



RYAN ST-A MANUAL



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Parts You Will Need To Complete Kit

- 1 - Rudder Servo (minimum 90 oz. torque) and mounting hardware
- 1 - Large Rudder Servo Arm
- 2 - Elevator Servos (minimum 90 oz. torque) and mounting hardware
- 2 - Aileron Servos (minimum 90 oz. torque) and mounting hardware
- 2 - Flap Servos (minimum 70 oz. torque) and mounting hardware
- 1 - Throttle Servo (minimum 50 oz. torque) and mounting hardware
- 1 - 24 inch Elevator Servo Extension
- 1 - "Y" Extension for Elevator Servos
- 2 - 12 inch Aileron Servo Extensions
- 2 - "Y" Extensions for Flap and Aileron Servos
- 1 - 3 inches 1/8 inch Heat Shrink Tubing
- 1 - 3 inches 5/8 inch Heat Shrink Tubing
- 1 - Engine 3.5 to 5.0 hp: 160 2-stroke glow
200-300 4-stroke glow
40cc-50cc gas
- 1 - Radio Transmitter (minimum 5-6 channels)
- 1 - Receiver
- 1 - Receiver Battery
- 1 - Ignition Battery (if required by engine choice)
- 1 - Switch Harness
- 1 - 3 1/2 inch Aluminum Spinner
- 1 - propeller (to match engine choice)

Note: Loctite everything that doesn't need to be removed or adjusted often.

Test fit all T-Nuts (Blind Nuts) to allow bolts to be easily started by hand and avoid cross threads. A striped T-Nut can be difficult to replace.

Note: Testors Brilliant Red Paint is a close match to the red paint used on this model.

Ailerons & Flaps

Collect these parts:

- 2 - Wings
- 2 - Ailerons
- 2 - Flaps

The Ailerons and Flaps come with Hinges that are pre-installed but not glued permanently. Test fit so that you have 1/16 inch spacing between the Control Surfaces and the Wings' trailing edge. Use Epoxy Glue to secure in place. Remember to make sure they are moving in the proper direction.

TIP: Use a small drop of light oil on the Hinge Joint so that the glue does not get in and prevent it from working smoothly.

Collect these parts:

- 2 - Aileron Servos (minimum 90 oz. torque) and mounting hardware
- 2 - Flap Servos (minimum 70 oz. torque) and mounting hardware
- 2 - 12 inch Aileron Servo Extensions
- 2 - Aileron Servo Hatch Covers (with slots)
- 8 - Small Wood Screws
- 4 - Threaded Push Rods
- 2 - Trumpet Bases
- 2 - Trumpet Washers
- 2 - Trumpet Screws
- 2 - Control Horns
- 2 - Clevises

The Aileron Servos are mounted on the bottom surface of both Outer Wing. Find the openings and use a sharp X-Acto Knife to cut the Covering from corner to corner. Seal and trim the Covering.

Pre-drill the holes for the Servo Screws with a 1/16 inch Drill Bit and attach.

TIP: Strengthen the holes by applying a few drops of thin CA glue.



The Flap Servos are mounted to the back of Hatch Covers. Find the openings on the bottom of both Wings and use a sharp X-Acto Knife to cut the Covering. Seal and trim the Covering the same as you have done for the Aileron openings.



The Flap Hatch Covers do not have cut outs. The screw holes in the Covers and Wing are pre-drilled. You just need to poke a hole in the Covering.

Note: Add a gusset of Epoxy Glue around the base of each Servo Mounting Post for extra strength.

Pre-drill the holes in the Mounting Posts with a 1/16 inch Drill Bit. Attach Servos to the Hatch Cover Mounting Posts using the hardware supplied with your Servos.



Attach a 12 inch Servo Extension to each Aileron Servo. Tie a nut or small weigh to one end of a light string and drop it through the Wing. Tape or tie the string to the Servo Lead and carefully pull it through the wing. You may be able to get the Flap Servo Lead through the Wing without tying a weight.

TIP: Use a 1-1/4 inch piece of 5/8 inch wide shrink tubing over the Servo Extension connection to prevent it coming apart.

Mount the Servo Arms on the Aileron Servos to determine where to position the Trumpet Base at the beveled edge of the Aileron. Mark the location and drill a 3/32 inch diameter hole on these marks.

