

TROY BUILT MODELS
SUPER DECATHLON ASSEMBLY MANUAL 7/15/09



The TBM 47% Super Decathlon was engineered to be the easiest to assemble and best flying 50% plane possible. Several minor deviations from scale were made to greatly improve its assembly time at the field, and its aerobatic capabilities. We hope that you enjoy the wide speed range capabilities, scale looks, and quick assembly.

The original prototype was used to make this manual. The production plane had a few changes, so there may be some slight differences.

***CG is located 1" behind the forward wing tube.

The TBM Super D has these advanced features:

- Engine range from 150 to 275cc. The ZDZ-210 with 4" drop headers is the best choice.
- Wing is 3 pieces for very easy assembly and transportation.
- Operating door on the right side of the fuselage and operating window on the left side of the fuselage, and a large removable hatch on the top of the center wing section provide easy access to the inside of the fuselage.
- Ailerons and elevators are properly hinged at the factory.
- Rudder hinges are installed, though the one piece hinge pin which holds the rudder to the plane is not installed. The rudder can be made to be removable.
- Pull-pull arrangement for the rudder is installed and is ready for quick installation.
- Motor box is reinforced at the factory and ready for quick engine installation. The firewall is not installed to make accommodation for any powerplant. The aluminum braces are included.
- Wheelpants are very light in weight.
- Aluminum landing gear is stout enough to resist excessive flex or bending off of grass fields.
- Tailwheel is positive and tough.
- Though not scale, flaps are optional. One servo per side is required. These are for pulling gliders and other slw speed uses.

IMPORTANT ASPECTS TO KEEP IN MIND

- The plane is not tail heavy like most aerobatic planes if you use a ZDZ-210 engine. While we encourage you to keep batteries and other accessories as far forward as possible for 150cc engines, little ballast is required for most engines. The ZDZ-210 is the perfect choice for weight and power.
- The plane does not require lots of downthrust like a Cub. The wing is semi symmetrical, not flat bottomed, so throughout the speed range and power settings, the plane maintains its heading without downthrust because it does not generate lots of asymmetric lift. We have no downthrust in the engine.
- The rudder is extremely effective. Due to the massive, flat fuselage sides, virtually no rudder is required for knife edge flight, even knife edge loops. A Seiko is recommended though 3 high powered standard servos will work.
- Keep the servo arms short and get as much mechanical advantage from the servos as possible. The control surfaces are very responsive. Huge throws are not required.
- We use JR-8711 servos because they have a tremendous amount of speed and power using unregulated Lithium batteries. Hitec and JR have new servos capable of running at high voltages such as 7.4v nominal.
- We recommend a PowerExpander with unregulated Lithium Polymer, A123 or very large Lilon batteries for the ultimate in burst amperage to high voltage servos.
- The plane is very light compared to other planes of this size. It is as much as 10 lbs lighter, so take offs and landings are much easier. It is stable at almost walking speed.
- The weight with fuel is far less than the thrust of a super ZDZ-210, so the Super D can hover and pull out with ease. With the DA-170, the Super D will pull out very slowly at full power setting.
- 150cc – 210cc engines will get 15-20 minutes on a 50 oz tank of fuel depending on throttle settings.
- Smoke is important in a plane like this. 100 oz of smoke fluid will last 10-15 minutes.
- Two 101 oz fuel tanks are included with the plane.

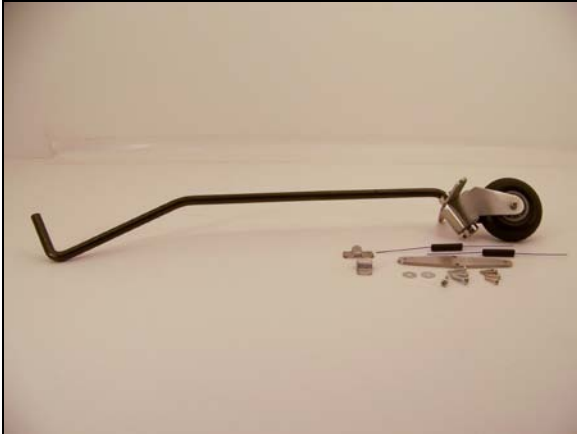
INCLUDED WITH THE KIT:

