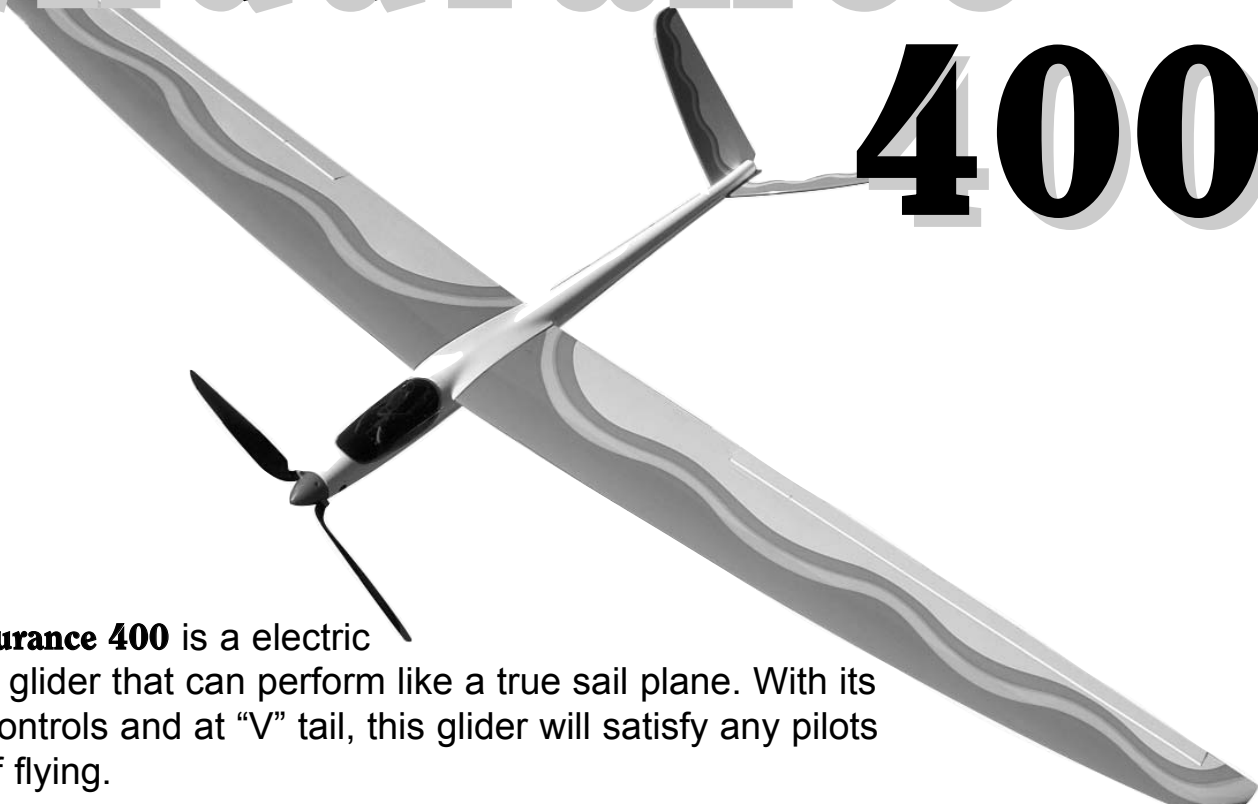


Endurance 400



The **Endurance 400** is a electric powered glider that can perform like a true sail plane. With its aileron controls and at "V" tail, this glider will satisfy any pilots dream of flying.

WARNING

A radio-controlled model is not a toy and is not intended for persons under 16 years old. Keep this kit out of the reach of younger children, as it contains parts that could be dangerous. A radio-controlled model is capable of causing serious bodily injury and property damage. It is the buyer's responsibility to assemble this aircraft correctly and to properly install the motor, radio, and all other equipment. Test and fly the finished model only in the presence and with the assistance of another experienced R/C flyer. The model must always be operated and flown using great care and common sense, as well as in accordance with the Safety Code of the Academy of Model Aeronautics (5151 Memorial Drive, Muncie, IN 47302, 1-800-435-9262). We suggest you join the AMA and become properly insured prior to flying this model. Also, consult with the AMA or your local hobby dealer to find an experienced instructor in your area. Per the Federal Communications Commission, you are required to use only those radio frequencies specified "for Model Aircraft."

