

How to build the GWS Pico Tiger Moth

By ArcherAce

A Word Before We Start

The first RC airplane I ever built was the GWS Pico Tiger Moth. Even though I'm not a regular model builder, it still should have not taken me the week to build that it did. Other than my lack of building skill, the biggest problem was, and continues to be the instruction manual.

At the 2004 Toledo Weak Signals Expo, I had the pleasure of talking to Mr. Linn, the man being GWS. He promised that new manuals for all the planes they offer were in the works. Since they have yet to materialize, and I'm about to start my fourth Tiger Moth build, I decided to take some pictures and write this impromptu addendum to the GWS manual.

Before I go any further, I'd like to thank everyone who has helped me over the last two years (has it been that long?!?!) [The Ezone's RC Groups forums](#) are an indispensable resource when it comes to up to date info, and instant help. I couldn't have done it without you guys!

The Pico Tiger Moth lends itself well to modification. Some of these "mods" are necessary. Some are purely esthetic. Whenever there is a deviation from the stock build, I'll make sure to note it in these instructions. If there is an optional mod, you'll find the  symbol. The last page of this manual will be dedicated to these esthetic mods. I believe listing the esthetic mods at the end will help your build flow, and not clutter the instructions. I suggest that you skip to the back of these instructions when you see that there is a possible mod. You might want to add it before you go any further with your build!

Last, if you have anything that you think should be added or corrected, feel free to contact me at joesarcherace@yahoo.com. Or, you can reach me through www.rcgroups.com. My nickname there is ArcherAce.

Feel free to post and distribute this file. I only ask that you leave it as is, with my name on it. I just spent the last 8 hours typing this, it's the least you could do.

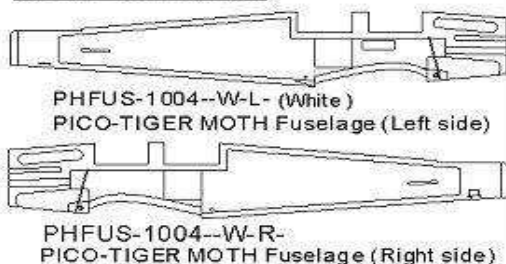
Lets Get Started!

The first few pages of the manual are useful the way they are. The diagrams are very helpful to the new builder. For that reason, I include them here as they appear in the manual. You can also find them on the [GWS website](#).

SPECIFICATIONS

Length: 670 mm (26.4 in.)
 Wing Span: 800 mm (31.5 in.)
 Wing Area: 18.60 dm² (288 sq. in.)
 Wing Loading: 11.6g/dm² (3.8 oz/sq.ft)
 Power System & Propeller:
 IPS - DX 2BB-AXC (Motor included)
 w/ 22.8 x 17.8 cm (9" x 7") (**1)
 or EDP - 100/280C
 w/ 12.7 x 7.6 cm (5" x 3")
 Flying Duration: 4~6 minutes
 Flying Speed: 2.3~4 m/sec.
 (8.5~13.1 ft./sec.)
 Maximum 16 km/hr.
 Flying Weight: 215~275 g (7.6~9.7 oz.)
 Radio required: 2~3 channel radio with
 2 sub-micro, micro or mini servos
 and electronic speed controller or
 auto cut-off unit
 Battery required: (**2)
 6.0~7.2V/110~150mAh

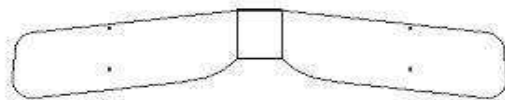
GW/P-TM-DAS1



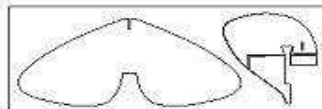
Remarks (**3): Please note that some plastic parts on the frame are not used for this airplane as this frame is designed for a use of other airplanes as well. Please consult the instruction manual for more details.

Caution (**4): To assemble this kit, please use only GWS glue supplied with this kit, and you can use epoxy glue if it is necessary.

GW/P-TM-DAS2



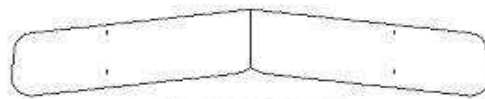
PHWIN-1005--W-U-
P-TM Wing (Upper) x 1 pce. (White)



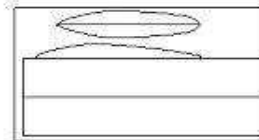
PHWIN-1005--W-T-
Horizontal Stabilizer &
Vertical Fin Set (White)

CONTENTS OF KIT (PART LIST)

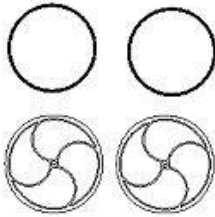
1. PICO-TM Fuselage (Right side)(White)	1 pce.
2. PICO-TM Fuselage (Left side) (White)	1 pce.
3. PICO-TM Wing (Upper)(White)	1 pce.
4. PICO-TM Wing (Lower)(White)	1 pce.
5. Horizontal Stabilizer & Vertical Fin Set	1 set
6. Double-sided Adhesive Tape for Wing Joint	1 set
7. Main Landing Gear	1 pce.
8. Ultra-light Wheel Rim (45 mm dia.)	2 pce.
9. Rubber Tire (42mm dia.)	2 pce.
10. Cowling and Strut Fixing Screw (M1.4 x 9mm TPA)	8 pcs.
11. Wing Joint Cover (White)	1 pcs.
12. P-TM PVC Wing Joint Tape (White)	1 set
13. Main Wing Strut Set (Upper Wing)	2 pcs.
14. Indoor Power Unit	1 set
IPS-DX2BB-AXC or EDP-100 / 280C	
15. Propeller: 22.8 x 17.8 cm (9" x 7")	1 set
16. Soft Safety Spinner	1 pce.
17. IPS Instruction Manual	1 pcs.
18. Push Rod (0.9 mm dia.)	2 pcs.
19. Bamboo Stick (3 x 85 mm)	2 pce.
20. IPS Mount (5 x 8 x 87mm/Wood)	1 pce.
21. Plastic Parts Frame "A" (**3)	1 set
22. Rubber Band	8 pce.
23. GWS Glue (**4)	1 pcs.
24. Double-sided Sponge Tape	4 pce.
25. Cowling (Transparent)	1 pcs.
26. Decal(TIGER MOTH)	1 pce.
27. Instruction Manual	1 pce.



PHWIN-1005--W-L-
P-TM Wing (Lower) x 1 pce. (White)



PYPOR-1015-----
Double-sided Adhesive Tape for Wing Joint

GW/P-TM-DAS3

PTCUS-1005-----
Rubber Tire
42mm dia. ϕ 2x 2 pcs.

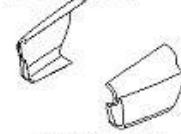
PHTYRP100145W---
Ultra-light Wheel Rim
(45 mm dia.) x 2 pcs.



PTMEWA1006---M-
Main Landing Gear
X 1 pce.

AASM-TM-COWLT---
Cowling (Transparent)

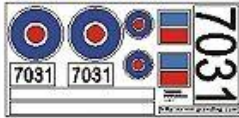
PVPEF-1024-T-R-



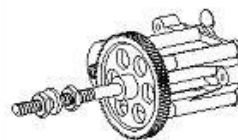
PVPEF-1024--T-L-

PYINS-1025-----

Instruction Manual x 1

PYPOP-1016-----

TIGER MOTH(Decal)
x 1 pce.

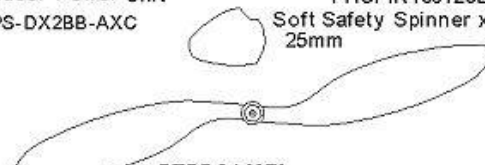
PYPOP-1003-----**GW/P-TM-DAS5**

Indoor Power Unit
IPS-DX2BB-AXC

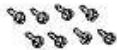


PYINS-1022-----
IPS
Instruction Manual

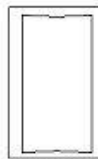
PHSPIR100125D
Soft Safety Spinner x 1
25mm



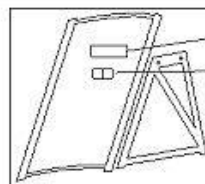
PTPROA9070-----
Propeller: 22.8 x 17.8 cm (9" x 7") x 1 pce.

