



Typically a modern .25 size engine, (like the Norvel .25), will fly with a 9 x 4, 9.5 x 4.5, or 10 x 4 propeller. A .35 or .40 size engine will fly with a 10 x 5 or 10 x 6 prop. Ultimately, final propeller selection is a matter of testing in flight. Refer to your engine manufacturer's instructions for more guidance in selecting a suitable propeller.

**CONTROL LINES (not supplied)**

The Primary Force should be flown on .015" dia. x 60 - 63 ft. long braided steel cable control lines.

**NOTE ON "LAP TIMES"**

Most serious C/L stunt fliers tailor their line length, prop selection, and engine run to give them a certain airspeed. They check their airspeed by using a stop watch to find out how long it takes the airplane to fly one lap of normal level flight. Our flight tests indicate that the Primary Force flies best at lap times of 5.0 - 5.3 seconds.

**COVERING MATERIAL**

Your Primary Force has been professionally covered with SIG AEROKOTE® iron-on plastic covering material.

The colors used on the Primary Force are AEROKOTE®

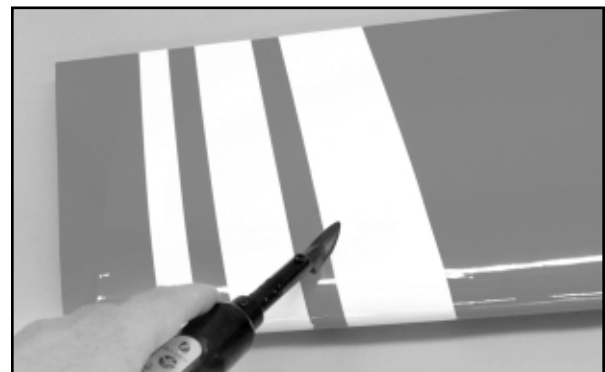
#SIGSTL321 Bright Orange, and

#SIGSTL100 Brilliant White

**Wrinkles In The Covering!** After you remove the covered model parts from their plastic bags, you may notice within the first couple days that some of the covering material may become slack or wrinkled. If that's the case, there is no need to be alarmed. The covering is not defective! Your Primary Force was covered in a part of the world which has consistently high humidity and some of that moisture is retained in the balsa wood when the parts were put in the bags. When exposed to drier air, the wood loses the excess moisture, dimensionally shrinking slightly in the process. In turn, this shrinkage may cause some slight relaxing of the covering, causing wrinkles to appear.

Any wrinkles that appear in the covering are easy to remove by applying a little heat from a modeler's "covering iron" or small "trim seal" iron. Be very careful if you are using a "heat gun" to tighten up loose covering. A heat gun spreads the heat over a very large area and can cause seams to "crawl" if you are not careful.

The best procedure is to first use a small trim seal iron to go over all the seams and color joints in the covering, making sure they are all sealed down and well adhered. Then, hold the hot iron over the wrinkle to lightly shrink the material - do not press on it. Once the covering is tight, lightly iron it back down to the wood. Use caution whenever the hot iron gets close to a seam in the covering. Over-heating a seam can cause the covering to creep, exposing the wood underneath.



**For reshinking AEROKOTE® set your iron temperature to approximately 220° - 250° F (104° - 121° C).**

**INTRODUCTION**

Congratulations on your purchase of the SIG Primary Force ARF. The reason for the name "Primary" is that this contest winning stunt ship is really easy to build, trim, and fly. It makes an excellent model for the beginning stunt flyer and expert alike. It will teach you the basic trimming skills needed to be a competitive stunt flyer without the complexity of a flapped model. Most experts that have flown the Primary Force like it for its simplicity and praise it for its honest and superb flying characteristics. The Primary Force can fly the entire AMA stunt pattern with a level of smoothness and "flow" that has up to now only been associated with flap-equipped stunt ships. The Primary Force is equipped with all the modern day trimming devices and can be flown with many of the existing .25 to .40 stunt engines.

**EASY TO ASSEMBLE**

Assembly of your Primary Force ARF is fast and simple when following the detailed instructions in this manual. A low parts count and professional engineering ensure quick and easy assembly. All parts are CAD-drawn and laser-cut, which means that everything fits the way it should. The airplane has been carefully jig built, yielding a straight and true airframe. The light weight structure is covered and finished in SIG AeroKote® polyester film. We urge you to read through this instruction manual first, before starting assembly, to familiarize yourself with the various aircraft parts and assembly sequences.

**Technical Specifications PRIMARY FORCE**

Wing Span:	50.8 in.	1290 mm
Wing Area:	500 in. <sup>2</sup>	32.3 dm <sup>2</sup>
Length:	39.5 in.	1003 mm
Flying Weight:	36 - 40 oz.	1020 - 1134 g
Wing Loading:	10.4 - 11.5 oz./ft. <sup>2</sup>	31.6 - 35.1 g/dm <sup>2</sup>

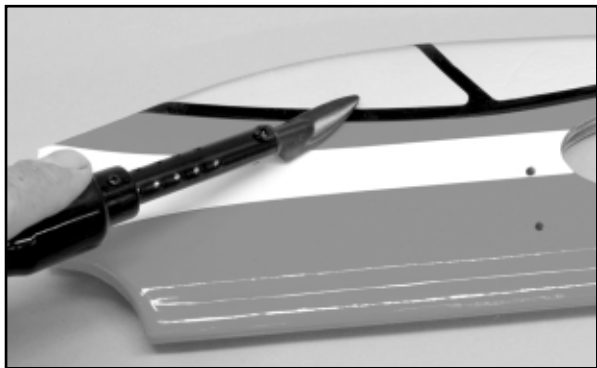
**ENGINE (not supplied)**

The Primary Force ARF was designed for light weight 2-stroke glow engines in the venerable "Fox .35 Stunt" power range. In this modern era that can include many fine engines from .25 cu. in. up to .40 cu. in. (4.1 - 6.5 cm<sup>3</sup>). The choice is yours, based on your personal preference and availability.

For the record, we've seen the Primary Force design powered by the following engines (old and new), all with excellent results: Fox 35 Stunt, OS Max 35S, McCoy 35/40 Redhead, OS 25FP, OS 25LA, OS 40FP, OS 40LA, Brodak 40. Here at the SIG factory, we have also been using the Norvel .25 BIG MIG and the Norvel .25 BB AME engines with good results.

**PROPELLER (not supplied)**

Due to the wide range of suitable engines for the Primary Force, it is impossible to recommend one "best" propeller for all situations.



**MODELER'S TIP:** One of the most common problems associated with shrinking any covering film is controlling the heat around the seams. Heat applied close to or directly onto seams re-heats the covering adhesive and the seams will often "crawl". This is easy to control. Just tear a few paper towels into strips and soak them in cool tap water. Lay the wet strips over any covering seam and use a heat gun or iron as you normally would. The wet strips keep the seam cool while the covering immediately next to it shrinks. This tip works great with any iron-on covering.

