

FOUR-STAR 120

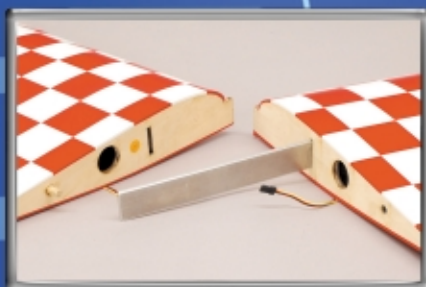


ALMOST READY TO FLY

ASSEMBLY MANUAL



KIT NO. SIGRC65ARF



SIG MANUFACTURING COMPANY, INC.


FOUR-STAR 120
 ALMOST READY TO FLY



FOUR-STAR 120 ARF ASSEMBLY MANUAL

INTRODUCTION:

The SIG FOUR-STAR 120 ARF combines the great classic looks and performance of the original Four-Star kit series, in an almost ready to fly package. The FOUR-STAR 120 ARF is easy to fly and makes an ideal choice for your first large low wing airplane. Intermediate and advanced flyers will also appreciate the maneuverability and smooth handling characteristics of this very honest flying design. All of this makes the FOUR-STAR 120 ARF the sport model that you will want to take to the flying field every time!

With the control throws set at the suggested low rates for the first flights, you will be able to easily get airborne, throttle back, and enjoy a truly nice flying, gentle R/C model. As your skills and confidence build, the control movements can be dialed up to match your abilities for more advanced aerobatics. The FOUR-STAR 120 ARF is a capable aerobatic model. Inside and outside loops, rolls, inverted flight, snap maneuvers, and great spins are all well within the Four-Star 120's flight envelope.

The FOUR-STAR 120 ARF kit has been engineered to get you into the air as quickly as possible with a R/C model that will truly last. The airframe has been expertly built and covered with SIG AeroKote®. This premium covering material is both rugged and easy to repair. The provided self-adhesive decals are high quality Mylar® and really serve to compliment the already striking color scheme.

This assembly manual has been specifically sequenced to get your FOUR-STAR 120 ARF assembled and into the air quickly. We strongly suggest that you read through this manual first, to become familiar with the various parts and their assembly sequences. The proper assembly and flying of this R/C model aircraft is *your* responsibility. If you are new to the sport/hobby of radio control, we urge you to seek the assistance of a qualified person to help you assemble this model airplane. If you do not understand a particular assembly step or sequence, **do not guess** - find qualified help and use it.

Specifications:	Imperial	Metric
Wing Span:	81 in.	2057 mm
Wing Area*:	1205 sq. in.	77.7 dm ²
Length:	65 in.	1651 mm
Flying Weight**:	11.5 - 12 lbs.	12.5 kg

Specifications:(cont.)	Imperial	Metric
Wing Loading:	22 oz./sq. ft.	67 g/sq. dm
Radio Required:	4 Channels with 5 servos	
Engine Required:	.90 - 1.20 2-Stroke	15 - 20 cu. cm
	1.20 - 1.50 4-Stroke	20 - 26 cu. cm
Kit Number:	SIGRC65ARFR (Red) or SIGRC65ARFY (Yellow)	

* Calculated at full span, including fuselage

** Flying weight can vary with use of different engines, battery packs, & equipment

RADIO EQUIPMENT:

The FOUR-STAR 120 ARF requires a typical four-channel radio system and five servos. We recommend you use ball bearing type servos of at least 60 oz./in. of torque for the two ailerons and for the elevators. We suggest using a metal gear servo of at least 100 oz./in. of torque for the rudder. The throttle can be driven by a typical standard servo.

We have used and can highly recommend the Hitec radio systems. These are affordable and reliable radio systems that offer all the features for this and the many other R/C aircraft in your future. For reference, this assembly manual will show the installation of a Hitec radio system, using the upgraded servos mentioned earlier. In addition, you will need two 12" servo lead extensions, one 6" standard aileron servo Y-harness and one 36" heavy-duty servo extension for the elevator servo. Due to the size of the model itself and the fact that it uses five servos, we suggest using an aftermarket airborne battery pack of at least 1000 mAh capacity.

Last, many of the following assembly steps will require the use of the radio system for the purpose of testing movements, etc. Before you begin assembly, place your radio system on charge to be sure it is ready to use during assembly.

ENGINE SELECTION:

The FOUR-STAR 120 ARF offers you the ability to use a wide range of engine types and sizes. The airplane has been designed to produce excellent performance when using the recommended engine sizes. Do not use engines larger than those recommended.

The FOUR-STAR 120 ARF flies very nicely using 4-stroke engines in the 1.20 to 1.80 cubic inch displacement range. 2-stroke engines in the .91 to 1.20 cubic inch displacement range will also provide plenty of power and performance. For example, either the AVIASTAR® 1.20 or 1.50 glow engines would be fine choices for this model. AviaStar® engines are powerful, ringed engines with oversize ball bearings. These high quality engines are both affordable and very reliable. Whatever engine you choose, take the time to carefully break it in according to the manufacturer's instructions. A good running, reliable engine is a minimum requirement for the enjoyment of this or any other R/C model aircraft.

Use only the propellers suggested for your particular engine. We also suggest using the larger diameter, lower pitch propellers listed for your engine by the manufacturer. Such props tend to provide very good pulling power during maneuvers, without a lot of excess speed. An 18" diameter propeller is about as big as you can use and still have adequate ground clearance. Lower pitch props are also of help in controlling your landings. The FOUR

STAR 120 ARF has a fairly low wing loading and may tend to float in ground effect during landings. A lower pitch prop has a "braking" effect in such circumstances and will get the airplane down to the ground nicely. We have made it a point to paint the tips of our props with a brightly colored paint to make the prop arc visible. Finally, always be sure to balance your flying props carefully to minimize vibration and possible engine bearing problems.

COVERING MATERIAL:

Your FOUR-STAR 120 ARF has been professionally covered using SIG AeroKote®. This high quality covering material is well known for its ease of application, light weight, and consistency of color. If you live in a dry climate, you may notice that some wrinkles might develop after removing the various covered parts from their plastic bags. This is perfectly normal in low humidity climates. Your model was built and covered in a part of the world with fairly high humidity and therefore, the wood was carrying a fair amount of moisture. When exposed to drier air, the wood typically loses this moisture, dimensionally shrinking in the process. In turn, this may cause some wrinkles. However, wrinkles are easy to remove by simply using a hobby type heat iron.

We suggest covering the iron shoe with a thin cotton cloth, such as an old T-shirt. This prevents scratching the film. The iron should be set to about 280° to 300° F. To avoid the seams from creeping during the shrinking process, first go over all the seams, heating them well and pressing them down with a cloth until cool. Use the heated iron to lightly shrink the material in the open span areas - do not press on it. Then lightly iron the material back down to the wood. You can also use a hobby type heat gun to re-shrink the covering but you must protect all seams and color joints to prevent unsightly creeping. A good way to do this is to roll up a damp paper towel and cover the seam with this while you apply the heat gun on the adjacent areas. For reference, your FOUR STAR 120 ARF was covered with SIG AeroKote® in one of the following color schemes.

AeroKote® #SIGSTL330 Bright Yellow with AeroKote® #SIGSTL433 Yellow & Black Checks

or

AeroKote® #SIGSTL311 Bright Red with AeroKote® #SIGSTL413 Red & White Checks

REQUIRED TOOLS:

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



- A Selection of Glues - SIG Thin and Medium CA Glue
SIG Kwik-Set 5-Minute and
30-Minute Epoxy
- Thread Locking Compound, Such As Loctite® Non-Permanent Blue
- A Selection of Screwdrivers, Both Blade and Phillips Types
- Pliers - Needle Nose and Flat Nose
- Diagonal Wire Cutters
- Small Allen Wrench Assortment
- Hobby Knife With Sharp #11 Blades
- Scissors
- Heat Gun, Heat Iron & Trim Seal Tool for Model Coverings
- Soldering Iron, Solder & Flux - StaBrite® Silver Solder & Flux Recommended
- Power Drill With An Assortment of Drill Bits
- A 90° Triangle or Square
- Masking Tape
- Paper Towels

COMPLETE KIT PARTS LIST:

The following is a complete list of all parts contained in this kit. Before beginning assembly, we suggest that you take the time to inventory the parts in your kit.

- BAG #1 Horizontal stabilizer and elevator - hinged but not glued - 4 hinges per side - 3/8" (9.5 mm) gap in covering in center of stab. top and bottom - wire joiner installed and glued - hard points for braces installed but not opened - all parts built up and sheeted over then covered
- BAG #2 Vertical fin and rudder - built-up, sheeted structure - 4 rudder hinges in place, not glued - hard points installed for bracing but not opened - factory covered
- BAG #3 Left wing panel - ailerons installed with 6 hinges but not glued, held in place with tape - aileron servo hatch/mount taped on bottom - tube for servo lead installed - receptacle built into main spars to receive aluminum joiner blade - locator dowel installed towards trailing edge - hold down tab at l.e. of root rib - servo lead hole in top sheeting but not opened
- BAG #4 Right wing panel - same as bag #3 except for locator dowel socket towards trailing edge
- BAG #5 Fiberglass wheel pants - 1 left, 1 right - painted to match covering w/ 2 each M3 blind mounting nuts installed in each pant
- BAG #6 Fuselage with canopy installed with six screws - black frame painted on canopy - cockpit floor covered in gray - spacer block installed in tail to protect stab. openings - servo tray installed inside - servo mounts provided under horizontal stab. but not opened - fiberglass tube for servo lead installed - antenna tube installed - pull-pull cable exit guide tubes installed - 4 blind nuts for landing gear installed - two 1/4-20 blind nuts for wing hold down installed - hole for neck of fuel tank in firewall - thrust lines marked on firewall - firewall and cowl cheeks fuel proofed - cowl drain in bottom of cowl not opened.
4 each M4 Blind Mounting Nuts installed in firewall

WING ASSEMBLY:

The FOUR-STAR 120 ARF wing has been designed to be a strong, easy to assemble, two-piece unit to ease transport in today's smaller vehicles. For more precise control authority, each wing panel has its own aileron servo. While working on the wing panels during the upcoming steps, we suggest that cover your workbench with a protective blanket or foam rubber sheet. This precaution will minimize unnecessary dings, dents, or scuffing of the covered parts.

Aileron Servo Installation & Aileron Hinging:

For the following steps you will need:

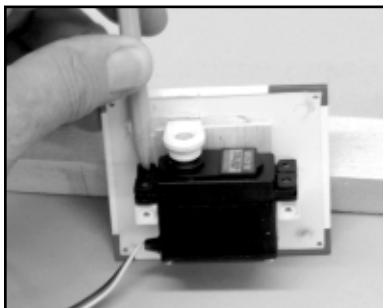
- The left & right wing panels with their ailerons, hinges, and servo hatch mounts
- The main aluminum wing joiner blade
- The aileron servos (at least 60 oz./in. of torque)
- Two 12" aileron servo lead extensions
- One 6" standard "Y" harness with connectors to fit your radio system
- After-market extra strength servo output arms - this manual shows our use of the DuBro #672 servo output arms for Hitec servos



□ 1) Start by first checking the fit of the two wing panels. Slide the joiner blade into the receptacle in one of the panels and then fit the opposite panel in place, sliding the two panels together at the center section. The rear locator dowel should fit into the hole in the opposite panel. Once satisfied, separate the two panels for now.

□ 2) As received, the aileron servo hatch/mounts are taped onto the bottom surfaces of each wing panel - remove these hatches from the wing panels. Fit one of your aileron servos onto the hatch mounting beams. Check to be sure that the servo arm will fit into the provided slots. Open up the slot as required for a good clearance fit. Repeat this process with the opposite servo and hatch/mount. Place a 1/16" (1.5 mm) spacer shim between the servo and the hatch and mark the beams for the four servo mounting screw holes. Remove the servos and shims and drill pilot holes for your servo mounting screws, using a #50 (1.8 mm) bit.

