WACO SRE

ALMOST READY TO FLY

ASSEMBLY MANUAL

KIT NO. SIGRC101ARF

SIG MANUFACTURING COMPANY, INC.

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INTRODUCTION:

"Waco". There are just certain names that never fail to conjure up the essence of the "Golden Age" of flight and the "Waco" name is certainly one of them! The Weaver Aviation Company in Troy, Ohio was synonymous with the art and grace of biplane design since most of us can remember. And to this day, the Waco reputation for designing and building some of the most elegant aircraft of their time has endured. There has always been argument about which specific Waco aircraft was the most beautiful, but virtually everyone agrees that Waco aircraft in general were all beautiful in their own way. And in our opinion, one of the most beautiful of all Waco designs has to be the E series Aristocrat.

Prior to WWII, during the mid to late 1930's, a very real market had developed for high-speed business and personal aircraft that could carry a reasonable number of people and baggage. Walter Beech had been refining his superb Staggerwing design since 1932 and its evolution into the D17S model represented a great product for this market. There were additional players as well, such as the Howard DGA-15P, the Spartan 7W, the Lockheed Vega 5C, and others. Waco, leaning heavily on their earlier "custom" C-8 cabin biplane, rolled out their new E series prototype in October of 1939. This aircraft, powered by a Pratt & Whitney Wasp Jr. 9-cylinder radial engine, was quite fast and roomy. This 5-place cabin biplane design was offered with four different engine options. Each engine make was noted by Waco in their use of three-letter nomenclature behind the name. These were:

Model E Aristocrat ARE = 330 hp Jacobs L-6mb 7-cylinder radial
Model E Aristocrat HRE = 300 hp Lycoming R680-E3 9-cylinder radial
Model E Aristocrat SRE = 450 hp Pratt & Whitney Wasp Jr. 9-cylinder radial
Model E Aristocrat WRE = 420 hp Wright R975-E3 9-cylinder radial

The most powerful version of this sleek new aircraft was the Waco SRE, fitted with the 400+ hp Pratt & Whitney Wasp Jr. 9-cylinder radial engine. In level flight the SRE was capable of better than 200mph and could cruise at just a little less than that! This was very impressive performance for the time, especially considering the design employed fixed, non-retractable landing gear.

Between October 1939 and February 1942, only 29 Aristocrat Model E aircraft had been produced by Waco. Production was ceased to fully devote the Waco factory to the war effort and the production of their cargo gliders. Fifteen of the production Aristocrat aircraft were called into service with USAAF, as the UC-72 light transport. Seven of these "drafted" Waco Aristocrats survived the war and returned to civilian life. Today only four Model E Aristocrats remain flying and are highly valued by their owners and Waco enthusiasts alike.

The SIG 1/6th scale Waco SRE ARF kit is a very nice tribute to the exquisite lines and high-performance capabilities of its full-scale counterpart. Based on the full-scale NC1252W SRE, the SIG Waco shares its beautiful color scheme and undeniably Waco lines. And in the air, the SIG Waco SRE is surely one of the nicest flying scale R/C airplanes we've ever flown! The flaps are effective and a lot of fun to work with. The flight controls are light, positive, and smooth and the scale-like landing gear provides very good take-off and landing performance.

The SIG Waco SRE ARF kit has been engineered to get you into the air quickly with a model that you can be truly proud of on the flight line. This Assembly Manual has been sequenced to put your model together in the correct order. We urge you to read through this manual carefully before starting assembly. We also urge you to carefully check your kit contents against the included parts listing in this manual, making sure that you have everything listed before you start assembly.

Throughout this Assembly Manual we will reference the use of various after-market products that were used in the assembly of our own Waco SRE models. At the end of this manual you will find a Product Reference section that provides you with contact information for these various fine manufacturers.

Last, the SIG Waco SRE ARF model is NOT intended for beginning R/C pilots. If this is your first R/C model aircraft, we strongly urge you to seek the expertise and assistance required to both properly assemble and fly this airplane.

Scale References:

SIG Manufacturing Company, Inc. wishes to gratefully acknowledge the excellent reference materials listed below, used in the development of this product:

- "WACO AIRPLANES, Ask Any Pilot", Raymond H. Brandley, Author
- IMPS QUARTERY, Fall 1982, Published by International Plastic Modelers Society
- IMPS QUARTERLY, Winter 1982, Published by International Plastic Modelers Society
- BOB BANKA'S DOCUMENTATION SERVICE, "Foto-Pak" #5283

Specifications:	**Imperial**	**Metric**
Wing Span, Top:	69.5 in.	1765.3 mm
Wing Area, Top*:	756 sq. in.	4877.4 cm^2
Wing Span, Bottom:	48.3 in.	1226.8 mm
Wing Area, Bottom*:	354 sq. in.	2283.8 cm^2
Wing Area, Total*:	1110 sq. in.	7161.2 cm^2
Length:	56.5 in. (overall)	1435 mm
Flying Weight**:	9.5 - 10 lbs.	4.30 - 4.53 kg
Wing Loading:	19.7 - 20.7 oz./sq. ft.	60 - 63.3 g/dm^2
Radio Required:	5 Channels (7 Servos required)	
Engine Required:	.75 - .90 2-Stroke	
	.90 - 1.20 4-Stroke	
Scale:	1/6th	
Kit Number:	SIGRC101ARF	

* Calculated at full span, including fuselage

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

ITEMS REQUIRED TO COMPLETE THIS KIT:

- Radio System, 5-channels, with seven (7) servos
- Appropriate servo extensions and Y-harnesses (see *Radio Systems* section below)
- After-Market Battery Pack - 1100 mah (optional, see *Radio Systems* section below)
- Engine - See *Engine Selection* section below
- Propeller to suit engine of choice
- Engine Mounting Hardware:
  4 each 8-32 x 1" Steel Socket Head bolts
  4 each 8-32 Lock Nuts
  4 each #8 Flat Washers
- Optional Fueling System - Du-Bro #334 Kwik-Fill Fueling Valve shown in manual
- Optional Glow Driver system (as shown in this manual)
- 1/4" thick foam rubber for installing receiver and battery pack
- Plastic Zip-Ties - used to organize and secure internal components and wiring
- Thread Locking Compound - such as Loctite® #242 Non-permanent "Blue"
- 30-Minute Epoxy - SIG 2-Part Epoxy Glue
- 5-Minute Epoxy - SIG Kwik-Set Epoxy Glue
- CA Glue - SIG Thin, Thick, and SIG Accelerator
- White Glue, such as SIG Super Weld Liquid Resin Glue
- 3/8" Dia. Heat Shrink Tubing to secure servo extension connectors
- A selection of appropriate tools and materials, such as:
  Electric Drill
  Dremel® Tool with assorted bits
  Safety Glasses
  A selection of drill bits and/or a drill index set
  Assorted sizes of both Phillips and regular screwdrivers
  Assorted hex wrenches & ball drivers (2 mm and 9/64" required for assembly)
  Soldering Iron & solder - optional, used for Glow Driver system connections
  Hobby knife with #11 blades
  Fine CA Applicator Tips
  Scissors
  Masking Tape
  Scrap plywood sheet
  Sandpaper - #220 is sufficient

RADIO SYSTEMS:

The SIG Waco SRE ARF model requires 5 channels to control the ailerons, elevators, rudder, throttle and flaps, using a total of seven (7) standard servos. Also, we chose to replace the typical 500 – 600maH airborne NiCad battery pack for a larger after-market 1100maH pack. We used this larger capacity pack in consideration of the fact that it powers the receiver along with seven servos. We suggest that you do the same thing with your own radio installation in this model.

Many transmitters have toggle switches to activate the flap channel. These are typically two or three position switches that can input pre-set flap angles upon activation. While this works fine we much prefer a rheostat type knob that allows us to roll in as much or as little flap input as needed for the wind conditions during any given flight. So we chose to use a Hitec Eclipse 7 QPCM transmitter that has this feature. In addition, this Hitec transmitter also provides any number of mixing functions, as well as exponential, end-point adjustments, sub-trims, etc. The use of a computer radio system such as this saves a huge amount of time and effort in the correct set-up and flight trimming of this or any model.

As shown in this assembly manual, we chose to use an aftermarket on/off switch assembly that provides the capability to charge the airborne battery pack externally. The switch we chose was the Maxx Products #3470 Charge/Switch product. This unit has proven to be very reliable and very convenient in terms of charging.

Another Maxx Products item that we chose to use in our own Waco models was the "Super Glow DLX" glow driver system, Maxx Products P/N 9900DX. This system is programmable through your radio system and keeps the glow plug lit at any pre-set throttle stick location of your choosing. In addition, with this unit installed in the Waco, there is no longer the need for a separate glow driver for starting the engine. The Super Glow DLX system is quite light and relatively easy to install. Based on our experience with this nifty little system, we can highly recommend its use in your own Waco. Of course, the use of this product is not a requirement and is only offered as an option.

In addition to the above, you will also need the following items for the radio installation:

2 each	6" Servo Extensions for aileron Y-Harness
2 each	12" Servo Extensions for the aileron servos
1 each	24" Servo Extension for the elevator servo
1 each	Standard Y-Harness for the ailerons
1 each	Servo Reversing Y-Harness for the flap servos (Maxx Products "Miracle Y" or equivalent)

ENGINE SELECTION:

The SIG Waco SRE ARF model is designed to be powered by glow engines in the following types and size ranges:

4-Stroke Engines: .90 - 1.20
2-Stroke Engines: .75 - .90

We prefer the use of 4-stroke engines for this particular model simply because they sound great, allow the use of larger propellers, typically use more manageable muffler sizes and are very much in keeping with the model itself. However, this is strictly our opinion and your own choice of engine type is up to you. Carefully note that the SIG Waco SRE ARF model has a great deal of wing area and therefore, a relatively light ready-to-fly wing loading. This means that the airplane is not going to necessarily fly "better" by being over-powered. We urge you to resist the temptation to install larger engine sizes than those recommended above. All this will accomplish is to make your installation more difficult and potentially cause undue stress and strain on the

airframe. For reference, we performed all of our flight-testing with our Waco models using .90, 1.00, and 1.20 4-stroke engines. The .90 flies the airplane beautifully, as does the 1.00 engine. The 1.20 is close to over-powering the airplane but works fine with throttle management. SIG's flying field is grass and all three of these engines allowed easy take-offs.

This assembly manual depicts the installation of a Saito 1.00 4-stroke engine, mounted in the inverted position. This installation has been completely tested and has demonstrated excellent starting and running results along with great idle characteristics. The Saito 1.00 engine provides the SIG Waco SRE with very good power margins and excellent reliability. The installation of this engine in our Waco will also show that the entire manifold and muffler system can be kept within the confines of the cowl, with no need for openings. Cooling airflow through the cowl and around the engine has been completely tested on this design and found to be excellent.

The only cowl openings required for this particular engine installation were two small elliptical openings to clear the valve boxes and a small diameter hole for the needle valve extension. We really like this installation because it is practical and also preserves the nice cowl and fuselage lines of the model. Take a look at the Engine Installation section of this manual for more complete details.

For reference, the practical maximum usable inside diameter of the cowl is 7-1/2". With the cowl fully in place on the fuselage, the distance from the front face of the firewall to the rear face of the spinner backplate is 5-7/16".

Last, we strongly suggest that you take the time to carefully break-in new engines. A good running, well broken-in engine almost always minimizes engine related problems at the flying field.

COVERING MATERIAL:

The SIG Waco SRE ARF model has been professionally covered with SIG AeroKote® covering film. This high quality polyester film has been expertly applied, using a scale color scheme, based on the beautiful NC1252W full-scale Waco SRE.

The SIG Waco SRE ARF kits are built and covered in a part of the world that is typically humid. When the individual covered parts are removed from their plastic bags, some wrinkling may occur over a 24 to 48 hour period of time. This is especially possible if you live in a drier climate. This phenomenon is perfectly normal and *DOES NOT* mean that your model has a defect. Such wrinkles are a result of the wood itself losing moisture and dimensionally shrinking in the process. This is the nature of wood, especially softer types, such as balsawood.

Some modelers may feel that the covering on the ARF model should be perfect and that they should not be expected to re-shrink wrinkles. This is not realistic, because any covering material - regardless of brand - that has been hand applied over wood, is indeed subject to the possibility of wrinkling.

The requirement is to therefore re-shrink the covering as needed. This is not difficult to do and can be done using normal hobby-type covering tools, such as a heat iron, a trim seal tool and a hobby-type heat gun. Carefully note that we do not recommend the use of a heat gun around any areas where two pieces of covering material have been seamed together. This is because a heat gun generates a great deal of broadcast type heat that in turn can loosen seams, often causing the seams to "creep". If you must use a heat gun around or near such seams, we suggest that you protect them first. To do this, soak a few paper towels in cool tap water and arrange the wet towels directly onto and over the seamed area. You can then use your heat gun to carefully shrink these areas.

When using a hobby-type heat iron, we always suggest that the surface of the shoe be covered with a soft cloth. This helps prevent scratching or hazing the surface of the covering material. For years we have used old cotton T-shirt cloth for this purpose and it has worked quite well for us. There are also commercially available "covering socks" that fit onto most covering iron shoes. However, these can vary in quality, so choose one that feels the softest. Also note that the temperatures required to shrink and seal AeroKote® (275° - 325° F) are definitely high enough to melt and/or distort some plastic parts. Exercise common sense when working with high heat sources around the plastic parts on your model!

For reference, the SIG Waco SRE ARF model was covered using the following AeroKote® colors and part numbers:

Cub Yellow Opaque	SIGSTL331
Black Opaque	SIGSTL201

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, using the provided check-off boxes (❑). Note that the CA type hinges for the ailerons, rudder, and elevators are in place in each of these parts but are <u>not</u> yet glued in place. Also note that the nuts and bolts required to mount your engine to the motor mounts are <u>not</u> included in this kit and must be purchased separately.

<u>Important Note:</u> Each Waco SRE ARF kit has been inspected and inventoried on three separate occasions before leaving the factory. Therefore, be assured that your kit has been checked and was shipped with all of the listed parts included. Missing part claims made ***<u>after</u>*** the assembly of the model begins cannot be honored. Also, please be aware that the various parts listed below may sometimes be packaged in a different order than shown. Just be sure to check each parts bag to make sure that you have received these parts.

❑ Bag #1 Bottom Wing - Covered and trimmed with AeroKote®
- 4-40 blind mounting nuts installed for N-struts - 2 on each side
- Wing bolt holes drilled and opened
- Wing bolt reinforcement plates installed and covered
- Rigging mount screw holes established
- N-strut mounting bracket recesses holes established

❑ Bag #2 Vertical Fin & Rudder Assembly - Covered with AeroKote®
- With four (4) CA hinges in place, not glued
- Bottom LE of rudder slotted and drilled for tailwheel wire

❑ Bag #3 Horizontal Stabilizer & Elevators - Covered with AeroKote®
- Six (6) CA hinges in place, not glued
- Covering removed at center of stabilizer for gluing

❑ Bag #4 Top Left Wing Panel - Covered & trimmed with AeroKote®
- Flap assembly hinged with four (4) point hinges - not glued
- Aileron hinged with four (4) CA hinges, not glued
- Outer N-strut mounting recesses established with 4-40 blind mounting nuts installed for N-strut brackets
- Rigging mount screw holes established
- Aileron & Flap servo mounting openings made with servo cable strings in place
- 8mm dia. rear locating dowel in place & glued
- 8-32 blind nuts installed in wing root rib for wing mounting

❑ Bag #5 Top Right Wing Panel - (same description as above)

❑ Bag #6 Fuselage - Covered with AeroKote®
- Removable Top Hatch in place with two T2.6 x 8 mm PWA mounting screws
- Front Windshield, painted - in place with four T2.6 x 8 mm PWA mounting screws
- Main Landing Gear Hatch in place with two T2.6 x 12 mm PWA mounting screws
- Landing gear 8-32 blind mounting nuts (4) in place
- Firewall centering lines for engine mounting reference
- Bottom rear hardpoint for mounting tailwheel assembly
- Fitting slots & 4-40 blind mount nuts (2) in place for rear landing gear supports
- 1/4-20 Blind Nuts (2) installed for bottom wing mounting
- Pull-pull exit slots cleared out at rear of fuselage
- Firewall and air dump opening fuel-proofed

❑ Bag #7 Cowl, fiberglass, & factory painted and trimmed, with four (4) pre-drilled mounting holes
- ❑ Sub bag A: (taped to inside of cowl):
  - 4 each T2.6 x 8 mm PWA mounting screws

❑ Bag #8 Main Landing Gear - 3 mm aluminum
- Factory painted yellow
- Pre-drilled with all required strut, axle and wheel pant mounting holes

❑ Bag #9 1 each Wheel Axle Wire - 4 mm dia. pre-bent to shape, painted yellow
- ❑ Sub bag A:
  - 1 each Center Landing Gear Wire Mounting Block - Nylon
  - 1 each Nylon Strap - Main landing gear wire retainer for nylon block
  - 2 each Nylon 4mm Main Landing Gear Wire Axle Bushings
- ❑ Sub bag B:
  - 4 each T2.6 x 10 mm PWA Screws, nylon block mounting screws

❑ Bag #10 2 each Main Wheels - 70 mm dia. (2-3/4"), "Lite" type
- ❑ Sub bag A:
  - 4 each Wheel Collars, 4 mm ID, with setscrews
  - 4 each 4-40 x 9 mm Allen Head bolts - wheel pant mounting
  - 4 each 8-32 x 14 mm Allen Head bolts - main landing gear mounting
  - 4 each 3 mm Flat Washers - 4 each for wheel pant mounting
  - 4 each 3 mm Split Ring Lock Washers - 4 each for wheel pant mounting
  - 4 each 4 mm Flat Washers for main landing gear bolts
  - 4 each 4 mm Split Ring Washers for landing gear bolts

❑ Bag #11 2 each Wheel Pants, plastic, factory painted
- With 4-40 blind mounting nuts installed (2 per pant)

❑ Bag #12 2 each N-Struts, factory painted & pre-drilled
- ❑ Sub bag A:
  Rear Landing Strut Supports - 2 mm aluminum
  - Factory painted yellow
  - Mounting holes drilled
- ❑ Sub bag B:
  - 4 each 4-40 x 9 mm Allen Head mounting bolts
  - 2 each 4-40 Lock Nuts
  - 2 each 4-40 Flat Washers
- ❑ Sub bag C:
  - 8 each N-Strut Mount Brackets, aluminum, factory painted, pre-drilled and bent - 4 each Top wing brackets, 4 each Bottom wing brackets
- ❑ Sub bag D:
  - 16 each 4-40 x 9 mm bolts with 2 mm Allen drive heads - "N" strut mounting
  - 8 each 4-40 Lock Nuts for above bolts - N-strut mounting

❑ Bag #13 2 each Molded Clear Plastic Side Window Set - 2 left & 2 right windows

❑ Bag #14 1 each Top Wing Joiner Blade - 3 mm aluminum, pre-drilled for mounting
- ❑ Sub bag A:
  - 2 each 4-40 x 10 mm Allen head bolts - wing blade mounting
  - 2 each 4-40 Lock Nuts
  - 2 each 4-40 Flat Washers

❑ Bag #15 1 each Fuel Tank Assembly, 450 cc (15.2 oz.) nylon tank body with clunk fuel line inside
- ❑ Sub bag A:
  - 1 each Rubber Stopper
  - 3 each Aluminum tank lines

1 each Front Clamp
1 each Rear Clamp, threaded
1 each M3 x 20mm Clamp Compression Bolt
1 each Fuel Pick-Up Weight

❑ Bag #16 1 each Waco Spinner Assembly – Cone & Backplate, Aluminum, 2-1/4" dia.
- ❑ Sub bag A:
  - 1 each Brass Union Nut - M8 x 1.25 mm x 8-32
  - 1 each Spinner Mounting Bolt - 8-32 x 9/16"

❑ Bag #17 1 each Fuel Tank Retainer - Balsawood, 9 mm x 12 mm x 90 mm
1 each Rudder Servo Mounting Doubler - Lite-Ply, 3 mm x 40 mm x 70 mm
2 each Throttle Tube Mounts - Lite-Ply, 3 mm
- ❑ Sub bag A:
  - 2 each Nylon Wing Bolts, 1/4-20 x 1-1/2", slotted - Bottom Wing Bolts
  - 2 each 8-32 x 25 mm Allen Head Top Wing Retaining Bolts
  - 2 each 8-32 (4 mm) Flat Washers for top wing retaining bolts
  - 2 each 8-32 (4 mm) Split Ring Lock Washers for top wing retaining bolts

❑ Bag #18 Reinforced Nylon Motor Mounts, 1 left, 1 right - .90 to 1.20 size
- ❑ Sub bag A:
  - 4 each 8-32 x 25 mm Motor Mount Bolts
  - 4 each 8-32 Blind Mounting Nuts
  - 4 each 4 mm Flat Washers
  - 4 each 4 mm Split Ring Washers

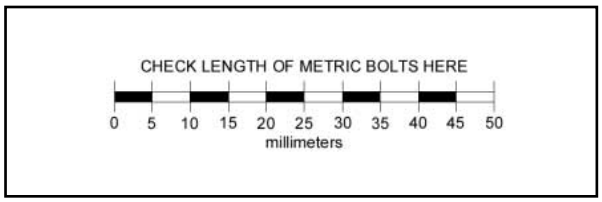
❑ Bag #19 1 each Tailwheel Assembly - assembled with 25 mm dia. tailwheel and two 2.1 mm ID wheel collars
- ❑ Sub bag A:
  - 3 each T2.6 x 10 mm Phillips Head Mounting Screws

❑ Bag #20 1 each Outer Nylon Throttle Pushrod Tube - 15-1/2"
1 each Inner Nylon Throttle Pushrod Tube - 15-1/2"
1 each M2 x 295 Steel Pushrod, threaded one end with metal clevis
1 each Solder Clevis, M2
1 each M2 x 22 mm Threaded Stud
1 each M2 Threaded Metal Clevis
2 each Aileron Pushrods, M2, threaded at one end w/ "Z" bend 2-7/8" (73 mm)
2 each Flap Pushrods, M2, threaded at one end w/ "Z" bend 2-1/2" (63.5 mm)
1 each Elevator Pushrod, M2, threaded at one end w/ "Z" bend 3-3/8" (85.7 mm)

❑ Bag #21 Rudder Pull-Pull Cable - Nylon-coated - Two (2) 39-3/4" lengths
- ❑ Sub bag A:
  - 4 each Threaded Rigging Couplers with Steel Clevises
  - 4 each 3 mm x 4 mm Copper Swage Tubes
- ❑ Sub bag B:
  - 7 each Nylon Control Horns
  - 1 each Nylon Control Horn Bases
- ❑ Sub bag C:
  - 4 each M2 x 15 mm Phillips Head bolts - rudder & elevator control horns
  - 8 each T2.6 x 12 mm PWA Screws - flap & aileron control horns
  - 2 each Hex Nuts - rudder control horns

❑ Bag #22 8 each Wing Flying Wires - 0.6 mm dia. x 13-3/4"
- ❑ Sub Bag A:
  - 8 each M2 Flying Wire Turnbuckles w/Locknuts in place - Left-hand threads
- ❑ Sub Bag B:
  - 8 each M2 Flying Wire Turnbuckles w/Locknuts in place - Right-hand threads
- ❑ Sub Bag C:
  - 16 each T2.6 x 8 mm PWA Mounting Screws
  - 16 each Flying Wire Swage Tubes, 3 x 4 mm
  - 2 each Flying Wire Separators, Pre-Drilled, Nylon

❑ 1 each Waco SRE ARF Assembly Manual
❑ 1 set Waco SRE ARF Decal Sheets



Hardware 101:
Every modeler has heard stories about "inferior" foreign hardware - we certainly have. While some of this might be deserved, the fact of the matter is that much of this comes from folks who failed to use the right tools for the job. A case in point is the common Phillips screwdriver. These things come with bits in all shapes, sizes, and angles. If you use a Phillips screwdriver that has too small of a bit for the screw, it will almost *always* "roach" out the head under the pressure of installing or removing it. And the same is true if the screwdriver bit is too large. One size does *not* fit all! Slotted screws installed with under or oversized screwdrivers can also suffer from this same kind of abuse. From experience, we can also tell you that magnetized screwdrivers are great for this project. Having the right tools available for the job can make a big difference in making the job all that much easier and enjoyable.