#### REQUIRED TOOLS

For proper assembly, we suggest you have the following tools and materials available:



- A selection of glues - SIG Thin, Medium and Thick CA, and SIG Epoxy Glue (5-minute and 30-minute)
- Fine point CA applicator tips
- Screwdrivers
- Pliers - Regular, Needle Nose, & Wire Cutters
- Drill with Assorted Drill Bits
- Pin Vise for small diameter drill bits
- Small Allen Wrench Assortment
- Small T-Pins
- Sandpaper
- Hobby Knife with sharp #11 blades
- Covering Iron and Trim Seal Tool
- Thread-lock compound, such as Loctite® Non-Permanent Blue
- 36" Straight edge or metal yardstick
- 90° square or triangle
- Felt tip pen
- Rubbing Alcohol (for cleaning off excess epoxy glue)
- Paper Towels

#### KIT INVENTORY

The following is a list of the parts contained in this kit. Use the check-off blocks to inventory your kit before beginning assembly.

- (1) Fuselage
- (1) Wing
- (1) Stabilizer
- (2) Elevators
- (1) Joiner Wire, installed but not glued
- (4) CA Hinges, installed but not glued
- (1) Pushrod Wire
- (1) Metal Clevis
- (1) Clevis Retainer Spring
- (1) Clevis Lock Nut
- (1) Nylon Control Horn & Retainer Plate
- (3) M2 x 15mm Phillips-Head Bolts
- (1) Right Main Landing Gear
- (1) Left Main Landing Gear
- (2) M3 x 25mm Phillips-Head Bolts
- (2) M3 Lock Nuts
- (2) Main Wheels
- (2) M3 x 25mm Phillips-Head Axle Bolts
- (2) Wheel Bushings
- (8) Flat Metal Washers
- (2) M3 Lock Nuts
- (1) Right Wheel Pant
- (1) Left Wheel Pant
- (1) Tail Wheel Wire
- (1) Tail Wheel
- (1) Wheel Collar with Set Screw
- (2) Metal Straps
- (4) T2 x 8mm PWA Screws
- (1) 1-3/4" dia. White Plastic Spinner
- (1) 4 oz. Fuel Tank
- (2) Rubber Bands
- (4) J-Bolts
- (2) Crimp Sleeves, for leadout ends
- (2) Brass Eyelets, for leadout ends
- (1) Decal Sheet

**Note:** Full-size plans are not available or needed for the Primary Force ARF.

#### ADDITIONAL MATERIALS

In addition to the above kit parts, you will need to purchase:

- Engine (see note on page 1)
- Propeller to fit your engine (see note on page 1)
- Mounting Bolts & Blind Nuts to fit your engine
- Fuel Tubing to fit your engine
- #32 or #30 Rubber Bands to mount the fuel tank
- C/L Handle & Control Lines (see note on page 1)
- Fuel, Starting Battery, & Typical Field Equipment

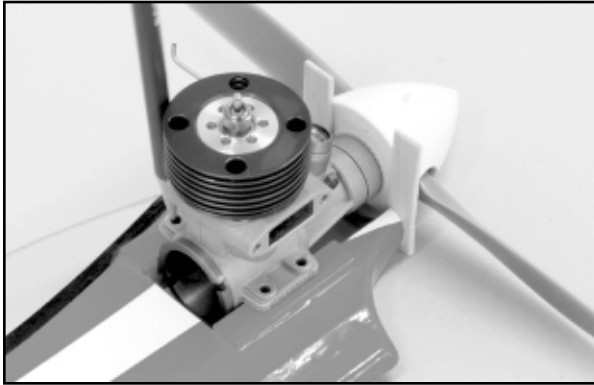
#### NOTES BEFORE BEGINNING ASSEMBLY

- In this manual, any references to right or left, refer to your right or left as if you were seated in the cockpit of the airplane.
- Whenever the generic word "glue" is used in this manual, you can use your own experience to decide what type of adhesive to use. When a specific type of glue works best for that step, the instructions will tell you what adhesive is recommended.

**MOUNTING THE ENGINE**

We suggest mounting the engine and fuel tank before the wing is installed in the fuselage, as it is much easier to work on them without the wing in the way.

- 1) Assemble the propeller and the 1-3/4" spinner onto your engine.
- 2) Cut two 1/16" x 1/4" x 2" shims from balsa or plywood to use as spacers between the spinner backplate and the front of the fuselage as shown.



- 3) Center the engine evenly between the motor mounts and make sure that the centerline of the engine lines up with the centerline of the wing cutout. Then mark the locations for the four engine mounting bolts onto the fuselage.
- 4) Drill the holes for your engine mounting bolts through the fuselage at the marked locations. If available, use a drill press to keep the holes perfectly vertical in the fuselage. After drilling, place a couple drops of Thin CA in each hole to help seal out fuel and let dry.
- 5) Install your blind nuts in the drilled holes on the left side of the fuselage. Bolt the engine in place and tighten the mounting bolts to finish aligning the blind nuts. Secure the blind nuts in place with CA glue.

**Note:** No right engine offset was required on the prototype. In fact, the engine was initially offset on the first prototype by placing washers under the front mounting lugs of the engine and the washers were later removed during trimming process.

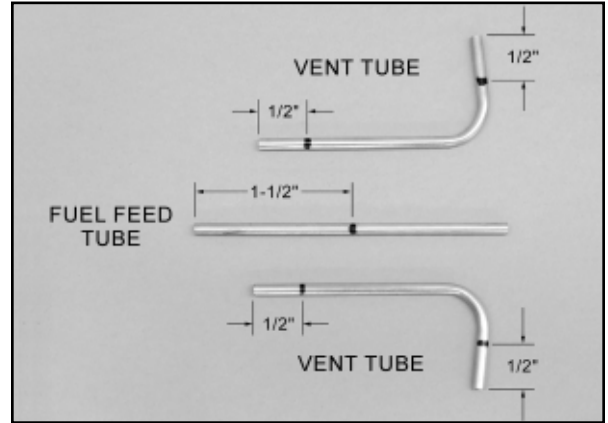
**FUEL TANK ASSEMBLY**

The fuel tank provided in this kit is a 4 oz. clunk-style plastic tank. We have used this tank successfully on the Primary Force with either standard up/down 2-vent plumbing and with "uniflow" plumbing. The choice for your airplane is up to you, based on your



personal experience and preference. For simplicity, the following instructions will only show the installation of standard 2-vent plumbing.

- 6) The 3 metal tubes (2 curved, 1 straight) supplied with the fuel tank need to be cut off for the Primary Force 2-vent installation.
  - a) The two curved metal tubes will be used for the tank vents. Cut 1/2" off BOTH ends of each curved tube, as shown.
  - b) The straight tube will be used for the fuel feed line. Cut it to 1-1/2" long.

