

New Glastar's
Glastar FT/TD
Radio Control Scale Model



Scale: 1= 5.00
Wingspan: 84" (2134 mm) Chord: 8.5"
Wing Area: 714 sq. in (4607 dm²)
Flying Weight: 8.5-9.5 lbs (3670 – 4100 g)
Wing Loading: 27 – 30 oz/ft²
Main Gear Wheel Track: 21" (533 mm)
Length: 51.5" (1308 mm)
Radio: 5 Channels with 7 servos
Engines: .60 – .91 cu in 2 Cycle
.70 – 1.2 cu in 4 Cycle

Assembly Instructions

Warranty

Experimental Aircraft Models, LLC (EAM) guarantees this kit to be free from defects in material and workmanship. The warranty does not cover individual parts damaged by modification or abuse. In no case will EAM's responsibility or liability exceed the original purchase price of the kit. EAM reserves the right to change or modify this warranty at any time.

EAM assumes or accepts no liability for the manner in which this model aircraft is used by the user, in any condition of assembly. By the act of purchasing this kit, the purchaser and any subsequent user accepts full responsibility and all resulting liability.

If the purchaser is not willing to accept the above liability associated with the use of this model aircraft, the purchaser is advised to return this kit immediately to the source from where it was obtained.

Please read this manual thoroughly before starting assembly. It includes critical assembly instructions and warnings in regards to the safe and enjoyable use of this scale aircraft model.

About Your Model : You have purchased one of a limited production run of Glastar model kits in the world. You have a very unique model of an Experimental aircraft.

In the United States, 'Experimental Aircraft' are aircraft that are 51% or more built by an individual (usually at home) and fly under an FAA issued "Flight Permit", rather than "Certification". During the past 30 years the most advanced designs in civil aviation aircraft have come from the 'Homebuilt' arena where, without the burden of certification expense and manufacturers liability insurance, aircraft of amazing performance and safety could be designed and offered to the public.

In our mission to support the homebuilder with a scale model of an aircraft project that may have consumed hundreds/thousands of hours to complete, we have brought together full-scale aircraft kit airframe manufacturers with a state-of-the-art world class ARF (Almost Ready to Fly) model manufacturer. Our intent is to provide as scale a model as possible that is as ARF as possible - within the confines of limited production run sizes and knowledge that a builder will may customize to match their own or a friends aircraft. In that sense, this product caters more to the full-scale builders and modelers, than it does 'out of the box' flyers.

Just as the homebuilder customizes their personal aircraft, we have offered the model in pure white, so that you may do the same. We also include multiple landing gear configurations in the kit, so that you may choose between the full-scale configurations offered by the airframe kit manufacturer. For those unfamiliar with the FT/TD designation, the TD is the Conventional gear (Taildragger) version and the 'FT' is the Tricycle (Fixed Trike) gear version. Otherwise the airframes are identical. We use a formed aluminum main gear secured to the fuselage forward of the door for the TD conventional gear version, and turn the gear around and mount it aft of the door for the FT version. (Just like the full scale aircraft does.) We have replicated the look of the forward swept nose gear in the way we modeled the fiberglass nose wheel fairing.

Please note that we use aircraft terminology in our instructions. Specifically 'Port' is left and 'Starboard' is Right, and 'Forward' is to the front and Aft is to the rear. No matter how you may have the model turned, Port is always the left side of the aircraft as the pilot sits in the cockpit facing forward. Thus if you are working on the model upside down with the tail facing towards you, putting something on the Port side eliminates the confusion that 'left' side might result in.

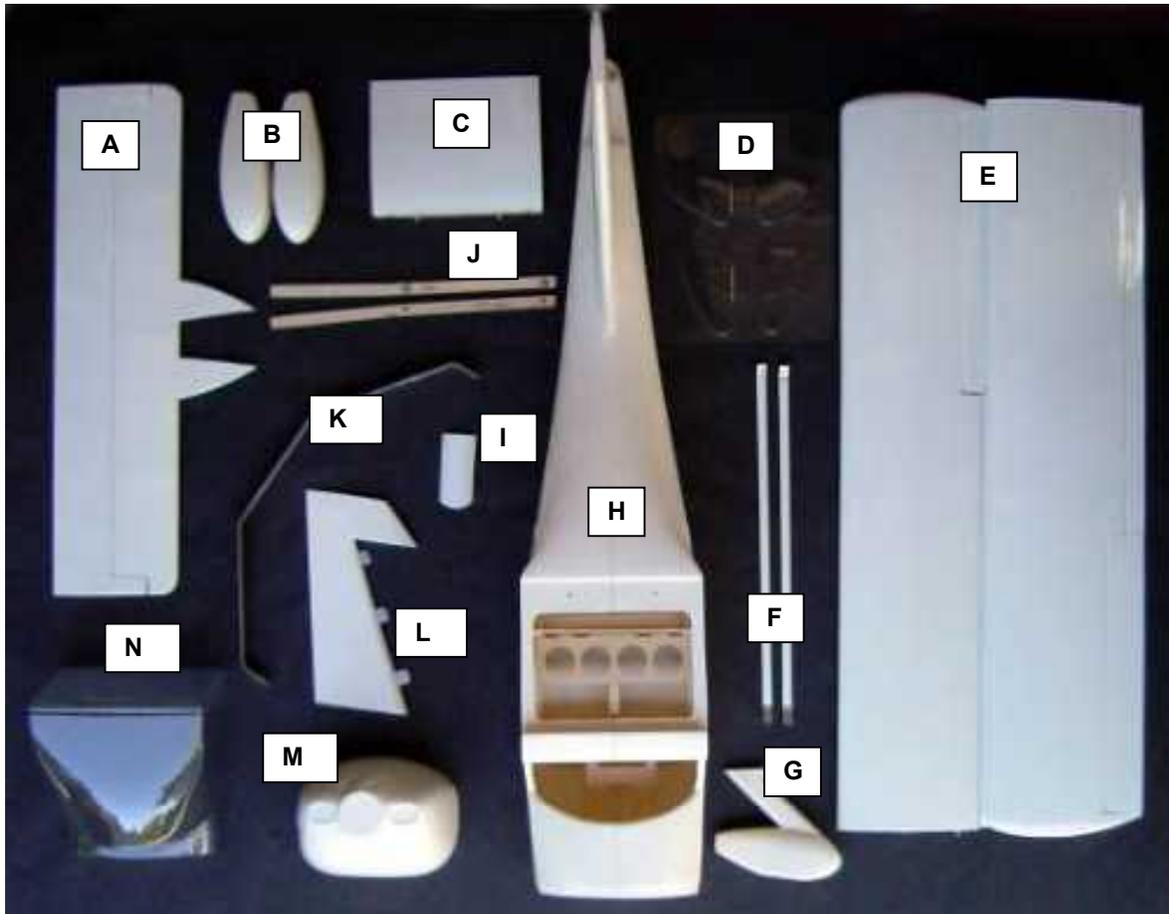
A final point: Because the model is so special and the volumes (by model standards) so low, we need your help. We have tried our absolute best to get everything right the first time. If there is something during the construction and flying of the model that you feel could be done more easily or better, we'd like to know. This is how it's done in the full size experimental aircraft world, and we want to be sure that the same spirit is carried on in smaller scale. Builders are continually finding ways to improve the full size aircraft, and there is no reason why modelers should not have the same ability to contribute to a better product.

Please feel free to e-mail us with kit comments at: info@RCHomebuilts.com We sincerely appreciate your vote of confidence in purchasing our rendition of New Glastar's Glastar and truly wish you the best of enjoyment.

Andrew Kondor
Managing Director
1224 Amber Dr.
Thunder Bay, ON
P7B 6M5 Canada

A note about the covering. Your Glastar's flying surfaces are covered in White 'Oracover' – commonly known as 'Ultracote' in the U.S. This is a high quality material, but through temperature changes during shipping, the model may show wrinkles. This is normal. This symptom is also more visible in that the model surfaces are fully balsa sheeted. The material can easily be tightened by the application of heat from a hair dryer/heat gun or hot iron. If using an iron, a piece of lightweight cotton (e.g. sheeting) placed between the iron and the covering helps to even the heating. Pressing lightly will transfer the heat to the covering, shrinking the material. Piercing a bubble with a pin and rubbing the hot area with a cloth further helps remove the wrinkles.