GW/P-TM-DAS4

PXTPAF-4J-1409R-
Cowling and Strut
Fixing Screw x 8 pcs.
(M1.4x 9mmTPA)



PVPEF-1025--W---
Wing Joint Cover x 1 pce.
(White)



PMHOD-1003-----
Main Wing Strut Set X2

Strut Mount (10x30mm) x 2

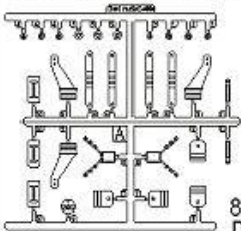
Cowling Mount (8x8mm) x 4



PYPOP-1017--w---
P-TM PVC Wing Joint Tape
x 2 (White)

GW/P-STICK-AS5

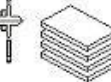
PMSPC-1001-----
plastic Parts Frame "A" x 1 set



8SADHP 1001-----
GWS Glue x 1 pce.



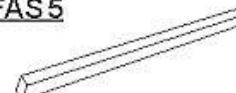
8SRBD-1001-----
Rubber Band x 8 pcs.



8STAPS1001-----
Double-sided Sponge Tape x 4 pcs.

GW/P-STICK-FAS5

PTSTK-1001-----
Bamboo Stick (3 ϕ x 85 mm) X 2 pcs.



PMCHSA1002-----
5x8x87x1pce.
IPS Mount

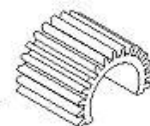


PTMEWA1001-----
Push Rod ϕ 0.9mm x 2 pcs.

OPTIONAL PARTS

For better performance and longer life of the motor ,
the heat sink is available as an optional item.

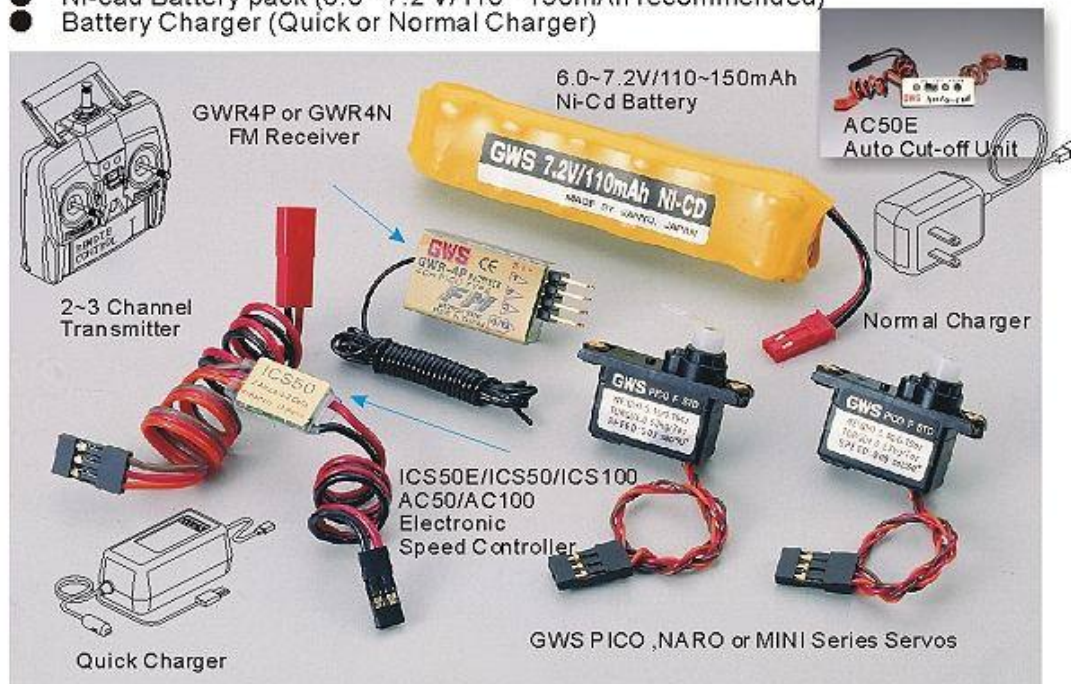
Heat Sink (for IPS)



RADIO CONTROL SYSTEM

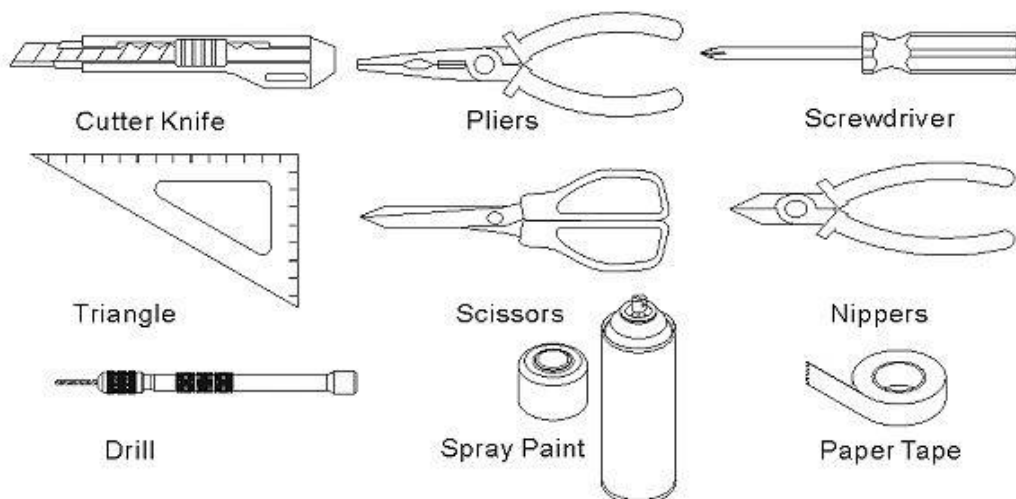
The following equipment and items are required separately to fly this airplane.

- Transmitter (2-3 channels)
- Receiver (GWS PICO Series or NARO Series Receiver recommended)
- Servo (GWS PICO Series, NARO Series or MINI Series Servo recommended)
- Electronic Speed Controller (GWS ICS-50E/ICS-50/ICS-100/AC50/AC-100 recommended) or Auto Cut-off Unit (GWS AC50E recommended)
- Ni-cad Battery pack (6.0~7.2 V/110~150mAh recommended)
- Battery Charger (Quick or Normal Charger)



TOOLS AND ITEMS

To assemble this airplane you need to prepare some tools.



There are a number of additional tools, and items you will need. While some of them are certainly not necessary, they will make for not only a much nicer plane, but also a much more enjoyable build.



As you can see, I recommend using both 5 and 15 minute epoxy to build your Tiger Moth. There will also be a use for both odorless (foam safe) and thin (NOT FOAM SAFE) CA.

There have been arguments that using epoxy on these planes makes for a heavy plane. This is simply not true! As long as you use a generous amount of microballoons, the epoxy turns out quite light. The microballoon filler also gives the epoxy some flexibility.

The reason we will not be using the supplied GWS glue is two-fold. First, it's not really glue. It's contact cement. If you do decide to use it, here is how.

First smear a thin layer of glue on one of the two parts you want to join. Then, put the two parts together to distribute the glue evenly between the two parts. Pull the parts back apart, and put them aside for approximately 5-10 minutes. After that time, the glue will feel dry to the touch. Pick up both parts and carefully align them and press them together. The contact cement bonds the second that you touch the two parts together. **YOU DO NOT GET A SECOND CHANCE!** Parts do not always match up as well as they should.

The second reason is time. You want to put the model together quickly so you can enjoy flying it. Why wait days for glue to dry?

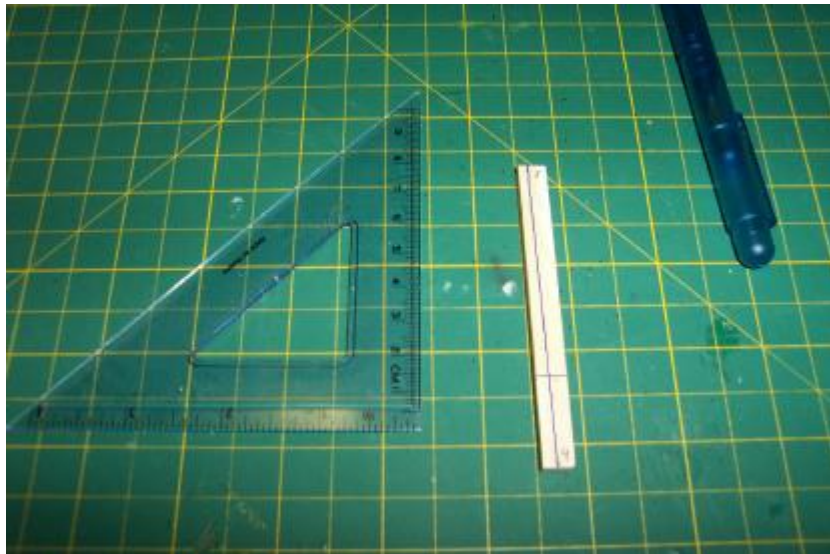
Whichever glue you decide to use, always remember **MORE GLUE DOES NOT MAKE A STRONGER BOND!** Instead of thinking "How much glue do I need", think "How little glue can I get away with". This will help keep this build, and any build you undertake, light!

