INTRODUCTION
Congratulations on your purchase of a SIG MAYHEM 40 ARF. This is not your average R/C aerobatic flyer! Properly assembled, powered and flown, the MAYHEM 40 can take you into the exciting world of 3D aerobatic flying. Generous wing area, lightweight construction, and huge control surfaces with large amounts of travel, enable the MAYHEM 40 to perform the extreme 3D maneuvers you've been reading about … hovering, harriers, waterfalls, blenders … the MAYHEM 40 can do them all.

NOTE: The MAYHEM 40 is not suitable for beginners. While it is a terrific flying airplane, it's neutral stability and quick controls are beyond the capabilities of beginning R/C pilots. You should be capable of flying low-wing, aileron equipped R/C models before flying this airplane.

EASY TO ASSEMBLE
The MAYHEM 40 ARF has been engineered to get you into the air as quickly as possible with an R/C model that compares to the best scratch-built airplanes. The airframe has been expertly constructed of the finest balsa and plywood available, then professionally covered with tough SIG AEROKOTE™ polyester film. The airplane is both rugged and easy to repair.

This assembly manual has been sequenced to get your MAYHEM assembled and into the air very quickly. We strongly suggest that you read through the manual first to familiarize yourself with the various parts and assembly sequences. The successful assembly and flying of this airplane is your responsibility. If you deviate from these instructions, you may wind-up with problems later on.

RADIO EQUIPMENT
The MAYHEM 40 requires a 4 (or more) channel radio system with five servos. We highly recommend the use of a modern programmable computer radio. Such radio systems allow you to easily set and adjust every channel and additionally program various flight functions to suit your individual style of flying.

Servo Requirements:

Ailerons -	two(2) standard or high performance servos
Elevator -	one(1) standard or high performance servo
Rudder -	one(1) standard or high performance servo
Throttle -	one(1) standard servo

Standard vs High-Performance Servos?
Standard servos with 45-55 in/oz of torque will fly the MAYHEM 40 with no problem, including basic pattern-style aerobatics. However if 3D flying is your goal, you should consider upgrading to extra high speed ball bearing servos for the ailerons, elevator, and rudder (we used Hitec HS925MG high speed ball bearing servos in the prototype shown in this manual).

All servos should be standard size dimensionally to fit in the openings provided in the aircraft structure.

Note: *The large control throws used in 3D flying require a servo with precise centering capability. You can not expect this airplane to give you optimum 3D performance using non-ball bearing standard servos.*

Servo Chords Needed:
Ailerons - one standard y-harness
Elevator - one 12" servo extension chord
Rudder - one 12" servo extension chord

ENGINE SELECTION
The MAYHEM has been designed to perform well when using the recommended engine sizes. Do not use an engine larger than recommended.

Recommended Engines:

.40 to .46 cu.in.	2-Stroke
.52 to .70 cu.in.	4-Stroke

Very Important: The MAYHEM 40 is designed for slow speed, high torque aerobatics. It's fantastic low speed maneuverability is the result of light weight and very large control surfaces - which are naturally prone to flutter if flown at excessive airspeeds. To avoid problems, follow these carefully tested guidelines:

1) Do not use engines larger than recommended. Resist the urge to overpower your MAYHEM 40 with larger engines, which can cause balance and structural problems, and produce excessive airspeed.
2) Do not use a propeller with more than 6 inch pitch. Keep the airspeed of the MAYHEM down by using low pitch propellers.
3) Do not fly full throttle except during climbs of at least 10 degrees. Always throttle back when in a dive.

Ignoring these cautions will put your model at high risk for catastrophic in-flight structural failure.

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

A selection of glues - thin, medium, and thick SIG CA, and SIG Epoxy Glue (5-minute and 30-minute)
Threadlock Compound, such as Loctite® Non-Permanent Blue
Silicone Sealer - clear or white
Screwdriver Assortment
Pliers - Needle Nose & Flat Nose
Diagonal Wire Cutters
Small Allen Wrench Assortment
Drill with Assorted Drill Bits
Pin Vise for Small Dia. Drill Bits
Hobby Knife With Sharp #11 Blades

Scissors
Covering Iron and Trim Seal Tool
Masking Tape
Paper Towels
Power Drill With Selection of Bits
Dremel® Tool with Selection of Sanding and Grinding Bits
Soldering Iron and Solder
Large Fuel Tubing

KIT CONTENTS INVENTORY

The following is a complete list of all parts contained in this kit. Before beginning assembly, we suggest that you take the time to inventory the parts in your kit, using the check-off boxes ❑ provided. Note that the CA type hinges for the ailerons, rudder, and elevators are not glued in place. You will glue them during the assembly process. Also, note that the nuts and bolts required to mount your engine to the motor mounts are not included in this kit and must be purchased separately.

Note: *The following abbreviations are used in the descriptions of bolts and screws in this list.*

SL = Slotted-Head
SC = Socket-Head
PH = Phillips-Head
PWA = Phillips Washer Head

BASIC AIRCRAFT PARTS (covered with AEROKOTE™)

1 bag ❑ (1) Right Wing Panel
❑ (1) Right Aileron
❑ (5) CA Hinges (not glued)
1 bag ❑ (1) Left Wing Panel
❑ (1) Left Aileron
❑ (5) CA Hinges (not glued)
1 bag ❑ (1) Stabilizer & Elevator Set, with
❑ (6) CA Hinges installed but not glued
1 bag ❑ (1) Fin & Rudder Set, with
❑ (3) CA Hinges installed but not glued
1 bag ❑ (1) Fuselage, with
❑ (1) Clear Plastic Canopy
❑ (6) M2 x 8mm PWA Screws, for canopy mounting
❑ (1) Fuselage Bottom Fairing
❑ (2) 1/4-20 Blind Nuts installed, for wing attachment
❑ (2) M4 Blind Nuts installed, for l.g. attachment
❑ (1) Fuel Tank Hatch
❑ (2) M2 x 8mm PWA Screws, for hatch mounting

OTHER PARTS:

1 bag ❑ (1) Fiberglass Cowling
❑ (5) M2.6 x 8mm PWA Mounting Screws
1 bag ❑ (1) Right Fiberglass Wheel Pant
❑ (1) Left Fiberglass Wheel Pant
❑ (1) Aluminum Main Landing Gear
❑ (2) M4 x 15mm PWA Bolts
❑ (2) M4 Split Lock Washers
❑ (2) 2-1/4" dia. Main Wheels
❑ (2) M4 x 34mm PWA Axle Bolts
❑ (4) M4 Lock Nuts
❑ (2) M4 Hex Nuts
❑ (4) M3 Split Lock Washers
❑ (4) M3 x 10mm PWA Bolts
❑ (1) 1" dia. Tail Wheel
❑ (1) Tailwheel Assembly: Formed Wire, Mounting Bracket, and Wheel Collar w/ Set Screw
❑ (4) M2 x 10mm PH Screws
❑ (1) Wheel Collar w/ Set Screw
1 bag Fuel Tank Assembly
❑ (1) 260cc (8.8 oz.) Plastic Tank
❑ (1) Rubber Stopper
❑ (1) Metal Front Clamp
❑ (1) Metal Rear Clamp
❑ (1) M3 x 19mm PH Clamp Bolt
❑ (1) Metal Clunk Pickup
❑ (1) Fuel Pickup Tubing, for inside tank
❑ (1) .118" od x 1-9/16" long Aluminum Tube
❑ (1) .118" od x 2" long Aluminum Tube
❑ (1) .118" od x 2-3/8" long Aluminum Tube
1 bag 2-1/4" Dia. White Spinner Assembly
❑ (1) Plastic Spinner Cone
❑ (1) Plastic Spinner Backplate
❑ (1) Plastic Prop Shaft Adapters
❑ (2) Screws
1 bag ❑ (4) Nylon Control Horns and Retainer Plates
❑ (8) M2 x 15mm PH Bolts
❑ (2) Wire Aileron Pushrods
❑ (1) Wire Elevator Pushrod
❑ (1) Wire Rudder Pushrod
❑ (4) Metal R/C Links
1 bag Throttle Pushrod Assembly
❑ (1) 1/8" od x 12-1/2" Plastic Pushrod Tube
❑ (1) 3/16" od x 11-3/8" Plastic Pushrod Sleeve
❑ (2) M2 x 7/8" long Threaded Studs
❑ (2) Metal R/C Links
1 bag ❑ (2) Glassed-Filled Engine Mounts
❑ (4) M3 x 20mm PH Bolts
❑ (4) M3 Blind Nuts
❑ (4) M3 Flat Metal Washers
❑ (4) M3 Split Lock Washers
1 bag ❑ (1) Hardwood Wing Joiner
❑ (2) 1/4-20 x 1-1/2" Nylon Wing Bolts
❑ (2) Fiberglass Wing Bolt Guides
❑ (1) Plywood Wing Bolt Plate
❑ (1) Plywood Throttle Pushrod Support
❑ (1) 5/16" x 1/2" x 2-7/8" Balsa Stick, for fuel tank rear support

MISCELLANEOUS:

❑ 1 Each	#SIGDKM298	MAYHEM 40 Decal Sheet
❑ 1 Each	#SIGIB298	MAYHEM 40 Assembly Manual

COVERING MATERIAL

Your MAYHEM 40 ARF has been professionally covered with SIG AEROKOTE™ polyester film covering.

The colors are: **# STL100 White**
 # STL311 Red
 # STL250 Blue
 # STL201 Black.

You may notice that some wrinkles might develop in the covering after removing the parts from their plastic bags. If that is the case, there is no need to be alarmed. This is perfectly normal in low humidity climates. Your model was built and covered in a part of the world with relatively high humidity and therefore the wood was likely carrying a fair amount of moisture. When exposed to drier air, the wood typically loses this moisture, dimensionally "shrinking" slightly in the process. In turn, this causes the wrinkles.

Any wrinkles that appear in the covering material are easy to remove by using a standard hobby-type heat iron. We suggest covering the iron's shoe with a thin cotton cloth, such as an old T-shirt, to prevent scratching the covering film.

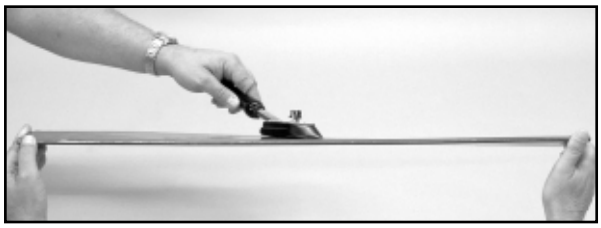
Set your iron to 220°F - 250°F (104°C - 121°C).

First, use the heated iron to go over all the seams and color joints in the covering, making they are all sealed down and well adhered. Then use the heated iron to lightly shrink the material - do not press on it. Once the covering is tight, lightly iron the material back down to the wood. You can also use a hobby-type heat gun to re-shrink the covering, but you must be extra careful around the seams. Re-heating seams may cause them to "creep", making them unsightly.

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

WARPS!
Light weight is a key ingrediant in the MAYHEM'S flight profile. Because of their light weight construction, the ailerons, elevators, and rudder of the MAYHEM can become warped whenever the covering material is heated for shrinking. Care must be used to make sure that the control surfaces remain straight as the covering cools. Avoid putting a twist in the part while taking out wrinkles.

If you find a warp in one of your parts, the warp can almost always be removed by twisting the surface in the opposite direction and holding it there while heat is applied to the covering material. After the covering cools, release the control surface and recheck for the warp. The amount of reverse twist and heat that you apply, will determine where the control surface ends up after it cools.



Note: *When trying to remove a warp, an extra set of hands are needed. Have someone assist you. While one person holds the reverse twist in the control surface, the other person applies the heat by passing a covering iron over both sides of the part.*

WING ASSEMBLY - OVERVIEW
The wing of the MAYHEM comes in two pieces, a right wing panel and a left wing panel, which will be permanently glued together to make a strong one-piece wing.

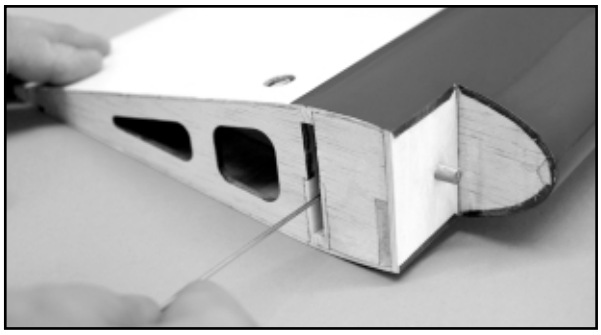
For precise control of the ailerons, there is one aileron servo mounted in each wing panel.