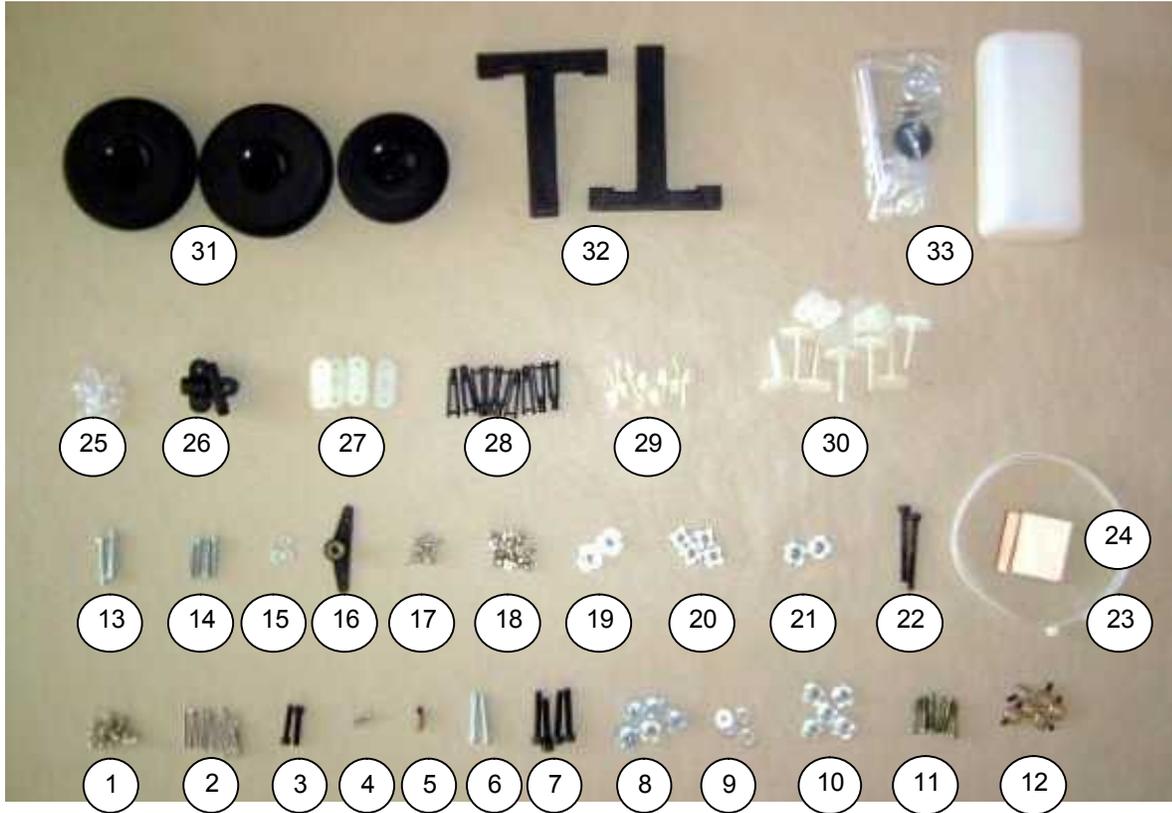
Airframe Components



Item	Description
A	Elevator & Stabilizer
B	Fiberglass Main Gear Wheel Pants
C	Center Wing Section
D	Molded Side Windows
E	Wings
F	Struts
G	Nose Wheel Fairing
H	Fiberglass Fuselage
I	Horizontal Stabilizer Center Cover Block
J	Wing Joiners (Port & Starboard)

Item	Description
K	Formed Aluminum Main Landing Gear
L	Rudder w/Hinges
M	Fiberglass Cowl
N	Formed Wind Shield

Hardware



Item	Description	Qty
1	#2 x 1/4" Washer Head Screw	16
2	M2 x 20 mm Machine Screw	14
3	6-32 x 3/4" Socket Head Cap Screw	2
4	#2 x 3/8" Screws	2
5	EZ Connector	1
6	M4 x 28 mm Machine Screw	2
7	8-32 x 1" Socket Head Cap Screw	4
8	8-32 Blind Nut (T-Nut)	4
9	#8 Flat Washer	4
10	M 3.5 Blind Nut	6
11	M 3.5 x 20 mm Machine Screw	6
12	Wheel Collars – 5 mm	6
13	M4 x 28 mm Machine Screw (Same as # 6)	2
14	M2.5 x 20 mm	4
15	M2.5 Washer	4

16	Steering Arm	1
Item	Description	Qty
17	#2 x 3/8" Washer Head Screw	6
18	#2 x 1/4 Washer Head Screw	20
19	8-32 Blind Nut	4
20	Main Gear Wheel Pants Retainers	2
21	M4 Blind Nut	2
22	M4 x 40mm Socket Head Cap Screw	2
23	Nylon Tie Wrap	2
24	Ply Backing Plates	3
25	Silicon Clevis Keepers	17
26	Nose Wheel Steering Blocks	1 pr
27	Nylon Landing Gear Straps	6
28	Nylon Clevis	9
29	Kwik Keepers	8
30	Control Horns and Backing Plates	7
31	Wheels	Set of 3
32	Glass Filled Nylon Engine Mount	1 pr
33	Fuel Tank & Hardware	1

Building the Wing

Sequence of events in this section:

- Installing ailerons and flap hinges
- Opening servo cover slots, wire and bolt holes in covering
- Assembling wing joiners and center section
- Cowling and wheel pant prep (while wing epoxy dries)
- Threading servo wire extensions and installing servos
- Installing control arms, horns and pushrods

Additional components you may need from the hobby store:

- CA Adhesive (Thin)
- CA Adhesive (Medium)
- (2) 36" Servo wire extensions
- (2) 12" Servo wire extensions
- (2) "Y" Servo wire harnesses
- (4) Optional extended length servo arms to fit your brand of servo

Installing Ailerons and Flap Hinges

The control surfaces on the wings and stabilizers are not yet permanently attached. We have pre-cut and positioned the 'CA' hinges for you. In this step you will be removing the flaps and aileron control surfaces from the wings, prepare them for hinge gluing, and permanently re-installing them on the wings.

- 1) Pull the ailerons and flaps away from the wing.
- 2) Trim away the Oracover from around the hinge slots on both the wings and the control surfaces. Our favorite method is to use an old soldering iron with a point on the end. This seals the Oracover to the wood at the same time as it melts back the covering from the slot. Otherwise a razor knife can be used to trim away the material. The objective is

be sure the adhesive can wick into the slot. You don't want an edge of film sitting against the hinge, which may prevent the adhesive from flowing into the slot.

- 3) Drill a small (1/16" or 1.5mm) hole in the center of each slot to help 'wick' the adhesive onto the hinge in the next step.
- 4) Insert the CA hinges halfway into the slots on the control surfaces and insert a pin to prevent the hinge from sliding any further into the slot.



- 5) Position the control surfaces up to the wing, inserting the other half of the hinge into the slots in the wing. Position both the flap and the aileron in the desired position.

- Note that the ailerons have 'hard points' in them, for later

control horn mounting. These rectangular pieces of wood are just visible beneath the covering about 1" off center. Be sure to re-install the flap so that the hard point is closer to the root rib than the tip of the wing.

- (Check side-to-side alignment so that the spaces between the wing, and the control surfaces themselves, are equal.) Remove the pins and place 4 –6 drops of Thin CA into the slot on both the wing and control surface for each hinge, on both top and bottom side of the wing.

- 6) Finish the installation on the opposite wing.
- 7) Pull on the control surfaces to ensure the bond and wiggle them to minimize stiffness.

Opening the strut mounting hole & servo cover slots

The Oracover must be removed in certain areas to allow access to interior blind nuts and clearance for the servo pushrods.

- 1) Referencing the picture at right and next page, use either a sharp pointed razor knife or hot soldering iron and open the two 1/4" (6mm) wing strut attach holes on the bottom of the wing. There is a 6-32 Blind nut glued into the wing.

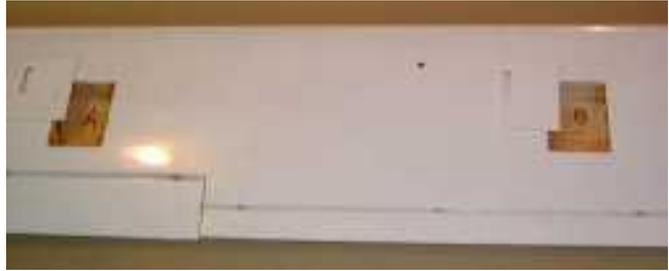
- a. Barely visibly beneath the covering, 15" (381 mm) from the root rib, 1 7/8" (48 mm). Glue may have entered the threads of the hole and it may look like it's not there. If you don't see the blind nut, gently drill into the hole with a 3/32" drill bit (This is smaller than the threads of the screw that goes into nut so you won't damage the threads) If the nut is not directly beneath the hole you'll 'bump' into it.

- b. Retrieve the 6-32 Socket Head Cap screws (#3) and test fit. Put the screws away as you won't need them again until later.



- 2) Locate the servo bay covers on the bottom of each wing. Remove one at a time, mark the bottom side of the cover and inside the servo bay with a letter or number to maintain their relationship.

- a. *For future reference, note that the slots for the aileron servos are 'outboard' from the plane's center line, and are left and right (opposite) to each other between wings. This is because the ailerons operate in opposite directions.*



- b. *The flap servo covers both have the slots to the same side of the servo cover centerline – because the flaps both operate in the same direction.*

- 3) Trim the slot opening of each servo cover with a sharp razor knife. (Don't use the soldering iron trick, as it will show the melted edge where it would be visible from the bottom side of the plane.)

- 4) With the covers in place, drill a 1/16" (1.5mm) hole at each corner. There is a gap between the inside top surface of the wing and the bottom of the block, so you can 'break through' carefully without drilling through the wing! Install #2 x3/8" washer head screws (#1), then remove the screws and cover and place a few drops of Thin CA into the holes to strengthen the threads.



- 5) Do not install the servos yet.

Assembling the Wing Joiners and Center Section

These steps are easier to do before the servos are installed, where wires exiting the wing would get in the way. (You will need to move the wood pull string anchor from the root ribs to allow the wing to sit flush against the center section.)

The Glastar's 84" wings are separable for transport to the flying field. Hardwood wing joiners are bonded into each wing, and then slip one behind the other inside the center section of the wing. Two 6-32 bolts enter the leading edge of the center section, pass through the forward wing joiner and thread into the aft joiner, clamping them together and to the center section.

- 1) Protect the end ribs on the center section from being glued by applying packing tape to the two ends. Carefully cut away the tape from the rectangular openings to allow passing the wing joiners into the section.