Assembling The Fuselage

Locate the IPS (indoor power system) stick and the left side of the fuselage. The left side should have the number 1 cast in the foam on the inside near where the motor mounts and where the rudder mounts.

Trial fit the stick in the corresponding slot in the fuselage. You'll notice that the stick only fits one way. Pay attention to which side of the stick will be facing up. This is the side of the stick that you will mark the thrust angle. Most every prop driven plane requires the motor/prop to point a bit down and right. This helps counteract the rotational torque of the motor. Setting the thrust angle will make your plane much easier to trim out and fly.

Now that you know which side of the stick is going to face up, use your triangle to mark a line, from back to front. The back line should be 5mm in and the front should be 4mm in. Also, mark a line at 22mm from the front of the stick. This is where the motor should stop when you install it on the stick. (page 5 figure 1 of your GWS manual)



Place the marked stick back in the fuselage. The line on the stick should line up perfectly with the inside of the fuselage. If it does not, double check both your measuring, and that you have the stick oriented correctly (5mm in the back, 4mm in the front). If these are both correct, use your sanding block to carefully sand the stick to bring the thrust angle into alignment. Now is also a good time to make sure your motor will slide onto the stick. If it will not slide onto the stick, use your sanding block to sand away just enough of the stick to allow for a tight fit of the motor. (page 5 figure 2 of your GWS manual) Once this is correct, remove the motor from the stick and set the stick aside.

From the plastic parts frame, locate part number 5. Use your #11 hobby knife to carefully cut the part from the frame. This part will be used as your tail skid. 

If you intend to fly your Tiger Moth outdoors, do not cut the skid as shown in the GWS manual. When the skid drags on the pavement (on takeoff and landing) the asphalt will grind away the skid. After one season of flying, you'll be lucky to have a skid left! The mod listed at the end of the manual addresses this.

Trial fit the skid in the cutout in the left side of the fuselage. Check the GWS manual again to be sure you have the skid oriented correctly. (page 5 figure 3 of your GWS manual)

Next, locate both the strut and cowl mounts. They are the small punch outs in the main wing strut set. You should have four cowl mounts and two strut mounts

When you're sure the ips stick and tailskid fit correctly, mix up a bit of 5 minute epoxy and microballoons. Glue these into the left side of the fuselage. Glue two cowl mounts and one strut mount to the right side of the fuselage. After a few minutes the epoxy will get tacky. When the ips stick and the tail skid tack up, use the last bit of epoxy to glue two more cowl mounts, and one strut mount to the left side of the fuselage.

Once the glue is set, use your pin drill to carefully drill a hole in the sides of the fuselage where the control wires exit. (page 5 figure 3 of your GWS manual). When drilling work very slowly. The drill will want to tear the foam more than it cuts it.



Next, we'll glue the two halves of the fuselage together.

Start by dry fitting the two halves together. It's not unusual for the two halves of the fuselage to be bowed away from each other. This doesn't make any difference as to how they will fit.



What's important is that when the two halves are pressed together they match up without any large gaps. A small gap near the cockpit isn't unusual. You should only be concerned if you have a large gap. If you can't press the two halves together, use your sanding block to carefully match the parts.

Tear off four strips of masking tape, about 10 inches long. Take one of the strips and tear it in half, so it's about an inch wide.



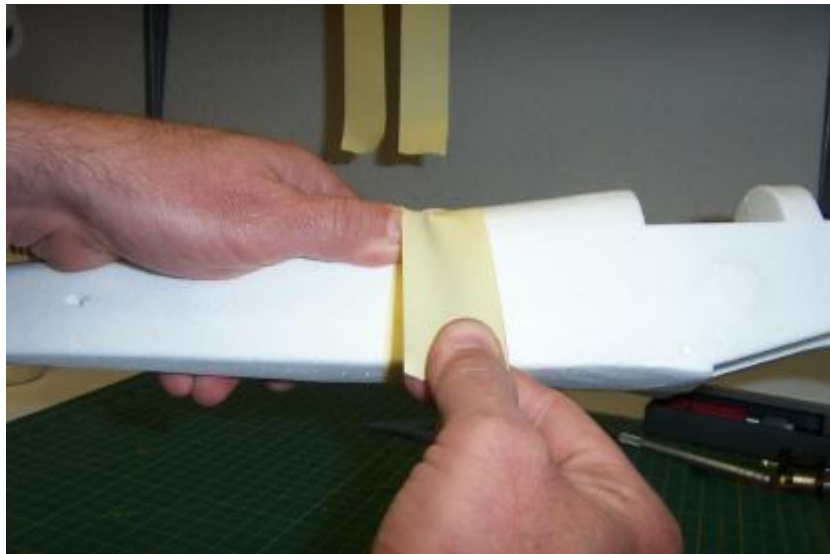
The GWS manual tells you to use "paper tapes" to hold your fuselage together while the glue is drying. The problem with that is most tape will pull the yellow paint right off your model! If you try to use a rubber band, it will leave marks in your fuselage. We are going to hold our fuselage with tape, but we are going to wind it backwards.

Start by holding the two halves of the fuselage together. Line up the cowl area, and wrap the longest piece of tape around the forward edge of the fuselage.



You can see that my left thumb is holding the tape until the other end comes around and overlaps it. The sticky part of the tape should be facing away from the plane! Wind the tape snug, not tight!

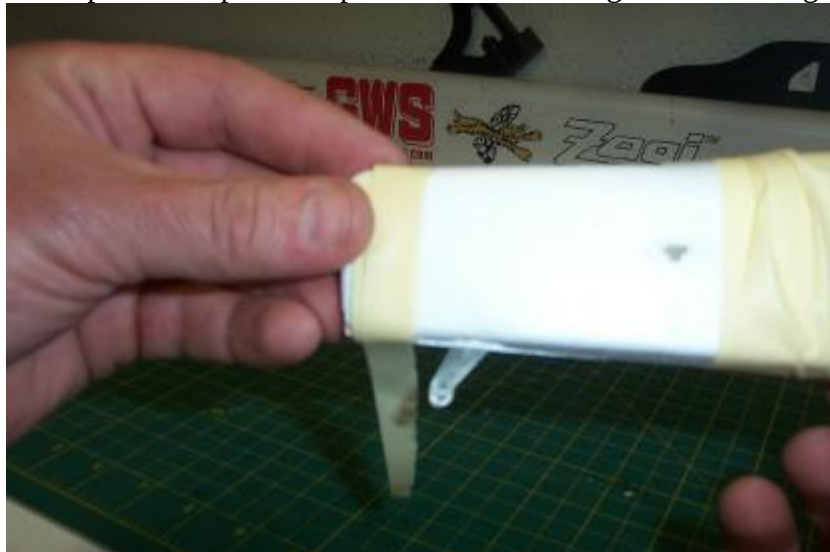
Wrap another piece of tape around the fuselage behind the cockpit using the same technique.



Your third wrap should be a bit in front of the rudder cut out.



Use the last, small piece of tape to wrap around the back edge of the fuselage.



Here's how it looks when it's done. Remember, the sticky side of the tape is facing out!



Starting with the small wind on the end, slide the tape “ring” off the fuselage. Next remove the tape ring from just in front of the rudder area. After that, the ring from behind the cockpit. Finally remove the cowl tape ring.

Examine the inside of the fuselage and make a mental note of all the mating surfaces. Also, notice the tailskid cutout in the right fuselage. If you’re using the stock GWS tailskid it’s important that you apply glue to that cutout. You’ll also want to apply glue to the motor stick cutout on the right fuselage.

To join the fuselage, it’s best to use 15 minute epoxy this give you plenty of time to apply the tape rings and be sure everything is lined up. If you’re confident you can get the two halves aligned quickly, and then use the 5 minute epoxy.

Before you mix up the epoxy, have a paper towel, soaked with rubbing alcohol ready. This is used to clean up any epoxy that squeezes out. If you are building a yellow Tiger Moth, test the alcohol in an inconspicuous place to be sure that it doesn’t remove the yellow paint. I haven’t built a yellow Tiger Moth in some time so I can’t test this to be sure it’s ok!

Mix up a large batch of epoxy and microballoons. Make sure you’ve mixed up more than you need. It’s better to have too much, then not enough. There won’t be time to mix up another batch.

Using a toothpick, or similar applicator, sparingly apply your epoxy and microballoon mixture to all mating surfaces on one side of the fuselage.

