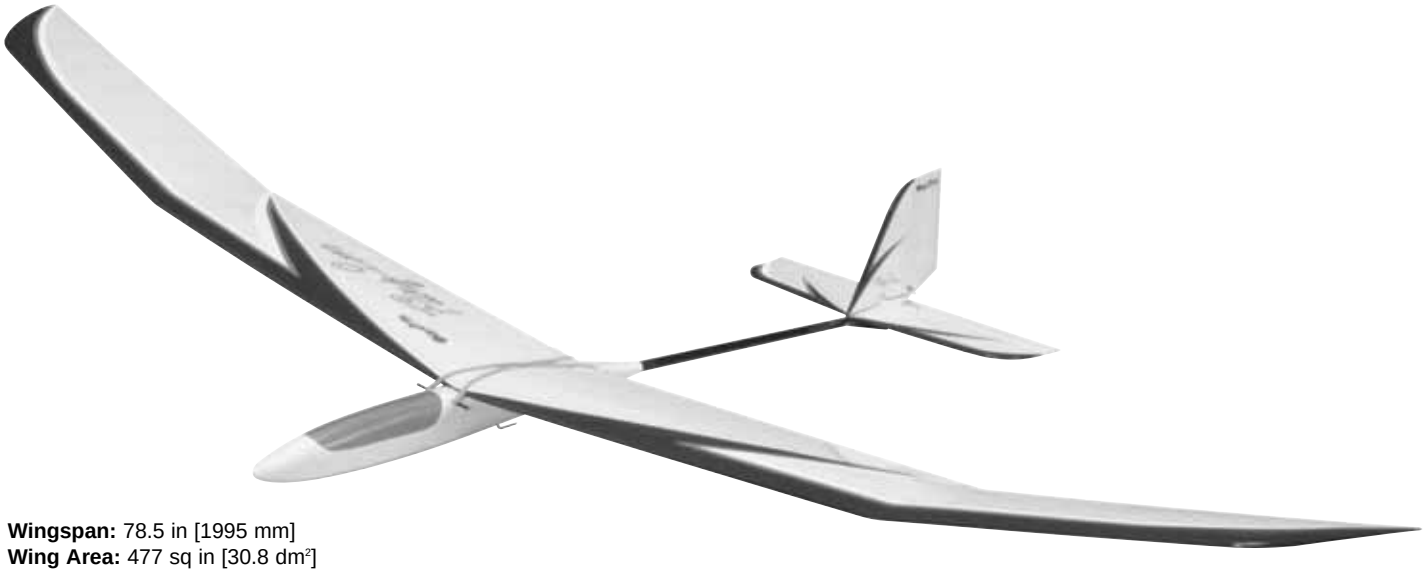
Fling™ 2m ARF

INSTRUCTION MANUAL



Wingspan: 78.5 in [1995 mm]
Wing Area: 477 sq in [30.8 dm²]
Weight: 19 – 21 oz [540 – 595 g]
Wing Loading: 5.7 – 6.3 oz/sq ft [18 – 19 g/dm²]
Length: 40 in [1015 mm]
Radio: Minimum 2-channel with two micro, mini or standard size servos

WARRANTY

Great Planes® Model Manufacturing Co. guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. **In no case shall Great Planes' liability exceed the original cost of the purchased kit.** Further, Great Planes reserves the right to change or modify this warranty without notice.

In that Great Planes has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the 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.

To make a warranty claim send the defective part or item to **Hobby Services** at the address below:

Hobby Services
3002 N. Apollo Dr., Suite 1
Champaign, IL 61822
USA

Include a letter stating your name, return shipping address, as much contact information as possible (daytime telephone number, fax number, e-mail address), a detailed description of the problem and a photocopy of the purchase receipt. Upon receipt of the package the problem will be evaluated as quickly as possible.

READ THROUGH THIS MANUAL BEFORE STARTING CONSTRUCTION. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.

GREAT PLANES® MODEL MANUFACTURING COMPANY
Champaign, Illinois
(217) 398-8970, Ext 5
airsupport@greatplanes.com

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INTRODUCTION

The Fling™ 2M ARF is a great way to have fun and try your hand at R/C soaring flight. The Fling 2M ARF has few parts. Assembly is quick and easy, and you'll get to the flying field fast, whether it is a sports park or a larger flying site. The Fling 2M ARF can be hand-launched for low-level thermal hunting fun, or you can use a 2-meter type hi-start and send your Fling 2M ARF to higher soaring flights. Have a friend get a Fling 2M ARF too, and you can have "first up / last down" contests or compete against each other trying to land the Fling 2M ARF closest to a certain place, a spot landing! Have fun with your new Fling 2M ARF!

For the latest technical updates or manual corrections to the Fling 2M ARF visit the Great Planes web site at **www.greatplanes.com**. Open the "Airplanes" link, and then select the Fling 2M ARF. If there is new technical information or changes to this model a "tech notice" box will appear in the upper left corner of the page.

AMA

We urge you to join the **AMA** (Academy of Model Aeronautics) and a local R/C club. The AMA is the governing body of model aviation and membership is required to fly at AMA clubs. Though joining the AMA provides many benefits, one of the primary reasons to join is liability protection. Coverage is not limited to flying at contests or on the club field. It even applies to flying at public demonstrations and air shows. Failure to comply with the **Safety Code** (excerpts printed in the back of the manual) may endanger insurance coverage. Additionally, training programs and instructors are available at AMA club sites to help you get started the right way. There are over 2,500 AMA chartered clubs across the country. Contact the AMA at the address or toll-free phone number below.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
Tele: (800) 435-9262
Fax (765) 741-0057
Or via the Internet at:
http://www.modelaircraft.org

IMPORTANT!!! Two of the most important things you can do to preserve the radio controlled aircraft hobby are to avoid flying near full-scale aircraft and avoid flying near or over groups of people.

PROTECT YOUR MODEL, YOURSELF & OTHERS...FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS

1. Your Fling 2M ARF should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, the Fling 2M ARF, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.

2. You must assemble the model **according to the instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. In a few cases

the instructions may differ slightly from the photos. In those instances the written instructions should be considered as correct.

3. You must take time to **build straight, true** and **strong**.

4. You must use an R/C radio system that is in first-class condition, and correctly sized components (batteries, hardware, etc.) throughout the building process.

5. You must correctly install all R/C and other components so that the model operates correctly on the ground and in the air.

6. You must check the operation of the model before **every** flight to insure that all equipment is operating and that the model has remained structurally sound. Be sure to check clevises or other connectors often and replace them if they show any signs of wear or fatigue.

7. If you are not an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.

8. **WARNING:** The fuselage included in this kit is made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow to remove fiberglass dust, as the dust will blow back into your eyes. Always wear safety goggles, a particle mask and rubber gloves when grinding, drilling and sanding fiberglass parts. Vacuum the parts and the work area thoroughly after working with fiberglass parts.

We, as the kit manufacturer, provide you with a top quality, thoroughly tested kit and instructions, but ultimately the quality and flyability of your finished model depends on how you build it; therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

Remember: Take your time and follow the instructions to end up with a well-built model that is straight and true.

DECISIONS YOU MUST MAKE

This is a partial list of items required to finish the Fling 2M ARF that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

Radio Equipment

If purchasing a complete system, the Futaba® 3FR single stick, 3-channel transmitter with R114ZH mini receiver and two S3003 standard servos is recommended (FUTJ52**). Replace the "**" with the channel number you wish to order. (For example, if you wish to order a system on channel 44, order FUTJ5244).

The 3FR does not come with the battery needed for the Fling 2M ARF. The Great Planes 4.8V 350mAh NiMH battery is best suited for this plane and is recommended.

If you are purchasing your components separately, refer to the following list for guidelines or ordering numbers.

- Any 2-channel (or more) 72 MHz FM transmitter, such as the Futaba 3FR (FUTJ52**)
- Great Planes ElectriFly™ 4-channel mini receiver w/o crystal (GPML0044 for low band, GPML0045 for high band) or similar lightweight micro receiver.
- Low band receiver crystal for Great Planes mini receivers (channels 11 to 35, FUTL62**)
- High band receiver crystal for Great Planes mini receivers (channels 36 to 60, FUTL63**)
- (2) Micro servos, such as the Futaba S3101 micro precision servos (FUTM0033)

-or-

- (2) Standard servos, such as the Futaba S3003 servo (FUTM0031)
- Great Planes 4.8V 350mAh NiMH receiver battery (GPMP0950)
- Hobbico® 6" [153 mm] Command Extension with Futaba J-connectors (HCAM2000) (for battery to receiver connection)

Note: An on/off receiver switch is not used. When ready to fly, the battery is simply connected to the receiver.