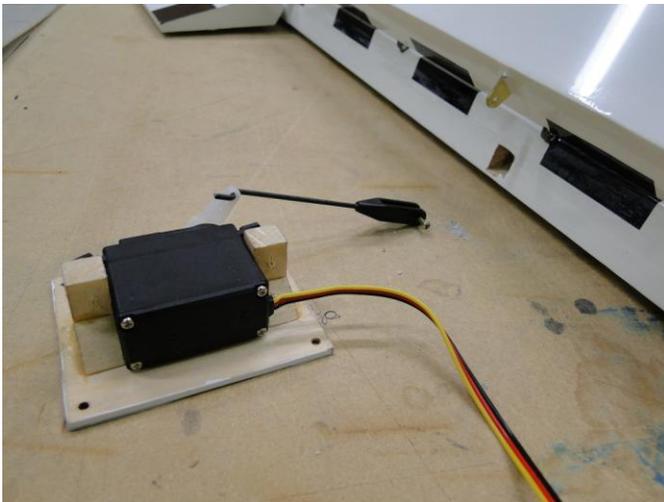
TIP: Strengthen the holes by applying a few drops of thin CA glue in both holes to reduce the amount of Balsa compression.



Install the Trumpet Base with the Trumpet Screw and Washer on the other side of the Elevator. **Do not over tighten.**

Install the Control Horn and Clevis on the Trumpet Base. Thread the Aileron Push Rod into the Clevis and make a “Z Bend” in the other end to install through your Aileron Servo Arm.

Attach a Clevis to each Flap Push Rods and connect to each Flap Servo Arm. Position the Hatch Covers so the Push Rods goes through the hole in the trailing edge of the Wing. Determine the place to make a “Z” bend in the Push Rod and connect with the Flap Control Horn (already installed). Secure both Flap Servo and Hatch assembly to the wing using 4 Small Wood Screws.



Horizontal Stabilizer & Elevators

Collect these parts:

- 1 – Horizontal Stab
- 2 – Elevators
- 1 – Fuselage



Remove the Elevators and Hinges from the Horizontal Stabilizer and set them aside.

Cut away the Covering over the opening on both sides at the rear of the Fuselage and test fit the Horizontal Stabilizer. It must be square with the bottom of the Fuselage.

Insert the Horizontal Stab through the opening and position the Stab in the center so the same amount sticks out both sides (use Ruler). Mark the edge of the fuselage on the upper and lower side of the Stab and then use a sharp X-Acto Knife to carefully cut away the Covering about 1/16 inch inside the lines. Be careful not to cut the Balsa.



Use a slower bonding Epoxy (like 15 to 30 minute) to attach the Stabilizer to give yourself more time to adjust and clean up.

Use a Tape Measure or a String to make sure the Stabilizer is square with the center line of the Fuselage, measuring from each tip of the Stabilizer to the front edge of the Fuselage. Wipe away any excess Epoxy with Isopropyl Alcohol (Rubbing Alcohol).

TIP: Use a bead of Canopy Glue along the base of the joint for a cleaner finish.

Position the Elevator halves so there is a 1/16 inch gap. Use Epoxy Glue to attach the Elevator Hinges.



Vertical Stabilizer

Collect these parts:

- 1 – Vertical Fin
- 1 – Fuselage



Similar to the Horizontal Stab, cut the Covering on the rear of the Fuselage for the Vertical Fin, insert and mark where to cut away the necessary Covering and use Epoxy Glue to attach.

Use a T-Square to position the Vertical Fin at 90 degrees to the bottom of the Fuselage. You may want to tape it in place until it dries.

TIP: Wipe away any excess Epoxy with Isopropyl Alcohol (Rubbing Alcohol) before it hardens.

TIP: If you used Canopy Glue to make a nice finish of the cracks between parts smears can be removed with Goo Gone.

Rudder & Tail Wheel

Collect these parts:

- 1 - Tail Wheel Assembly
- 1 - Fuselage
- 2 - Springs
- 4 - Wood Screws
- 1 - Rudder
- 2 - Rudder Cheeks
- 1 - Rudder Control Horn

Install the Tail Wheel Assembly at rear of the Fuselage on the bottom side with the 2 Wood Screws provided.



TIP: Remove the screws and add a drop of Thin CA Glue to each hole and re-attach the Tail Wheel Bracket. This will help harden the Balsa and stop the Wood Screws from loosening.



Attach the Rudder Control Horn to the Bottom of the Rudder with 4 Wood Screws provided.

TIP: Remove the screws and add a drop of Thin CA Glue to each hole and re-attach the Rudder Control Horn. This will help harden the Balsa and stop the Wood Screws from loosening.

Position the fiberglass Rudder Cheeks at the bottom of the Rudder and trace the edge. Use a sharp X-Acto Knife to carefully cut away the Covering about 1/16 inch inside the lines. Be careful not to cut the Balsa. Use Epoxy to glue the Cheeks into place.



The Rudder comes with Hinges that are pre-installed but not glued permanently. Test fit so that you have 1/16 inch spacing between the Vertical Stab and Rudder. Use Epoxy Glue on the Hinges as you have done before. Remember to make sure they are moving in the proper direction.

TIP: Use a small drop of light oil on the Hinge Joint so that the glue does not get in and prevent it from working smoothly.

You can now attach the 2 Tail Wheel Springs.