- 2) Retrieve the two Wing Joiners (#J) and wing Center Section. # C)

- 3) Look at the trailing edge of the center section (i.e. you are looking forward over the center section) & insert the wing

joiner with the blind nuts into the port (left) side. The flange on the blind nuts should be facing you i.e.aft. It will cross the inside of the center section and hit the inside of rib on the far right, just aft of the rectangular hole. Note the upward angle (dihedral) the wing joiner makes with the center section.

- 4) Into the starboard (right) side, insert the other wing joiner, holes into the center section, making sure that the leg remaining outside the center section also has an upward angle!

- 5) Retrieve two 6-32 x 1 1/2" bolts and No. 6 washers from the U.S. Pack. Place these bolts into the holes in the leading edge of the center section, through the starboard joiner and start them in the blind nuts on the aft (Port) wing joiner. Snug these bolts for the next steps where the joiners will be glued into the wings.



- 6) Test fit the Joiners into both wing halves - slide the wings up to the center section. Sand the Joiners if necessary to get a smooth close fit.

- 7) Bevel the ends of the wing joiners where they will insert into the wing. (This will minimize scraping away glue when you insert the joiner.

- 8) Apply 30 minute epoxy into the wing joiner hole of one wing and slide the wing on to the appropriate wing joiner. Move the wing in and out and check that the epoxy is properly spread on the joiner. Slide up to the root rib. DO NOT BOND to the center section rib!. (You put the glue in the hole, rather than on the joiner so as to minimize this possibility.)

- 9) Repeat for the other wing. Temporarily tape the wings across the center section and to each other. Set aside to dry, upright, while supporting the wing from beneath at about the flap servo bays.

Preparing Fiberglass Cowl and Wheel Pants

To take advantage of the drying time required for the wing, now is a good time to prepare the Cowling and Wheel Pants for later use.

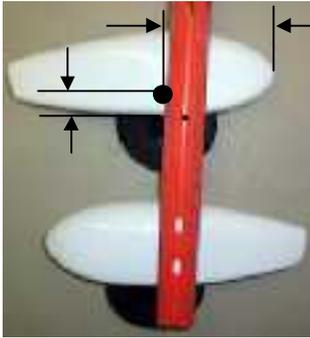
If you are going to be painting these components we suggest that you wash the parts in warm soapy water to remove any mold release. Following washing you can scuff sand the parts with 320 or 400 grit wet sandpaper.

If you are going to use the parts with their white gel coat finish, no preparatory surface finish work is needed.

- 1) Retrieve the cowling. Carefully cut away the air inlets and the propeller opening. A Dremel_{im} tool with a small milling bit works well for this task.



- 2) Retrieve the main wheel pants. Measure from the tip of the wheel pant back $3\frac{1}{4}$ " (82 mm) and $\frac{1}{2}$ " up from the bottom of the wheel pant. Place a mark for drilling.
 - Make a left and right.

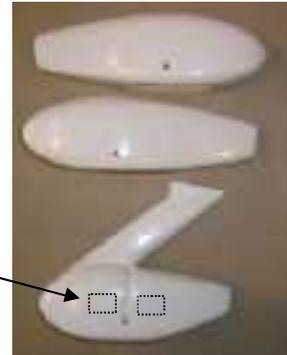


- Pilot drill with a drill smaller than $\frac{3}{32}$ " (2.4mm) then open the hole to $\frac{5}{32}$ " (4 mm).
- Do both wheel pants.

- 3) If you are building the tricycle gear version, prepare the nose wheel fairing for later use:

- a. Drill a $\frac{3}{16}$ " hole (5 mm) at the base of the groove in the fairing.
- b. Retrieve one of the wheel pant ply backers (#24) and cut it in half.

- c. Bond the two halves into the inside of the fairing on both sides of the bump created by the groove. (A gear strap (#27) will bridge over the wire gear in the groove and screw into these ply piece from the outside.)



Installing Servos & Threading Servo Wire Extensions

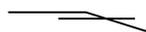
For ease of serviceability we secure the servos directly to the underside of the servo covers, mounting them with double sided foam tape (not supplied). Verify that the servo arms are electrically neutral/centered by connecting to the receiver, turning on both the transmitter and receiver and centering the trim on all channels. Turn off the receiver first, then the transmitter.

Note that the Glastar wing is fairly thin. You will be able to just fit a newer standard size servo. (.73" x 1.52" x 1.32" or 19mm x 38mm x 35mm) Older standard servos may not fit. The easiest and our preference is to use a high torque micro servo. (Eg. JR 331 Micro Torque rating should be 41 – 48 oz/in.. Servos thicker than .73" or 19mm will not fit.)

- 1) Test Position a servo on the back side of a servo cover, with $\frac{1}{32}$ " thick double sided foam tape. The arm should be just forward of the center of the slot, and projecting from the slot at 90 degrees - with the face of the arm parallel to the slot.

- Before securing the servo, replace (if necessary) the output arm with an arm long enough to protrude through the cover and allow clearance of the pushrod when operated to extreme positions.
- Alternatively, if you are unable to locate longer servo output arms, you can widen the slot to $\frac{11}{32}$ " (9 mm) to allow room for the rod keeper, which would otherwise interfere with the slot sides.



- This approach, which will be described later, will require later bending of the push rod so that it enters the slot slightly more vertically - Like this  instead of .

- Before installing the servos retrieve one of the black pushrods and test fit into the outer most servo arm hole. Likely you will have to drill the hole to 5/64" (2mm) (It is difficult to drill holes in the servo arm after the servo is mounted.)

- 2) Test fit the cover & servo into the wing. In some cases the corner block may need to be cut back to allow clearance for the arm to rotate. (Make your life easy, use a pair of diagonal wire cutters to 'snap' off the end of the block.) Also trim the corner of the mounting flange on the servo, if necessary, to prevent it from pressing against the inside top skin of the wing.



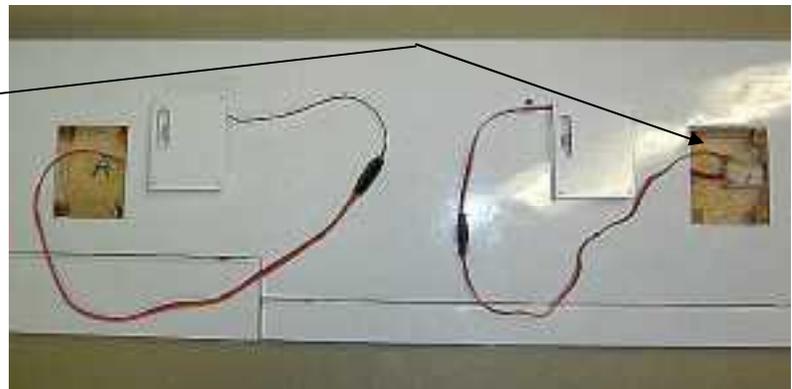
- 3) Repeat the above process for all four wing servos. Again, note how the Flap servos both face in the same direction, while the aileron servos lay in opposite directions.

- 4) Plug a 36" servo cable extension on to the Aileron servo cables. Use a piece of heat shrink tubing or electrical tape to keep the connection secure.

- 5) Using the pre-installed monofilament pull string, draw the aileron servo cable through the wing **just up to the flap servo bay**.

- If the cord is missing or has been pulled through by accident, a metal pushrod in the kit makes a great 'snake'. Insert the pushrod into the root rib hole, push through to the servo bay and attach the servo cable to the pushrod with tape and pull it back through the hole.

- 6) Secure the end of the flap servo cable behind the aileron connector (so they both fit through the hole) temporarily with tape, and pull the 'train' through to the root rib of the wing. Remove pull string.



- 7) Separate the aileron and flap servo wires, and clearly label each for later connection to the receiver.

- 8) Repeat the servo installation process for the other wing.

- 9) Plug the servos into the receiver and test their operation to be sure wire connections inside the wing remained tight.



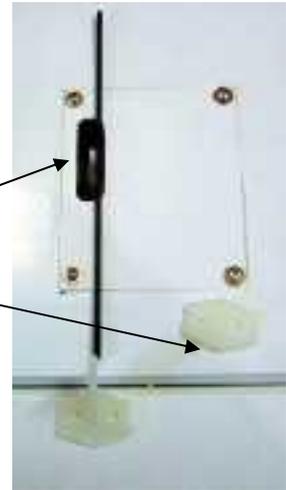
Installing control arms, horns and pushrods

Nylon control horns will be fastened to the ailerons and flaps control surfaces, and wire pushrods will be bent and cut to final length. Nylon clevises are then threaded to the ends of the pushrods and connected to the control horns.

- 1) Plug an aileron servo into the receiver and turn the transmitter 'on' and set the aileron servos to center. Be sure trim is set to center. Turn radio off, receiver first.
- 2) With the servo cover in place, double check that the servo arm exits the slot perpendicular to the cover.
- 3) Retrieve four 4 1/2" (115mm) pushrods and four (4) clevises (# 28).

- 4) Looking down at the servo, lay a pushrod to the right side and alongside the servo arm, square with aileron and position a control horn (# 30) in line with the pushrod. Mark the location of the horn and install with two (2) M2 x 20mm bolts (# 2) and control horn backing plates.

- If you keep the rods on the right side of the servo arm on all pushrods for both wings, the rod keepers will be more easily installed later.
- Note that the backing plate may require sanding off the pointed edge along one side so as not to interfere with 'up' aileron action when it is positioned on top of the aileron.