ADDITIONAL ITEMS REQUIRED

Adhesives and Building Supplies

This is the list of hardware and accessories required to finish the Fling 2M ARF. Order numbers are provided in parentheses.

- ❏ Up-Start 2m (up to 200' launches at sites with 300' or more launch area) (DYFP8305)
- ❏ Great Planes Pro™ 30-minute epoxy (GPMR6047) or Great Planes Pro 6-minute epoxy (GPMR6042)
- ❏ Hobbico #1 Hobby knife (HCAR0105)
- ❏ Hobbico #11 Blades (5-pack, HCAR0211)
- ❏ Hobbico 1/4" [6 mm] R/C foam rubber – (HCAQ1000)
- ❏ 3/32" [2.4 mm] Drill bit
- ❏ Great Planes stick-on segmented lead weights (GPMQ4485)

Optional Supplies and Tools

Here is a list of optional tools mentioned in the manual that will help you build the Fling 2M ARF.

- ❏ Great Planes Plan Protector™ (GPMR6167) or wax paper
- ❏ Great Planes 2 oz. [57 g] Spray CA activator (GPMR6035)
- ❏ Great Planes mixing cups (GPMR8056)
- ❏ Great Planes epoxy brushes (6, GPMR8060)
- ❏ Hobbico builder's triangle set (HCAR0480)
- ❏ Great Planes Threadlocker™ thread-locking cement (GPMR6060)
- ❏ Denatured alcohol (for epoxy clean up)
- ❏ Top Flite® Panel Line Pen (TOPQ2510)
- ❏ Hobbico Z-bend pliers (HCAR2000)
- ❏ Great Planes AccuThrow™ deflection gauge (GPMR2405)
- ❏ Great Planes CG Machine™ (GPMR2400)

IMPORTANT BUILDING NOTES

• Whenever just ***epoxy*** is specified you may use **either** 30-minute (or 45-minute) epoxy **or** 6-minute epoxy. When 30-minute epoxy is specified it is **highly** recommended that you use only 30-minute (or 45-minute) epoxy, because you will need the working time and/or the additional strength.

• ***Photos*** and ***sketches*** are placed before the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

• The stabilizer and wing incidences have been factory-built into this model. However, some technically-minded modelers may wish to check these measurements anyway. To view this information visit the web site at **www.greatplanes.com** and click on "Technical Data." Due to manufacturing tolerances which will have little or no effect on the way your model will fly, please expect slight deviations between your model and the published values.

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Fling 2M ARF are available using the order numbers in the **Replacement Parts List** that follows. The fastest, most economical service can be provided by your hobby dealer or mail-order company.

To locate a hobby dealer, visit the Hobbico web site at **www.hobbico.com**. Choose "Where to Buy" at the bottom of the menu on the left side of the page. Follow the instructions provided on the page to locate a U.S., Canadian or International dealer.

Parts may also be ordered directly from **Hobby Services** by calling (217) 398-0007, or via facsimile at (217) 398-7721, but full retail prices and shipping and handling charges will apply. Illinois and Nevada residents will also be charged sales tax. If ordering via fax, include a Visa® or MasterCard® number and expiration date for payment.

Mail parts orders and payments by personal check to:

Hobby Services
3002 N. Apollo Drive, Suite 1
Champaign, IL 61822

Be certain to specify the order number exactly as listed in the **Replacement Parts List**. Payment by credit card or personal check only; no C.O.D.

If additional assistance is required for any reason contact Product Support by e-mail at **productsupport@greatplanes.com**, or by telephone at (217) 398-8970.

Replacement Parts List

Order Number	Description	How to Purchase
	Missing pieces	Contact Product Support
	Instruction manual	Contact Product Support
	Full-size plans	Not available
GPMA2715	Wing Set	Contact Hobby Supplier
GPMA2716	Fuselage	Contact Hobby Supplier
GPMA2717	Tail Set	Contact Hobby Supplier
GPMA2718	Canopy	Contact Hobby Supplier
GPMA2719	Decal Sheet	Contact Hobby Supplier

COMMON ABBREVIATIONS

Fuse = Fuselage
Stab = Horizontal Stabilizer
Fin = Vertical Fin
LE = Leading Edge
TE = Trailing Edge
LG = Landing Gear
Ply = Plywood
" = Inches
mm = Millimeters
SHCS = Socket Head Cap Screw

METRIC CONVERSIONS

1" = 25.4 mm (conversion factor)

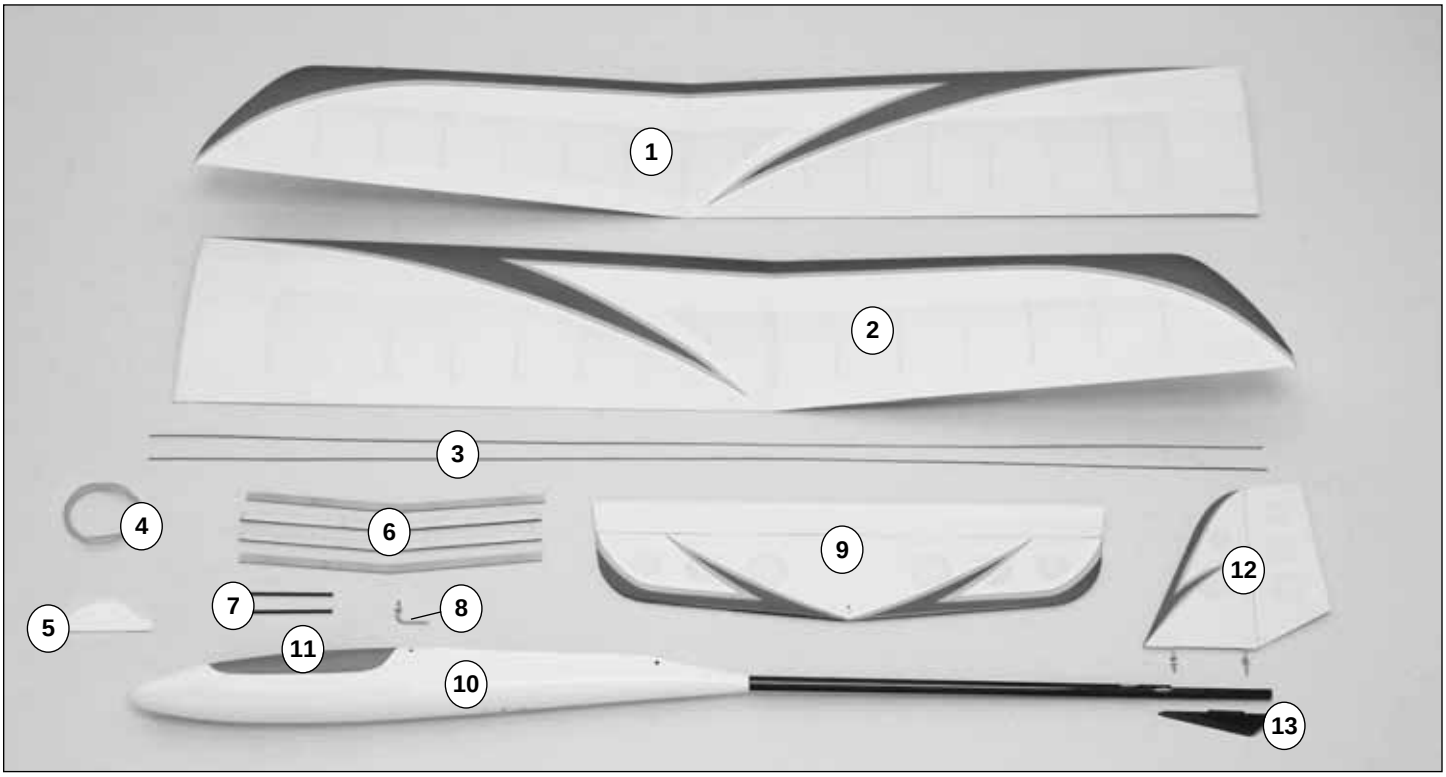
1/64"	=	.4 mm	3/4"	=	19.0 mm
1/32"	=	.8 mm	1"	=	25.4 mm
1/16"	=	1.6 mm	2"	=	50.8 mm
3/32"	=	2.4 mm	3"	=	76.2 mm
1/8"	=	3.2 mm	6"	=	152.4 mm
5/32"	=	4.0 mm	12"	=	304.8 mm
3/16"	=	4.8 mm	18"	=	457.2 mm
1/4"	=	6.4 mm	21"	=	533.4 mm
3/8"	=	9.5 mm	24"	=	609.6 mm
1/2"	=	12.7 mm	30"	=	762.0 mm
5/8"	=	15.9 mm	36"	=	914.4 mm

KIT INSPECTION

Before starting to build, take an inventory of this kit to make sure it is complete, and inspect the parts to make sure they are of acceptable quality. If any parts are missing or are not of acceptable quality, or if you need assistance with assembly, contact **Product Support**. When reporting defective or missing parts, use the part names exactly as they are written in the **Kit Contents** list.