Middle Wing & Struts

Collect these parts:

- 1 - Fuselage
- 2 - Wing Fairings
- 1 - Mid Wing Section
- 2 - Wing Struts
- 2 - Strut Fairings



To attach the Fairing to the Fuse side first install the Mid Wing Section with 4 bolts provided (longer ones in front, shorter ones in rear).

Lay the Fairing in place and trace around it with a pencil. This part of the covering is to be removed.



Use a sharp X-Acto Knife to carefully cut away the Covering about 1/16 inch inside the lines. Be careful not to cut the Balsa.





Roughen up the side of Fairing with sandpaper.



Apply Epoxy to the Fairing.

Be careful not to get glue on Wing side of Fairing.



Apply Epoxy to the Fuselage where the Covering has been removed.



Carefully attach the Fairing. Tape in place until the Epoxy sets up.

TIP: Wipe away any excess Epoxy with Isopropyl Alcohol (Rubbing Alcohol) before it hardens.

Repeat for other side of the Fuselage.



Locate the holes for the strut mount and poke a hole in the covering using a pencil at the fuse and mid wing location.



Mount the strut using supplied socket head bolts. Make sure the airfoil shape is pointing forward.



To install the Strut Fairing you will have to cut it back $\frac{3}{16}$ inch so the non-bent end of the Strut will slide through it. You will have to drill a hole in the top of the fairing to reach the Socket Head Bolt inside. Glue the fairing to the Strut with Hot Glue.

Landing Gear & Wheel Pants

Collect these parts:

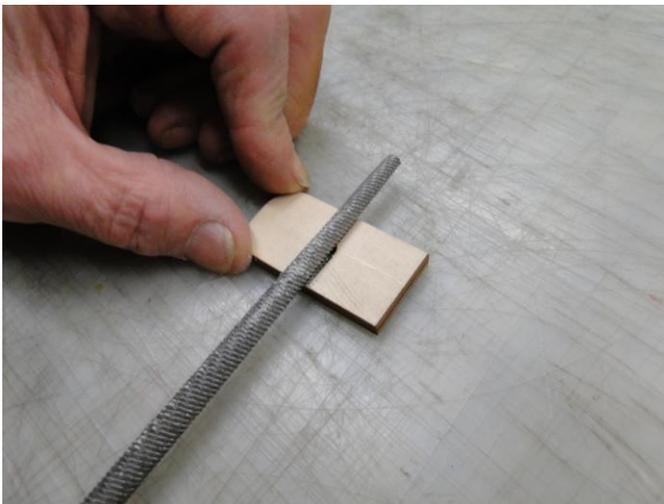
- 1 – Fuselage
- 2 – Outer Wings
- 1 – Middle Wing
- 2 - Wheel Axles
- 4 - Axle Lock Collars
- 2 - Wheels
- 2 - Wheel Pant Assembly (2pcs each)
- 2 - Plywood Wheel Pant Inserts
- 2 - Aluminum Flat Bars
- 8 – Clevises
- Braided Wire Cable
- Mounting straps & screws

Note: Please read through this entire section before starting the mounting of the wheel pant assembly, wires and wing struts.



Cut away the Covering on the bottom of the Wings to allow the Wire Landing Gear to mount into the Wing. Slight bending might be necessary.

A bit of carving may be necessary to the slot so the Wire Gear fully sits into the Wing, especially the edge of the hole to allow for the bend in the Landing Gear Wire.



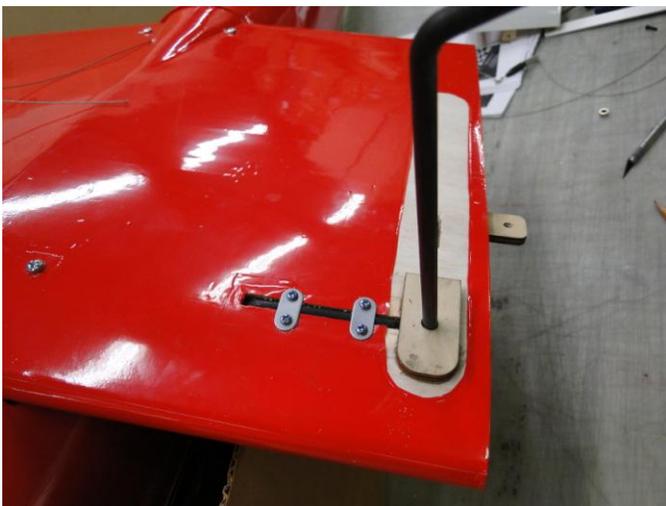
Slide the Plywood Wheel Pant insert over the Landing Gear Wire to see how much grinding or filing to make it sit flat on the wing.



Slide the lower half of the Wheel Pant Assembly over the Landing Gear Wire and push up against the Plywood Wheel Pant Insert and trace around the lower Wheel Pant with a pencil.



Use a sharp X-Acto Knife to carefully cut away the Covering about 1/16 inch inside the lines. Be careful not to cut into the Balsa.