The servo hatch/mounts each have four mounting holes - one in each corner. Use a sharpened dowel to open up these holes, through the covering. Place the hatch/mounts back into their appropriate wing

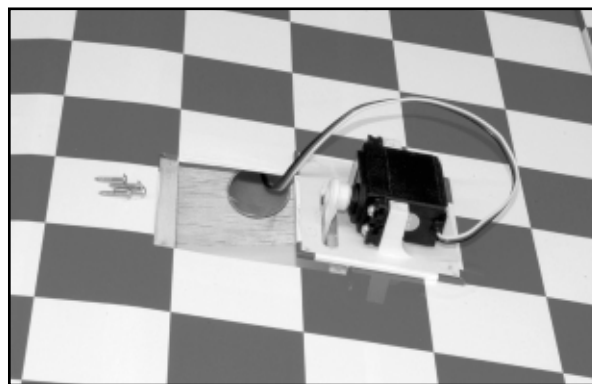


panels and use a power drill with a 1/16" bit to drill pilot holes into the wing panels for the retaining screws.

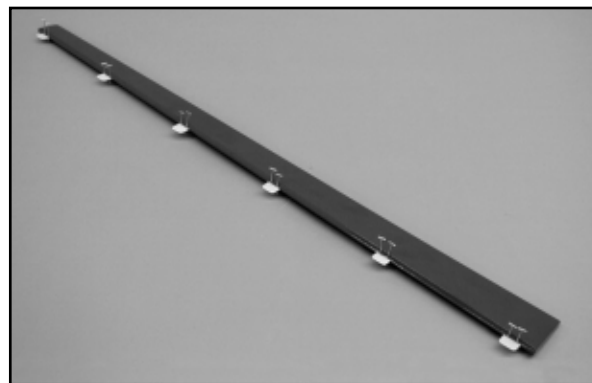
□ 3) On the top center of both wing panels, just inboard of the center wing rib, you will now need to remove the covering over the servo lead exit holes, using a sharp #11 blade.

□ 4) Install a 12" servo lead extension to both of the aileron servos. We suggest securing these connections with a piece of heat shrink tubing. Next, install the rubber grommets and brass eyelets, that came with your radio system, into the servo mounting lugs.

□ 5) Using the mounting screws that came with your radio system, mount the servo onto the hatch/mount. Using your radio system, center the aileron servos, making sure the trims are at neutral. Install an extra long servo arm onto each servo, making sure it is centered in the slot and is at 90° to the servo case. Once satisfied, install the servo arm retaining screws into each servo. Unplug the servos from the receiver and turn off your radio system. Feed the servo extension leads through the tube inside the wing and pull the connector out of the hole at the top center of the wing panel. Use the eight T2 x 12 mm Phillips Head screws (Bag 8, Sub Bag 1) to install and secure the two aileron hatch/mounts into each wing panel.

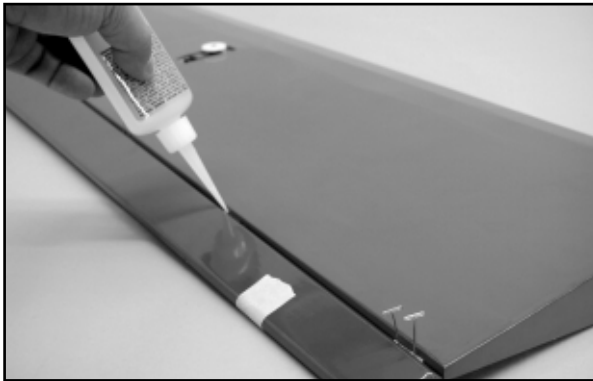
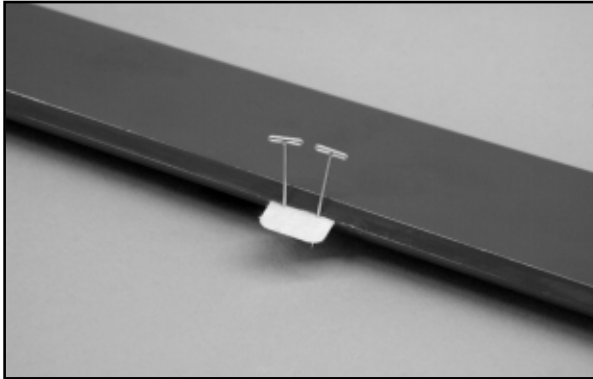


□ 6) The ailerons are now hinged to the wing panels. Note that the installation method for these hinges will be the same for all of the control surfaces on this model. Press the six CA hinges into the slots in each aileron leaving 1/2" exposed. Use two pins in the center of each hinge to keep them centered when inserting them into the corresponding slots in the trailing edge of the wing panel.

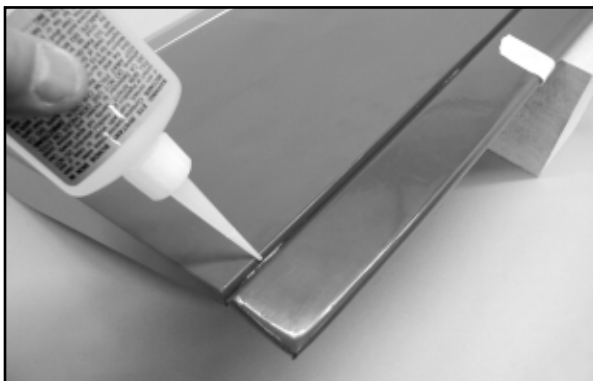


□ 7) Carefully insert the hinges into the trailing edge of the wing until the pins are tight against the trailing edge, setting the proper gap between the aileron and the wing. Adjust the ailerons as

needed to align the tip with the wing tip, in top view. The aileron should now be in the proper position for permanently hinging it in place.



□ 8) Flex the aileron down slightly and hold it in this position with a piece of masking tape. Remove the pins from one hinge and apply 4 drops of thin CA directly onto the hinge. We suggest using a fine tipped applicator on the glue bottle to better control the flow of glue - excessive glue can run through the gap and mar the backside of the wing. Repeat this process on the remaining five hinges. Remove the masking tape holding the aileron and turn the wing panel over on your bench. Again flex the aileron and hold it in position with a piece of tape. Apply four drops of thin CA glue to each exposed hinge. Remove the tape, allowing the aileron to return to the neutral position. Because it takes a little time for the glue to fully wick its way through the hinge surface and surrounding wood, allow 10 minutes or so before flexing the aileron. Hinge the remaining aileron to the remaining wing panel using the same procedures just described.



□ 9) After sufficient time has passed, firmly flex the now-hinged ailerons to free their movement. Also, pull on the aileron, at each hinge location, to make sure that each hinge is firmly adhered in

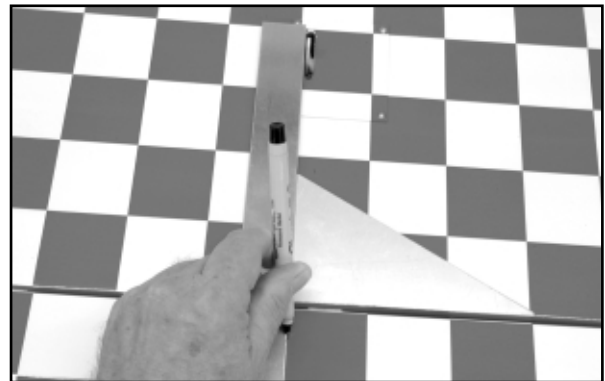
place. Any clean-up required for CA glue drops, can be done with SIG Debonder and a soft cloth.

Installing the Aileron Control Horns and Pushrods:

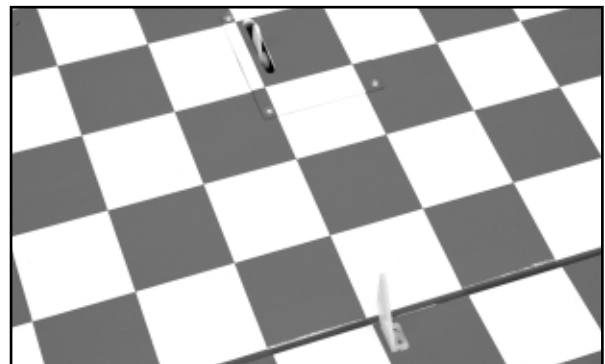
For the following steps you will need:

- 1 each Left Hand Nylon Control Horn, Long with Back Plate
- 1 each Right Hand Nylon Control Horn, Long with Back Plate
- 2 each 4-40 x 128 mm Threaded Rod
- 2 each 4-40 Threaded R/C Links
- 2 each 4-40 Metal Solder links
- 2 each 4-40 Hex Nuts
- 4 each M2 x 18 mm Phillips head bolts
- Soldering Iron, Flux & Solder
- Laser-Cut Aileron Gage

□ 1) As shown, use a square to locate the mounting position of the control horn on the aileron. A perpendicular line from the aileron hinge line intersects with the servo arm. Mark the leading edge of the aileron at this point and then draw a line from this point 1" (25.4 mm) back, toward the trailing edge of the aileron

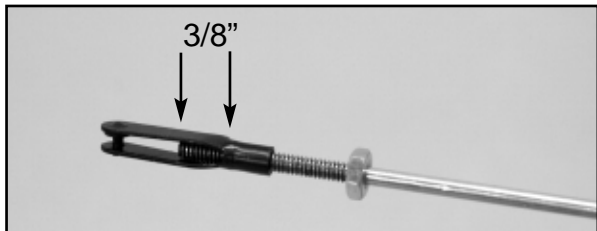


□ 2) From Bag 12, locate one left and one right control horn. The base of the control horn should be positioned toward the inboard (fuselage) end of the wing. Place the control horn on the bottom of the aileron with the upright arm of the horn next to the line, with the linkage holes in the upright arm directly over the hinge line. Mark the position of the horn mounting holes in the base plate onto the aileron.



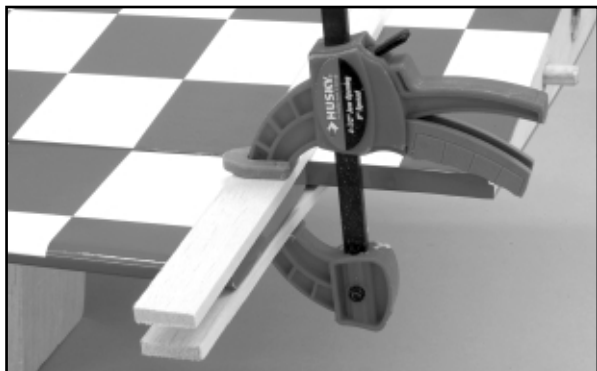
□ 3) Use a power drill and a 5/64" drill bit to drill holes through the aileron at the control horn mounting locations just made. Use two of the M2 x 18 mm sheet metal screws to attach the control horns to each aileron. The screws seat into the nylon retaining plate, included with each control horn. After the screws are securely in place, the excess screw tips can be trimmed using a pair of side cutters. The remaining stubs can be filed or ground flush to the retaining plate.

□ 4) Thread one of the 4-40 hex nuts all the way onto one of the 4-40 x 128 mm threaded aileron pushrods. Thread a 4-40 R/C link onto the pushrod, centering its threaded barrel, leaving an equal amount of threads on each side. Clean the opposite end of the pushrod with fine sandpaper and then slip a 4-40 solder link in place.



□ 5) Plug the aileron servo connector into the receiver and turn the radio system on. Tape the aileron in the approximate neutral position. Install the solder link into the outermost hole in the servo output arm and install the threaded R/C link into the outermost hole in the aileron control horn.

The solder link is now soldered to the aileron pushrod. We like and recommend the use of Stay-Brite® silver solder and flux for such connections. Apply a drop of flux to the solder link/pushrod and apply just enough solder to allow it to "flow". When the joint has cooled, remove the pushrod and thoroughly clean the solder joint and lightly oil to prevent rust. Remove the tape holding the aileron in position. Repeat this process on the opposite wing panel and aileron pushrod.



□ 6) The ailerons are now set to their neutral positions using the provided laser-cut plywood Aileron Gage, found in Bag 8, Sub Bag M. As shown, this gage is held against the bottom surface of each wing panel, centered on the hinge line. Temporarily join the wing panels and plug the aileron servo leads into the receiver with the transmitter aileron trim at neutral. Using the aileron gage,



adjust the aileron pushrod R/C links as required to achieve uniform contact with the bottom surface of the aileron gage.

Now, test the movement of the ailerons with the transmitter to make sure they are moving in the correct directions - right stick movement should cause the right aileron to move up. Once satisfied, unplug the servos, turn off the radio system and set the wing panels aside for final assembly later.