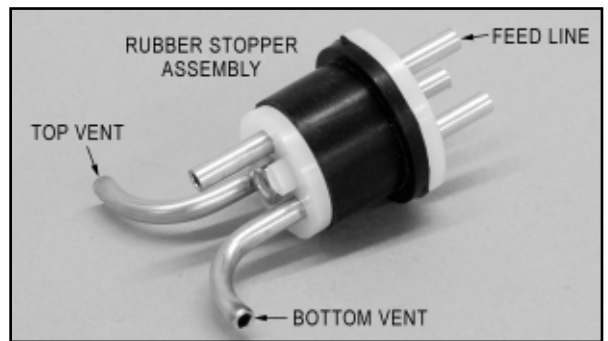


**Cutting Metal Fuel Lines:** There are actually several good ways to go about cutting metal fuel line tubing.

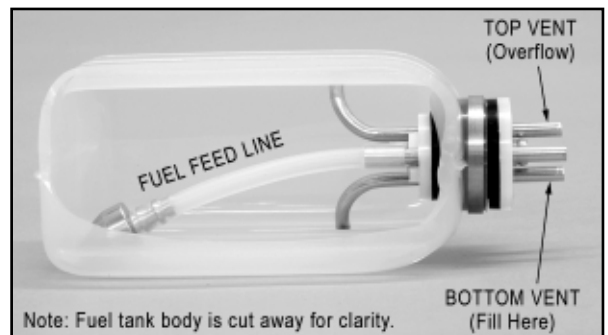
- 1) Small Tubing Cutter (such as K&S #296).
- 2) Dremel® Tool with Abrasive Cutoff Wheel.
- 3) Razor Saw (such as X-Acto #239).

Regardless which method you use, be sure that you remove any burrs from the outside and inside of the cut end. Burrs on the outside of the tube can cut your fuel line tubing, and burrs on the inside of the tube can restrict fuel flow. Use fine sandpaper to clean up burrs on the outside of the tube, and a #11 modeling knife to remove any burrs on the inside.

- 7) Assemble the metal tubes in the rubber stopper, as shown.



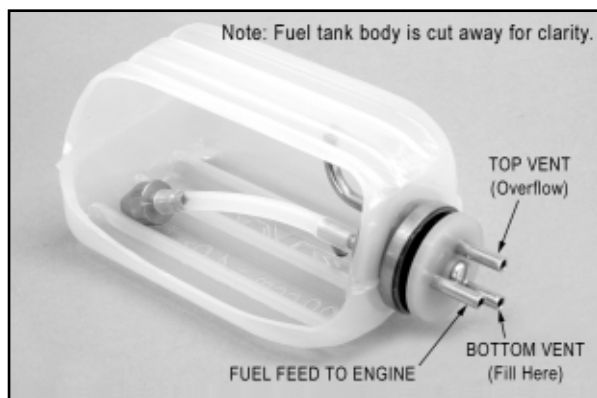
- 8) Install the stopper assembly in the tank, along with the flexible fuel line tubing with the metal klunk weight on the end.



Adjust the overall length of the flexible fuel line tubing as necessary to allow the klunk weight to swing freely inside the tank without hanging up on the back of the tank. Also make sure that the TOP VENT is near, but not touching, the top of the fuel tank. And the BOTTOM VENT should be near, but not touching, the bottom of the tank. Below are two more pictures of the standard 2-vent fuel tank.

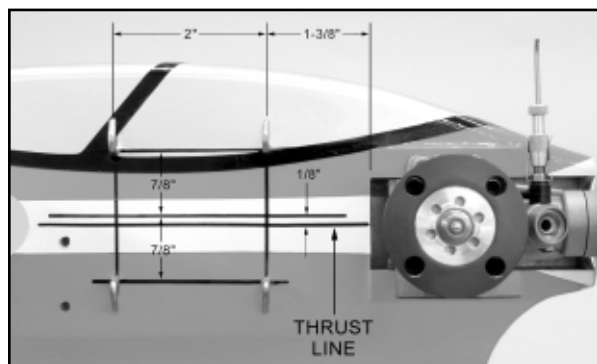


**NOTE:** With this standard 2-vent fuel tank plumbing arrangement, you fill the tank by putting fuel in through the bottom vent until it runs out the overflow line which is the top vent.



### MOUNTING THE FUEL TANK

- 9) Mount the fuel tank to the fuselage using J-Bolts and rubberbands, using this procedure.
  - a) First draw the thrustline across the fuel tank area, from the back of the engine to the wing cutout, with a felt-tip pen. Make sure it lines up precisely with the center of the engine and the center of the wing cutout.
  - b) Then draw a parallel line 1/8" above the thrust line. This line represents the location of the center line of the fuel tank.
  - c) Now draw parallel lines 7/8" above and 7/8" below the tank centerline.
  - d) Measure back 1-3/8" from the back edge of the motor cutout in the fuselage and draw a vertical line.



- e) Draw another vertical line 2" behind the first one.
- f) The intersections of the vertical lines with the 7/8" horizontal lines mark the locations for the four J-Bolts. Use a 1/16" dia. bit to drill pilot holes into the fuselage (but not completely through it) for the J-Bolts. Thread the J-Bolts into the holes.
- g) Temporarily take the J-Bolts back out of the holes. Put some epoxy glue in the holes, and then thread the J-Bolts back in. Use a rag soaked with rubbing alcohol to remove the ink lines and clean up any excess epoxy.
- h) Use six to eight #32 or #30 Rubber Bands (not supplied) to mount the fuel tank in place between the J-Bolts, as shown.
- i) Connect the tank's fuel feed line to the engine with a piece of heat-proof silocone fuel line tubing (not supplied).



- j) **Optional:** Place a piece of foam rubber (not supplied) between the fuel tank and the fuselage. The foam helps isolate the fuel tank from engine vibration and minimizes fuel foaming and erratic engine runs.

**Note:** The 1-3/4" overall vertical spacing between the J-Bolts allows for some adjustment of the fuel tank height to achieve equal engine speed during both upright and inverted flight. Our flight tests have shown it best to mount the tank with its centerline approximately 1/8" above the engine thrust line. But your results may vary. By using scrap wood shims, you can fine tune your tank height during flight testing to achieve a good engine run.