Great Planes Product Support
3002 N. Apollo Drive, Suite 1
Champaign, IL 61822
Telephone: (217) 398-8970, ext. 5
Fax: (217) 398-7721
E-mail: **airsupport@greatplanes.com**

KIT CONTENTS



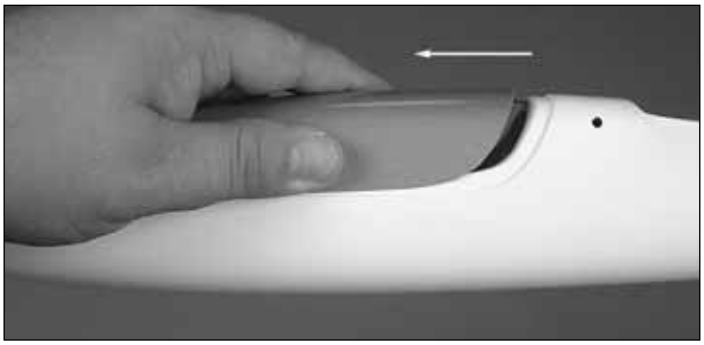
Kit Contents

1. Left Wing Panel
2. Right Wing Panel
3. 40" [1016 mm] Pushrods (2)
4. Rubber Bands
5. TE Support
6. Aluminum Wing Joiner Plates (2) & Hardwood Wing Joiner Plates (2)
7. Carbon Fiber Wing Dowels (2)
8. Tow Hook
9. Stab
10. Fuselage
11. Canopy
12. Fin
13. Plastic Tail Skid Halves (2)

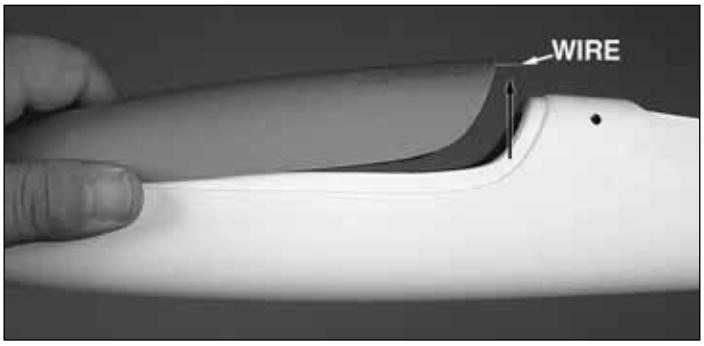
Parts Not Shown
Nylon Control Horns & Backplates (2)
2 x 1/2" [13 mm] Machine Screws (2)
1/16" [1.6 mm] Wheel Collar
#2 Lock Nut
#2 Nuts (2)
#2 Flat Washers (2)

ASSEMBLY INSTRUCTIONS

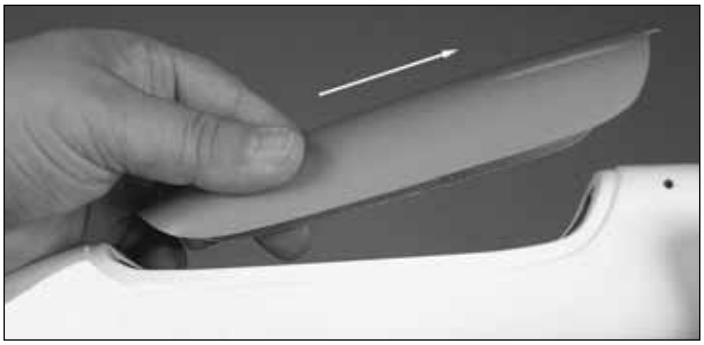
Canopy Removal



❏ 1. Slide the **canopy** forward till the rear wire is visible.



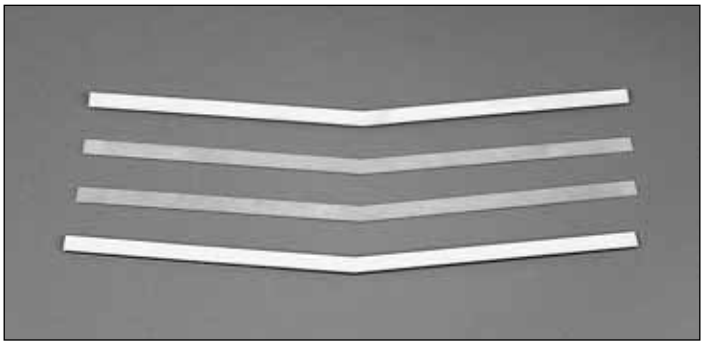
❏ 2. Lift the rear of the canopy till the wire is clear of the **fuselage**.



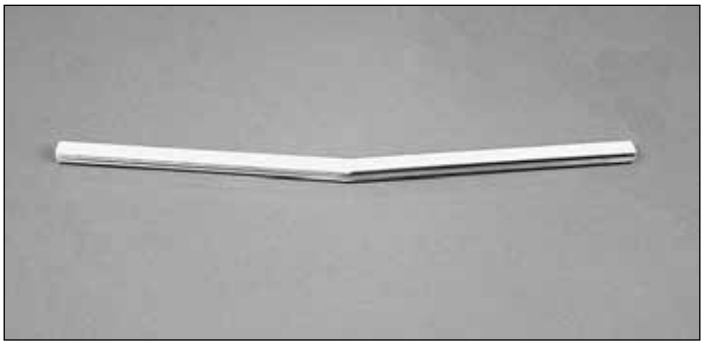
❏ 3. Slide the canopy aft until the front wire comes free.

❏ 4. To attach the canopy, reverse the previous steps.

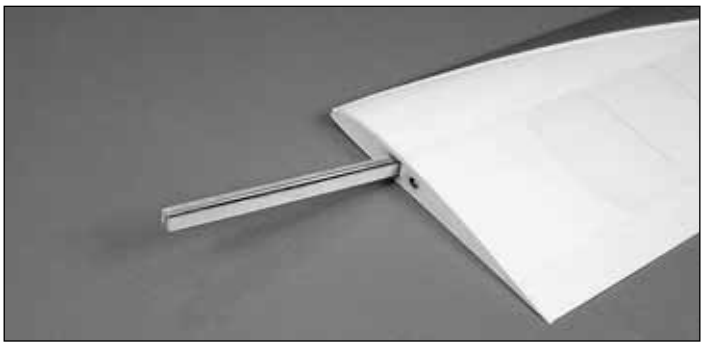
Assemble the Wing



❏ 1. Locate the two hardwood and two aluminum **wing joiner plates**.

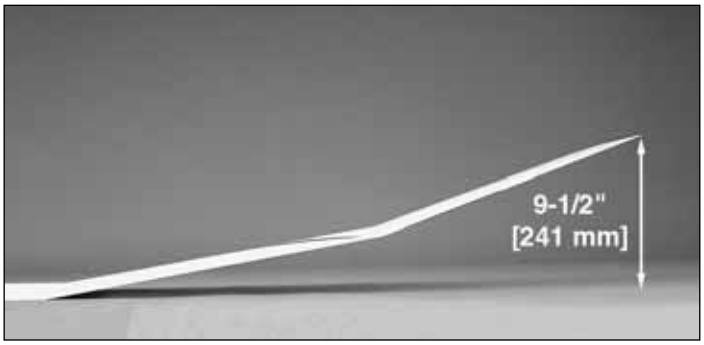


❏ 2. Using epoxy, glue the joiner plates together. The two aluminum plates are glued between the two hardwood plates. Allow the epoxy to fully cure before proceeding.