Attach the Straps using Screws supplied.

Glue the Plywood Wheel pant Insert into place with Epoxy Glue.



Use Epoxy to glue the lower Wheel Pant in place, pushed up against the Plywood Wheel Pant Insert.



Install the Aluminum Bar in place and use Screws supplied to secure it to the Wing. Sanding off the paint and rounding the corners will help it fit better.

Blind Nuts are accessible through the opening in the end of the mid wing section.

Mount so the slight bend of the Aluminum Bar leans inward.



Install one Lock Collar on the Axle where the inside of the Wheel would come to rest.

TIP: It is recommended to use Loctite or grind a flat spot on the Axle to attach the Wheel Lock Collars more securely.

TIP: You may have to remove burrs from the end of the Axle using a Dremil Tool so that the Lock Collar and Wheel will easily slide onto the Axle.



Hold the Wheel inside the upper Wheel Pant and twist to allow the Wheel to slide onto the Axle. This will require you to grind off a minimum of 5/16 inch around the opening of the Wheel Pant. The more you lengthen the opening, the more movement you allow the Landing Gear Wire to flex for rough landings.

It will take a bit of work to get the wheel on the axle. It is a very tight squeeze.

Set the upper Wheel Pant into the lower section. There are 2 pieces of wood that are fiberglassed inside the upper Wheel Pant that make a narrow gap for the Aluminum Bar.

Slide on the second Lock Collar and tighten the so the Wheel spins freely between the two Collars.



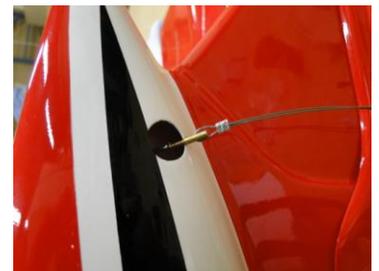
Bend 8 steel straps at a 45° angle. Locate the Blind Nuts on the bottom of the Center and Outer Wings and install Bent Straps using bolts provided.

The location of the Blind Nuts in the Outer Wing Panels is about 2.5 inches and 9.25 inches from the leading edge and 18.5 inches from the root of the Outer Wing. You should be able to feel the depression where the hole is located.

HINT: Use a magnet to find the blind nuts in the wings.



Bend 4 more Straps and mount them on each side of both Aluminum Bars using Bolts and Nuts provided. Access again through the wholes in the Wheel Pants.



Measure and cut the necessary amount of Braided Wire Cable to string between each set of 3 Bent Straps. Crimp the Braided Wire to the Brass Turnbuckles that insert in the Clevises.

Make sure wires are on the tight side and not limp.

Note: You can adjust the lengths of the Cable later with the Threaded Couplers.



Repeat the same process for the Wires on the top of the Wing from where the Strut attaches to the Fuselage.

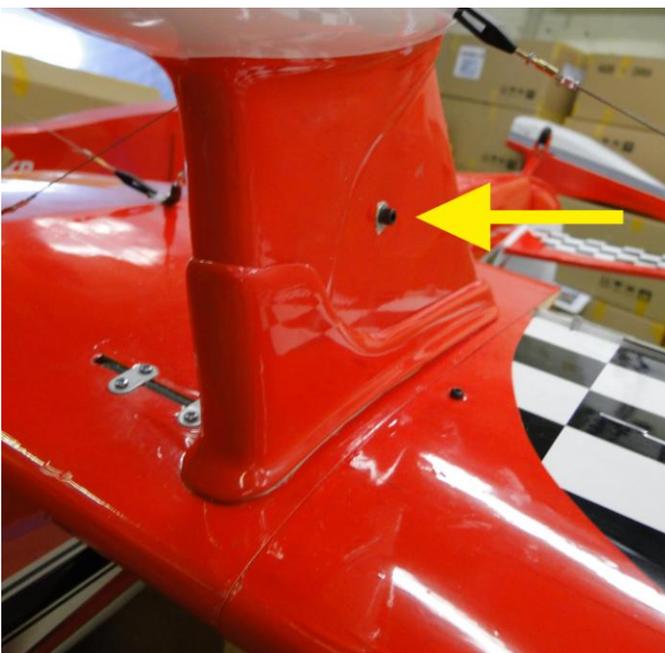
Attach 2 Wire Covers to the Wing with Epoxy Glue. Drill a hole in the tops to access the bolt.



Repeat the same process for the Wires between the two Wheel Pants along the center line of the Middle Wing.

The attachment points are located 3 inches from the Leading Edge and 5 3/4 inches from the Trailing Edge.

HINT: To strengthen these anchor points you could carve out and recess a piece of dowel or hardwood.



To take some of the looseness out of the Wheel Pant assembly we suggest drilling a hole through the Lower Wheel Pant and through the Aluminum Bar using a 8-32 x 3/4 inch socket head bolt, washers and nylock nut.

