Gladiator II

DHLG

Modified version - with aileron servos located in the wing.

Building instructions

Gladiator II is supplied as ARF (Almost Ready to Fly). All parts required for the model completion are included. You have to provide only RC equipment and adhesives.

Recommended RC equipment (or equivalent):
Graupner 700 receiver
4 x W-060 Super Micro servos
4 x KAN Ni-MH 350 mAh batteries

Adhesives:
5-minute epoxy
CA adhesives (thin, medium and thick)

Fuselage - RC Equipment installation

RC equipment should be located in the vertical balsa web of the fuselage spine, under the removable, slip-on nose cone. The position of all parts is shown on the included photographs.

Place battery pack in the balsa web cutout in the front portion of the fuselage and secure it in place by a packing tape.

The receiver should be located next to the battery. To ensure that the receiver fits into the given space, remove it from its plastic box. Position the receiver crystal away from the servos! Use packing tape to attach it to the surface of the balsa web (not in a cutout).

Install the elevator and rudder servos in the remaining space in the cutouts in the balsa web so that the control cables could not cross each other.

Both servos should be cemented into balsa web cutouts with a 5-minute epoxy or a thick CA.

Before each servo is cemented in the web, make sure that the proper servo horn is installed and the servo is in its neutral position. Each servo location should allow for servo horn adjustment or replacement.

Check the removable nose cone clearance during installation.

Wing

The one piece wing is supplied practically finished. All you have to do is to install the following:
- aileron servos, their control linkages and servo covers
- a wing peg used for the circular throw

If you are an experienced model builder, you can install the servos and their controls according to your experience and preferences, or you can use the following instructions:

1) Cut the servo openings in the designated locations on the lower side of the wing. Make a circular opening (10 mm) in the center of the wing, right behind the wing spar. This opening will be used for connection of the ailerons servo cables to the receiver.

2) Position servo horns in the neutral position (with a zero trim) and then reposition the control horns so that they would be tilted slightly to the back (about 2 steps on the servo shaft). This provides a

3) longer servo horn movement required for flaps control. Adjust the length of the servo horns so they fit under the provided servo covers.

4) Pull the servo cables through the access hole in the center of the wing. You will have to make holes in the ribs and temporarily remove the servo connectors to be able to pull the cables through.

5) Tape the bottom and sides of servos with a Scotch tape and then cement the servos in wells using 5 minute Epoxy. Servo horns should be located in the middle of the channel provided for push rods in the servo covers. Servo horns should be able to move freely in both directions. To improve the servo installation, insert and cement a little balsa block between each servo and a web of the main spar.

6) The next step should be the installation of aileron control horns.
The supplied threaded brass pins could be used as servo horns. Drill a hole in the lower skin of the aileron in front of the aileron spar under about 45 degrees and through the spar web. Snap the supplied plastic clevis on the brass pin (horn) and position in the predrilled hole so that centerline of the clevis pin is parallel with the aileron hinge line and located above the hinge line in the neutral position. The aileron horn should not stick out of the lower aileron skin further than push rod cover allows.
Cement the aileron horn in place by 5 minute Epoxy mixed with Microbaloons. Repeat the procedure on the other aileron.

7) Now we can set up the aileron push rods.
Each push rod consists of a carbon rod (2mm dia.) and 2 plastic micro clevises.
Carefully enlarge the hole in each clevis with a 2 mm drill bit and sand the ends of the carbon rod to fit into the clevis. On one side of each rod cement (CA) a clevis and snap it to the servo horn. Snap clevises to the aileron horns and make sure the servos and ailerons are in neutral positions and then measure the required length of the push rods, cut the carbon rods to the proper length, sand the end and cement (CA) to the clevis on the aileron side.

8) Cut and trim the servo covers to fit over the servo wells and then tape in their positions.

Wing peg

The wing peg should be located at the end of the wing. Both ends of the wing are reinforced with carbon fiber cloth and the peg can be installed on the either side of the wing. (On the left wing for the right-handed throwers and vice versa).

The recommended position of the peg centerline is 45 mm (1 3/4 in) from the trailing edge (close to the aft balsa web) and 12-15 mm (½-5/8 in) from the tip of the wing. Ideally, the peg should be installed parallel with the vertical axes of the glider. This means that from the side view the peg should be perpendicular to the bottom of the wing and from the front view (when the whole wing is in the horizontal position) the peg should be vertical.

The 6 mm dia (15/64 in) carbon peg (tube) is supplied. To ensure the proper peg position, drill the hole for the peg very carefully with a help of some fixture. Enter the peg in the hole so that its lower portion sticks out slightly further (a couple of mm, about 3/16 in) than on the top side of the wing. This will make it easier to hold during the circular throw. Then cement the peg in the wing using the thin CA, first from one side of the peg and then from the other.

When using CA or any other adhesive, make sure the wing surface is protected - dripping or running CA will damage the wing surface.

Tail Surfaces

Cement the vertical stabilizer into the supplied short carbon fiber tube. On the stab is shown a centerline of its position in the tube cutout. Cement the stab in place using CA and then reinforce the joint with the supplied fiberglass cloth. The strength of the joint is important because of the high load on the vertical stab during circular throw.

Install the short tube with the vertical stab on the end of the fuselage carbon boom.

Attach the wing to the fuselage. Slide the tube with the vertical stab onto the end of the boom until the end of the boom touches the leading edge of the stab. Before cementing clean the cemented surfaces to achieve a strong joint and make sure that the vertical stab is in the centerline of the fuselage and perpendicular to the wing. We recommend reinforcing the short carbon tube in two places with carbon fiber cloth using a thin CA (see drawing). To improve the cementing of the vertical stab tube to the tapering carbon boom, drill a little hole in the top of the boom in front of the leading edge of the vertical stab and pour in some thick or gel CA in the space between the boom and the stab tube.