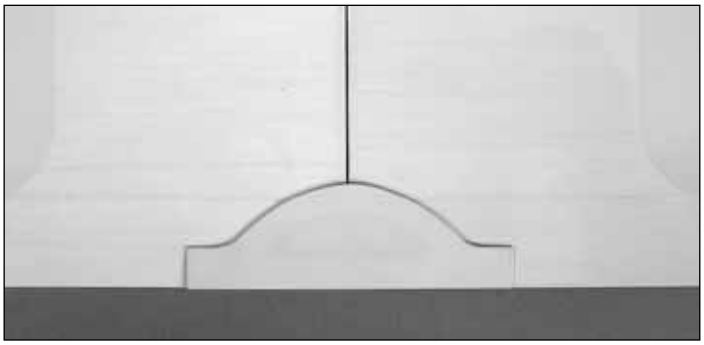
❏ 3. Test fit the **wing joiner** into the slots in the wing halves. Sand the joiners as required to get a good fit. **Note:** If the root rib angles aren't exactly the same, that's OK. The difference can be filled with a little epoxy when the wings are joined. The proper dihedral angle and the gluing of the wing joiner are more important than the fit of the two wing panels.

❏ 4. Cover your workbench with wax paper or Great Planes Plan Protector.



❏ 5. With the **inner left wing section** flat on your workbench and the center joint on the wax paper, raise the right wing tip 9-1/2" [241 mm] to properly set the dihedral. Block the raised right wing at the desired height and make a mental note of the position needed for it to maintain that dihedral.

❏ 6. Remove the joiner from the wings. Cover the joiner, left and right wing root ribs and pockets in the wing panels with a moderate, but not excessive amount of 30-minute epoxy. Join the wing halves together making sure the wing joiner is centered. Ensure that the left wing remains flat and that the right wing tip is 9-1/2" [241 mm] from your workbench and can remain that way undisturbed until the epoxy has hardened. Remove any excess epoxy with a paper towel and denatured alcohol, being careful not to disturb the joint. **Hint:** Use masking tape to hold the wing together while the epoxy hardens.

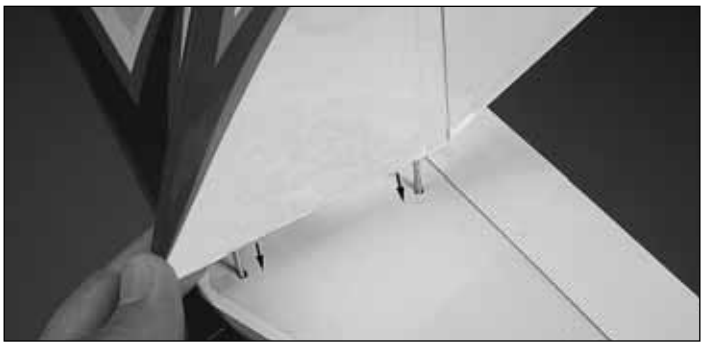


❏ 7. Glue the plywood **TE support** centered on the TE of the wing with CA.

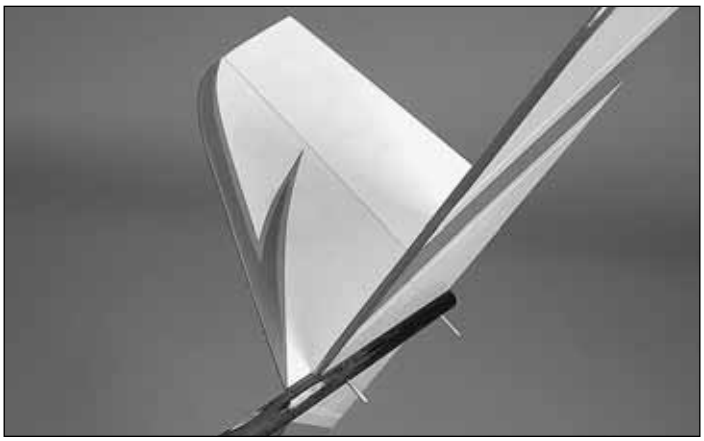
❏ 8. Glue the carbon fiber **wing dowels** into the fuse with a small amount of thin CA. Be sure the length of the carbon on each side is equal.

Assemble the Tail

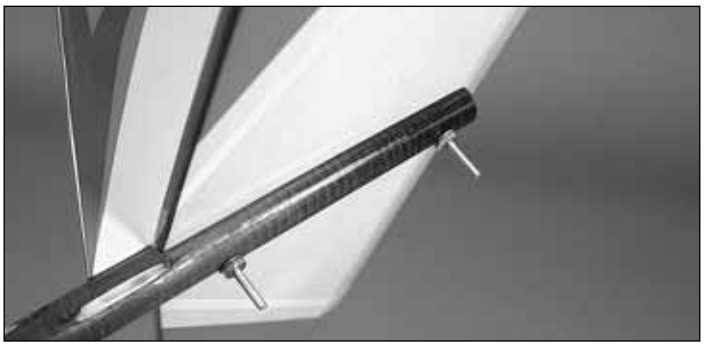
❏ 1. Locate the two small holes in the **stab**. Remove the covering from these holes using a sharp hobby knife.



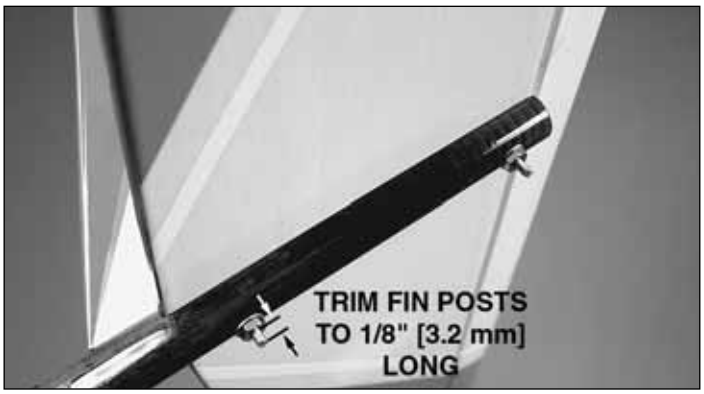
❏ 2. Insert the **fin posts** into the holes in the stab as shown. These two parts joined together will be referred to as the **tail assembly** from this point.



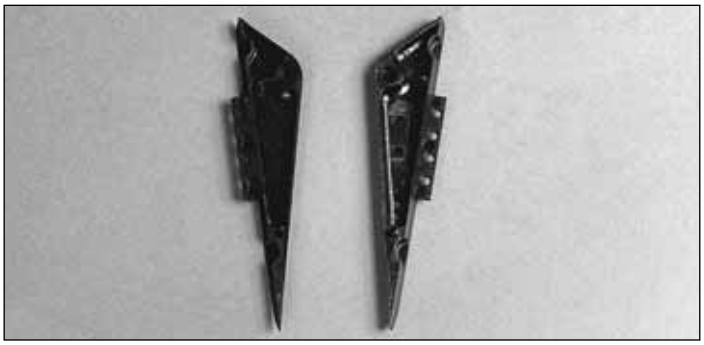
❏ 3. Attach the tail assembly to the tail boom as shown.



❏ 4. Secure the tail assembly to the fuselage using two #2 hex nuts and #2 flat washers as shown. Be sure not to overtighten the nuts as the stab could become damaged. Apply a drop of Threadlocker to each hex nut to prevent it from backing off.



❏ 5. Trim the fin posts to 1/8" [3.2 mm] past the #2 hex nuts.

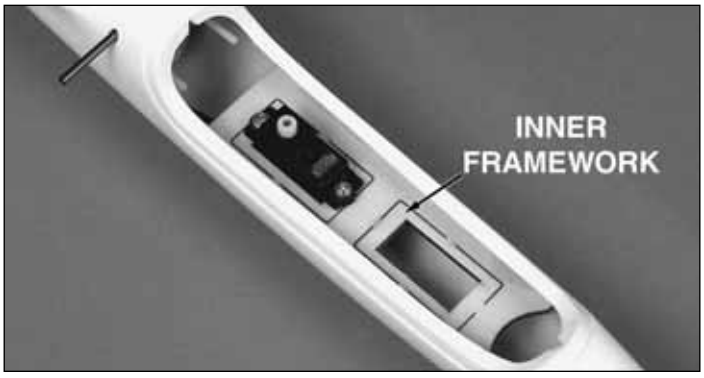


❏ 6. Locate the two plastic halves for the **tail skid**.

❏ 7. Glue the two tail skid pieces together as shown using CA.

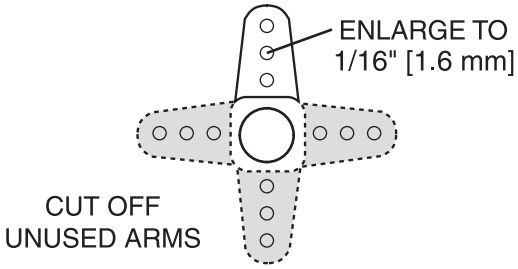
❏ 8. Insert the tail skid post into the slot cut in the tail of the fuselage and glue in place using CA as shown.