Rudder Controls

Collect these parts:

- 1 - Rudder Servo (minimum 70 oz. torque)
- 1 - Large Servo Arm
- 1 - Wire Cable
- 4 - Cable Crimp Fittings
- 2 - Clevises
- 2 - Threaded Couplers
- 2 - Threaded Coupler Nuts
- 2 - Trumpet Bases
- 1 - Trumpet Screw
- 2 - Control Horns
- 1 - Fuselage



The Rudder has 2 Trumpet Bases that screw together through the Rudder. Position the Trumpet Base at the edge of the Rudder beveled edge and 1 inch from the bottom of the Rudder and mark. Drill a 5/32 inch hole right through the Rudder. Then drill a 1/2 inch hole through the Fiberglass Rudder Cheek on each side.

Install the 2 Trumpet Bases with the Trumpet Screw. **Do not over tighten.**

***TIP:** Strengthen the holes by applying a few drops of thin CA glue in both holes to reduce the amount of Balsa compression.*



Cut the Cable into 2 equal lengths and thread the Cable through these new uncovered holes in the rear of the Fuselage. Thread one Crimp Fitting over the end of one Cable, then thread the Cable through the outer hole in the your Large Rudder Servo Arm. Fold back the Cable 1 inch and slide the Crimp Fitting over the Cable end. When satisfied with the fit, crimp the fitting. Repeat for the other end of the Servo Arm with the other Cable.



TIP: Use a 3/4 inch piece of 1/8 inch shrink tubing to cover the sharp end of the Cable sticking out of the crimped Joint at both ends of the Cable. You will have to slide this on Cable in advance.

Install the Rudder Servo in the center position of the Servo Tray using the hardware supplied with your Servo and attach the Large Servo Arm with the Cables attached.



Install the Horns, Clevises and Threaded Couplers onto the Trumpet Bases on the Rudder. With the Rudder Servo Arm in the middle/neutral position and the Rudder in the neutral position (hold in position with Masking Tape), thread a Crimp Fitting over both ends of the Cable and through Threaded Couplers as you did on the Servo Arm. Pull both Cables snug, fold them over and slide the Crimp Fitting into position. Pull both Cables snug, fold them over and slide the Crimp Fitting into position.



TIP: An extra loop of the Cable through the Crimp Fitting will make the connection stronger.

Cut a slot $\frac{1}{4}$ inch below the rear servo cutout that is $\frac{3}{16}$ inch wide x $1\text{-}\frac{3}{16}$ inch long.

TIP: Crossing the Cables helpsthe angle of the Wires where they exit the Fuselage.



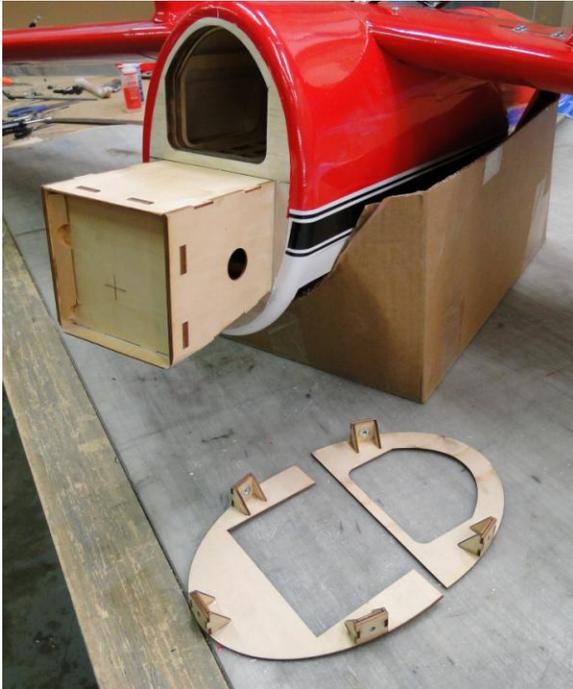
When satisfied with the lengths, carefully crimp the Cable fittings and trim the excess Cable.

Note: You can adjust the lengths of the Cable later with the Threaded Couplers.

Cowl

Collect these parts:

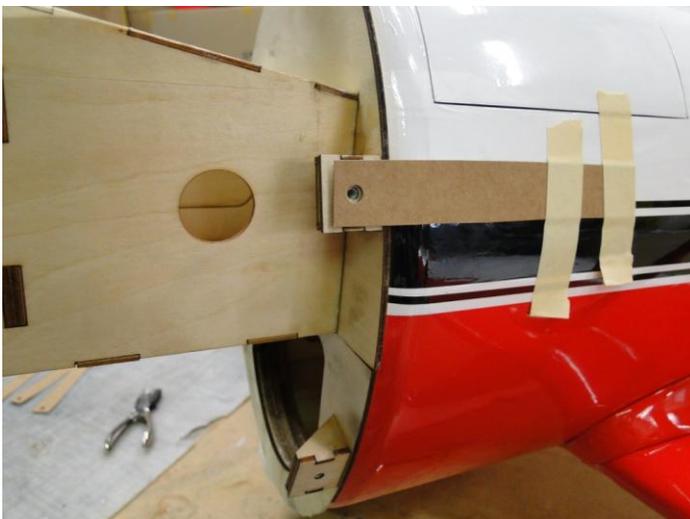
- 1 – Fuselage
- 1 – Cowl
- 1 – Cowl Fastening Ring (2 pcs)



Install the upper and lower sections of the Cowl Fastening Ring around the Engine Box against the Firewall with Epoxy Glue.