LIMITED WARRANTY

Carl Goldberg Products, Ltd. has inspected and certified the components of this aircraft. The company urges the buyer to perform his own inspection, prior to assembly, and to immediately request a replacement of any parts he believes to be defective for their intended use. The company warrants replacement of any such components, provided the buyer requests such replacement within a period of 90 days from the date of purchase and provided the defective part is returned, if so requested by the company.

No other warranty, expressed or implied, is made by the company with respect to this kit. The buyer acknowledges and understands that it is his responsibility to carefully assemble the finished flying model airplane and to fly it safely. The buyer hereby assumes full responsibility for the risk and all liability for personal or property damage or injury arising out of the buyer's use of the components of this kit.

CARL GOLDBERG PRODUCTS, LTD.

P.O. Box 818 Oakwood GA 30566 Phone #678-450-0085 Fax # 770-532-2163 www.carlgoldbergproducts.com

USING THIS INSTRUCTION MANUAL

Before you begin assembling your **Endurance 400 ARF**, take some time to read through this entire instruction book. It is designed to take you step-by-step through the process and to give you added information on motor and radio selection and set-up, balancing your aircraft, and flying your model. The time you spend will speed the assembly process and help you avoid problems.

PREPARING FOR ASSEMBLY

You will need a work area of approximately 24 x 48" which has been covered to protect it from adhesive, as well as cuts and other damage. Many people cover their work area with a sheet of dry wall (sheet rock) and/or waxed paper to prevent CA Glue and Epoxy from ruining the work surface.

CONSTRUCTION TIPS

IMPORTANT: ALWAYS READ A FEW STEPS AHEAD. This will alert you to coming instructions and will help you plan accordingly.

Using the Parts Identification section, familiarize yourself with the various items included in your kit box.

Do not hesitate to ask questions. Your local hobby dealer and area flyers will most likely be happy to help, as they want you to have a successful flying experience.

You may also receive technical assistance from Carl Goldberg Products, Ltd. via e-mail (questions@carlgoldberg-products.com) or by telephone 1-678-450-0085.

ADHESIVES & GLUING TECHNIQUES

CA adhesives are specially formulated to firmly glue the plywood, hardwood, and balsa used in your model and to withstand the vibration and stresses of high performance flight. However, there are times, such as when you are installing the stabilizer and fin on the fuselage and want more set-up time for careful alignment and positioning, then you should use epoxy. Occasionally, you also will want to use thin CA, which "wicks" into the surrounding areas. Aliphatic resin glue or similar water-based glues can also be used, but they will add to the assembly time because they dry so much more slowly than CA glue. Remember, when ever using any CA, you must be careful to read instructions thoroughly, as you will have only seconds for positioning of parts. Be sure to trial fit parts together before gluing. Also, never use watery THIN type CA glue for gluing plywood and hardwood parts. Thin CA's do not adequately bond these areas.

CAUTION

Some people may experience an allergic reaction when exposed to fumes from CA glue or epoxy. As with paints, thinners, and solvents, it is always important to use glues only where there is adequate ventilation to carry fumes away. A fan is recommended. Also, special care must be taken when using CA, as it will bond skin as well as other surfaces. Before using any CA, carefully read all label precautions. When using CA, protective eye-wear and care in keeping the glue away from the face is highly recommended. If CA does happen to get into the eye, hold lid open and flush with water only. Seek immediate medical attention.

COVERING

The **Endurance 400 ARF** is covered in a premium polyester film chosen by many of the world's top flyers for its beauty, toughness, and ease of application and repair. It is not uncommon for ARF's to develop a few wrinkles in transit. If this is true of your model, the situation is easily corrected. Before you begin putting the pieces together, run around the edge of the seams first then over the surface of each section with an iron (either specially designed for airplane use or the more cumbersome household iron). Apply the heat (set at about 350° F), following along with a soft cloth and pressing down on the covering as you go around. This will more firmly set the covering adhesive into the wood and keep your aircraft covering tight and smooth in the future. Once you have ironed the seams stay away from them with the heat or the covering will slide when you try to shrink the middle. If this happens the wrinkles will not come out of the covering.