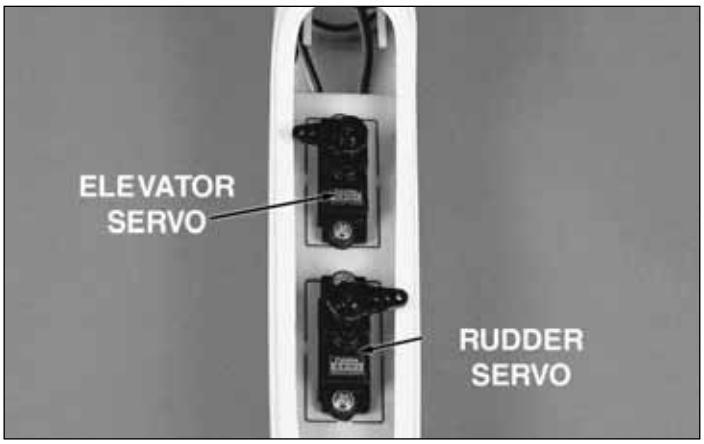
Install the Servos & Pushrods



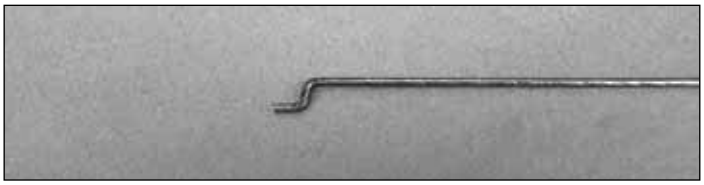
❏ 1. Install the servos in the **fuselage servo tray** as shown. If you will be using standard size servos, cut the inner framework away from the servo tray to accommodate these larger servos. **Note:** The following photos will show the installation of micro servos.

❏ 2. Temporarily connect your servos to your radio system. Turn on the radio with the trims centered and center the servos. For a 2-channel sailplane such as the Fling 2M ARF, the rudder is plugged into the aileron channel and the elevator is in the elevator channel.

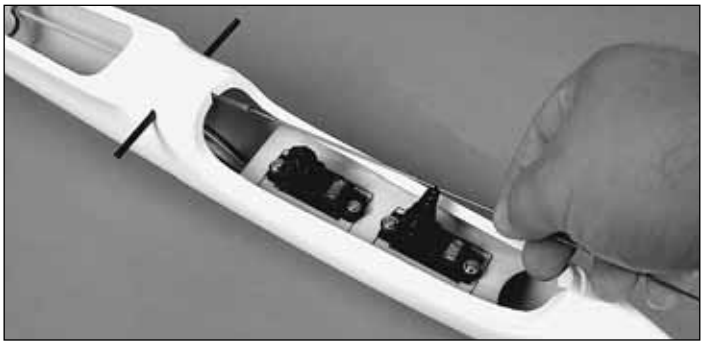




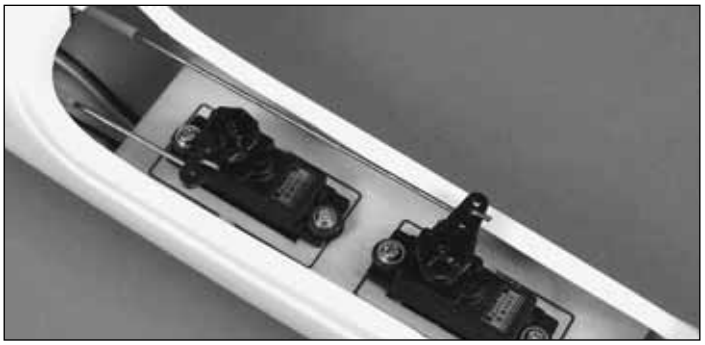
❏ 3. With the servos centered, install a servo arm onto each servo. Trim the arms as shown.



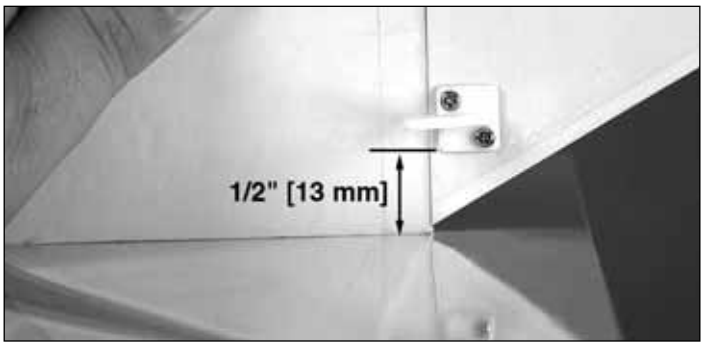
❏ 4. Locate the two 40" [1016 mm] pushrod wires. Put a Z-bend in one end of each wire as shown. Z-bend pliers work best for this.

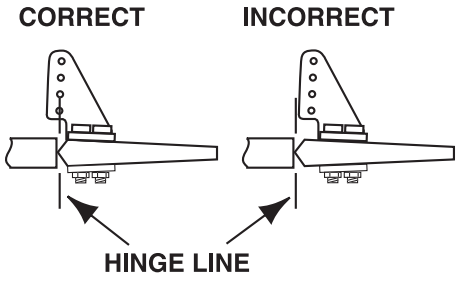


❏ 5. Insert each wire into the pushrod guide tubes in the fuselage.

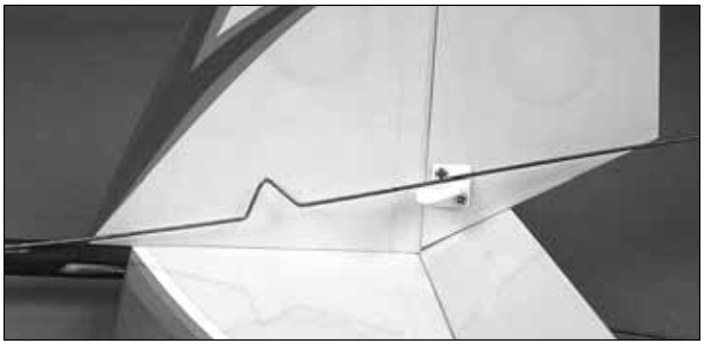


❏ 6. Remove the servo arms and insert the Z-bend into the second hole out from center on the arms. Reattach the servo arms and servo arm screws.

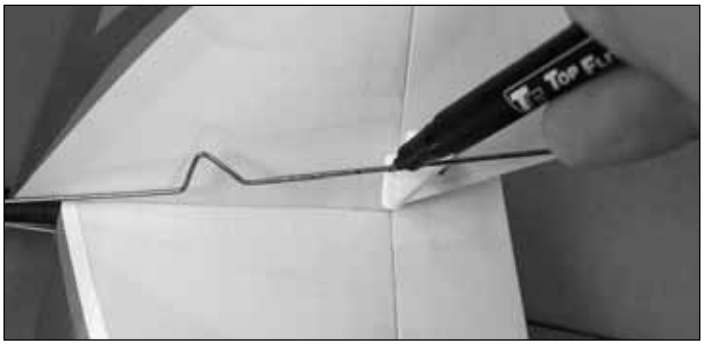




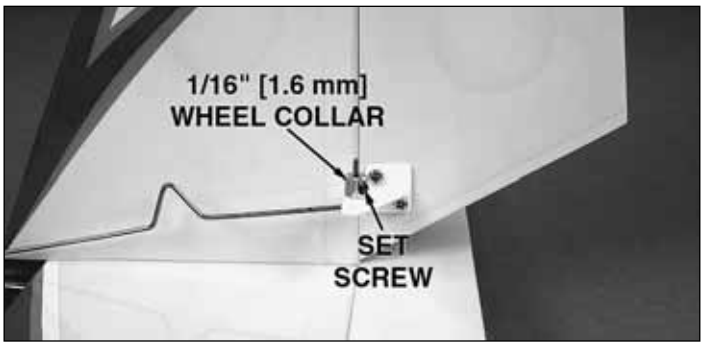
❏ 7. Position a white nylon control horn in line with the rudder pushrod exiting the fuselage. The control horn should be 1/2" [13 mm] from the top of the stab as shown. Ensure the holes in the control horn line up with the hinge line. Mark the location of the control horn screws with a felt-tip pen or pencil. Drill 3/32" [2.4 mm] holes at these marks. Attach the control horn to the elevator control surface using two of the supplied #2 x 1/2" [13 mm] machine screws and a white backplate on the back of the control surface.