- 5) To size and cut the pushrod to length, thread a clevis on to the end of a pushrod and place a silicon band keeper (#25) on to the clevis. Temporarily attach the clevis to the horn and lay the rod out along side the servo arm.

- If you have used a short servo arm you will need to make a shallow bend in the pushrod so that it can enter the slot and still have room for the keeper. Bend a shallow (10 to 15 degrees) midway between the horn and servo arm.
- Rotate the rod 180 degrees so that the bend lays flat along the wing – allowing you to determine where to mark, and in the next step bend, so as to fit the servo arm hole.

- 6) Mark the location of the servo arm hole on the wire and subtract 1/16" (1.5mm) for a bend allowance. Carefully bend a right angle (pointing away from the arm!), so that when you rotate the rod back into position it will fit into the arm. Cut the leg to 5/16" (6mm)

Pushrod shown already cut to length with leg bent and upside down. Piece gets turned over and leg inserted into servo arm hole.



- 7) Rotate the pushrod back into the correct position and install into the servo arm using a # 29 Keeper.

- 8) Repeat the above steps to install the other aileron servo.



- 9) Set the flap servos to the "up" position (Servo arm rotated aft, towards the flap.)

10) Repeat steps 1-9 above to install the flap pushrods.

Fuselage Assembly

Installing the Nose Wheel Bracket

If you are building the Tricycle gear version the next steps install the nose wheel steering bracket. Even if you are not building the tricycle version, setting the blind nuts for the nose wheel mounting will give you options in the future. Otherwise, skip this section if you are building the tail wheel version.

1) Retrieve the following:

- Formed wire nose gear
- Two nose wheel steering blocks (# 26)
- Four M2.5 x 20 mm bolts (# 14)
- Four M2.5 blind nuts (# 20)
- Four 2.5 mm flat washers (# 15)
- Steering arm (#16)

2) Fit the blocks to the firewall with the bolts.

- a. Insert the nose gear through the two blocks and the steering arm between the blocks to ensure it all fits and the holes and are in-line. Drill out the blocks and steering arm to 13/64 and shave thickness if necessary. The steering arm should fit smoothly between the blocks with little play.



- b. Pull the blind nuts into place using the M2.5 bolts through the washers and steering blocks.
- Before installing, test fit each bolt into the blind nut to be sure it does not bind.
 - We found the easiest way to install the blind nuts is to wrap a piece of tape, sticky side out, around our finger and 'stick' the blind nut to our finger. Place the nut against the end of the bolt and push the bolt back out, so that the blind nut is pressing against the backside of the firewall. Carefully start the bolt into the nut and hold until the barbs bite into the wood.
 - After the nuts bite into the wood, push firmly on the screwdriver to keep from stripping the cross slots in the head.

3) Inspect the bond of the inner ply firewall to the backside of the fiberglass firewall. If this does not meet your building standards, reinforce with epoxy and/or glass cloth.

Engine Installation

Sequence of events in this section:

- Initial Cowl fitting
- Positioning and installing the engine
- Assembling and installing the fuel tank and fuel lines

Additional components you may need from the hobby store:

“Pitts” style muffler, Top Flight ‘In Cowl’ muffler or muffler extension for two cycle motors

Initial Cowl fit

1. The cowl is secured with six #2 x 1/2” (#17) washer head screws. You may choose your own spacing around the circumference. See steps below.
 - We put two top screws 3” each side of center, 2 side screws just up from the bottom corner radius, and saved the last two screws for positioning after the bottom of the cowl is cut away later to fit your muffler.
2. The firewall has a built in offset for engine thrust. The width of the ‘joggle’ over which the cowl sits varies from 5/16” on the starboard side to 1/2” on the port side. You ideally want the screws holding the cowl in place to go into the plywood behind the firewall & the firewall is not parallel to the ‘joggle’ (The joggle is square with the fuselage so that the cowling sits straight.)
3. To determine the mounting holes distance away from the edge of the cowl, measure on the fuselage, from the edge of the joggle to the firewall, at each planned screw location, and make a note of the distance. (Write on a piece of tape and stick it next to the spot!)
4. Slide the cowl over the ‘joggle’ at the front of the fuselage and tape the cowl in place. Site from the front of the fuselage to be sure the cowl is not rotated.
5. Measure from the back edge of the cowl, at the same spot you measured in step 2, and subtract 1/8”. This will ensure that the screw will enter the plywood behind the firewall.
6. Mark and drill the mounting holes, 1/16” (1.5 mm), and test fit the cowl with the screws. Remove the screws and drop some thin CA into the holes (actually best done from inside the fuselage in the space between the fuselage and the ply.)



Positioning and Installing the Engine

The objective of this section is to place the engine on the firewall so that the back of the spinner clears the front of the cowl by 1/16” (1.5mm), and the spinner is centered on the cowl. Our instructions will work for all brands of engines.

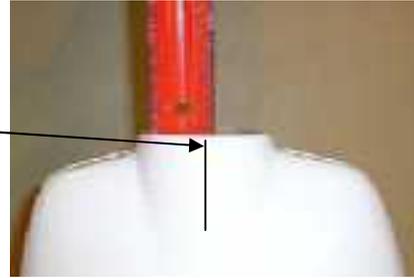
A) Positioning the engine fore/aft (front to back) on the motor mount

1) Place the cowl on the model and secure with a few screws.

2) Measure from the firewall to the front edge of the cowl through the center opening. It is approximately 5 9/16" (142 mm) The firewall has a 2 degree offset built in, so measuring from the center is important.



3) Place the motor mounts on a work bench or piece of wood so that the short legs overhang, and raise the mounts enough so that when the motor sits on the rails, it will not bottom out on the bench.



4) Make sure the rails are square with the bench or wood, and the legs are touching the facing surface where they overhang. Place the engine squarely

between the rails and position it so that the distance from the rear of the rails to the front face of the thrust washer is the same as you measured in step 2 above, and then move the motor forward 1/16" (1.5mm). You are better to err moving forward too much, than too little.

5) Mark the engine hole locations (we like using a 'Transfer Punch') and drill straight through. Secure the engine with 4-40 bolts and washers & locknuts.

B) Positioning the Engine Assembly on the Firewall and Preparing for Fuel Tank Installation

We like the direct method of positioning the engine/mounts, as opposed to measuring. That is, we'll put the engine/mounts assembly under the cowl, position it and mark the location. (This is easier with a second set of hands.)

First test that the back plate for the Aluminum spinner (supplied in the U.S. Pack) slips over the prop shaft - be sure it's a close fit, and easily removed. (A bushing is packed with the spinner nut.) Then read '1 through 10' below before starting.

1) Remove the cowl and stand the model on its tail (preferably on a pad.)

2) Place the engine/mount assembly on the firewall so that the cylinder exhaust faces the bottom of the aircraft (i.e. laying 'sideways') and the prop shaft is somewhat centered.

3) Place the cowl over the engine and ensure correct position with at least two screws.

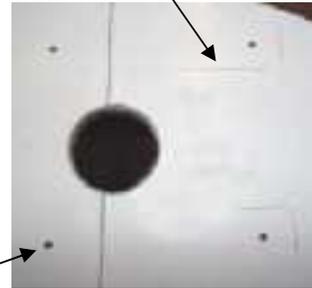
4) Move the engine by the prop shaft so that the spinner back plate is centered on the cowling and the cylinder is either horizontal or clears the inside of the cowl. Cut away the cowl as necessary for your engine.



5) Press down on the engine shaft to prevent the engine from moving and mark the corners of both the upper and lower engine mounts against the plywood.

6) This is also a good time to verify the back plate clearance with the cowl. If the back plate rubs on the cowling you can shim the engine mount forward with either washers or a thin piece of ply.

7) Remove the cowling, replace the engine/mount assembly and mark the engine mount holes. Then drill a small pilot hole through the firewall, followed with a 3/16" (4.5mm) drill in 4 places.



8) Install the engine mount with four 8-32 socket head bolts (# 7), four No. 8 washers (# 9) and four 8-32 blind nuts (# 19) through the engine mounts into the blind nuts which you place from inside the fuselage.

- Depending upon your engine selection you may find that the lower blind nuts may come very close to the fuel tank platform, requiring trimming of the flange on the nut, or carving clearance in the platform

9) This is a good time to locate and drill a 5/32" (4 mm) passage hole for the throttle pushrod. For most two cycle engines, a good place to put the hole is to the left of the lower engine mount. This will clear the fuel tank to be installed next.

(Remember to position the hole high enough to clear the tank platform inside.) The exact location will depend upon your choice of engine and its throttle arm position. Remember that

the fuel tank will be behind the firewall. Look ahead to the next section to see where the fuel tank sits. In the picture above we lined up the hole with the carburetor throttle arm (beneath the carburetor) using a long drill.



10) Drill a 3/16" dia hole on the opposite side for the fuel fill line.

Installing the fuel tank

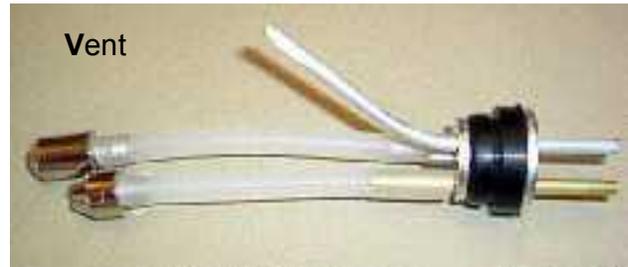
1) Referencing the pictures below and following steps, assemble the fuel tank so that the flat side with "260 CC" becomes the top. Replace the fuel line supplied with the tank (which may be hidden in the tank) with a piece of the fuel line supplied with the U.S. Pack. (It's better quality.)