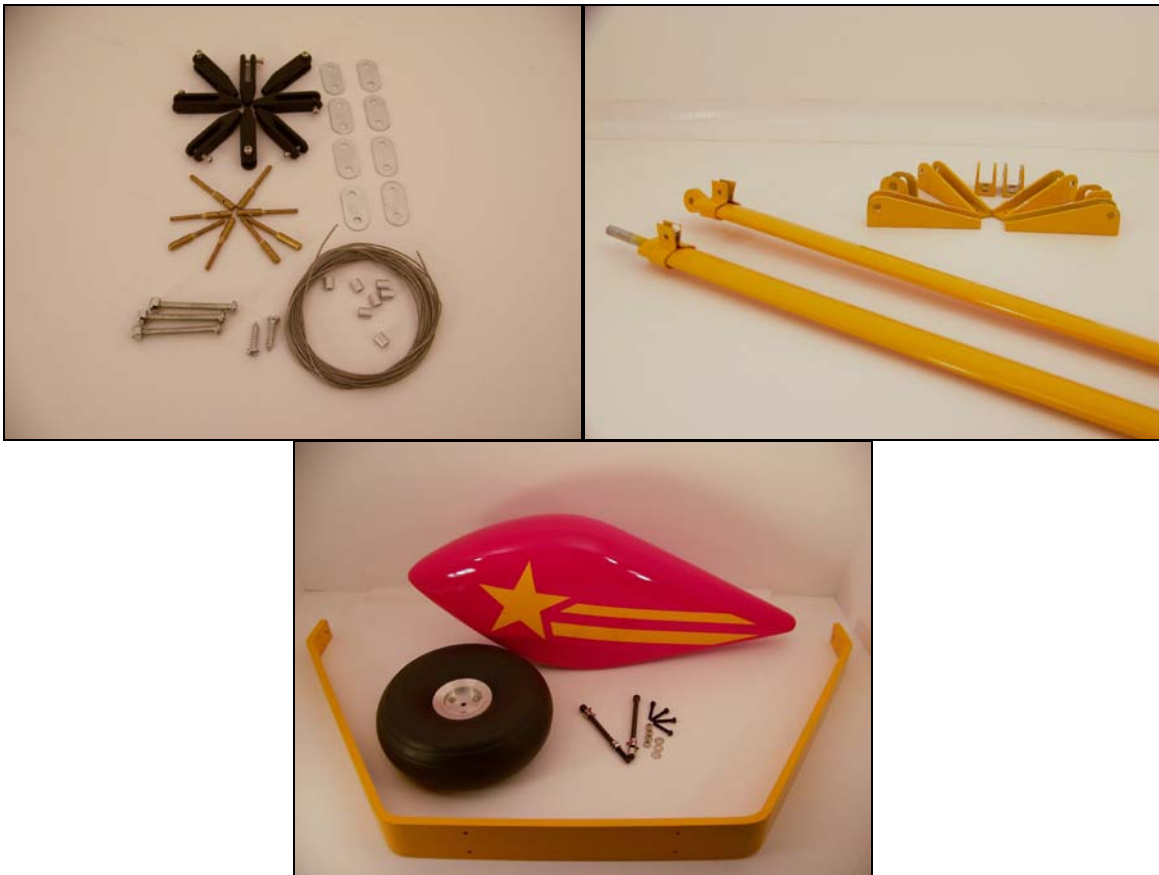
Be sure to inventory all the parts

- 3 piece wing. Center section is fixed, the outer sections are 7' x 32"
- Fuselage
- Canopy
- 6" CF Spinner
- Two 101oz Fuel tanks
- All control horns, pull-pull cable, linkages, and flying wires. The control horns are not the bolt type (called swivel clevis and horn), they are phenolic parts glued in place.
- High quality 7" tires with aluminum wheels
- Aluminum struts and jury struts

NOTE!!!!!!

- 1) The photos below are incorrect, but are close. These are photos of the prototype plane. Updated photos are coming soon.
- 2) TBM used only 2 aileron servos per side and one elevator servo per side. We used JR-8711 servos at 7.4v, and we had no problems, but to be safe, we recommend the use of 3 aileron servos per side and 2 elevator servos per side. Hitec HS-7950 servos should work as well though they were not tested.
- 3) We have minimal throws and used minimal servos and short servo arms. If you are going to do 3D, then use all the servos, and use larger servo arms.