To avoid unnecessary dents, dings, or scuffing of the airplane parts, we suggest that you cover your workbench with a soft household blanket or foam sheet while assemblying your model.

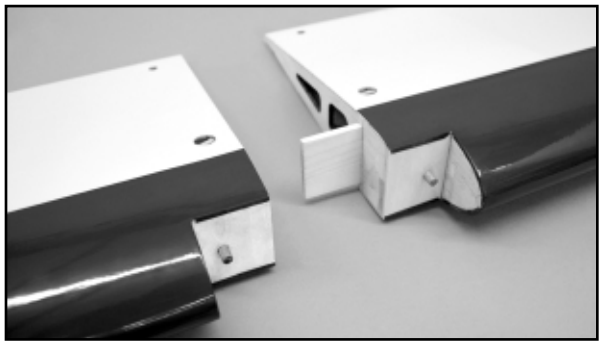
WING ASSEMBLY, PART I: Joining the wing panels
For the following steps you will need these parts:
- 1 - Right Wing Panel
- 1 - Left Wing Panel
- 1 - Hardwood Wing Joiner

❑ 1) Trial fit both wing panels onto the Hardwood Wing Joiner. Check to see that the wing panels fit together in proper alignment, and that both root ribs come into firm contact with each other. If the Hardwood Wing Joiner requires a little trimming to achieve this fit, do so now. When satisfied with the fit, take back apart.

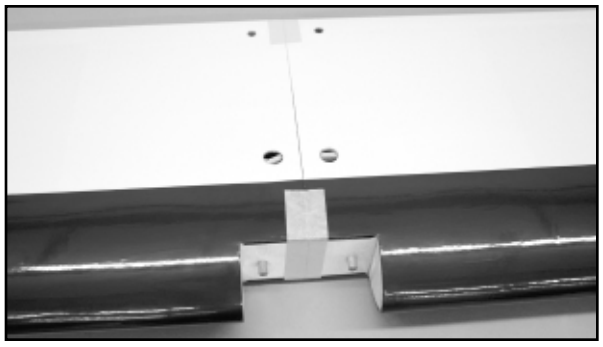
❑ 2) Use slow drying epoxy glue to permanently join the two wing panels together. Apply the glue generously to the end ribs, Work some glue into the joiner slots, and coat the joiner itself.



Carefully slide the wing panels together on the joiner. Press them together tight. Wipe away any excess epoxy that oozes from the joint with a paper towel or a rag dampened with rubbing alcohol.



Be careful that the leading and trailing edges of the two wing panels are perfectly aligned and that there is no built in twist. Secure the joint in perfect alignment with tape until the glue dries.



NOTE: It's very important to use plenty of epoxy when gluing the wing panels together. The strength of your wing joint depends on it! Don't worry if the excess glue oozes out and gets on the

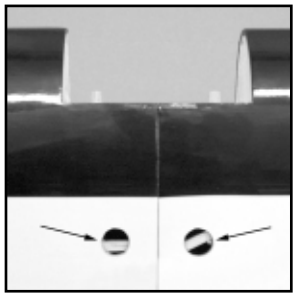
covering material. With slow-drying epoxy, you will have plenty of time to clean up all the glue smears with a paper towel soaked in rubbing alcohol. Also, if possible get someone to help you with this proceedure. An extra set of hands makes the job much easier! While one person is holding the wing panes tightly together, the other person can wipe off the excess glue.

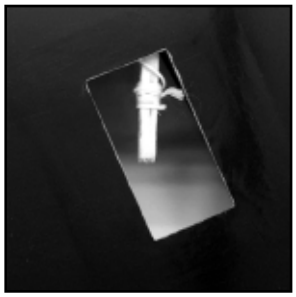
WING ASSEMBLY, PART II: Installing the aileron servos

For the following steps you will need these parts:

- 1 - The Wing Assembly
- 2 - Aileron Servos (not supplied)
- 1 - Servo Y-Harness Chord (not supplied)

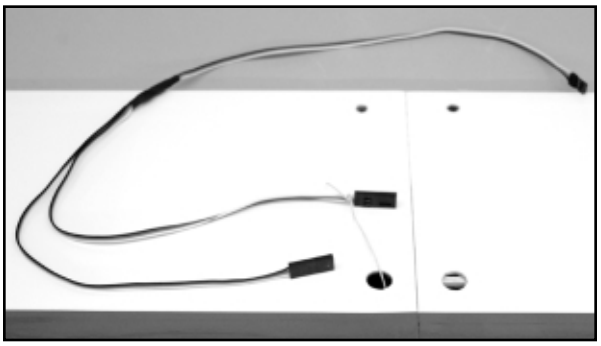
Note: On the top side of the wing, on each side of the center joint, you will find two round holes. Inside each hole you will find a short length of wood with a string tied to it. Likewise, inside the aileron servo bays on the bottom of the wing you will find similar wood pieces with strings tied them. These are the other ends of the strings you saw at the center of the wing. These strings will be used to pull the aileron servo wires through the wing panels in the following steps.





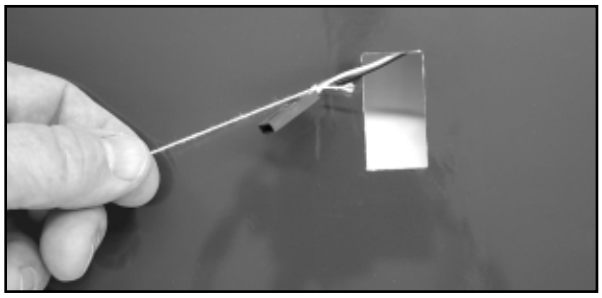
Working on one wing panel at a time...

❑ 1) Start at the center hole and gently break the wood piece loose from the wing structure. Pull the wood piece and the string a few inches outside of the wing. Remove the wood piece from the string and disgard it. Tie the end of the string securely to the end of one of the two servo leads of your Y-Harness Chord, as shown.

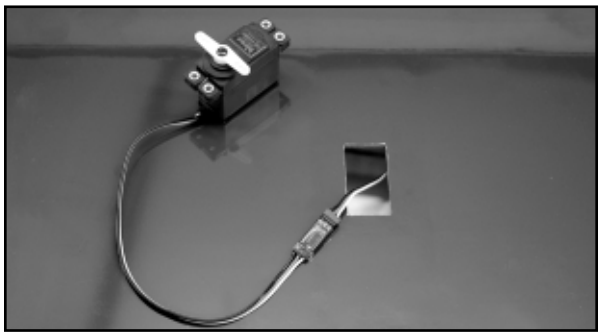


❑ 2) Go to the aileron servo bay on the same side of the wing and break that wood piece loose from the wing structure. Carefully pull the string and the attached Y-Harness lead through the wing panel, until the plug on the end of the wire comes out of the opening in the servo bay. Be sure you don't pull all of the Y-Harness inside the wing - leave the other two plugs of the Y-Harness outside at the center of the wing.

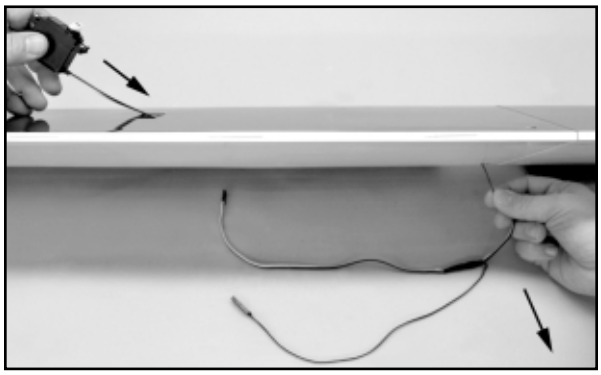
Note: *You may occasionally feel like the wire has become stuck inside the wing. This is simply the plug on the end of the servo wire hitting the side of the holes in the wing ribs. Gently work the string back and forth from both ends until the plug fits through the hole. Sometimes the servo plug comes through all the ribs the first time without getting hung up, and other times it seems like it gets hung up on every rib. Be patient and don't try to force it. The holes in the ribs are large enough to get any common servo plug through. Sometimes it helps to hold the wing panel vertically and shake it slightly while pulling lightly on the string.*



❑ 3) Once you can get a grip on the Y-Harness plug at the servo bay, connect your aileron servo to the plug. Tape the connection so it can't ever come loose inside the wing. Then untie the string from the wire and dispose of it.



❑ 4) Now feed the wire back inside the wing by carefully pulling on the other end of the Y-Harness where it exits the top of the wing. Keep pulling the wire back towards the center section until you can fit the aileron servo into the plywood servo mount that is built into the wing panel. Note that the servo should be positioned so that its output arm is at the rear end, toward the trailing edge of the wing. Use a small drill bit to drill pilot holes in the servo mount for the servo mounting screws. Use the screws supplied with your radio system to mount the servo in place on the servo mount.

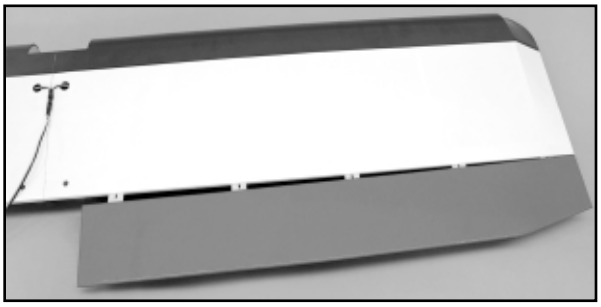


Repeat these steps to mount an aileron servo in the other side of the wing.

WING ASSEMBLY, PART III: Hinging the ailerons
For the following steps you will need these parts:
- The wing assembly
- 1 - Right Aileron
- 1 - Left Aileron
- 10 - CA Hinges (5 per aileron)

❑ 1) Start by inserting CA Hinges into the 5 slots in the trailing edge of one side of the wing. Slide the hinges HALFWAY into each hinge slot. DO NOT GLUE THE HINGES AT THIS TIME!

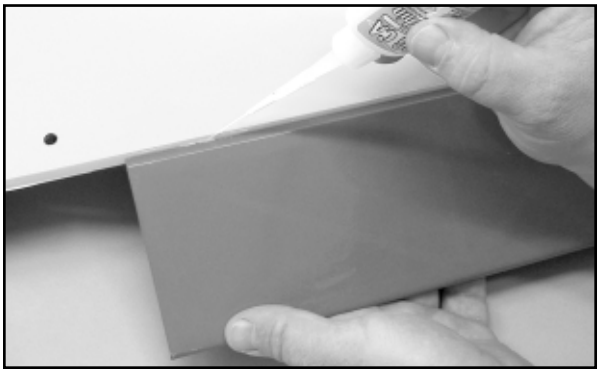
❑ 2) Now install the aileron onto the exposed half of the hinges. It's easiest to slip the aileron onto the hinges at angle, one hinge at a time, instead of trying to push it straight onto all the hinges at once. Start at the wingtip, inserting the end hinge into the end slot in the aileron. Once you have that hinge started, move to the next hinge and get it started into its slot. Move on down the line until you have all five hinges started. Then you can finish pushing the aileron up against the back of the wing. Don't be overly concerned if the hinges don't end up perfectly straight or perfectly centered in the slots - approximately halfway is good enough. AGAIN, DO NOT GLUE THE HINGES IN AT THIS TIME!



❑ 3) To set the proper amount of gap between the aileron and the wing, simply deflect the aileron to the maximum amount of travel needed. This will automatically set the proper hinge gap! Keep in mind that for best control response the gap should be kept as small as possible, but big enough to allow full movement of the control surface. Make sure everything is functioning properly before proceeding to the next step.

❑ 4) Flex the aileron downward, exposing the hinges between the wing and aileron. Carefully place 3-4 drops of Thin CA glue directly onto each hinge in the gap. You will notice that the glue is quickly wicked into the slot as it penetrates both the wood and the hinge. Turn the part over and apply 3-4 drops of glue to the other side of each hinge. Keep a rag handy to wipe off any excess glue.