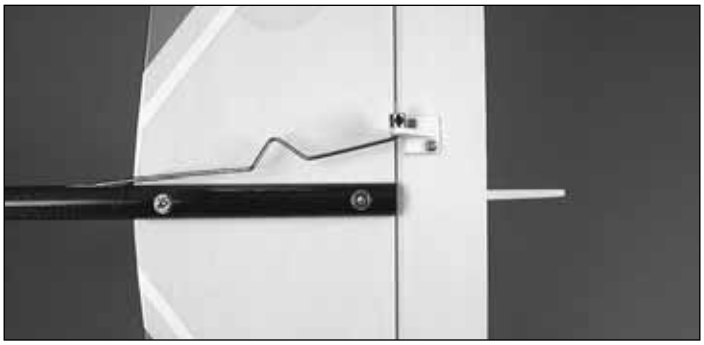
❏ 8. Using pliers, bend the pushrod wire into the shape of a “V” as shown. This “V” can be modified after installation to adjust trim. Do the same for the elevator pushrod.



❏ 9. Make a mark on the pushrod where it crosses the control horn. Make a 90° bend at this mark and insert the pushrod into the second hole on the control horn.



❏ 10. Slide a 1/16" [1.6 mm] wheel collar with set screw over the pushrod as shown. Secure the wheel collar by tightening the set screw. Add a drop of Threadlocker to the set screw to prevent it from backing out.

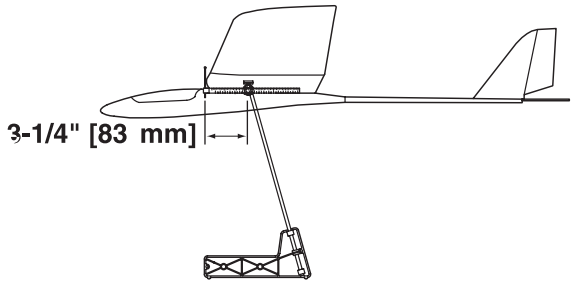


❏ 11. Attach the elevator control horn and pushrod the same way as the rudder control horn. The elevator control horn is positioned 1/4" [6.4 mm] from the fuselage boom as shown. Ensure that the holes in the control horn align with the hinge line.

Final Installation & C.G.

❏ 1. Thread the **tow hook** into the middle tow hook position until there are no threads showing for your first flights. Secure the tow hook using the #2 nylon lock nut from the inside of the fuselage. Be careful not to overtighten the lock nut to avoid crushing the fuselage.

❏ 2. The receiver (Rx) and the battery should be all the weight that is needed to set the correct C.G. On our test plane we got the Fling 2M ARF to balance by placing the battery and receiver in the nose, forward of the servos with the receiver on bottom. Also, to keep the weight low, do not use a switch. Instead, plug the battery directly into the Rx using a 6" [153 mm] servo extension. Do not permanently mount your receiver and battery until you have verified their correct location for balancing the plane in the next steps.



❏ 3. Accurately mark the balance point on the bottom of the wing on both sides of the fuselage. The balance point is located 3-1/4" [83 mm] back from the leading edge at the fuselage. This is the balance point at which your model should balance for your first flights. Later, you may wish to experiment by shifting the balance up to 1/2" [13 mm] forward or 1/4" [6.4 mm] back to change the flying characteristics. Moving the C.G. forward will add some stability but it will decrease the overall performance of the sailplane. Moving the balance back makes the model more agile with a lighter and snappier “feel” and improves the sailplane’s response to air currents. In any case, please start at the location we recommend and do not at any time balance your model outside the recommended range.

❏ 4. Temporarily place the battery and receiver in the nose of the fuselage on top of a 1/2" [13 mm] thick strip of foam. Then, mount the wing and canopy.

❏ 5. Check that the plane balances at the recommended C.G. Move the battery and receiver until the plane balances on that point. With the battery and receiver mounted as far forward as possible, it still may be necessary to use stick-on lead weight to balance the Fling 2M ARF. If you find it necessary to use stick-on lead weight, attach it to the underside of the left side of the stab for tail weight or to the sides of the nose of the fuselage for nose weight.

❏ 6. Drill a 1/16" [1.6 mm] hole in the bottom of the fuse in the rear of the wing opening. Route the antenna through the forward wing former and out the hole in the bottom of the fuse. Tape the antenna to the bottom of the fuse.

Apply the Decals

1. Use scissors or a sharp hobby knife to cut the decals from the sheet.

2. Be certain the model is clean and free from oily fingerprints and dust. Prepare a dishpan or small bucket with a mixture of liquid dish soap and warm water–about one teaspoon of soap per gallon of water. Submerse the decal in the soap and water and peel off the paper backing. **Note:** Even though the decals have a "sticky-back" and are not the water transfer type, submersing them in soap & water allows accurate positioning and reduces air bubbles underneath.

3. Position decal on the model where desired. Holding the decal down, use a paper towel to wipe most of the water away.

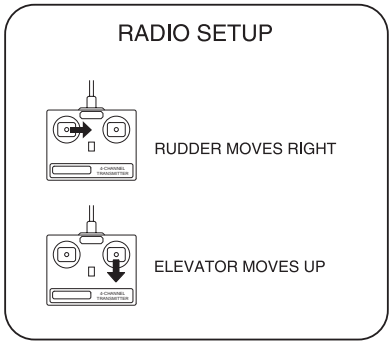
4. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

GET THE MODEL READY TO FLY

Check the Control Directions

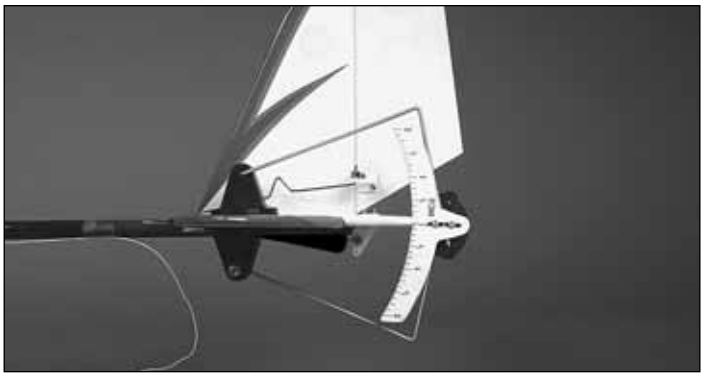
❏ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

❏ 2. With the transmitter and receiver still on, check all the control surfaces to see if they are centered. If necessary, adjust the "V" bends on the pushrods to center the control surfaces.



❏ 3. Make certain that the control surfaces respond in the correct direction as shown in the diagram. If any of the controls respond in the wrong direction, use the servo reversing switch in the transmitter to reverse the servos connected to those controls. Be certain the control surfaces have remained centered. Adjust if necessary.

Set the Control Throws



Use a Great Planes AccuThrow (or a ruler) to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the **low rate** setting.

Note: The throws are measured at the **widest part** of the elevators and rudder.

These are the recommended control surface throws:

	High Rate	Low Rate
ELEVATOR:	1/2" [13 mm] up	1/4" [6.4 mm] up
	1/2" [13 mm] down	1/4" [6.4 mm] down
RUDDER:	1-1/4" [32 mm] right	5/8" [16 mm] right
	1-1/4" [32 mm] left	5/8" [16 mm] left

IMPORTANT: The Fling 2M ARF has been **extensively** flown and tested to arrive at the throws at which it flies best. Flying your model at these throws will provide you with the greatest chance for successful first flights. If, after you have become accustomed to the way the Fling 2M ARF flies, you would like to change the throws to suit your taste, that is fine. However, too much control throw could make the model difficult to control, so remember, "more is not always better."

PREFLIGHT

Identify Your Model

No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on the back cover page of this manual and place it on or inside your model.

Charge the Batteries

Follow the battery charging instructions that came with your radio control system to charge the batteries. You should always charge your transmitter and receiver batteries the night before you go flying, and at other times as recommended by the radio manufacturer.

CAUTION: Unless the instructions that came with your radio system state differently, the **initial** charge on **new** transmitter and receiver batteries should be done for 15 hours **using the slow-charger that came with the radio system**. This will "condition" the batteries so that the next charge may be done using the fast-charger of your choice. If the initial charge is done with a fast-charger, the batteries may not reach their full capacity and you may be flying with batteries that are only partially charged.