Incidence & Thrust Angle Information:

Incidence and thrust have been built into this model at the factory. However, some modelers may still wish to know these values:

Incidence:	Top Wing	-1°
	Bottom Wing	0°
	Horizontal Stabilizer	0°
Engine Thrust:	Right Thrust:	2°
	Down Thrust:	2°

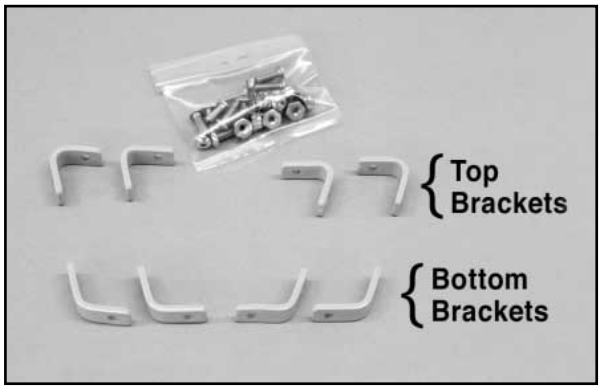
ASSEMBLY:

WINGS:

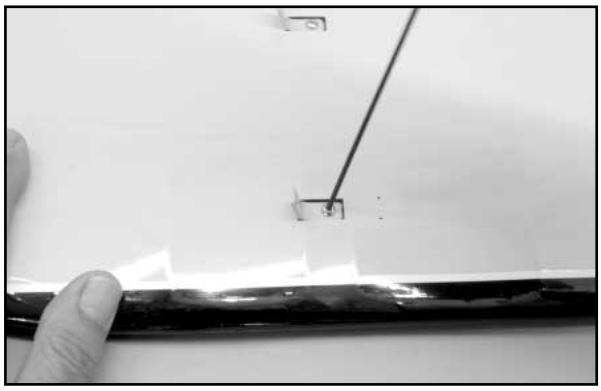
Bottom Wing:

The bottom wing has been completely built and covered at the factory with no further structural steps required. However, in preparation for final assembly later, now is an excellent time to prepare the bottom wings for assembly to the airframe.

❑ 1) From the kit contents locate Bag #12 containing the N-struts and related strut hardware items. Open the small bag containing the eight (8) pre-painted N-strut mounting brackets. The bottom wing N-strut brackets have been pre-bent with open angles - select these four brackets for this step (the four remaining painted N-strut mounts, with the pre-bent closed angles, will be installed into the top wing panels shortly).



From the remaining small bag, select four of the 4-40 x 13 mm bracket mounting bolts. Use a 2 mm Allen head hex wrench to now install the four N-strut brackets in place into the recesses in the top of the wing. We suggest using thread locking compound on the bolt threads and tightening the bolts firmly.



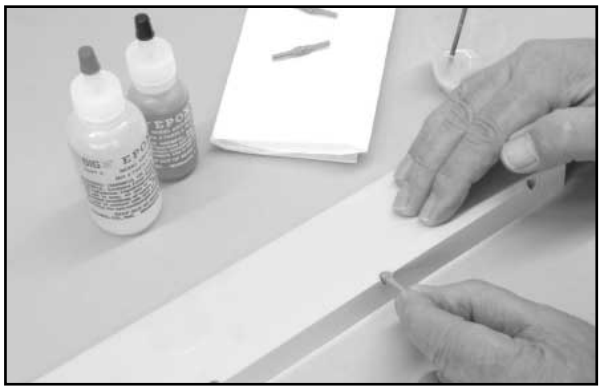
❑ 2) The top surface of bottom wing has four (4) small holes on each wing panel. These have been opened at the factory to identify their locations. These holes are the screw locations for the rigging brackets, used to anchor the flying wires. Beneath these holes are hardwood mounting blocks. Because the bottom wing is easy to work with at this point, we suggest pre-threading these holes now, in preparation for installing the rigging brackets later. To do this, locate Bag #22 and remove one of the T2.6 x 8 mm PWA Mounting Screws. Use a Phillips screwdriver to thread this screw fully into each of the eight holes, pre-threading them. Set the bottom wing aside for later final assembly in this manual.

Top Wing Panels:

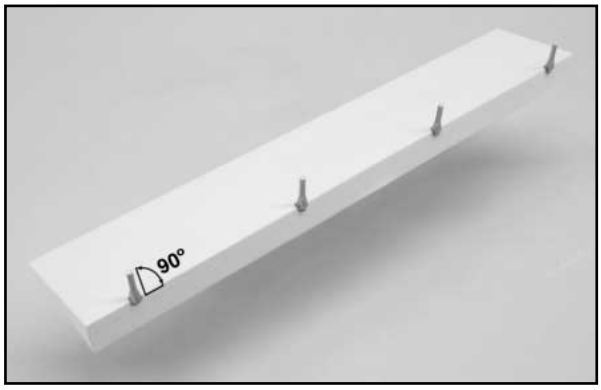
As received in the kit, both of the top wing panels have the ailerons and flaps in place with the appropriate hinges. Note that these hinges are NOT glued in place. In the following steps, you will be required to test the movement of the aileron and flap servos with your radio system. So now is a good time to place both the airborne battery pack and the transmitter on charge in order to use them later.

❑ 1) The flaps are hinged first. Begin by removing the flap and its four point hinges and the aileron and its CA hinges from both of the wing panels. Set the ailerons aside for now.

❑ 2) Use a toothpick or sharpened dowel to apply a small amount of Vasoline® to the center pivot point of each point hinge, making sure this area is well coated - do not get Vasoline® on the outer hinge arms. The Vasoline® helps to protect the hinge pivot point from epoxy glue. Using 30-minute epoxy, glue all four hinges in place into the pre-drilled holes in the flap.



Each exposed hinge leg should be oriented 90° to the flap. Use alcohol and a paper towel to carefully remove any excess or oozing glue from the center hinge point and let the glue cure. Repeat this process with the opposite wing panel and its flap.

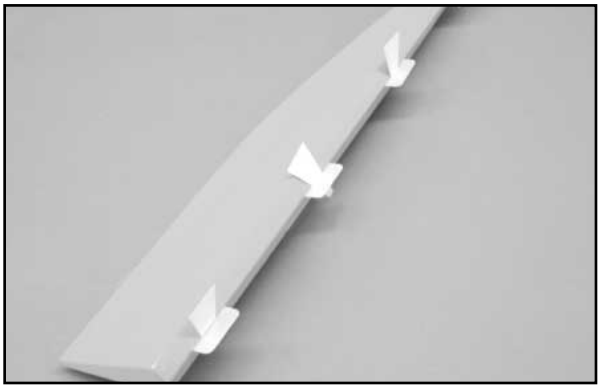


❑ 3) The flaps are now mounted in place to their appropriate wing panels. Trial fit the flaps first to make sure that they line-up with the top and bottom surfaces of the wing panel. Make adjustments as needed in the mounting holes to achieve a good fit. Again using 30-minute epoxy, apply glue in the hinge holes and to the exposed flap hinge legs. Press the four hinge legs into the holes in the wing panel. Use a piece of tape on the top of the panel to hold the flap in place. A little alcohol and a paper towel will remove any excess or oozing glue from the hinge points. Repeat this procedure with the remaining flap on the opposite wing panel. Allow the glue to cure.

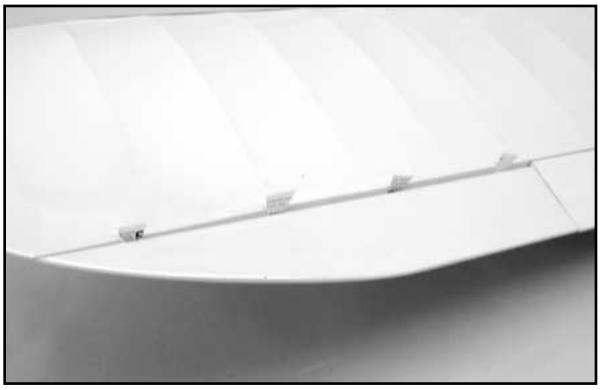
After the epoxy cures, flex each flap to free up their movement. We used a small amount of gun oil on the hinge points to further free up their movement.

❑ 4) The ailerons are now hinged in place to each wing panel. The supplied hinges are the CA type. Note that the installation procedure for these hinges is the same for the elevators and rudders and will not be repeated in those related steps.

The supplied hinges have a die-cut center slot that can be used to accurately place and center the hinges equally into both the wing panel and the aileron. To do this, use a business card and pair of scissors to cut four "wedges". These should be cut wide enough at the top so as to not pass through the slot in the center of the hinge. Press the hinges into place into the pre-cut slots in the wing panel, up to the center slot. Place a card "wedge" into each of the hinge slots.



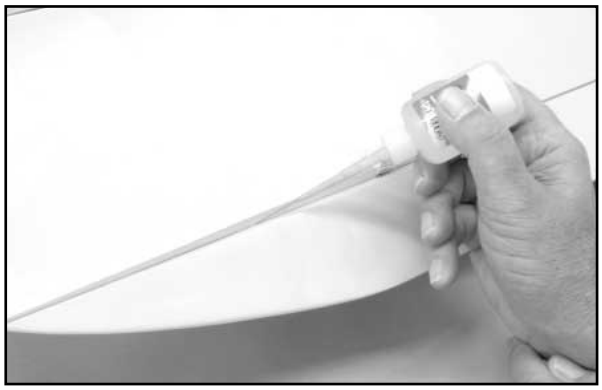
Now fit the aileron carefully onto each exposed hinge half, up to the card wedges. Align the outer tip of the aileron with the wing tip, by sliding the aileron left or right as needed. Next, make sure that when the aileron is in its correct position, there is a reasonable clearance between the inboard end of the aileron and the outboard end of the flap. We used a business card as the spacer between these two surfaces. With everything checked, the hinges can now be permanently glued in place using thin CA, preferably with a small applicator tip on the bottle.



Flex the aileron downward, exposing both sides of the hinges, between the wing panel and the aileron. Use a piece of masking tape to hold the aileron in this position. Remove the card "wedge" from one of the hinges and apply four (4) small drops of glue to each side of the hinge slot. Remove the card "wedge" from the next hinge and again apply four (4) small drops of glue to each side of the hinge slot. Repeat this process with the remaining hinges.

Remove the tape holding the aileron in the downward flexed position. Flex the aileron in the opposite, upward position and use a piece of masking tape to hold it in place. Turn the wing panel over and repeat the above gluing process - four drops of glue to each side of the hinge slot - on all four hinges. Remove the masking tape, returning the aileron to its centered position.

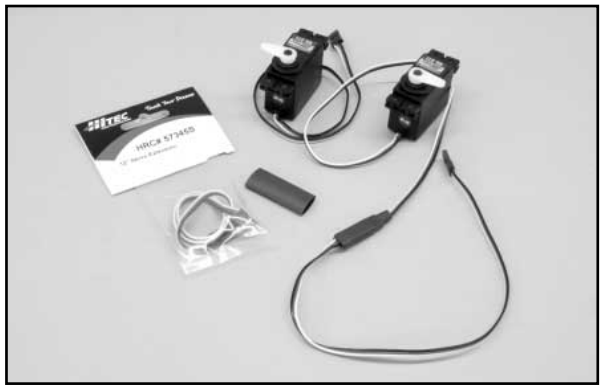
Because it takes some time for the CA glue to fully "wick" its way through the hinge surface and the surrounding wood, allow about 10 minutes before flexing the aileron. Any excess glue on the surrounding covering can be quickly removed with SIG Debonder.



After sufficient time has passed, flex the hinged aileron firmly up and down on the panel to create free and easy movement. We also suggest pulling on each aileron, at each hinge location, making sure they are each firmly in place. Repeat this same procedure with the opposite wing panel and aileron.

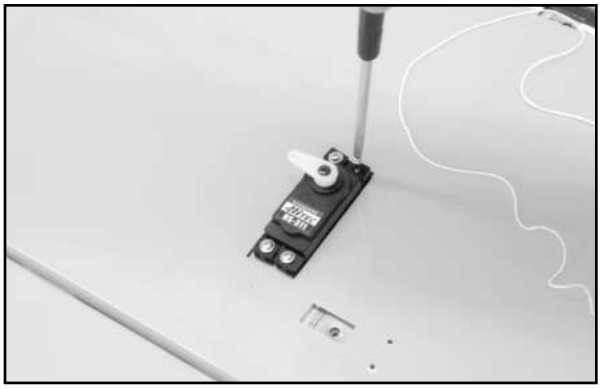
❑ 5) The aileron servos are now installed in each wing panel. Note that these two servos will be oriented in the wing panels with their output arms facing outwards towards the wingtips, with the head of the servo toward the leading edge.

Prepare the two aileron servos by installing a 12” servo extension onto each servo connector. We suggest that you make these connections secure by using a short length of heat shrink tubing, shrunk around the servo and extension connections. Now install the rubber grommets and eyelets that came with your servos into the servo mounting lugs.



Using the string found in the aileron servo opening, tie it to the servo extension lead. At the root rib, pull the servo extension through the wing panel and out through the opening. Use a piece of tape to hold the connector against the root rib. The servo can now be seated into the servo opening in the wing panel. Use a pin vise and a small diameter drill bit to make four screw "pilot" holes through the hardwood mounts. Using the screws that came with

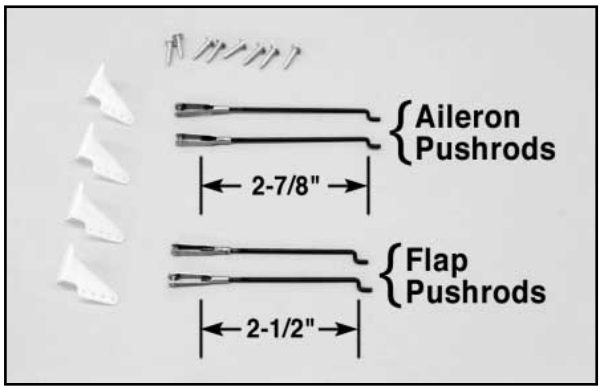
your servos, mount the servo in place. Install the opposite aileron servo in the same manner. Last, use a small piece of tape to identify the two servo leads as the aileron leads.



❑ 6) The flap servos are now installed in each wing panel. Like the aileron servos, the flap servos are oriented in the wing panel with their output arms facing outward toward the wing tip with the head of the servo toward the leading edge. Install the rubber grommets and eyelets into the mounting lugs of both servos.

Like the aileron servos, feed the servo leads through the servo mounting opening in the wing panel and out through the opening at the wing root. Tape the connector temporarily to the root rib. Install the flap servo into its opening in the wing panel, oriented as shown, and drill four small diameter "pilot" holes through the hardwood mounts. Secure the servo in place with the screws that came with your servos. Install the opposite flap servo in the opposite wing panel in the same manner. Again, we suggest identifying the flap servo connectors with a small piece of tape.

❑ 7) From the kit contents, locate hardware Bag #20, and remove the two (2) Aileron Pushrods (2-7/8" long with a metal clevis at one end and a Z-bend at the other) and the two (2) Flap Pushrods (2-1/2" long with a metal clevis at one end and a Z-bend at the other). Locate Bag #21 and remove four (4) Nylon Control Horns and the eight (8) T2.6 x 12 mm PWA screws.

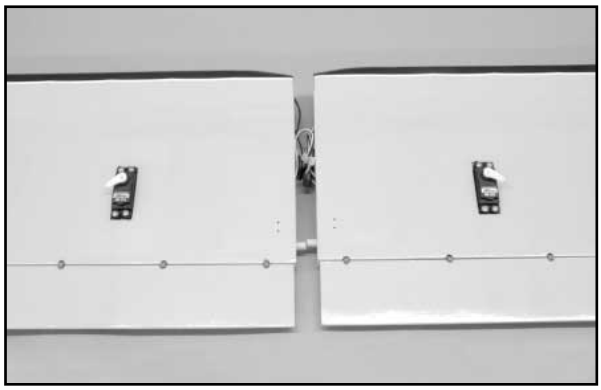


The flap linkages are installed first. Select the two 2-1/2" flap pushrods, two nylon control horns, two nylon control horn bases, and four M2 x 20 mm Phillips Head bolts.

IMPORTANT NOTE: *Before* making the servo/flap linkage connections, it is *first* necessary to make absolutely sure that the flap servos are traveling in the correct directions, in mirror image to each other. If the servo movement is in the wrong direction when the linkages are attached, damage *WILL* be done to either the flap hinges or the servo gears - possibly even both!

The easiest and most convenient method to achieve mirror image movement in the flap servos is by the use of a servo reversing Y-harness, such as the Maxx Products *Miracle Y* unit. Simply plug the two flap servo connectors into this Y-harness and then plug the Y-harness connector into your receiver, using the appropriate flap channel (with our Hitec radio system, channel 6 is the designated flap channel). Now plug the airborne battery pack into the switch assembly and the switch into the receiver. Turn the transmitter on and then the airborne battery pack. What you want to determine by doing this is the direction that the two flap servos are moving for correct flap movement.

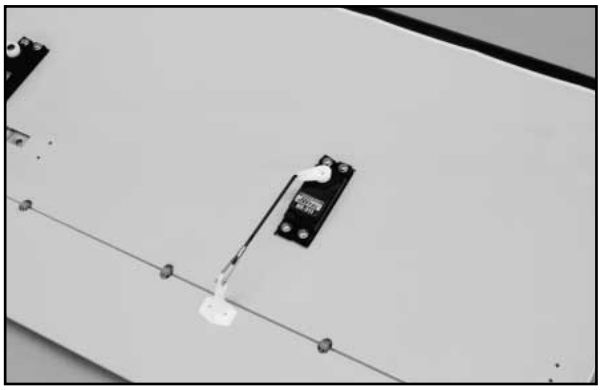
With no flap input from your transmitter, remove the servo output arms and reposition them back in place so that they angle back toward the flap hinge line at approximately 45°. This position is the "zero or no flap" position. The correct motion for the flap servo output arms is to *pull* toward the leading edge of the wing as flap input is being made through the transmitter. If your flap servo



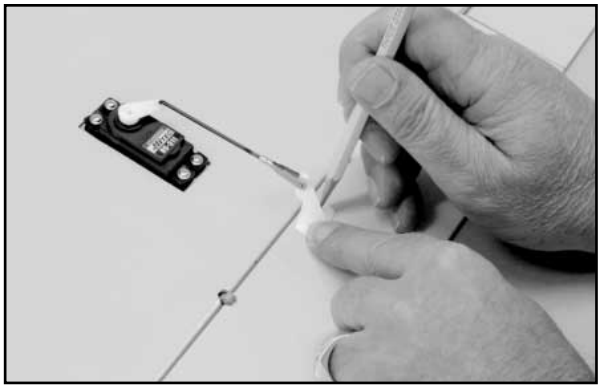
motion moves the output arms towards the flap, reverse the flap channel through the transmitter. With the servos now moving in the correct directions and the output arms in place correctly, linkages between the servos and the flaps can be safely made.

❑ 8) The provided flap and aileron pushrods are ready to use. The wire diameter is .072” and because of this, we found it helpful to first drill out the two outmost holes in both flap servo output arms, using a #49 index drill (.072”). This allows the Z-bend end of the linkages to fit nicely into these holes, without "slop".

On top of each wing panel at the flap joints, use a piece of tape to hold the flaps in neutral (zero flap) position. Pad your work surface to protect the wing panels and place them upside down on your bench. Install a 2-1/2" flap pushrod into each flap servo output arms at the outermost holes, using the "Z" bend ends. At the clevis end, install a nylon control horn, using the second hole from the top. Reinstall the arms back onto each servo in the 45° aft position.

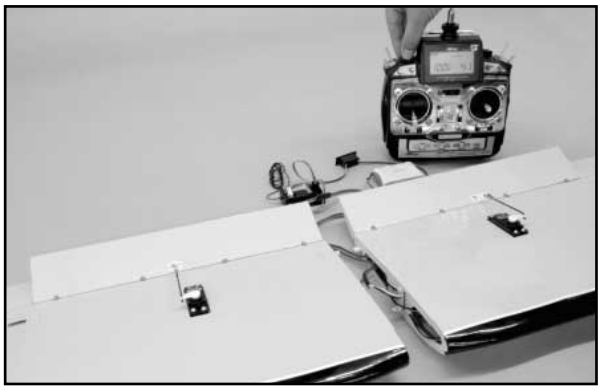


Hold one of the nylon control horns in place at the leading edge of the flap hinge line. Thread the clevis in our out to allow the control horn base to rest flat onto the flap surface with its front edge right at the hinge line. Move the horn left or right as needed to position it in line with the servo output arm. Hold the horn base in this position and use a pencil or sharpened dowel to mark the mounting hole locations for the control horn, onto the flap surface. Repeat this process on the remaining wing panel and flap.



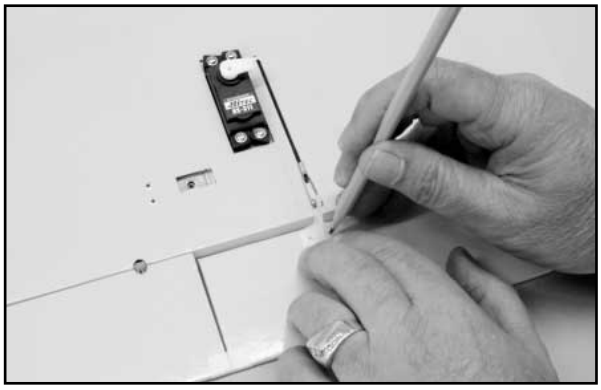
Using a #57 (.043”) dia. bit, drill two parallel and perpendicular holes into the flap at the marks just made, about 3/8" deep. Repeat this on the remaining flap. Because the control horn mounting holes are undersize for the T2.6 mounting screws, use a #39 (.099") bit to open up these two mounting holes in each control horn base. The two flap control horns are now mounted to the flap using the provided T2.6 x 12 mm screws. Remove the tape from the top sides of both panels to free the flaps.

The transmitter can now be used to test the flaps. If necessary, adjust the clevises to neutralize the flaps at zero, or no-flap. Now test the flap movement with the transmitter. Use the End Point Adjustment (EPA) feature in your transmitter to cut the flap servo throw down to the maximum suggested 30° angle (1-7/32" total movement). Reinstall and tighten the flap servo output arm screws.



❑ 9) The aileron servo linkages are now installed. Remove the servo output arm retaining screws. Attach the aileron pushrods (2-7/8") to each aileron servo output arm, in the outermost hole location, using the "Z" bend end of the pushrods. Connect a nylon control horn to each clevis, into the second hole from the end. Connect a standard Y-harness to each aileron servo lead at the wing roots. Connect the Y-harness into the receiver and also connect the flap connector in place. Turn your transmitter on and then the receiver. Use a small piece of tape to tape the inboard end of the aileron to the outboard end of the adjacent flap, aligning the aileron in neutral. Now place the output arms back onto each aileron servos, orienting them at 90° to the servo body with their ends facing outboard towards the wingtips. Orient the control horn/clevis ends of the pushrods back to the ailerons.

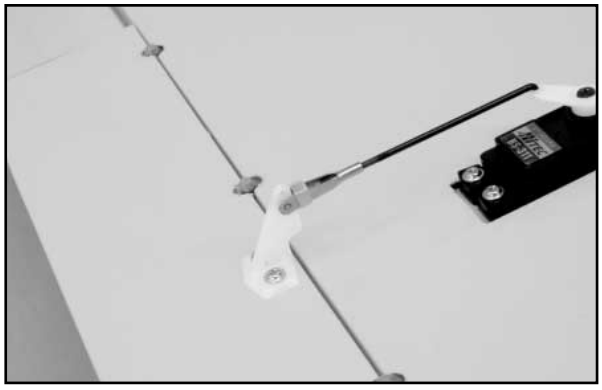
Thread the clevis in or out as needed to position the base of the control horn flat against the aileron surface with its forward edge at the rear beveled edge of the aileron. Move the horn left or right as needed to make the pushrod line-up at a right angle to the servo. Hold the control horn in place on the aileron and use a sharp pencil or pointed dowel to mark the control horn mounting hole locations onto the aileron. Swing the pushrod and horn out of the way and repeat this process on the opposite aileron servo.



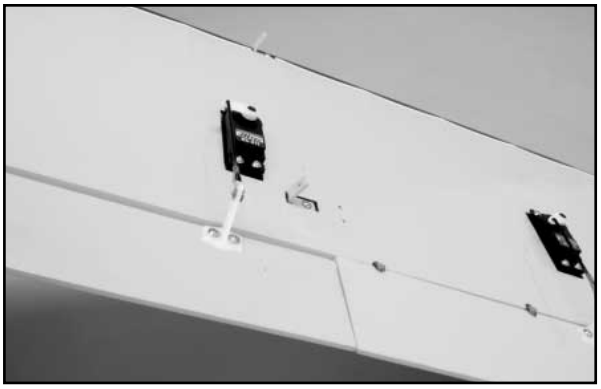
As you did when mounting the flap horns, use a #57 (.043") dia. bit to now drill two parallel and perpendicular into the aileron at the marks just made, about 3/8" deep. Repeat this on the opposite aileron. Use the four remaining T-2.6 x 12 mm screws to mount the control horns in place to each aileron. Remove the tape holding the flaps and ailerons together.