Note: *We recommend using a fine-tip applicator on your CA glue bottle. If you happen to get glue smears on the plastic covering, don't worry about them right now. Once the glue is dry, you can clean the glue smears off the covering with CA Debonder.*



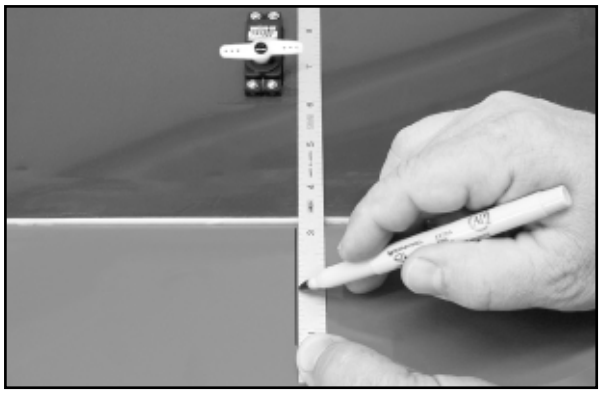
❑ 5) Allow at least 10 minutes before flexing the aileron. After sufficient time has passed, flex the aileron up and down several times. At first you might notice a little stiffness in the joint. This will go away after the hinges have been flexed back and forth a few times. Also, pull on the aileron at each hinge location to make sure all the hinges are securely in place. Repeat this process to attach the other aileron to the other wing.

WARNING: *The CA hinges provided in this kit are made of a special absorbant material that can only be glued with Thin CA adhesive. Thin CA (any brand) is the ONLY type of glue that can be used on these hinges - do not use epoxy or any other type of glue! Also, never use CA Accelerator on CA Hinges!*

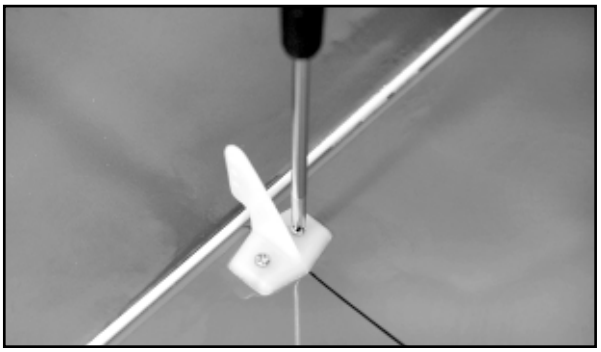
It's critical that you only make one application of glue to each side of a CA Hinge! If you apply additional glue after the first application of glue is dry, the second application of glue will merely puddle in the hinge gap and make the hinge too stiff to operate. The excess glue could also weaken the hinge! When properly glued, the part of the hinge that you can see in the hinge gap should have a dry appearance, not wet. A dry appearance indicates that almost all of the glue has properly soaked into the hinge slot. A wet appearance indicates that excess glue is puddled in the hinge gap. Three to four drops of Thin CA is the right amount.

WING ASSEMBLY, PART IV: Install Control Horns & Pushrods
For the following steps you will need these parts:
- The wing assembly
- 2 - Nylon Control Horns & Retainer Plates
- 4 - M2 x 15mm Phillips-Head Bolts
- 2 - Wire Aileron Pushrods
- 2 - Metal R/C Links

❑ 1) Use a straight edge and a fine line marker to draw a guideline on the aileron which lines up with the last hole in the aileron servo output arm. This line should be 90° to the hinge line of the aileron.



❑ 2) Set a Nylon Control Horn in place on the bottom of the aileron. The front edge of the horn's base should be located at the front edge of the aileron leading edge bevel. The upright arm of

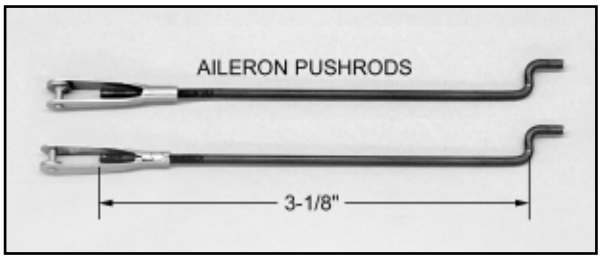


the control horn should be lined up with the line you drew in the previous step. Once you have the horn properly located, mark the location of the two control horn mounting holes onto the aileron. Drill a 1/16" dia. hole completely through the aileron at each mark.

❑ 3) Mount the control horn in place using the Nylon Retainer Plate on the top side of the aileron and two M2 x 15mm Phillips-Head Bolts.

❑ 4) Repeat the last three steps to mount a control horn on the other aileron.

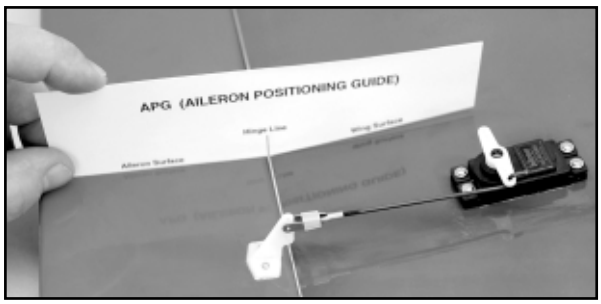
❑ 5) Note that the Wire Aileron pushrods have threads and an adjustable R/C Link on one end, and a pre-formed "z-bend" on the other end.



a) Install the z-bend end of the pushrod into the outer hole of the aileron servo output arm. Note: The hole in the servo output arm may be a little too tight. If necessary, drill out the holes in the arm with a 5/64" dia. or #50 (.070") drill bit.

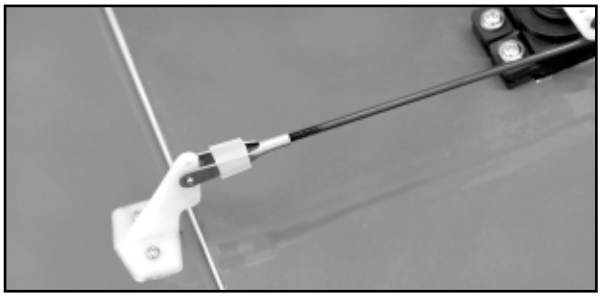
b) Install the servo arm and pushrod onto the servo, making sure it is accurately centered in neutral position.

c) Clip the R/C Link into the control horn. Check the aileron for neutral position, adjusting the overall length of the pushrod by screwing the R/C Link in or out as needed to get the aileron in neutral position when the servo is in neutral position.



Note: Because of the thickness of the MAYHEM airfoil, it is not easy to determine exactly when the aileron is in neutral position. For this reason we have supplied an Aileron Positioning Guide (APG). Cut out the APG and use it to hold the aileron in true neutral position when making your pushrod length adjustments.

SAFETY NOTE: Cut and fit a short length (about 3/16" or so) of medium diameter fuel tubing (not furnished) onto the R/C Link to prevent it from opening and coming off the control horn in flight.



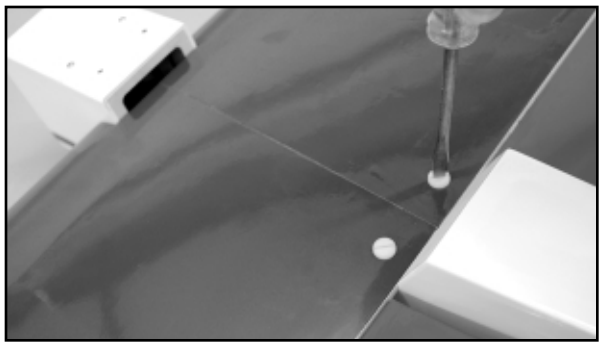
WING ASSEMBLY, PART V: Fitting the Wing to the Fuselage

For the following steps you will need these parts:

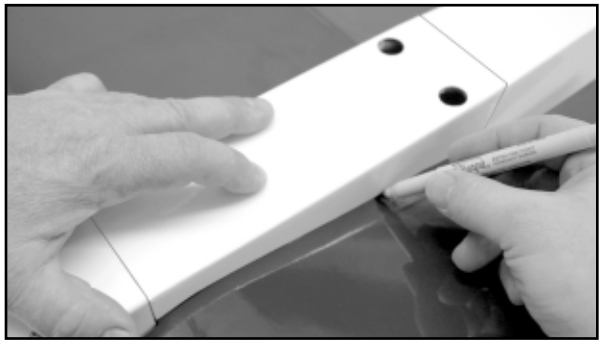
- The wing assembly
- 1 - Fuselage
- 1 - Plywood Wing Bolt Plate
- 2 - 1/4-20 x 1-1/2" Nylon Wing Bolts
- 2 - Fiberglass Wing Bolt Guides
- 1 - Fuselage Bottom Fairing

❑ 1) Trial fit the wing in place on the fuselage, using the two 1/4-20 x 1-1/2" Nylon Wing Bolts provided. The nylon wing bolts should pass freely thru the holes near the trailing edge of the wing and thread into the blind nuts that are pre-installed in the fuselage. Do not overtighten the bolts - just snug them up enough to hold the wing in place for the next step.

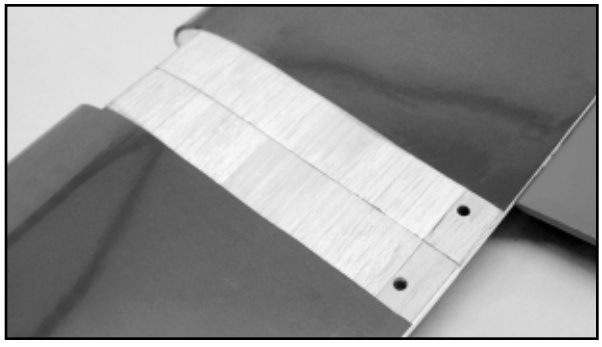
Note: If you have any difficulty mounting the wing to the fuselage, find the cause of any binding now, and fix it before proceeding.



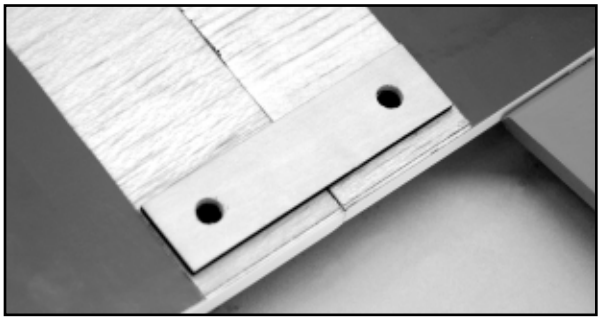
❑ 2) Set the Fuselage Bottom Fairing in place on the bottom of the wing. Align it with the fuselage. Use a felt-tip pen to mark the location of the bottom fairing on the wing surface. Mark both sides. Then remove the fairing and the wing from the fuselage.



❑ 3) Remove the covering material from the bottom of the wing between the marked lines. Start by using a sharp hobby knife to cut through the covering material along the marked lines. Be very careful to cut the covering material only - not the balsa wood structure underneath! Once you've cut through the covering material, peel the unwanted covering off the wing.



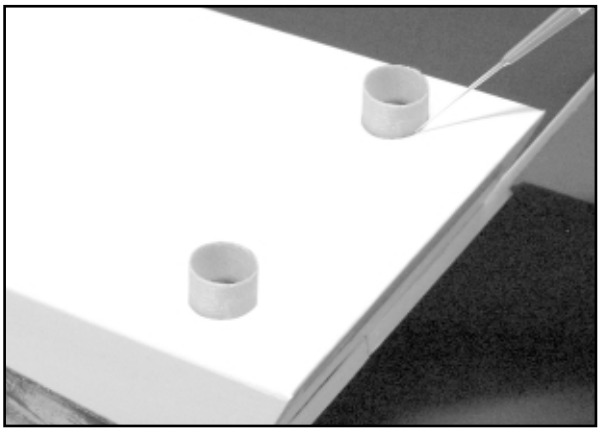
❑ 4) Glue the Plywood Wing Bolt Plate in place on the bottom of the wing, carefully aligning the two 1/4" holes in the plate with the holes in the wing before the glue dries. Make sure there is no excess glue inside the holes. If necessary, run a 1/4" dia. drill bit through the holes after the glue is completely dry.



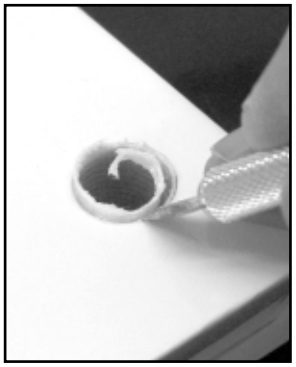
❑ 5) Now permanently glue the Fuselage Bottom Fairing onto the bottom of the wing with thick CA or epoxy glue. Let dry.

❑ 6) a. Bolt the wing back in place on the fuselage. Locate the two Fiberglass Wing Bolt Guides and fit them into the wing bolt holes in the bottom fairing. The guides should slip into the holes and go all the way down against the surface of the wing and around the head of the wing bolt.