Range Check

Ground check the operational range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

AMA SAFETY CODE (excerpts)

Read and abide by the following excerpts from the Academy of Model Aeronautics Safety Code. For the complete Safety Code refer to *Model Aviation* magazine, the AMA web site or the Code that came with your AMA license.

General

1) I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.

2) I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.

3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. **Note:** This does not apply to models while being flown indoors.

7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind).

Radio Control

1) I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.

2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in the front of the flight line. Intentional flying behind the flight line is prohibited.

4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

5) **I will not knowingly operate my model within three miles of any pre-existing flying site except in accordance with the frequency sharing agreement listed** [in the complete AMA Safety Code].

9) Under no circumstances may a pilot or other person touch a powered model in flight; **nor should any part of the model other than the landing gear, intentionally touch the ground, except while landing**.

CHECK LIST

During the last few moments of preparation your mind may be elsewhere anticipating the excitement of the first flight. Because of this, you may be more likely to overlook certain checks and procedures that should be performed before the model is flown. To help avoid this, a check list is provided to make sure these important areas are not overlooked. Many are covered in the instruction manual, so where appropriate refer to the manual for complete instructions. Be sure to check the items off as they are completed.

- ❏ 1. Check the C.G. according to the measurements provided in the manual.
- ❏ 2. Be certain the battery and receiver are securely mounted in the fuse. Simply stuffing them into place with foam rubber is not sufficient.
- ❏ 3. Extend your receiver antenna and make sure it has a strain relief inside the fuselage to keep tension off the solder joint inside the receiver.
- ❏ 4. Balance your model *laterally* as explained in the instructions.
- ❏ 5. Use thread-locking compound to secure critical fasteners such as the set screws that hold the wheel axles to the struts, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.
- ❏ 6. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, cowl mounting screws, etc.).
- ❏ 7. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
- ❏ 8. Make sure there are silicone retainers on all the clevises and that all servo arms are secured to the servos with the screws included with your radio.
- ❏ 9. Secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat-shrink tubing or special clips suitable for that purpose.
- ❏ 10. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).
- ❏ 11. Place your name, address, AMA number and telephone number on or inside your model.
- ❏ 12. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.
- ❏ 13. If you wish to photograph your model, do so before your first flight.
- ❏ 14. Range check your radio when you get to the flying field.

FLYING

Mount the Wing

Mount the wing to the fuselage with the supplied rubber bands. Install them from front to back, crisscrossing the last two. Never use torn, cracked or oily rubber bands. After removing the rubber bands from your model, store them in a container with talcum powder or clay-type kitty litter to absorb oil and keep them fresh for the next flying session.

If the rubber bands you will be using are different from those supplied with the ARF, consult an experienced modeler to make certain they are strong enough, and that you have used enough of them. If uncertain, force the front of the wing off of the wing saddle. There should be considerable resistance! If the wing can be forced from the fuselage without having to strain your hands, then there are probably not enough rubber bands.

IMPORTANT!!! Flying a model with too few rubber bands can be dangerous. If the wing momentarily lifts from the fuselage and acts as though a large amount of "up" elevator has suddenly been applied because there are not enough rubber bands or they are too weak, internal structural damage may result. Even worse, the wing could actually detach from the fuselage resulting in a crash. If the model exhibits any tendencies that indicate there are not enough rubber bands, immediately reduce power, land and closely inspect the model for damage. If no damage is found, add more rubber bands.

The Fling 2M ARF is a great flying model that flies smoothly and predictably. The Fling 2M ARF does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice an alarming or unusual sound such as a low-pitched "buzz," this may indicate control surface *flutter*. Flutter occurs when a control surface (such as an aileron or elevator) or a flying surface (such as a wing or stab) rapidly vibrates up and down (thus causing the noise). In extreme cases, if not detected immediately, flutter can actually cause the control surface to detach or the flying surface to fail, thus causing loss of control followed by an impending crash. The best thing to do when flutter is detected is to **land as soon as safely possible**. Identify which surface fluttered (so the problem may be resolved) by checking all the servo grommets for deterioration or signs of vibration. Make certain all pushrod linkages are secure and free of play. If it fluttered once, under similar circumstances it will probably flutter again unless the problem is fixed. Some things which can cause flutter are; Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of wire pushrods caused by large bends; Excessive free play in servo gears; Insecure servo mounting; and one of the most prevalent causes of flutter; Flying an over-powered model at excessive speeds.

Preparations

First of all, if you are flying with other flyers, check to make sure they are not flying or testing on the same frequency as your model. Try to find an experienced pilot to help you with your first flights.

Although the Fling 2M ARF is very easy to fly, an experienced pilot can save you a lot of time and possible aggravation by helping you get your model in the air smoothly. Find a BIG, OPEN field for your first flights – the bigger the better as you won't have to worry about where you need to land. Ground based objects (trees, poles, buildings, etc.) seem to attract model airplanes like a magnet.

Trim Flights

It is a good idea to do a couple of trim flights before each flying session to make sure the plane is still in trim and the radio is working properly. The model will survive a hard landing from 6 feet [2 m] much better than it will one from several hundred feet. The first few trim flights should be done over a grass field. The longer the grass, the better (more cushion). Turn on the transmitter first and then the receiver. Hold the Fling 2M ARF under the wing with the nose pointed slightly down and directly into the wind. It is very important that you launch the model with the wings level and the nose pointing at a spot on the ground about 50 feet in front of you. Have a friend stand off to the side of you and tell you whether the nose is pointing up or down. If the sailplane is launched with the nose up or launched too hard it will climb a few feet, stall and fall nose-first straight down. With the nose pointed down slightly, the sailplane will accelerate down until it picks up enough flying speed and then level off and glide forward. The plane should be launched with a gentle push forward. With a little practice you will be able to launch it at just the right speed so it soars straight ahead in a long and impressive glide path. Adjust the trims on your transmitter to get the plane to fly straight ahead in a smooth glide path. Once you get the hang of launching, you can try turning the plane during the trim flights by gently applying a "touch" of right or left rudder. You can also try "flaring" the landings by slowly applying a touch of up elevator (pull the stick back) as the plane nears the ground. The Fling 2M ARF will continue to fly just a few inches off the ground for a surprisingly long distance. It is important you don't "over-control" the model. Make any control inputs slowly and smoothly rather than moving the transmitter sticks abruptly.

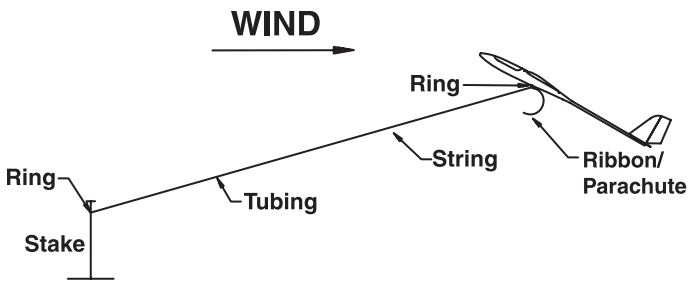
First Flights

Note: Remember that your radio control responds as if you were sitting in the cockpit. When you push the transmitter stick to the right, the rudder moves to the plane's right! This means that when the plane is flying towards you it may seem like the rudder controls are reversed (when you give "right" rudder the plane turns to your left–which is the plane's "right").

It is sometimes easier to learn to fly the plane if you always face your body in the direction the plane is flying and look over your shoulder to watch the model. Don't worry about accomplishing very much on your first flights. Use these flights to get the "feel" of the controls and the Fling's flying characteristics. Try to keep the plane upwind and just perform some gentle "S-turns" (always turning into the wind) until it is time to set up for landing. Have a helper adjust the trims on your transmitter (a little at a time) until the plane will fly straight and level with the transmitter sticks in their neutral positions. It can be very hard for a beginner to fly a plane straight towards him as he would have to do if the plane were downwind and every mistake took the plane a little farther downwind. When it is time to land, just continue performing the gentle "S-turns" upwind and let the plane glide onto the ground. Don't worry about where the plane lands–just miss any trees, etc. Practice flying directly into the wind (upwind of yourself) without letting the plane get off course, and then turn and come downwind until the plane is even with you and try it again. When you are comfortable with flying directly into the wind, start letting the plane go behind you (downwind) a little before you start back upwind. Continue this until you can fly directly towards you from downwind without getting disoriented. At this point you can start to establish a "landing pattern" and bring the sailplane in for a landing from downwind. This enables the plane to be flown as slowly (ground speed) as possible for accurate landings.

Your First Hi-Start Launch

IMPORTANT! If you choose to utilize a winch for launching the Fling 2M ARF, keep in mind this is a lightweight model that will require a soft winch launch. A hard launch from a winch could cause the wing to fail.