FUSELAGE ASSEMBLY:

Fuselage Preparation:

To avoid damage, we suggest that you remove the canopy from the fuselage and set it and its mounting screws aside for now. Next, the fuselage has several openings that have been covered over and now need to be opened up. These are;

- a) The oil drain hole in the bottom front of the engine compartment
- b) The two pull-pull rudder cable exit holes on each side of the fuselage beneath the horizontal stabilizer at the tail
- c) The antenna tube exit hole on the bottom rear of the fuselage, located about 6-1/2" forward of the tailpost.

Using a hobby knife with a sharp #11 blade works well in making these openings. In the case of the oil drain opening, we suggest sealing the exposed wood with a few drops of thin CA glue to prevent oil from penetrating the wood.

ENGINE INSTALLATION:

For the following steps you will need these parts:

- Your Engine
- Engine Mounting Hardware (not included)
- 2 each Glass-Filled Engine Mounts
- Fuel Tank Assembly
- Fuel Tubing (not included)
- 3" Dia. Spinner Assembly
- Your Propeller
- 4 each M4 x 25 mm Phillips Head Bolts
- 4 each M4 Flat Metal Washers
- 4 each M4 Split Ring Washers
- 1 each 1/8" dia. x 15" Inner Nyrod Tubing
- 1 each 1/16" dia. x 18" Flex Cable
- 1 each 2-56 Nylon R/C link
- 1 each 2-56 Threaded Coupler
- 1 each Pushrod Connector w/Setscrew
- 1 each Pushrod Connector Keeper
- 1 each Plywood Pushrod Guide

IMPORTANT NOTE: The motor mounts provided with the Four Star 120 ARF kit are of excellent quality and designed to work well with both 2-stroke and 4-stroke engines up to 1.50 displacement. **DO NOT** use any engine larger than these with the supplied motor mounts. **DO NOT** mount your engine on these motor mounts by drilling and tapping them for bolts or screws! These mounts should be drilled for clearance of the engine mounting bolts and the engine itself should be secured to the mount arms with bolts, washers, and lock nuts. Tapping threads into these motor mount arms may weaken them, potentially causing them to fail.

□ 1) Note that four M4 blind mounting nuts have been factory installed behind the firewall. The spacing of these nuts, in conjunction with oblong motor mount holes provides crankcase mounting widths from 1-11/16" to 2-1/4" (42.8 to 57 mm). Such spacing adjustment covers most recommended engine sizes for this model. If the crankcase width of your engine is outside of these dimensions, or you are using an alternate engine mounting system, you will have to modify this bolt pattern accordingly.

NOTE: The engine and tank compartment were fuel-proofed during the production of this model. However, if desired, these areas can be additionally fuel-proofed. To do this, use a brush to apply a coat of surfacing resin or clear polyurethane varnish to these areas, as well as, the inside of the wing saddle in the radio compartment. Be sure to brush the resin up to the covering edges.

□ 2) Bolt the engine mounts in place on the front of the firewall using the M4 x 25 mm Phillips Head Bolts. Put a M4 flat washer and a M4 split ring washer on each of four M4 x 25 mm bolts, apply a little thread locking compound to the threads and install the two motor mount arms to the firewall - do not tighten in place yet.

□ 3) As previously mentioned, the motor mount arms can be positioned to adjust to the width of the engine's crankcase. Place your engine on the motor mounts, moving the arms as needed to accept the engine. Also, center the spinner backplate to the fuselage in the top view. When everything appears correct, tighten the motor mount bolts to the firewall.

□ 4) Use a punch or a pencil to mark the engine's mounting screw locations directly onto the motor mount arms. To make these hole position marks easier to see, a neat trick is to use white or silver plastic model paint or paint marker to paint the tops of the motor mount arms.



□ 5) Remove the engine and drill four clearance holes for the bolts that will hold the engine to the mounts. Do not tap these holes as doing so may weaken the mounts.

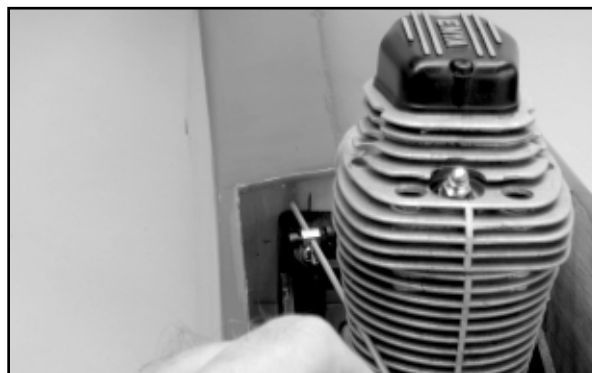
4-STROKE INSTALLATION DETAILS:

NOTE: If you are installing a 2-stroke engine, move ahead to Step 9 in this section.

□ 6) When installing a 4-stroke engine, note that the throttle cable housing tube must be relocated. Start by pulling the throttle housing tube out of the firewall and fuselage.

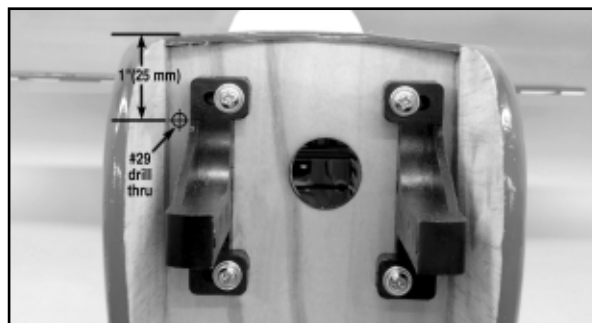
□ 7) Install a pushrod connector into the outermost hole of the throttle arm on the carburetor. Place the engine on the motor

mount arms and mark the firewall with the appropriate position for the throttle pushrod.



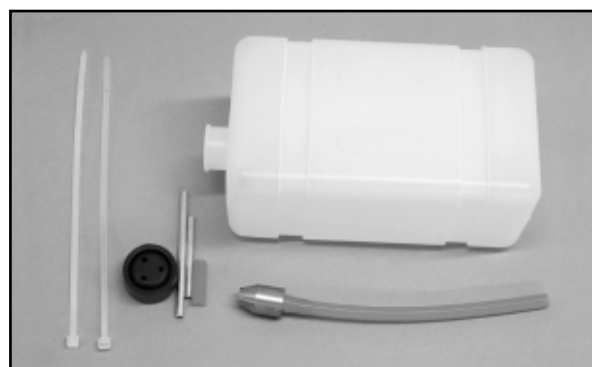
□ 8) Remove the engine from the mounts and use a #29 (3.4 mm) bit, drill a hole through the firewall at the marked location. You will also need to drill a new hole through the fuselage former at the leading edge of the wing and the former in the approximate center of the fuel tank compartment, on the opposite side of the factory drilled hole. The throttle cable housing tube is now glued into position in the holes in the firewall and two fuselage formers. Position the engine compartment end of this tube flush with the forward face of the firewall.

□ 9) In the case of a 2-stroke engine installation, the hole for the throttle cable tube needs to be drilled through the firewall. This hole is located between the motor mount and the fuselage side, on the throttle arm side of the engine. Use a #29 (3.4 mm) bit to drill this hole. Now feed the throttle housing tube through the firewall and through the holes in the two fuselage formers - leave about 1" of tubing in front of the firewall. With the tubing now positioned, use thick or medium CA glue to secure it permanently in place to the firewall and fuselage formers.



Fuel Tank Assembly & Installation:

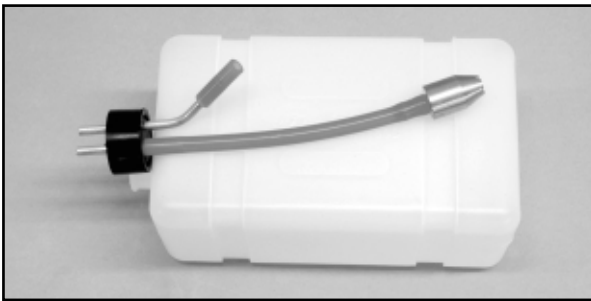
□ 1) The 500 cc (16.9 oz.) fuel tank supplied provided with this kit is now assembled. We suggest using a simple two-line fuel



system in this airplane. One fuel line is connected to the fuel pick-up (clunk) line and to the engine's carburetor. This same can then be used to fill the tank. The second line is the overflow line, used when filling the tank. After the tank is full, this fuel line is then connected to the pressure tap on the engine muffler, providing muffler pressure to the tank when it is running.

□ 2) Note that the rubber stopper has three holes molded into the flanged side but not opened up on the interior side. Two of these holes will be used for the fuel lines and need to be opened. Insert the two aluminum tubes through these holes until about 1/2" (12.7 mm) protrudes from the flat end of the stopper.

□ 3) Gently bend the longer overflow tube upwards towards the top of the tank on the inside. Cut the end of the short piece of silicone tube at a 45° angle. Slip this tube over the vent tube and adjust until it just makes contact to the top of the tank. Make sure the opening in the end of the tube does not become blocked by the top of the tank. Adjust the length of the longer silicon tube to the clunk weight, allowing the weight to move freely inside the tank and so it is about 3/8" away from the back of the tank when at rest. Install this tube on the other aluminum tube inside the tank.



□ 4) Install the stopper assembly into the neck of the tank and secure it with a zip tie over the flange on the tank neck.

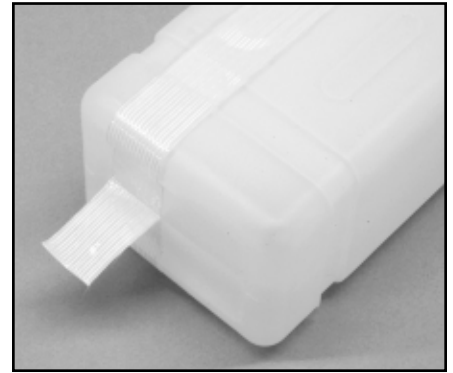


In front view, the neck should be offset slightly to the right and the overflow tube should go to the top of the tank.



MODELER'S NOTE: Whenever we assemble a new tank or refit an older tank with new fittings, we make it a practice to pressure-check the finished tank before installing it in the model. This is simple to do. Simply install a couple of lengths of fuel tubing onto the tank overflow and fuel line tubes. Then submerge the tank into a pot of water. Blow into one or both of the fuel lines and look for any "bubbles" coming from the tank body. Make any fixes necessary and then install your fuel tank with confidence.

□ 5) To ease the removal of the tank at a later time, make a pull tab at the rear of the tank by wrapping a loop of reinforced strapping tape around the front of the tank allowing a 1" (25.4 mm) tab to extend at the rear.



□ 6) To install the tank in the fuselage, first apply a generous bead of silicone sealer around the neck of the tank. Install the tank into the fuselage tank compartment. Make sure the offset neck of the tank lines up properly with the round hole in the firewall. Firmly press the tank body to the firewall and allow the silicone sealer to set before proceeding.



□ 7) Glue the provided 10 mm sq. x 103 mm balsa tank retainer strip into position against the fuselage sides and firmly against the rear of the tank. Trim as required to obtain a snug fit against the fuselage sides. We suggest using a drop or two of thin CA glue to both sides of the retainer strip, where it contacts the fuselage. This secures the strip nicely, but still allows it to be easily removed should the need ever arise.



Final Engine & Throttle Linkage Installation:

□ 1) Install the engine to the motor mount arms, using appropriate sized socket head bolts, lock washers, flat washers, and lock nuts (not provided).

□ 2) Now is the time to address any modifications or clearance holes that may be needed for your particular engine installation in the nose of the fuselage. These may include muffler clearance,

needle valve holes, etc. These can be easily made using a Dremel® Tool and sanding bits. Once these openings or clearances have been made, any exposed wood should be fuel-proofed. This can be done using thin CA glue, clear dope, or surfacing resin. Finally, cut and install two lengths of fuel tubing, connecting the fuel tank pick-up line with the carburetor and the tank overflow line with the pressure tap in the engine muffler.

□ 3) Prepare the throttle servo for installation by first installing the rubber grommets and brass eyelets into the mounting lugs. Place the throttle servo into the appropriate opening in the fuselage servo tray and mark the four mounting screw locations onto the servo tray. Remove the servo and drill four pilot holes for the servo mounting screws. Place the servo back into the servo tray and use the screws provided with your radio system to secure it in place. Connect the throttle servo to the receiver and use the radio to make sure the throttle arm is moving in the proper direction to obtain high and low throttle settings at the carburetor. Remove and reposition the servo arm as needed to achieve equal fore and aft movement. Slip the laser-cut plywood pushrod housing tube guide over the throttle tube.