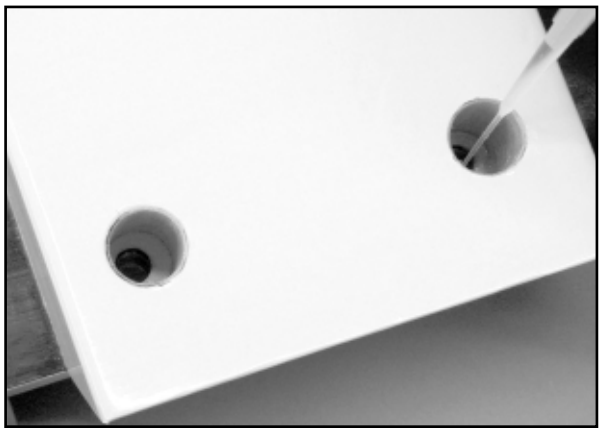
b. Once you have the wing bolt guides fitted in place, use a little thin CA glue to adhere them to the bottom fairing. Let dry.



c. Use a sharp hobby knife to trim the excess wing bolt guide off flush with the bottom fairing. Don't try to take it all off with one deep cut - cut off small pieces at a time. By working slowly and carefully, you can get it trimmed off without gouging or cutting into the bottom fairing.



d. With the wing removed from the fuselage, and the wing bolts removed from the wing, put a few drops of thin CA glue in the bottom of the wing bolt guides to bond them to the surface of the wing. Don't use too much.

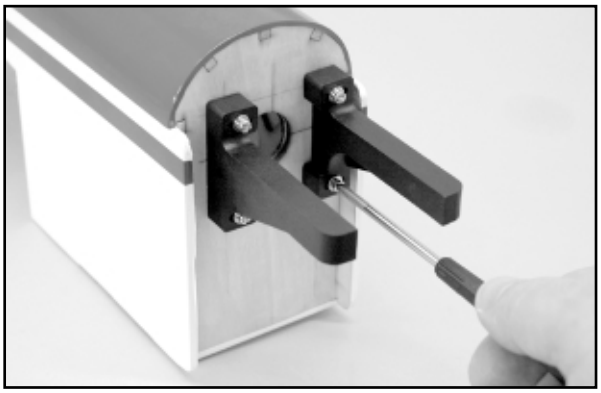


FUSELAGE ASSEMBLY, PART I: Engine Mounting

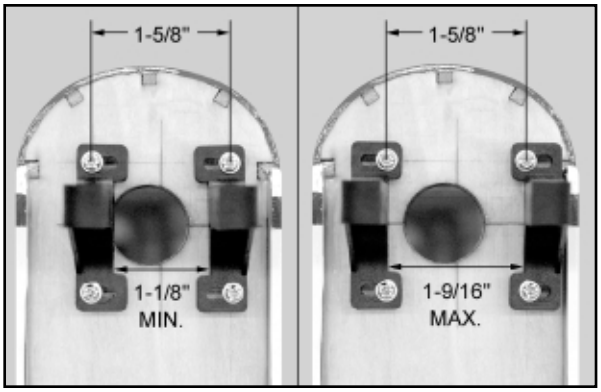
For the following steps you will need these parts:

- 1 - Fuselage
- 2 - Glass-Filled Engine Mounts
- 4 - M3 x 20mm PH Bolts
- 4 - M3 Flat Metal Washers
- 4 - M3 Split Lock Washers
- 1 - Engine and suitable engine mounting Bolts (not supplied)

❑ 1) Bolt the Engine Mounts in place on the front of the firewall using the M3 x 20mm Phillips-Head Bolts, Flat Metal Washers, and Split Lock Washers provided.



❑ 2) The 1-5/8" vertical spacing between the mounting bolts, along with the slotted holes in the engine mounts, allow the engine mounts to accomodate any engine that has a crankcase width between 1-1/8" to 1-9/16". That should cover any engines within the recommended size range for the Mayhem 40.



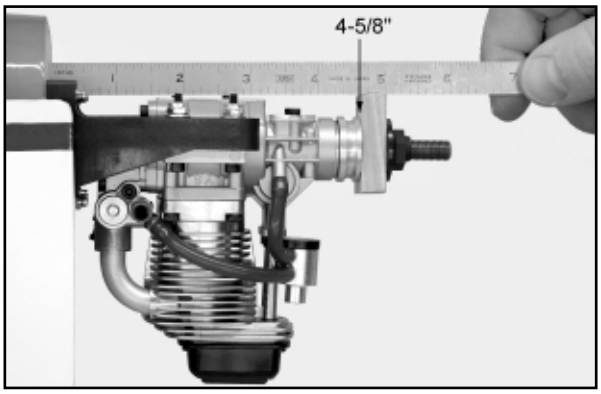
❑ 3) a. Move your engine forward or backward on the engine mounts until you measure exactly 4-5/8" from the front face of the prop drive washer to the front of the firewall. This is the distance your engine needs to be from the firewall for proper cowl

alignment and prop clearance purposes. Accurately mark the engine's mounting bolt hole locations onto the engine mounts. Then set the engine aside.

b. Drill the four engine mounting holes completely through the mounts. Be very careful to drill them perpendicular to the mount. Use a drill press if available.

c. Mount your engine in place on the engine mounts. We suggest using a little thread locking compound (Loctite®) on the mounting bolts to keep them from coming loose.

Note: *This kit DOES NOT contain bolts for mounting your engine to the engine mounts. That's because not all of the engines that can be used in the Mayhem use the same size bolts. Some engines may need 4-40 size bolts, while others may need 6-32. You will need to go to the hobby shop to obtain the correct size mounting bolts for your engine..*



IMPORTANT SAFETY ISSUE!

DO NOT DRILL AND TAP THE GLASS-FILLED ENGINE MOUNTS FOR BOLTS, OR USE SELF-TAPPING SCREWS OR WOOD SCREWS. THOSE METHODS WILL WEAKEN THE ENGINE MOUNTS AND CAN LEAD TO ENGINE MOUNT FAILURE!

1) Use only **Socket-Head Bolts** with **Aircraft Lock Nuts** and **Flat Metal Washers** to fasten your engine to the glass-filled engine mounts, as shown in these instructions.

2) The holes you drill through the mounts must be big enough for the engine mounting bolts to pass freely through. The bolts should not go in tight. In the case of 4-40 mounting bolts, a 1/8" dia. drill bit will provide proper clearance holes. For 6-32 bolts use a 5/32" drill bit.

FUSELAGE ASSEMBLY, PART II: Main Landing Gear

For the following steps you will need these parts:

- The fuselage assembly
- 1 - Aluminum Landing Gear
- 2 - M4 x 15mm PWA Bolts
- 2 - M4 Split Lock Washers
- 2 - 2-1/4" dia. Main Wheels
- 2 - M4 x 34mm PWA Axle Bolts
- 4 - M4 Lock Nuts
- 2 - M4 Hex Nuts
- 1 - Right Fiberglass Wheel Pant
- 1 - Left Fiberglass Wheel Pant
- 4 - M3 x 10mm PWA Bolts
- 4 - M3 Split Lock Washers

Note: *When assembling the hardware in the following steps, we recommend that you use a thread-locking compound, such as Locktite®, to keep the parts from vibrating loose in flight. It only takes a small drop, placed right in the threads of the mating parts, to keep them tight and secure.*

❑ 1) a. Insert one of the M4 x 34mm PWA Axle Bolts through the hub of one of the 2-1/4" dia. Main Wheels. Slide the wheel all the way up against the head of the bolt.

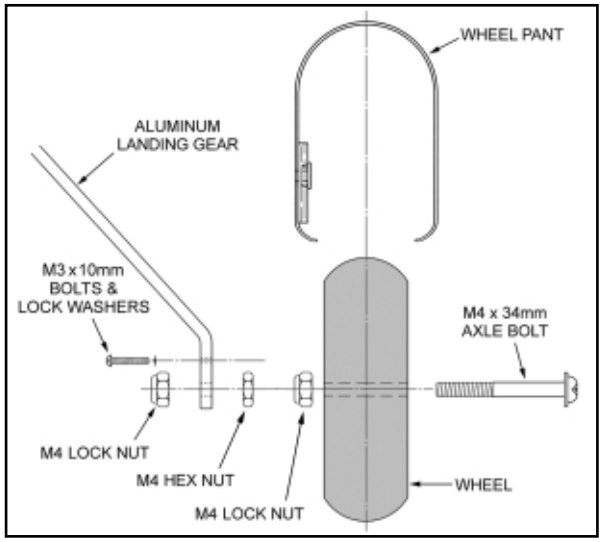
b. Next thread a M4 Lock Nut onto the threaded end of the bolt, and run it all the way up to the wheel - but not too tight - the wheel must turn freely.

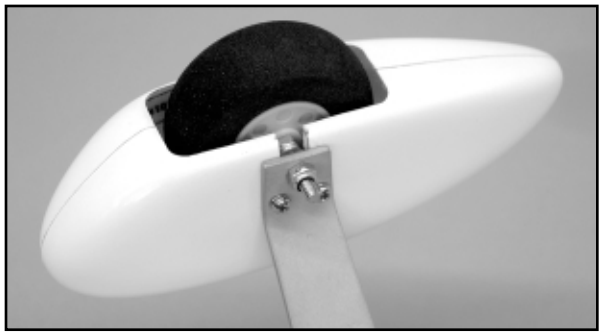
c. Now thread a M4 Hex Nut up tight against the Lock Nut. This hex nut serves as a spacer to keep the tire from rubbing on the wheel pant after it is installed.

d. Finally, insert the threaded end of the axel bolt through the aluminum landing gear leg and install another M4 Lock Nut on the inside of the landing gear leg. Tighten securely.

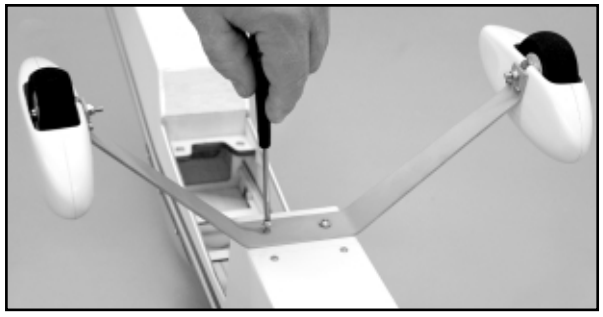
e. Repeat this proceedure to install the other wheel onto the opposite landing gear leg.

❑ 2) Mount the Fiberglass Wheel Pants to the landing gear with the M3 x 10mm PWA Bolts and M3 Split Lock Washers provided. Tighten securely. Double check to make sure that the wheels turn freely without obstruction.





❑ 3) Bolt the main landing gear assembly onto the bottom of the fuselage using the M4 x 15mm PWA Bolts and M4 Split Lock Washers provided. Put a drop of thread locking compound, such as Locktite®, on the threads of the bolts before screwing them in.

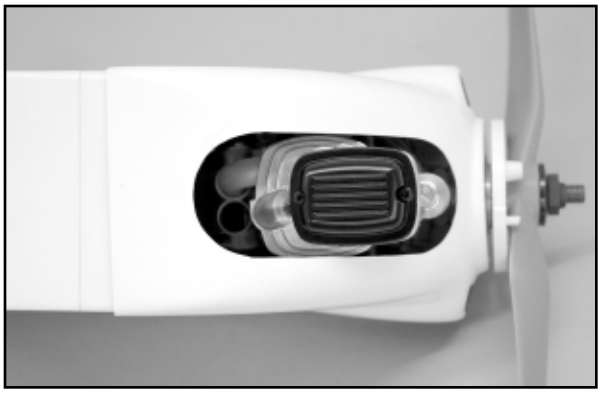


FUSELAGE ASSEMBLY, PART III: Cowling and Spinner

For the following steps you will need these parts:

- The fuselage assembly
- 1 - Fiberglass Cowling
- 5 - M2.6 x 8mm PWA Screws
- 1 - 2-1/4" Plastic Spinner Assembly

❑ 1) Try fitting the Fiberglass Cowling over your engine and back onto the fuselage. If you have a typical MAYHEM engine installation (meaning a single-cylinder engine mounted inverted) you will need to make an opening in the bottom of the cowling for the engine cylinder to stick through. Watch carefully to see where the head of the engine first hits the inside of the cowling and mark that location with a pencil or felt tip marker. Remove the cowl, and use a Dremel® Tool to make a small opening in the cowl at the point of contact. Refit the cowl, checking the hole location and size, adjust as needed and again use the Dremel® Tool to make the opening bigger. Keep refitting, remarking and readjusting the hole until the cowling can be slipped over the engine into correct position on the fuselage. As a general rule, you should end up with at least 3/16" clearance between the cowling and any engine part.