2) You will need to gently bend one long piece of tubing to reach up to the inside top of the tank to create the vent line. The short fuel pickup piece enters straight in. Mark the large outside metal disk with (O)utlet and (V)ent and

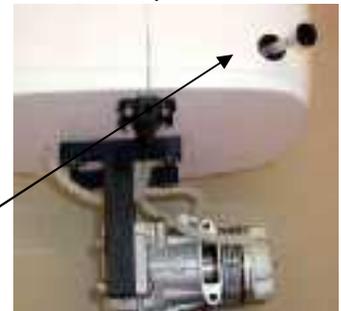
(F)ill so you know which tube is which. Do not tighten the plug screw yet.

- Your kit was supplied with the optional DuBro 'Fill-it Fueling System' in the U.S. Pack. Use the DuBro third piece of brass tubing to enable remote refueling. Follow the ~~Installation~~ **Installation** directions on DuBro's package to install the filler.
- Use the DuBro clunk on the fuel pick-up line (**Outlet**), and the clunk ~~Fill~~ **Fill** packed with the tank for the **Fill** line.



- 3) The rubber plug fits tightly and a flat blade screwdriver (used carefully) around the groove helps to get it in the hole.
- 4) Making sure that the vent tube is pointing to the top of the tank and the clunk does not hit on the inside back end of the tank, tighten the plug screw until it is snug and the plug is firmly held in place. The plug expands between the two metal disks to create the seal.
- 5) Cut a small piece of foam (not supplied) approximately 4" x3" (100 x 75 mm) on which the fuel tank will sit, atop the tank platform
- 6) Note that the tank platform has slots in it. Position the fuel tank between the slots and all the way forward so that the tank neck extends into the large hole in the firewall. Retrieve the two nylon tie wraps (# 23) and secure the tank in place on the foam.
 - Positioning the loops in the slots first and starting them to the first or second 'click' is an easier way. After the loops are in place you can slide the tank into position.
 - Make sure the tank is right side up and all the way forward. Pull the tie wraps tight anchoring the tank in place.
- 7) Install the fuel lines
 - a. Cut a piece of silicon tubing supplied in the U.S. Pack to fit between the tank outlet and the engine fuel inlet.
 - b. Cut a piece of silicon tubing to fit on the Vent line to be used to reach the muffler pressure outlet. (Estimate this as best you can at this point.)
 - c. Use the remaining fuel line to connect to the (F)ill tube of the tank and pass back through the firewall to connect to the DuBro 'Fill It Fuel System' in the next steps. (Cut the end of the tube at a sharp diagonal to help feed it through the firewall) but leave it as long as possible.

- 8) Install the DuBro 'Fill It Fuel System' (Fuel Dot) in the U.S. pack by making a 7/16" dia hole in the lower forward section of the fuselage. This hides the dot under the fuselage but is still easy to reach. Decide which side you would like it on, depending upon how you like to service your model. Remember you are working upside down! (We actually prefer it on the other side from the picture, and that's how we realized we should remind you that the model is upside down!) Follow the instructions on the 'Fill It' packaging to complete the installation.



Stabilizer and Rudder Installation

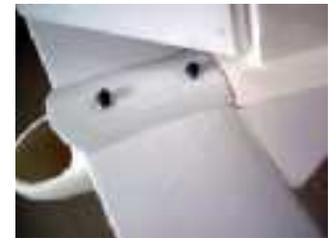
Sequence of events in this section:

- Attaching the Stabilizer to the Fuselage
- Hinging the Elevators and Rudder
- Attaching control horns to the Elevators and Rudder

1. Retrieve the Horizontal Stabilizer and Center Cover Block. Remove the covering from over the two mounting holes found on each piece.



2. Test fit the stabilizer into position (the delta fins match the contour of the fuselage.)
 - a. Test that the holes in the stabilizer and cover block line up with the holes in the fuselage. (Use the M4 x 40 mm (#22) socket head bolts for this.)
 - b. If there is slight misalignment, check the stab and cover block for fit independently with the fuselage, and then with each other. Adjust the holes for angular alignment if necessary and open the fuselage hole to 3/16 or larger if desired. (The body of the blind nut is 3/16" dia, so making the hole slightly larger is also ok. (There is some flexibility if you end up slotting a hole, as the seated blind nut will finalize the position.)



3. To mount the stabilizer two M4 Blind nuts (# 21) will be installed in the stabilizer platform, positioned inside the model through the big hole behind the platform.
 - a. Pull them into place using the M4 socket head bolts (# 22) and a # 6 washer as a backing plate.
 - b. Use a scrap piece of 3/4" wood with a 3/16" hole in it – this will space out the bolt head so the threads do not bottom out on the blind nut before it is tight. Do not use the stabilizer and Cover Block to pull the blind nuts into place!
 - c. Put a few drops of medium CA on the outside of the blind nut barrel and flange before installing.



4. Install the stabilizer using the M4 bolts and washers. (See picture above)
5. If you are building the Conventional gear (tailwheel version): If not, skip this step.
 - a. Retrieve the 1/4" x 1/2" x 2" hardwood tail wheel mounting block from the U.S. pack.
 - b. Scuff sand inside the bottom of the fuselage through the hole behind the stabilizer. 1/4" each side of the bead of adhesive and 2" long.

- c. Generously cover one side of the wood with epoxy and 'bed' the piece in epoxy lengthwise at the tail end, inside the fuselage. Mix up enough epoxy to fill the gap under the hardwood and completely seat the piece.
 - d. Place the piece forward from the tail end of the aircraft about 3/4" so that it does not sit on the inside radius at the back of the fuselage.
 - e. Mark the location of the mounting block on the outside of the fuselage.
6. Install the elevator by marking the hinge locations, trimming away covering from the slot, drilling the 1/16" 'wicking hole', placing the CA hinges in the slots with pins to prevent entering more than half way and finally bonding with thin CA.

7. Retrieve the rudder, and with CA hinges temporarily in place, lay alongside the vertical stabilizer (fin) to mark the location of where the hinges will be installed in the fin.



8. Using the hot soldering and/or razor knife, prepare the slot areas in the center line of the fin to accept the hinges. Finish hinge preparation by drilling a 1/16" hole in the center of each slot.



9. Remove the rudder and the CA hinges from the rudder and trim away the covering and drill the slots for hinge bonding into the rudder.

10. Replace the CA hinges with pins in the mid points and slide the rudder into place into the fin. Position the rudder vertically so that you have minimum yet adequate clearance where the rudder overhangs the top of the fin.

11. Remove the pins and bond the rudder hinges using thin CA

12. Install the rudder control horn.

- a. The horn is positioned on the Port side, 1" up from the bottom of the rudder, with the flat side of the control arm parallel to the length of the fuselage.
- b. We have supplied two 2-56 x 1" machine screws in the U.S. Kit, as the thickness of the rudder is just slightly wider than the length of the M2 x 20 mm (#2) control horn mounting screws supplied in the kits standard hardware pack. (Drill out the backing plate holes to 1/16" to enable threading into the holes.)



Install Pushrod Housings: Elevator, Rudder and Tail Wheel Steering

We have supplied an upgrade package of Sullivan semi-flexible pushrods, housings and clevises. These traverse the bends in the tubing more easily, but require some soldering to attach the ends. Solder is also used to stiffen the cable outside the housing where it may travel unsupported for a few inches. You may choose to use either the supplied standard pushrods or the Sullivan rods. In any event, if you are building the tailwheel version you will require at least one of the Sullivan rods. The pictures in this manual show the standard rods.

Elevator Pushrod Housing

- 1) Retrieve the three pack of Sullivan pushrods and housings. Measure the diameter of a housing and using the indentation molded into the fuselage as the forward most point, drill a hole and cut a slot aftward the width of the housing for a length of 1 ½" (40mm). The housing will be bonded in this slot.
 - a. With 1 ¾" of housing extending from the slot (to partially support the pushrod back towards the elevator) scuff sand the nylon tubing where it will exit the fuselage, to allow better adherence of the epoxy
 - b. Insert the housing into the slot, 1 ¾" exiting and tuck the other end into a hole in

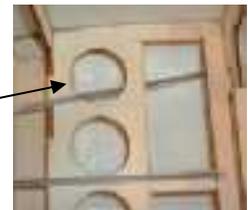


the servo tray on the same side of the model (this is to help hold the housing into the slot.)

- c. Epoxy the housing into the slot. Tape the exiting end into an optimum position and allow to dry.
- 2) Install the Elevator control horn under the starboard side and in line with the pushrod housing.
 - You can slip the pushrod into the housing to project the placement of the control horn.

Rudder Pushrod Housing

- 3) Retrieve a second pushrod and housing. Measure the diameter of the housing and using the indentation molded into the port side of the fin on the fuselage, drill and cut a slot aftward the width of the housing for a length of 1" (25mm). The housing will be bonded in this slot.
 - a. You may leave a few inches extending from the slot – as it will be cut flush after bonding. Scuff sand the nylon tubing where it will exit and along the length of the slot to allow better adherence of the epoxy
 - b. Insert the housing all the way into the slot with a couple of inches exiting, and tuck the other end into a hole in the servo tray on the same side of the model (this is to help hold the housing into the slot.)
 - c. Epoxy the housing into the slot. Tape the exiting end into an



optimum position for the pushrod if necessary. Clean excess epoxy with alcohol. Be sure to clean under the exiting housing, as you will be trimming the housing flush and epoxy that squeezed under the tube at the aft end may show

after trimming. Allow to dry before trimming.