❑ 10) With the transmitter, first test and confirm that the ailerons are moving in the correct directions - right aileron stick movement causes the right aileron to move "up". If they move in the opposite direction, use the servo-reversing feature to change the direction of their movement. Next, the ailerons are centered - be sure that the transmitter aileron trims are at zero. If necessary, adjust each aileron clevis as needed to make both ailerons aligned with the flap. The linkages should now be correctly adjusted. Reinstall the servo output arm retaining screws and turn off the radio system and disconnect the flap and aileron connectors.

We always suggest that you now cut and install some clevis "keepers" for the aileron and flap connections. These are simply 1/8" lengths of large diameter silicon fuel tubing (not included). Slip one of these pieces of tubing over a pair of needle nose pliers and then open the pliers to allow the stretched tubing to fit over one of the clevises. Slide the tubing off the pliers, over the clevis, and back onto the pushrod. Reconnect the clevis to the control horn and slide the piece of tubing back up and over the clevis legs, up to its connection with the horn. Repeat this process with the remaining clevises and pushrods. Doing this ensures that the clevis/control horn connections will stay put.



❑ 11) The four <u>top</u> wing N-strut mounting brackets (two per wing panel) are now installed into the bottom surfaces of top wing panels. These brackets are factory-painted yellow and have "closed" angles bent into them, as shown. Just as we did earlier with the bottom wing brackets, these top wing brackets are installed into the recesses built into the bottom surfaces of the top wing panels. Use four 4-40 x 9 mm round head Allen bolts to install the four brackets, using thread-locking compound on the bolt threads.



❑ 12) As described in Step 2 of the Bottom Wing instructions, use one of the T2.6 x 8 mm PWA screws from Bag #22 to pre-thread the eight (8) rigging bracket holes. Return the screw to its bag for later use.

The top wings are now complete and ready to use in the final assembly steps of this manual.

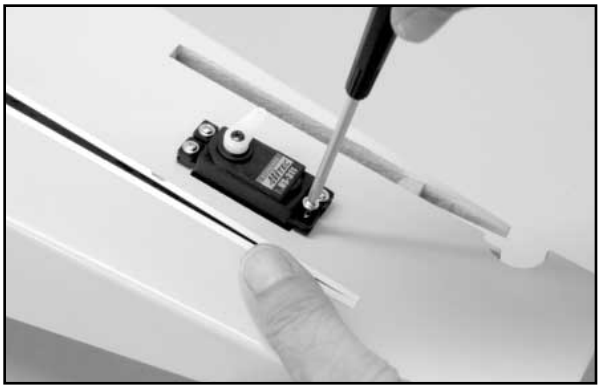
FUSELAGE AND TAIL GROUP ASSEMBLY:

For general access and ease of assembly, as well as the installation of the various required components, we suggest that you remove the top hatch and windshield from the fuselage. Set these parts and their mounting screws aside for now. Also note that the following assembly steps will not have you mounting the main landing gear until after most of the assembly is completed. This is done to make working with the large fuselage a lot easier.

❑ 1) The elevator servo is now installed into the provided opening on the left rear fuselage side. First prepare the servo for installation by installing the rubber grommets and eyelets that came with the radio system. Next, plug a 24" servo extension into the servo lead and secure this connection with a length of heat shrink tubing.

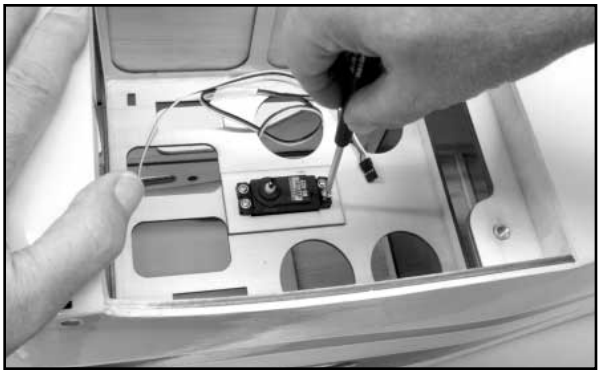
Insert the servo extension through the elevator servo opening at the rear of the fuselage and guide it up to the servo tray area in the cabin. Note that our radio installation in this model will have you mounting the receiver on the bottom of the servo tray area. Therefore, tape the end of the elevator servo lead to the bottom of the servo tray for now.

Insert the elevator servo into its fuselage opening, against the fuselage side. Use a sharp pencil or pointed instrument to now mark the four servo mounting screw locations onto the fuselage side. Pull the servo out of the opening and use a small diameter bit (we used a #58, .042" dia.) to drill the four pilot holes for the servo screws. Reinstall the elevator servo and secure it in place with the four mounting screws.

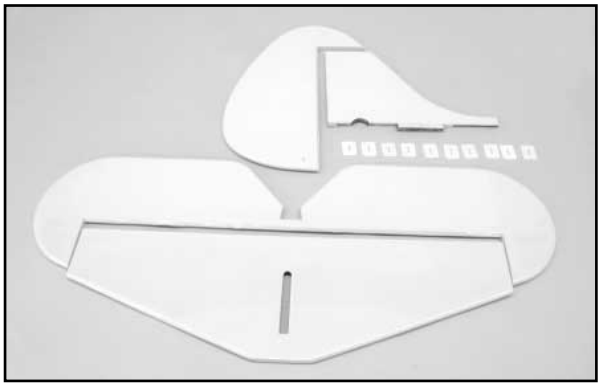


❑ 2) From Bag #17, remove the laser-cut plywood rudder servo mounting doubler. Use 5-minute epoxy to glue this doubler to the bottom side of the servo tray in the cabin, over the center rudder servo opening. Align its inside edges with those of the servo tray and allow the glue to cure.

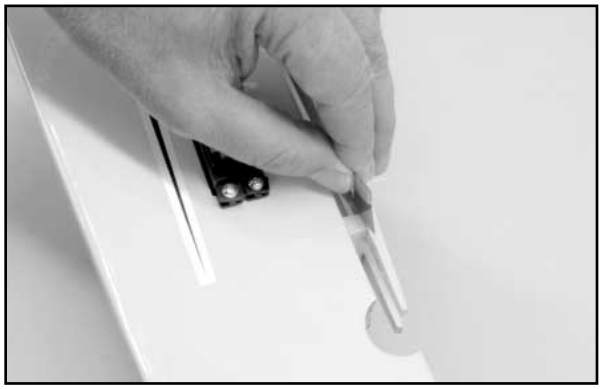
❑ 3) The rudder servo is now installed in the fuselage. Install the rubber grommets and eyelets into the mounting lugs. Turn the fuselage upside down on your bench and place the rudder servo into its opening in the servo tray, as shown. Use a sharp pencil to mark servo mounting screw locations onto the doubler. Remove the servo and use a small diameter bit (we used a #58, .042" dia.) to drill four pilot holes for the servo screws. Reinstall the rudder servo back in place in the servo tray with its head toward the front of the fuselage. Secure the servo in place with four of the servo-mounting screws that came with your radio system.



❑ 4) From the kit contents, locate the vertical fin and rudder and the horizontal stabilizer and elevators. Remove the rudder from the fin and elevators from the stabilizer. Remove and set aside the CA hinges for these assemblies.



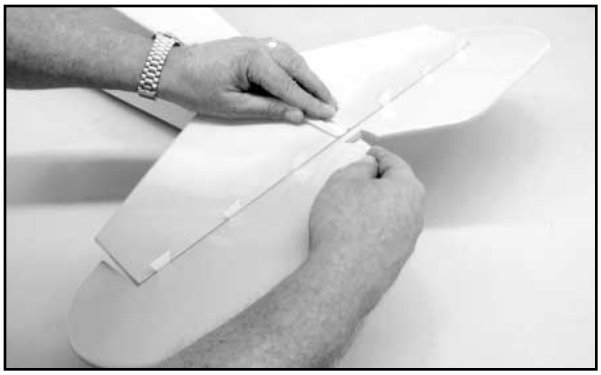
Note that your Waco fuselage was packaged with a factory installed and tack-glued balsa support for the top rear fuselage/ stabilizer fairings. This was done to prevent these fairings from breaking during handling and shipping. This support must now be removed. We suggest using a single-edge razor blade or a hobby knife with a sharp #11 blade. Once the support is removed, carefully remove any excess glue or balsa from the areas of contact.



The horizontal stabilizer is now glued into the slot at the rear of the fuselage. Note that the uncovered center-section of the horizontal stabilizer is the <u>bottom</u> side of this of this surface. We suggest using white glue to the stab in place because it gives you a little time to properly align it to the fuselage and it's also easy to clean up with water. We used SIG Super-Weld liquid resin glue for this job. We also suggest that you bolt the bottom wing in place into the fuselage. Doing this gives you a good visual reference for proper alignment.

Use a scrap piece of balsa to apply the glue to the inside edges of the stabilizer slot. Gently lift the rear ends of the two top rear stabilizer fairings and slide the stabilizer into place. First, center the stab to the fuselage, sliding it as far forward in the slots as possible. Because the bottom tab on the vertical fin keys into the center slot in the stab, insert the fin into its slot in the top rear of the fuselage and into the slot in the stab. What you want to determine is that the fin sits squarely at 90° to the fuselage and stab. Once you're satisfied that the stab is in the correct position, remove the fin and weight or pin the stab in place and allow the glue to dry. Any excess white glue is easily removed with a clean paper towel and water.

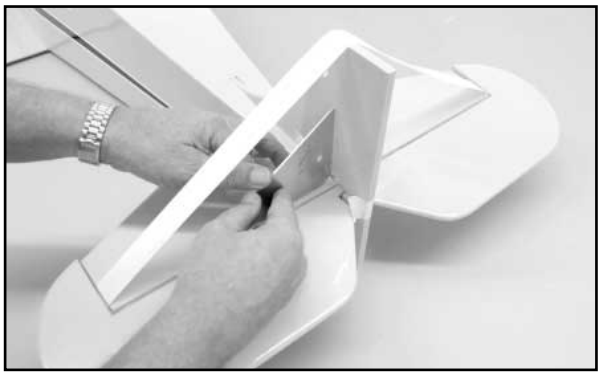
❑ 5) The elevators are now hinged to the horizontal stabilizer, using the hinging methods described earlier for the flaps and ailerons. To do this, insert the six elevator hinges into the slots at the leading edge of the elevators. As before, insert cardboard "wedges" into each of the center hinge slots in each hinge. Starting at one end or the other, gently bend the exposed hinge upwards, and press it into its corresponding slot in the trailing edge of the stabilizer. Move to the next hinge and repeat this process. Continue until all six hinges are started into the slots in the stabilizer. Push the elevators into place against the stabilizer, allowing the center section to rotate down into the rounded opening at the rear.



Center the elevators left and right to the stabilizer, leaving the same amount of clearance space at the outer counter balances.

With the elevators in the proper position, use a piece of tape to hold the elevators at either full up or down. Use thin CA glue with a fine-tip applicator to glue each hinge as described earlier with the flaps and ailerons. Remember to apply four drops of glue to each side of the slot in each of the hinges and then turn the model, hold the elevators in the opposite direction and repeat this process on the other side of each hinge. Remove the tape, returning the elevators to neutral. Allow at least 10 minutes before flexing the elevators to free their movement.

❑ 6) The vertical fin is now glued in place into its slot at the top rear of the fuselage and into the center slot in the horizontal stabilizer. Again, we suggest that you use white glue for this step because it allows time to position the fin correctly. Use a 90° triangle, held against the top surface of the horizontal stabilizer to make sure the fin is truly perpendicular. Also, be sure that the trailing edge of the fin is aligned exactly with the tailpost of the fuselage - this is the hinge line for the rudder. Use a length of tape, extending from the tip of one side of the stab, over the top of the fin and down again to the opposite side of the fin to hold the fin in this 90° perpendicular position. It is also suggested that you view the model from the front and rear, making sure the fin is visually aligned. Any excess glue is easily removed with a clean paper towel and water. Allow the glue to dry.



❑ 7) With the stabilizer and elevators and the vertical fin permanently in place, unbolt the bottom wing and set it aside. In this step, the elevator control horn is mounted in place to the leading edge of the left inboard elevator. From the kit contents locate one of the three remaining nylon control horns, its nylon base, two M2 x 15 mm Phillips Head bolts and the 3-3/8” elevator pushrod with the clevis in place.

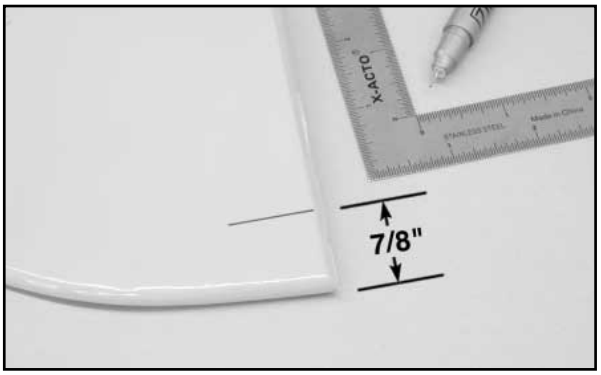
Turn the fuselage over, upside down on the bench. Plug the elevator connector into the receiver elevator receptacle and connect the switch harness and battery pack to the receiver. Turn the transmitter on, followed by the receiver. Check the elevator servo for correct movement when the elevator stick is used. If necessary, reverse the servo movement. Attach the Z-bend end of the elevator pushrod to the outermost hole in the output arm and attach the clevis end of the pushrod to the outermost hole in the nylon control horn. Reposition the output arm back on to the elevator servo, orienting it to point straight up towards the stabilizer. Reinstall the output arm retaining screw. Use a small piece of tape to hold the elevators in neutral to the stabilizer. Place the base of the nylon control horn onto the inboard leading edge of the left elevator half. Thread the clevis in or out as needed to position the base of the control horn flat against the elevator surface with its very front edge aligned with the chamfer line on the elevators. Holding the horn base in this position, use a sharp pencil to mark the location of the two mounting holes onto the elevator surface.

Rotate the control horn and pushrod out of the way. Use a #47 (.078” dia.) bit to drill two clearance holes for the M2 horn mounting bolts, completely through the elevator at the marks just made. Rotate the control horn and pushrod back into position and install the control horn to the elevator using the two M2 x 15 mm

bolts. Insert the bolts through the horn and elevator and use a small Phillips screwdriver to thread each exposed bolt end into the nylon control horn base on top of the elevator.. Tighten this assembly to secure it in place. Remove the piece(s) of tape holding the elevators in neutral. Excess bolt ends above the nylon base should be clipped off and ground smooth.

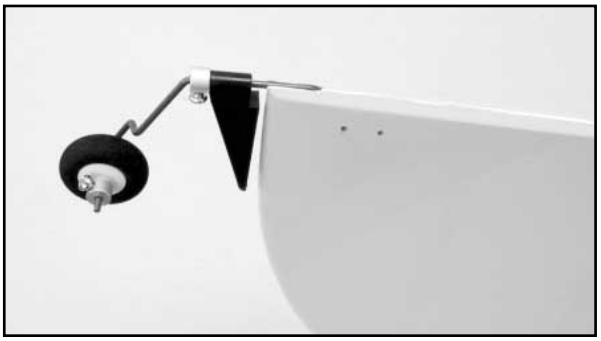
Elevator movement can now be tested using the transmitter. Be sure the elevator channel has zero trim inputs. If necessary, adjust the clevis to bring the elevators to neutral with the stabilizer. Once you're satisfied, turn off the switch, unplug the elevator servo, and switch from the receiver and turn off the transmitter.

❑ 8) With the rudder not yet hinged, this is an ideal time to pre-drill the two required mounting holes for the two nylon rudder control horns. To determine the positioning of the control horns, measure 7/8" up from the bottom front leading edge of the rudder and mark this point with a non-permanent fine line marker. Hold the rudder's leading edge on a flat surface and use a 90° triangle to draw a line from the leading edge aft - about 1" or so. Place the rudder on a flat surface and measure back 3/8" from the very front leading edge of the rudder, at the line just drawn and mark this location with the marker. This is now the location for the bottom control horn mounting hole. Now place the control horn over this mark, centering its bottom hole over the mark just made. Use the marker to now mark the location of the top mounting hole. Set the control horn aside.



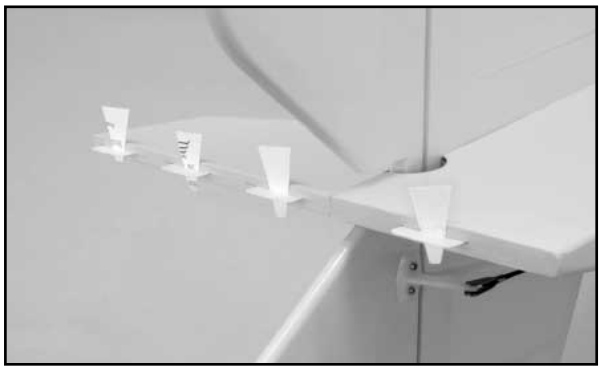
Drill two parallel clearance holes completely through the rudder at the two mounting bolt locations just made. We suggest using a drill press and a #47 (.078" dia.) bit to drill these two holes.

❑ 9) From the kit contents, locate Bag #19, containing the tailwheel assembly. Note that the top 90° bend in the tailwheel wire assembly fits into the pre-drilled hole at the bottom leading edge of the rudder. Note that the rudder also has a pre-cut "channel" below this hole to accept the tailwheel wire above the mounting bracket. Trial-fit the tailwheel wire into the bottom leading edge of the rudder at this time. It may be necessary to deepen the channel a little more to fully accept the tailwheel wire, making it flush with the hinge line. This can be done with a small file or a hobby knife with a #11 blade.



Once the wire fits fully into the rudder, it is glued in place. We suggest using 30-minute epoxy for this job. Use a small dowel or toothpick to apply glue fully into the hole in the rudder and then into the channel. Insert the tailwheel wire fully in place, pressing it flush with the hinge line. Use your fingertips to feather the glue around the wire in the channel and then remove any excess glue with alcohol and a paper towel. Allow the glue to cure.

❑ 10) The rudder is now hinged to the trailing edge of the fin and the tailpost of the fuselage. Press each hinge into the trailing edge of the fin and tailpost and use the card wedge method to center them. Slip the rudder onto each of the four hinges, pressing it fully in place against the fin and fuselage. Now check the fit of the tailwheel bracket against the bottom rear of the fuselage and the clearance between the top rudder balance and the top of the fin. If necessary, "tweek" the tailwheel wire with pliers, allowing the bracket to rest flat against the bottom of the fuselage.



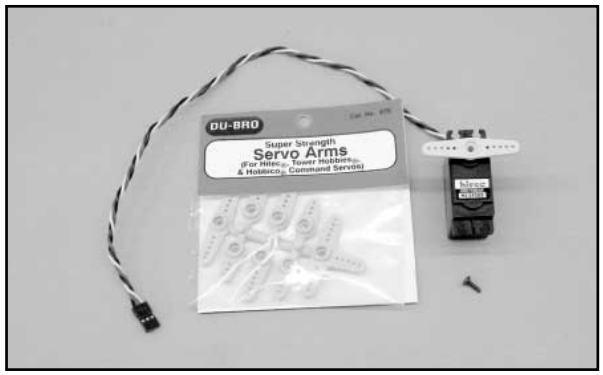
With the rudder and tailwheel bracket now fitting correctly, swing the rudder fully in one direction or the other and hold it in this position with a piece of tape. Remove one of the card wedges in one of the hinges and apply four drops of thin CA glue to the hinge above and below slot. Remove the card wedge from the next hinge and repeat this process. When all four hinges have been glued, remove the tape holding the rudder and flex it fully in the opposite direction, again using tape to hold it in this position. Turn the airplane over and again apply CA glue to each exposed hinge on the opposite side of the rudder and fin. Remove the tape and return the rudder to its neutral position. Allow about 10 minutes for the glue to fully wick through the hinges and surrounding wood.

After sufficient time has passed, briskly flex the rudder left and right to free up its movement. Any excess glue can be removed with SIG Debonder.

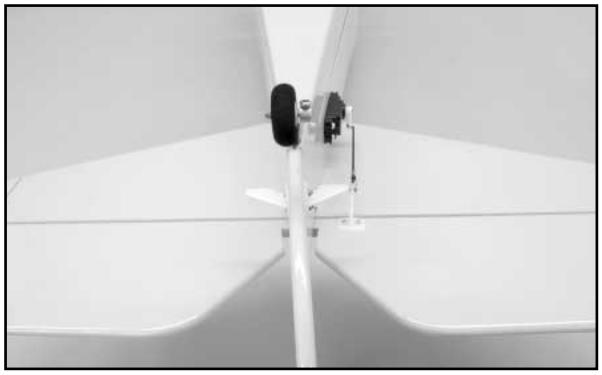
❑ 11) The tailwheel mounting bracket is now mounted in place to the bottom rear of the fuselage using the three provided T2.6 x 10 mm Phillips head screws. Visually center the bracket in place and use a sharp pencil to mark the mounting hole locations onto the fuselage. Swing the bracket out of the way and use a #58 (.042" dia.) bit to drill three pilot holes at the marks just made. Use a small Phillips screwdriver to mount the tailwheel bracket firmly in place to the fuselage.

Modeler's Note: In the next 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 servo output arm and the control horns. Simply stated, the goal is to create a true rectangle, where the two long sides are the parallel pull-pull cables and the two shorter ends are the servo output arm and the rudder control horns. In the case of the Waco, the two opposing control horns, when in place on each side of the rudder, have a distance of 2-1/8" between each horn's outermost linkage holes. Therefore, it becomes necessary to find a servo output arm for the rudder servo that has this same approximate distance.

Because typical standard servos do not come with output arms this large, it is necessary to either fabricate one or find an aftermarket output arm that comes as close as possible. Fortunately, Du-Bro makes such output arms. These are called their "Super Strength Long Servo Arms". For our Hitec servos, we used the Du-Bro #672 arms - note that Du-Bro produces these output arms for all servo brands.

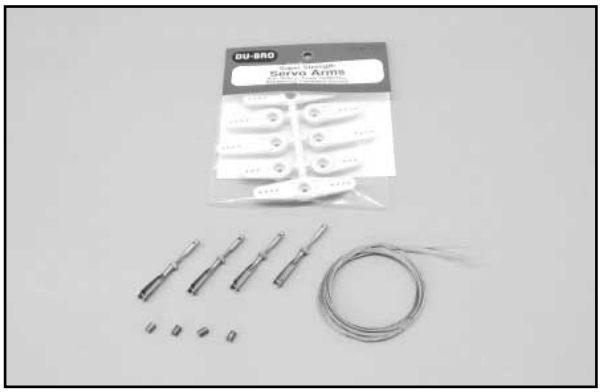


❑ 12) The two nylon rudder control horns - one on each side of the rudder in mirror image - are now bolted in place using the two M2 x 13 mm Phillips head bolts and the two M2 nuts packaged in Bag #21. As always, we suggest using a thread-locking compound to secure the nuts and bolts firmly.

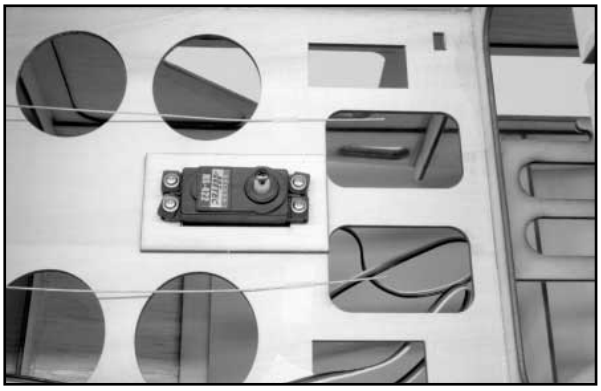


❑ 13) From Bag #21, remove the following parts:
4 each Threaded Rigging Couplers with Clevises in place
4 each Copper Swage Tubes
2 each Nylon Coated Pull-Pull Cables

In addition to the above kit parts, you will also need an appropriately sized servo output arm for your rudder servo, as described above in the boxed Modeler's Note.