❑ 2) Once the cowling is in place without any part of the engine contacting it, mount your spinner backplate and propeller on the engine prop shaft. Tighten the prop assembly sufficiently to bring the spinner backplate firmly in contact against the engine's prop mounting flange. Now check to see that you have at least a 1/16" gap between the back of the spinner backplate and the front of the cowling (1/16" to 1/8" is OK). Adjust the final location of the cowling, making sure that the spinner backplate is centered on the front and that the back edges are tight against the fuselage. Use masking tape to temporarily hold the cowling in correct position on the fuselage.

❑ 3) With the cowling securely taped in place, use a 3/64" (or #56) dia. drill bit to drill pilot holes in the fuselage, centered in each of the four pre-drilled mounting holes in the cowl. Mount the cowl to the fuselage with the four M2.6 x 8mm PWA Screws provided.

❑ 4) Determine what size and shape opening you will need in the cowling to accomodate your engine's muffler. Then cut the opening in the cowling, starting small and gradually opening it up to the final size.

Note: *As you can see in the next photo, the cutout for the YS-63 muffler in our photo model was a fairly simple 5/8" wide slot cut straight forward from the back edge of the cowl. The slot is approximately 2-1/4" long. We used an additional M2.6 x 8mm PWA Screw (provided) to hold down the corner of the cowling just above the slot. Depending upon your exact engine ocnfiguration, you may do something similar for your Mayhem.*

❑ 5) Determine the location of the hole required in the cowling for access to your engine's needle valve. Start with the engine and cowling on the airplane and "eyeball" the approximate location of where the needle valve will exit the cowling. Take your best guess and mark that location on the cowl. Now make a small 1/16" dia. hole at the marked location. Chances are that you are close to the correct spot. Stick a piece of music wire into the hole, down to the needle valve. Carefully observe if the hole needs to be repositioned to straighten up the wire, as if it were the needle valve. Make another mark on the cowl and open the hole just a little towards the corrected position. In this manner, continue checking and adjusting the exit hole until it aligns perfectly with the carburetor/needle valve position. Then enlarge the hole enough to insert and install the needle valve in the carb. Be sure the hole has at least 3/32" clearance around the needle valve to avoid contact.

Tip: *A handy tool to assit with cutting holes in the cowling is a small penlight. The penlight can be used from the inside or outside of the cowl to highlight and spot the required hole location.*

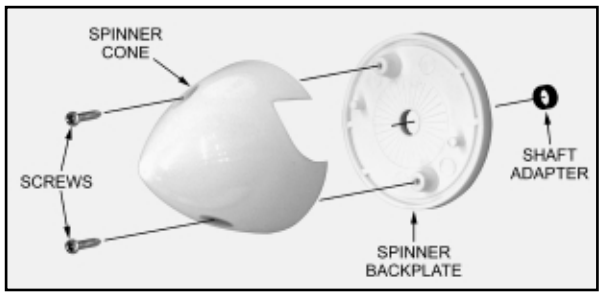
❑ 6) Figure out how you are going to light your glow plug and whether that will require an additional opening in your cowling.

Note: *For the YS-63, we did not need an additional opening - the glow plug is accessible through the opening we made in the bottom of the cowling.*

❑ 7) Next figure out how you are going to fuel and de-fuel your airplane, and whether that will require another opening in your cowling. If so, make the appropriate opening at this time.

Note: *For the YS-63, we did not need an additional opening - the fueling is done through the opening we made for the cylinder head in the bottom of the cowling.*

❑ 8) The supplied plastic Spinner is easy to assemble. If the diameter of your engine's prop shaft is smaller than the hole in the spinner backplate, select a prop shaft adapter to fit. If your prop shaft is larger than the hole in the backplate, the hole can be drilled larger to fit (use drill press). Install the backplate and your propeller tightly onto your engine, using the engine's prop nut and washer. Snap the spinner cone in place, and attach it to the backplate with the four screws provided. Don't over-tighten the screws.



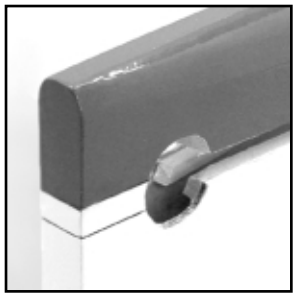
FUSELAGE ASSEMBLY, PART IV: Tail Surfaces & Tailwheel
For the following steps you will need these parts:

- The fuselage assembly
- 1 - Stabilizer & Elevator Set
- 1 - Fin & Rudder Set
- 9 - CA Hinges (6 for elevators, 3 for rudder)
- 1 - Tailwheel Wire, Mounting Bracket, Wheel Collar, Set Screw
- 4 - M2 x 10mm Phillips-Head Screws
- 1 - 1" dia. Tail Wheel
- 1 - Wheel Collar w/ Set Screw

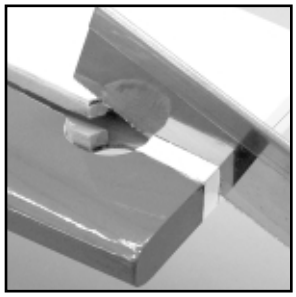
❑ 1) Six CA hinges have been factory installed, but not glued, in the Stabilizer and Elevator set. Glue the hinges permanently in place at this time, using the same proceedures used for gluing the aileron hinges on page 5. Let dry 10 minutes before flexing the hinges. Do not glue the Fin and Rudder hinges at this time!

❑ 2) Prepare the fuselage to receive the stabilizer and elevators by extending the stabilizer cutout all the way to the back of the fuselage. In other words, cut out the portion of the fuselage that is directly behind the stabilizer slot, so that the stab and elevators can then be slid in place from the back. This portion of the fuselage was left in during manufacture of the airplane to lend support the top of the fuselage during shipping and handling.

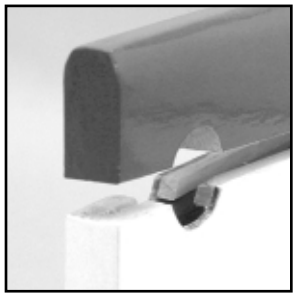
a. Start by drawing guidelines on the rear of the fuselage to indicate exactly where cuts should be made to remove the unwanted portion. The guidelines are simply a straight extension of the top and bottom edges of the stabilizer slot.



b. Use a hobby razor saw and/or hobby knife to cut out the unwanted portion of wood between the lines.

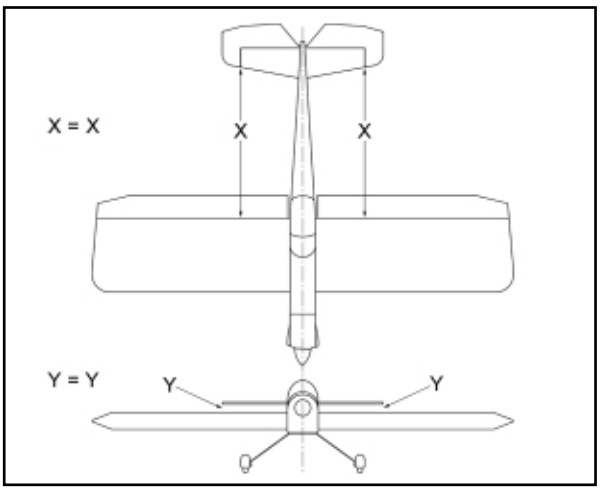


c. Smooth the surfaces of the fresh cuts with fine sandpaper, and then fuel proof the exposed wood with some thin CA glue.



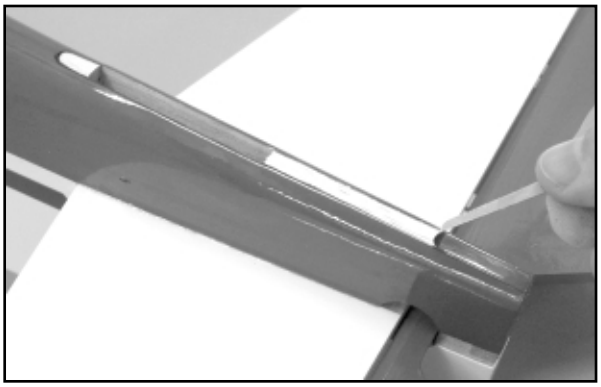
❑ 3) Mount the wing to the fuselage, and then trial fit the stabilizer/elevator assembly in place. Check the alignment of the stab with the rest of the airplane. View the airplane from the top, front and rear, making sure the stabilizer is not tilted or skewed (see drawing on next page). Measure the distance from the wing trailing edge back to the stab's leading edge tip, and note the distance. Then make the same measurement on the opposite side of the airplane. The two measurements must be the same. Adjust the stabilizer as needed until they are the same.

❑ 4) The stabilizer/elevator assembly can now be permanently glued into the fuselage. Slow-drying epoxy glue is recommended for this step, to allow you plenty of time to get the stab back in proper alignment before the glue dries. Wipe any epoxy glue smears off the covering material with a rag soaked in rubbing alcohol.

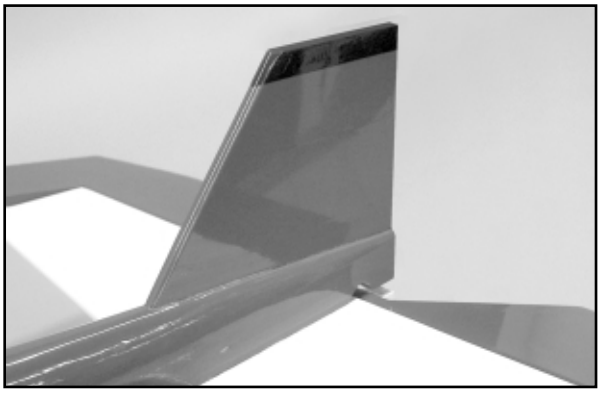


❑ 5) Seperate the Fin and Rudder from each other, and set the Rudder and Hinges aside for now. Trial fit the fin alone in place on the fuselage. There should be no gaps between the bottom of the fin and the top of the fuselage. If there are any gaps, sand the bottom of the fin to eliminate them.

❑ 6) Use a felt-tip pen to mark the locaton of the fin on the top of the fuselage. Then take the fin back off the airplane and remove the covering material from the top of the fuselage between the marked lines, *(see photo on next page)*. This must be done to provide a strong wood-to-wood joint between the bottom of the fin and the fuselage.

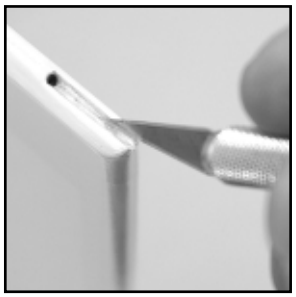


❑ 7) The fin can now be permanently glued in place on the fuselage. Epoxy glue is recommended for this step for maximum strength. Wipe any excess epoxy glue smears off the covering material with a rag soaked in rubbing alcohol.



❑ 8) Look closely at the bottom of the rudder leading edge. Notice that there is a pre-drilled hole in the leading edge, about 5/8" up from the bottom corner, where the 90° arm of the Tailwheel Wire will be installed.

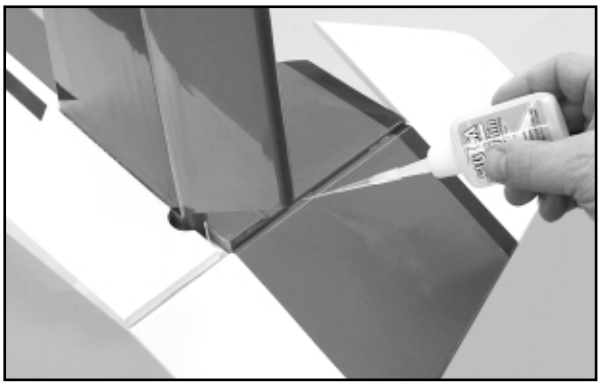
a. Use a sharp #11 hobby knife or single-edge razor blade to inlet the rudder leading edge, from the hole down to the bottom corner, to accept the shank of the Tailwheel Wire.



b. Trial fit the Tailwheel Wire in place in the rudder leading edge. Adjust the slot if necessary.

c. Glue the Tailwheel Wire in place, being careful not to get any glue on the plastic Mounting Bracket.