Align the other half of the fuselage. Starting with the cowl tape ring, slide it onto the cowl area. This time, push it as far back as it will go. The tape will tighten up against the taper of the cowl area. Be careful not to push any of the rings so far back that you dent

the foam. That much pressure isn't necessary. In order, slide the cockpit ring, the rudder cutout ring, and the back of the fuselage ring onto the fuselage. Slide each ring up a little farther than where they were when you made them.

Using your paper towel and rubbing alcohol, wipe away any excess epoxy.

Hold the fuselage until the epoxy sets up. Use its drying time to make sure that everything is aligned. Pay special attention to the cockpit area. If your fuselage halves are a bit out of alignment after the glue has set, you can always sand them back into shape. However, the cockpit area is difficult to fix. Usually, you'll have to hold the cockpit area together until the epoxy dries.

Once the glue has dried, gently twist and pull on the tape rings to slide them off the fuselage. The masking tape I use is used in auto painting. I don't know if there are different types of masking tape, but this brand (Scotch) has never stuck to any of the epoxy that has squeezed out. This shouldn't be an issue though. You didn't use enough epoxy to have any squeeze out. Did you?

Building The Wings

Lower Wing

Locate the plastic wing joint cover. If you look at the top of the cover, you'll notice an indentation running around the top. This is where you'll cut. Here is a picture for reference.



You can use standard scissors to cut this out, but it's best to use a set of curved scissors. These curved scissors can be purchased at any hobby store for a nominal fee. The curve in the blades makes it much easier to cut out any plastic parts. If you intend to build models, this is a must have item.

Next, we will set the dihedral in the lower wing. Dihedral is the angle in the wings from the fuselage. It's the slight "V" shape made by bending the tips of the wings up. It is important to have dihedral in your wings, as it contributes to the overall stability and turning ability of your Tiger Moth.

To set the wing dihedral, we will not be using the tape provided in your kit. What you'll need is something heavy enough to hold one side of the wing flat against your work surface, and something to prop the other side of the wing up while it dries. I always use a two liter pop bottle half filled with water, and four CD jewel cases.



Start by mixing up a batch of 5 minute epoxy and microballoons. Fold the wing back on itself, so the center seam opens up. Do not fold it so far that you crack the seam!



Apply a liberal amount of epoxy into this center section. Try to put it all right in the middle of the seam.

Place the lower wing on a flat surface and lay the pop bottle flat on one side of the wing. Make sure that the bottle is holding the wing flat, but not crushing the wing! I'll usually flatten my bottle a bit then put the cap on. This takes the roundness out of the plastic bottle and keeps it from rolling off the wing.

Stack up your four CD cases, and slide them under the opposite side of the wing. Here's how it should look. I've left the CD cases hanging out, but you should have them completely under the wing. That way you're sure to get even pressure across the joint. The wing will dry straight.



The GWS instruction manual (page 6 figure 11) shows that with one side of the wings flat on your building surface, the other side should be set to a height of 80mm. Slide the CD cases toward the pop bottle until the wing tip is 90mm off the building surface. The extra 10mm allows for some “droop” in the wings once the glue cures.



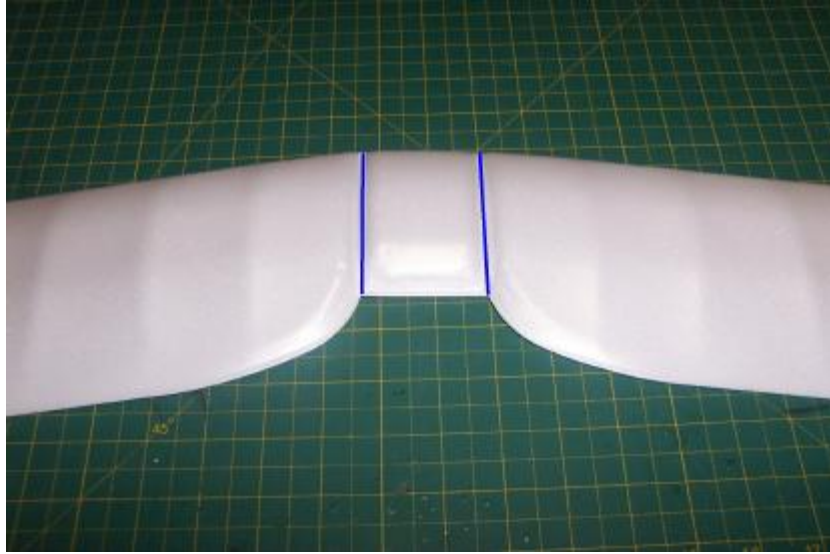
Located in the same bag that held the wing joint cover, you'll find two pieces of double sided tape. Apply this tape to the bottom of the wing joint cover per the GWS manual. (Page 6 figure 10) and install the wing joint cover.



Upper Wing

The upper wing builds almost identical to the lower wing. Again, we will not be using the GWS tape method, but epoxy to set the dihedral.

Just as you did for the lower wing, mix up a batch of 5 minute epoxy and microballoons. Apply the epoxy into the middle of the seams on the upper wing.



Set something with enough weight to hold the wing flat between the epoxy filled seams. I'm using a half filled bottle of rubbing alcohol. Again, be sure that it is heavy enough to hold the wing flat, but not heavy enough to damage the wing.

Take your CD cases, and slide them under each side of the wing at the same time.



The GWS manual tells us that with the center section flat, each wing tip should be raised to 38mm. Using your CD cases, adjust the height of the wingtips to 46mm. Again, the extra height allows for droop.



As a note, I realize that my measurements would be off since I have the center section on a mat. I've allowed for the thickness of the mat. I just couldn't have taken any decent pictures of a white plane on a white building table so I've tried to use the mat as a background.

When the epoxy cures, you're done with the wing build. There is no need to apply the PVC wing joint tape to the upper wing. (Page 7 figure 14)

Horizontal Stabilizer and Vertical Fin

Locate the foam sheet that contains the horizontal stabilizer and vertical fin. Carefully remove them from the foam. Save the foam scrap for use later.

Look closely at the stabs and you'll see that one side one side is flat, the other is grooved. The grooved side of the horizontal stab is the bottom. We'll build this one first.

Using both hands, carefully flex the elevator on the horizontal stab to "loosen up" the foam. (The elevator is the part that moves. The stabilizer is the part that gets fastened to the fuselage)



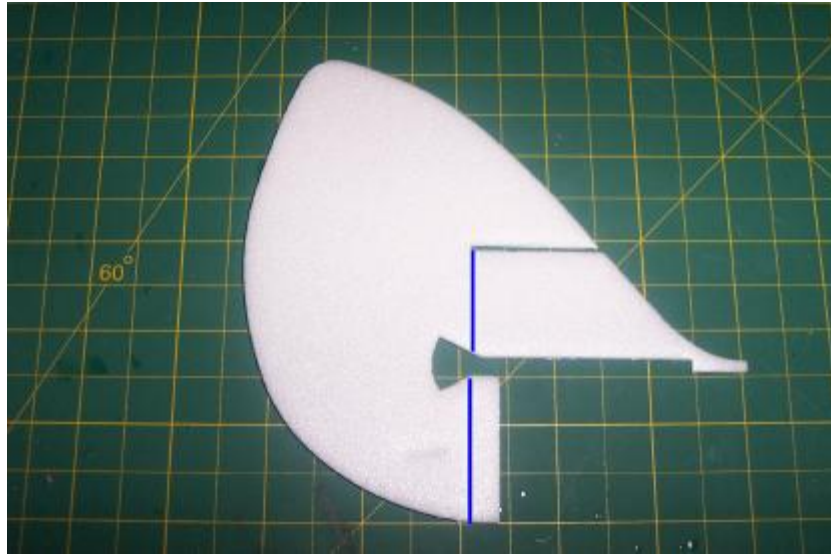
Flex one side, then the other. Try not to crack the foam joint. If you do, it won't make much of a difference, but its best as one solid piece.

Next, locate the clear tape that is provided in the kit. It's on the decal sheet. Using the longest piece lay the tap across the flat side of the seam.



Once you have the tape secured, continue to flex the seam back and forth until it loosens up.

Repeat this process for the rudder. Notice that the rudder's seam in on both the vertical stabilizer and below it where it fits into the back of the fuselage.



Painting

If you're building a white Tiger Moth, now it's time to paint it. Whatever paint you decide to use, test it first on the scrap foam left over from the stabilizers. Most spray paint eats foam, so be careful!

Before you paint, it's best to lightly sand the fuselage. Use a sanding block and fine sandpaper to remove the mold marks. Also take this opportunity to sand the two halves of the fuselage into alignment. When you're done sanding, wipe the plane down in rubbing alcohol to remove any dirt and oil.