Install the horizontal stabilizer pylon on the lower side of the fuselage boom, in the centerline of the horizontal stab. The leading edge of the stab should be about 530 mm (20 7/8 in) behind the trailing edge of the wing.

We recommend the horizontal stab to be parallel with the lower side of the fuselage boom (carbon tube). This will guarantee the desired decalage angle (angle between the wing and horizontal stab). The build in decalage angle and recommended CG location will assure the required longitudinal (pitch) stability.

Make sure that you cement the horizontal stab on the pylon so that it is parallel with the wing and perpendicular to the vertical stab.

Hang the rudder and the elevator using standard hinge tape or any available plastic hinges, according to your preferences. Rudder and elevator control horns are supplied. Be sure they are properly installed and securely cemented.

Control Horns and Pull-pull Control Cables

The rudder control horn should be installed in the centerline of the fuselage boom (carbon tube), close to the rudder hinge line. The control cables are led through the fuselage and exit at the end of the fuselage boom (carbon tube). You can make about 6 mm (1/4 in) slots on both sides of the end of the tube to facilitate the exit of the control cables.

The elevator control horn should be located about 8 mm (5/16 in) from the fuselage boom, on the left or right side of the boom (according to your preference), as close as possible to the elevator hinge line. Exit holes of the control cables should be located on the corresponding side of the fuselage boom. Exit hole for the upper cable, about 80 mm (3 1/8 in) in front of the control horn. Exit hole for the lower cable, about 120 mm (4 3/4 in) in front of the control horn. The lower cable should be led through a guide (supplied white tubing) cemented at the leading edge of the lower surface of the stab in the direction of the control horn.

Each cable has to be pulled through the fuselage to the related side of the servo, through the hole in the servo horn and secured using about 5 mm (3/16 in) of the supplied white tubing and a drop of CA. Then attach the cable to the control horn on the proper side of the rudder or the elevator. The control surfaces and servos have to be in the neutral position. The cables must have a small tension to eliminate the slack in the linkage and to keep the control surfaces tight. Tension of the cables should not strain the servos.

The cables could be also secured by small metal tubings available in stores selling fishing supplies. The tubing is squeezed and CA is not required.

Check the proper function of all control surfaces and linkages.

Finishing touches

Cut the corresponding opening in the fuselage under the wing for the aileron servo wires connection to the transmitter. Be careful not to damage the carbon boom inside the fuselage. The size of the opening has to allow the servo connectors to be passed through.

The transition of the fuselage into the top of the wing should be sealed by a supplied carbon cover. It has to be shaped to fit the top of the wing and then cemented to the fuselage.

To ensure the tight fit of the slip-on nose cone on the fuselage spine, use a Scotch tape wound up (taped) around the aft oval portion of the spine, under the end of the cone.

The Gladiator II fuselage is made of carbon fiber. The carbon makes the fuselage stronger

and lighter. The carbon also leads the electric current and bounces the transmitter signal. Therefore it is important to get the receiver antenna out of the fuselage as fast as possible. Get the antenna out of the fuselage right after the removable nose cone, attach by a tape on the fuselage boom and the vertical stab. You should increase the antenna length for the length hidden in the fuselage. Do not stretch the antenna alongside of the carbon boom; let it be loose and away from the carbon fuselage surface. If you would like to hide the antenna, it is possible to use the open space between ailerons and the aft balsa web of the wing. The antenna could be cemented to the balsa web; however it would be necessary to use a connector allowing the wing removal.

Ailerons have their hinge line on the top of the wing. The gap on the lower side of the wing can be sealed by a gap tape attached to the bottom of the ailerons leading edge and slipped under the bottom skin of the wing, in the open space behind the aft balsa web.

Recommended Settings

The initial throws of the control surfaces:
Elevator: 12 mm (½ in) up and down
Rudder: 15 mm (5/8 in) left and right
Ailerons: 18 mm (3/4 in) up and 9 mm (3/8 in) down

Throws of the control surfaces can be changed for different phases of the flight or flight conditions, depending on the capabilities of your transmitter.

Mix the controls as you are accustomed to.

Flaps should be interconnected with the elevator to assure the longitudinal stability.

Ailerons and rudder should be interconnected. Ailerons efficiency is diminishing with flaps extension and the rudder is required. The solution can be an electronic mix, pilot's skills or both.

Recommended CG location is 76 mm (3 in) from the leading edge of the wing (measured at the center of the wing).

Completed model may require only a very small piece of lead in the nose of the fuselage.

Specifications

Wing span:	1492 mm (58 3/4 in)
Fuselage length:	1104 mm (43 ½ in)
Wing area:	21.5 dm2 (2.32 ft2)
Wing airfoil:	HN487
Empty weight:	210 - 220 g (7.33 - 7.75 oz) - (without RC equipment and battery)
Flying weight:	290 - 295 g (10.1 - 10.3 oz)
Wing loading:	13.5 - 13.7 g/dm2 (4.4 - 4.5 oz/ft2)

Final notes:

To prevent wing damage, do not catch the model by the wing leading edge on landing. Instead, catch it by the nose of the fuselage or by the throwing peg at the wing tip.

Composite models are very strong, but the surface of the wing is very sensitive and could be easily damaged, so be careful and transport the wing in a protective cover (bubble wrap) and store in a sun shade, away from excessive heat.

OK, let's do it.....!!!
Let's go to fly!!!

I wish you lots of enjoyment in flying this model.
In case you have any questions, please do not hesitate to contact me by phone at +4207373882487 or by e-mail at info@f3k.cz.