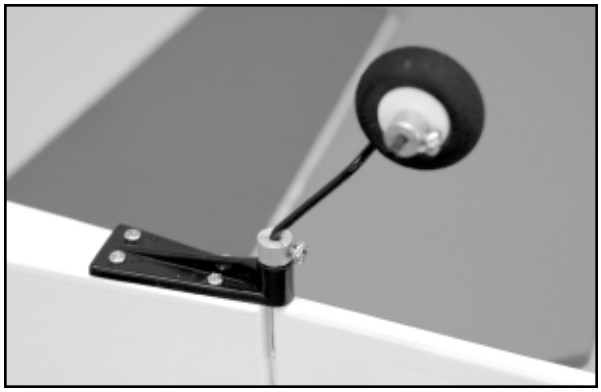
❑ 9) Install the rudder to the back of the fin and fuselage with three CA Hinges. After preliminary assembly and alignment, glue the hinges permanently in place using the same proceedures you used for gluing the aileron hinges and elevator hinges in previous steps. Let dry 10 minutes before flexing the hinges.



❑ 10) Hold the plastic tailwheel Mounting Bracket in place against the bottom of the fuselage. Mark the locations of the four mounting holes on the fuselage. Drill 3/64" dia. pilot holes at the marks. Install the Mounting Bracket with the four M2 x 10mm Phillips-Head Screws provided.

❑ 11) Hold the Wheel Collar that is on the Tailwheel Wire up tight against the bottom of the Mounting Bracket, and then tighten the Set Screw.

❑ 12) Install the 1" dia. Tail Wheel on the axle, holding it in place with the Wheel Collar provided.



RADIO INSTALLATION, PART I: Elevator

For the following steps you will need these parts:

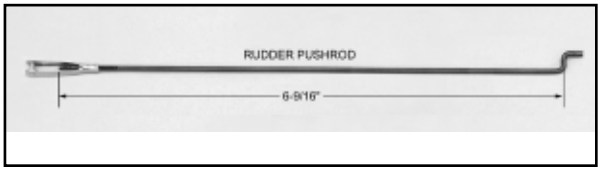
- The fuselage assembly
- 1 - Nylon Control Horn and Retainer Plate
- 2 - M2 x 15mm Phillips-Head Bolts
- 1 - Wire Elevator Pushrod
- 1 - Metal R/C Link
- 1 - Elevator Servo (not supplied)
- 1 - 12" Servo Extension Chord (not supplied)

❑ 1) Plug a 12" long servo extension chord onto the end of the elevator servo wire. Secure well with tape. Poke the free end of the extended servo wire through the elevator servo mount in the rear of the fuselage. Hold the fuselage vertically, nose down, as you pass the servo wire all the way forward to the radio compartment. Once you have the wire completely inside, install the elevator servo in the fuselage using the using the rubber grommets and screws that came with the servo.

❑ 2) Mount a control horn on the BOTTOM OF THE LEFT ELEVATOR. Locate the horn at the inboard end of the elevator, directly in line with the elevator servo. The front edge of the horn's base should be located right at the front edge of the elevator's leading edge bevel. Once you have the horn properly located,

mark the location of the two control horn mounting holes onto the elevator. Drill a 1/16" dia. hole completely through the elevator at each mark. Mount the control horn in place with the Nylon Retainer Plate on the top side of the elevator and two M2 x 15mm Phillips-Head Bolts.

❑ 3) The elevator pushrod consists of a wire rod with threads and an adjustable R/C Link on one end, and a pre-formed "z-bend" on the other end.

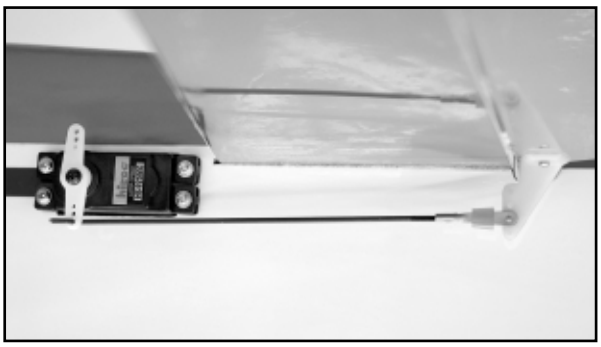


a) Install the z-bend end of the pushrod into the outer hole of the elevator servo output arm. Note: The hole in the servo output arm may be a little too tight. If necessary, drill out the holes in the arm with a 5/64" dia. or #50 (.070") drill bit.

b) Install the servo arm and pushrod onto the servo, making sure it is accurately centered in neutral position.

c) Clip the R/C Link into the control horn. Check the elevator for neutral position, adjusting the overall length of the pushrod by screwing the R/C Link in or out as needed to get the elevator in neutral position when the servo is in neutral position.

SAFETY NOTE: *Cut and fit a short length (about 3/16" or so) of medium diameter fuel tubing (not furnished) onto the R/C Link to prevent it from opening and coming off the control horn in flight.*



RADIO INSTALLATION, PART II: Rudder

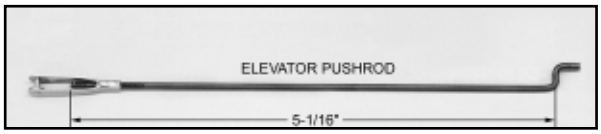
For the following steps you will need these parts:

- The fuselage assembly
- 1 - Nylon Control Horn and Retainer Plate
- 2 - M2 x 15mm Phillips-Head Bolts
- 1 - Wire Rudder Pushrod
- 1 - Metal R/C Link
- 1 - Rudder Servo (not supplied)
- 1 - 12" Servo Extension Chord (not supplied)

❑ 1) Plug a 12" long servo extension chord onto the end of the rudder servo wire. Secure well with tape. Poke the free end of the extended servo wire through the rudder servo mount in the rear of the fuselage. Hold the fuselage vertically, nose down, as you pass the servo wire all the way forward to the radio compartment. Once you have the wire completely inside, install the rudder servo in the fuselage using the using the rubber grommets and screws that came with the servo.

❑ 2) Mount a control horn on the RIGHT SIDE OF THE RUDDER. Locate the horn directly in line with the outermost hole of the rudder servo arm. The front edge of the horn's base should be located right at the front edge of the rudder's leading edge bevel. Once you have the horn properly located, mark the location of the two control horn mounting holes onto the rudder. Drill a 1/16" dia. hole completely through the rudder at each mark. Mount the control horn in place with the Nylon Retainer Plate and two M2 x 15mm Phillips-Head Bolts.

❑ 3) The rudder pushrod consists of a wire rod with threads and an adjustable R/C Link on one end, and a pre-formed "z-bend" on the other end.

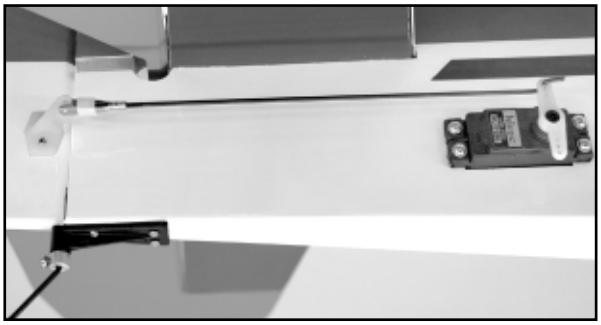


a) Install the z-bend end of the pushrod into the outer hole of the rudder servo output arm. Note: The hole in the servo output arm may be a little too tight. If necessary, drill out the holes in the arm with a 5/64" dia. or #50 (.070") drill bit.

b) Install the servo arm and pushrod onto the servo, making sure it is accurately centered in neutral position.

c) Clip the R/C Link into the control horn. Check the rudder for neutral position, adjusting the overall length of the pushrod by screwing the R/C Link in or out as needed to get the rudder in neutral position when the servo is in neutral position.

SAFETY NOTE: *Cut and fit a short length (about 3/16" or so) of fuel tubing (not furnished) onto the R/C Link to prevent it from opening and coming off the control horn in flight.*



RADIO INSTALLATION, PART III: Throttle Pushrod

For the following steps you will need these parts:

- The fuselage assembly
- 1 - 1/8" od x 12-1/2" Plastic Pushrod Tube
- 1 - 3/16" od x 11-3/8" Plastic Pushrod Sleeve
- 2 - M2 x 7/8" long Threaded Studs
- 2 - Metal R/C Links
- 1 - Plywood Pushrod Support
- 1 - Throttle Servo (not supplied)

The following instructions describe installation of the throttle pushrod components that are included in this kit with the YS-63 engine that we used. This pushrod system should be adaptable to most 4-stroke or 2-stroke single cylinder glow engines. There may be some engine installations that require a slightly different pushrod arrangement and additional materials (not supplied). Take a few minutes to study your engine installation and develope a plan on how you can best route your throttle pushrod from the engine, through the firewall, around the fuel tank, and back to the throttle servo.

❑ 1) Drill a 3/16"-7/32" dia. hole through the firewall, aligned with the engine's carburetor throttle arm. From the front, insert the 3/16" od x 11-3/8" long Plastic Pushrod Sleeve through the firewall

and back into the fuselage. Notice that there is a slot cut in the first fuselage former behind the firewall for the pushrod sleeve to go through. This slot keeps the pushrod sleeve out of the area where the fuel tank is mounted.

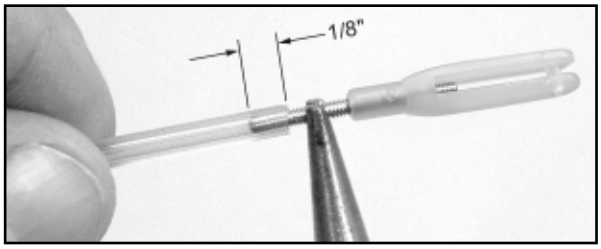
❑ 2) After you get the pushrod sleeve through the slotted former in the tank area, experiment with different routings of the pushrod from that point back to the area where the throttle servo will be located. Once you've decided on the best location for your throttle servo and route for your pushrod, mount the throttle servo in the plywood servo tray using the rubber grommets and mounting screws that came with the servo.

Note: *In our installation of the YS-63, we mounted the throttle servo near the fuselage side (look ahead to next 2 photos to see our finished throttle pushrod installation). We made a small notch in the fuselage former that is located at the leading edge of the wing opening to accomodate the pushrod. It's a straight shot from there back to the servo arm.*

❑ 3) Inside the fuselage, slip the Plywood Throttle Pushrod Support over the end of the pushrod sleeve. The plywood pushrod support should be positioned near the end of the throttle pushrod sleeve. Its job is to aim the end of the pushrod directly at the throttle servo arm. Feel free to change the overall length of the pushrod support if necessary to fit your particular installation. Once you've determined where to mount it, glue the plywood pushrod support to the fuselage structure.

❑ 4) Determine how long the pushrod sleeve needs to be to fit your installation (we purposely provided it too long so it would work with practically any installation). In most cases you will need to shorten the pushrod sleeve a little bit. As a general rule, the ends of the pushrod sleeve should be about 1-1/2" away from the servo arm and the throttle arm. Use a sharp razor blade to cut the pushrod sleeve to length. Remove the tube and sand its surface with 220 sandpaper to rough it a little. Reinstall the tube and glue it in place to the firewall and the plywood pushrod supports.

❑ 5) Screw the Threaded Stud with R/C Link into one end of the 1/8" od x 12-1/2" Plastic Pushrod Tube. Use a needle nose pliers to grip the threaded stud so you can screw it in at least 1/8".



❑ 6) At the firewall, insert the plain end of the plastic pushrod tube inside the plastic pushrod sleeve. Push it in until the R/C link can be clipped to engine throttle arm. Then reach inside the fuselage

and operate the throttle pushrod tube from the servo end. Make sure the pushrod can fully open and close the carburetor without binding.