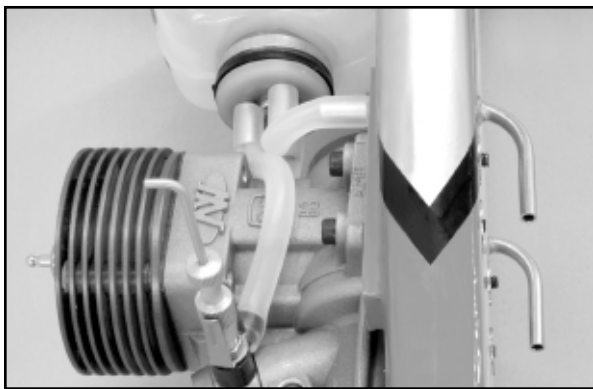
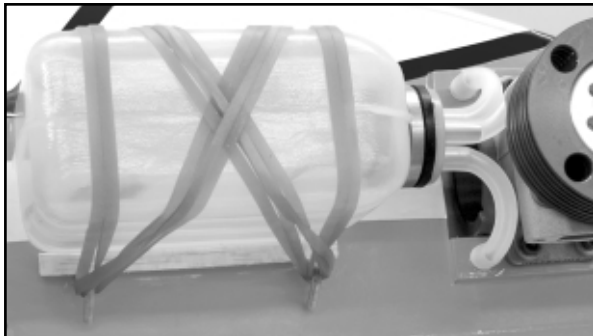
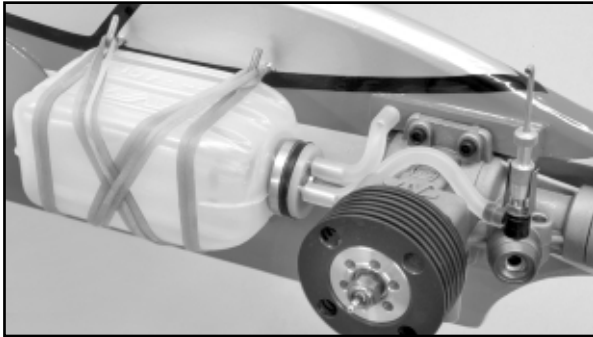
□10) For best performance the top and bottom tank vents should be extended into unobstructed airflow, instead of being behind the engine as they are now. There are many ways to extend the tank vents on a profile model, and experienced modelers usually have their own favorite method. For that reason, we do not supply the materials to make tank vent extensions.

Here is our preferred method of extending the fuel tank vents on a model with a profile fuselage:

- a) Try to locate two more 90° curved brass fuel tank vents (not supplied) like the two that came with your tank. People who have been in this hobby for a long time usually have some of these laying around (from old tanks or unused from single vent setups). If you can't find surplus pre-curved tank vents, they are very easy to make out of K&S 1/8"od Soft Brass Tubing #121(not supplied).



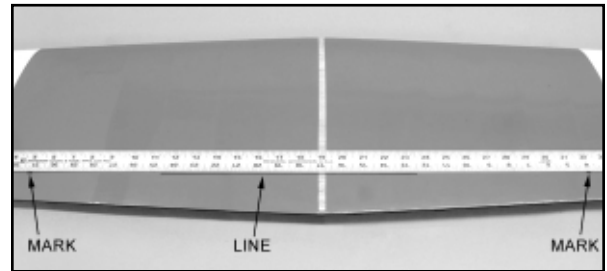
- b) Drill a 1/8" dia. hole completely through the fuselage right behind each of the two motor mounting lugs.
- c) Scuff up the outside of the brass extension tubes with medium sandpaper to improve glue adhesion. Then glue the extension tubes into the holes in the fuselage.
- d) Connect the tank's top and bottom vents to the extension tubes with a heat-proof silicone fuel line tubing (not supplied).



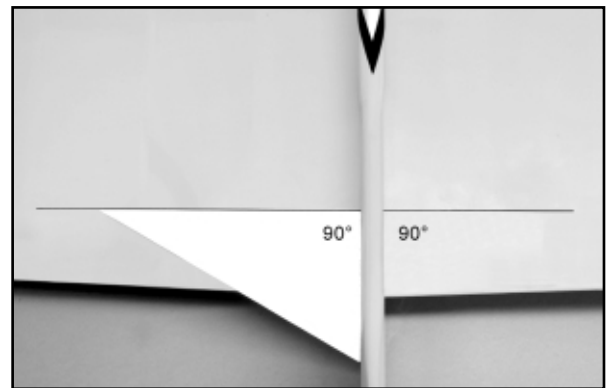
Since the wing of the Primary Force has a triple taper and is offset from center, verifying the alignment by measuring is not a simple matter. We will need to create a dependable way to verify the alignment accurately.

Fortunately, if you look very closely at the surface of the Primary Force wing you will see that the front edge of the trailing edge sheeting, where it meets the cap strips over the ribs, is straight from tip to tip. We can use this line to measure our 90° angle.

- 11) On the top of the wing count out four ribs from center on each side and make a small mark with a fine tip marking pen where the trailing edge sheet and the cap strip meet. Then using a long straightedge, draw a line between these marks as shown. This gives us a good spanwise reference line.



- 12) Slide the right (outboard) wing into the wing cutout in the fuselage. Slide it in until the uncovered section at the middle of the wing is completely under the fuselage. Use a carpenter's square or 90° triangle to align the wing perpendicular to the fuselage, using the line you drew in the previous step as the reference. Double check by using the triangle on both sides of the fuselage.



Now that the engine and fuel tank installations are finished, it's best to temporarily remove them while you work on the rest of the airplane. Be sure to fuel proof any exposed wood in the engine and tank area with Thin CA glue or fuel proof paint.

### INSTALL THE WING

The first thing we need is to properly identify the top and bottom of the wing so that we know which way it goes in the fuselage. Note that the top of the wing is perfectly smooth with no openings. Note that the bottom of the wing has a hatch for access to the bellcrank, and that this hatch will be on the inboard (left) side of the fuselage. Also note that when looking at wing from the top, the left (inboard) wing is slightly longer than the right (outboard) wing. And that the left (inboard) wing also has the leadout wires exiting from the tip.

PROPER ALIGNMENT of the wing to the fuselage is very critical to the flight performance of the airplane. It is important to take extra time to get the alignment as perfect as possible. The goal is to get the fuselage and the wing perpendicular to each other.

- 13) Once you have the wing in position and perfectly aligned, use a felt-tip pen to mark the exact fuselage location on the surfaces of the wing. Run the pen tight against the side of the fuselage, from the leading edge of the wing all the way to the trailing edge. Mark both sides of the fuselage on both the top and bottom of the wing. Then remove the wing for the next step.



□14) Remove the covering material from the wing between the marked lines, to allow for maximum gluing area. Use a sharp #11 hobby knife or single-edge razor blade to cut through the covering material just inside the marked lines. Be very careful to cut the covering material only - not the balsa wood structure underneath. After you've cut through the covering material, peel the unwanted covering off the wing.

