

**Preliminary edition rev. 1.01 November 2010  
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# **Wild Hare R/C Yak 55SP 25% Assembly Manual**

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## Warranty Information

Wild Hare Hobbies, Inc. guarantees this kit to be free of defects in both material and workmanship at the time of purchase. This warranty does not cover any components damaged by use or modification. **In no case shall Wild Hare Hobbies, Inc. liability exceed the original cost of the purchased kit.** Further Wild Hare Hobbies Inc, reserves the right to change or modify this warranty without notice.

In that Wild Hare has no control over final assembly or materials used in final assembly, no liability shall be assumed or accepted for any damage resulting from the use by user of the final user assembled product. By the act of using the user assembled product, the user accepts all resulting liability.

If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return this kit immediately in new and unused condition to the place of purchase.

While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying such as racing or extreme aerobatics the modeler is responsible for taking steps to reinforce the high stress points.

**Read through this manual before starting construction. It contains important warnings and instructions concerning the assembly and use of this model.**

**Warning.** This is not a toy. If not properly controlled it can cause injury or death and property damage..

## Specifications

Wingspan	73 inches
Length	69 inches
Wing Area	960 sq. inches
Weight	10-11 lbs .
Recommended engine	DLE-30 cc gas engine or 1.20-1.80 glow

Additional equipment required

Computer Radio with at least 5 channels, 7 channels preferred

2 elevator servos minimum 70 oz./in. of torque each

2 aileron servos, total torque required not less than 70 oz./in. per wing.

rudder servo at least 130 oz./in. (see text)

Servos must be either, metal or Karbonite gears, plastic gear servos are not strong enough for the control surfaces.

throttle servo and optional choke servo

battery pack at least 1500 mah

Switch for receiver battery and battery pack

2x12" and 2x24" servo extensions.

We recommend the DLE-30 engine and a 19-8 "Bunny" prop.

All of these accessories can be purchased from Wild Hare directly.

## **Optional Accessories**

Wild Hare R/C makes available several accessories that can enhance the Yak. These are;

**DLE-30** engine is the best power plant that we have found for this plane.

**Hitec** servos, we have a selection of appropriate servos in all price ranges. For this plane we recommend the Hitec 5845HB

We recommend **A123 Lithium** batteries for long life, simplicity, and because they have all the power you will ever need. Of course Wild Hare sells these.



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### Step 1. Open and inspect everything

In the box you should have a fuselage with hatch, wings, carbon fiber wing and stab tubes, the elevator/stab assemblies, the rudder, cowl, wheel pants, canopy, landing gear, and a package with the tail wheel assembly and miscellaneous fasteners, axles, control horns, and other hardware. Check everything for shipping damage and/or manufacturing defects. **If there is a problem, report it to us NOW**, not after you start building the plane. Once you have begun cutting, drilling or gluing we cannot accept the return of the plane or any component parts.

Before proceeding to any assembly, now is a good time to go over the whole plane and fix any cosmetic flaws.

### **Known issues and improvements**

There are a few areas where, at this unassembled stage, you can improve the final results of your assembly project. There are many items that cannot be addressed on the assembly line due to cost and possibly because not every improvement would be welcomed by every builder. Here are the items that we have found so far.

**Go over the covering with a heat gun or iron.** The covering tends to get loose over time and with changes in temperature and humidity. It may have come out of the box with wrinkles, I can assure you it did not go into the box that way. Please be careful not to overshrink the covering. Be very careful not to use too much heat especially near an edge or seam, too much heat will cause the covering to pull away and wrinkle badly.

The **wheel spats as supplied must be modified** to work properly, see the text in the landing gear section.

The **engine cowl mounts** to the front with 4 4-40 screws. The upper two go in from the rear of the F1 former and the two lower screws go in from the front. You will need a long screwdriver/slotted screws for the lower screws, or you can get an extra long hex ball driver from [www.microfasteners.com](http://www.microfasteners.com) and use socket head screws.



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### Step 2. Preparation work

Before you start actually assembling the plane there are quite a few things that can be done in preparation that will make assembly easier.

Trim away the covering from these areas using a very sharp x-acto knife;

**Fuselage** Wing tube opening, stab tube holes, anti-rotation dowel holes for wings and stabs, the holes for the aileron extensions to pass into the fuse from the wings, and the holes for the wing and stab retention bolts. Also the elevator servo openings and the slots for the rudder pull-pull cables.