Painting the Tiger Moth isn't so much painting as it is dusting. When finished, you should still be able to see the white foam under the paint. Paint adds a lot of weight. If you try to cover the white completely, you'll turn a nice floating plane into a flying pig. If you can, try to incorporate the white of the foam into your paint scheme.

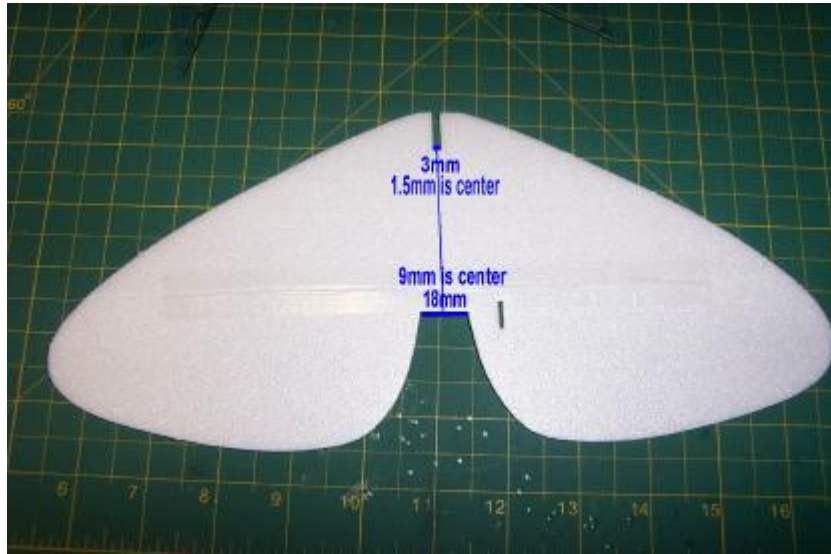
If you paint with spray cans, hold the can as far away from the plane as you can and allow the paint to fall onto the plane. Spray paint contains acetone. Acetone dissolves foam. If you hold the can as far away from the plane as you can when you spray, it gives the acetone a chance to evaporate before it touches your plane.

Details can be added later with a sharpie marker. While markers don't look as good as paint, they add virtually no weight.

Installing The Tail Feathers

To install the horizontal stabilizer, you'll need to find the exact center. The notches in the center of the stabilizer and elevator are 3mm and 18mm respectively. Half of that would be the center of the stabilizer. Working on the side that the tape is on (the top)

measure 9mm across the bottom opening and 1.5mm across the top. This is the center of the stabilizer. Draw a line to mark the center.



Now, flip the assembly over and place a small mark at 9mm on the bottom of the elevator.

Trial fit the assembly to the fuselage. If it is crooked, use your sanding block and sandpaper to align the halves.



Mix up some 5 minute epoxy and microballoons. Lightly coat the mounting surface on the fuselage with epoxy. Align the horizontal stabilizer, with the line up, with the center of the fuselage. Use the fuselage seam as a guide. Once you get the stab lined up, use pins to hold it in place. Carefully flip the fuselage over and look at the mark you made on the bottom of the elevator.

Looking through the rudder mounting slot at the back of the fuselage, make sure your mark lines up with the fuselage seam. This ensures that your stabilizer is straight.



After the epoxy has cured on the horizontal stabilizer, remove the pins and trial fit the vertical stab and rudder. Once you are satisfied with its fit, mix up another batch of epoxy and microballoons and secure it to the top of the horizontal stab. (page 9 figure 25) and the slot in the back of the fuselage. Be sure that you do not push the stab to far into the fuselage! You want the hinge line to fall just behind the fuselage.

While the epoxy is drying, use your triangle to make sure the vertical stab is truly vertical.



You can see that a spring clip not only holds the bottom of the vertical stab while it dries, but also act as a stand for the plane. Remember when you're setting the angle of the vertical stabilizer that you are in fact using the vertical stabilizer and not the rudder! The rudder is the part that moves, the vertical stab doesn't. Place your triangle on the stabs, not the moving surfaces!

Wing Mounts

This is very straight forward. Use a drill, or your hobby knife, to open up the holes in the side of the fuselage.



Insert the supplied dowel rods into the hole making sure that there is an equal amount of dowel showing on each side of the plane.

Secure the dowels with a few drops of foam safe CA

Motor Cowl

Using your curved blade scissors, follow the indentation and cut out both halves of the motor cowl.

Looking at each side of the cowl, you'll see little dot like indentation. These dots are where the screws go to mount the cowl to the fuselage. Put the blade of your hobby knife on these indentations, and spin the knife to drill a hole in the cowl. Do not make the hole to big. A smaller hole will help hold the screws in place.

Place one half of the cowl up to its respective side of the fuselage. Line up the holes you just made in the cowl with the cowl mounts that you glued in place. While holding the cowl and fuselage with one hand, use your hobby knife to drill a starter hole in the cowl mount. This hole doesn't have to go all the way through the cowl mount. It's just used

to get the screw started. Install the screw and repeat the process for the other three cowl screws.

Once you have the cowl mounted, you'll see a bit of overlap between the two cowls. GWS recommends that you use this overlap to glue the two cowl halves together. We won't be doing that.



Using Scotch brand crystal clear tape, pull a piece that is longer than the top of the cowl. Do not use the cutter on the dispenser to cut the tape. Instead, use a pair of scissors to cut the tape. If you use the cutter, you get a jagged edge on the tape. This jagged edge will show. If you use scissors to cut the tape, the clean cut edge will be almost invisible.

Lay your scissor cut piece of scotch tape along the cowl seam from front to back. The seam will not be right on the center line of the plane. There is a way to make your seam line up with the center line of the plane, but this is unnecessary. Once the cowl is painted, the seam will blend in nicely.

Next, remove the four screws holding the cowl in place. Open the two cowl halves up, bending them along the tape hinge line. Using your curved blade scissors, remove the part of the cowl that is overlapping on the inside of the cowl.

Wipe the inside of the cowl with rubbing alcohol and allow it to dry. When it's dry, lightly dust the inside of the two cowl halves with spray paint.

When the paint had dried, install the IPS motor on the stick, (page 10 figures 29-30) and re-install the cowl.

Main Landing Gear

Locate the wheel rims and the rubber o-rings that are to be the tires.



Slip the o-rings onto the wheels and secure them with thin CA glue. (Page 11 figure 36)

Locate part #4 from the plastic parts frame and cut out two of them with your hobby knife.

The spokes of the GWS wheels are made to act as a shock absorber. To this end, they must be installed properly. If you look at page 11 figure 36 picture 2 of your manual, you'll notice that the wheel there is facing forward, if the plane it were mounted on were facing to the right. Notice how the wheels are oriented in the below picture. There wheels are mounted in the proper direction.



Once you are sure you have the wheels oriented correctly, use the #4 fasteners to secure them to the landing gear.

The problem with the GWS landing gear is that on a hard landing the landing gear wire flexes outward, into the foam. After a few hard landings, the sides of your fuselage will have crack in them from the landing gear. This mod fixes that.

Using dental floss, or a heavy sewing thread, begin to wrap the thread around the landing gear just above where the gear would fit into the fuselage. Wind the thread back and forth, in and out of the gear. After 8 or so winds, tie the ends of the string together and cut off the excess ends. Gather the thread up at the base of the gear, just before it turns down into the legs that support the wheels. Here is how it should look.



Open up your thin CA, and put a few drops onto the thread. Allow it to wick into the thread and dry.

After it has dried, carefully bend the landing gear back into shape. You should be bending the gear right at the thread. You want your gear to look like this when you are done.