□ 4) The throttle cable is now prepared. Solder the 2-56 threaded coupler onto one end of the 1/16" dia. x 18" throttle cable. Thread the 2-56 nylon R/C link onto the threaded coupler until 1/16" of threads are showing inside of the link.

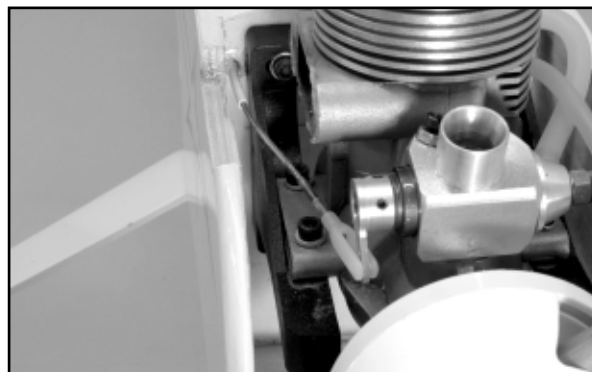
Carefully note that if your engine is a 2-stroke type, the end of the throttle cable with the soldered coupler and nylon R/C link will be located at the carburetor throttle arm. Conversely, if your engine is a 4-stroke type, the nylon R/C link will be located at the throttle servo.

□ 5) In the case of a 2-stroke engine installation, install the pushrod connector with setscrew in the outermost hole of the servo arm. Now insert the unprepared end of the throttle cable into the nylon tube at the firewall and feed it back into the radio compartment and into and through the pushrod connector on the servo arm.



□ 6) Using thick or medium CA glue, position and glue the plywood pushrod tubing support directly to the side of the fuselage, about 4" ahead of the servo.

□ 7) With the carburetor fully closed and the servo rotated to the idle position, tighten the setscrew in the pushrod connector, locking the cable in place. Using your radio system, adjust the servo end points to achieve full throttle servo travel with no binding at either end of the throttle cable. Once satisfied with this initial set-up, reinstall and tighten the servo output arm retaining screw.



□ 8) If your engine installation is a 4-stroke type, all of the previous instructions apply with the exception of the throttle cable. From inside the fuselage, insert the unprepared end of the throttle cable into the housing tube, feeding it all the way up to the engine compartment and through the hole in the pushrod connector on the carburetor arm (previously installed).



Connect the nylon R/C link into the outermost hole in the servo output arm. Glue the throttle tubing support to the side of the fuselage.



Use your radio system to adjust the throttle servo movement to achieve true "low" and "high" throttle settings, with no binding. Once satisfied with this initial set-up, tighten the setscrew in the pushrod connector. Trim any excess throttle cable, as needed and reinstall and tighten the servo output arm retaining screw.

□ 9) With the engine installation now complete, the provided 3" dia. spinner assembly can be installed to the engine. First, measure the outside diameter of the propeller shaft on your engine. The center hole in the spinner backplate must be drilled out to clear the prop shaft of your particular engine. This is best done using a drill press.

Slip the spinner backplate onto the prop shaft of the engine,

followed by the propeller. This assembly is now firmly tightened in place using the engine thrust washer and prop nut. The spinner cone is then placed over the propeller and its rear face fitted into the groove in the backplate. The spinner cone is then secured to the backplate using the two provided PA3 x 12 mm Phillips head sheet metal screws.



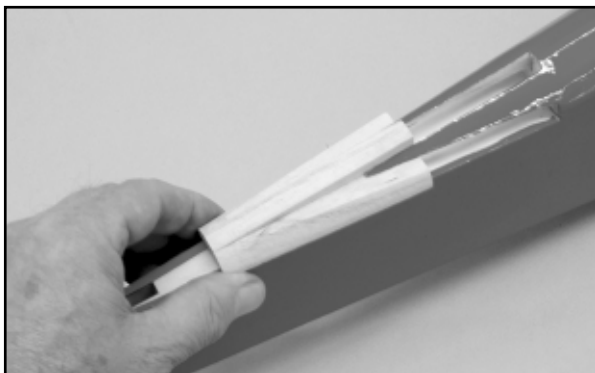
Note that some propeller makes or types may be too large to fit into the molded recesses in the spinner cone. In this case, some trimming of the cone recesses may be required. Use a sharp #11 blade to "shave" the prop openings until the prop fits properly. Be sure to only remove as much plastic as needed to fit over the propeller and that the openings are equally opened on each side of the spinner cone.

TAIL SURFACE INSTALLATION:

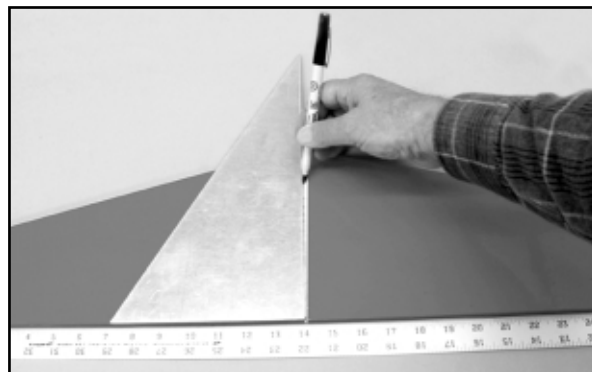
For the following steps you will need:

- 1 each Horizontal Stabilizer & Elevator Set - hinged but not glued
- 1 each Vertical Fin & Rudder Set - hinged but not glued
- 1 each Nylon Control Horn - Left
- 1 each Nylon Control Horn - Right
- 2 each M2 x 15 mm Phillips Head Bolts
- 2 each M2 Nuts

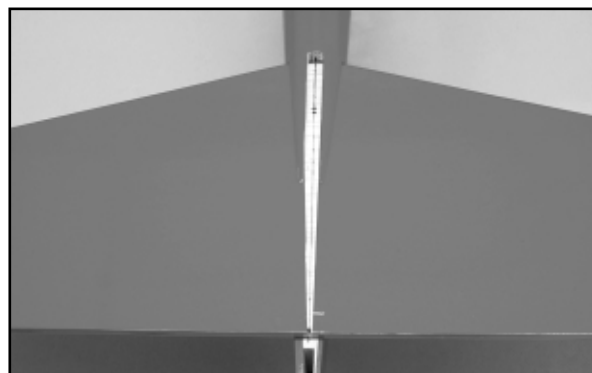
□ 1) At the top rear of the fuselage, in the horizontal stabilizer slots, you will see a small wood block occupying the space where the stabilizer will fit. This block is only in place to protect the top stabilizer fairings. Remove this spacer by slipping it straight back and out of the stabilizer slots. Exercise care when handling the fuselage, making sure that the two stab fairings do not get damaged.



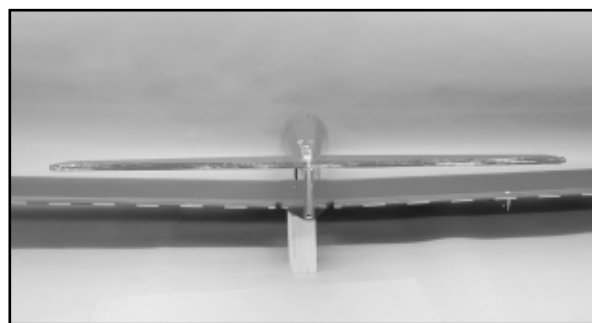
□ 2) As shown, use a felt tip pen or marker and a small square to clearly mark the centerline of the stabilizer onto its top surface.



□ 3) We suggest bolting the wing to the fuselage before gluing the stabilizer in place. Doing this provides good visual reference in squaring and leveling the stabilizer to the fuselage during its installation. Slip the stabilizer in place, being careful to align the centerline on the stabilizer with the centerline of the fuselage. Also make sure the trailing edge of the stabilizer is parallel to the trailing edge of the wing.

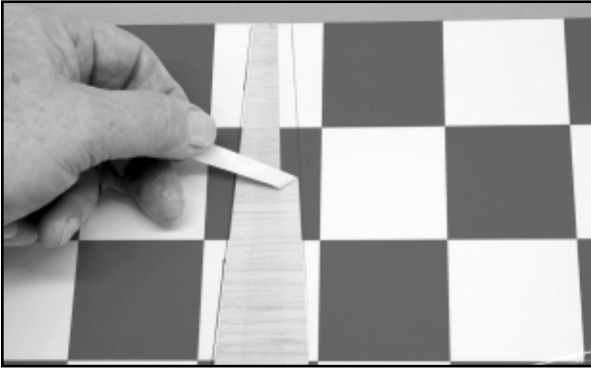


□ 4) With the fuselage on a flat surface, stand back and view the model from the rear. The stabilizer should be absolutely aligned with the wings, without leaning to one side or the other. If it is leaning, lightly sand the high side of the mounting surface in the fuselage until the stabilizer is level with the wing.



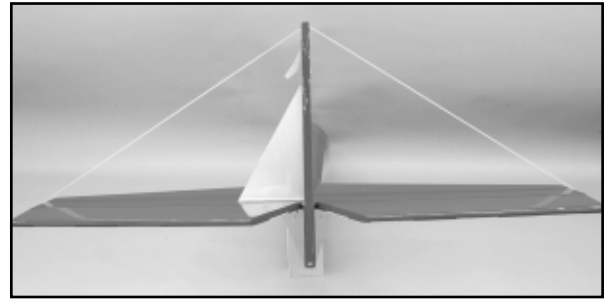
□ 5) Again, using a felt tip pen, mark the position of the fuselage sides onto the bottom of the stabilizer. Next, mark the location of the outer top edges of the stabilizer fairings onto the top of the stabilizer. Remove the stabilizer from the model.

□ 6) Use a hobby knife and a #11 blade to carefully remove the covering from the stabilizer to expose the wood structure for gluing purposes. Trim the covering about 1/32" or so inside the marker lines. It is very important that the wood beneath the covering is not scored or cut during this process. In the fuselage stabilizer slots, trim the covering away from each slot surface, leaving 1/32" or so of covering.

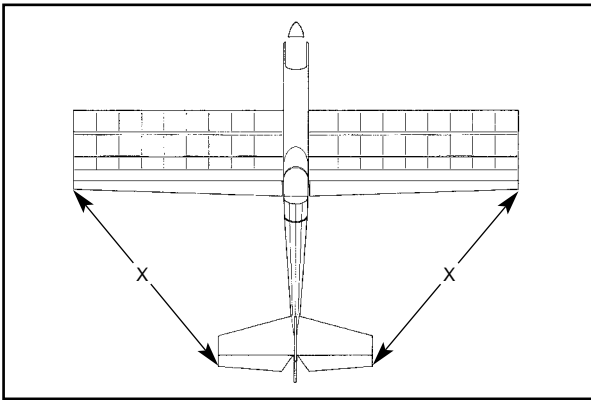


slips into the rear of the fuselage. Press the fin firmly into place and use a clean paper towel and denatured alcohol to clean up and remove any excess or oozing glue.

View the model from the rear, making sure the vertical fin is absolutely 90° upright to the stabilizer. If necessary, use a length of masking tape to pull and hold the fin into proper alignment. Allow the epoxy to fully cure.



□ 7) The stabilizer is now glued in place into the slots at the rear of the fuselage. For this step, we suggest using 15-minute epoxy to allow sufficient time to position the stabilizer accurately and to make any final adjustments that may be needed. In top view, the stabilizer must be aligned squarely to the fuselage and the wings. Any excess epoxy can be easily removed with a clean paper towel and denatured alcohol. With the stabilizer in its final position, allow the epoxy to cure completely before continuing.



□ 11) The rudder is now hinged in place to the trailing edge of the vertical fin and tailpost, using the four provided CA hinges. The hinging process is the same for the rudder as it was for the elevators and ailerons. As before, allow about 10 minutes for the thin CA glue to fully wick across the hinge surfaces and into the surrounding wood. After sufficient time has passed, briskly flex the rudder left and right to free its movement.