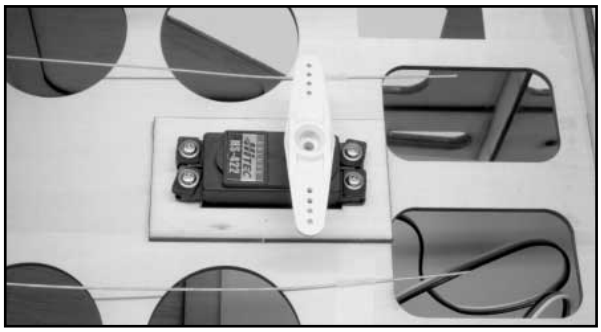


a) Unroll and separate the two nylon coated pull-pull cables. Insert one end of one of these cables into the pre-installed exit at the rear of the fuselage. Feed the cable through the fuselage, up to servo tray in the cabin area, taking care to avoid the elevator servo extension cable. Tape the cable end in place anywhere near the rudder servo. Also tape the rear end of the cable to the fuselage side for now. Repeat this process with the remaining pull-pull cable on the opposite side of the fuselage.



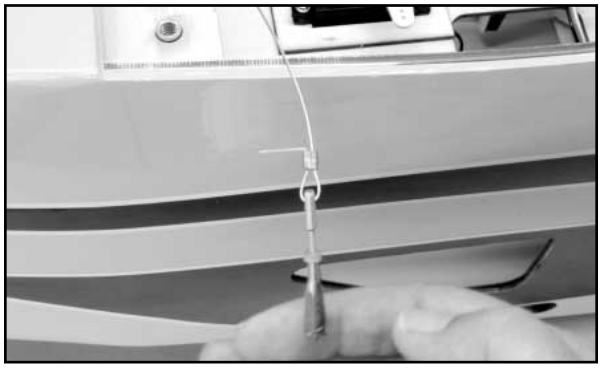
b) The rudder servo must now be neutralized, with the transmitter rudder trim also in neutral. Plug the rudder servo lead into the correct rudder channel in the receiver, followed by the switch and airborne battery pack. Turn on the transmitter and then the receiver. First determine that the servo is moving in the correct direction. If it isn't, use the servo reversing function in your

transmitter to correct this. Now fit the rudder output arm onto the servo, aligning it at 180° to the servo body. If it will not fit at the 180° position, try reversing it on the output shaft. If necessary, use the transmitter "Sub Trim" function to achieve the correct positioning.

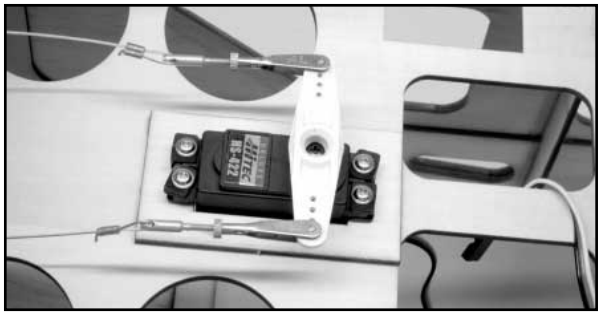


With the servo arm now seated correctly and with the servo moving in the correct direction, the pull-pull cables are now attached to each side of the output arm.

c) Remove one of the taped cable ends from the servo tray. Slide a copper swage onto the cable end, holding it with your fingers and then thread the end of the cable through the small hole in one of the rigging couplers. Loop the end of the cable back through the copper swage. Leaving about 1/2" of cable end exposed at the copper swage, firmly bend the cable end at right angles to the swage. Now pull the cable through the swage, closing the loop with the rigging cable to within about 3/8" or so away from the swage. Use a crimping tool or a pair of needle nose pliers to firmly crimp the swage at its middle, securing the cable loop. Use wire cutters to remove the excess exposed cable (earlier bent at 90°) at the swage, leaving about 1/16" or so. Repeat this process with the remaining cable for the opposite side of the output arm.



Install the clevis ends of the two rigging couplers onto the correct sides of the output arm, one in each outermost end and install and tighten the output arm screw into the rudder servo. Turn off the receiver and transmitter for now.



❑ 14) The final pull-pull rudder connections are now made at the two rudder control horns. Use a piece of masking tape at the leading edge of the fin and rudder to hold the rudder in neutral to the fin. Turn the radio system on and turn the fuselage over, upside down on your work surface.

Center the metal R/C links on both threaded pull-pull fittings, leaving equal amounts of adjustment in either direction and tighten the knurled nut firmly against the clevis. Slide a brass swage tube onto one of the pull-pull cable ends. Thread the end of the cable end through the small hole in the rigging fitting and then thread the cable end back through the copper swage tube. Connect the clevis to the outermost hole in the corresponding nylon control horn. Pull the loose end of the cable taut and slide the swage tube back toward the pull-pull fitting, to within about 3/8" or so. Test the cable with finger pressure. The idea is to set the cable straight, without being too tight. Use a crimping tool or needle nose pliers to firmly crimp the swage tube at its center. Repeat this same procedure with the opposite pull-pull cable.

Remove the piece of tape holding the rudder to the fin. Check the rudder's position with the fin - it should be in neutral. If not, adjust the metal clevises as needed to set the rudder at neutral. Test the action of the rudder with your transmitter - it should move smoothly. With the fittings now adjusted and set, tighten the knurled nuts on each of the pull-pull fittings firmly against the metal clevises. Bend the excess cable in front of both swage tubes firmly to 90° and trim off the excess cable using wire cutters, leaving a 1/16" or so. Turn off the receiver and then the transmitter and disconnect the rudder servo cable from the receiver.

As recommended with all clevis-to-control horn connections, short lengths of silicon fuel tubing should be placed onto each clevis as a retainer.

ENGINE AND FUEL TANK INSTALLATION:

The following steps will show the installation of a Saito 1.00 four-stroke engine, mounted in the inverted position. To make the initial fitting of the engine to the mounts more convenient, remove the muffler, header pipe, and needle valve for now.

IMPORTANT NOTE: The motor mounts provided with the Waco SRE ARF kit are of excellent quality and designed to work well with 2-stroke engines up to 1.20 displacement 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.

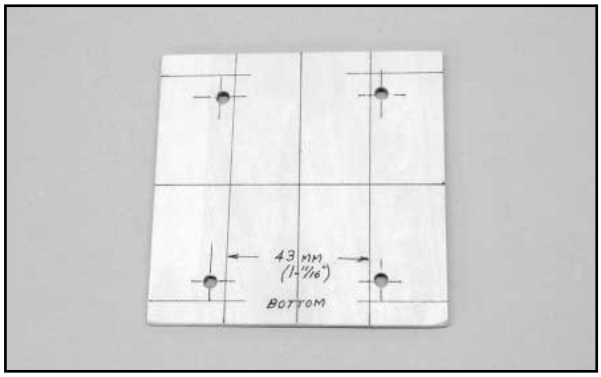
❑ 1) From the kit contents, locate Bag #18 containing the motor mount assembly parts. In addition, you will need the engine mounting bolts, lock nuts, and flat washers (not included) for your particular engine. In the case of the Saito 1.00, shown in the following steps, we used 8-32 x 1-1/4" Allen Head bolts, #8 flat washers, and 8-32 lock nuts for this purpose.

The first step is to properly mount the engine itself to the motor mount arms. An easy and accurate way to do this is to temporarily mount the two motor mount arms onto a scrap piece of 1/8" lite-ply, cut to a 3-1/2" square. Doing this ensures that the back faces of both mounts are truly flat in relationship to each other and the engine when it is eventually mounted in place to the firewall.

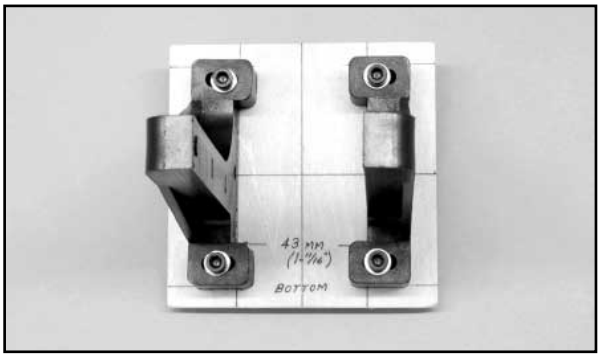
Prepare the scrap piece of plywood with accurate horizontal and vertical centerlines, using a pencil and a triangle. Next, measure the width of the engine case. For reference, our Saito 1.00 has a stated case width of 43 mm (1-11/16"), according to the engine manual. Once you know the case width of your engine, divide that number in half - again, in the case of our Saito, that number is .8465". Mark this dimension on each side of the vertical centerline on the scrap plywood piece and use a triangle to draw these two lines. These two lines become the vertical mounting reference lines for the inside faces of the two motor mounts.

❑ 2) Next, the horizontal positioning of the motor mounts is established. The overall height of the motor mount base is 2.937", so round this off to 3". As we did in establishing the vertical mounting location in Step 1, divide this number in half - 1-1/2" - and make a mark at this measurement on each side of the horizontal centerline. Use a triangle and pencil to now draw lines onto the scrap plywood at these marks. With the exception of the four mounting bolt holes, all of the information needed to accurately position and mount the two motor mount arms onto the scrap piece of plywood is now in place.

Note that the two motor mount arms have oblong mounting holes. These allow the mount arms to be adjusted as needed on the firewall. When drilling the four mounting holes, use the center of the oblong holes to allow a little movement in either direction. Drill the four motor mount holes through the plywood, using a 3/16" dia. bit.

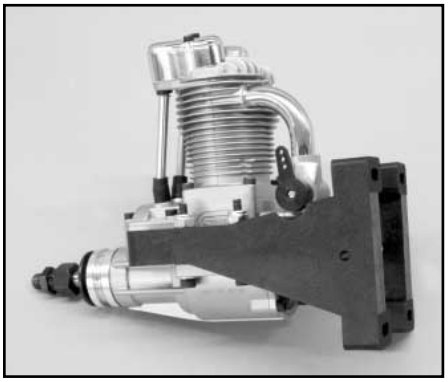


Temporarily install the motor mount arms to the piece of plywood, using the bolts, washers and blind nuts provided (thread the blind nuts onto the bolts backwards, with the flat base against the plywood). Just hand-tighten the hardware for now. Note that because the engine will be mounted in the inverted position, the motor mount arms are oriented with the larger of their two webs towards the top.



Slide the motor mount arms left or right to align them accurately to each side of the vertical centerline. Once in position, use an Allen wrench to tighten the bolts just enough to lock the arms in place. Put the engine onto the motor mount arms. Using a ruler, adjust the engine on the mounts to locate the face of its prop hub at 5-7/16" from the face of the scrap piece of plywood. Hold the engine in this position and use a drill bit in each of the engine's mounting lug holes, marking their centered positions onto the motor mount arms. Remove the engine and then the motor mount arms from the piece of plywood.

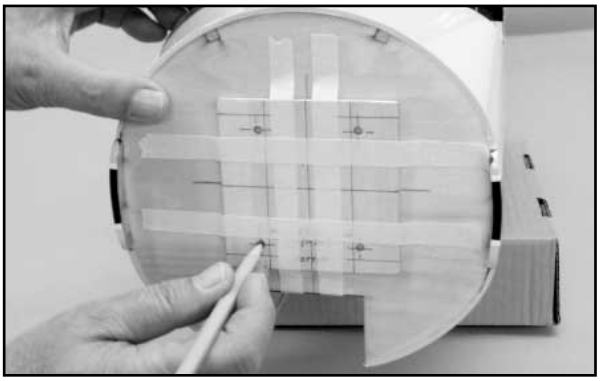
Modeler's Note: Some engines may require slight modifications to the motor mounts in order to make them fit properly. For example, our Saito 1.00 required us to use a Dremel® Tool with a drum sander bit to chamfer the left mount arm to achieve clearance for the throttle arm and the carburetor body. The Dremel® Tool makes this quick and easy to do and ensures a good fit to the motor mount arms. *Only* remove enough material to achieve the required clearance and fit.



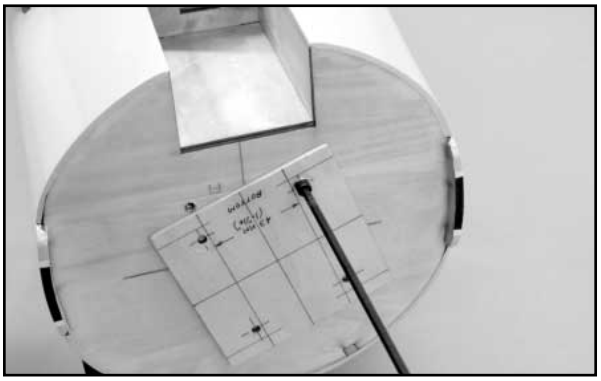
❑ 3) The engine mounting bolt holes are now drilled through the two mount arms. These four holes should be *clearance* holes for the bolts you intend to use. For example, using the Saito 1.00 engine shown here, we used 8-32 x 1-1/4" socket head bolts. For 8-32 bolts we used a #19 (.166" dia,) bit to drill the proper clearance holes. If you are careful, it may be possible to drill these holes by hand, using a power drill. However, using a drill press to drill these holes ensures that they are correctly placed and drilled truly perpendicular to the motor mount arms.

❑ 4) The 3-1/2" square piece of plywood used in the earlier steps has now become a very accurate pattern that is used to accurately locate the four required motor mount holes onto the fuselage firewall. Hold the pattern against the firewall and line-up its horizontal and vertical centerlines with those on the firewall. Note that the horizontal and vertical locating lines on the firewall appear to be offset and they are. This is because these two lines take into consideration the 2° of right thrust and the 2° of down thrust built into the fuselage.

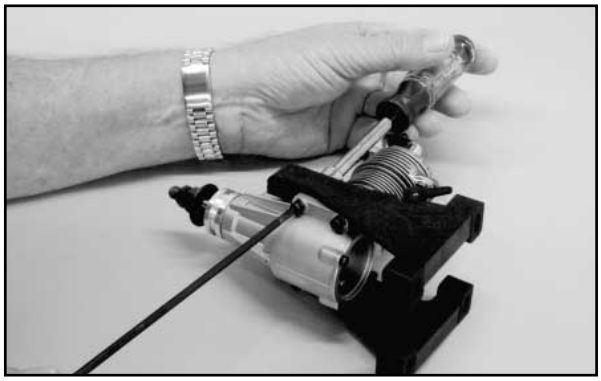
Securely tape or hold the pattern firmly in place with the centerlines aligned with those on the firewall. Use a pencil to clearly mark the four hole locations onto the firewall. Remove the pattern and use a 7/32" dia. bit and a power drill to drill the four mounting holes completely through the firewall at the marks just made.



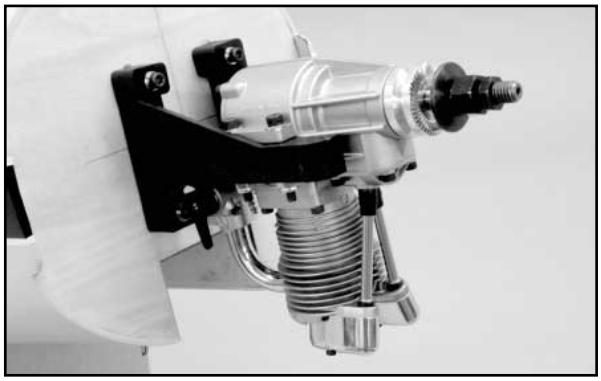
❑ 5) From the kit contents, locate Bag 18, Sub Bag A. The four 8-32 blind mounting nuts are now installed and glued into the backside of the firewall. This can be made easier by first threading the backside of one of the blind nuts partially onto the end of a lightly tapered 14" length of 1/8" dia. dowel. Apply a little 30-minute epoxy to the splined face and barrel of the blind nut. Feed the dowel through the bottom wing saddle, to the firewall and then into one of the drilled holes. From the front side of the firewall, insert one of the 8-32 bolts and washers through the plywood pattern and then through the corresponding hole in the firewall. Engage the threads of the blind nut being held in place and begin threading it in place. Keep pulling back on the bolt, holding the blind nut against the firewall, while threading it fully in place. Use an Allen wrench to continue tightening the bolt, pulling the blind nut fully into the backside of the firewall. Remove the bolt and repeat this process to install the remaining blind nuts.



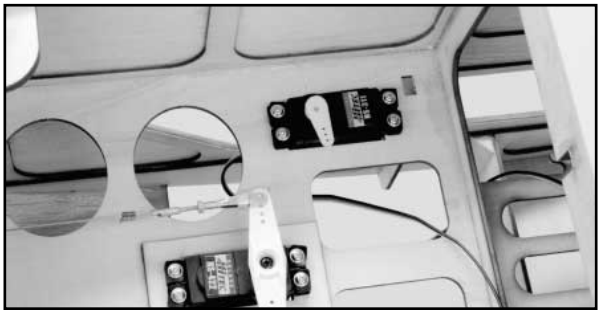
❑ 6) Temporarily mount the engine to the two motor mount arms, using your own hardware (again, we suggest socket head hardened steel bolts with washers and lock nuts, as shown). Because the engine will have to be removed in the following steps, don't tighten the bolts yet - just enough to get the engine sitting firmly in place on the motor mount arms.



Apply a little threadlock compound to each of the 8-32 x 25 mm mounting bolts. Slip a split ring washer and a flat washer onto each mounting bolt. Hold the engine/motor mount assembly in place to the firewall and install each bolt in place to hold the assembly to the firewall. Allow enough play in the bolts to be able to slide the motor mount arms left or right, as needed, to center the motor mount bases to the firewall. When everything looks about right, firmly tighten the bolts.



❑ 7) The throttle servo is now installed into the servo tray in the cabin. Like the rudder servo, the throttle servo is installed upside



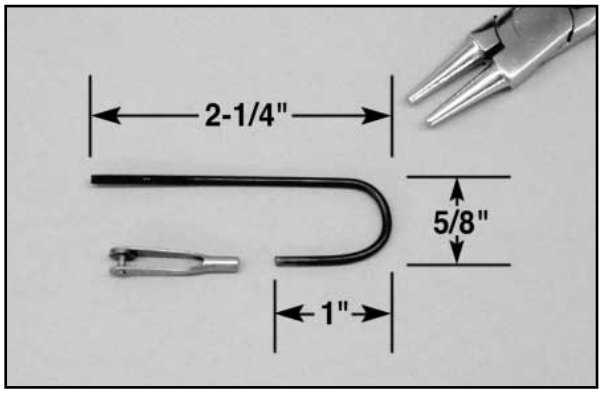
down in the servo tray with its output arm facing inward towards the center of the cabin, as shown. This servo is installed into the opening that is on the same side as the carburetor throttle arm. Prepare the throttle servo by first installing the rubber grommets and eyelets into its mounting lugs. Place the servo into its opening in the servo tray and mark its mounting hole locations onto the tray with a sharp pencil. Remove the servo and drill four small pilot holes for the mounting screws. Using the servo mounting screws that came with your radio system mount the servo in place.

Now is the time to test the throttle servo for correct movement, using the radio system. Plug the servo into the throttle channel in your receiver. Turn on the transmitter and then the airborne system. You want to first check the servo to be sure that it's moving correctly, providing low and high throttle movements that correspond with the engine throttle barrel. Next, the servo output arm should be repositioned as necessary to provide equal back and forth movement. With these issues now addressed, turn off the radio system.

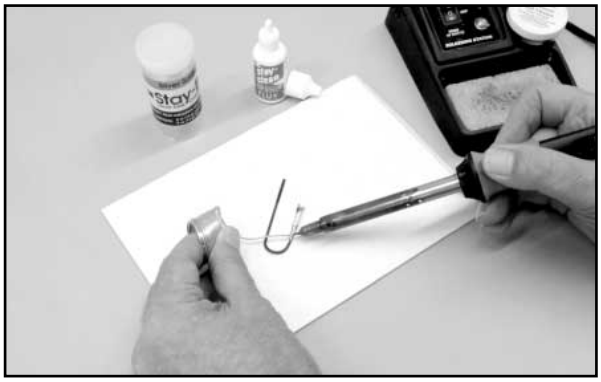
❑ 8) With the engine temporarily in place on the mounts the mounts in place on the firewall, the throttle linkage connecting the carburetor throttle arm and the throttle servo can be made.

Our Saito 1.00 is typical of most 4-stroke engines in that its carburetor and throttle arm is located at the rear of the engine. This usually places the throttle arm very close to the firewall, making a "normal" clevis linkage set-up problematic. Also, because the fuel tank, when in place in the fuselage, sits directly behind the engine, it may obstruct the installation of the throttle tube. With these considerations, we used a reverse link arrangement for our throttle linkage. This installation effectively moves the throttle tube location away from the fuel tank and also provides a better, less curved run back to the throttle servo. To do this, it is necessary to make a pushrod - next to the engine - that reverses the action of the servo at the carburetor throttle arm. This is done by using the supplied M2 x 295 mm steel pushrod (threaded at one end) to create a "U" shaped throttle arm pushrod. From the kit contents, locate Bag #17 and remove the two laser-cut plywood Throttle Tube Mounts. You will also need the remaining throttle linkage parts from Bag #20.

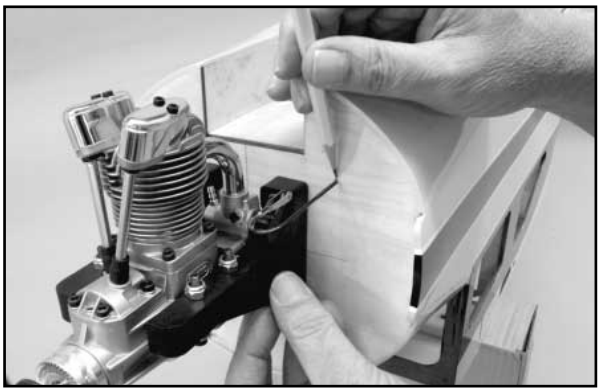
a) Bend and cut the M2 x 295 mm steel pushrod as shown. Note that the dimensions provided are based on our use of the Saito 1.00 engine. Other engine makes may require slightly different dimensions but the concept is the same. (insert Photo #70)



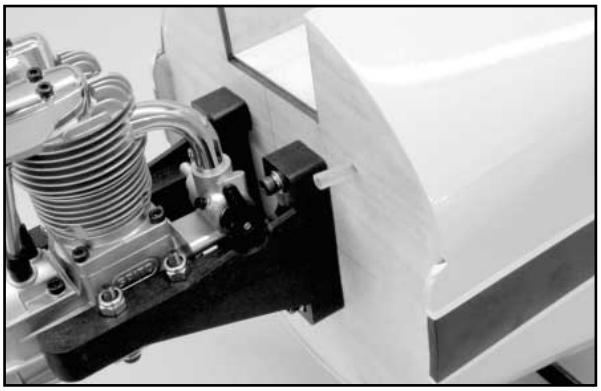
b) Using the M2 solder link clevis, solder the clevis in place to the short, unthreaded end of the pushrod. Note that the clevis is soldered to the wire with its two arms up on edge.



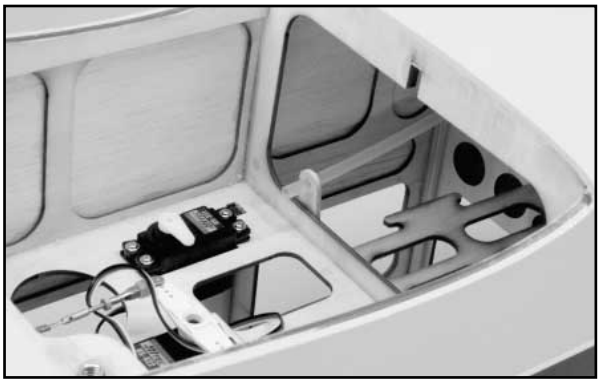
c) Attach the clevis to the carburetor throttle arm at its topmost hole location. Move the throttle arm back toward the firewall and use a pencil to mark the approximate location of the threaded end of the pushrod onto the firewall. This is the location for the required hole in the firewall for the outer nylon throttle pushrod housing. Disconnect the clevis from the throttle arm. Drill a 7/32" dia. hole completely through the firewall at the pencil mark.



d) The outer nylon throttle housing tube is now installed. First, lightly sand the tube with #220 sandpaper to roughen its surface a bit. Insert the tubing into the firewall, feeding it all the way back toward the throttle servo. Using 5-minute epoxy, glue the tube to the firewall, leaving 3/4" of its length protruding from the face of the firewall. Allow the glue to cure.