Your Engine will have to be positioned to the Engine Box so that the Prop Shaft exits the center of the Cowl opening. It works best to stand up the fuselage. It can be held that way in a work bench or with the landing gear supported by a step ladder.

Then position the Cowl so the stripes line up with the fuselage. Mark the position of the Cowl with tape and gently remove it and mark the position of the Engine on the Firewall.

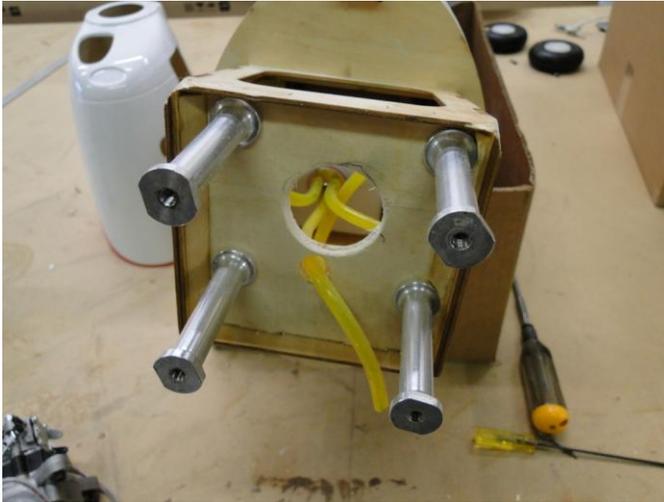


Use cardboard tabs to mark the location of the Blind Nuts in the Cowl Fastening Ring. Insert the Cowl under these tabs and push back to the tape marks you made earlier. When satisfied mark the positions and drill 3/32 inch dia. holes in the Cowl.

Engine & Throttle Servo

Collect these parts:

- 1 – Fuselage
- 1 - Engine 3.5 to 5.0 hp: 160 2-stroke glow, 200-300 4-stroke glow, 40cc-50cc gas
- Propeller, Spinner, Stand-offs



The Firewall has some right thrust built in. You can shim your Motor Mount (Stand Offs) with washers to achieve some down thrust if you feel it is necessary.

Stand offs are mounted slightly to the left center to allow the prop shaft of the engine to exit at the center of the Cowl opening.



Use a hole saw to cut out a hole at least 1-1/4 diameter if you have a rear mounting carburetor (to breathe). It also allows passage of the Fuel Lines.



Ignition module is mounted to the bottom side of the engine box.

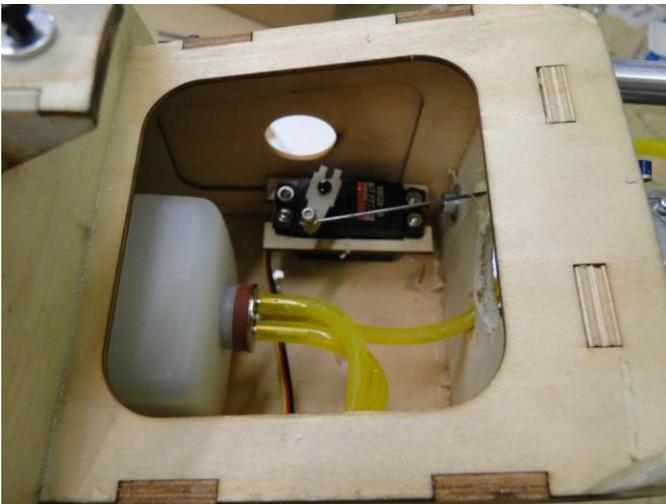
You can use Velcro, double sided tape or zip ties to mount the module.



Bottom View of Engine and Ignition Module installed.



Top View of installed Engine.



Throttle Servo is mounted inside the Fuel Tank component.

Install on the side with direct access to the throttle arm.

Drill a hole through the firewall for the throttle linkage. You may want to also install a linkage to operate the engine choke if your Engine is so equipped.



Cut out any the Cowl as needed for your Muffler.



Installing some Engines may require cutting away some of the Engine Box or Fuselage. It is recommended to reinforce any cut-outs and for larger engines.