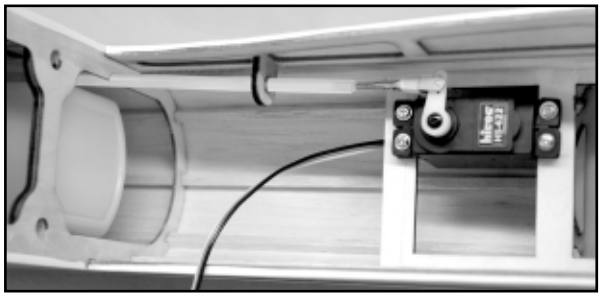
❑ 7) Finish the servo end of the throttle pushrod as follows:

a. Turn your radio on and make sure the throttle servo is operating in the right direction for high and low throttle. Put the throttle servo in high throttle position and turn off the radio.

b. Put the throttle pushrod in high throttle position.

c. Inside the fuselage, clip the Threaded Stud with Metal R/C Link to the servo arm. Hold the threaded stud and the pushrod tube alongside each other and mark the tube for cutting to length. Remember to allow for the 1/8" that the threaded stud will be screwed inside the end of the pushrod tube. Once you've determined the correct length, cut off the excess pushrod tube with a sharp razor knife.

d. Unclip the R/C link from the servo arm and screw the threaded stud 1/8" inside the end of the pushrod tube, as you did the other end in step 5. Then reattach the R/C link to the servo arm. Use a small piece of fuel tubing (not supplied) on the R/C link to keep it from coming open.



❑ 8) Turn your radio back on and check the operation of the throttle. Adjust the overall length of the throttle pushrod by scewing the R/C links in or out as needed to achieve full throttle control. When finished, secure at least one of the R/C links to it's threaded stud with CA glue, so that the pushrod tube cannot rotate in flight and change adjustment.

RADIO INSTALLATION, PART IV: Radio System

With all the servos now installed, all that remains is the installation of the receiver, battery pack and switch.

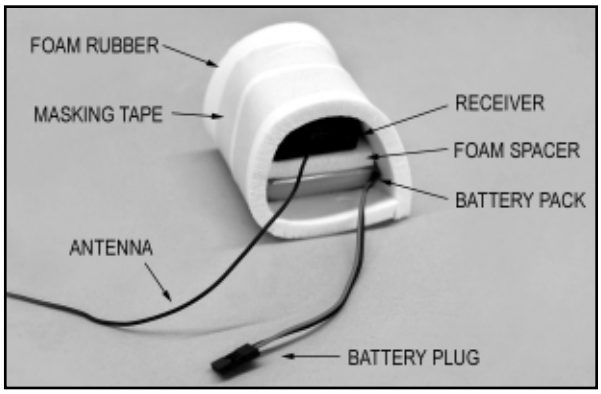
RX BATTERY PACK: The single heaviest unit of the radio system is the battery pack. This means that you can, if needed, locate the battery pack wherever it is needed in the airplane to help achieve the correct balance point. Be sure to wrap the battery pack in foam rubber to isolate it from vibration. Use more foam packing, rubber bands or tie-wraps to secure it to the model structure so that it can't move around in flight.

RECEIVER: Wrap the receiver in foam and secure it in the fuselage. Route the receiver antenna outside the model and secure it back near the tail of the airplane.

Notes about our installation: *To achieve proper balance with the YS-63 in our prototype, we needed to put both the battery pack and the receiver in the area just in front of the servo tray. So we wrapped the battery pack and the receiver together in a single piece of foam rubber, with a seperate piece of foam rubber between them, as shown in the next photo.*

For the receiver antenna, we drilled a 1/16" dia. exit hole in the right fuselage side at the receiver position. The antenna goes through the hole and is string back to the tail of the airplane. We

secured the end of the antenna under the stabilizer, using a piece of small fuel tubing, a small rubber band, and the head of the "T-pin" glued into the fudselage side, as shown in the second photo.



SWITCH: The radio on/off switch should be mounted on the fuselage side opposite the engine exhaust. Cut a small rectangular opening in the fuselage side for the switch toggle to poke through, and drill two small holes for the switch mounting bolts.

RADIO INSTALLATION, PART V: Final Safety Inspection

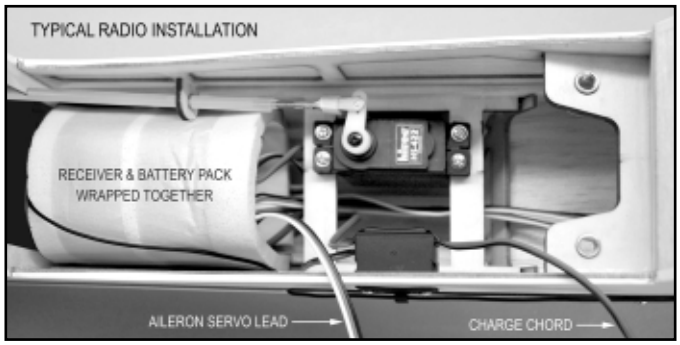
1) Take the time to fit each R/C link with a short length of silicone fuel tubing to keep the links firmly closed. This common safety practice has saved a lot of models!

2) Make sure that you have secured the servo arms to each servo with the retaining screws.

3) Turn the radio on and check the functions of all the controls. Make sure they are moving in the right direction! Thousands of R/C airplanes have crashed over the years because the servos were moving the wrong way! Also make sure all the servos are centered and working perfectly, without any binding. Correct any such problems now, before proceeding.

4) Be sure to range check your radio installation on the ground, before you attempt to fly your MAYHEM for the first time. With the transmitter antenna collapsed, and the receiver and transmitter turned on, you should be able to walk at least 100 ft. away from the model and still have solid control. Have an assistant stand by the airplane to watch the action of the control surfaces, while you walk slowly away from the model, constantly working the controls as you go. Your assistant should signal to you if the control surfaces become erratic. If all is well out to 100 ft. or further, repeat the test with the engine running, with the assistant holding the airplane. If the control surfaces do not respond correctly, do not fly! Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires, poor solder joints in your battery pack, or a defective cell in the battery pack, or a damaged receiver crystal from a previous crash. If you can't find and fix the problem, send the radio in to an approved service center.

NEVER FLY WITH A RADIO SYSTEM THAT ISN'T WORKING 100% CORRECTLY. THE PROBLEM WON'T GET BETTER IN THE AIR, IT WILL GET WORSE!



RADIO INSTALLATION, PART VI: Set The Control Throws

Use a ruler to accurately measure and adjust the travel of each control surface to the amounts shown below. Keep in mind that these settings are meant to serve as a starting point. As you gain experience flying your MAYHEM, you may want to adjust the throws to suit your flying style. All measurements should be taken at the widest part of the elevators, ailerons, and rudder.

	Low Rate	High 3D Rate
Ailerons	1" up	2" up
	1" down	2" down
	-20% expo	-70% expo
Elevator	1" up	2" up
	1" down	2" down
	-20% expo	-50% expo
Rudder	2" right	3"-4" right
	2" left	3"-4" left
	-20% expo	-70% expo

Note: High Rate 3D Control Throws

The 3D control throws are only meant for extreme aerobatics. They are not meant for normal flying. You should be competent and comfortable flying your MAYHEM with normal control throws before attempting 3D rates.

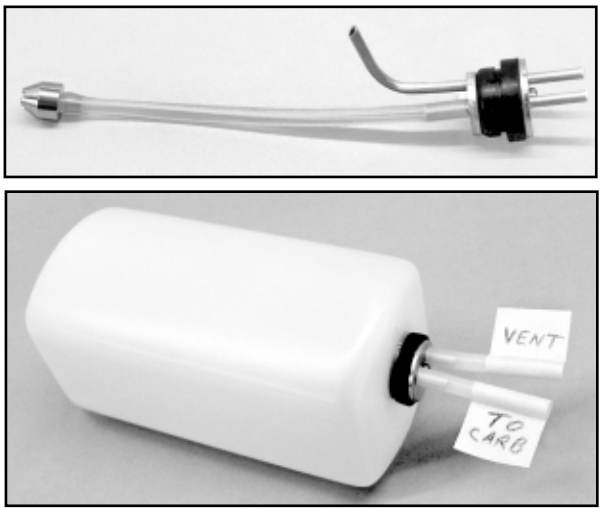
FUEL TANK INSTALLATION

❑ 1) Assemble the fuel tank as shown. We recommend that you plumb your tank with a standard 2 tube setup. One of the tubes is the "vent" line, through which you will fuel and defuel the tank. The other tube is the "fuel feed" line to the carburetor.

Note that the rubber stopper for the tank has two holes that go all the way through it. Use these holes for the aluminum vent and fuel feed tubes. Use the shortest of the three supplied aluminum tubes

for the fuel feed tube. Use the longest of the aluminum tubes for the vent tube. Gently bend the vent tube upwards to 90°, so it will be near the top of the tank. Adjust the length of the internal silicone fuel tubing to allow free movement of the metal clunk pick-up inside the tank. Install the stopper assembly into the neck of the tank and secure by tightening the clamp bolt.

Be sure to label the "vent" and "carb" lines for later identification.



❑ 2) Trial fit the tank in place into the front of the fuselage to familiarize yourself with how it mounts. The front of the tank should fit through the hole in the firewall. The main body of the tank is supported by the contoured hole in the fuselage former. Take the tank back out of the fuselage.

❑ 3) Apply a bead of silicon adhesive around the neck of the tank, where it will contact the inside of the firewall. Put another big blob of silicone on the front of the tank just below the neck. Slide the tank in place into the fuselage, pushing it in until the neck goes into the hole in the firewall.

❑ 4) A 5/16" x 1/2" x 2-7/8" balsa stick is provided to keep the fuel tank in place. Install the balsa stick across the back of the tank, gluing it to the front of the fuselage former. This will keep the tank from sliding backwards in flight. If the tank ever has to be removed for service, you can break the balsa stick loose to get the tank out.

DECAL APPLICATION

The decals in this kit are made of sticky-back mylar with an extremely aggressive adhesive. They are NOT water activated transfers. These decals are not die-cut and need to be cut from their sheets with a sharp hobby knife or scissors. Trim as close to the image as possible.

Putting sticky-back decals on a model can be tricky! Especially medium to large size ones like those in this kit. If you don't do it right you will end up with unsightly air bubbles trapped underneath the decal. The best method is to put large decals on "wet".

You will need a "soapy water" mixture (water mixed with a very small amount of dish soap, or SIG Pure Magic Model Airplane Cleaner, or Fantastic®, Windex®, or 409® type cleaners all work good). You will also need a supple squeegee (the SIG 4" Epoxy Spreader #SIGSH678 is perfect for this job), a couple clean soft cloths (old tee shirts are great), a good straight edge, a ruler, and a hobby knife with sharp #11 blades. We also suggest that you have some trim tape handy for making temporary guidelines (1/8" width or so is perfect) for help in aligning the decals.

First spray the surface of the model where the decal is to be placed with a soapy water mixture. Then peel the backing sheet completely off the decal, being careful not to let the sticky side double over and adhere to itself. Place the decal onto the wet surface of the model. Do not push down! The soapy water solution will keep the decal from actually sticking to the model until you have had time to shift it around into exact position. Once you have it in position, squeegee the excess soapy water out from under the decal. Mop up the water with a dry cloth. Squeegee repeatedly to get as much of the water out from under the decal as possible.

BALANCE THE MODEL

While all airplanes must be balanced to achieve flight, the balance of an aerobatic airplane like the MAYHEM 40 is especially critical. The final placement of the longitudinal Center of Gravity, or Balance Point, will have a great effect on the aerobatic performance of this airplane. Balancing this model should be approached with patience and care.

Balance the MAYHEM with everything on board, including the propeller, spinner, etc. Do not leave anything off the airplane that will be on it during flight. DO NOT fill the fuel tank - the tank must be empty during balancing!

BALANCE POINTS REFERENCE CHART

* Percentage of Mean Aerodynamic Chord

% of MAC*	distance aft of wing leading edge	
29%	4.06"	for normal flying
31%	4.34"	
33%	4.62"	
34%	4.76"	for 3D flying
35%	4.90"	
36%	5.04"	
37%	5.18"	
38%	5.32"	

For initial test flying and familiarization purposes, we suggest a starting balance point of 33% MAC, which is approximately 4-5/6" behind the leading edge of the wing.

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

As your experience with the MAYHEM 40 increases, you can adjust the balance point to suit yourself. In general, as the balance point is moved aft, the airplane will become more responsive and less stable in all axis. Some pilots like their models extremely reactive, while others like to fly with more smoothness. If you never get into 3D flying, you will probably like the balance point at the intial setting of 33%. In the end, the final balance point and control throws you use will depend on how you like to fly.

The best means of shifting the CG fore or aft is by shifting the locatoin of the battery pack. If is the heaviest movable component in the airplane. Wherever you put the battery pack, make sure it cannot move around in flight. Our MAYHEM 40 prototypes required no additional nose or tail weight to achieve different balance points. We shifted the balance point by shifting the battery pack.