A hi-start is the most popular way to launch your Fling 2M ARF. It consists of rubber tubing and about 200' of string with

a ribbon at the end. One end of the rubber is staked down directly upwind of the launch point. One end of the string is attached to the other end of the rubber. The end of the string with the ribbon has a loop or ring and is attached to the tow hook on the sailplane. Lay the mini hi-start out with the stake directly into the wind. Place the stake at the far **upwind** edge of the flying field so the ribbon will blow back onto the flying field. Turn on your transmitter and then your receiver and hook the ring onto your plane's tow hook. Pull the plane back approximately 20 yards. More tension can be used after you get acquainted with the launching procedure. **NEVER** pull more than 30 yards. Hold the plane **above your head** with the wings level and the nose pointed **slightly up and directly into the wind**. Give the plane a healthy push forward to get it flying and it will climb up like a kite. You should not have to touch the elevator during the launch but use the rudder stick to keep it going straight up. As the rubber relaxes, the plane will fly off the hi-start and the ribbon will bring the end of the string back towards you.

THERMAL FLYING

Thermal soaring is one of the most intriguing of all aspects of flying and the Fling 2M ARF was designed to excel at thermal soaring even in the hands of a novice. It can be hard for the average person to understand how a plane can fly for hours and gain altitude **without a motor!**

Facts About Thermals

Thermals are natural phenomenons that happen outside, by the millions, every single day of the year. Thermals are responsible for many things including forming several types of clouds, creating breezes, and distributing plant seeds and pollen. If you have ever seen a dust devil (which is nothing more than a thermal that has picked up some dust), you have seen a thermal in action. Their swirling action is very similar to that of a tornado but of course much gentler. Most thermals have updrafts rising in the 200 to 700 feet per minute range but they have been known to produce updrafts of over 5,000 feet per minute (that's over 50 miles/hour straight up!) These strong thermals can rip a plane apart or carry the plane out of sight before the pilot can get out of the updraft. Thermals are formed by the uneven heating of the earth and buildings, etc. by the sun. The darker colored surfaces absorb heat faster than the lighter colors, which reflect a great deal of the sun's energy back into space. These darker areas (plowed fields, asphalt parking lots, tar roofs, etc.) get warmer than the lighter areas (lakes, grassy fields, forests, etc.). This causes the air above the darker areas to be warmer than the air over the lighter areas and the more buoyant warm air rises as the cooler, denser air forces its way underneath the warmer air. As this warm air is forced upward, it contacts the cooler air of the higher altitudes. This larger temperature difference makes the thermal rise quicker. The thermal is gradually cooled by the surrounding cooler air and its strength diminishes. Eventually the thermal stops rising and any moisture contained in the once warm air condenses and forms a puffy cumulus cloud. These clouds, which mark the tops of thermals, are usually between 2000 and 5000 feet high.

Thermal Soaring

It takes a lot of concentration to thermal soar effectively. A sailplane can fly along the edge of a thermal and unless the pilot is carefully watching the model he may not realize the opportunity to gain some altitude. Because most thermals are relatively small (a couple hundred feet in diameter or less at 400' altitude) compared to the rest of the sky, the sailplanes will rarely fly directly into the thermal and start rising. Generally, the sailplane will fly into the edge or near a thermal and the effects the thermal has on the plane may be **almost** unnoticeable. As the sailplane approaches a thermal, the wing tip that reaches the rising air first will be lifted before the opposite wing tip. This causes the plane to "bank" and turn away from where we would like the plane to go.

When you are thermal soaring, you should try to fly as smoothly and straight as possible. Trim the plane to fly in a straight line and **only** touch the controls when you have to. Watch the sailplane carefully and it will tell you what it is encountering.

When the sailplane flies directly into a thermal it will either start rising or stop sinking. Either case is reason enough to start circling (especially in a contest where every second counts). Fly straight ahead until you feel like you are in the strongest lift, **fly a couple of seconds farther** (so your circle will be centered in the strongest lift) and then start circling in a fairly tight but smooth turn. When the sailplane is low the turns have to be tighter to stay in the strongest lift. As the plane gains altitude, the turns can be larger and flatter. The flatter the turn, the more efficient the plane is flying, but don't be afraid to really "crank" it into a steep bank when you are low. If you see the plane falling off on one side of the turn, move your circle over into the stronger lift. Thermals move along with the wind so as you circle you will be swept along with it. Be careful when thermaling that you don't get so far downwind you can't make it back to the field to land.

If the sailplane is flying along straight and all of a sudden turns, let the plane continue to bank (you may have to give it some rudder to keep it banking) until it has turned 270° (3/4 of a full circle). Straighten out the bank and fly into whatever turned the plane. If you encounter lift, and you won't every time, start circling just as you did when flying directly into a thermal.

Thermals are generated all day long, but the strongest thermals are produced when the sun is directly overhead. 10:00 am to 2:00 pm seems to be the best time to get those "killer" thermals. Some of these thermals can be very large and you may find it hard to get out of them. If you find yourself getting too high, don't dive the plane to get out of the lift. Sailplanes are very efficient aircraft and they will build up a lot of speed and could "blow up" in the rough air

of a thermal. The easiest way to lose altitude is to apply full rudder and full up elevator. This will put the plane into a tight spin that will not over stress the airframe but it will enable it to lose altitude very quickly. This is especially helpful if the sailplane gets sucked into a cloud or it gets too high to see. The twirling action will give the sun a better chance of flashing off of the wing and catching your attention. When you are high enough and want to leave the thermal, add a little down trim to pick up some speed and fly 90 degrees to the direction of the wind. If you are not real high and want to find another thermal, you may want to look upwind of the last thermal. The same source that generated this thermal is probably producing another. Just watch out for "sink" which is often found behind and between thermals.

As you might expect, with all this air rising, there is also air sinking. This air is the sailplane pilot's nightmare and can really make soaring challenging. "Sink" is usually not as strong as the thermals in the same area, but it can be very strong. Downdrafts of many hundreds of feet per minute are common on a good soaring day. These downdrafts can make a sailplane look like it is falling out of the air. Because of this, it is important that you do not let the sailplane get too far downwind.

When encountering sink, immediately turn and fly 90 degrees to the direction of the wind (towards you if possible). Apply a little "down elevator" and pick up some speed to get out of the sink as fast as possible. Every second you stay in the sink is precious altitude lost.

Slope Soaring

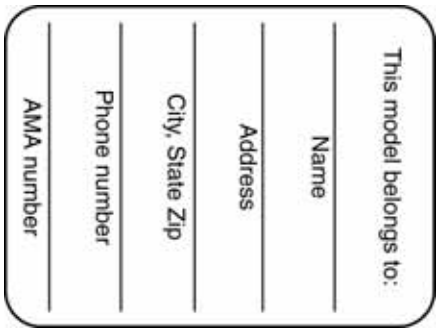
Slope soaring is a type of flying that is very popular in hilly regions and along the coasts. This type of soaring is possible when the wind is blowing directly up a hill or cliff. As the wind hits the slope it is forced up, producing lift which can be utilized by real sailplanes, hang gliders, birds and even model sailplanes. To be able to slope soar, you need a slope with a smooth piece of land (or water) out in front of it and a breeze blowing pretty close to straight up the slope. The higher and steeper the hill or cliff is, the better. Also, the larger and smoother the land out in front is, the better. The air flowing along that hits the hill and is forced up can generate a very large area of lift. Behind the hill is a large area of turbulent air that can be very dangerous to try to fly in. The faster the wind is blowing, the stronger the lift and turbulence will be. To fly off a slope, stand near the edge and throw the sailplane (nose down) into the wind. As the sailplane flies out into the "band" of lift it will begin to gain altitude. Turn and fly parallel to the slope and make all of your turns into the wind (especially when you are close to the slope).You will be surprised at the altitude you can gain just from slope lift. Thermals will often be "popped loose" by these slopes. If you catch a thermal and follow it downwind, be very careful to stay high enough to make it back to the slope without flying through the turbulent air behind the slope. If you don't have enough altitude you may want to land a good distance behind the slope if possible to avoid this turbulent air.

Slope Landings

Landings can be very tricky on some slopes. On gentle slopes you can often fly very close to the top of the slope and "slide" into the top of the slope without encountering any turbulent air. On steeper slopes you may have to be a little more aggressive to get the plane out of the lift. In any case it is a good idea to plan your landing before launching your plane.

Have a ball! But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!



Make a copy of this identification tag and put it on or inside your model.

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