COMPONENTS NEEDED TO COMPLETE THE KIT

Be sure to have all the parts on hand to hasten installation

- 150cc – 275cc engine. The ZDZ-210 is the best match for performance and weight.
- Canister mufflers are preferred, though standard mufflers can be used.
- Canister Mounts
- 4" drop headers depending on canisters and engine used.
- Propeller
- Six high powered 400 oz-in servos for the ailerons
- Four 1.25" aluminum servo arms for the ailerons
- Four high powered 400 oz-in servos for the elevators
- Two 1" aluminum servo arms for elevators
- Two Sullivan #562 4-40 snap links for choke and throttle
- Two standard servos for choke and throttle
- Seiko servo for rudder. The Seiko has two leads. One lead is for power, the other is for signal. We plug both leads directly into the rudder ports in a PowerExpander. There is no interference doing this, and it receives full voltage.
- Seiko adjustable servo arm.
- Four 2' servo extensions which stay inside the fuselage for the ailerons.
- Two 7' servo extensions for the elevators.
- Two 5' servo extensions which connect to the outer aileron servos.
- Two 3' servo extensions which connect to the inner aileron servos.
- Two 1' servo extensions for smoke and throttle.
- Servo wire holders
- Smart Fly EQ-10 PowerExpander. No regulators required.
- Rx Batteries – two 3600 mah LiPoly or A123 type batteries with Deans plugs, with HD switches with Dean's leads
- Ignition battery – one 2600 mah Lilon battery with regulator if necessary for your ignition, and switch.
- Switches for the Rx and ignition.
- Smoke pump, smoke line and pressure fittings.
- Loctite!

ASSEMBLY SEQUENCE

PLEASE FOLLOW THE ORDER AS FOLLOWS FOR THE EASIEST INSTALLATION

QUICK OVERVIEW

- 1) Rx, switches and temporarily mount a battery.
- 2) Rudder
- 3) Engine
- 4) Muffler
- 5) Throttle and Choke servos
- 6) Fuel and Smoke tanks
- 7) Landing gear
- 8) Tailwheel
- 9) Wing servos
- 10) Stabs
- 11) Cowl
- 12) Flying Wires
- 13) Canopy and windows
- 14) Baffles for cowling
- 15) Spinner
- 16) Batteries

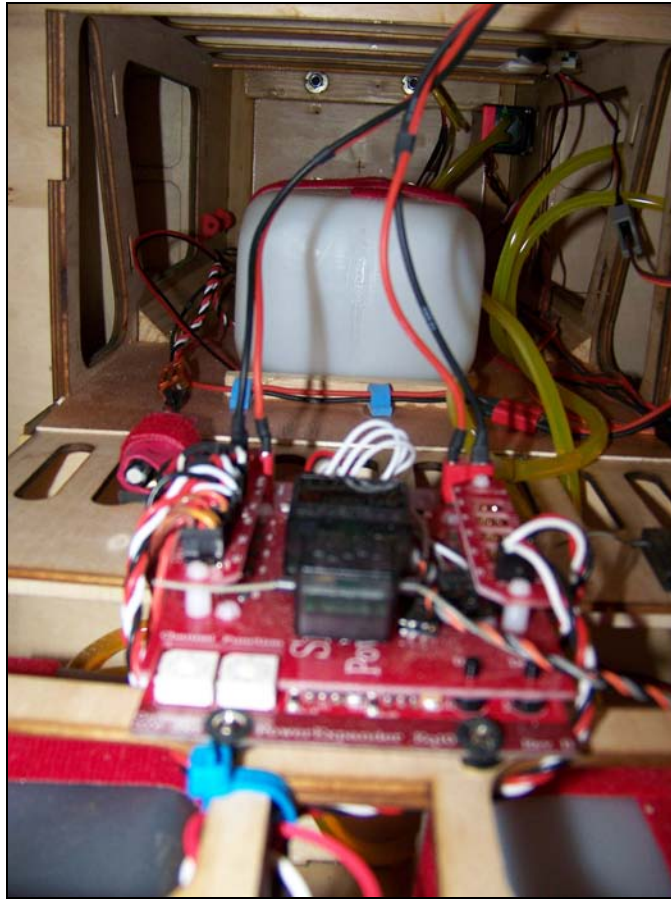
DETAILED INSTRUCTIONS

If you have questions, please call us. We will update this manual from time to time to address any issues.