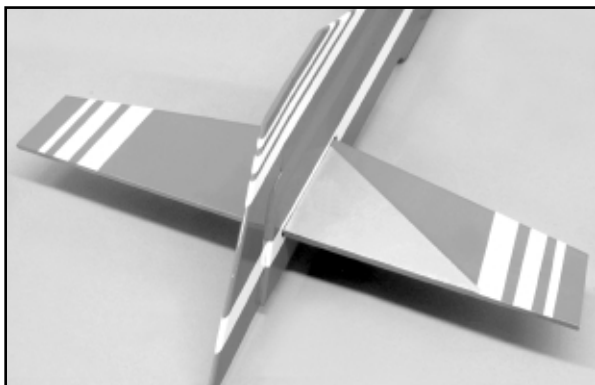
□15) Glue the wing permanently in place in the fuselage, being very careful to get it back in perfect alignment before the glue dries. To allow adequate working time for alignment and clean up, use slow drying epoxy glue for this joint. Follow these steps:

- a) Spread a thin coat of mixed epoxy glue on the bare wood at the center of the wing, top, and bottom.
- b) Slide the fuselage over the right wing panel and into position at the center section.
- c) Use a 90° square to double check the alignment of the wing and fuselage. Use a couple of pins at the leading and trailing edges to hold the wing in position until the glue dries.
- d) While the glue is drying, clean up any excess epoxy around the wing joint with a paper towel and rubbing alcohol. Double check the alignment one last time and set aside to dry.

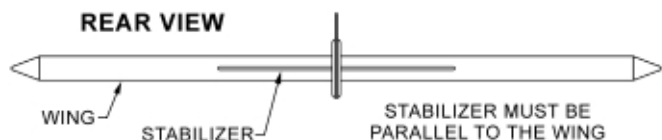
### INSTALL THE STABILIZER

Remove the elevators, hinges, and wire joiner from the stabilizer and set aside.

□16) Slide the stabilizer into the rear slot in the fuselage. Slide it to the front of the slot and use a 90° square to make the trailing edge perpendicular to the fuselage as shown.



Now move behind the fuselage and check the alignment of the stabilizer to the wing from the rear view. The wing and stabilizer must be parallel to each other. If necessary, alter the stab cutout in the fuselage to allow you to get the stab in proper alignment.



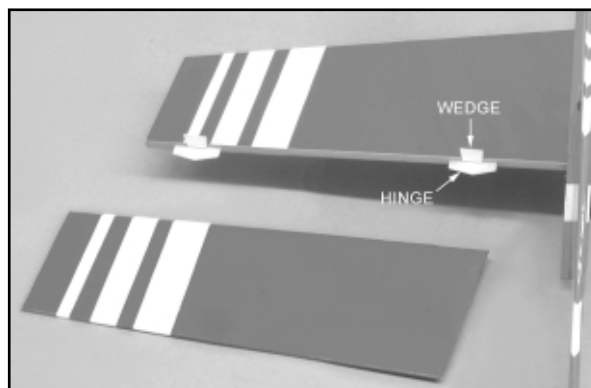
□17) Once you have the stabilizer properly aligned, use a felt-tip pen to mark the fuselage location on the top and bottom surfaces of the stabilizer. Remove the stabilizer from the fuselage, and then carefully remove the covering material between the lines. Remove any residual ink lines with rubbing alcohol before proceeding.

□18) Glue the stabilizer permanently in place in the fuselage, being very careful to get it in perfect alignment before the glue dries. Clean up any excess epoxy with a paper towel and alcohol. Set aside until thoroughly cured.

### HINGING THE ELEVATORS

The CA Hinges supplied in this kit have a die-cut center slot that can be used to accurately center the hinge equally into both the stabilizer and elevators. To do this, get an old business card, or similar stock, and use a scissors to cut some "wedges". The wedges should be wide enough at one end so as not to pass through the hinge slot cutout.

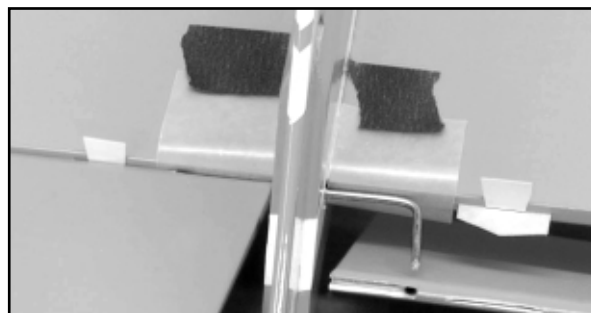
□19) Test fit the CA hinges and the elevators onto the back of the stabilizer. Place one of the card wedges into the center slot of each hinge to keep the hinge centered. When you are satisfied that everything fits properly, pull the elevator halves off the hinges again. Leave the hinges and wedges in position in the back of the stabilizer. Do this for both the right and left elevators.



□20) Test fit the elevator joiner wire into the hole and groove in the leading edge of each elevator. Make sure the joiner wire goes in easily and that the elevators will be in straight alignment with each other. Make slight alterations to the hole or slot if necessary.

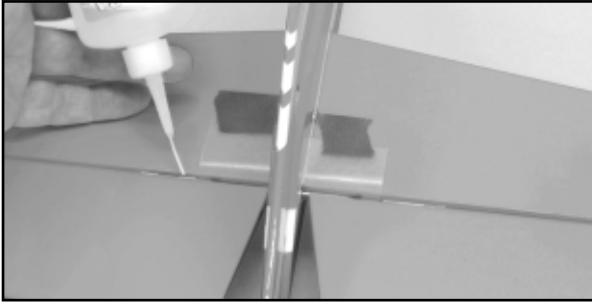
□21) After you are sure that the elevators, joiner wire, and hinges will fit together easily, proceed with the final hinging as follows:

- a) Insert the elevator joiner wire through the gap in the fuselage behind the stabilizer.
- b) Tape a couple pieces of wax paper between the wire joiner and the stabilizer to prevent any excess epoxy from getting on the stabilizer.
- c) Mix slow drying epoxy glue and coat the legs of the joiner wire with the glue. Install the elevator on the joiner wire and the hinges at the same time. Wipe off any excess epoxy that oozes out around the joiner wire. Install both elevators in this manner.



- d) Push both elevators firmly up against the back of the stab. Make sure that the entire elevator assembly is centered on the span of the stab. Also double check that the elevators are in alignment with each other. Remove card wedges from the hinges.
- e) Set the proper amount of gap between the stab and elevators by deflecting the elevator about 45° each way. This will automatically set the proper hinge gap. Make sure everything is functioning properly before proceeding to the next step.

- f) Hold the elevators in the down position while you carefully place 2 drops of Thin CA glue directly onto one of the hinges in the gap (be sure to use a fine applicator tip on your glue bottle). You will notice that the glue quickly wicks into the wood and the hinge. Quickly turn the model over and apply 2 drops of glue to the other side of the hinge. Continue this process until you have glued both sides of all the hinges. Keep a rag handy to wipe off any excess CA glue.



**Note:** If you get some glue smears on the plastic covering, don't worry about them right now. Once all the hinges are glued, you can go back to clean the smears off with a little CA Debonder on a rag or paper towel.

