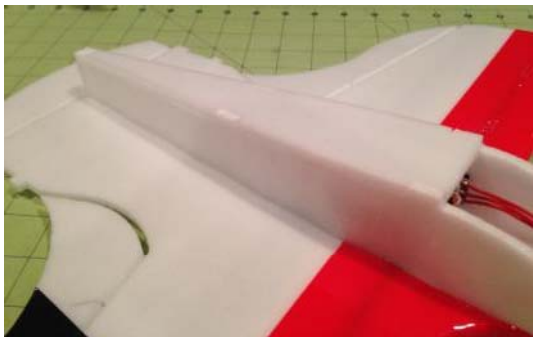
2.8 Electronics Installation/Fuselage Bottom Installation

- **Parts Required:**
  - Main Wing Assembly
  - Fuselage Bottom
  - Motor, Receiver, ESC
  - Bullet Connectors
- **Tools Required:**
  - Soldering Iron
  - Heat Gun
  - Beacon Foam-Tac

1) Solder any necessary connectors to your motor and ESC, if needed, and install the motor to the front of the firewall using standard servo-mounting screws like the ones that you didn't use from your servos on this model. Route the motor wires through the slot in the firewall and connect them to your ESC.
2) Attach your ESC and receiver on either side of the inside of the fuselage. We recommend using Velcro for mounting to ease in adjustment and removal. Plug both servo plugs and the ESC plug into the receiver.

Bind the receiver to your radio and ensure all functions are working now as it is more difficult to access the electronics once the fuselage bottom is installed.

3) Apply glue to the exposed edges of the bottom of the fuselage sides and install the fuselage bottom, aligning all of the tabs into the slots. If you plan to fly streamer combat you may elect to put a small amount of clear packing tape on the rear portion of the fuse. This will allow you to tape the streamer to the airplane and remove the tape when completed with no damage to the airframe.



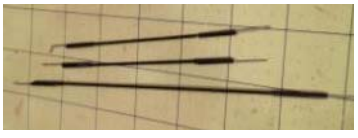
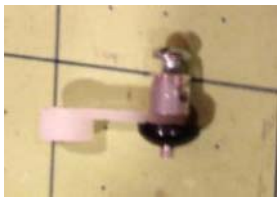
2.9 Control Rod/Horn Installation

- **Parts Required:**
  - Main Wing Assembly
  - Micro Control Horn (3 each)
  - Micro Z-Bend (3 each)
  - Micro Straight Control Wire (3 Each)
  - Micro EZ-Connector (3 each)
  - 6.5” 0.051” Carbon Rod
  - 4” 0.051” Carbon Rod (2 each)
  - 2” 2mm Heat Shrink Tube (3 each)
- **Tools Required:**
  - Beacon Foam-Tac
  - Heat Gun

1) Apply Foam-Tac to the bottom of the control horns and insert them into the slots cut in the elevator and the ailerons, making sure that the holes line up directly above the control surface hinge line.
2) Apply Foam-Tac to the end of a Z-bend wire and glue it to the end of a carbon rod. Once tacky, slide a ~0.5” piece of heat shrink tube over the wire and the end of the carbon rod and shrink it to hold the joint securely with about 0.5” of wire protruding from the carbon rod. Repeat this for the other two rods.
3) The process is the same for securing the straight pieces of control wire on the end of each rod.
4) Install the Micro EZ-Connectors to the outer-most holes on your servo horns.
5) Gently connect the Z-bend side of the longest rod assembly to the control horn on the elevator. Slide the straight end of wire into the EZ-Connector and center the control surface manually then tighten the grub screw to secure the rod to the servo.
6) Repeat step 5 with the shorter rod assemblies and install them on the ailerons.






2.10 Vertical Stabilizer & Winglet Installation

- **Parts Required:**
  - Main Wing Assembly
  - Vertical Stabilizer (2 each)
  - Winglet (2 each)
- **Tools Required:**
  - Beacon Foam-Tac

1) Apply Foam-Tac to rear sides of the main wing assembly where the tabs are located and glue the vertical stabilizers to the main wing assembly, aligning the tabs with the slots.
2) Apply Foam-Tac to the straight edge of the winglet and install them to the outside of the vertical stabilizers, aligning the tab with the slot and ensuring that the leading edge of the winglet is flush with the vertical stab's leading edge.

3 Setup and Tuning

3.1 Center of Gravity

The CG of this plane is located approximately 1" to 1.5” from the leading edge of the main wing. Moving the CG fore and aft will dramatically change the handling of the plane so adjust to your liking. An aft CG will allow for slower, high-alpha flight, but will be more unstable while a more fore CG will provide a faster, more “locked in” flight experience. Use the fore/aft location of the battery to adjust the CG without adding additional weight.

3.2 Control Throws & Expo

By altering the amount of control throw the surfaces have you can fine-tune the handling and performance. Below are the recommended settings as tested that will provide a successful flying experience. Throws are measured at the point farthest from the hinge.

Control Surface	Low Rate Throw	Low Rate Expo	High Rate Throw	High Rate Expo
Elevator	1/2in (70%)	30%	1in (100%)	45%
Aileron	1in (70%)	30%	2in (100%)	45%

The aileron control surfaces have built-in differential so they will move more in the up direction than in the down direction. This helps to eliminate adverse yaw. Measure the throw on the ailerons in the up direction.

3.3 Launching

Launching this aircraft is very simple and is easy to do. Simply hold the airplane by the fuselage in one hand with your radio in the other. Advance the throttle to full and gently toss the aircraft forward, releasing it with wings level and a slightly up attitude.

This is a high-performance model aircraft! Extreme care must be taken to avoid the prop as it is spinning extremely fast and can cause serious bodily injury.

3.4 Flying Tips

This aircraft is designed to be the perfect “toss in the car” model for most fliers! The compact size allows it to fly in smaller parks and indoor flying venues, but the speed that it is capable of makes it a great choice for your local flying field as well. With smaller control throws and more expo, the Mana-Tee is a great choice for newer pilots that are getting their feet wet with aileron controls. Turn the throws up and you get a plane that is extremely aerobatic and will perform axial rolls at an alarming rate! Landing the aircraft is simple; keep some throttle applied and as the plane nears the ground, pull back on the elevator to flare.

We developed this model for club combat events and have found many pilots bringing them out on non-combat nights because they are just so much fun to fly! When we do fly combat we have used narrow-width (~0.5”) x 10’ crepe paper streamers attached with tape to the rear of the fuselage with no significant degradation in performance. In the “rare” case that a Mana-Tee is involved in a mid-air collision, the interlocking construction should provide your electronics and battery protection over other combat plane designs.

Remember: Always follow the AMA safety guidelines! Never fly over people or animals.

3.5 Decorating/Finishing

The beauty of this aircraft is that you have the opportunity to finish it with the look that you desire. We recommend using colored packaging tape (available on the Building Supplies section of our website) for decorating as it is easy to use, lightweight, and provides a nice, glossy finish. Water-based paints have been used with good results as well. Prior to using any paints or markers, test on a scrap piece of foam to ensure that it doesn’t damage the foam.

Remember that any weight you add to the airframe will affect its performance so keep heavy applications of paint and decals to a minimum.

3.6 Repairs & Spare Parts

Due to this models design and light weight, it is surprisingly durable! If a part of the model is damaged it can typically be repaired using small pieces of packaging tape or by gluing using Beacon Foam Tac.

If a part is damaged beyond repair, simply send us an email at Support@Sawn-Craft.com as we have replacement parts available for purchase.