Tail wheel installation

The steerable tail wheel supplied was originally designed to be operated by a pin in the bottom of the rudder moving in the slot in the control arm. Because the Glastar's unique fuselage is in the way, we need to modify it. We will be using a third pushrod to steer the tailwheel.

Background: A pushrod is installed, similar to the elevator pushrod, only on the opposite (Port) side of the fuselage. At the cabin end near the servos, the housing will be positioned next to the rudder pushrod housing. The pushrod where it exits the housing next to the rudder pushrod will be bent slightly to lie alongside the rudder pushrod. The two are then connected using a collar, which locks them together but still allows adjustment relative to each other. Operation of the rudder servo then drives both the rudder and tail wheel in the same direction.

- 1) Assuming that you previously installed the ¼" x ½" x 2" hardwood tail wheel mounting plate from the U.S. pack, retrieve the tail wheel bracket from the U.S. pack.
- 2) Cut off the steering arm at the bottom of the slot, leaving just a short arm. Drill a 5/64" hole just in from the new end of the arm.
- 3) Install the tail wheel bracket on the center line of the model into the backing plate, using the wood screws supplied in the tail wheel bracket package.
 - a. Be sure the steering arm is in place and projecting to the port side of the model.
- 4) Install a pushrod housing for the separate tail wheel steering pushrod.
 - a. Notch the fuselage as you did for the elevator pushrod, but on the other side.
 - b. Position the pushrod housing in place, laying next to the rudder pushrod in the cabin area, and epoxy the housing into place where it exits the fuselage.

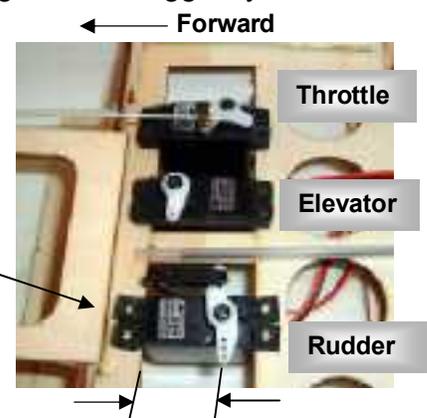


Installing the Radio and Fuselage Mounted Servos

Depending upon the engine you have chosen to install, the location of the throttle servo may vary, which may affect the location of the other servos. In the picture we are showing the planned location of the servos using an OS Max 61 FX engine. We suggest you do a similar test fit.

Logic behind our positioning:

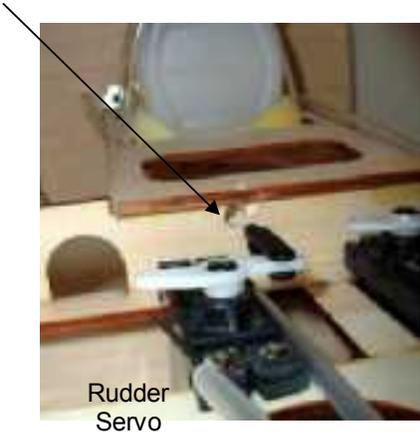
- In the tricycle gear version the rudder servo will be operating the nose wheel from a steering arm that points to the left side. However, it will attach to the right side of the servo arm. As a result, there is a desire to position the servo towards the left side of the model. But to minimize bending of the rudder pushrod keep the servo towards the center of the model, on the left side.



- Note that the servo is mounted with the output arm towards the rear of the aircraft so as to allow clearance for a clevis for the nose wheel pushrod.
 - The elevator servo is near the center of the model to minimize pushrod bending
 - The throttle servo is on the same side as the engine throttle arm. In the picture we have installed the Throttle Wire EZ connector (#5) into the throttle arm and the throttle pushrod wire and housing through the hole in the firewall you drilled earlier.
- 1) After positioning the servos, secure throttle and elevator servos in place using screws supplied with the radio. Wait until after the next step to secure the rudder servo.
 - 2) Tail wheel builders can skip this step. Tri-gear builders: To allow passage of the nose wheel steering pushrod, drill a 1/4" hole in the bulkhead forward of the rudder servo and in line with the second hole in your servo's starboard side output arm. This hole passes beneath the fuel tank platform.

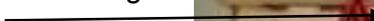
(Please accept our apologies for not laser cutting this hole and having the triangular brace that supports the tank platform where the hole is. We recognize the difficulty in drilling a hole in this location.)

- a. There are three ways we have tested to drill this hole.
 - Use a right angle drill attachment with your electric drill motor. (Now might be the time to buy the one you've always wanted to have. . .)
 - Use a long drill bit through the port side aft window
 - Use a Dremeltm tool with a milling bit
 - Burn it through with a soldering iron – wet the immediate area first.
 - Use a trained squirrel and have him nibble away at the spot. (Well, we didn't test this one . . .)



- 3) Secure the rudder servo in place

Size and Connect the Elevator and Rudder Pushrods.

- 1) Inside the fuselage cut the two rod housings so that they end approximately 2" away from servos, or about 1/2" forward of the aft bulkhead. These will pass through the brace shown, which is not installed yet. 
- 2) Plug the rudder and elevator servos into the receiver. Turn your transmitter on and with trim centered put the servos into the neutral position. Turn off the receiver first, then the transmitter. Physically position the servo arm so that is at right angles with the servo body. Check centering again if necessary.



- 3) Thread a # 28 rod clevis on to the ends of both 2mm x 34" (864 mm) pushrods with a silicon keeper (# 25) rolled up on to the clevises.
- 4) Slide the elevator pushrod into the housing from the aft end of the plane.
 - a. Connect the clevis to the elevator horn
 - b. Center the elevator
- 5) Hold the pushrod next to the servo arm and bend a right angle in the rod at the desired hole location and rotate the rod in the clevis if necessary so that it can enter at right angles to the face of the servo arm (allowing 1/16" (1.5mm) bend allowance). You can either complete a 'Z' bend, or leave it at a right angle and cut the wire off with a minimum 3/16 (5mm) inside leg. Do not attach to the servo arm yet, as you will be installing a brace for the pushrod housing shortly.



6) Repeat steps 4 and 5 for the Rudder pushrod.

- a. Trim the excess length from the rudder pushrod housing where it exits the fin.
 - Because the hinge angle is different from the angle at which the pushrod approaches you will likely require a shallow bend in the pushrod between the clevis and the point where the pushrod exits the fin.
 - The hinge angle also makes the control horn move up and down as the rudder pivots. It is for this reason that we set the attachment angle of the control horn to be between that of the hinge line and that at which the pushrod approaches.



- 5) Tri-gear builders can skip this step. Tail wheel builders: Test fit the steering pushrod with a clevis to the tail wheel steering arm. At the cockpit end, bend the pushrod to a shallow Z bend so as to lie along side the rudder pushrod. (The end must 'move over' the distance of twice the housing wall thickness and lie parallel to the rudder pushrod wire.) Reinforce the bend in the Sullivan pushrod cable by wicking solder into the cable braid.
 - a. Retrieve a 5/32" (4mm) clamping collar and join the two pushrods after aligning the tail wheel and rudder.
 - b. Test for smooth operation of the two in unison by hand

- 6) Retrieve the 1/8" x 1/2" x 8" wood brace found in the U.S. pack. With all pushrods sized and temporarily inserted into their respective servo arms, hold the brace directly above the pushrod housings and mark the position of where to drill two (for tri-gear version) or three (for conventional gear) holes to accept the pushrod housings.
 - Drill the clearance holes for the housing where you marked.



- The tail wheel pushrod 'hole' is actually a 'slot' where the rudder and steering pushrod housings sit right next to each other.
- 7) Remove the pushrods from the servos and slide the brace over the ends and up to the aft fuselage former.
 - a. If you are installing the tail wheel, reassemble the clamping collar over the rudder and steering pushrod wires.
 - b. Install the pushrods into the servo arms and secure with a Kwik Keeper (# 29).
 - c. Bond the brace to the cabin frame with medium CA.
 - d. Bond the pushrod housings to the brace with Epoxy.
 - 8) Double-check the positions of the elevator and rudder (and tail wheel). Adjust at the clevis and collar as necessary to center the control surfaces and tail wheel if applicable.

Nose Wheel Steering Installation (Tricycle Gear Option)

Tailwheel builders can skip to the Throttle Pushrod Installation section, which is next.

The nose wheel steering is operated by a .070" (1.8mm) dia. pushrod wire, which slides inside a nylon tube/housing. The nose wheel steering pushrod requires a hole to be drilled in the firewall, through which the nylon housing/steering wire will pass.

Temporarily install the nose gear with the steering arm in place. Orient the arm so that the bushing is towards the bottom, and the angled sides of the arms are towards the firewall.



- 1) Referring to the picture, drill a 5/32" (4mm) hole in the firewall behind and just above the steering arm (on the port side of the model.) Lay the drill across the top of the arm even with the outer most hole on the steering arm. This will offset the tube just enough to allow the bend in the wire and not bind as the arm moves close to the firewall.
- 2) Locate a length of clear Nylon rod housing and feed into place through the new hole. Cut so that it fits flush at the firewall and goes through the hole you drilled in the frame (The one you used the squirrel for), just in front of the rudder servo.
- 3) Scuff sand the pushrod housing at the firewall end, and epoxy in place at the firewall. (Slide the housing forward a little; placing epoxy on the tube and sliding it back to flush –drawing the epoxy into the hole while rotating it. Be careful not to get epoxy in the tube, there are easier ways to have a fixed nose wheel!)
- 4) Assemble a clevis and silicon keeper to the 20" (508 mm) pushrod wire.
- 5) After the epoxy has set on the housing, slide the pushrod assembly, wire end first, into the housing from the cockpit end.