All horns look like this. Trial fit them into the slots provided and use Hysol to glue them in place.



- 1) Rx, switches and temporarily mount a battery.



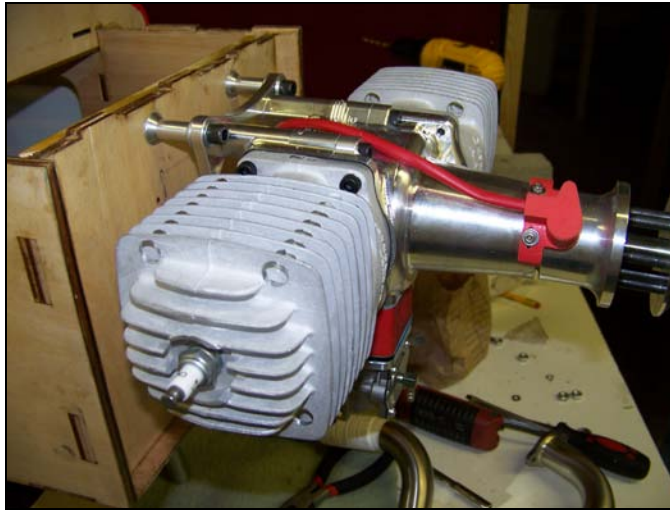
- a. It is likely that the Rx and Ignition batteries will need to be mounted to the torque box for CG reasons. Mount them temporarily with Velcro. Later you can relocate them more rearward if necessary.

2) Rudder (NOTE – rudder cables are crossed)

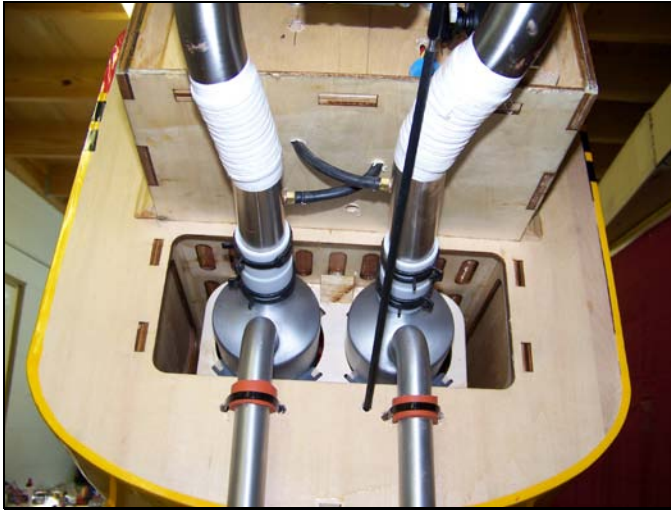


- a. Install rudder horns using Hysol.
- b. Glue rudder in place using Hysol
- c. Install ball links in outer holes (7" total spread).
- d. Install pull-pull cable.
- e. Before installing the Seiko PS-050 rudder servo, install the adjustable servo arm. The spread between the ball links should be 4" using the inner most holes on the Air Wild adjustable servo arm. Install ball links and cable terminators. Now install servo into plane in the hole closest to the front of the plane. If you choose to use multiple servos, make a tray from scrap plywood as required. Keep forward in the plane.
- f. Connect the cables by pulling the cables taught, and marking them where they should pass through the terminator. Using a felt tip pen, mark the cable itself. Then disconnect the cable from the rudder and tailwheel steering arm. Then terminate the cables. Then reinstall and adjust as necessary.