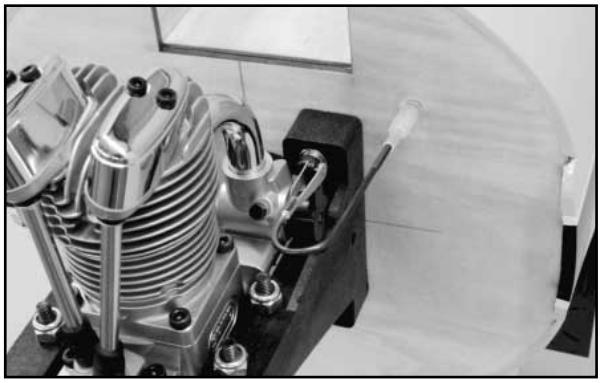


e) From inside the fuselage, slip both of the laser-cut plywood Throttle Tube Mounts onto the throttle tube housing. These mounts are used to direct and secure the throttle tube back to the throttle servo. They are glued in place to the cabin former and servo tray to create a smooth transitional curve back to the throttle servo arm location. Use 5-minute epoxy or thick CA glue to secure these tube in the mounts.



f) The outer throttle tube is now trimmed to the correct length, ahead of the throttle servo output arm, using a single edge razor blade.

g) The inner nylon throttle pushrod is now prepared. First thread the threaded end of the "U" shaped wire pushrod into one end of the inner nylon throttle pushrod. The threads on the metal pushrod should be in place to about one half of their overall length. Insert the opposite end of the inner pushrod tube all the way into the outer tubing at the firewall. Connect the clevis end of the "U" shaped pushrod to the outermost hole in the carburetor throttle arm. Manually check the action of the pushrod in moving the throttle arm fully fore and aft. Make any adjustments needed to create smooth movement.



h) With the throttle pushrod now in place, it is trimmed to its final length at the servo end. With our Saito 1.00, full "low" throttle requires the throttle servo to push the pushrod fully forward. Conversely, full "high" throttle requires the servo to pull the pushrod fully back. Plug the throttle servo into the throttle receptacle in the receiver, turn on the transmitter and then the airborne radio system. Test the throttle servo movement once again with your transmitter. If it moves in the wrong direction, reverse the movement at the transmitter. Now remove the throttle servo output arm retaining screw. Install the M2 threaded clevis with its M2 x 22 mm threaded stud in place into the outermost hole in the servo output arm. Place the arm back onto the servo at the full "high" throttle position - about 45° back from center and also hold the nylon pushrod at the full "high" throttle position. Using a marking pen, mark the nylon pushrod where it will be cut and still accept about 1/4" of the threaded stud. Remove the pushrod and cut it off at the mark just made.

i) Remove the M2 threaded clevis from the servo output arm and remove M2 x 22 mm threaded stud from the clevis. Pull the inner nylon pushrod fully out of the housing tube. The threaded stud is now threaded into the trimmed end of the inner nylon pushrod, about 1/4". Reinstall the pushrod back into its housing tube and reconnect the metal solder clevis to the throttle arm at the carburetor. From inside the fuselage, thread the M2 clevis onto the threaded stud. Reattach the clevis to the servo output arm, again, at its outermost hole.

The completed throttle linkage system can now be tested and adjusted to achieve full high and low throttle settings using the transmitter. This may require repositioning the servo output arm on the servo and adjusting the metal clevis fore or aft on the threaded stud.

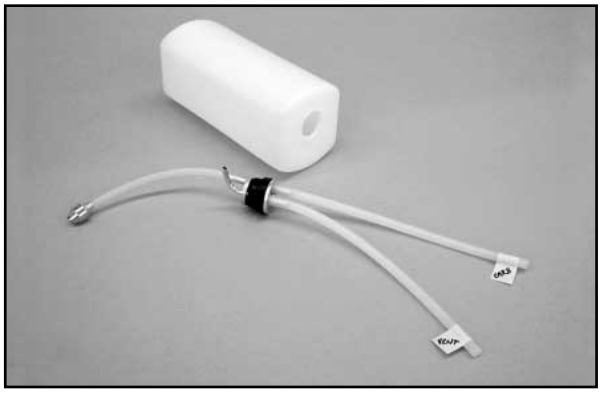
With the throttle linkage now installed and adjusted, it's time to make and install the fuel tank.

FUEL TANK ASSEMBLY:

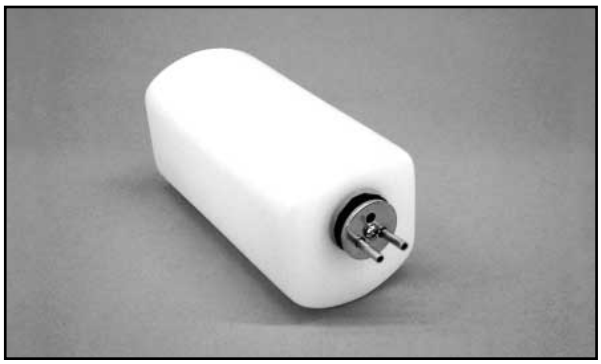
From the kit contents, locate the Fuel Tank Assembly, Bag #16. The 450 cc (15.2 oz.) fuel tank is now assembled. We suggest using a simple two-line fuel delivery system in this airplane. One fuel line is connected to the fuel pick-up or "clunk" line and the engine's carburetor. This is the fuel line that will be used to fuel and defuel the tank. The second fuel line is the overflow or vent line, used when filling the tank. After filling the tank, this same fuel line is then connected to the engine's muffler pressure nipple, providing some manifold pressure to the tank. Note that the rubber stopper for the tank has two holes all the way through it. Use these two holes for the two aluminum fuel lines. Also note that the correct orientation of the fuel tank body in the tank compartment is with its neck "up" in front view.

Gently bend the aluminum overflow tube upward to reach - but not touch - the top of the tank on the inside, leaving about 3/8" - 1/2"of exposed aluminum tubing at the front of the tank stopper. The fuel pick-up aluminum tubing requires no bending. Adjust the length of the internal silicon tubing to allow free movement of the fuel pick-up weight inside the tank, at its rear. Like the overflow tubing, leave 3/8" - 1/2" of exposed tube at the front of the stopper. Insert the stopper assembly into the neck of the tank, firmly seating it to the tank body. Slide two 8" or so lengths of silicon fuel tubing (not included) over the two exposed aluminum fuel lines and identify each of them as "vent" and "carb" with small pieces of tape. Doing

Doing this now avoids any confusion later when connecting the fuel lines to their proper locations on the fueling valve and/or engine.



Secure the stopper assembly in the tank body by tightening the compression bolt in the center of the stopper. Tighten this bolt firmly, causing the rubber stopper to compress and expand in the tank's hole, creating a secure seal around the neck of the tank.



OPTIONAL - FUEL TANK FOR GASOLINE ENGINES:

If you plan to use a gasoline engine in your Waco SRE, then you *must* assemble your fuel tank using gas *compatible* parts. Because gasoline attacks and destroys the typical silicon fuel tubing used for glow engines, as well as the rubber stoppers used in most R/C fuel tanks, these items must be replaced with gasoline compatible parts. Sullivan Products makes a neat "Gasoline/Diesel" Fuel Tank Conversion Kit (P/N 484) for this very purpose. This little package includes a gas compatible stopper, Tygon fuel pick-up tubing and a molded nylon front and rear compression plates. Du-Bro Products also makes a replacement tank stopper for gasoline use (P/N 400) and Tygon fuel line (P/N 799). Note that the Waco SRE fuel tank is usable with either the Sullivan or Du-Bro replacement stoppers. Remember to use only gas compatible fuel tubing for gas engines, such as Tygon.

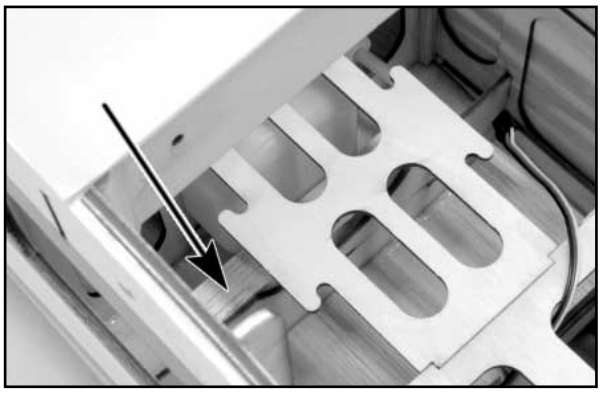
The fuel tank body itself is gas compatible and can be assembled in the same way as described earlier, using a replacement gas stopper and Tygon fuel lines.

FUEL TANK INSTALLATION:

❑ 1) The completed fuel tank is now installed into the nose of the model. As mentioned earlier, the fuel tank has an offset neck. The correct orientation of the tank in the tank compartment is with the neck "up" when viewed from the front. Prepare the tank for installation by first applying a generous bead of silicon sealer around the neck of the fuel tank. For this we use typical bathroom type silicon that comes in tubes, available in most hardware stores.

From the bottom wing saddle opening on the fuselage, insert the tank into the tank compartment. Feed the two silicon fuel lines through the round opening in the firewall, and then push the fuel tank firmly in place against the backside of the firewall. Press the tank firmly, compressing the silicon sealer to make a good seal.

❑ 2) From Bag #17, locate the 9 mm x 12 mm x 90 mm balsa fuel tank retainer. This piece of balsa works as a "wedge" between the bottom rear face of the fuel tank and the plywood sub former just behind it. It may require some trimming to fit correctly. Trial-fit it in place and then remove it for any trimming that may be required. To install it, simply center it and press it in place and then apply thin CA glue along the former/retainer joint. The retainer holds the securely and is also still easy to remove, should the need arise to remove the tank from the fuselage.

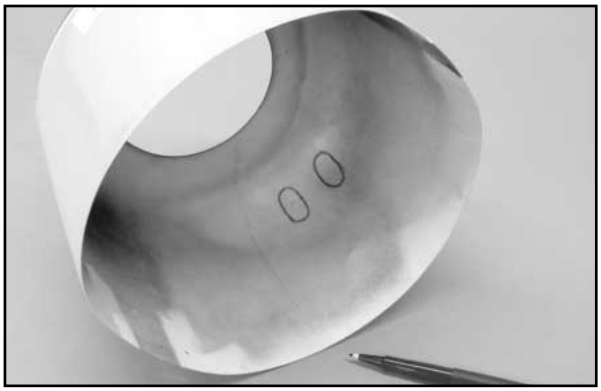


The two labeled fuel lines will be left unconnected for now until the cowl and muffler system is installed in the following steps.

ENGINE, COWL, & MUFFLER INSTALLATION:

The fiberglass cowl is now initially fitted over the engine and onto the fuselage. As received in the kit, the cowl comes with four T2.6 x 8 mm PWA mounting screws in a small bag taped to the larger bag containing the cowl. Locate these screws and have them ready. As mentioned earlier, the muffler, header, and needle valve should be removed from the engine for now.

❑ 1) With the fuselage sitting upright on your work surface, try first fitting the cowl over the engine and back onto the fuselage. In the case of our Saito 1.00, we found that the two valve covers at the top of the engine head prevented the cowl from fitting correctly. This meant that the cowling had to be relieved in that immediate area in order to fit. Hold the cowl in place on the fuselage as squarely as possible, with the black trim stripes aligned on both sides and use a little tape to hold it in this position. Use a fine tip non-permanent black marker to roughly outline the shapes of the valve covers onto the inside surface of the cowl. Remove the cowl and use the marker pen to make these initial lines more pronounced, smooth and connected.



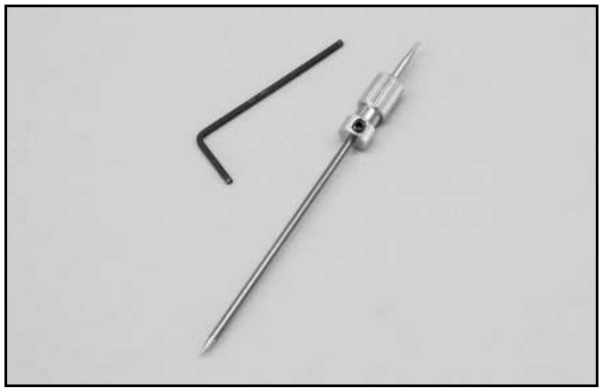
Now that these marks are clearly visible inside the cowl, they need to be transferred to the outside surface of the cowl. To do this we used a small flashlight held inside of the cowl to easily see the marks on the outside surface through the yellow paint. We again used a marker pen to trace these lines onto the outside surface of the cowl. If you don't have a small enough flashlight, use a bare light bulb - it works great.

❑ 2) Using a Dremel® Tool with a tapered sanding bit, carefully create the shaped openings in the cowling at the valve cover marks just made. *Whenever working with fiberglass, always use a facemask and safety glasses!* Do not get carried away and remove too much material, just stay within the lines. Now, refit the cowl over the engine and onto the fuselage. Use the marker pen to now open and refine the relief marks on the cowl. Remove the cowl and again use the Dremel® Tool and sanding bit to open the holes to the marks you just made. Continue this process until you have neatly made the required openings for your engine. The whole idea here is to "sneak up" on these openings, continually checking your work with the cowl in place over the fuselage. Work neatly until the cowl fits nicely, leaving approximately 1/16” - 3/32” clearance all around these openings.

❑ 3) Once the cowl fits nicely in place, use pieces of tape to hold it onto the fuselage. What you want to see is the black stripes on the cowl lining up with those on the fuselage and that, in side view, the stripes are straight. The front of the engine should be nicely centered in the cowl opening. With the cowl held in the position with tape, mark the cowl mounting screw positions onto the fuselage through the pre-drilled holes in the cowl. Remove the cowl and drill pilot holes for the cowl screws at the marks just made. At the center of each mounting hole mark, use a #56 (.046” dia.) bit to drill four pilot holes for the mounting screws. Use a small Phillips screwdriver to now mount the cowl in place to the fuselage. We suggest hardening these holes by removing the screws and using thin CA glue, applied with a small applicator tip, to place a small drop of glue into each hole. Let the glue set and again run the mounting screws in place.

❑ 4) Now that the cowl mounts nicely in place, the engine needle valve requires an extension to exit the cowl. This requires a music wire needle valve extension. Most engines come with needle valves that have holes in their ends and setscrews in place for just such extensions. Our Saito needle valve has this feature with a center hole diameter just large enough to accept 5/64” dia. (.078) K&S music wire. The idea here is to create a perfect sized hole for this extension at exactly the correct place in the cowl when it is in place on the fuselage.

First remove the cowl. Cut a 4" length of 5/64" dia. music wire and deburr the ends. Insert one end of this wire fully into the hole in the needle valve and then tighten the setscrew enough to hold it securely. Thread the needle valve and wire extension fully in place in the carburetor. Lay a straight edge against the fuselage side at the nose, intersecting the piece of wire. Mark this point on the wire with a marker pen. Remove the needle valve from the engine and remove the wire extension from the needle valve. Cut the wire to length at the mark just made. Sharpen one end of this wire to a sharp, tapered point using a Dremel® Tool and a carbide cut-off wheel. Reinstall the unsharpened end of the wire fully back into the needle valve and tighten the setscrew.



Reinstall the needle valve fully back into the carburetor. Mount the cowl to the fuselage with the mounting screws. From the front of the cowl, use a pair of hemostats to begin turning the needle valve out of the carburetor. As the needle valve is turned, the sharpened end of the wire will come into contact with the inside surface of the cowl. Continue turning the needle valve until it is firmly pressed against the inside cowl surface. Place a pad paper over the cowl at the location of the sharpened wire point. Using a tap hammer, lightly tap the paper pad. Removing the pad, you should see a "dimple" formed on the outside surface of the cowl. When you can see this mark, remove the cowl from the fuselage. Use a 3/32" dia.

(.093) bit to drill a hole through the cowl at the dimple mark just made by the sharpened wire. Remove the cowl and remove the needle valve and wire from the engine. Remove and discard the sharpened piece of music wire from the needle valve.

Cut a fresh 4” piece of 5/64” dia. MW and deburr the ends. Install one end of this new wire piece into the needle valve and tighten the setscrew to hold it. Reinstall the cowl back onto the fuselage using the four mounting screws. From the front of the cowl insert the needle valve with the wire in place, wire end first. Guide the wire end through the 3/32” hole in the cowl. Hold the wire end with your fingers. Now locate the carburetor opening for the needle valve and thread the needle valve fully back into the carburetor.

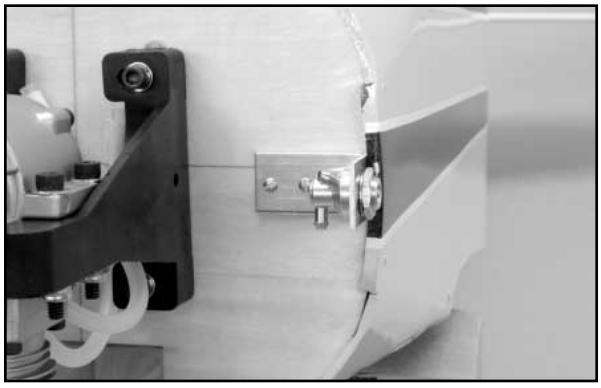
At the outside of the cowl, use a fine tip marker to mark the wire about 1/8” or so away from the cowl itself. Once again, unthread the needle valve and remove it and the wire from the cowl. Use a heavy set of pliers to bend the wire 90° at the mark just made. Use a carbide cut-off wheel to trim the bent end of the wire to a length of about 1/2” or so. You should now have accurately located and usable needle valve extension.

The only other thing that we would suggest is removing the extension from the needle valve and filing or grinding a small "flat" in its surface where the needle valve setscrew contacts it. This allows the setscrew to hold the extension firmly in place without loosening. Remove the cowl from the fuselage and set aside the needle valve and extension for later final assembly.

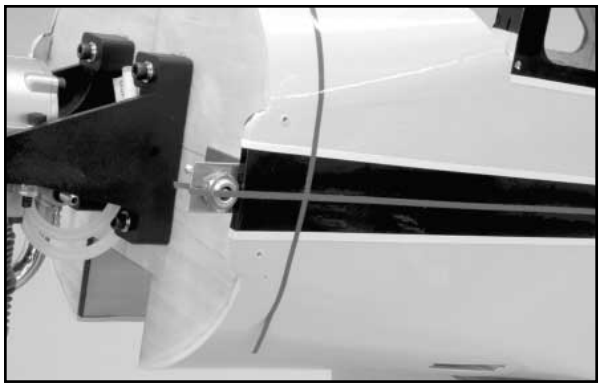
❑ 5) The next item to address is the ability to fuel and defuel the tank. We used and can highly recommend the Du-Bro Kwik-Fill Fueling Valve, P/N 334 and a SIG Fueling Valve Mounting Bracket, P/N SIGSH759.

With the simple two-line fuel system shown in this manual, these two parts create a very neat and efficient fueling system. The SIG Fueling Valve Bracket allows the fuel valve to be mounted to the firewall. This eliminates the need to mount it to the cowl where it could damage the paint or fiberglass by repeated use. As shown, we located our fuel valve on the left side of the cowl, just behind the center of the black trim stripe on the cowl.

a) First, mount the SIG fueling valve bracket to the firewall using the provided sheet metal screws. Next, mount the Kwik-Fill valve to the mounting bracket, tightening it firmly in place.



Lay a piece of 1/16” wide trim tape over the exact center of the valve, in a straight line back along the fuselage to a distance of about 8” or so. This tape will assist in locating the required opening in the cowl for the fueling valve.

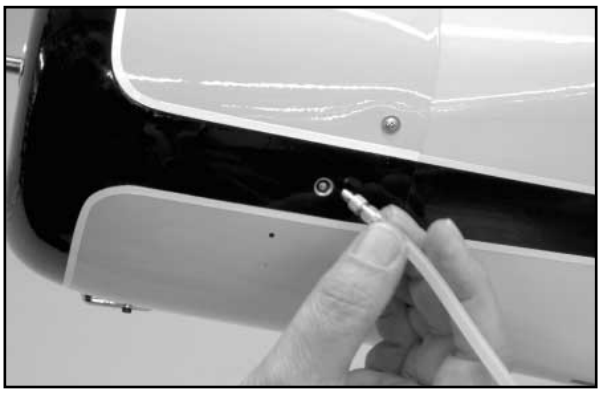


b) Install the cowl back onto the fuselage using the four mounting screws. At the exact rear edge of the cowl in side view, at the black trim stripe, lay another piece of 1/16” trim tape vertically, matching the rear edge of the cowl. Remove the cowl from the fuselage. From the forward edge of the vertical piece of trim tape, measure the distance to the center of the fueling valve and note this measurement on paper (for reference, our

measurement was 1-5/16”). Reinstall the cowl onto the fuselage.

c) Lay a ruler on the side of the fuselage, centered over the trim tape. From the back edge of the cowl, measure forward to the measurement you just recorded. Mark this point on the cowl, using a sharp, pointed instrument. Remove the cowl and at the mark just made, drill a 3/32” dia. hole through the cowl. Remove the trim tape pieces from the fuselage and reinstall the cowl onto the fuselage.

d) You should now be able to see the center of the fueling valve through the small hole just drilled in the cowl. It might be a little off center but this is easily corrected in a moment. The Du-Bro fueling probe that comes with the valve itself, requires a 1/4" hole diameter to fit fully into the valve. Use a pencil and a circle guide to draw a 1/4" dia. hole directly onto the cowl - corrected as needed to adjust for any off center issues. Use a Dremel® Tool with a tapered sanding bit to open up the hole in the cowl to the 1/4" outline just drawn. Mount the cowl and check your work. The fueling opening in the cowl should now be directly over the center of the fueling valve and the fuel probe should fit into and out of it easily.



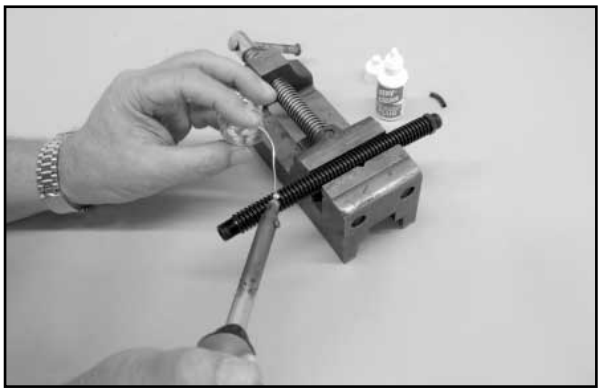
❑ 6) It is at this point that you have to give consideration to any unique cowl opening(s) that may be required for your particular engine and muffler. If you are using a 2-stroke engine with a conventional muffler set-up, you will most definitely have to create openings in the fiberglass cowl for its clearance. These openings should be made carefully and be kept to a minimum. If you are using a 4-stroke engine with a stock header and muffler, you will also have to create an opening for the muffler. Also, consideration has to be given to the glow plug and how you will access it with a glow driver. We suggest planning these openings carefully, marking them with a non-permanent marker and using a Dremel® Tool with sanding bits to make them as neat as possible. If you have chosen to use the Saito 1.00 four-stroke engine, as shown in this manual, the following steps will show you how to completely eliminate the need for muffler openings in the cowl.

❑ 7) For our Saito 1.00 installation, we chose to use a Saito 7” Flex Tube Header - part number: SAI182TD1112.

Our reason for using this part was to neatly and efficiently redirect the exhaust back to the stock muffler that we mounted into the bottom center recessed opening at the nose of the fuselage. We fitted our stock muffler with an aluminum exhaust diverter made by MAC's Products - part number #9114. This diverter holds up to the high heat generated at the muffler by 4-stroke engines. This set-up also maintains the nice lines of the airplane and has proven to be outstanding in our own Waco models. We can highly recommend duplicating it on your own Waco SRE.

Modeler’s Note: We obtained two Saito 1.00 engines for our Waco models and discovered that apparently Saito produced these engines with two different muffler types. One of these muffler types is the constant diameter canister type with its header location squarely at one end and the exhaust outlet squarely at the opposite end. The other muffler type is cast aluminum with a tapered shape. This muffler has a heavily offset header location and its exhaust outlet squarely in the center of the opposite end. The Flex Tube Header installation shown in this manual works with either of these muffler types.

a) As received the Saito Flex Header comes with a pre-installed pressure tap tube, located toward its muffler end. Because we wanted to use the pre-installed pressure tap already in place on the stock Saito muffler, this tube had to be sealed. To do this we trimmed off the pressure tube and filled the small hole with solder, effectively sealing the pipe.