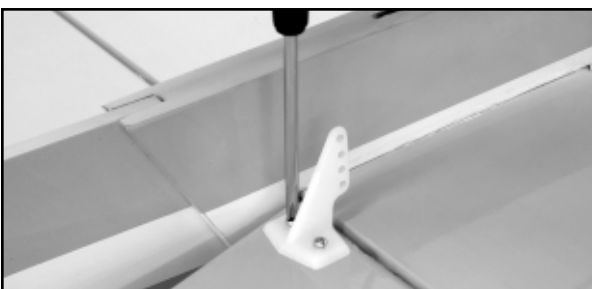
- g) Let the glue dry a minimum of 10 minutes before flexing the hinges. At first you might notice a little stiffness in the joint. This will go away after the hinges have been flexed back and forth a couple dozen times.

**VERY IMPORTANT:** It's critical that you only make one application of glue to each side of a CA hinge. If you apply additional glue to the hinge after the first application of glue is already dry, the second application of glue will merely puddle in the hinge gap and make the hinge too stiff to operate properly. The excess glue can also weaken the hinge! When properly glued, the portion of the hinge that you see in the hinge gap should have a dry appearance, not wet. A dry appearance indicates that almost all of the glue has properly soaked into the hinge and wood. A wet appearance indicates that excess glue is puddled in the hinge gap. Excess glue can become brittle with age and cut the hinge. Also, NEVER USE CA ACCELERATOR (KICKER) ON CA HINGES!

### INSTALL CONTROL SYSTEM

- 22) Install the Nylon Control Horn on the bottom of the left elevator as shown.

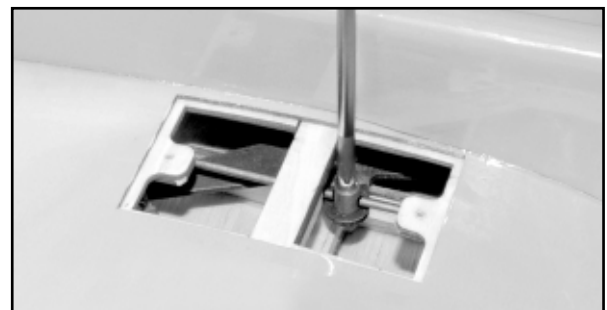
- Hold the Control Horn in place on the elevator, approximately 1/2" out from the fuselage side. Make sure the pivot holes of the Control Horn are directly over the hinge line. Then mark the locations of the two mounting holes onto the elevator.
- Drill completely through the elevator at the marks with a 5/64" dia. drill bit.
- Mount the Control Horn on the elevator with the two M2 x 15mm Screws provided, using the nylon control horn Retainer Plate on the top side of the elevator.



- 23) Install the elevator pushrod as follows:
- Screw the metal clevis onto the threaded end of the pushrod wire. Adjust the clevis until it is approximately centered on the threads fore and aft.
  - Remove the bellcrank hatch from the wing. Notice that the bellcrank is supplied with a heavy-duty connector to retain the pushrod. Loosen the set screw on top of the connector far enough to open up the side hole in the connector.
  - Insert the plain end of the pushrod wire through the oval pushrod exit hole in the wing, directing it forwards towards the bellcrank and into the side hole of the connector.
  - Clip the metal clevis into the bottom hole of the elevator control horn (the hole farthest from the elevator).
  - Use two pieces of scrap balsa stick and a couple rubber bands to lock the elevator in neutral position.



- f) Hold the bellcrank in neutral position while you use a felt tip pen to put marks on the pushrod on both sides of the connector. Then pull the pushrod back out of the airplane
- a n d
- file or grind a flat on the pushrod between these two marks.
- g) Re-install the pushrod as before, inserting the forward end through the connector and hooking up the clevis to the control horn. Turn the pushrod so that the connector's set screw will seat on the flat that you have filed. Remove the elevator lock so you can move the bellcrank off neutral position, which will allow you to to tighten the set screw against the flat spot.



**VERY IMPORTANT:** For the safety of this critical connection of the control system, we strongly advise that you use a thread lock compound such as Loctite® on the setscrew and pushrod wire during final assembly. Be careful not to let any thread-lock seep down between the connector and the bellcrank.

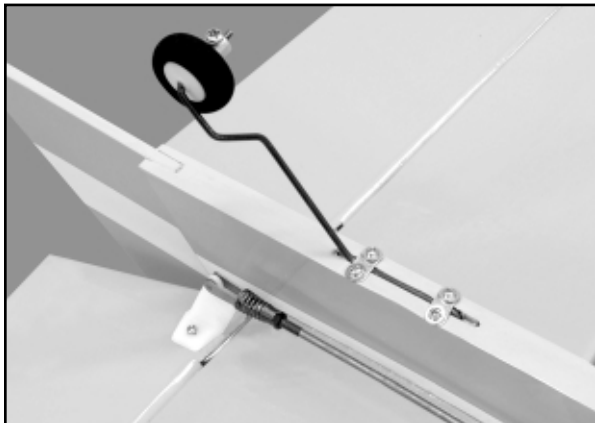


- h) Once you have the pushrod locked in the connector, hold the bellcrank in neutral position while you check the position of the elevators. If necessary, adjust the overall length of the pushrod by screwing the clevis in or out until the elevators are in perfect neutral when the bellcrank is in neutral. When you've finished the adjustment, slide the clevis retainer spring over the clevis, and then tighten the clevis lock nut up against the back of the clevis.

## LANDING GEAR

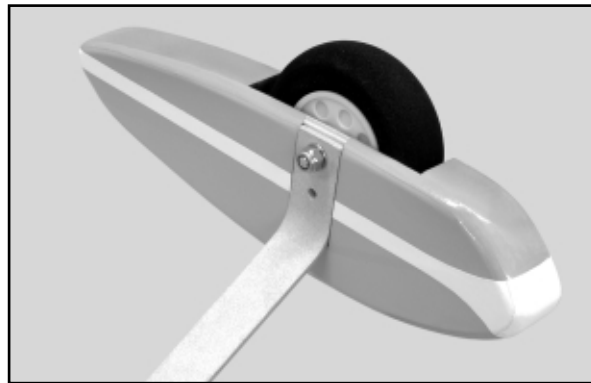
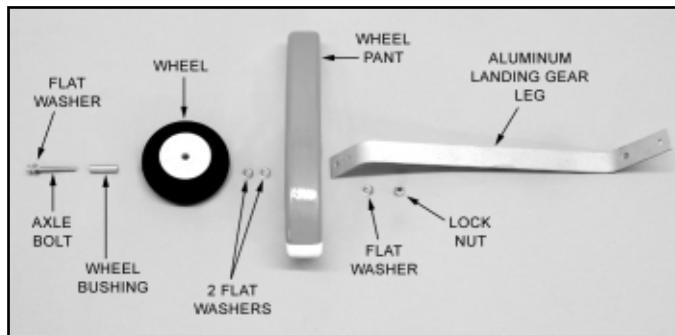
□24) Install the tailwheel assembly on the bottom of the fuselage, as follows:

- Trial fit the tailwheel wire into the pre-cut slot in the bottom of the fuselage. The wire should fit completely in the slot, flush with the surface of the fuselage.
- Hold the two metal straps in position over the tailwheel wire and mark the locations for the four mounting screws. Drill four pilot holes with a 3/64" dia. bit.
- Place a small drop of Thin CA in each drilled hole for fuel proofing.
- Remove the tailwheel wire and coat the inside of the slot with Thin CA for fuel proofing. Let dry.
- Re-insert the tailwheel wire into the slot and secure in place with the metal straps and four M2 x 8mm screws.