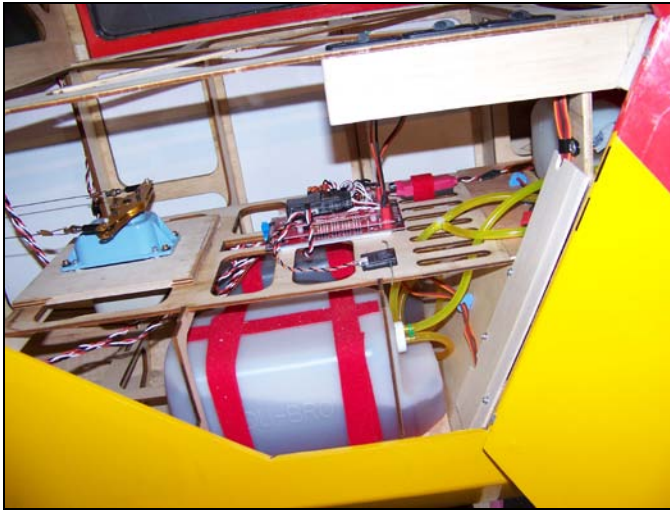
3) Engine



- a. Install the Sullivan #562 ball links to the choke and throttle arms.
 - b. Temporarily install the engine using the markings on the firewall as a guide. Use wood screws 4 for now in case you need to move the engine slightly.
 - c. Install the cowl. Adjust the engine using stand offs if necessary so that the spinner backplate lines up properly with the cowl.
 - d. Use bolts, blind nuts, washers and locknuts to install engine. Blind nuts alone are not strong enough to hold gas engines of any size.
 - e. Install the ignition inside the engine box along with the battery, switch and regulator.
 - f. Use TBM spiral wrap to protect the ignition wires passing through the fuselage.
- ### 4) Muffler and Smoke System



- a. Cut out the bottom of the cowl as shown above for hot air exhaust.
 - b. Install 2 MTW canister mounts as shown. Glue in place using hard triangle stock.
 - c. Use wire ties to hold the stingers to the former. We used some high temperature tubing for shock absorption.
 - d. Note the smoke injectors and the black high temperature tubing used.
 - e. Also note the overflow tubes for the gas and the smoke between the stingers
 - f. Be sure to allow space around the canisters for cooling air flow.
 - g. Open the bottom of the fuselage behind the canister for cooling air to exit.
- 5) Throttle and Choke servos
- a. Install the #562 ball link to the Sullivan #584 push rod
 - b. Install two standard size servos.
 - c. Connect throttle and choke linkage.
- 6) Fuel tanks and Smoke tanks



- a. Mount the tank where shown and hold in with Velcro. See photos above. Shown are 50 oz tanks, though now included are the 101 oz tanks.

7) Landing gear



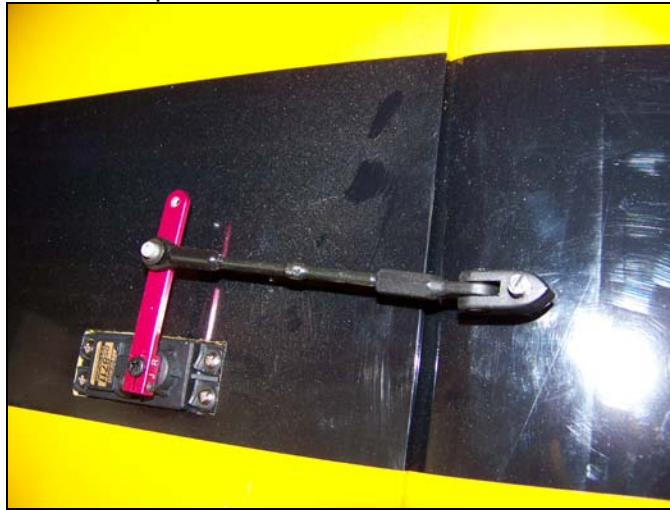
- a. This is just standard landing gear which is held on by 4 bolts going through aluminum angle in the fuselage. Use locknuts to hold in place.
- b. Cut a slot for the wheel pants to slide over the axel. Drill holes through the landing gear into the wheel pants. Use supplied screws to attach. Make sure they are very strong, and do not vibrate. There must be a lot of clearance around the tires to be sure that they don't catch the wheel pants when they deflect under a hard turn.

8) Tailwheel



- a. Install the tailwheel as shown. The production version is different.