- 6) Attach the clevis to into a hole on the starboard side of the rudder servo arm. Electrically center the rudder servo, and mechanically center the nose wheel gear and steering arm.
- 7) With the pushrod extending through the firewall and laying over the steering arm, mark and bend a Z bend in the end of the rod to fit the outermost hole in the steering arm.
- 8) Drill the hole in the steering arm to 5/64 " to fit the steering wire if needed.



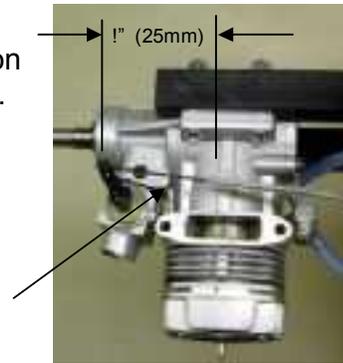
- 9) Slide the nose gear out of the blocks to remove the steering arm and then reassemble with the z bend threaded through the hole in the arm.



Throttle Pushrod Installation

The throttle is operated by a .050" (1.3mm) dia. pushrod wire, which slides inside a nylon tube/housing. Installation will vary, particularly if you are installing a 4 cycle engine.

- 1) Retrieve the nylon housing and slip it through the hole in the firewall and cut to size so that inside the fuselage the housing stops at the frame supporting the aft end of the fuel tank platform, and forward extends to within approximately 1" (25mm) of the engine throttle arm.
- 2) Retrieve the pushrod wire. Bend the end at a right angle making a ¼" leg and use a Kwik keeper (# 29) to secure. Insert the leg so that it points away from the centerline of the aircraft. This will 'spring load' the rod so that if the keeper is lost, it will 'fail safe' and not fall out of the hole. Alternatively you can bend a 'Z' bend on the end of the wire to fit the engine throttle arm. (Which will likely require removing the throttle arm on the engine, or the engine itself to allow connection).
- 3) If not previously done, retrieve the EZ Connector for the throttle rod. (# 5) and fit to the outermost hole in the throttle arm by removing the arm from the servo. Be sure to use a washer on the bottom side of the servo arm and secure with Loctite or similar thread locker. (Since this part rotates as the arm moves the nut must be protected from loosening.) The barrel of the connector should rotate smoothly in the hole in the servo arm.



- 4) Turn the radio on with the throttle servo plugged into the receiver. Move the throttle stick to full throttle and turn off the radio, transmitter last. (Be sure to verify direction of travel required for your engine throttle operation and reverse the servo operation as necessary with your transmitter settings.)
- 5) Slide the EZ Connector/servo arm over the throttle wire and position the servo arm on the servo output splines so that full travel will close the throttle. Replace the servo arm center screw. Snug the Allen screw securing the wire. Test the entire installation to be sure the throttle moves full travel and full down trim closes the throttle entirely. If you must err in one direction, slight over-travel when pushing the rod will spring the rod slightly, which is more acceptable than straining on the rod when pulling. If you have a computer radio the better way is to set the control throw exactly.
- 6) Bond the nylon housing tube to the firewall so that it will stay where originally positioned. Allow the end near the servo to move with the servo arm. Notch clearance in the frame if necessary to ensure alignment of the pushrod with the servo arm.
- 7) If you have not done so already, connect the fuel line to your engine carburetor.

Install the Main Landing Gear

- 1) Retrieve the main formed aluminum gear and DuBro Spring Steel Axle Shafts in the U.S. Pack.
 - a. Cut them to length. Cut off approximately 3/8" (9.5 mm) so that the axle portion measures 1 1/2" to 1 5/8" (38 – 41mm)
 - b. Install the axles into the aluminum gear as shown.



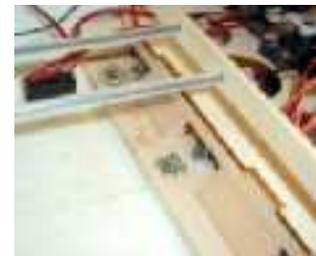
Main Gear Installation Tricycle Version (Conventional gear skip to next section.)

- 2) Position the landing gear on the bottom of the fuselage in the molded recess. Center the gear with the taper forward.
- 3) Pilot drill 11/64" (4.4mm) six holes into the fuselage using the landing gear as a template.



Use (a # 11) M3.5 x 20mm bolt as you drill each hole to help hold position. Remove the landing gear and drill out the holes to 7/32" (5.5 mm)

- 4) Install the landing gear with the M3.5 blind nuts (#10) and M3.5 x 20mm bolts (#11) through the landing gear into the fuselage.
- 5) You can use a small scribe, awl or screwdriver to help position the blind nuts. Then lay the tool across the top of the nut to hold in position while starting the bolt. Place a few drops of medium CA under the nuts before pulling them tight.



- 6) Retrieve the balsa corner brace from the U.S. pack and cut two pieces 1 5/8". Glue these two corner braces along the ply landing gear plate where it intersects the backside of the rear cabin frame.

Main Gear Installation - Conventional Version

- 1) With the fuselage upside down, measure forward from the **AFT** edge of the tricycle gear molded recess 7 1/4" (184 mm). Do this both sides of center and mark this location.
- 2) Position the landing gear, **Forward Edge to the marks**, centered and with the taper forward.
- 3) Pilot drill six holes into the fuselage using the landing gear as a template, using an 11/64" drill (4.4 mm)
 - Drop in a # 11 M3.5 x 20mm bolt as you drill each hole to help hold position.



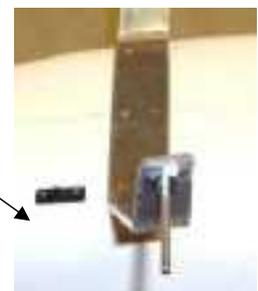
- 4) Remove the landing gear and drill out the holes to 7/32" (5.5 mm).
- 5) Install the landing gear with the M3.5 blind nuts (#10) into the ply landing gear plate and M3.5 x 20mm bolts (#11) through the landing gear into the fuselage.
- 6) Inside the fuselage glue the balsa triangle brace in the U.S. Pack to the front side of the forward fuselage former and the ply landing gear plate.

Completing the Radio Installation

In this section we secure the receiver, install the switch/charging harness, and run the antenna.

- 1) You will need two "Y" connectors for your receiver; One to operate the flaps, and the other to operate the ailerons. (Previously identified in "Building the Wing" section)
 - a. Plug-in all connectors to the receiver and secure
 - i. Aileron Y
 - ii. Flap Y
 - iii. Throttle Servo
 - iv. Rudder Servo
 - v. Elevator Servo
 - vi. Battery pack into switch
 - vii. Switch into receiver (*secure junction with tape or heat shrink tubing.*)

- 2) Install the switch harness. We like the position just aft of the tri-gear landing gear mounting pad on the bottom where it is less visible.
- 3) Wrap the receiver in foam and secure the foam with duct tape or equivalent. The receiver should be able to 'float' a little inside the foam.



- 4) Position and secure the receiver with a tie wrap.
 - Consider your wire routing at this time to minimize visibility of the wires in the cabin through the windows
- 5) Route the receiver antenna. We extended the antenna through the fuselage exiting underneath the elevator and taping the overhang to the aft end of the fuselage.
- 6) We will use the battery mounting to assist with the weight and balance of the aircraft. As such, we leave this to you to determine the best position for your model. You will want to wrap the battery in foam, and tape, again allowing 'float' for vibration isolation. You can secure the battery in your choice of location using Velcro, Tie-Wraps, adhesive backed wire tie anchors, etc. Just remember that it has a certain amount of mass, and you don't want it coming loose in the cockpit during your, no doubt perfectly coordinated, ball centered, aerobic routines!

Installing Main Gear Wheel Pants – Both Gear Configurations

Wheels are assembled to the axles using collars to prevent them from slipping off. Main gear wheel pants are retained using brackets that are installed in the wheel pant. This method absorbs impacts by allowing rotation of the wheel pant, rather than breaking it.

1. Retrieve from the U.S Pack (2) Sullivan wheel pant mounting brackets. These brackets will be installed on the inside of the wheel pant.



2. Using the 5/32" drill to simulate an axle shaft through the previously drilled hole, position the bracket on the outside of the wheel pant and mark the location of two mounting holes. Remove the bracket (or use it as a template) and drill two 1/16" (1.5mm) holes. (*DuBro retainer shown in pictures, Sullivan installation is identical.*)



3. Assemble the bracket bolt and nut as shown in the above picture. Position the bracket flat side against the inside of the wheel pant, and secure using two #2 x 3/8" screws from the outside. (Using the drill shank again helps with alignment.)

4. Slide the wheel pants and wheels on the gear and trial fit/trim the wheel pant openings as necessary for access to the wheel pant bracket bolt and to facilitate putting the wheel retaining collars in place.



5. Secure the wheel pants, and retaining collars so that the wheel spins freely, and the wheel pant is snug to the axle shaft.

Installing the Nose Wheel and Wheel Pant/Fairing (Tricycle Version)

The nose gear wheel pant fits the shape of the nose gear wire and is held in place by a nylon gear strap.