□25) Assemble the main landing gear legs in this order.

- Slide one of the flat metal washers onto the M3 x 25mm phillips-head axle bolt, all the way up to the head of the bolt.
- Next slide the wheel bushing onto the axle, and then the main wheel over the bushing.
- Add two more flat metal washer, which serve as spacers between the wheel and the wheel pant.
- Insert the axle assembly through the axle hole in the wheel pant and then through the bottom hole of the landing gear leg.
- Complete the assembly with another flat metal washer and a lock nut against the gear leg. Tighten securely. Make sure the wheel turns freely.
- Repeat this sequence to assemble the other main landing gear leg, wheel, and wheel pant.



□26) Bolt the main landing gear legs to the fuselage as follows:

- Flow a couple drops of Thin CA into the two holes in the fuselage for the main landing gear attachment bolts. This seals the wood from fuel and oil. Let dry.
- Insert two M3 x 25mm phillips-head bolts through the mounting holes of one of the main landing gear legs. Run these bolts through the mounting holes in the fuselage, holding the landing gear leg tight against the fuselage.
- Place the other landing gear leg over the protruding bolts on the other side of the fuselage, and then screw on the M3 lock nuts. Tighten securely.



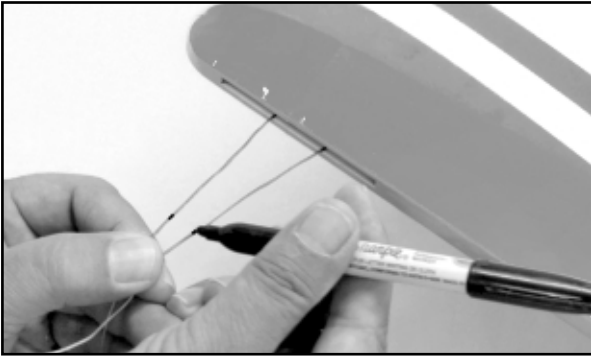
## COMPLETING THE LEADOUTS

□27) Use a 2.5mm hex wrench or ball driver to adjust the leadout guide at the wing tip. The leadout guide adjustment bolt should be located 2-3/8" aft of the wing leading edge (or 6-11/16" forward of the trailing edge) for the first test flight.

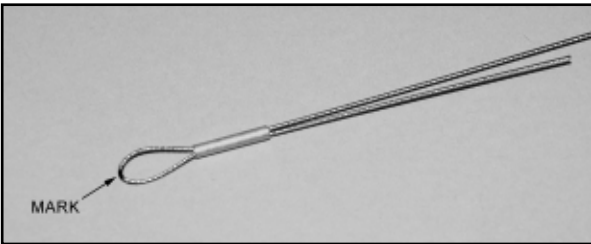


□28) Lock the elevators in neutral position as you did in Step 23e, using two pieces of scrap balsa stick and a couple rubber bands. Then pull both leadout wires tight at the wing tip with one hand, while you measure out 2-1/2" from the wing tip and mark both leadouts together at this point.

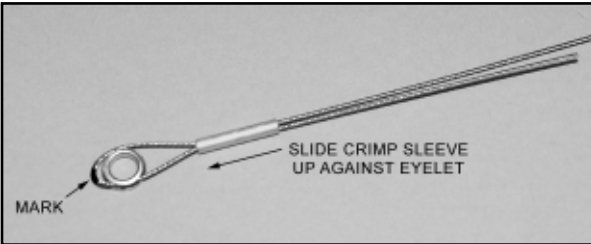




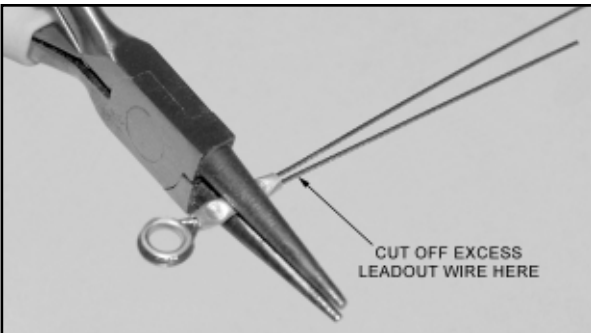
- 29) Complete the ends of the leadout cables as follows:
- Slide one of the brass crimp sleeves over the end of one of the leadout wires and up towards the wingtip, past the mark you made in the previous step.
  - Bend the leadout wire 180° at your mark and insert the loose end of the leadout back through the crimp sleeve, creating a loop in the end of the cable.



- Insert a brass eyelet into the loop and slide the crimp sleeve up tight against the brass eyelet. Make sure the mark on the cable stays at the outside edge of the loop.



- Crimp the sleeve in 2-3 places as shown with a round jawed "snipe" nose pliers (such as X-Acto #75050). Use the fattest part of the jaws of the pliers when crimping the sleeve, in order to maximize the radius of the crimps and avoid kinking the leadout wire.



- Trim off the excess leadout wire. Put a small drop of epoxy glue at each end of the crimp sleeve and let dry.
- Repeat these steps for the other leadout wire.

**NOTE:** There are other common ways to make leadout ends, and experienced control-line fliers may have a slightly different method

that they prefer. We have found the method shown here to be completely satisfactory and safe for the Primary Force, provided a proper crimping pliers is used, like the one shown.

## DECAL APPLICATION

The decals supplied with the Primary Force are Mylar® stickers with an extremely aggressive adhesive. These decals are not die-cut. Each design must be cut from the sheet with a sharp #11 hobby knife or a sharp scissors.

Small decals can be easily applied to the model by simply removing the paper backing sheet, and then laying the decal in position and pressing it in place with your finger.