Small holes can be opened up more easily with the tip of a hot soldering iron.

**Wings** Remove the covering over the servo bays and over the slots in the ailerons for the control horns.

**Stabs** Remove the covering over the slots in the elevators for the control horns.

**Rudder** remove the covering over the cable slots in the fuselage and remove the covering over the slots in the rudder for the control horns. **Note that there are two sets of slots.** The upper set which is approximately in the center of the rudder's hinge line is used for a pull-pull setup. The lower set, which is about 1" from the bottom, would be used if you prefer a push-pull linkage.

Glue hinges into the rudder elevators and ailerons. This plane uses CA type hinges which require thin CA adhesive.





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### Step 3. Engine mounting

The first thing to do, before anything else goes in the fuselage, is to get the engine mounted and aligned with the cowl. Here's how I have done it. With a round cowl like the Yak this is especially easy because a slight misalignment can not be seen and will not affect the way the plane flies.

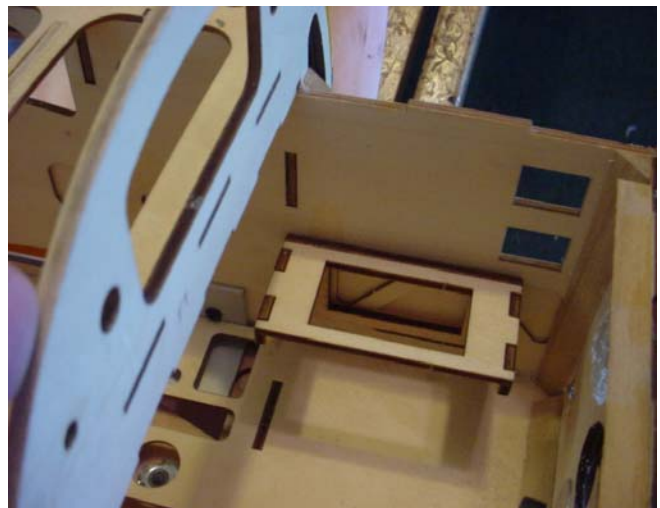
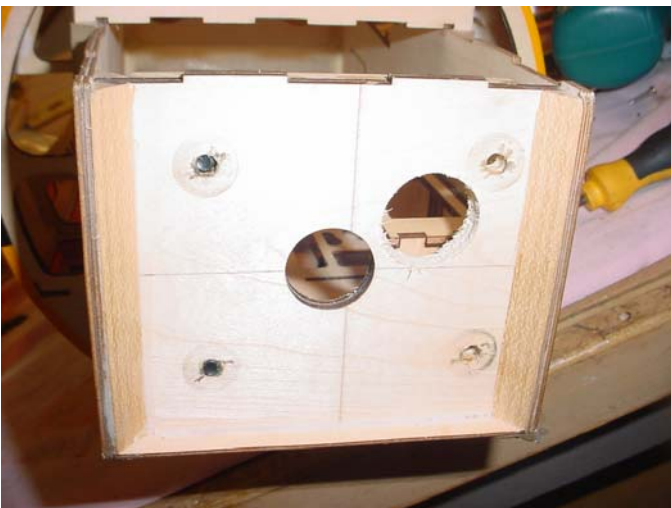
Note that the firewall already has right thrust built in. **Do not use the template for the DLE-30 that is supplied as part of the plane, it's wrong. Use the one that Wild Hare supplies, it's the small one with laser cut bolt holes.**

*This plane is designed around a DLE-30 engine of 2-2.5 pounds. If you use a significantly lighter or heavier engine you may need to shift some components around to get a proper CG.*

Locating the engine could not be easier. The engine centerline is marked with two lines on the firewall. Wild Hare can supply a template for the DLE-30, if you are using another engine you will have to make one that defines the centerline of the engine. Simply line up the template of your engine with the cross lines matching the lines on the firewall and drill the engine's mounting holes. Using a DLE-30 mount the engine on the 60mm standoffs that are supplied with the rear carb engines. You may wish to space the engine out a little, do this by placing wood spacers

The photos below show location of the throttle servo tray and a hole for pushrods when using a DLE-30.