- 1) Trial fit the nose wheel fairing on to the nose gear with a wheel collar, the nose wheel and a second collar.
 - a. You will likely have to cut a vertical 'notch' in the angled leg to allow the wire to recess into the angled portion of the fairing.
- 2) Position the Nylon gear strap (#27) over the two ply pieces bonded in earlier, and drill two (2) 1/16" dia (1.5mm) pilot holes.
- 3) Using two No. 2 x 3/8" (# 4) screws, attach the gear to the fairing with the wheel pant retainer.
- 4) Reassemble the nose gear into the bearing blocks, being sure to properly orient the steering arm and the Z-bent steering pushrod. Do not tighten the setscrew on the steering arm yet.



Final Cowl Fitting

- 1) Install your choice of muffler. We used a Slimline muffler on an OS 61 Engine.
- 2) Verify that the cowl fits properly over your selected engine, and provide openings as necessary for glow plug ignition access, needle valve access, and muffler exhaust (The opening for the exhaust provides the exit for cooling air)
- 3) If building the tri-gear version, while trial fitting your cut-outs for the muffler, set the nose gear height so that the coil in the leg just clears the bottom of the cowl. (See picture above - muffler not shown)
- 4) After adjusting the height, tighten the set screw in the steering arm to retain height.



Wing Fitting

- 1) Retrieve the wing assembly (wings assembled into the center section) and make sure the clamping screws through the leading edge of the center section are secure.
- 2) Fit the wing into the wing saddle by inserting the dowels on the center section into the leading edge holes in the fuselage and lower the trailing edge over the blind nuts.
 - a. Some adjustment is likely due to a build up of tolerances. Looking through the trailing edge holes, if the wing needs to move sideways, slot the dowel holes in the fuselage horizontally to the appropriate side.
 - b. If the trailing edge requires pressure to seat, carefully slot vertically the dowel holes in the fuselage at the top of the radius.
 - c. Double check that dowels are of sufficient length to ensure safe wing retention.
 - d. Pass an 11/64" drill through the wing trailing edge holes into the fuselage.
- 3) Retrieve and install two 8-32 blind nuts (# 8) in the holes underneath the trailing edge of the wing saddle on top of the fuselage.
 - a. Put a few drops of medium CA on the barrel to help retain the nut in the hole
 - b. Start them into place using the 8-32 bolt and washer provided.



Stop after the nut starts to seat – don't crush the wing! (Cont'd)

- c. Remove the wing and finish pulling the nuts directly against the fiberglass with a washer under the head of the bolt.
 - Note that one side of the nut's flange will intersect with the triangular balsa reinforcement. You can just pull the nut tight; The CA glue and compression will hold it in place.

- 4) Check fit of the wing using the two 8-32 x 1 1/4" wing mounting socket head bolts.

Strut Attachment

- 1) With the wing in place retrieve the two 6-32 x 3/4" socket head screws (#3), the two struts and two 6-32 blind nuts from the U.S. pack. (We enhanced the kit after it left the factory to have machine threads securing the struts on the cabin side – which were originally wood screws into the plywood – hence the 6-32 bolts packaged separately.)
- 2) Each strut has an end with a shallow and sharper bend.
 - a. Secure the shallow bent end to the hole in the wing with a 6-32 (#3) socket head bolt.
 - b. Swing the strut against the fuselage and determine the exact location to secure the other end, aft of the door into the plywood bonded to the inside of the fuselage.
 - c. Twist the strut end at the fuselage to lay flat against the fuselage by holding the metal end with a pair of needle nose pliers right next to the covered wood, and twist the metal bracket with another pair of pliers.
 - d. Mark, through the strut hole, on the fuselage the position to drill.
 - e. Drill a 5/32" (4 mm) hole which will accept the blind nut from the inside.
 - f. Install the blind nut, pulling it into place with the 6/32 bolt.
 - g. Repeat for the other strut



Painting

If you wish to paint your model, now is a good time to do it – before installing the windows and after you've manhandled it while building it.

Your models flying surfaces are covered with a premium quality polyester covering made in Germany known as Oracover. In the U.S. it is popularly known as Ultracoat™.

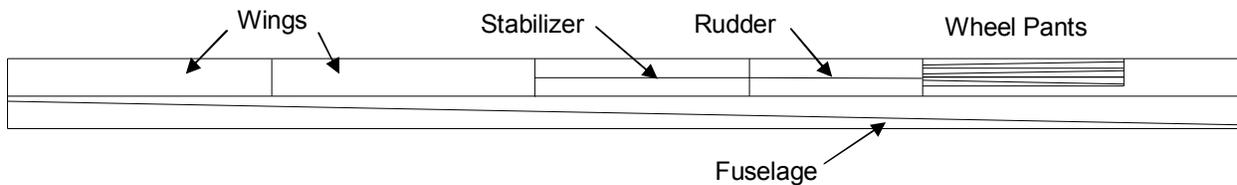
If you paint the model there is a 'best practice' technique for ensuring the best possible bond to the polyester film. Our recommendation is to visit the Top Flight Models web site and read/print their instructions for painting Monokote (a similar product). The address for their instructions is: <http://www.monokote.com/lustrekote/painting-tips/topr7200tip1.html> In a nutshell, the process is to scuff sand the film with 00 steel wool so that a mechanical bond can be made to the film. A primer may be applied and then the top coat. They recommend the use of their Lustrekote paints, which have been tested for adhesion and glo fuel resistance.

Painting of the fiberglass parts is straight forward: Sand with 320 – 400 grit wet dry sand papaper and a little bit of dish detergent. Rinse and dry. Mask, prime with a suitable fiberglass primer and paint with a fuel proof paint.

If you are not modeling a specific aircraft, you may choose to finish off the model using the trim colors we have supplied. The model comes with two (2) sheets of Vinyl trim, which transforms the model significantly! The sheets are computer cut and you will want to orient the pieces to the diagrams below before removing the pieces.

You can use the box cover picture as an example. We used the primary color as the bottom stripe on the fuselage and outside stripes on the wings and stabilizers. The dark Grey is the thinnest stripe and makes a good transition to the lighter silver color. Note that you can cut a curve into the stripes after they are applied to add a different dimension to the look. (We did that at the very front of the stripes, creating a upward sweeping effect.)

Color Trim



Gray Trim - Layout is identical to the color stripes, only thinner.

Decals: The Glastar emblem may be placed either on the tail, or on the fuselage just aft of the cowling in line with the striping, which you would remove in that section. The black rectangles simulate the ceiling windows in the center wing section aft of the spar.

Windshield and Windows Installation

- 1) Remove the wing to gain access to the inside of the fuselage
- 2) Trim the fiberglass around the windshield opening so that all edges are smooth and straight.
- 3) Retrieve the molded window sheet. Cut out each window from this sheet, .3/8" (10mm) outside of the molded shape. (So you have a 'flange'. You will be bonding this flange to the inside of the fuselage so that the windows sit flush.
- 4) Test fit each window in its respective opening and then bond in place with medium CA. If the opening is too small, try sanding a little bit all the way around.
- 5) Retrieve the windshield and trim along the score lines molded into the part.
 - Making a first cut 1/4" (6 mm) wide of the score line will make it easier to trim to the final line.
 - Our model used for this manual had a tight windshield at the cabin top. Inspection of production revealed a tooling issue which we are looking into. Using a heat gun at the upper corners and re-forming the windshield at these corners works very well.
- 6) Secure the windshield in place with four No 2 x 1/4" washer head screws (# 18).

Recommended Propeller Sizes

A fully scale propeller on the model would measure 1/5th of 70" or 14". We recommend as large a propeller as possible (and a correspondingly finer pitch) so that it extends beyond the sides of the fuselage and good 'traction' is provided.

	.60 - .65	.80 - .91
2 Cycle	13 x 5	14 x 6
4 Cycle	14 x 5	14 x 6

Control Throws

We recommend the following control surface movement for the initial flights:

Rudder, measured at the top of the Rudder trailing edge, each side of center: 1/2" (12 mm)

Elevator, measured at the trailing edge near the rudder, each direction from center:

Dual Rate On: 1/2" (12 mm) Off: 3/4" (18 mm)

Ailerons, measured at the wing tip end, each side of center:

Dual Rate On: 1/2" Off: 11/16" (17 mm)

Flaps, measured at the trailing edge from top of wing to top of flap: 5/8" (16 mm)

Weight and Balance – This is probably the most critical assembly step you do!

We recommend setting the balance of the model at 2 3/8" (60 mm) " aft of the leading edge, which is 28% of the chord line. Moving the balance point further forward will increase the pitch stability of the model – not a bad thing given the huge elevator area, reasonably short coupling and narrow chord line of this aircraft. None-the-less, the CG we are suggesting assumes this is not your first airplane and we'd like you to be pleased with the performance. Moving the balance point aft will decrease the pitch stability, giving a livelier feel - at the risk of being able to easily over-control the aircraft. Try our setting and then feel free to experiment.

Bench Pre-Flight

In case we didn't mention it before:

- Make sure all clevises have their silicone keeper rings in place and as close to the servo or control arm as possible.
- Install the radio 'On-Off' switch if you were waiting until after the trim was done.
- Make sure all servos have their output arms held in place by the center screw
- Be sure the steering arm has been tightened – consider using Loctite to secure
- Check that all control surfaces move freely
- Check that control surfaces are at the same relative angles – i.e. in line with the flying surface to which they are attached.
- Check that all control horns are firmly attached
- Check that all control surfaces are firmly hinged by tugging on them
- Put some fuel in the tank and make sure the plumbing is correct
- Check correct operation of control surfaces with your radio – that left is left, etc..
- Go have fun and enjoy safely!