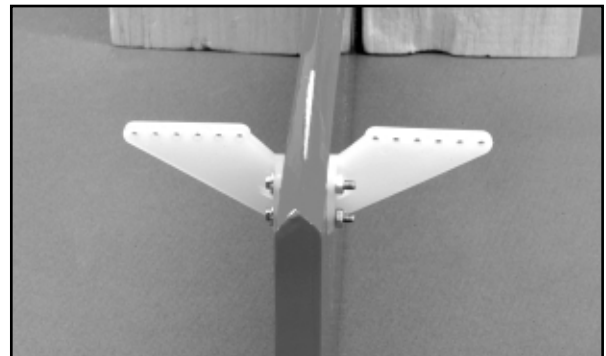
□ 12) The two rudder pull-pull control horns are now positioned and installed to the rudder. Note that these two control horns will be installed to the rudder in mirror image relationship. From the bottom leading edge of the rudder, measure up and make a mark at 1-1/8" (28.5 mm). This mark represents the top of the control horn, with its mount base facing downward. Hold the control horn in place to the rudder, with its vertical linkage holes aligned with the leading edge of the rudder. Use a marker pen to transfer the two control horn mounting hole locations to the surface of the rudder. Use a power drill and a 5/64" bit to drill two perpendicular holes completely through the rudder at the two marks just made.

□ 8) With the stabilizer now installed, the elevators are hinged in place to the trailing edge. To do this, use the exact same procedures and methods described earlier during the hinging of the ailerons. Remember, allow 10 minutes or so for the CA glue to fully wick its way over the hinge surfaces and into the wood. After sufficient time has passed, briskly flex the elevators to free up their movement.

The left and right rudder control horns are now mounted to the rudder, using the provided M2 x 15 mm bolts and M2 nuts. Tighten the nuts firmly and place a single drop of thin CA glue on the bolt ends at the nuts.

□ 9) Fit the vertical fin and tailpost in place between the two stabilizer fairings and into the slot at the rear of the fuselage. With the fin firmly in place, again use a felt tip pen to mark the position of the fin base onto the top of the stabilizer. Also mark the location of the two stabilizer fairings onto both sides of the fin. Remove the fin from the model.

Using a #11 blade, carefully remove the covering from the top of the stabilizer, between the marks just made. Likewise, carefully cut and remove the covering from both sides of the fin, exposing the wood for gluing purposes between the two fairings. As mentioned, be careful to not cut or score the wood beneath the covering.

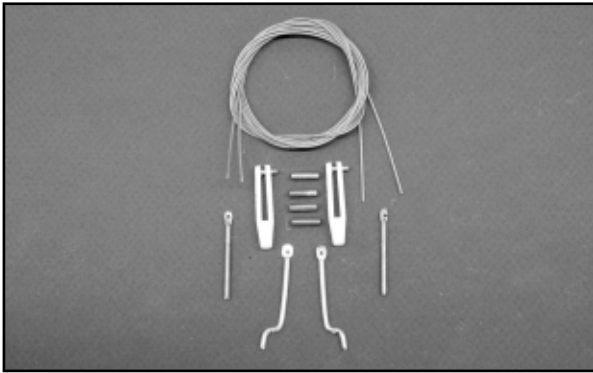


□ 10) The vertical fin can now be glued in place at the rear of the fuselage, again using 15-minute epoxy to allow reasonable working time. Apply glue to the exposed wood on both inside surfaces of the fairings and to the bottom of the fin where it contacts the stabilizer. Also apply glue to the fin tailpost, where it

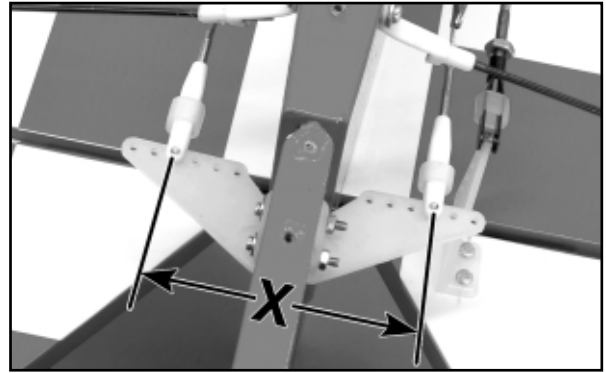
PULL-PULL RUDDER SYSTEM:

- The following parts will be required for these steps:
- 2 each Plastic Coated Steel Pull-Pull Cable - 1 meter long
 - 4 each 3 mm dia. x 8 mm Brass Swage Tubes

- 2 each Z-Bend Cable End Fittings
- 2 each Threaded Cable End Fittings
- 2 each R/C Links - Nylon with Metal Pins
- 1 each Left Nylon Control Horn
- 1 each Right Nylon Control Horn
- 1 each Heavy-duty rudder servo output arm (DuBro #672 arms shown)



mounting screws that came with your radio system. Reinstall the servo into the tray and secure it in place with the mounting screws.



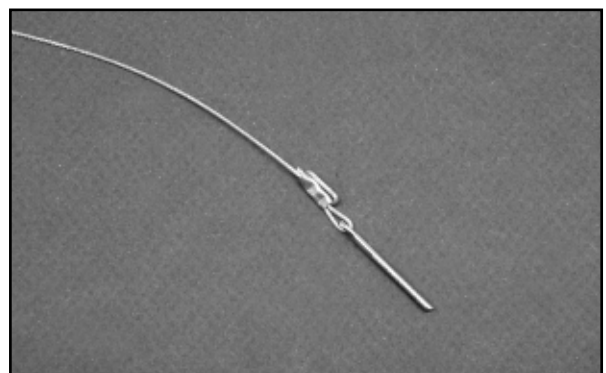
MODELER'S NOTE: In the next few steps, you will assemble and install the rudder pull-pull system. When setting up a pull-pull system for any flight surface, such as the rudder, it is important to maintain the best possible geometry between the two cable connections on each side of the output arm and the cable connections at the two opposing rudder control horns. The goal is to try and make the distance between these two connections as similar as possible. In the case of the Four-Star 120 ARF, we used a DuBro #672 "Super Strength Long Servo Arm" set for our rudder servo. The distance between the outermost attach points in the DuBro servo arm measures 2". Therefore, at the rudder horns, it is necessary to connect the left and right rudder cables as close to 2" apart as possible. Also note that in our pull-pull rudder installation, the two cables cross each other inside the fuselage.

Note - DuBro makes these aftermarket servo output arms for virtually any servo brand and type.



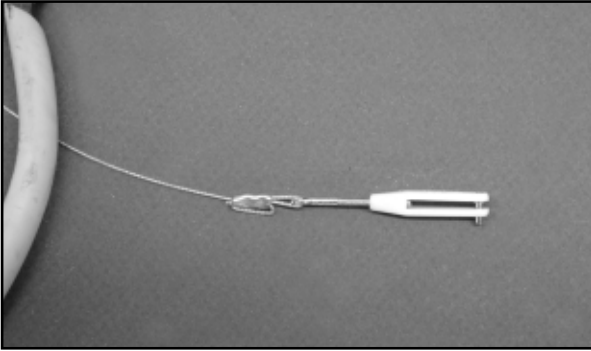
□ 2) Note that the pull-pull cables will be prepared with two different types of connections at each of their ends. At the rudder horns, the cable connections consist of a threaded stud with a hole at one end for the cable. At the servo output arm ends of the cables, the connections consist of a metal wire with a Z-bend and a hole at the other end for the cable. The rudder ends of both cables are prepared first.

Slide one of the copper swage tubes onto one end of one of cables, holding it with your fingers. Now thread the cable end through the small hole in the end of the threaded stud cable fitting, leaving 4" to 5" of the cable extending past the hole. Loop the short end of the cable back through the swage tube, then loop it around again and through the swage tube for the third time. Firmly pull out all of the slack that you can in the cable. Use needle nose pliers or a crimping tool to now firmly crimp the copper tube at its center. Use diagonal cutters to trim the excess cable away from the swage tube. Repeat this procedure on the remaining cable end.



□ 1) Prepare your rudder servo for installation into the fuselage by first installing the rubber grommets and brass eyelets into its mounting lugs. Place the servo into the center opening in the fuselage servo tray, with its head facing forward. Use a pencil or marker pen to mark the mounting hole locations onto the servo tray and remove the servo. Drill four small diameter pilot holes for the

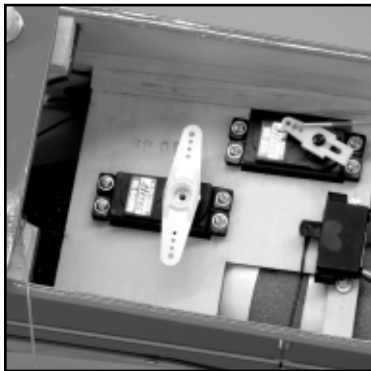
- ❑ 3) Thread the two white nylon R/C links onto these fittings until about 1/16" of threads protrude through the center of the link.



- ❑ 4) Feed the unprepared ends of the cables into the pull-pull exits built into each side of the fuselage at the rear, about 1-1/2" below the leading edge of the stabilizer. Feed the cable ends through the fuselage to the rudder servo location. Take up all the slack until you can connect the R/C links to the outermost holes in the rudder control horns.

MODELER'S TIP: Because the pull-pull cables were coiled and packaged at the factory, they have a tendency to curl inside the fuselage, as they are being fed into the exit holes. If necessary, make a simple pulling hook from a coat hanger to reach down inside of the fuselage, snagging the cable loops and pulling them out into the servo compartment.

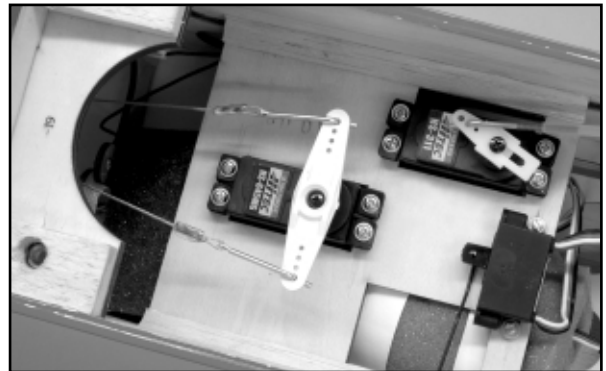
- ❑ 5) Remove the standard output arm from your rudder servo and install a heavy-duty 2-arm output arm, such as the DuBro unit described earlier. Connect the rudder servo to the receiver and turn the radio system on. Center the rudder trim and then reposition the output arm on the servo to position the two arms at 90° to the servo body, as shown. Once satisfied with the position of the output arm, reinstall the retaining screw to hold it in place.



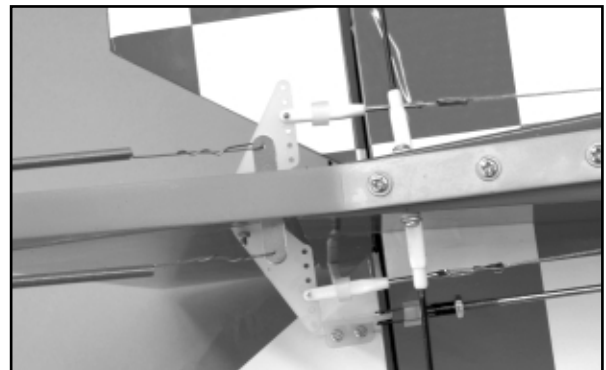
To hold the rudder in the neutral position with the vertical fin, temporarily tape or clamp the rudder in neutral alignment.



- ❑ 6) With the fuselage upside down on your bench, choose one of the rudder cables and slide a copper swage tube onto its end and hold it with your fingers. Pass the end of the cable through the hole in the end of one of the Z-bend connectors and then pass the cable end back through the swage tube. Connect the Z-bend end of the coupler to the side of the servo arm that is opposite to its connection at the rudder horn (remember, the cables cross each other in the fuselage). Repeat this same procedure for the second pull-pull cable. Take up the slack in the cables and slide the swage tubes up close to the rigging couplers. The radio system should still be on, holding the servo in neutral. Both cables should be taut - not tight. Loop the cable end back around and through the swage tube and pull it tight. Firmly crimp the swage tube at its center, locking the cable. Repeat this process with the remaining cable and swage tube. Use diagonal cutters to remove the excess cable at the swage tubes.



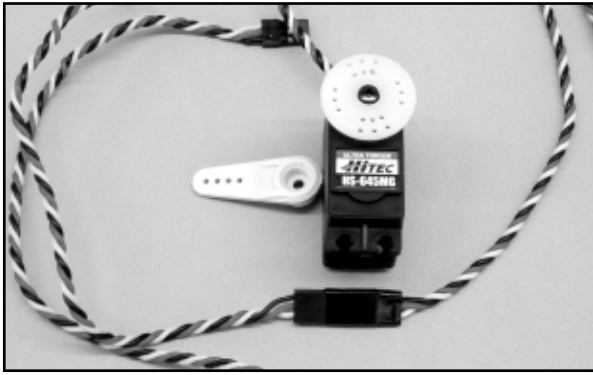
- ❑ 7) With the radio system still on and the rudder still being held in the neutral position, adjust the threaded R/C links until they both feel uniformly taut - not tight. Remove the neutral restraint holding the rudder and test the movement and centering of the rudder. Make any adjustments necessary and turn off the radio system.