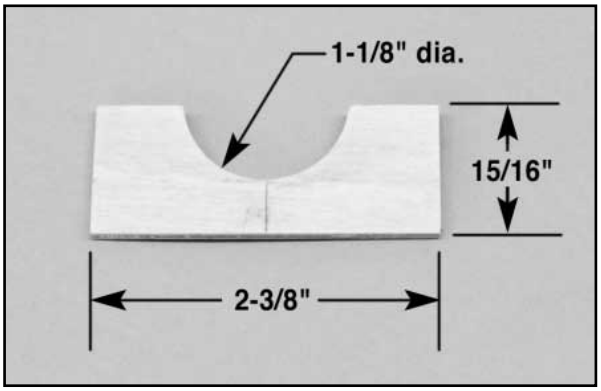


b) Disconnect the throttle linkage and remove the engine from the mount arms. Install one of the header nuts that came with the engine exhaust system and thread it fully in place onto the flex tube header. Thread the header in place into the engine exhaust port and firmly tighten the jam nut, locking the flex pipe in place in the engine.

c) The flex tube header can now be bent into the desired configuration. This tube bends surprisingly well and will hold its shape provided you over-bend it a little. Continue bending the tube and placing the engine back on the mount arms to check your progress. The goal is to bend the tube to clear it from any contact with the cowl and to wind up with the muffler end of the tube aligned with the muffler's header mounting location, with the muffler aimed directly back from behind the engine head. Be patient and periodically check your progress by placing the engine on the mount arms. When the flex tube is bent to about the correct configuration, consideration to mounting the muffler firmly to the fuselage must be addressed.

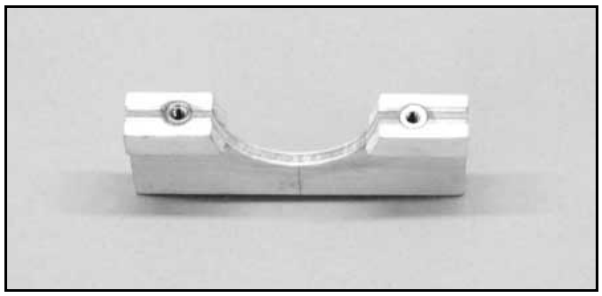
❑ 8) The muffler mount is now made. This is an optional step and is included to illustrate how we accomplished our own mounting system. This muffler mount is basically a scrap piece of 1/8" lite-ply, cut to fit on edge into the recessed opening at the bottom front of the fuselage, behind the cowl. Carefully note that the top of this opening is the fuel tank floor, and therefore no holes should be drilled through it.

a) Using a pencil and triangle, measure, mark, and cut a piece of 1/8" lite-ply to create a rectangle measuring 15/16" x 2-3/8". Use a sanding block to dress the two 15/16" sides until the rectangle fits upright into the recessed opening, uniformly contacting the sides and bottom. Measure and mark the center of the mount (1-3/16") and use a triangle to mark this centerline onto the mount. From the bottom of the mount, measure up 3/8" at the centerline and mark this point. At the centerline, use a circle guide to accurately draw a 1-1/8" dia. half circle, with the bottom of the circle at the 3/8" mark just made (this circle size is just a bit larger in diameter than the diameter of our muffler at the location it will be mounted). Use a jigsaw to now cut-out the half-circle from the former and sand off any rough edges



b) Cut two 2-3/8" lengths of 1/8" x 1/4" spruce. Use 30-minute epoxy to glue one piece of spruce to each side of the muffler mount, at the top where the half circle cut out is widest. Use a vise or weights to clamp this assembly firmly together and allow the glue to cure.

c) Sand the ends of the spruce pieces flush with sides of the mount. With a jigsaw, remove the excess 1/8" x 1/4" spruce from within the half-circle area of the mount. We prefer to use 4-40 socket head hardware for mounting and securing the muffler. With this in mind, we used a pair of Du-Bro #391 4-40 Threaded Inserts and a pair of 4-40 x 1/4" Socket Head Cap Bolts for our muffler clamp. These threaded inserts are installed into the top of the muffler mount, between the two spruce pieces. To do this first drill two 3/16" dia. holes into the top of the muffler mount, locating each hole 1/4" away from the half circle cut out, on each side. Center these holes exactly in the center of the lite-ply and drill them both to a depth of 3/8". Thread a 1/4" socket head cap bolt all the way into each insert. Coat the outer threads of the insert with a little 5-minute epoxy and use an Allen head driver to install both inserts fully into and flush with the top of the mount. Remove the two Allen head bolts and allow the glue to cure.

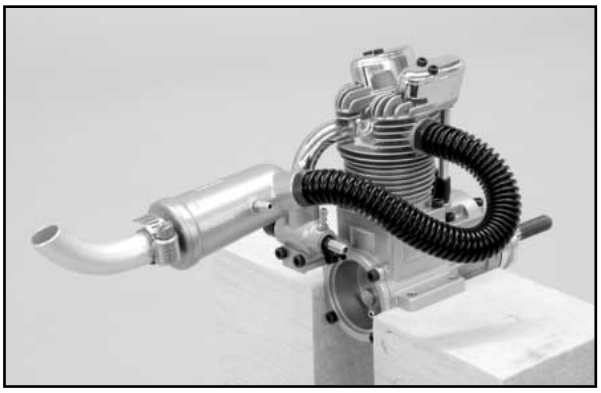


d) A simple aluminum muffler "clamp" is now made from a piece of scrap .03 (1/32") aluminum sheet. Use tin snips to make a strip of this material 1/4" wide x 4" long. Round the corners of one end with sandpaper. From the tip of the rounded end, measure and mark a point at 3/8". Now measure and mark a point in the center of the strip, 3/16" from the end. Drill a hole through this point using a 7/64" dia. bit. At the 3/8" mark, bend the strip 90° to the drilled end "tab". Now bend and form the strip around the muffler body, creating a half-circle shape. Place the muffler into the mount and then secure the drilled "tab" end of the strip to the mount with a 4-40 x 1/4" socket head bolt. Mark a bending location on the opposite side of the aluminum strip, about 3/32" - 1/8" above the mount, where it must be bent to create a second mounting "tab". Remove the aluminum clamp and bend it at 90° at the mark just made. Trim off the excess strip material to leave a 3/8" "tab" length. Drill a hole in center of this tab for the 4-40 mounting bolt, using a 7/64" dia. bit. Clean up and deburr the aluminum clamp with sandpaper.

e) Last, we wanted to cushion the muffler when it is clamped in place into the muffler mount. To do this we slit a piece of heat resistant neoprene tubing lengthwise and placed it over the half-circle cut out, holding it in place with silicon glue. This custom muffler mount is now complete and ready to install into the fuselage. This will take place shortly so the mount handy.

❑ 9) The MAC's Products #9114 aluminum exhaust diverter is now fitted to the exhaust tube on the muffler. This diverter uses a

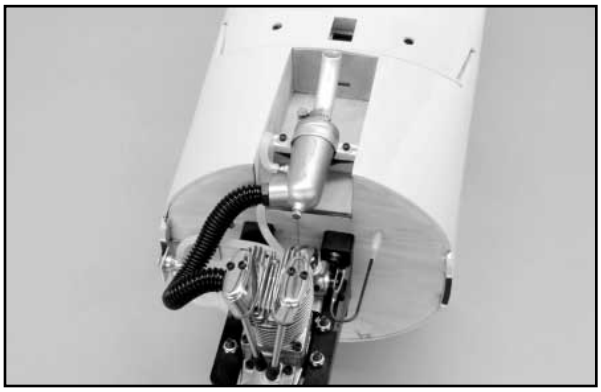
metal hose clamp to hold it in place to the muffler. The diverter itself is slotted at one end, allowing the clamp to compress it firmly to the muffler. Note that in the case of the Saito cast aluminum muffler (described earlier), the small, machined ridge at the end of the exhaust outlet must be removed before fitting the diverter in place. A carbide cut-off wheel makes quick work of this job. Install the diverter in place to the muffler and tighten the clamp just enough to hold it in place. Thread the muffler onto flex tube end and orient the pressure nipple for best access. Tighten the lock nut firmly to the muffler, locking it in place.



The engine, with the header, muffler, and diverter parts in place, is now final-mounted in place to the motor mounts using the recommended socket head bolts, washers and lock nuts. Tighten all bolts and nuts firmly.

❑ 10) The lite-ply muffler mount, made earlier, is now installed into the bottom front recess in the fuselage, using 30-minute epoxy. Make sure the mount is fully in contact with the sides and bottom of the recess and that it is positioned to best accept the muffler body. Allow the glue to cure. Install the aluminum clamp over the muffler and use the two 4-40 x 1/4" socket head bolts - with thread locking compound - to firmly secure the muffler in place.

With the muffler mounted, the exhaust diverter can be oriented on the exhaust outlet, aiming it straight down in relationship to the fuselage in side and front views. Hold the diverter tube in this position and firmly tighten the hose clamp screw, locking the diverter in place. As shown, this makes for a very tidy and very usable exhaust system!



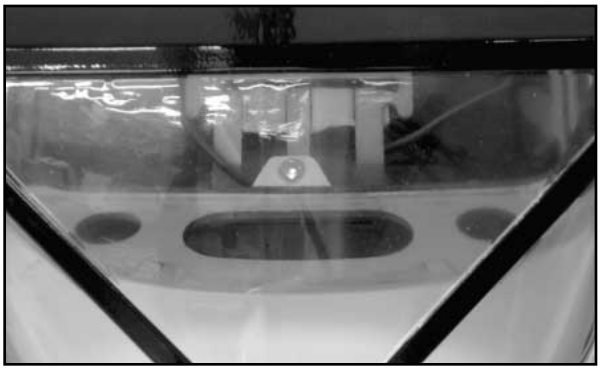
❑ 11) Reconnect the throttle clevis onto the carburetor throttle arm. Make all required fuel tubing connections to the fuel valve and the carburetor. The "vent" line goes back to the pressure nipple in the muffler. When fueling the tank, this line is disconnected for overflow purposes and then reconnected to provide manifold pressure to the tank.

OPTIONAL GLOW DRIVER INSTALLATION:

As mentioned earlier, we chose to install an after-market glow driver system in our Waco models. We decided to do this for several reasons having to do with the elimination of any need for glow plug and glow driver access through the cowl and also for such a system's ability to keep the glow plug lit at lower throttle settings. There are several such systems on the market and we're sure that each of these has their own individual attributes. The system we chose was the MAXX PRODUCTS "*SuperGlow DLX*" - P/N MX9900DX. This system plugs directly into the receiver throttle receptacle and is easy to program through the transmitter. It's also quite small and lightweight. This product comes with everything needed to install and run it, even including its own wall charger for the onboard 1300 mAh sub-C cell that powers the system.

Following the instructions that came with this system, we were able to install it without any real problems. We wrapped the control module in foam sheet and mounted it on the servo tray, just ahead of the airborne battery pack, using two tie-wraps to secure it. Likewise, after wiring the battery, we wrapped the sub-C cell in sheet foam and used a tie-wrap to mount it on the servo tray next to the receiver. The system comes complete with an external charging receptacle for charging the sub-C battery. Because this receptacle is black in color, we mounted it on the left fuselage side, centered within the black trim stripe area, just ahead of our airborne radio system on/off switch. In this location, it is virtually invisible.

This system also incorporates the use of a very small and very intense LED bulb that visually indicates when the system is providing current to the glow plug. This bulb should be mounted in a conspicuous location, allowing it to be easily seen. We mounted this bulb inside the fuselage at the top center of the forward cabin bulkhead. This location lets us see it easily through the windshield, even on the brightest of days.



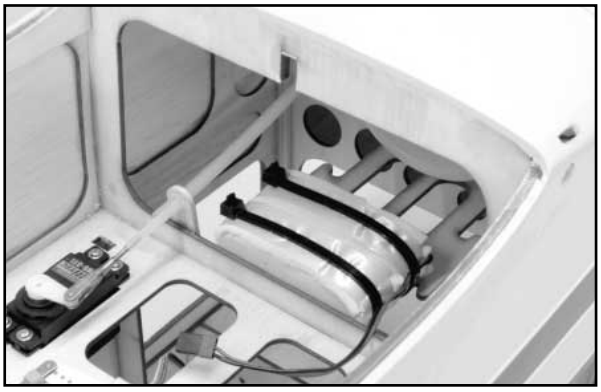
As shown, this installation requires a small hole to be drilled through the firewall to provide an opening for the glow plug connector wire and the ground wire. We secured our ground wire connector to the closest rear engine mounting bolt, using a metal connector crimped and soldered to the end of the wire.

After using the MAXX Products MX9900DX system extensively in our own Waco models, our opinion is that the installation and use of this sophisticated little glow driver system is well worth its reasonable price and the minimal effort required to install it.

COMPLETING THE RADIO INSTALLATION:

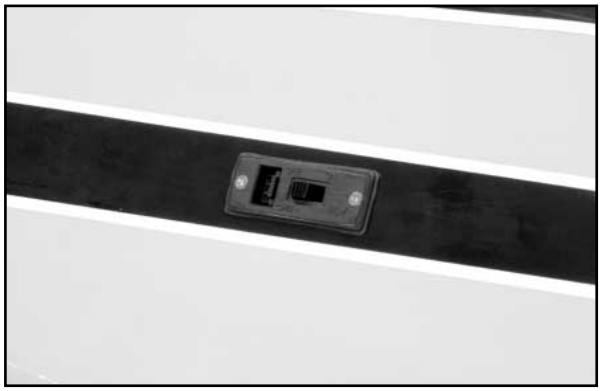
At this point in assembly, all of the servos should be already installed, tested, and working. What remains is the installation of the battery pack, the on/off switch, the receiver, the optional glow driver, and routing the antenna. Note that in this installation, the battery pack and receiver are both mounted on the *bottom* surface of the servo tray.

Battery Pack: The airborne battery pack is installed first. First wrap the battery pack with sheet foam and use tape to secure the foam. We mounted the battery packs in our Waco models on the servo tray, as shown. We used two zip-ties to secure the pack firmly in place. If the battery pack has to be moved for C.G. purposes, the zip-ties can be easily cut and the pack relocated as needed.

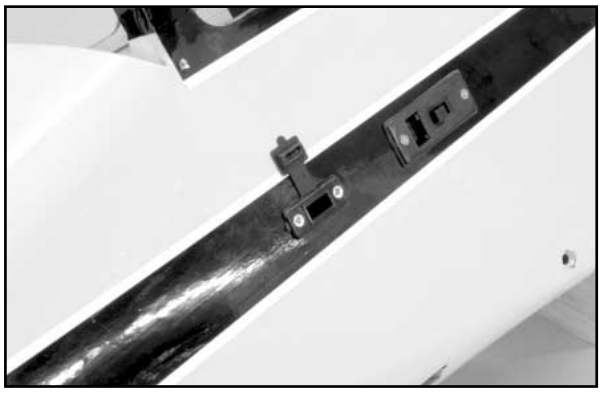


On/Off Switch: As mentioned earlier in this manual, we substituted the on/off switch that came with radio system for a MAXX Products #3470 *Charge Switch*. This heavy-duty after-market switch allows the airborne system to be charged externally and includes a silicon shock mount to prevent vibration damage. It is installed just like any other on/off switch.

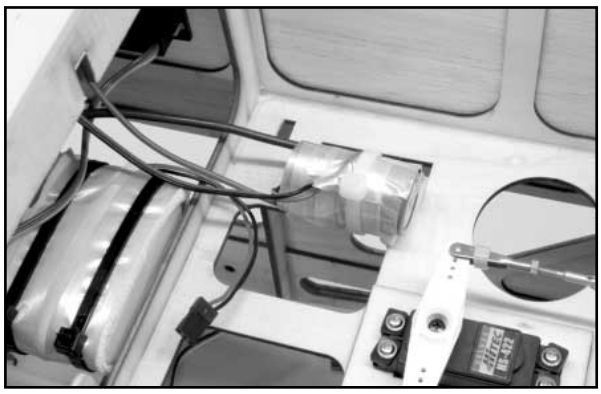
As shown, we located our switch on the left side of the fuselage, centered within the black trim stripe. Because the switch assembly is black, it becomes virtually invisible when in place. Use the backplate provided with the switch as a cutting template for the switch body. Use a hobby knife with a #11 blade and a small straight edge to open the required rectangular cut out in the fuselage side and mount the switch with the included bolts and nuts.



Optional Glow Driver System: The optional glow driver system is installed now. After completing the wiring of this system, the first thing to do is to mount the external charging receptacle that is provided with the product. Like the airborne on/off switch, we mounted this receptacle centered within the black trim stripe on the left fuselage side, as shown. Note the small "flap" shown in the photo. This is a rubber cover for the receptacle when it's not in use.

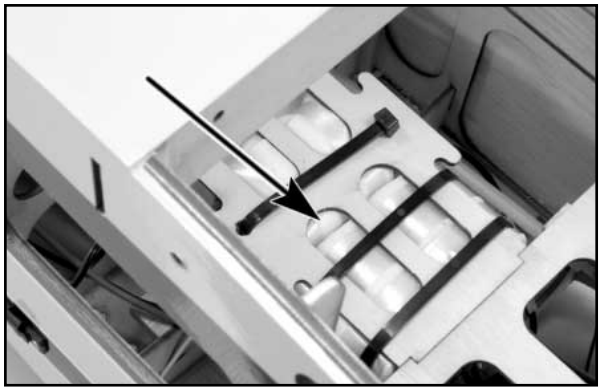


We mounted our well taped and foam padded sub-C cell on the bottom left side of the cabin servo tray, next to the receiver mounting location. A single zip-tie securely holds this cell firmly in place.

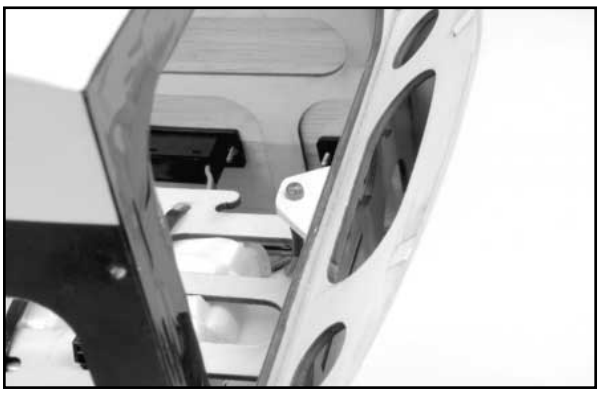


As mentioned earlier, we mounted the glow driver control box on the bottom side of the servo tray, immediately behind the fuel tank and just in front of the airborne system battery pack. We wrapped this box in foam, secured with tape, and used a single zip-tie to

secure it in place. As shown, we drilled two small holes in the servo tray to better fit and tighten the zip-tie. We located the programming button on the bottom side of the box, allowing us to re-program it if that ever became necessary. At this point, we suggest making a final test of the system using the transmitter.

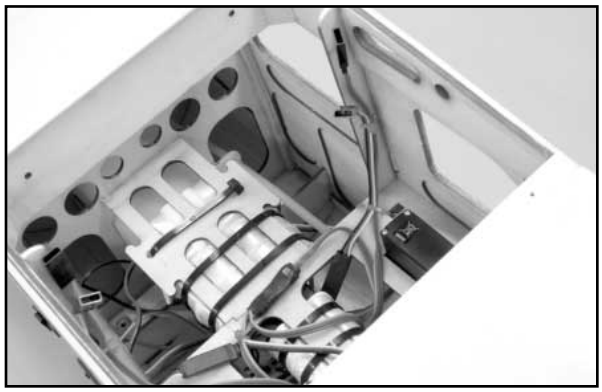


Last, the LED bulb needs to be mounted in a location that is easy to see. As mentioned earlier, we mounted our LED bulb against the forward fuselage cabin former, at the top. This location works well for us even on very sunny days. A scrap piece 1/8" lite-ply works great for this purpose. Simply drill it to accept the bulb and install it with against the former. Press the bulb in place and secure it with a drop of thin CA glue.



Receiver: The receiver is mounted to the bottom center of the servo tray, immediately next to the throttle servo. First, insert the flap Miracle Y harness into the appropriate flap channel receptacle. The standard aileron Y harness is installed into the receiver next. Note that because the two aileron Y leads from most standard Y harnesses are so short, they will both need 6" servo extensions in order to reach the aileron leads at the top of the fuselage. Plug these extensions in place and secure them with short lengths of heat shrink tubing. Plug the now prepared aileron Y harness into the receiver aileron receptacle. Cut some sheet foam to size to wrap the receiver, leaving access to the remaining rudder, throttle, elevator and switch harness receptacles. As shown, we used two zip-ties to secure the foam-wrapped receiver in place to the servo tray. With the receiver now in place, make the remaining servo connections. We used shorter zip-ties to organize and secure any excess or loose servo cables.

In order to comfortably reach the flap and aileron connectors at the wing roots of the top wing panels, we routed one of the aileron Y harness leads and one of the flap Miracle Y leads through the servo tray and up against the center window cabin former on one side of the fuselage. We did the same thing on the opposite side of the fuselage. We then used a small zip tie to secure the leads on each center window former.



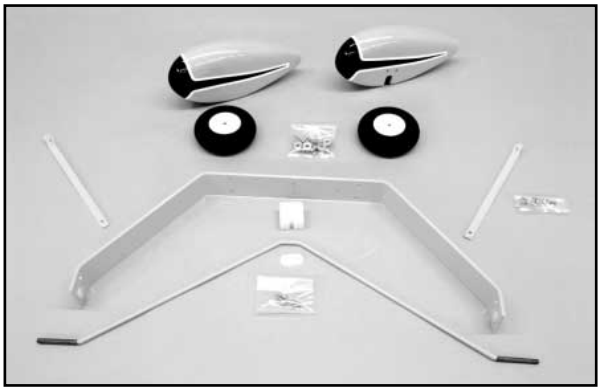
Once all connections have been made, use the transmitter to test each fuselage mounted servo. If you have installed a glow driver system, now is the perfect time to program it. We set ours up to light the glow plug up to 1/4 throttle through our transmitter and we have never felt the need to change this initial program.

Routing The Antenna: The receiver antenna can be routed out of the model in any number of ways. However, in the interest of maintaining the lines of the fuselage, we routed our antenna out of the fuselage, just behind the center trailing edge of the lower wing saddle. We drilled a 3/32" dia. hole in the servo tray on the left side, next to the fuselage side. We attached the antenna strain relief part that came with our Hitec radio system to the antenna and then routed the antenna up through the 3/32" hole just drilled. The antenna was then routed back to another 3/32" dia. hole, drilled at the rear of the servo tray. It then was routed down to a hole that we drilled through the fuselage bottom, behind the bottom wing saddle. From this exit point, our antenna extends back to the tailwheel bracket. There we made and attached a small wire hook and used a rubber band to hold it in place. In actual practice with our own Waco models this has worked perfectly and all but totally hides the antenna.

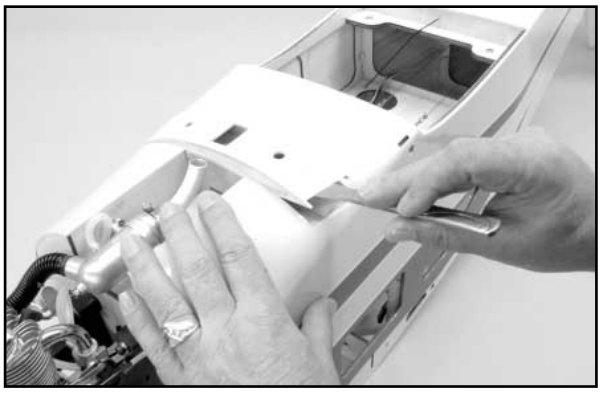
LANDING GEAR AND WHEEL PANTS:

For assembly and mounting of the landing gear to the fuselage, locate the following items from the kit contents:

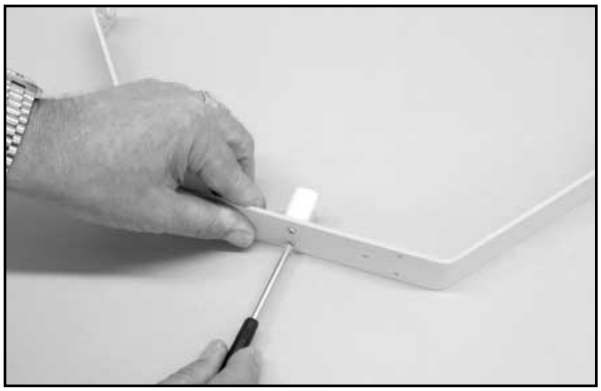
Bag #8	Main Landing Gear - painted
Bag #9	Main Axle Wire Form - painted - & bagged hardware
Bag #10	Main Wheels & bagged hardware
Bag #11	Wheel Pants
Bag #12	Sub bag A - Rear Landing Strut Supports - painted
	Sub bag B - Rear Landing Strut Mounting Hardware



❑ 1) Turn the fuselage over, upside down on your padded work surface. The main landing gear hatch cover is located just behind the recessed opening at the nose. This hatch is attached to the fuselage with two T2.6 x 12 mm PWA screws that are accessible through the two round holes on each side of the hatch. Use a small Phillips screwdriver to remove these two screws, setting them aside for now. The landing gear hatch is now removed from the fuselage. From experience we can tell you that this hatch has tight tolerances and is firmly in place. Use care when removing it. We used a common flat butter knife, wedged under the side slots, gently prying it up until it could be removed.