Other engines may pose other problems, we strongly suggest that you use the DLE-30 since this is how the plane was designed.





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### Step 4. Hinging the control surfaces

Hinging is a very simple matter with CA hinges. The slots are already cut so all you have to do is glue them in. **Please note that we have included aftermarket (blue color) hinges with this plane, we feel these are better quality than the manufacturer supplied white hinges.**

Before you start gluing anything, test fit each control surface. Aileron to wing, elevator to stabilizer, rudder to fin/fuse, with the hinges in place. Make sure the hinges go in the pre-cut slots smoothly and that there is ample room for the hinge so there is no large gap between surfaces. Mark on the surfaces where the hinges go. It may be necessary to trim the sharp corners of the hinge or to clear out the slot with a razor knife to get a good unobstructed fit.

Once you are certain that they all go together smoothly, first glue the hinges into one side of one surface with the tiniest drop of CA that you can apply, just enough to keep the hinge in place as you slide the surfaces together.

Once the two surfaces are together with the hinges in the slots flex the hinge to the point of full deflection and apply one or two drops of thin CA. Be careful not to apply too much causing drips and runs. It's a good idea to have a tissue or paper towel handy in case you apply too much.

Turn the surface over and glue the opposite side and you are done.



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### Step 5. Mounting the hatch and canopy

The hatch mounts to the fuselage by tabs on each side that are attached at the rear of the hatch. The tabs are already drilled and a 3mm blind nut is installed. You should be able to install the hatch with two 4-40 screws through the fuse side.

The canopy is part of the hatch, it's all one piece.





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### Step 6. Install horizontal stabilizer

This step is easy.

Trim the covering around the holes in the fuse for the stab spar tube and the retaining bolt hole on each side. You should also cut away the covering over the holes for the elevator servos, but don't cut out the rudder servo covering yet.

Slide the spar through the fuse, and slide the stabilizers onto the tube from each side.

Retain the stab to the fuse with two 4-40 bolt, washer and lock washer. I advise you to use washers and lock washers and/or a little red RTV silicone on the threads. Don't use a lot, and don't use red loctite, or you won't be able to get the screws out without tearing out the blind nut.

The assembled h-stab with controls is shown below.





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### Step 7. Install control horns on all surfaces

This plane is supplied with double truss composite control horns. They install into two slots in each surface.

First open the slots, use a sharp razor knife or the tip of a soldering iron. Open the bottom only on ailerons and elevators, open both sides of the rudder.

The horns supplied are used in many types of planes, they may need to be shortened slightly to fit all the way into the slot. On the rudder you will need to glue in two horns on each side. Shorten the horns equally to be sure to get adequate gluing surface, the horns have sets of grooves on the edge gluing surface to give you a guide to making them equal length.

Assemble the horns with ball links and spacers, and glue them, into the slots with 30 minute epoxy.





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### Step 8. Installing the servos

1. **Elevator servos.** Trim away the covering from the rear sides of the fuselage to expose the two servo trays. Servos should be secured with all screws.
2. **Aileron servos.** There is a servo wire tunnel through the wing that touches the servo tray. You can use a piece of wire with a hook to fish through the hole and pull the servo pigtail through or there may be a piece of string in the wing that can be used as a pull cord. Be sure the extension is long enough to reach the receiver. Also be sure the servo extension is securely attached to the servo lead.
3. **Rudder servo (pull-pull).** Install a single digital servo such as a Hitec 5485 or better in the servo tray and use pull-pull cables to actuate the rudder. Cables, fittings, cable crimp sleeves and clevises are supplied with the kit.
4. **Rudder servo(s) (push-pull).** There are servo mounts in the fuselage side directly behind the elevator servos. You may put one or two rudder servos in these openings if you prefer a pushrod type linkage. Be aware that this will shift the CG rearward, so before you make this decision you should check the balance with the plane fully assembled. This is a handy feature if you are using a heavier engine but with a very light engine this can cause real problems. The pushrods for a push-pull setup are not supplied.

**Note about the supplied hardware** — We have found that no matter what we do some people feel they need to install much heavier duty hardware. I want to assure you that we have flight tested the plane extensively using these components and they worked fine. There is no need for heavier duty pushrods or other hardware.