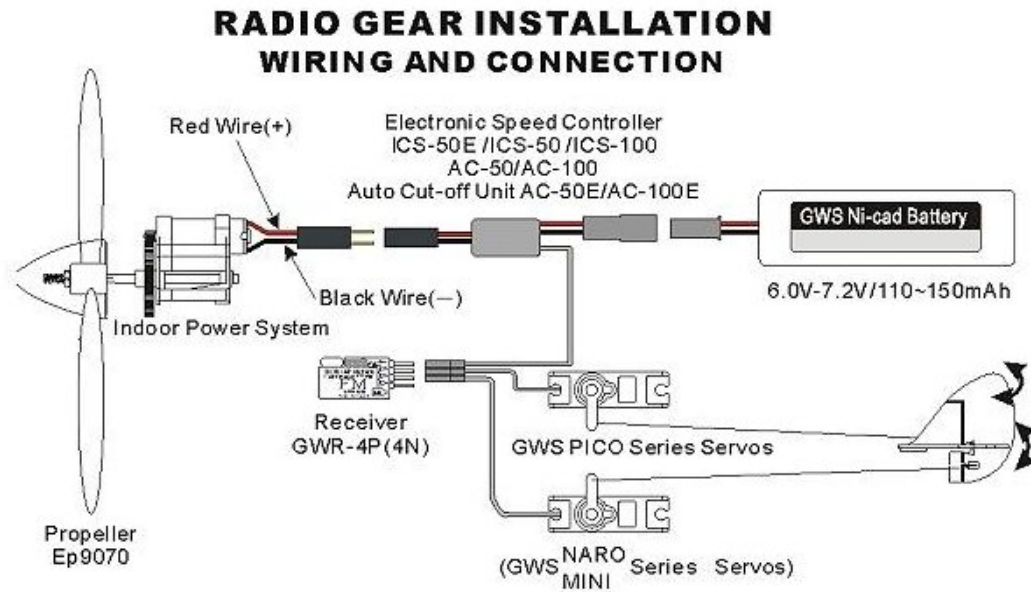


Insert the landing gear into the landing gear slot, and make sure that it fits properly. Once you are satisfied with the fit, remove the gear and put some epoxy and microballoons along the bottom of the landing gear slot. There is no need to put epoxy on the sides of the landing gear slot. The landing gear will never touch the sides of the fuselage anyway. Push the landing gear back into the slot, seating it at the bottom of the slot. Add a little more epoxy along the wire to make sure you get good adhesion.

This mod transfers the force of landing off the sides of the thin fuselage walls to the thicker top of the fuselage.

Your Tiger Moth will not stand on its own two feet!

Hooking Up The Controls

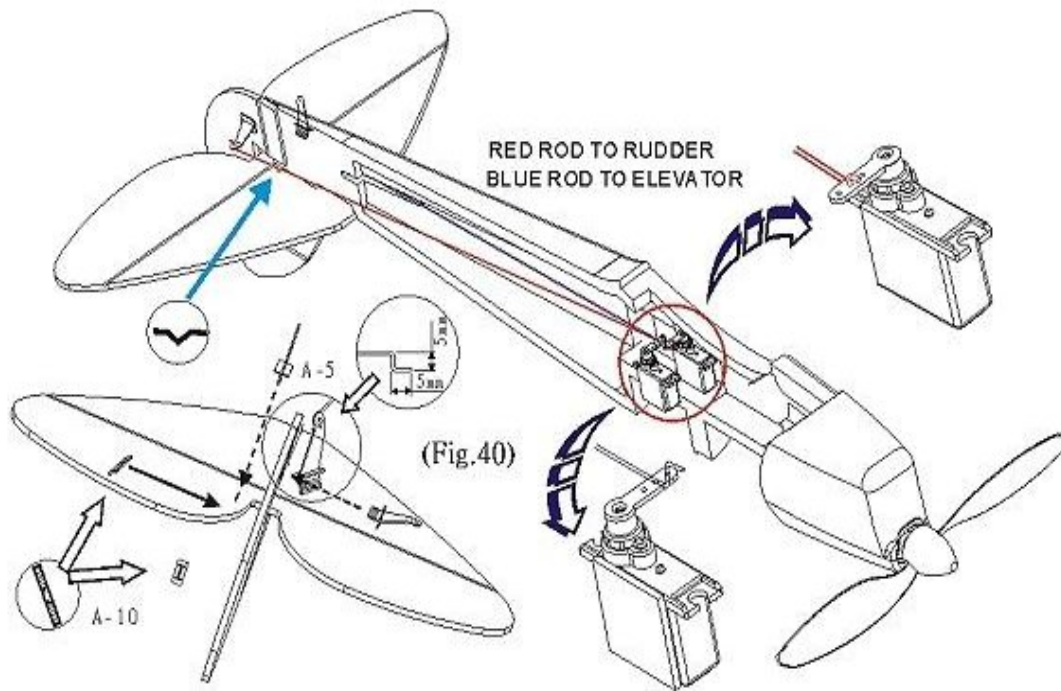


Connection for Receiver, Servos and Electronic Speed Controller

Connections for receiver, servos and speed controller (Auto Cut-off Unit) are different according to the transmitter you are using. Please refer to the following chart for easy understanding.

	Futaba TX	JR TX	Sanwa (Airtronics) TX	Hi-tec TX
GWS RX4/B	Rudder/Battery	Rudder/Battery	Rudder/Battery	Rudder/Battery
3	Throttle	Elevator	Elevator	Throttle
2	Elevator	Aileron	Aileron	Elevator
1	Aileron	Throttle	Throttle	Aileron

PICO-TIGER MOTH



(Fig.41)

The diagrams in the GWS instruction manual do a good job of showing where and how the gear hooks up. There are a few things that should be addressed.

Before mounting the servos, sand off the round mold marks inside the fuselage. You want the servos to sit flat against the fuselage.

The servos mount fine with the supplied double sided tape, usually. As an extra bit of caution, you should use a few drops of hot glue to help secure them. If you don't have a hot glue gun, wrap the servo in tape and epoxy it to the fuselage. This way you can remove the servo from the plane later.

If you're new to Z bends, check out the [Z bend](#) section at the end. Du-bro makes a micro pushrod system that is hard to beat!

The GWS control horn works well, but over time the retainers loosen up. This makes control difficult if not impossible. To remedy this, run a small bead of hot glue down each side of the retainer where the horn comes through. If you don't have a hot glue gun, a drop of foam safe CA will work.

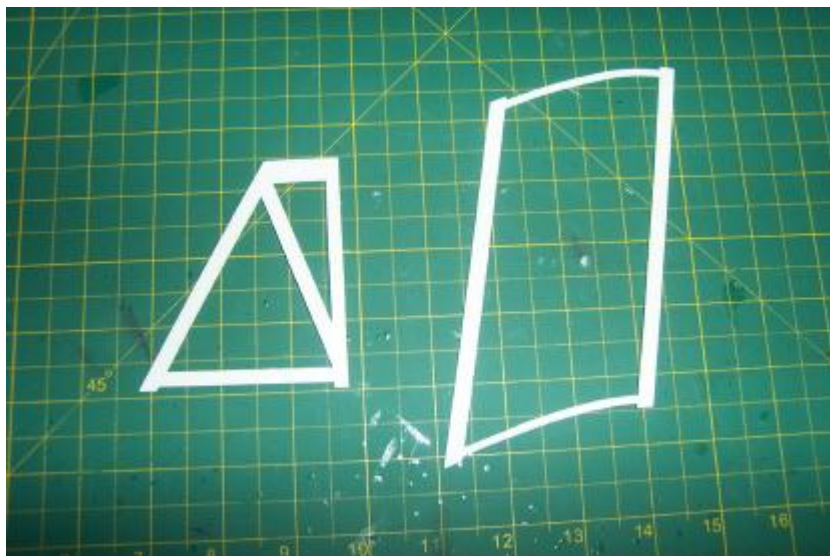
Remember too, that the control horns mount a certain way! The holes on the horn should be located over the hinge line. They are bent the way they are for a reason!

Route the antenna out behind the back of the wing saddle. (Where the wing meets the fuselage) Run the antenna along the bottom of the fuselage, to the tailskid. Use your hobby knife to drill two small holes at the top of the tailskid. Weave your antenna wire through these holes. It will hold your antenna tight and keep it out of the control surfaces.



Wing Assembly

Start the wing assembly with the struts.



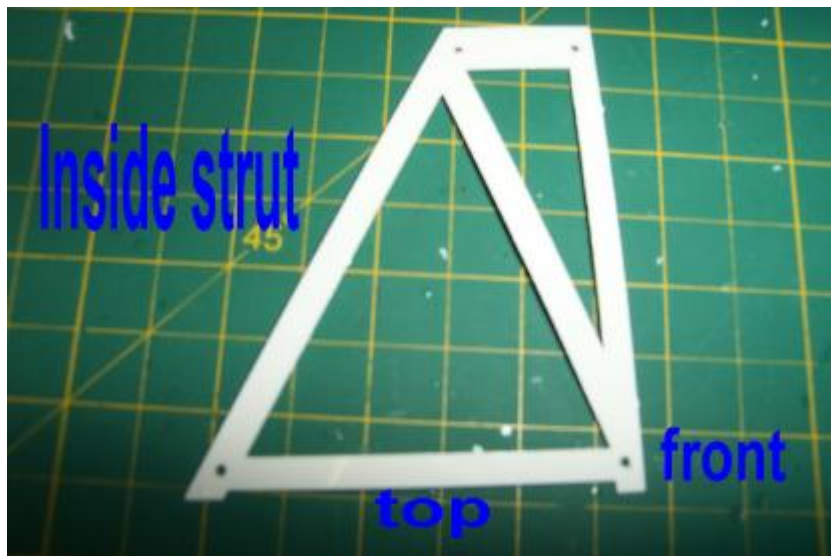
For some reason, people seem to think that these struts need to be replaced with wooden ones, or at least sandwiched between two pieces of wood. Adding wood to this plane