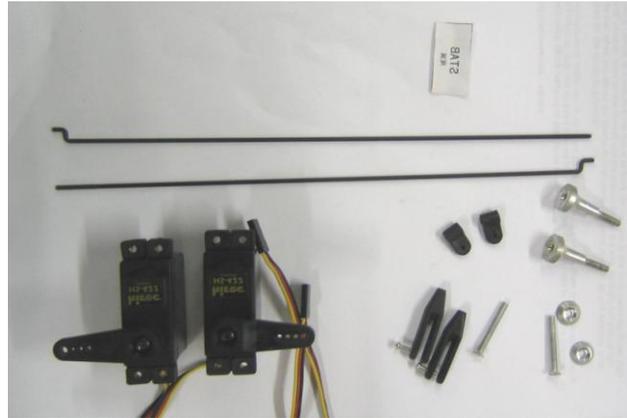


Also cut out necessary holes in the Cowl for the proper Engine cooling using a Dremel Tool.

Elevator Controls

Collect these parts:

- 2 - Elevator Servo (minimum 70 oz. torque) and mounting hardware
- 1 - 24 inch Servo Extensions
- 1 - "Y" Extension for Elevator Servos
- 2 - Threaded Push Rod (longest one)
- 2 - Trumpet Base
- 2 - Trumpet Washer
- 2 - Trumpet Screw
- 2 - Control Horn
- 2 - Clevis
- 1 - Fuselage



Find the location for the Elevator Servos in the rear of the Fuselage and as you have done before use a sharp X-Acto Knife to cut the Covering, from corner to corner. Seal and trim the Covering the same as you did for the Fuselage Hatch Cover

Attach a 24 inch Servo Extension and "Y" Extension to the Elevator Servos.

TIP: Use a 1-1/4 inch piece of 5/8 inch wide shrink tubing over the connection to help prevent it coming apart.



Position the Elevator Servo in the Fuselage and pre-drill the holes using a 1/16 inch Drill Bit. Use the hardware supplied with your Servo for final installation.



Position the Trumpet Base at the edge of the Elevator beveled edge and 1 inch from the edge closest to the Rudder. Mark the spot and drill a 3/32 inch diameter hole through the Elevator. Install the Trumpet Base with the Trumpet Screw and Washer on the other side of the Elevator. **Do not over tighten.**

TIP: Strengthen the holes by applying a few drops of thin CA glue in both holes to reduce the amount of Balsa compression.

Install the Control Horn and Clevis on the Trumpet Base. Thread the Elevator Push Rod into the Clevis and make a "Z Bend" in the other end to install through your Elevator Servo Arm.

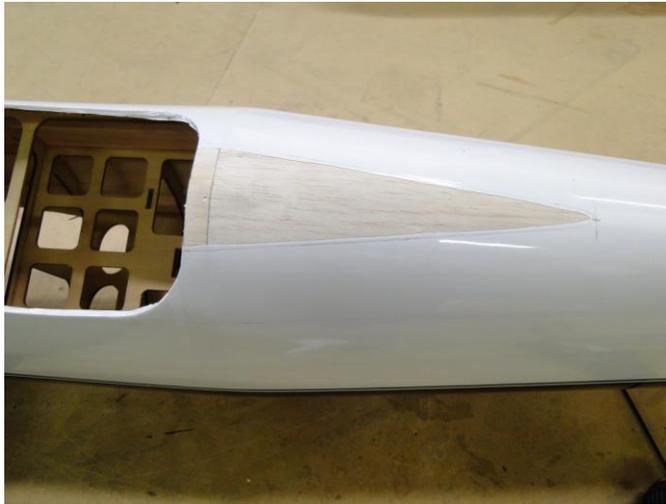
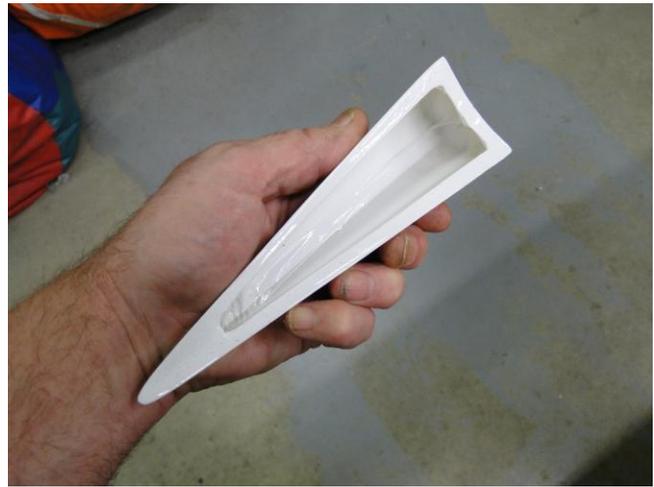
Canopy & Windscreen

Collect these parts:

- 1 - Fuselage
- 1 - Turtle Deck
- 1 - Windscreen

Trace the Turtle Deck onto the center line of the fuselage behind the Cockpit opening. Use a sharp X-Acto Knife to carefully cut away the Covering about 1/16 inch inside the lines. Be careful not to cut into the Balsa