The kit comes with carbon-fiber servo arms. These are a nice addition to get more throw, simply attach them to the servo wheel that comes with your servos using 4 supplied screws/nuts. Of course machines aluminum arms are better, but these are free and they work. If using a push-pull you may need to use the CF arms on elevators to get sufficient clearance between rudder and elevator pushrods.

**Note the location of the pull-pull cable slots in the photo at bottom-right.**—They are tiny and hard to find, but they are there under the covering.





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### Step 9. Install the landing gear

**Landing Gear**—There should be drilled holes in the landing gear plate under the covering, these should match up with the holes in the landing gear. There are 3 holes, one of which is already filled with an 8-32 blind nut.

Attaching the cover hatch can be done two ways. The plate has holes so that it can be installed with the gear mounting screws. I find this to be awkward/difficult and it compromises the gear's mounting, plus it usually crushes the plywood.

A simpler method is to just trim away all that structure and hold the cover hatch in place with some clear packing tape.

**Wheel Spats**—**The wheel spats require some modification**, the manufacturer made some changes that do not work together.

First, substitute the supplied Dubro axles for the axles supplied with the kit. You can reuse the wheel collars that came with the original axles.

The wheel spats will need to be drilled to allow the Dubro axles to recess into the spat. Using a 1/2" Forstner bit you can drill approximately half way through the side that is toward the wheel, then complete that hole with a 5/16" bit in the center to allow the Dubro axle's threaded section to go through the spat and the landing gear. You will also need to drill the landing gear out to 5/16". Then assemble the axle through the spat and gear and tighten with the supplied lock nut.

An alternate method (that may be simpler and stronger) is to simply drill the spat all the way through, then attach (glue) a small "doughnut" of 1/16" aircraft ply to the back side. The doughnut would be approximately 1" OD and 5/16" id.

Use the supplied wheel collars, one on each side of each wheel, to position the wheel on the axle for a good appearance.

**Tail Wheel**—The tail wheel bracket attaches to the hardwood plate at the bottom of the tail using two wood screws. Use the supplied arm to attach it to the rudder, or I have found that it is perfectly OK to just leave the tailwheel free floating and to steer with the rudder. I have tested this several times and it gives plenty of steering authority when taxiing.

**See photos of the landing gear assembly on the next page.**



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### Step 10. Mounting the wings

Push the CF tube spar through the tube in the fuselage until it protrudes an equal distance on both sides. Carefully push each wing onto the tube until the anti-rotation dowels engage the holes in the fuselage side. As the wing approaches the fuselage guide the aileron extension through the access hole.

The wings mount to the fuselage with one 1/4"-20 nylon screw on each wing through the fuselage side. Nylon fasteners tend to be very resistant to vibration so if you decide to replace the nylon screw with a metal screw be careful that it is kept tight.





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Steps 11. Balance the plane and adjust control throws

**The first flight should be done with the plane balanced at the center of the wing tube or slightly forward, not behind the center line. This will be safe for the first flight.** After the first flight you may adjust the CG to your flying style, but make changes a little at a time.

If your plane is tail heavy, consider moving batteries as far forward as possible, remove anything from the tail that might be adding weight, get a lighter tailwheel, Remember that the farther weight is from the CG the less of it you will need. A small weight on a long arm makes a big difference. A heavy spinner has more effect than a bigger battery because it is farther from the CG. Using lighter mini-servos is another option.

We set the control throws as follows on planes in test. Please keep in mind the high rates specified here are for 3d, not for just faster response. The elevator in particular at these rates will cause instant stalling, tumbling, and all sorts of other things that can only be done at low speeds. **Do not use the 3d settings until you are thoroughly familiar with the plane on low rates and then do your initial tests at high altitude, be prepared to go to low rates if necessary.**

	High rate (3D)	Low rate
Ailerons	23 deg	<b>15 deg</b>
Elevators	40+ deg.	<b>12 deg.</b>
Rudder	45 deg.	<b>25 deg.</b>

**Fly the plane on low rates at first. At high 3d rates it is very difficult to fly. The 3d rates are intended only for extreme aerobatics.**

**Ailerons in particular are very sensitive. Using 3d rates will cause the plane to roll so fast it's not possible to keep track of its orientation, use with care.**