ELEVATOR SERVO INSTALLATION:

The following parts will be required for these steps:

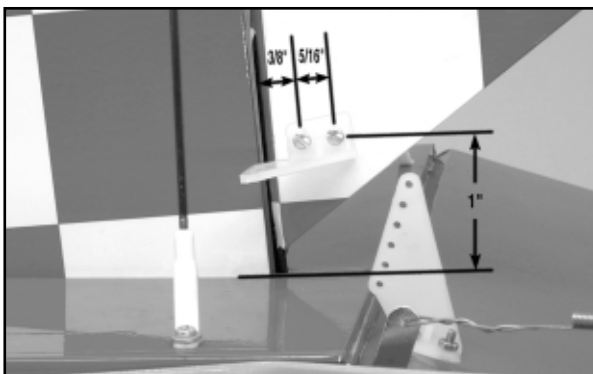
- 1 each 4-40 x 152 mm Threaded Pushrod
- 1 each 4-40 Threaded Metal R/C Link
- 1 each 4-40 Metal Solder R/C Link
- 2 each 4-40 Hex Nut
- 1 each Long Control Horn and Backing Plate
- 2 each M2 x 18 mm Phillips Head Bolts
- 1 each Elevator Servo (not supplied)
- 1 each Heavy Duty Long Servo Arm (not supplied)
- 1 each Servo Extension Cord - 36" Heavy Duty (not supplied)
- Soldering Iron, Flux, & Solder



- 1) First, prepare the elevator servo for mounting by installing its rubber grommets and brass eyelets. Next, plug the 36" servo lead extension into the servo lead. We always suggest placing heat shrink tubing of these connections to prevent them from coming apart inside the fuselage.

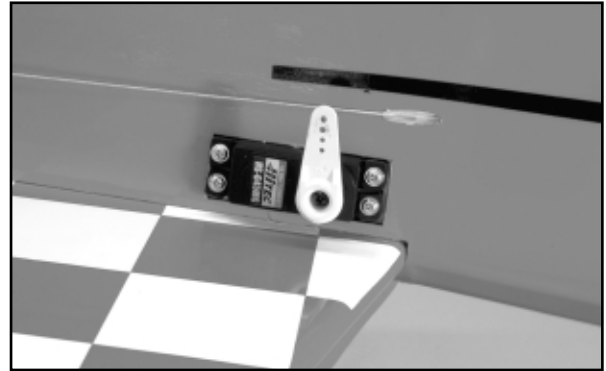
Locate the elevator servo opening on the left fuselage side immediately beneath the stabilizer at the leading edge. Use a #11 blade to remove the covering over the elevator servo opening/mount. Feed the free end of the servo extension through the elevator servo opening and start it into the fiberglass guide tube inside the fuselage. Holding the fuselage vertically, nose down, feed the extension all the way down the tube until it comes out in the radio compartment. Once servo lead and extension is completely inside, fit the elevator servo into the opening with its head forward, toward the nose. Hold the servo in place and drill four small diameter pilot holes for the mounting screws. Secure the servo in place using the screws that came with your radio system.

- 2) The elevator control horn is now installed. On the bottom of the stabilizer, at the elevator hinge line, measure out 1" from the left fuselage side and mark this location onto the elevator with a marker pen. Place a small square on the elevator hinge line and draw a 1" line on the elevator at 90° to the hinge line. Place a ruler on this line and use a marker pen to mark a point at 3/8" back from the hinge line and another at 5/16" back from the hinge line. These two marks are the locations for the two elevator control horn mounting bolts. Drill holes through these two locations, using a power drill and a 5/64" bit. Mount the elevator control horn to the bottom of the elevator using two M2 x 18 mm Phillips Head bolts threaded into the nylon backing base on the top of the elevator.



- 3) Plug the elevator servo into the receiver and turn the radio on. Make sure the transmitter elevator trim is in neutral. Next, make sure the elevator servo is moving in the correct direction for up and down elevator movement. If necessary, reposition the

output arm on the servo, making sure it is at or near 90° to the servo body, pointing straight down. Reinstall the output arm retaining screw into the servo.



- 4) Thread the 4-40 hex nut all the way onto the threaded end of the elevator pushrod. Thread the metal 4-40 R/C link onto the pushrod, centering it on the remaining pushrod threads. Hold it in this position by hand-tightening the nut up against its back side. Lightly sand the opposite end of the pushrod with sandpaper. Install the metal R/C link into the outermost hole in the elevator control horn. Slip the 4-40 solder link onto the sanded end of the pushrod and install it into the outermost hole of the servo output arm. As you did with the rudder, secure the elevator in neutral to the stabilizer with tape or a clamp. Apply a little StaBrite® silver solder flux to the pushrod/solder link joint and use solder to secure the solder link in place to the pushrod end.

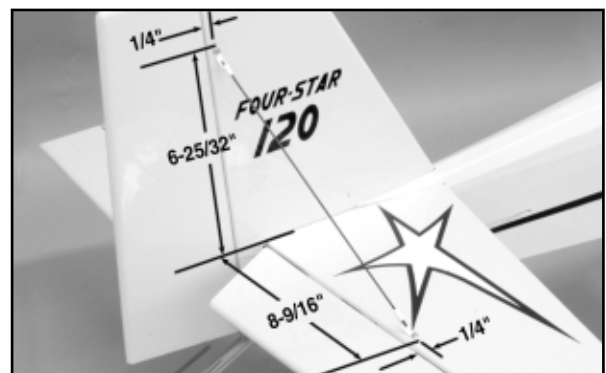
- 5) Remove the tape and/or clamps holding the elevator in neutral. Test the action of the elevators using the radio system.

TAIL BRACE INSTALLATION:

The following parts will be required for these steps:

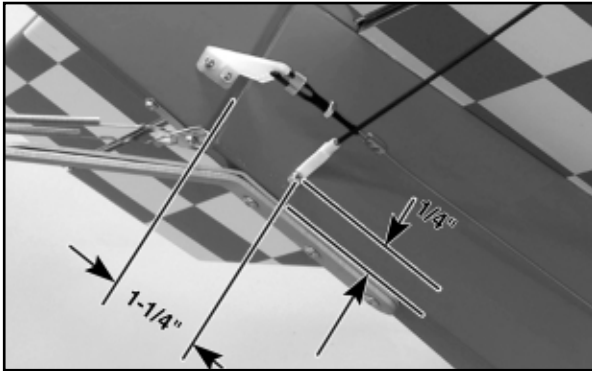
- 2 each 1.8 mm x 202 mm Threaded rods with plastic fittings at each end
- 2 each 1.8 mm x 254 mm Threaded rods with plastic fittings at each end
- 3 each M2 x 18 mm Phillips head bolts
- 3 each M2 Nut
- 6 each M2 Flat washers
- 2 each T2 x 12 mm Phillips head sheet metal screws

- 1) Both the stabilizer and the vertical fin have pre-drilled holes with hard points for mounting the tail brace assemblies. These holes now need to be found and opened. On the stabilizer, these holes are located about 8-9/16" out from the vertical fin, about 1/4" ahead of the hinge line. On the vertical fin these holes are



6-25/32" up from the horizontal stabilizer and again 1/4" forward of the hinge line.

□ 2) At the bottom rear of the fuselage, on each side, one 1/16" dia. pilot hole needs to be drilled for the T2 x 12 mm bottom brace attachment screw. These holes are located 1-1/4" forward of the rudder hinge line and 1/4" up from the bottom of the fuselage.



□ 3) The plastic end fittings are much easier to work with if you pre-bend their ends to the approximate mounting angles, where they meet their mounting surfaces. Lightly warming them with a heat gun and then bending them with round nose pliers accomplishes this nicely.

□ 4) Working first with the two shorter bottom braces, we suggest first pre-threading the plastic fittings onto each end of the wire. Then thread the fittings in or out to adjust the final hole-to-hole length of the finished brace. Mount the two bottom braces to the fuselage sides using the two T2 x 12 mm Phillips head sheet metal screws, as shown in step 2.

□ 5) The two longer top braces are made next. Pre-thread the fittings in place to each end of the wire braces. Thread the fittings in or out to adjust the final hole-to-hole length of the finished brace.

□ 6) Place an M2 washer onto one of the M2 X 18 mm bolts. Insert the bolt through one of the top brace fitting ends and then through the hole in the top of the horizontal stabilizer. On the bottom of the stabilizer, slip the free end of the bottom brace onto this bolt. Add another M2 washer and a small amount of thread locking compound. Thread an M2 nut all the way in place onto the bolt end, clamping the top and bottom fittings firmly in place to the top and bottom of the stabilizer. Repeat this same procedure on the opposite stabilizer side.

□ 7) Finally, the same bolting procedure is used to mate the two remaining brace fittings to the hole in the vertical fin. Make sure



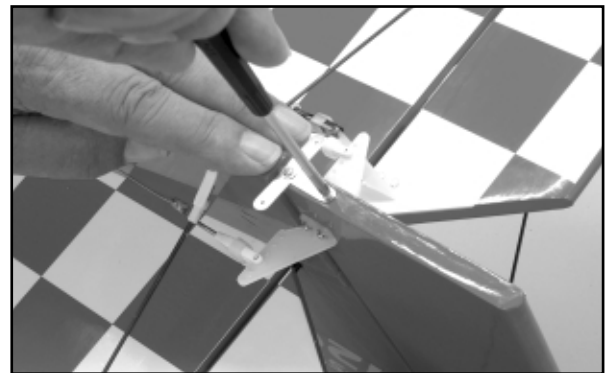
that the surfaces are all square with each other. If not, adjust the length of the braces to correct. The completed assembly should look like this.

INSTALLING THE TAILWHEEL:

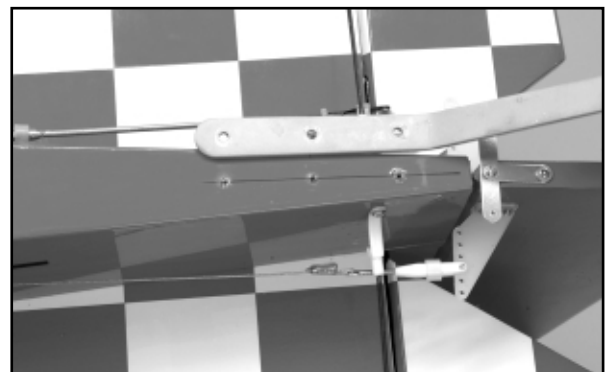
For the following steps you will need the following kit parts:

- Tail wheel assembly, Bag 10

□ 1) With the fuselage upside down on your work surface, place the metal rudder "T"- horn on the bottom surface of the rudder with the "T" oriented toward the front of the model. Center the T-horn on the rudder and line its leading edge up with the rudder as shown. Mark the two mounting hole locations for the T-horn onto the rudder. Drill pilot holes for the two T2 x 10 mm PWA mounting screws. Mount the T-horn in place to the bottom of the rudder.



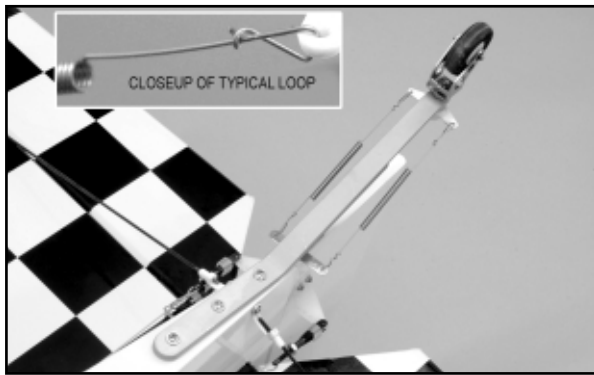
□ 2) Place the main tail wheel leaf spring onto the fuselage at the very rear. Make sure it is lined up with the fuselage centerline and that it is as far back as shown in the photos. Mark and then drill the three 3/32" (1.75 mm) pilot holes into the fuselage bottom, along the centerline.