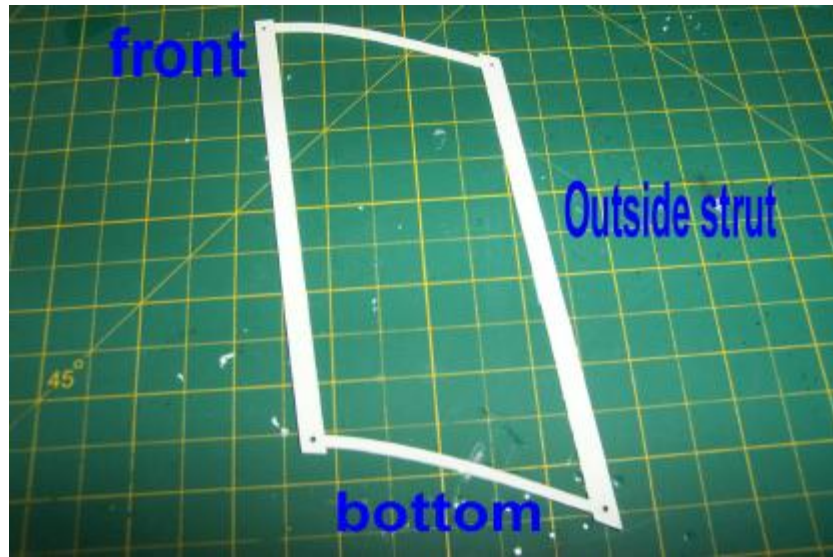
would add unnecessary weight. Here's a better idea that not only reinforces the wing, but looks great too!

Start by using your #11 hobby knife to drill four very small holes in the corner of each strut.



Here is how they look when they are done. Along with notes on how they are oriented. (Sorry I took the pictures upside down. Refer to page 14 figure 42 picture 5)

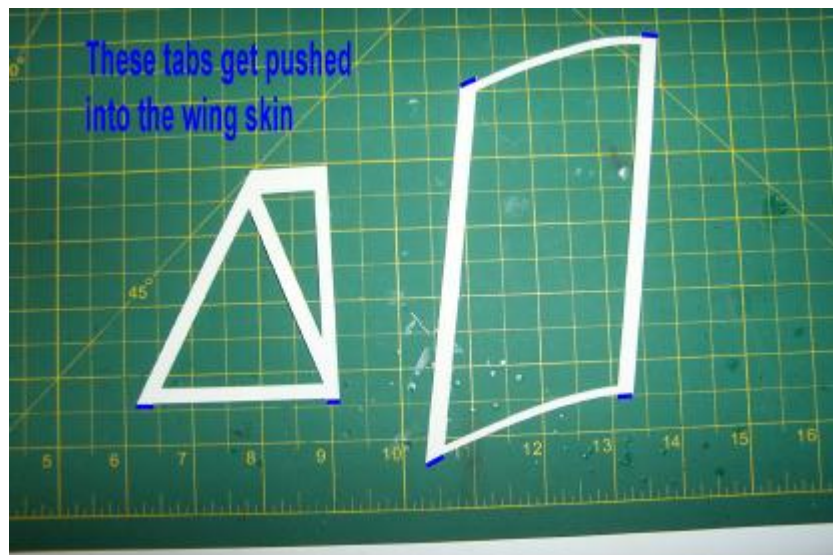




After you get the holes drilled, you can paint the strut.

If you refer to page 13, figure 41 you'll find some excellent pictures on how to install the struts to the wings. If you look carefully on the top of the bottom wing, and the bottom of the top wing, you'll find four small indentations. These indentations are where the struts mount. However, some clarification on the positioning and installation of the struts are in order.

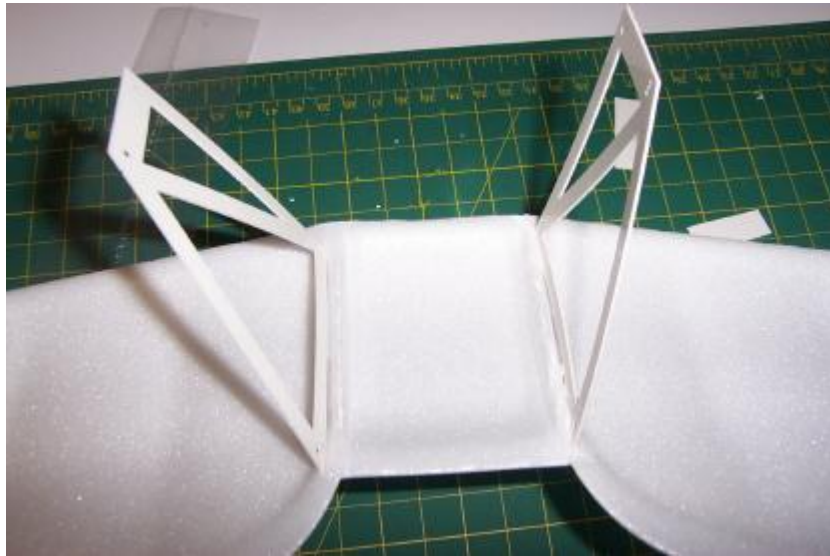
When you glue the struts into the wing, push the tabs on the struts into the wing skin. You might have to use your hobby knife to cut a slot for them to fit into.



Once you get the slots cut, tear off a number of pieces of masking tape and have them at the ready. Double check that you have the strut orientation correct. If everything dry fits, mix up a batch of epoxy with microballoons.

Starting with the lower wing, place a small dab of epoxy on each indentation where the strut is to be mounted. Push the strut into the indentation and secure it with masking tape. You may have to hold it for a few minutes until the epoxy tacks up. After the glue cures, go along the bottom of the strut and secure the rest of it to the wing with drops of foam safe CA.

The top struts should line up along the outside of the seam on the top wing. In the picture below, you can see where I have a gap between the seam and the strut. After the glue has dried, you can go back and fix this with foam safe CA.



Since the inside struts must “bow” to touch the seam, you must hold the strut in place until it dries. It is important that the struts be glued securely to the seam.

Once the glue cures on the top wing struts, attach the outside struts to the upper wing. There is no easy way to do this. You have to hold the struts straight while they dry as you support the weight of the wings.

Attaching The Wings To The Fuselage

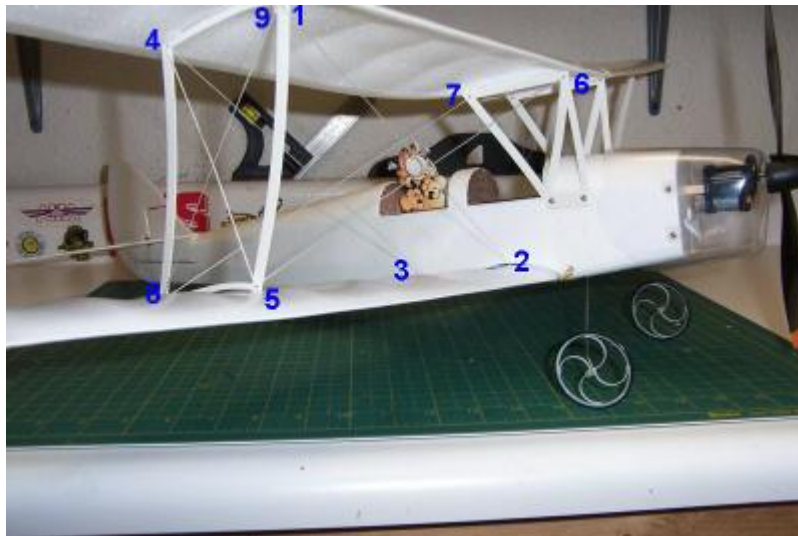
Refer to page 14 figure 42 of your GWS manual. The pictures here are excellent. The only recommendation I have is that when you put the strut screws into the mounts, you first start a pilot hole with your hobby knife. Like the cowl mounts, the hole doesn't need to go all the way through. It only needs to be deep enough to allow the screw to bite into the plastic.

Installing Flying Wires

This mod should have been part of the kit the whole time. Without installing flying wires, you'll rip the wings right off your Tiger Moth on the first loop. Even if you never

intend to loop your Tiger Moth, the flying wires do more to improve the looks of your plane than any other mod.