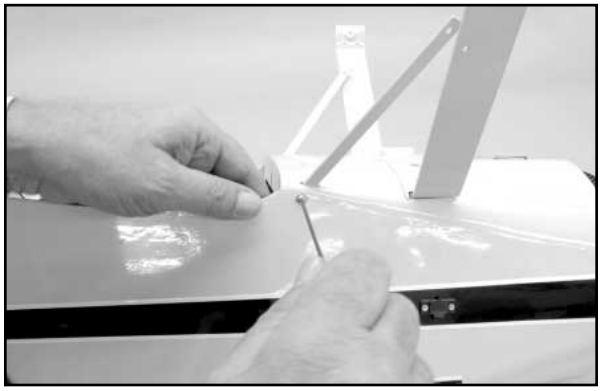
❑ 2) Attach the nylon Center Landing Gear Wire Mounting Block in place onto the bottom center of the main landing gear, using two T2.6 x 10 mm PWA screws. This block is correctly in place with its slotted end facing downward in relationship to the landing gear. This slot accepts the main axle wire form when it's mounted in place.



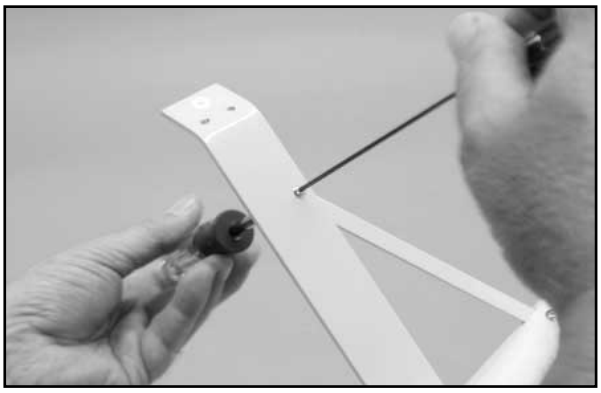
❑ 3) The main landing gear - with the nylon mounting block now firmly in place - can now installed to the fuselage using the four provided 8-32 x 14 mm Allen head bolts, four 4 mm flat washers and the four 4 mm split ring washers. **NOTE:** The main landing gear is installed with the small holes - one on each leg - located to the rear of the fuselage. Use thread locking compound on each 8-32 bolt and tighten the four mounting bolts firmly.

Now that the main landing gear is installed with the slotted nylon wire-mounting block in place, the fuselage landing gear hatch is now reinstalled in place into the fuselage, over the landing gear and nylon block. Center the hatch and use the two T2.6 x 12 mm PWA screws to secure it in place.

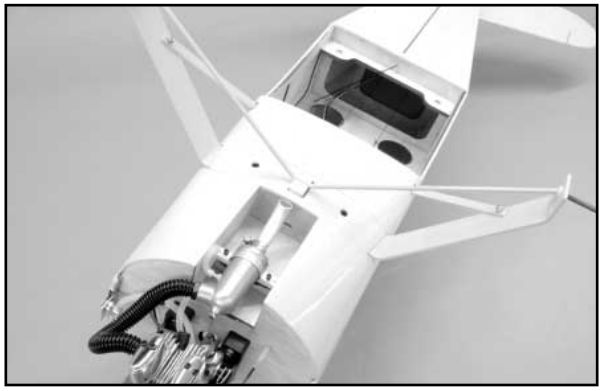
❑ 4) The two painted Rear Landing Strut Supports are now installed into the fuselage and then to each landing gear leg. These struts have been pre-drilled and pre-bent, creating a left and a right strut. At the fuselage, the tapered and bent ends of these struts fit into the slots just in front of the leading edge of the bottom wing saddle. They are each secured in the fuselage with a 4-40 x 9 mm round head Allen bolt and a 4-40 flat washer. Insert the bolts through the outside holes on each side of the fuselage, through the holes in the rear landing gear supports and into a pre-installed 4-40 blind mounting nut inside the fuselage. Use thread-locking compound when installing these two bolts. Once the bolts have engaged the blind nuts, thread them in place but do not tighten them yet.



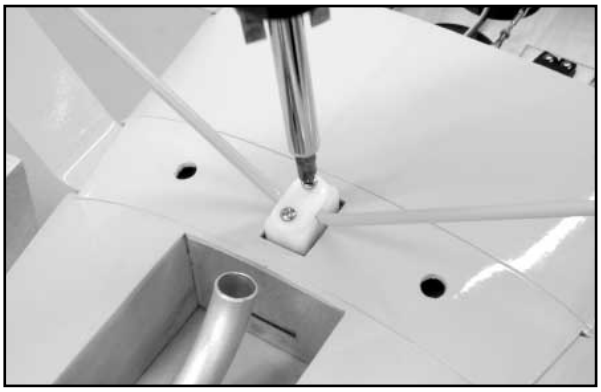
At the main landing gear legs, the forward ends of rear support struts intersect the small hole pre-drilled in each landing gear leg. Note that these support struts are mounted to the *inside* of the landing gear legs. Use the provided 4-40 round head Allen bolts and 4-40 lock nut to firmly secure the front of each support in place to the main landing gear legs. Now, go back to the previously installed bolts at the fuselage and tighten them.



❑ 5) The painted Main Axle Wire Form is now mounted in place into the main landing gear. From the inside surface of each landing gear leg, press a nylon 4 mm Wire Axle Bushing in place into the axle hole. The flanged ends of these bushings face inward. From inside the main landing gear, insert one of the wire axle ends into the bushing, sliding it all the way in place. Flex the wire axle on the opposite side of the landing gear enough to be able to insert the wire axle end through the nylon bushing and fully slide it in place. At the center of the wire axle form, flex it enough to raise it over and then into the slot in the nylon center-mounted block.



The axle wire form is now secured into the nylon block using the nylon "cap" and the two remaining T2.6 x 10 mm PWA screws.



❑ 6) The two main 2-3/4" diameter wheels are now installed onto the wire axle ends. First, slide one of the 4 mm wheel collars in place onto one of the axles. Locate it immediately next to the main landing gear leg with its setscrew pointing straight down. Tighten its setscrew just enough to hold it in place. Slide one of the main wheels onto the axle and then slide another 4 mm wheel collar in place over the axle end. Orient the setscrew straight down and tighten it just enough to hold it in place.

Now, fit the appropriate fiberglass wheel pant (there is a left and right pant) in place over the wheel, sliding its inner slot over the inner wheel collar. Determine if the fit of the wheel within the wheel pant is OK. Adjust the inner wheel collar on the axle as needed to position the wheel in the pant to roll freely. Tighten the setscrew to hold it in place. Repeat this fitting process with the opposite wheel and wheel pant.

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 wire, where the wheel collar setscrew will be tightened. Second, remove the setscrews from each wheel collar and apply some thread locking compound to the threads. These two simple steps almost always prevent wheel collars coming loose.

❑ 7) The wheel pants are now installed onto the landing gear legs, using the 4-40 x 9 mm round head Allen bolts, washers, and split ring lock washers provided. Once again, we suggest using thread lock compound on the threads of these mounting bolts. Make whatever adjustments needed to make the wheels roll smoothly within the wheel pants. (insert Photo #103)

SIDE WINDOW INSTALLATION:

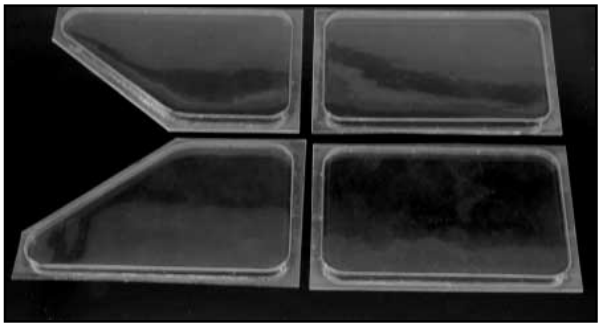
From the kit contents locate Bag #13, containing the Molded Clear Plastic Side Window set. This bag contains both a left and a right

SIDE WINDOW INSTALLATION:

From the kit contents locate Bag #13, containing the Molded Clear Plastic Side Window set. This bag contains both a left and a right window set. These window sets have been molded to fit nicely into the four side window openings in the fuselage, from the inside.

❑ 1) Use a small piece of #220 sandpaper to lightly sand the inside edges of each window opening in the fuselage to smooth them. Clean off any dust. To get rid of the bare wood look in these four window frames, we used a black marker pen with a large chisel tip to lightly go around each window cut out, blackening each frame uniformly.

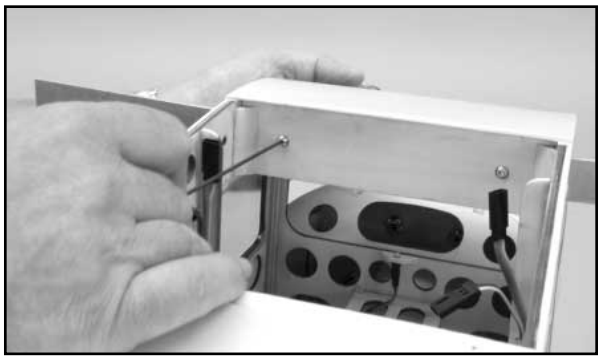
❑ 2) Using scissors, cut out each individual window, leaving about 1/8" of plastic around the edges for a gluing surface. When all four windows are cut out, test fit each of them into their respective openings. Pop them back out and use a little alcohol and a paper towel to clean the gluing edges of each window.



We suggest using 5-minute epoxy glue to mount these windows. ***Do not*** use CA glue for this purpose! Apply a thin bead of glue around the gluing edges of the plastic window and press it in place from the inside of the fuselage. If necessary, use a few small pieces of tape to hold the window in place until the glue sets. A little alcohol on a soft cloth or paper towel will easily and safely remove any excess glue from the windows.

❑ 3) The aluminum top wing panel joiner blade is now installed into the fuselage. From the kit contents, locate Bag #14, containing the Top Wing Joiner Blade and the hardware bag for mounting it.

Install the aluminum joiner blade into the vertical slot at the top of the fuselage - positive dihedral edge up - and continue sliding through the fuselage and through the opposite vertical slot on the opposite side. Center the blade. From the backside of the top plywood former, insert the two 4-40 x 10 mm Allen head bolts, each with a 4-40 flat washer, through the two pre-drilled holes and through the matching holes in the joiner blade. From the front of the blade, thread the 4-40 lock nuts onto the bolt ends. Hold one of the lock nuts with either a nut driver or a pair of pliers and from the backside, use an Allen wrench to firmly tighten the bolt. Repeat this process with the remaining bolt and nut.



❑ 4) The molded windshield - removed earlier in these instructions - is now reinstalled in place at the top front of the fuselage with the four T2.6 x 8 mm PWA screws.

DECAL APPLICATION:

With the wings still not mounted, this is the most convenient opportunity to apply the decals. Locate the decal sheets from the kit contents.

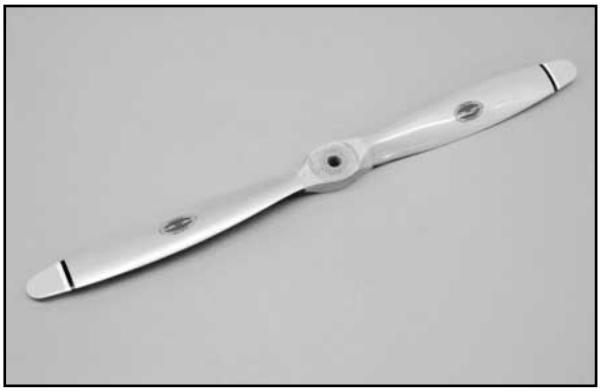
The decals supplied with your Waco SRE ARF kit are high quality Mylar™ with a very aggressive adhesive. The individual decals are not die-cut and must be removed from the sheet with a hobby knife and a sharp #11 blade or sharp scissors. A straight edge makes this easier in the case of registration numbers, door panels, etc. Use the box art and other photos in this manual for the correct placement of the provided decals. Note that the largest NC1252W decal is applied to the top right wing panel. The medium-size NC1252W decal is applied to the bottom left wing panel, as shown in the photo. We suggest the following procedure to accurately apply the larger decals in this kit.

Carefully cut out the decal and lift it off the sheet with tweezers. Use a product like SIG Pure Magic Model Airplane Cleaner or Windex® to spray the general area of the model that will receive the decal. Then 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.

The wing walk decal is applied to the top inboard left surface of the bottom wing. To position this decal correctly, the bottom wing should be mounted to the fuselage. Also, a full-scale wing walk has a flat black, textured surface. Some of you may wish to substitute the supplied wing walk decal with a piece of #400 wet or dry type sandpaper. This has about the right texture and look, making it very believable. The sandpaper can be cut to the same dimensions as the decal and adhered in place with a thin application of Pacer's Zap A-Dapa-A Goo™.

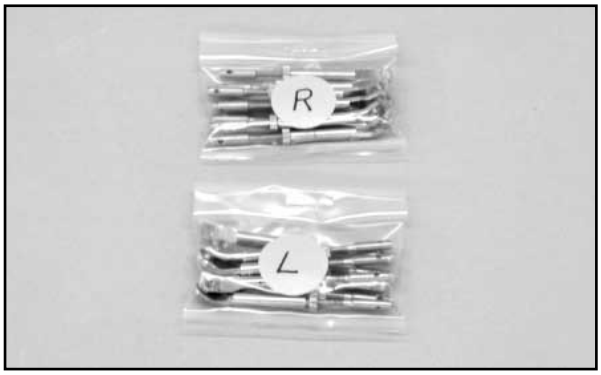
Note that the decal set includes two *Hamilton-Standard* logos that appeared on the propellers of many full-size Waco aircraft. As shown, these logos look really nice on a dummy, non-flying display propeller. If you want to use these logo decals on a flying propeller, then we suggest airbrushing them with a light coat of clear epoxy paint after they have been applied and before using the prop for flight.



FINAL ASSEMBLY:

In these last assembly steps, the wings will be attached, the N-struts mounted, the rigging cables installed and the spinner installed onto the engine and propeller.

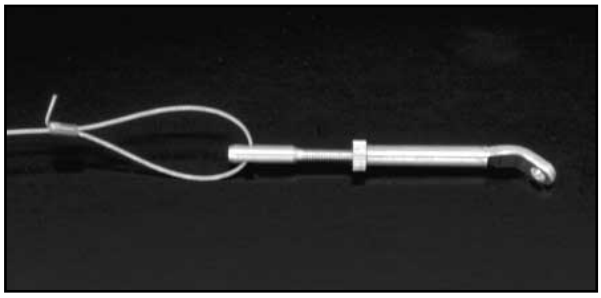
❑ 1) From the kit contents, locate Bag #22. This bag contains all of the components used for installing the flying wires. Carefully note that there are two separate bags containing the turnbuckles used in this rigging sequence. One of these bags is marked "L" - for left-hand threads - and the other bag is marked "R" - for right-hand threads.



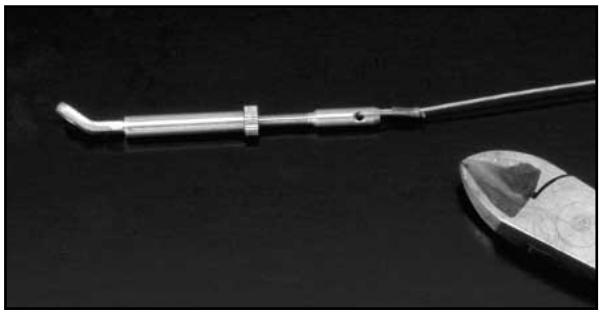
The reason for left and right-hand threaded turnbuckles is that when one right-hand threaded turnbuckle is opposed at the opposite end with a left-hand thread turnbuckle, the required tightening of the flying wires will not result in undue twisting of the flying wire cables. It is therefore important to understand that each right-hand turnbuckle needs to have a left-hand turnbuckle at its opposite end. The simplest way to ensure that this happens is to use one bag of eight turnbuckles for the top wing panels and the remaining bag of eight turnbuckles for the bottom wing.

❑ 2) Starting with the top two wing panels, select a bag of eight turnbuckles (either all right-handed or all left-handed) and remove them from the bag. Adjust each turnbuckle to allow equal in and out adjustment and use the knurled lock nut to lock this positioning into each turnbuckle. Uncoil the eight 0.6 x 13-3/4" flying wire cables. Select eight of the 3 mm x 4 mm copper swage tubes (16 provided).

Slide one of the copper swage tubes onto one end of one of the flying wire cables, holding it with your fingers. Insert the end of the cable through the small, drilled hole at the end of the turnbuckle and loop it back into and through the copper swage. Bend the end of the cable, protruding from the swage, upwards to 90° leaving about 1/8" of cable end, as shown.

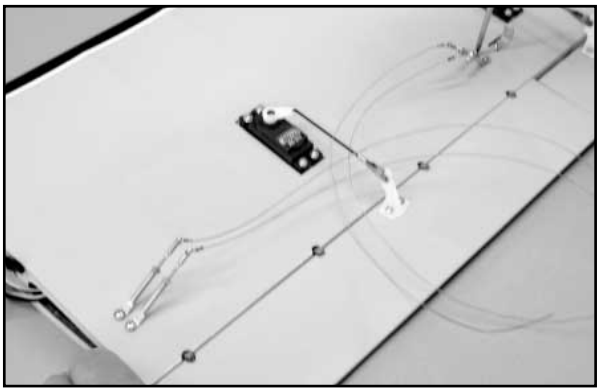


Pull the looped cable and swage through the turnbuckle hole, closing the loop to within about 3/32" - 1/8". Firmly crimp the copper swage, locking the cable in place. Use a small side-cutter to clip the 1/8" of cable - bent at 90° - leaving about 1/16" or so.



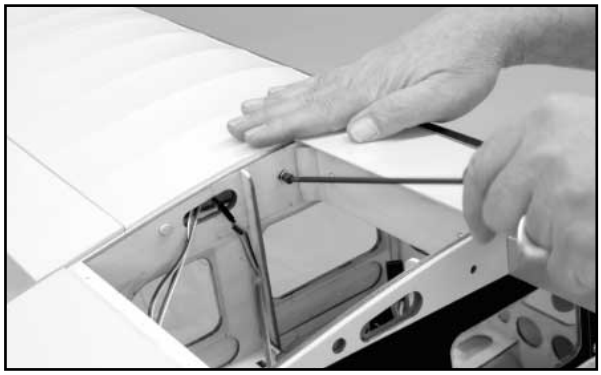
Repeat this process with the remaining seven turnbuckles, cables, and swages. You should now have eight turnbuckles with the flying wires attached and locked in place.

❑ 3) All eight turnbuckles, with the flying wires attached, are now mounted to the bottom surfaces of the two top wing panels, using eight of the provided T2.6 x 8 mm PWA screws. Earlier, we had you establish the threads in these mounting holes. As shown, the two outboard turnbuckles are installed angled downward toward the bottom wing root position. The two inboard turnbuckles are installed angled downward toward the outboard end of the bottom wing. Firmly tighten the mounting screws.



❑ 4) The remaining eight (either all left or all right-hand thread) turnbuckles are now installed onto the top surface of the bottom wing. As before, first adjust each turnbuckle for equal in and out adjustment. As shown, these turnbuckles are installed with their angled ends facing each other. Firmly tighten each mounting screw.

❑ 5) Mount the bottom wing in place to the fuselage, using the two 1/4-20 x 1-1/2” nylon wing bolts. The two top wing panels are now mounted in place. Slide one of the wing panels over the aluminum wing joiner blade. Guide the aileron and flap connectors into the fuselage through the opening at the wing root area of the cabin. Slide the wing panel fully in place, engaging the rear dowel locater hole with the dowel in the wing root. Install the opposite top wing panel in the same way. The two top wing panels are now secured in place using the two provided 8-32 x 25 mm socket head bolts, 8-32 split ring lock washers and the 8-32 flat washers. Apply a little thread-locking compound to the threads. The bolts are installed through the hole in the inside of the fuselage and into the corresponding top wing root hole. Engage the bolt threads into the 8-32 blind nut - pre-installed into the wing - and use a 9/64" ball-driver to tighten the bolts.



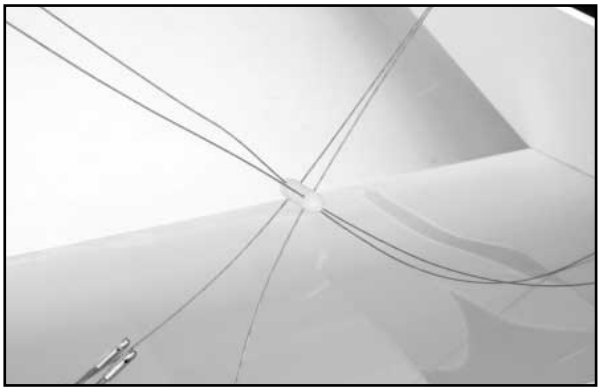
Make the aileron and flap connections with the Y-harness leads in the fuselage. Tuck the excess servo cable back into the wing roots. Use your transmitter to now, once again, test the movement of the ailerons and flaps. Turn off the radio system once you're satisfied.

❑ 6) From the kit contents, locate the remaining contents of Bag #12; the two painted N-Struts, the eight 4-40 x 9 mm Allen drive bolts and the eight 4-40 locknuts.

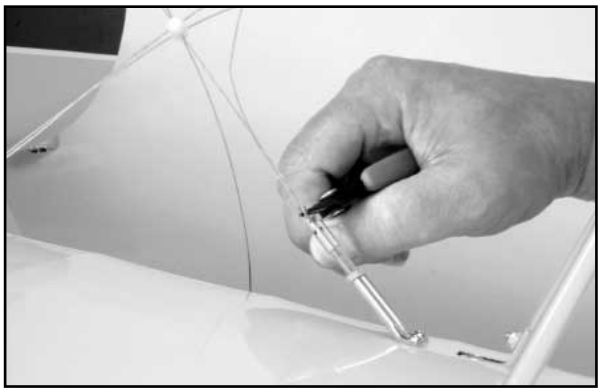
The left and right N-struts are now mounted in place between the upper and lower wing panels, to the N-strut brackets, already in place. The correct orientation of these struts is with their recessed circular bolt mounting holes facing outboard toward the wingtips. The struts mount to the outside (wingtip) surfaces of the N-strut brackets. Due to the oblique mounting angles of struts to the brackets, we found that using a pair of hemostats to hold the lock nuts in place, while turning and a 5/64" ball-driver in the bolt heads, worked well.

❑ 7) With the N-struts mounted, the final flying wire connections can be made. For this step you will need the remaining eight 3 mm x 4 mm copper swages and the two pre-drilled molded nylon flying wire separators. Note that on the full-scale Waco SRE and many other biplanes, these separators were used to keep the flying wires from chafing against each other and to reduce harmonic "singing" in flight. Also, the term "flying wires" is really a generality. Actually, these cables have two different functions and descriptions. The cables that extend downward from the top wing root to the outer bottom wing location are called "landing wires". The cables that extend from the outer top wing location to the bottom wing root are called "flying wires".