For the larger decals we suggest the following method of application:

- Carefully cut out the decal with a hobby knife.
- Peel the paper backing sheet completely off the decal, being careful not to let the sticky side double over and adhere to itself.
- Use a product like SIG Pure Magic Model Airplane Cleaner, Fantastic®, or Windex® to spray the area of the model that will receive the decal. Then spray the adhesive side of the decal as well.
- Lightly place the decal onto the wet surface of the model. The liquid cleaner solution will keep the decal from actually sticking to the model until you have had time to shift it around into exact position. Once in position, use a piece of stiff cardboard (or sheet balsa, thin plywood, or a SIG SH678 EPOXY SPREADER) to squeegee the excess liquid cleaner out from under the decal. Squeegee repeatedly, removing all excess liquid and any air bubbles. Mop up the liquid with a paper towel. Allow to dry overnight.
- When completely dry, wash off any soapy smears with a clean wet rag.



## PRE-FLIGHT

### BALANCE

All airplanes must be properly balanced to achieve good flight characteristics, and the balance of an aerobatic airplane like the Primary Force is especially critical. Balancing this model should be approached with patience and care.

For initial test flying and familiarization purposes, we suggest a starting balance point of:

**16.5%** of the Mean Aerodynamic Chord  
which is **2-1/8"** behind the leading  
edge of the wing at the fuselage

**IMPORTANT NOTE:** Balanced means the airplane sets perfectly level when supported at the desired balance point - NOT slightly nose down or nose up - PERFECTLY FLAT LEVEL!

## WING TIP WEIGHT

Install 3/4 oz. of weight in the tip weight box (Note: Three of the SIG 1/4 oz. Lead Weights #SH561 fit perfectly inside the Primary Force tip weight box). Use small pieces of foam rubber or paper towels to insulate the lead weights and keep them from rattling in the box.

## ADJUSTABLE LEADOUT GUIDE

The Primary Force is equipped with an adjustable leadout guide which lets you alter the location of the leadouts at the wing tip. This is an important flight trim feature that can have a great affect on achieving proper line tension during aerobatic maneuvers. As mentioned previously in Step 27, for your initial test flights the leadout guide adjustment bolt should be located at 2-3/8" aft of the wing leading edge (or 6-11/16" forward of the trailing edge).

## CONTROL SYSTEM

The control system must work free and smooth with an equal amount of up and down travel.

## ENGINE BREAK-IN

Make sure your engine is properly broken in and running properly before attempting the first test flight.

## FLYING THE PRIMARY FORCE

The Primary Force is not a trainer model. It is intended for pilots who have some previous control-line experience. If you are a new pilot, please seek the assistance of an experienced control-line pilot who can help you with your first flights.

## ADVANCED FLIGHT TRIMMING

These trimming tips are geared towards experienced stunt fliers who are seeking the ultimate aerobatic performance from their Primary Force. Nonetheless, the information provided here can also be of value to less experienced fliers as their skills progress. As you become more proficient and begin learning all of the pattern maneuvers, these tips will help you fine tune your airplane's performance to keep up with your improving pilot skills.

## HANDLE SPACING

If you are using a control handle that has adjustable line spacing, set the spacing at 3-1/2" between the lines. During the first few flights carefully watch the model in the square maneuvers. If the Primary Force hops when coming out of a square corner then reduce the line spacing 1/4" at a time until the hop is eliminated.

## LINE LENGTH

Start out with 60 ft. lines from the center of the handle to the center of the model. If the engine is running properly and the lap times are too fast, increase the line length two feet at a time until lap times are in the proper range.

## LAP TIMES

The Primary Force flies best at 5.0 - 5.3 second lap times. Exact time will vary slightly depending on which engine you are using and its running characteristics. EXAMPLE 1: The venerable Fox .35 Stunt engine likes to fly along at a slower 5.2 lap time and then speeds up slightly during maneuvers (the classic 4-2-4 break). Reduce the amount of speed up in the maneuvers with the Fox by using a 10x5 prop. EXAMPLE 2: The OS LA-25 likes to cook along in a wet 2-cycle at a 5.0 lap time, but the speed in the maneuvers ends up being about the same as the Fox 35. As always, you can adjust to suit your equipment and preferences.

## TIP WEIGHT

With 3/4 oz. of weight in the tip weight box the outboard wing should drop in a hard corner. Make small adjustments, one at a

time. Remove one of the weights from the box and cut off the corners of the weight. Fly the model and see if the wing drops again in a hard corner. If it does, cut off the corners of another weight and fly again. The Primary Force should pop a turn without any sign of wobble or hop while exiting a square turn. If the model feels soft in the overheads, then replace one of the weights with one that does not have corners cutoff and move the leadouts forward 1/8".

## LEADOUT POSITION

The 2-3/8" starting leadout position (see Step 27) should be really close to the final trim location. Tip weight has a big effect on the position of the leadouts, so go easy and move the leadouts slightly ahead if you add tip weight, and slightly to the rear if you remove tip weight. Never move the leadouts more than 1/8" at a time.

## FLY SAFELY!

Please operate your airplane in a safe, responsible manner with constant regard to other flyers, spectators, and property.

## GOOD LUCK AND HAPPY LANDINGS!

### **WARNING! THIS IS NOT A TOY!**

Flying machines of any form, either model-size or full-size, are not toys! Because of the speeds that airplanes must achieve in order to fly, they are capable of causing serious bodily harm and property damage if they crash. **IT IS YOUR RESPONSIBILITY AND YOURS ALONE** to assemble this model airplane correctly according to the plans and instructions, to ground test the finished model before each flight to make sure it is completely airworthy, and to always fly your model in a safe location and in a safe manner. The first test flights should only be made by an experienced flyer, familiar with high performance model aircraft.

## JOIN THE AMA

The governing body for model airplanes in the United States is the ACADEMY OF MODEL AERONAUTICS, commonly called the AMA. The AMA SAFETY CODE provides guidelines for the safe operation of model airplanes. While AMA membership is not necessarily mandatory, it is required by most flying clubs in the U.S. and provides you with important liability insurance in case your model should ever cause serious property damage or personal injury to someone else.

**ACADEMY OF MODEL AERONAUTICS**  
5161 East Memorial Drive  
Muncie, IN 47302  
Telephone: (765) 287-1256  
AMA WEB SITE: [www.modelaircraft.org](http://www.modelaircraft.org)

## CUSTOMER SERVICE

SIG MANUFACTURING CO. is committed to your success in assembling and flying the Primary Force ARF. Should you encounter any problem building this kit, or discover any missing or damaged parts, please contact us by mail or telephone.

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Montezuma, IA 50171-0520  
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(to order parts)  
**SIG MODELER'S HOTLINE: 1-641-623-0215**  
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**SIG WEB SITE: [www.sigmf.com](http://www.sigmf.com)**

## LIMIT OF LIABILITY

The craftsmanship, attention to detail and actions of the builder/flyer of this model airplane kit will ultimately determine the airworthiness, flight performance and safety of the finished model. SIG MFG. CO.'s obligation shall be to replace those parts of the kit proven to be defective or missing. The user shall determine the suitability of the product for his or her intended use and shall assume all risk and liability in connection therewith.