Place the shorter secondary leaf spring under the primary leaf spring, lining up the mounting holes. Use the three provided T3 x 12 mm PWA screws to secure the leaf springs firmly in place to the fuselage.

□ 3) Install the two steering centering springs to the arms of the metal T-horn on the rudder. Needle nose pliers work best for making the loops in each end of the spring wires. It's important that both springs be bent identically, resulting in the same overall length, thereby centering the tail wheel with the rudder in neutral. Also, the two centering springs should be under some small tension when they are installed. This keeps them "loaded" under all steering loads. Do not over stretch these two springs. Just a

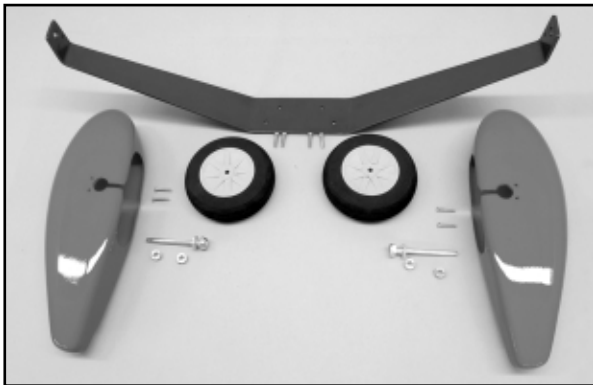
little tension is all that's needed.



MAIN LANDING GEAR & WHEEL PANT ASSEMBLY:

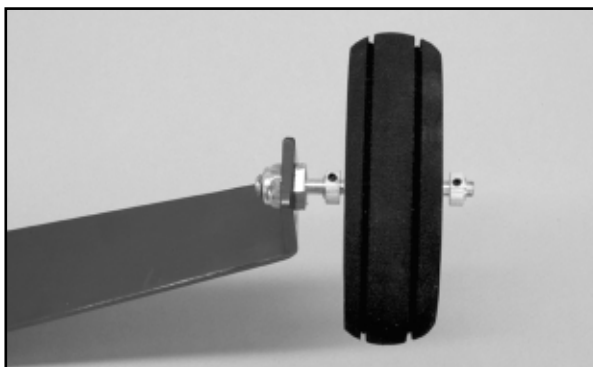
For the following steps you will need the following kit parts:

- 1 each Formed Aluminum Main Landing Gear
- 2 each Fiberglass Wheel Pants
- 2 each 5 mm x 47 mm Axle Shaft with M8 Threaded End
- 2 each M8 lock nut
- 4 each PM4 x 16 mm Phillips Head Bolts
- 4 each M3 x 12 mm Phillips Head Bolts
- 4 each 5.1 mm I.D. Wheel Collars with Set Screws
- Thread Locking Compound, such as Loctite® Non-Permanent Blue



❑ 1) Install the two main wheel axles into the two large holes at the bottom of each landing gear leg. Secure the axles in place to the landing gear legs with the two M8 lock nuts. Tighten these nuts firmly.

❑ 2) Slip a 5.1 mm wheel collar onto each axle, followed by the main wheels. Slip the remaining wheel collars in place onto each axle. Locate the outer wheel collar close to outer end of the axle, with its setscrew facing straight down. Snug the setscrew lightly in

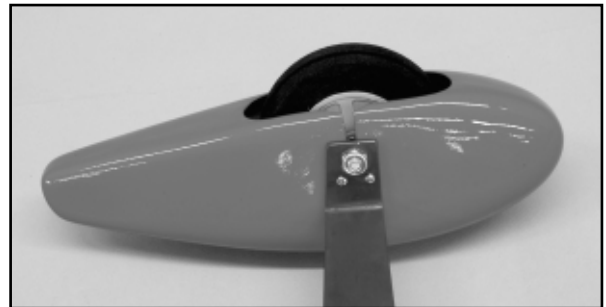


this position to the axle. Slide the wheel out to the outside wheel collar, followed by the inside wheel collar. With the setscrew facing straight down, snug the setscrew in the inner wheel collar lightly against the axle, leaving sufficient "play" to allow the main wheel to roll freely.

❑ 3) In this step, the proper relationship between the two main wheels and their wheel collars will be established with the fiberglass wheel pants in place.

Place the appropriate left and right wheel pants over the main wheels, down to the wheel axles and against the landing gear leg. Temporarily mount the wheel pants to the landing gear legs, using the four M3 x 12 mm bolts. Just lightly tighten these bolts to secure the pants.

Looking down into each wheel pant opening, observe the position of the wheels within the wheel pants. If required, reposition the two wheel collars and the wheel to center them within the pant opening. Once both wheels are centered and roll freely, firmly tighten the wheel collar setscrews to secure the wheel in place. The four M3 x 12 mm wheel pant mounting bolts can now be tightened in place.



MODELER'S TIP: When installing wheel collars, we always suggest the following precautions. First, use a file or a Dremel® Tool and a carbide cut-off disk to file or grind a small "flat" into the axle, where the wheel collar setscrew will be tightened. Second, remove the setscrews from each wheel collar and apply a little thread-locking compound to their threads. These two simple steps almost always prevent wheel collars coming loose.

❑ 4) With the landing gear/wheel pant assembly now complete, it is mounted to the fuselage using the four provided PM4 x 16 mm mounting bolts. As always, we suggest using thread-locking compound on these bolts.

RECEIVER, BATTERY PACK, & SWITCH INSTALLATION:

All flight control servos and the throttle servo have now been installed and tested. The remaining tasks are the installation of the receiver, battery pack and switch. Of all these components, the heaviest is, of course, the battery pack. The battery pack can be positioned in the fuselage in any location required to achieve the proper Center of Gravity (C.G.). Note that the model will be balanced for the correct CG location a bit later in this manual.

Receiver: We wrapped our receiver in foam sheet with rubber bands. We then wedged it under the servo tray. The foam wrapped

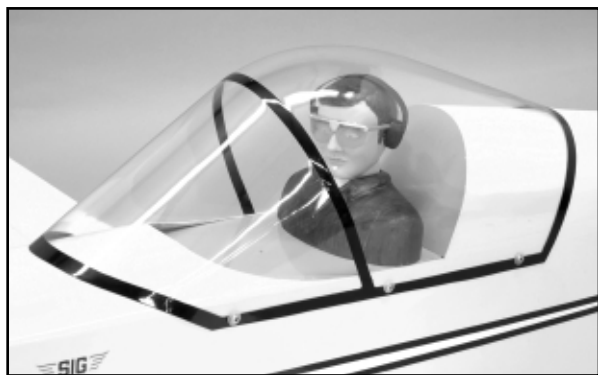
receiver can also be placed directly onto the servo tray and held in place with a pair of zip-ties. The receiver antenna is routed through the internal antenna tube, factory-mounted in the fuselage.

On/Off Switch: We chose to mount our onboard switch assemblies inside the fuselage, directly to the forward end of the servo tray. We then used a length of 1/16" dia. music wire from the switch lever, through the fuselage side, making a neat remote on/off end with a simple L-bend. Of course the switch can be mounted to the fuselage side by cutting a small rectangular opening in the fuselage side to accept the switch and then mounting it in the traditional manner.

Battery Pack: Our prototype Four-Star 120 ARF models both had their 1000 mAh battery packs placed in the nose of the fuselage, beneath the fuel tank. With heavier engines, the battery pack can be moved back as needed to achieve the correct C.G. location. Always wrap the battery pack in foam to protect it from vibration.

OPTIONAL PILOT FIGURE:

Many modelers enjoy the look of a nice pilot figure in the cockpit of their models. We're no different and decided to install a pilot in our own FOUR-STAR 120 ARF models. We chose a Williams Bros. 1/4" scale "Sportsman" (Williams Bros. P/N 62600) figure to pilot our models. After assembly, we painted the figure with plastic compatible paints and added a few details to make him a bit more believable.



We installed the finished pilot into the cockpit area, using 15-minute epoxy. From beneath the figure's base, we glued a piece of 1/16" plywood to the wood. After the glue set, we drilled pilot holes for two #4 x 3/4" sheet metal screws (not provided) and secured these screws through the pilot holes and into the base of the pilot figure.

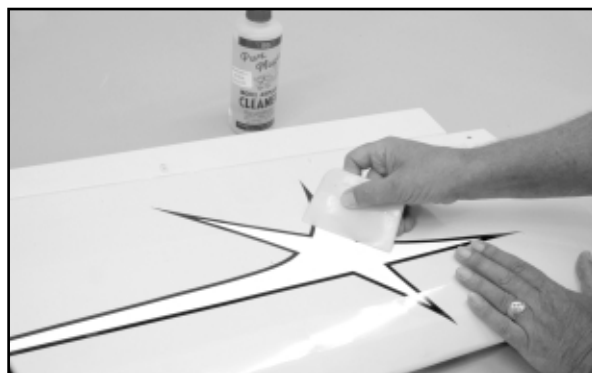
Now that the airplane is essentially complete and your optional pilot figure is in place, the canopy can now be reinstalled onto the fuselage, using the 6 screws and plastic washers that were removed and set aside earlier in the manual.

DECAL APPLICATION:

As mentioned earlier, the Four-Star 120 ARF decals are high-quality Mylar with a very aggressive adhesive. The individual decals are not die-cut and must be removed from their carrier sheets using a hobby knife and a sharp #11 blade or scissors. A straight edge makes this easier in the case of the longer graphics. For location purposes, use the box art photos as a guide for

placement purposes. We suggest the following procedure to apply these decals.

Carefully and completely cut out the decal. Remove the decal itself from the sheet using tweezers. Use a product such as SIG Pure Magic Model Airplane Cleaner or Windex® to spray the general area of the model that will receive the decal. Also spray the adhesive side of the decal as well. Lightly position the decal in place on the model. The liquid cleaner allows the decal to slide easily into the desired position, as long as you don't press down on it. Once the decal is in position, hold it lightly in place with your fingertips and use a paper towel to gently dab the excess liquid away. Use a small squeegee to now set the decal in place, removing all excess liquid and any trapped air bubbles from beneath the decal. The SIG 4" Epoxy Spreader - #SIGSH678 - is perfect for this job. Remove any excess fluid with a dry paper towel and allow the decals to set overnight. They will be solidly adhered to the model without any air bubbles.



CONTROL SURFACE TRAVEL:

The following surface control movements for the Four-Star 120 ARF model are based on our experience with our prototype models. These movements have provided us with a very smooth flying model. We urge you to use these initial low rate surface movements for your test flight set-up and then change them incrementally to best suit your own particular flying style. Note that the following control movement measurements are made at the widest point on the control surfaces.

SURFACE	LOW RATE TRAVEL	HIGH RATE TRAVEL
ELEVATORS:	3/4" UP - 3/4" DOWN	1-1/8" UP - 1-1/8" DOWN
AILERONS:	3/4" UP - 3/4" DOWN	1-1/8" UP - 1-1/8" DOWN
RUDDER:	1" LEFT - 1" RIGHT	2" LEFT - 2" RIGHT

We have used and can recommend the use of exponential to smooth out the flight characteristics when using the high rate recommendations. We used 40% to 50% of expo to achieve very smooth control response.

CENTER OF GRAVITY:

Establishing the correct Center of Gravity (C.G.) for this or any R/C aircraft is critical to its ultimate success in the air. Measured from the leading edge of the wing, next to the fuselage side, the recommended starting balance point range for the Four-Star 120 ARF is **4-1/4" to 4-3/4"** (108 to 120 mm).

Mark the above C.G. range onto the tops of both wing panels using

trim tape or a non-permanent marker pen. As shown, we balanced our Four-Star 120 ARF models upside down, using a simple padded C.G. fixture.



When balancing the model at the predetermined C.G. location, the model must balance *level*. If the nose hangs down when suspended at the proper C.G. location, it means that the model nose-heavy. Likewise, if the tail hangs down, the model is tail-heavy. If either of these conditions exists with your model, it must be corrected.

In the case of a nose-heavy model, the correction to make it balance level is fairly easy. The heaviest component in the model is typically the battery pack and this can be repositioned a further back in the model as needed to achieve the correct balance. In the case of a tail-heavy model, weight has to be brought forward in the fuselage to achieve the proper balance. There are several ways to do this but the easiest is to move the battery pack as far forward in the nose of the model to achieve the correct C.G. point. In the unlikely event that more weight is needed, you might consider adding lead weight into the nose or using a "Heavy Hub", available commercially from Harry Higley Products. In any case, it is imperative that the correct C.G. location is established before you fly the model.