9) Wing Servos – Use 6 JR 8711 servos or equivalent.



- a. Install the servos using 1.25" metal servo arms as shown. This photo shows 10-32 swivel clevis and horns, though in production, we will use the glued in place horns.
- b. Glue in the horns using Hysol. The ailerons need as much deflection as possible.
- c. Connect the linkages as shown.
- d. The aileron servo wires are held in place with wire keepers.

10) Stabs



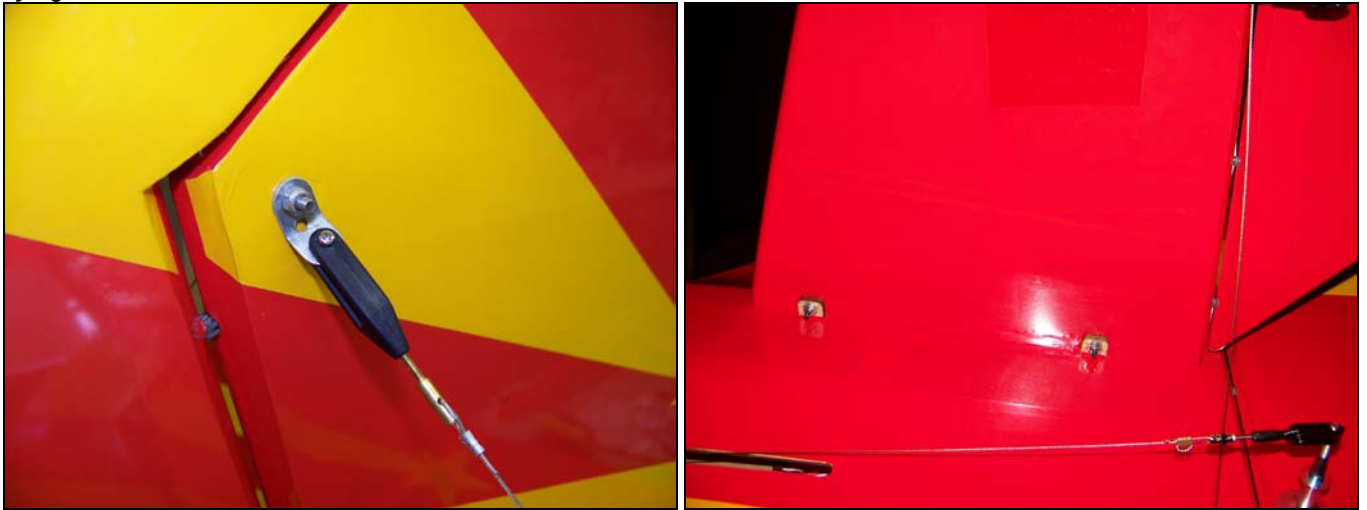
- a. Use four JR-8711 servos or equivalent. There are provisions for two servos per stab.
- b. Open the servo wells with a soldering iron.
- c. Install the servos, arms, linkage and horns like the ailerons. Use 7' extensions. Use 1" arms.
- d. Use some covering to cover the servo well once it is installed.
- e. Just slide the stabs onto the tubes and install the 2 6-32 screws per side (with thread lock).

11) Cowl



- a. The cowl is pre mounted. There are not screws from the side. The cowl is mounted the typical Pilot RC way which is screws from the inside of the plane, so no screws show. Just insert the screws.

12) Flying Wires



- a. Install the flying wires. Make them taught, but don't twist the stabs or rudders.

13) Canopy and Windows



- a. Use E6000 glue to install the front windshield. All the other windows are already installed.

14) Baffles



- a. Use scrap pieces of balsa glued in place to direct the air over the cylinders

15) Spinner and Propeller

16) Batteries

- a. Now install the batteries to make the plane balance properly. The CG is located 1" behind the forward wing tube.

17) Set up

- a. We only have one flight mode for the Super D.
- b. We set the control surfaces to deflect just enough to give good performance.
- c. Set the deflection of the elevators and ailerons to 20 degrees, and the rudder to as much as possible. If you are going to do some crazy flying be sure to put in all the servos, and then you can use larger servo arms.

18) Flying

- a. You will find that this is an extremely well manner plane. Have fun with it!