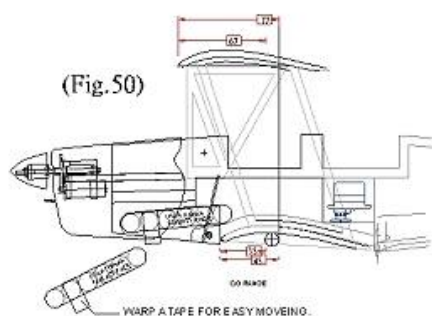
Start by pulling off a few feet of either dental floss or heavy thread. Use whatever color you'd like. I'm using the same heavy white thread that I used on the landing gear. Tie the thread into a knot at position #1 and apply a single drop of thin CA. Remember thin CA is **NOT** foam friendly. So, be sure you don't get any on the wings! Eyeball a straight line from position #1 to position #2 on the lower wing. You'll notice that the wing joint cover hangs out a bit from under the fuselage. This is what you want. Use your hobby knife to drill a small hole through the wing joint cover and through the bottom wing. Fish the string through that hole and out the bottom of the wing. Again, eyeball a straight line from position #4 to position #3. Use your hobby knife to again drill a hole through the wing joint cover. This creates the hole for position #3. Fish the thread from position #2, up through the bottom of the wing, and out the top of position #3. After that, follow the pattern all the way to position #9. Once you get to position #9, go back through and take any slack out of your thread. You don't want the thread guitar string tight, just snug. A bit of play is fine. Once you are satisfied with the tension on the thread, put a drop of thin CA on position #9. Tie off the string that is left at position #9 and cut off any excess thread. Repeat for the other wing.



TIPS AND HINTS

PREFLIGHT CHECKS

It is always recommended that you charge your transmitter and receiver batteries as well as the battery pack for the motor before attempting to fly your airplane.



The Center of Gravity (C.G./balancing point) is located 35~45mm back from the leading edge of the lower wing. After all radio gear and the battery pack is installed, check the C.G. point of your airplane. If the balancing point is offset, move the receiver and speed controller forward or vice versa until you find the recommended balancing point.

(Fig.50)

Check the radio gear and the linkage thoroughly on the ground and make sure that all the control surfaces are working properly and correctly before attempting to take off your airplane.

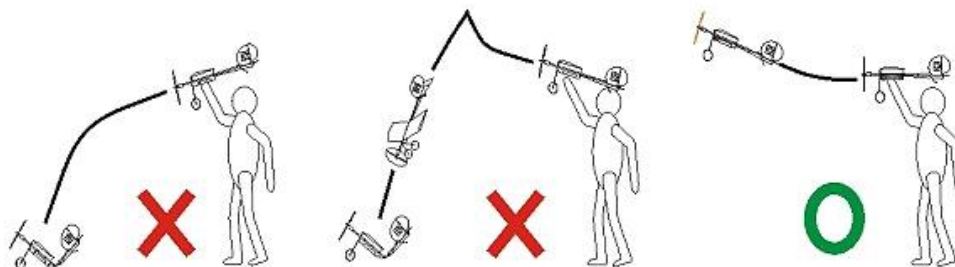
We recommend that you should check the range of your radio before the first flight of the day.

FLIGHT

Always turn on the receiver last after turning on the transmitter, and shut off the receiver first before turning off the transmitter.

You can take off your airplane from the smooth surface ground, normally 1-3 meters for run and take off.

If you are hand-launching your model, move the throttle stick up fully and see if the motor is running at the maximum rpm. Then, throw your model to the air horizontally as shown and apply up elevator as model climbs at a shallow angle. If you launch your airplane at a steep angle, upward or downward, it may result in a crash of your model.



CAUTION

- If you are only beginner for the radio control model flying, do not attempt to fly your model without any assistance or advice from advanced and expert fliers.
- Do not fly close to buildings, electric power lines, or roads. Do not fly near other people who are not aware of what you are doing.

NEVER FLY OVER PEOPLES' HEADS OR CARS .

- Fly on a calm day. Gusty winds will make it hard for you until you learn to control your aircraft well. Turbulence caused by wind blowing over near by trees and buildings will make it very difficult for you to fly. Pick an open area and wait until the wind is calm.

If you are going to attempt to fly your airplane in the indoor arena, closer attention and more safety preparation must be made in order to avoid any possible casualties or damage to property.

- If you are flying at a field with other modelers, DO NOT turn on you transmitter until you are certain that no one else is using your channel.

LIMITED WARRANTY

- Your new GWS PICO-TIGER MOTH airplane kit is warranted against defects in material and workmanship.
- This warranty does not apply to any component parts, which have been improperly installed, handled, abused, damaged, modified and used.

WARNING:

- If you are a beginner to R/C model flight then we strongly recommend you seek advice from your supplier and local model flying club before attempting to fly your model.

This model is not a toy and must be assembled and used responsibly in order for successful flight to be achieved.

- Improper use of this model may lead to injury or damage to persons or property. GWS and their distributors will not accept any responsibility for any injury or damage arising from improper use of this model.

- E & O E



Du-bro makes a fine line of accessories for park flyers. Their tail wheel assemblies work well on the Tiger Moth. A real tail wheel will eliminate the cheesy looking control horn. For the ultimate in tail wheel assemblies, check out LighterRC's [steer-able tail assembly](#). It puts the stress on the fuselage, but hooks to the rudder. Nothing looks cooler than taxiing out to the runway!

The stock GWS wheels are very weak. Replace them with [Du-bro's 2" micro light wheels](#). To secure them to the landing gear, cut a small circle out of paper and push it onto the landing gear wire. Secure the paper with a drop of epoxy. After the epoxy dries, use a marker to color it black. I've never had a wheel pop off!

North East Sailplanes sells a nice [super light wheel](#). It's a bit big at 2.5", but they look and work great!

Making Z bends to secure your control wires is a real pain. It also makes adjustments difficult. To avoid this hassle, check out [Du-bro's RC micro pushrod system](#).

Need more mods? Check out [Ezone's warehouse of information on the GWS Tiger Moth!](#)

Prop Savers

If you crash, or have a less than perfect landing, the orange GWS props are suppose to snap in two. This is both good, and bad. Good, because it prevents the prop from acting like a giant lever and bending the gearbox output shaft. It is bad because you'll go through a ton of props. To prevent this, you should install a prop saver.

This version of the prop saver was first posted on [Ezone by t j-rome](#). It's takes 2 minutes to make, and works very well. The only drawback is that it's almost impossible to use a spinner with it. A small price to pay to save a fortune on props though!

Begin by finding an extra servo horn. For this example I'm using a one with four arms. A two arm horn works just as well. You'll also see in the picture that we use two GWS prop shaft washers, two GWS prop shaft nuts, and a couple of small rubber bands. The rubber bands I'm using can be found in the hair care section of any store. These rubber bands are used to hold very small hair braids (cornrows).



The next step is to sandwich the servo horn between the washers, held in place by the two nuts. The nut that is on the end of the prop shaft should have no more than a few threads sticking out the end. If you turn it down to far, the prop will not be able to fold.



Using a pair of needle nose pliers, bend two opposing arms back toward the motor. They bend quite easily, and will retain the bend well.



Finally, put the prop on the end of the shaft and secure it with two or three small rubber bands. To test your prop saver, simulate a prop strike by pushing the prop down onto your work table. The prop should fold over.



Always check the condition of your rubber bands before you fly. They do tear and deteriorate with use. Losing a prop in flight is just as bad as breaking a prop!

Making Pilots

Every plane needs a pilot, and the Tiger Moth is no exception! If you have a printer and a paint program you can add any pilot you want to your Tiger Moth. Here's how.

Cartoon characters work best. But, you can use any picture you have. For this Tiger Moth, I decided to use Garfield.

Start by opening up the picture in your paint program. Using the resize option, scale the picture so that it looks right in your plane. Don't worry about making it true scale. What you're after here is more cartoon scale! Resize and print your picture until you're happy with the size. Then print it out. Go back into your paint program and chose the mirror option. Print that out also.

Next, cut out one of the pictures. Don't worry about trimming it around all the details. You can see in the picture below that I left Garfield's whiskers as one solid piece.



Rough cut the other picture out. Using a glue stick, attach it to a disposable foam plate.



Use your #11 hobby knife to cut the picture out of the foam.



Now, flip the picture with the foam backing over and glue the other picture to it. You might have to use your hobby knife to fine tune the fit. Here's how it looks.



To secure the pilot to the plane, a dab of epoxy on the bottom of the pilot is all it takes. When you line up your pilot in the cockpit, be sure to set him up parallel to the seam in the fuselage! If you get him crooked he'll no longer be a pilot, but a rudder!

Here are a few more pilots to get you started. I've also included a picture of an instrument panel. You'll have to trim it to fit. Use a glue stick to secure it to the cockpit.