FLYING:

If you have carefully followed the assembly instructions in this manual, test flying your new FOUR-STAR 120 ARF should be a lot of fun. When it comes to test flying a new model, we always advise modelers to choose a calm day with little or no wind. These conditions allow you to better evaluate and more accurately adjust the trim requirements for your airplane. As we've mentioned before, a good running, reliable engine is a must for the ultimate success of your airplane. Take the time to solve any engine problems *before* you try to fly.

Always make it a part of your pre-flight routine to check each control on the airplane, making sure the surfaces are moving in the correct directions. Also check each control linkage to be sure they are secure and that nothing is loose. With all the controls checked, make a range check with your radio system, using the procedures provided by your radio system manufacturer.

After starting and warming up the engine, hold full-up elevator (to keep the tail wheel firmly on the ground) and taxi the FOUR-STAR 120 ARF out to the take-off position on your flying field. Line up the airplane facing into the wind and along the centerline of the runway. Hold a little up elevator and smoothly advance the throttle - **do not** slam the throttle full open all at once. As the Four-Star

120 ARF begins moving forward, back off of the up elevator input and use the rudder as required to correct any engine torque and/or wind induced deviations from a straight take-off run. At takeoff speed, use a slight amount of up elevator to lift off, using ailerons to keep the wings level. Climb to a reasonable altitude before making any trim changes.

Although not intended as a primary R/C trainer, the FOUR-STAR 120 ARF is a very forgiving design that allows you to fly at relatively low speeds. With the control movements set at the measurements provided in this manual, the airplane should exhibit smooth, predictable control. Try a few loops and rolls. Inverted flight is easy, requiring a little down elevator for level flight. The FOUR-STAR 120 ARF also performs nice inside and outside loops, snap rolls, Immelmans, stall turns, Cuban eights, and spins. Of course, it is not a pattern aircraft, but with practice, there isn't much that it won't do. As with any aircraft, getting consistently good results is usually just a matter of practice.

Still at altitude, throttle the engine back to idle. This will give you a good idea of the glide characteristics. While still at idle, steadily increase up elevator input to get a feel for the stall characteristics. The FOUR-STAR 120 ARF tends to stall very gently, with the nose dropping straight ahead with little tendency to drop a wing. This is great information to have when setting up your first landings.

Landing the FOUR-STAR 120 ARF is typically a pleasure. We suggest using a standard landing approach, beginning with a throttled back downwind leg and base turn to the final approach into the wind. During final approach, keep just a little power on the engine until the airplane is over the end of the runway. In crosswind conditions, a little rudder input will likely be needed to keep the airplane lined up with the runway. The FOUR-STAR 120 ARF is best landed in the three-point position. As long as we're on the subject, no landing gear system is bulletproof. Your FOUR-STAR 120 ARF has a great landing gear system that has proven to be very tough on both grass and asphalt flying fields. However, it can be ripped off during less than desirable landing approaches, poor field conditions, failure to flare, and just plain "brain fade". If this happens, simply epoxy the landing gear block in place and learn to be more careful the next time. After landing, always remember to hold up elevator when taxiing, to keep the tail wheel firmly to the ground.

We sincerely hope that your FOUR-STAR 120 ARF will provide you with many, many enjoyable flights. We also hope that this has been a pleasurable kit for you to assemble and fly. Please operate your airplane in a safe, responsible manner with constant regard to other flyers, spectators, and property.

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 R/C flyer, familiar with high performance R/C aircraft.

The governing body for radio-control 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 R/C model airplanes. While AMA membership is not necessarily mandatory, it is required by most R/C flying clubs in the U.S. and provides you with important liability insurance in case your R/C model should ever cause serious property damage or personal injury to someone else. For more information, contact:

ACADEMY OF MODEL AERONAUTICS
5161 East Memorial Drive
Muncie, IN 47302
Telephone: (765) 287-1256

AMA WEB SITE: modelaircraft.org

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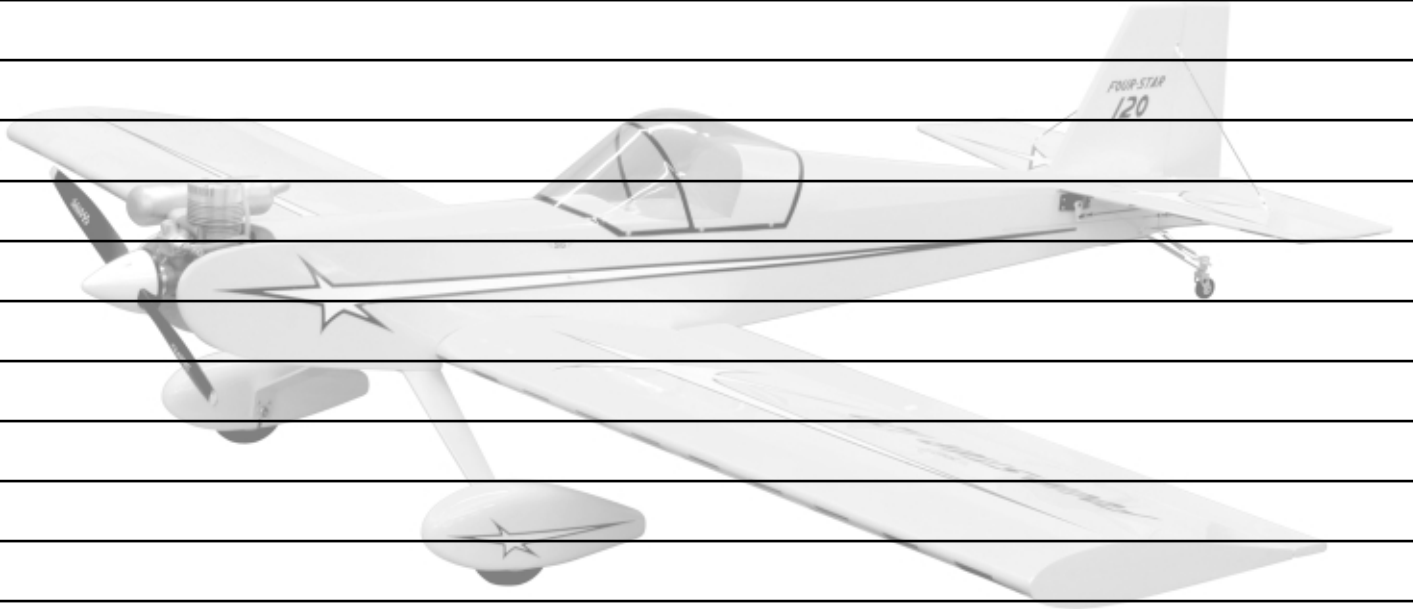
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The craftsmanship, attention to detail and actions of the builder/flyer of this model airplane kit will ultimately determine the airworthiness, flight performance, and safety of the finished model. SIG MFG. CO.'s obligation shall be to replace those 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.

FOUR-STAR I20 LOG BOOK

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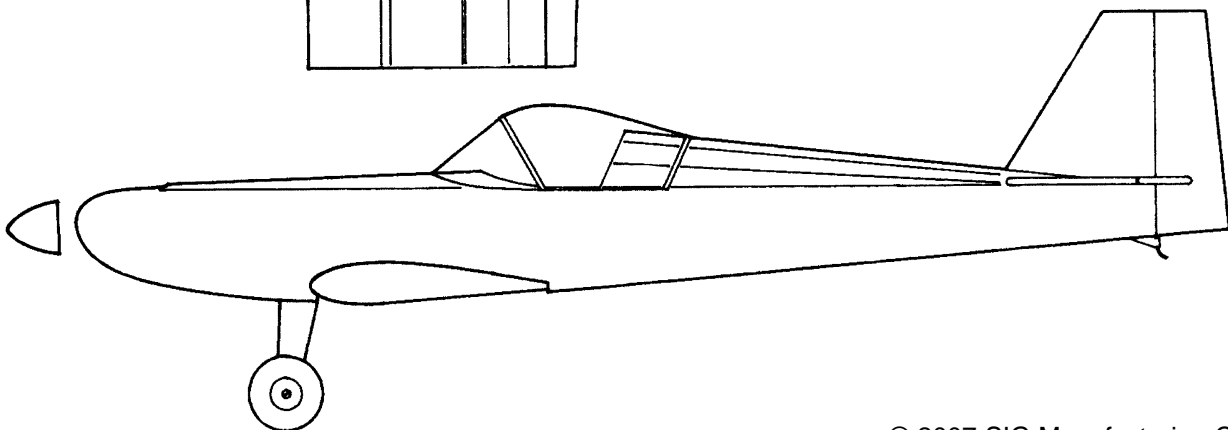
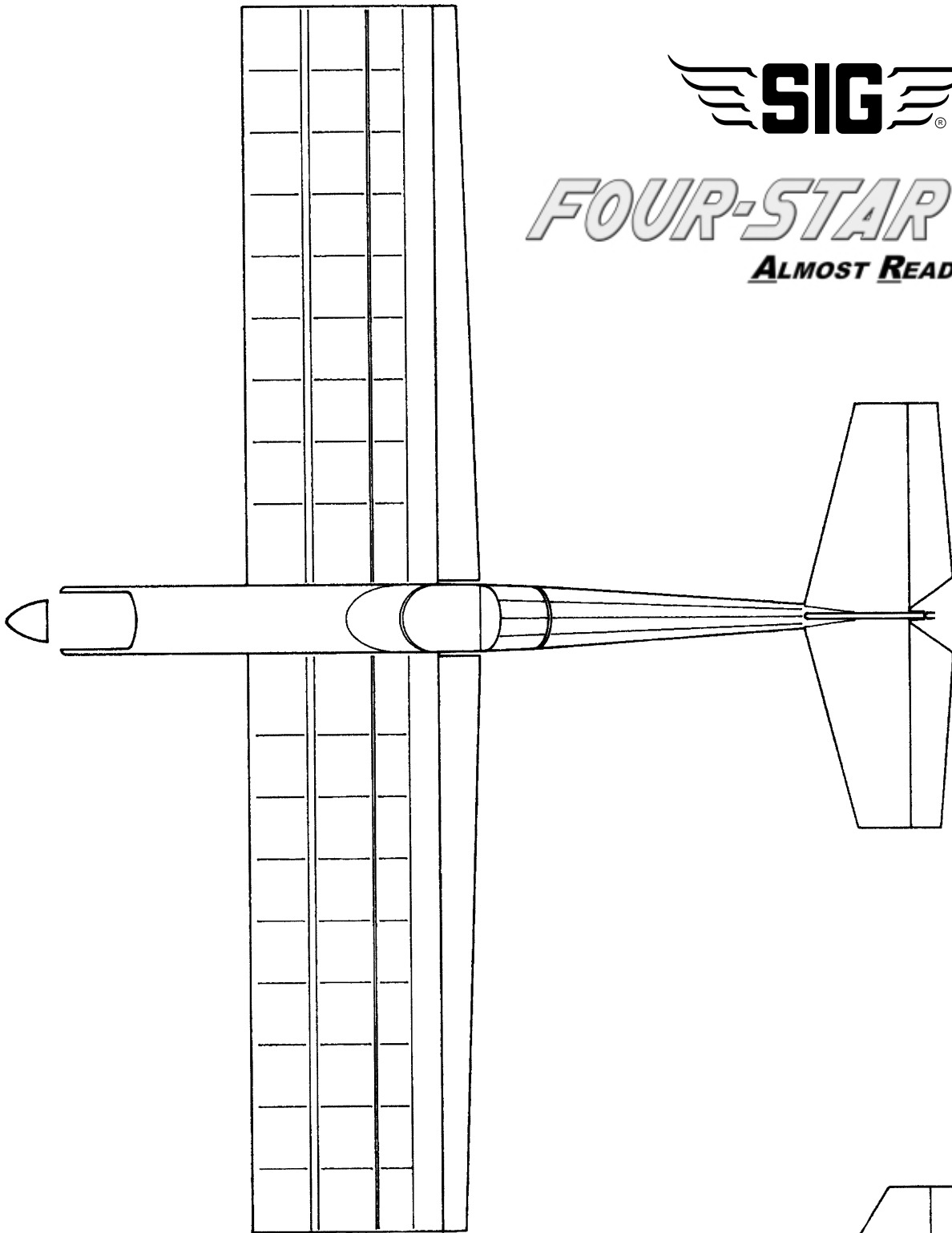
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