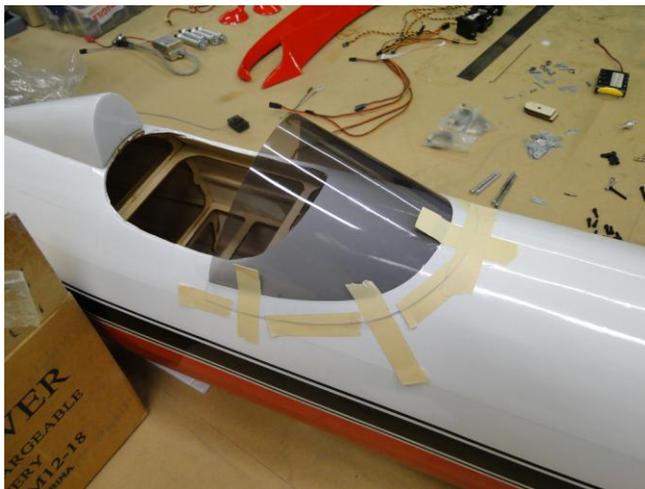
TIP: Use a small amount of heat from a sealing iron or heat gun when removing any covering.



After trial fitting the Turtle Deck glue with 5 minute 2 part Epoxy Glue and let dry.

TIP: Wipe away any excess Epoxy with Isopropyl Alcohol (Rubbing Alcohol).

Position the Windscreen at the front edge of the Cockpit opening and mark the position. Glue the Windscreen with Canopy Glue and tape into place to dry where you will be



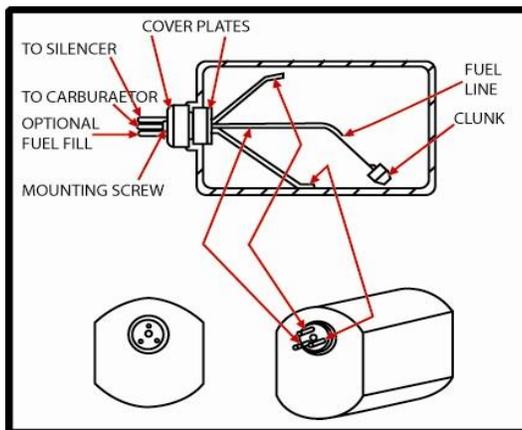
Fuel Tank

Collect these parts:

- 1 - Fuel Tank Assembly
- 1 - Fuselage

Using the supplied hardware, assemble the Fuel Tank. Carefully, bend the metal tubing to avoid kinking. You might need to use a larger size Fuel Tubing for your engine.

Note: Remember to mark which tube is for what purpose for connecting properly to the Engine later.



Note: Your model airplane is supplied with a Glow fuel tank and hardware kit. If you plan to use a gas engine you will have to change the stopper and Fuel Lines.

The Tank sits inside the Fuselage between the Servo Tray and the front of the Engine Box.



There are many Tank mounting choices but the easiest is to attach Velcro to the top of the Tank, attach Velcro on the inside ceiling of the Fuselage, strap through the vent holes in the front of the Fuselage (we used a Velcro strap) with the Fuel Lines going through the pre-drilled hole in the Engine Box.

Note: To reduce fuel foaming you can wrap the Fuel Tank in Foam.

Radio Set Up

Note: The C of G is on the Main Wing Spar, 3-3/4 inches from the Wing's Leading Edge.

TIP: To balance properly you might have to move batteries forward and add hose weight for the lighter gas engines (below 3.5 lbs) and especially glow engines.

It is recommended to use Foam Rubber and plastic Electrical Straps to secure your Receiver and Battery in place. The location will depend on the balance point of your airplane and will determine the best position to mount your Switch Harness.

You will need Y Servo Extensions to connect the 2 Aileron Servo Extensions and also the 2 Flap Servos to your Receiver. Disconnect all the Servo Arms before you turn on your Radio Transmitter for the first time and reconnect so that each Servo is centered and working in the proper direction.

Control Surface Throws

These are recommended Control Surface Throws to start with. After you have become familiar with the airplane you can adjust for your personal style of flying.

Rudder	+/- 1-1/2 inch low rate and 2-1/2 inch high rate
Elevators	+/- 3/4 inch low rate and 1-1/4 inch high rate
Ailerons	+/- 3/4 inch low rate and 1-1/4 inch high rate
Flaps	- 3/4 inch low rate and 1-1/4 inch high rate

Covering



Sometimes in storage or shipping the Covering can sag or wrinkle. Use a small amount of heat from a Heat Gun and a Mitt to go over the entire airplane and smooth any wrinkles in the Covering. Be careful not to use too much heat.



20 Ryan Place, Brantford, Ontario, N3S 7S1, Canada
tel: 519-756-1110 fax: 519-756-1663