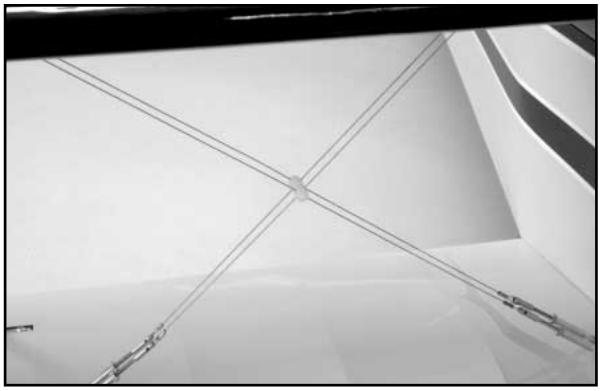
a) Insert the loose flying wire ends through the small pre-drilled holes in one of the nylon separators. As shown, you must choose which two parallel flying wire pass through the two middle separator holes and which two parallel cables will pass through the two outer separator holes. Take care to keep the flying wires from tangling.



b) Slide one of the 3 mm x 4 mm copper swage tubes onto one of the loose cable ends. Thread the loose end of the cable through the drilled hole at the end of the appropriate turnbuckle. Loop the loose cable end back through the copper swage tube. Using a pair of needle nose pliers, pull the loose cable end, making the flying wire taut. Slide the copper swage tube down to the turnbuckle, to within 3/16" or so. Firmly crimp the swage tube and then, bend the loose cable end 90° to the swage tube. Use small side-cutters to trim the bent cable end, leaving about 1/16" or so. Repeat this process with the remaining parallel cable. Now, repeat this same process with the opposing parallel flying wires.



c) Move to the opposite top and bottom wing panels and repeat the above steps, installing the flying wires through the nylon separator in mirror image to the opposite panels. In this rigging installation process you will see that the nylon separator automatically seeks the center of the crossed flying wire sets. With all eight flying wires now in place, the turnbuckles can be used, if needed, to adjust the cable tension. The goal is to make all eight flying wires uniformly taut. Once the turnbuckles have been adjusted, firmly tighten the round knurled nut on each turnbuckle to lock it in place.



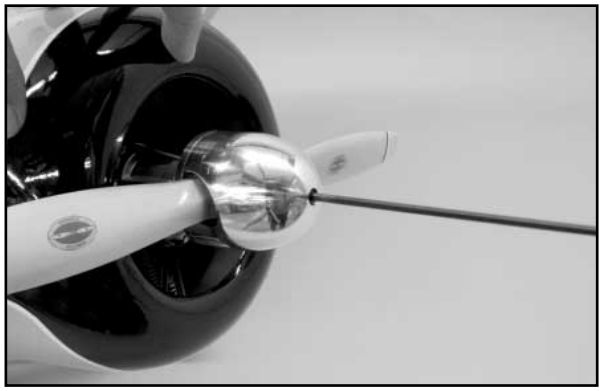
❑ 8) The top fuselage access hatch can now be reinstalled in place using the two T2.6 x 8 mm PWA screws. If your cowl is not in place on the model, reinstall it now.

❑ 9) From the kit contents, locate Bag #16, the aluminum scale spinner. First, please carefully note that this spinner assembly includes an M8 x 1.25 mm x 8-32 brass union nut. The M8 x 1.25 threads in this nut are sized for the prop shafts of Saito 1.00, 1.20, and 1.25 4-stroke engines. If this union nut does *not* fit your particular engine, you will have to replace it with one that does fit. Also, the supplied spinner cone bolt is a standard 8-32 socket head bolt with a length of 9/16". A good source for after-market spinner union nuts is CB ASSOCIATES, located in Sierra Madre, California.

The spinner for your Waco SRE kit has factory-cut prop openings, sized to accept virtually any propeller used on the recommended engine ranges for this model. This means that it is unnecessary to modify these openings. However, if for whatever reason you feel that you must modify these two openings, then we strongly suggest that you approach this task with care and precision.

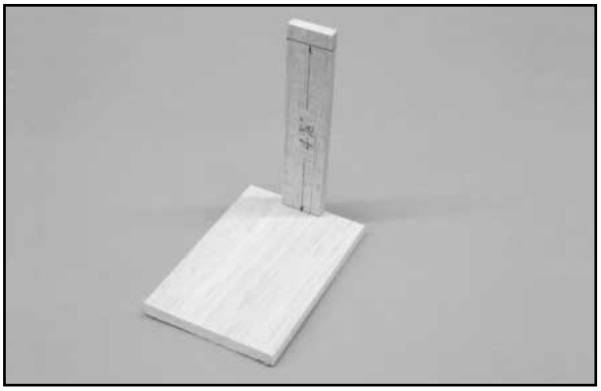
a) Remove the engine prop shaft nuts and thrust washer. Install the spinner backplate onto the prop shaft, sliding it all the way back. The propeller is installed next, followed by the thrust washer, a single prop nut, and finally the union nut. Tighten the prop nut first and then firmly tighten the union nut to the prop nut.

b) The spinner cone is installed over the propeller and into the backplate recess. Center the cone in relationship to the propeller blades, making sure the prop blade cut-outs are not contacting the propeller. The 8-32 x 9/16" socket head bolt is then installed into the center of the spinner cone and tightened in place.

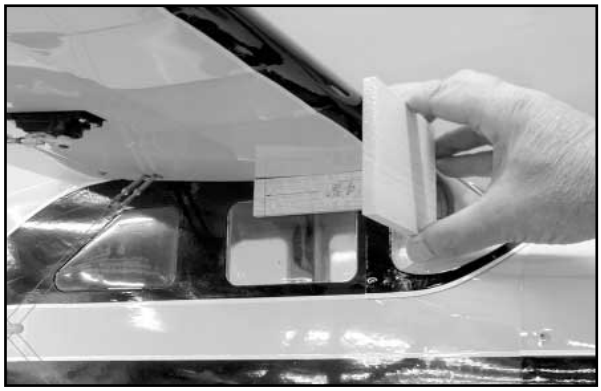


CENTER OF GRAVITY:

Establishing the correct Center of Gravity (C.G.) for this or any R/C model aircraft is critical to its ultimate success in the air. Measured next to the fuselage, the recommended starting balance point for the Waco SRE ARF is located 4-3/8" (111.1 mm) behind the leading edge of the top wing. Note - the 4-3/8" C.G. location is taken from the forward most part of the leading edge, not the tapered-in section next to the windshield. This measurement equates to a 29% C.G. location. At the wing tips, this same C.G. location measures 5/16" behind the main wing spar, on the bottom of the top wing panels. To do this as accurately as possible, we made a simple fixture from scrap balsa. This fixture works on either side of the fuselage, accurately giving us the 4-3/8" location. On our models, we used thin pieces of tape to note the C.G. location on the bottoms of the top wing panels, next to the fuselage.



For reference, the finished Saito 1.00 powered Waco SRE, shown in this manual weighs exactly 9 pounds, 8 ounces and required no lead to balance. This finished weight includes the 1100 mAh airborne battery pack and the onboard glow system, shown in this manual.



Because of the Waco's two wings and generally large size, the use of a balancing fixture is not very practical. However, you can either balance the model from the wing tips using the 5/16" measurement - taken from the back edge of the bottom main wing spar - or you can balance the airplane at the marks made against the fuselage, using your fingertips. Note that the model is always balanced with the fuel tank empty.

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 is nose heavy. Likewise, if the tail hangs down, the model is tail heavy. If either of these conditions exist with your model, they must be corrected.

In the case of a model that balances nose heavy, 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 further back in the fuselage as needed to make the model balance correctly. In the case of a tail-heavy model, weight has to be brought forward in the fuselage to get the airplane to balance level. This can be achieved several ways but the most effective is to move the battery pack forward as needed. In the unlikely event that more weight is needed then you may have to add lead weight to the firewall to achieve the correct balance. In any case, it is imperative that you establish the correct C.G. location with your model ***before*** you fly it.

CONTROL MOVEMENTS:

The following surface control movements for the Waco SRE 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 surface movements for your initial test flight set up and *then* change them incrementally to best suit your own particular flying style. This is especially true with the elevators. The counter-balanced elevators on the Waco are powerful and on our models, the suggested initial movement given below has never been changed.

Note that we have also included our exponential inputs, along with the percentage of aileron/rudder mixing that we use. Because all pilots have differing opinions about what they like or dislike in control authority, these numbers can certainly be changed to suit your own flying style. Note that the following measurements are taken from the inboard end of the tapered ailerons and at the widest trailing edge point of the rudder and elevators:

AILERONS:	**3/4" Up - 3/4" Down**
ELEVATORS:	**7/8" Up - 7/8" Down**
	(with 20% Exponential)
RUDDER:	**1-5/8" Left - 1-5/8" Right**
AILERON TO RUDDER MIX:	**15% Rudder Movement**
FLAPS:	**Position #1: 5/8" = 15°**
	Position #2: 1-7/32" = 30°
	(max suggested travel)

FLYING:

If you have carefully followed these assembly instructions, test flying your new Waco SRE model should be a lot of fun! We repeat this in all of our assembly manuals and we'll do it again now; when it comes to test flying this or any new airplane, do yourself a favor by choosing a day that is calm, with little or no wind. These conditions allow you to much better evaluate and more accurately adjust any needed flight trim inputs. Take all necessary steps to eliminate any potential problems at the field, especially in the set-up of the engine. A good running, reliable engine is a *must* in the ultimate success of this or any airplane. Take the time to solve any engine related problems *before* trying to fly your model. Just to give you a little more incentive to get your engine running reliably, we can tell you that the Waco can certainly glide in a dead-stick situation, but *not* very far! Two wings, a round cowl, wheel pants and flying wires all represent a reasonable amount of aerodynamic drag.

Make it a routine part of your pre-flight procedures to check each control on the airplane, making sure each flight surface is moving in the correct direction. Also check each control linkage to be sure they are secure and that nothing is loose. Next, be sure to make a range test with your radio system, per the radio manufacturer's procedures. We always suggest that this same range check procedure be made with the engine running.

When you're satisfied that the airplane is ready for flight, start the engine and allow it to warm-up to operating temperature. Hold full up elevator and taxi the model out to the take-off position on the flying field. For take-off, the airplane should be lined-up with the center of the runway, with the nose pointed directly into the wind. Holding a little up elevator, smoothly advance the throttle - ***do not*** slam the throttle wide open all at once. As the airplane begins moving forward, gradually back off of the elevator input, using the rudder only as needed to correct any engine torque and/or wind induced deviations from a straight take-off run. Allow the tail to come up and the airplane to gather speed on the main wheels. Lift-off will happen shortly. Keep the wings level with the ailerons and climb out at a shallow angle to a reasonable trim altitude. At altitude, use your transmitter to make any necessary trim adjustments to achieve straight and level, hands-off flight.

You should find that your Waco SRE is a very comfortable flying airplane. The control surface movements given in this manual should provide the airplane with smooth, positive control in pitch, roll, and yaw. In addition, we have found that these control surfaces remain effective down to virtually zero airspeed. As suggested earlier, we prefer flying our Waco models with a little coordinated rudder mixed in with the ailerons. Of course, we've flown it without rudder mixing and it flies just fine. But we found that a little rudder input, about 10% to 15%, made the flying a bit more enjoyable. Our Hitec transmitter allows us to turn the rudder/aileron coupling on or off with the flip of a switch, making the coupling an option during any given flight.

With the model now trimmed and flying straight and level, you can begin to explore the Waco's capabilities. At a reasonable altitude, try a simple loop. The airplane should fly through the loop without any tendency to twist out at the top. A clean loop typically indicates that the C.G. is correctly located. Next, again at altitude, roll the airplane inverted to get a feel for what it flies like in this attitude. For reference, we found that it took virtually no down elevator input to fly our Waco models inverted. Next, you might want to try a simple 3-turn spin. Our Waco models performed beautiful spins with almost instant pull out when the controls were returned to neutral. Next, try a few aileron rolls. Our Waco models roll nicely, in a proto-typical manner. We turned off the aileron/rudder coupling during our rolls to keep the tail from wandering. It is at this point in your test flight that you probably want to find out how effective the flaps are.

First and foremost, you need to realize that the flaps on your Waco model are indeed effective and will really change the way the model flies when they are deployed. You also need to realize that flaps are *low speed* control surfaces, used primarily for landings. Our rule of thumb for the deployment of flaps is that the throttle setting must be at 1/3rd throttle or less before we drop them. *Never deploy the flaps at high flight speeds.* Dropping the flaps at high speed can place a great deal of unnecessary stress on the flap servos and the linkages.

If your transmitter uses a toggle type flap switch and you have set-up your flaps as suggested in this manual, then you should have two basic flap deflection angles to work with. The first is the milder 15° angle and the second is the more aggressive 30° flap angle. Fly your model to a reasonable altitude and throttle back the engine to the suggested 1/3rd or less power setting. Now deploy the flaps to the first 15° angle. Because of the increased lift generated by the flaps, the model will want to climb a little. Holding a little down elevator will compensate for this increase in lift. The net result of the flaps along with a little corrective down elevator input will serve to slow the airplane down nicely. As you gain experience with the flaps and their effect on your airplane in flight, you may want to adjust the amount of flap that is deployed when you hit the flap switch. Of course, if you are using a transmitter with a rheostat type flap switch, you can roll in as much or as little flap as you need at any given time. Now try the 30° flap setting. You will quickly realize that 30° is just about all the flap travel you'll ever need with the Waco. In fact, we recommend that you do not exceed this flap setting with this model. Too much flap input will slow the airplane down a great deal and could get you into trouble if you're too close to the ground.

We use the flap function on our Waco models almost exclusively in the landing phase of our flights. We have found that in wind conditions above 10 mph or so, flaps are just not needed. Below this wind speed, we routinely use the flap function to make very scale like landings in a controlled amount of distance. While we have used a small amount of deployed flap during take-offs, we've found that doing so runs the risk of getting off the ground a little early. Use of the flap function is an acquired skill and should be approached incrementally, with regard to the current wind conditions. And speaking of wind, we've found that our Waco SRE models handle wind quite well. Powered by the recommended engines, you should find that you can comfortably fly this airplane in relatively strong wind conditions.

While still at altitude, it's a good time to learn the stall characteristics of your Waco. Turn the model into the wind, keeping the wings level. Begin throttling back the engine while steadily increasing up elevator input. At some point, the airplane will stop flying and enter a stall. We've found on our Waco models that the stall was fairly clean, with the nose dropping forward and controlled flight resuming almost immediately. The information that you're after here is to learn at what speed and attitude the model stalls. This is important to know, especially in the landing phases of your flights.

Landing your Waco should present no real problems. We use and suggest a standard landing approach routine involving the downwind leg, the turn to the base leg and the final turn to the landing. In the downwind leg, the throttle should be brought back enough to allow the airplane to descend at a very shallow angle. If you're going to deploy the flaps, now is the time to do so. The turn to the base leg and the turn to the final approach should likewise be done with the model slightly descending. Once flying into the wind, line the airplane up with the centerline of the runway and use the throttle as required to extend or decrease the final approach to landing. We have almost consistently landed our Waco models in the 3-point position, flaring just before touchdown. After touchdown and rollout, hold full up elevator and taxi back to the pit area. Now you have to admit, *THAT* was pretty!

After this first flight, we always suggest that you first clean up the airplane and then, perform a full and complete inspection of the entire model, including all nuts, bolts, linkages, etc. In our experience, we've found that most anything on a new model that can come loose or fail will almost always show up during the first few flights. We also suggest that you periodically check and adjust the flying wires, using the adjustable turnbuckles as needed. Remember, you want these wires uniformly taut - not tight. Now is the time to address any such issues.

SIG Manufacturing sincerely hopes that you continue to enjoy your Waco SRE ARF model for a long time to come. We also urge you to always operate your model safely with constant regard to other people and property. Good Flying.....!

PRODUCT REFERENCE:

Bob's Aircraft Documentation Costa Mesa, CA bobsairdoc.com	Scale Aircraft Documentation For Full-Scale NC1252W Waco SRE Foto-Pak #5283
Du-Bro Products, Inc. Wauconda, IL www.dubro.com	Kwik-Fill Fueling Valve, #334 Super Strength Long Servo Arms, #672
Hitec RCD USA Poway, CA www.hitecrcd.com	Radio Control Systems, Servos, Servo Extensions, After-Market Battery Packs
Horizon Hobby, Inc. Champaign, IL www.horizonhobby.com	Exclusive U.S. Distributor for Saito Engines Saito 1.00 Four-Stroke Engine 7" Flex Tube Header, #SAI182TD1112
Mac's Products Sacramento, CA www.macspro.com	Aluminum Exhaust Diverter, #9114
Maxx Products Lake Zurich, IL www.maxxprod.com	Super Glow DLX Glow Driver, #9900DX Charge Switch, #3470 Miracle Y Servo Reversing Y-Harness
SIG Manufacturing Company, Inc. Montezuma, IA www.sigmfg.com	AeroKote® Covering Film Glues - CA, Thick, Medium, & Thin Epoxy, 5-Minute, & 30-Minute Fueling Valve Mounting Bracket, #SIGSH759 4" Epoxy Spreader, #SIGSH678

(**Note:** The manufacturer's part numbers and contact information provided above were correct and current when this manual was written. Part numbers and/or products are subject to change)

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

CUSTOMER SERVICE

SIG MANUFACTURING COMPANY, INC. is committed to your success in both assembling and flying the WACO SRE ARF kit. Should you encounter any problem building this kit, or discover any missing or damaged parts, please feel free to contact us by mail or telephone.

SIG MANUFACTURING COMPANY, INC.
P.O. Box 520
401-7 South Front Street
Montezuma, IA 50171-0520 USA

PHONE: 1-641-623-5154
FAX: 1-641-623-3922

SIG WEB SITE: www.sigmfg.com
SIG E-MAIL: mail@sigmfg.com

LIMIT OF LIABILITY

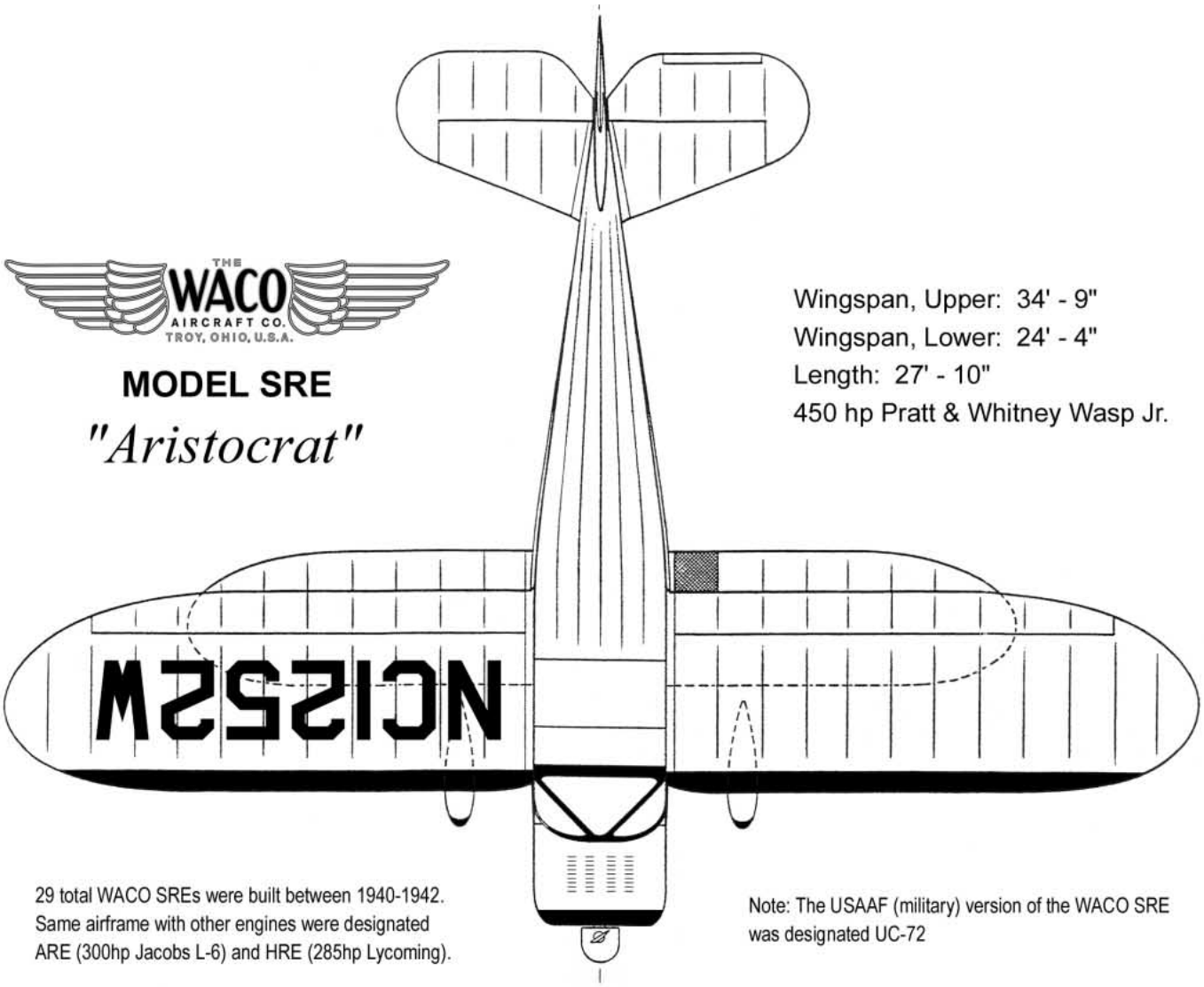
The craftsmanship, attention to detail and actions of the builder/flyer of this model airplane kit will ultimately determine the airworthiness, flight performance, and safety of the finished model. SIG MFG. CO.'s obligation shall be to replace those parts of the kit proven to be defective or missing.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

THE WACO AIRCRAFT CO. TROY, OHIO, U.S.A.

MODEL SRE

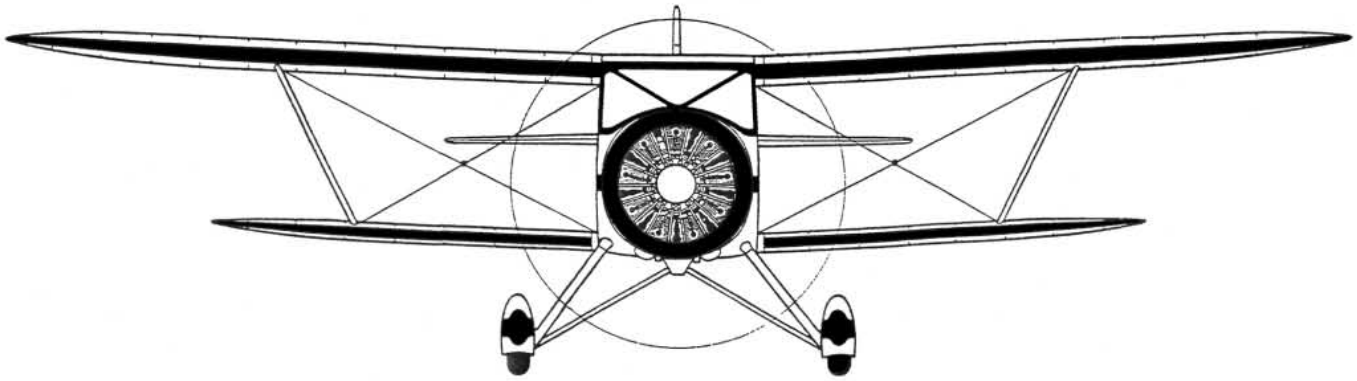
"Aristocrat"

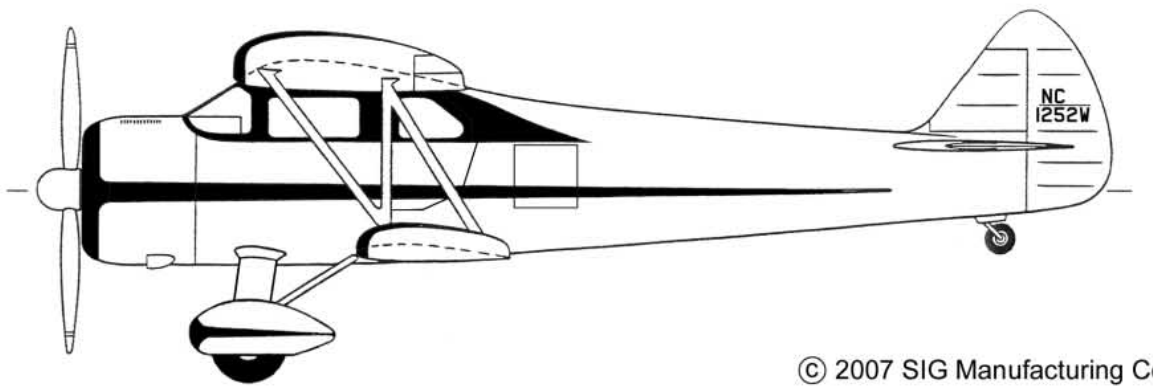
Wingspan, Upper: 34' - 9"
Wingspan, Lower: 24' - 4"
Length: 27' - 10"
450 hp Pratt & Whitney Wasp Jr.



29 total WACO SREs were built between 1940-1942. Same airframe with other engines were designated ARE (300hp Jacobs L-6) and HRE (285hp Lycoming).

Note: The USAAF (military) version of the WACO SRE was designated UC-72





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