If moving your battery pack does not achieve the balance point you want, and more weight is needed, consider using a larger (and therefore heavier) battery pack. Try to avoid adding useless weight. If you need more weight in the nose, try a heavier spinner or replace the light wheels with heavier after-market wheels. If your model is nose heavy and battery shifting does not work, you can try adding lead stick-on weights in the rear of the fuselage. After you've determined how much tail weight you need, the weights can be placed inside the fuselage by simply removing the elevator servo and placing the weights inside and securing them. With the elevator servo back in place, the weights are hidden.

Lastly, the aerobatic performance of your MAYHEM 40 will benefit greatly if you balance the airplane laterally as well as fore and aft (eliminate the "heavy wingtip" syndrome). Lateral balancing requires that the model be suspended upside down, using substantial chord or fishing line. Hang the model in level flight attitude from the ceiling or a rafter, with one line looped over the engine propeller shaft and another line looped over the tailwheel bracket. The model should hang level in side view. With the model secured in this way, level the wings and then slowly let go. Ideally the wings should stay level when you put them there. If one wing panel drops lower, it means that it is heavier than the other panel. When flying the model, this imbalance can cause the airplane to "pull" to the heavy side, especially in loops and up line maneuvers. To make the airplane track true, the light wing panel needs weight added so it will balance level with the other panel. Add stick-on weights or push finishing nails into the light wingtip to achieve balance. Always make sure the weights cannot come loose.

INCIDENCE & THRUST ANGLES

The MAYHEM 40 was built at the factory with the following specs:

Wing Incidence:	0°
Stab Incidence:	0°
Engine - Side View	0° down
Engine - Top View	2° right

FLYING

If you have carefully followed this assembly manual, test flying your MAYHEM 40 should be a lot of fun. Try to choose a calm day with little or no wind for the first flight. Good conditions allow you to better evaluate and more accurately adjust the trim requirements for your airplane. As we've mentioned before, a good running, reliable engine is a must for the ultimate success of your airplane. Take the time to solve any engine problems before you try to fly.

Always make it part of your pre-flight routine to check each control on the airplane, making sure the surfaces are moving in the correct directions. Also check each control linkage to be sure they are secure and that nothing is loose.

After starting and warming up the engine, taxi the MAYHEM out to the take-off position on the flying field. Hold up elevator during the taxi to keep the tailwheel firmly to the ground. For take-off, the airplane should be lined-up with the center of the field with the nose pointed directly into the wind. Hold a little up elevator and smoothly advance the throttle - do not slam the throttle full open all at once. The airplane should roll forward smoothly, tailwheel on the ground. As speed builds, back off of the up elevator input and use the rudder as needed to maintain a straight takeoff run. The tail will come up as flying speed is reached and a little up elevator will lift the MAYHEM off the ground.

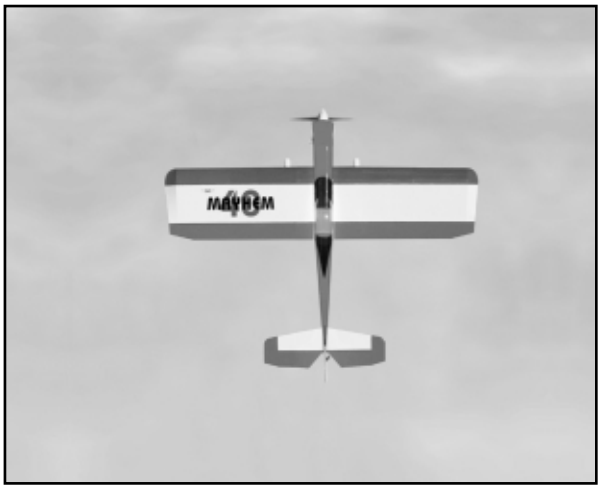
Maintain a straight outbound flight path, climbing at a shallow angle until a safe maneuvering altitude is reached. Make your control inputs smooth and avoid jerking the sticks. Once you achieve a safe altitude, throttle back slightly to a nice "cruising" speed.

THROTTLE MANAGEMENT: The MAYHEM, and similar designs, are not designed to fly at high air speeds. The key to their unique flying characteristics is super light weight construction and extra large control surfaces. Full throttle is only for takeoff and aerobatic maneuvers. For normal level flight, you should throttle back to cruising speed. Also, never dive the MAYHEM at full throttle (see CAUTION note about control surface flutter at end of this page).

Once you've settled at cruising altitude and speed, adjust the trims as needed to achieve hands off straight and level flight. Take it easy with the MAYHEM for the first flight, gradually getting acquainted with it as you gain confidence. Take the MAYHEM to a safe altitude and throttle the engine back to idle. This will give you a good idea of the glide characteristics. While still at idle, steadily increase up elevator to get a feel for the stall characteristics. Stalls tend to be very gentle with the nose dropping straight ahead with little tendency to drop a wing. This is great information to have when set up for your first landing.

Landing the MAYHEM is typically a pleasure. To begin a landing approach, lower the throttle partway while on the downwind leg. This allows the nose of the model to drop slightly. Continue to bleed off excess altitude, maintaining good airspeed and control, while you make your final turn to the runway. Keep a little power on the engine during final approach, down to a few feet off the ground. The MAYHEM has a very thick wing and slows down quickly when you completely close the throttle. Once the airplane is 3-4 feet off the ground, close the throttle completely in preparation for touchdown. Gradually add more up elevator as the airplane slows down and settles towards the ground. Flair the airplane as the ground approaches for a smooth 3-point landing and rollout. Hard landings are not necessary - sound piloting skills are. After landing, always remember to hold up elevator when taxiing to keep the tailwheel firmly to the ground.

Before flying your MAYHEM 40 a second time, double check the airplane for anything that may have come loose, become disconnected, etc. during the first flight.



Each flight will be even more fun as you fine tune the trim of your MAYHEM. Try a few loops and rolls. Inverted flight is easy, requiring little down elevator for hold level flight. Next try some snap rolls, spins, and knife edge flight. The MAYHEM should perform all of these maneuvers with ease. Note any tendencies that you can trim out when you're back on the ground. For instance, if the MAYHEM has a tendancy to "pull", or drift, towards the canopy during knife edge flight, try raising BOTH ailerons 1/2 turn. If it pulls towards the landing gear, lower both ailerons. Fly it again and note any difference. Always make changes slowly, in small amounts, and only one change per flight. As with any aircraft, getting consistently good results from the MAYHEM is usually a matter of flight trim and practice.

For those of you interested in 3-D aerobatics, set up your radio to take advantage of the huge control movements available from this model. However, we would urge you to "sneak up" on such control throws, making very sure you have them available to you only on your high rate switches!

CAUTION: If you notice any unusual sounds while flying, such as a low pitched buzz, this may be control surface "flutter". Flutter can happen to any R/C airplane. Designs like the MAYHEM 40, with light weight, extra large control surfaces are especially vunerable. Flutter can quickly destroy your aircraft if left unchecked. It can break your pushrod linkages, strip gears inside the servo, and even cause control surfaces or entire wings to come off the airplane in flight. Anytime you detect flutter, you must immediately cut the throttle and land the airplane! Check all servo mountings and pushrod linkages before flying again. If a control surface flutttered once, it will flutter again under similar circumstances. In general, some of the things to look at when trying to cure flutter are: Loose servo mounting screws or deteriorated rubber grommets. Excessive hinge gap. Weak or loose control horn. Weak or flexible pushrods. Poor fit of R/C link pin in control horn. Internal servo gears that are weak, stripped, or have excessive play or backlash.

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

GOOD LUCK AND GOOD FLYING!

WARNING! THIS IS NOT A TOY!

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

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

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

AMA WEB SITE: www.modelaircraft.org

CUSTOMER SERVICE

SIG MANUFACTURING COMPANY, INC. is committed to your success in both assembling and flying the MAYHEM 40 ARF. Should you encounter any problem building this kit, or discover any missing or damaged parts, please feel free to contact us by mail or telephone.

SIG MANUFACTURING COMPANY, INC.
401-7 South Front Street
Montezuma, IA 50171-0520

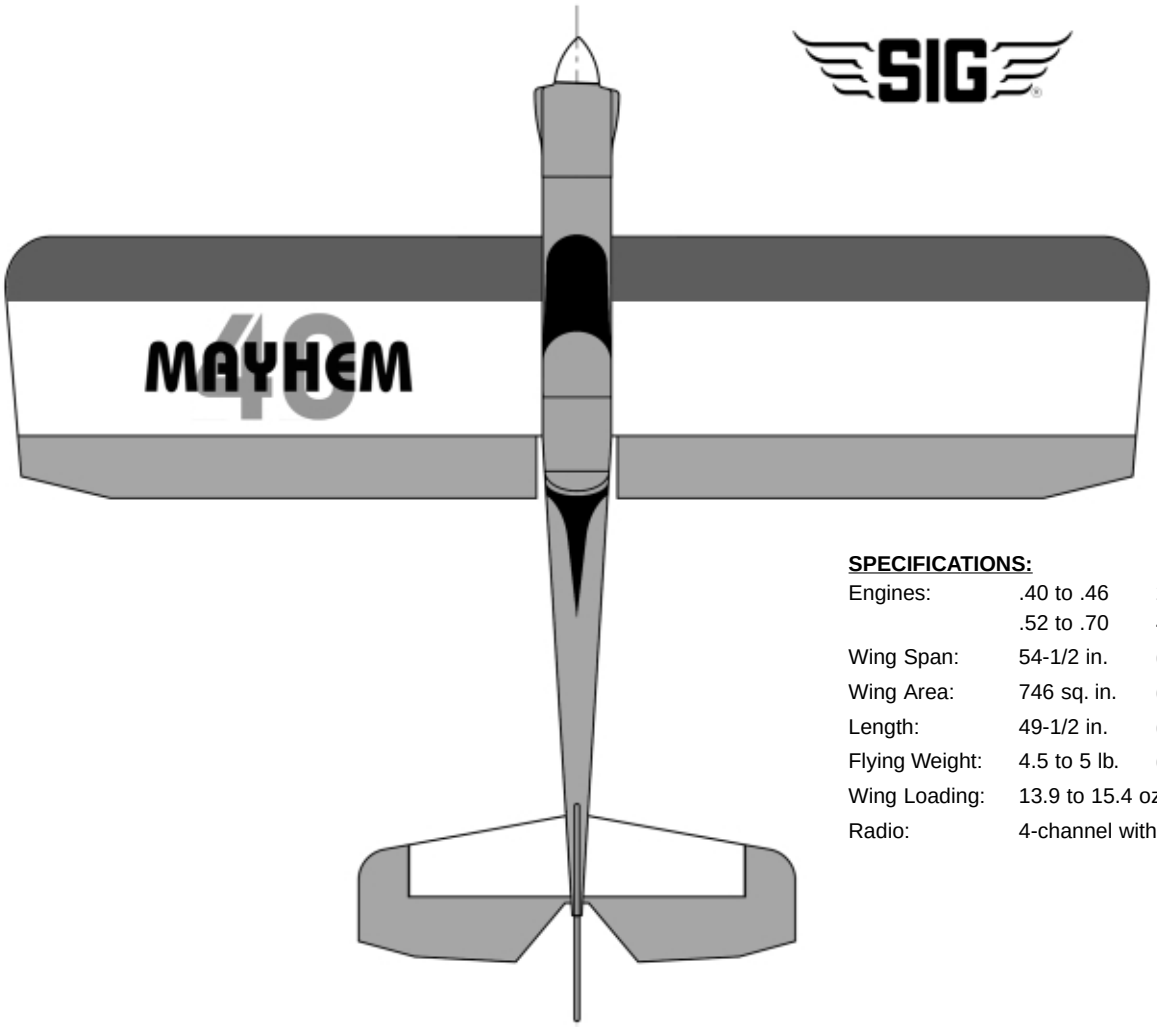
SIG MODELER'S ORDERLINE: 1-800-247-5008
(to order parts)

SIG MODELER'S HOTLINE: 1-641-623-0215
(for technical support)

SIG WEB SITE: www.sigmfg.com

LIMIT OF LIABILITY

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



SPECIFICATIONS:

Engines:	.40 to .46	2-Stroke
	.52 to .70	4-Stroke
Wing Span:	54-1/2 in.	(1384 mm)
Wing Area:	746 sq. in.	(48.1 sq. dm.)
Length:	49-1/2 in.	(1257 mm)
Flying Weight:	4.5 to 5 lb.	(2041 to 2268 g)
Wing Loading:	13.9 to 15.4 oz. per sq. ft.	
Radio:	4-channel with 5 servos	

APG (AILERON POSITIONING GUIDE)