ITEMS NEEDED TO COMPLETE THIS AIRCRAFT

- 1 RADIO GUIDANCE SYSTEM (3 CHANNEL MINIMUM REQUIRED WITH 3 SERVOS)
- 2 FUTABA 3108 SERVOS (AILERONS)
- 1 FUTABA 3101 SERVO (ELEVATOR)
- 1 MICRO RECEIVER (GWS)
- 2 6" AILERON SERVO EXTENSION WIRE
- 1 ELECTRONIC SPEED CONTROL (20 AMP FOR LI-PO BATTERIES)
- 1 2 OR 3 CELL 1500 MAH LI-PO BATTERY
- 1 CA ACCELERATOR
- 1 1 OZ. BOTTLE CA MEDIUM GLUE
- 1 1/2 OZ. BOTTLE CA THIN GLUE
- 1 5 MINUET EPOXY
- 1 1/4" FOAM RUBBER
- 1 DOUBLE SIDED SERVO TAPE
- 1 ELECTRICAL TAPE
- 1 120 GRIT SAND PAPER

TOOLS AND SUPPLIES FOR ASSEMBLY

- MODELING OR UTILITY KNIFE
- WORK SURFACE (24" X48")
- SMALL STANDARD & PHILLIPS SCREW-DRIVERS
- MASKING TAPE
- NEEDLE NOSE PLIERS
- 24" RULER
- FLEXIBLE STRAIGHT-EDGE
- SOFT PENCIL
- A FEW STRAIGHT OR "T" PINS
- WIRE CUTTER (DYKES)
- OPTIONAL HEAT GUN/COVERING IRON
- HOT GLUE GUN

Caution:

Before starting, carefully go over all high stress areas with an epoxy or wood glue to confirm all areas are well glued.

Warnings about Lithium Polymer batteries

NEVER charge Lithium Polymer batteries with a charger designed for NiCd, NiMH, or any other type of battery chemistry. Use **ONLY** the chargers listed under REQUIRES or equivalent substitutes.

Do not allow Li-Po cells to overheat at any time. Cells which reach greater than 140° Fahrenheit (60C) will usually become damaged and could catch fire.

Do not charge or discharge Li-Po cells on or near combustible materials including paper, plastic, carpets, vinyl, leather, wood, inside an R/C model or full size automobile.

Do not expose Li-Po cells to water or moisture at any time.

Do not store batteries near an open flame or heater.

Do not assemble Li-Po cells or pre-assembled packs together with other Li-Po cells or packs.

Do not allow a Li-Po battery to be left unattended during charging or discharging.

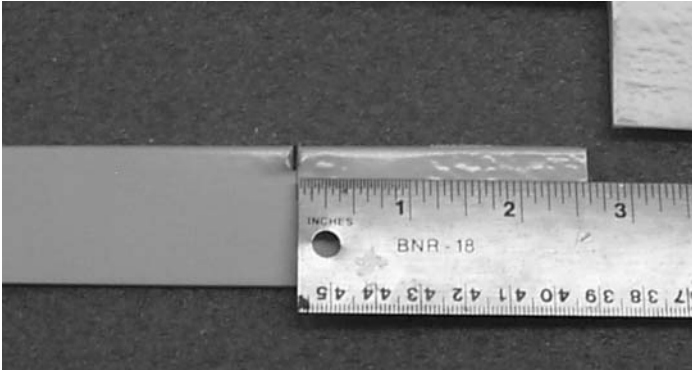
Always store Li-Po batteries in a secure location away from children

Always remove a Li-Po battery if model is involved in any kind of crash. Carefully inspect the battery and connectors for even the smallest damage. **CAUTION**, cells may be hot! **Do not** allow the electrolyte to get into eyes or on skin. Wash affected areas immediately if they come into contact with electrolyte

Wing

Installing Ailerons

- Collect the following parts:
 - (2) Wing (Left & Right)
 - (2) Ailerons (Left & Right)
 - (8) Mini CA hinges
 - (2) Wood control horns



- Locate the pre-cut control horn slots in both ailerons.
 - Using a hobby knife (#11 blade), slide the blade into each slot to make sure the covering is cleanly cut. The slot is 2-5/8" from the end of the aileron
 - Making sure that the aileron is upside down, insert the wood control horn in the slot.
- Keep the control horn perpendicular to you table top and the end flush with the top of the aileron.
 - Thin CA glue the control horn into the aileron.
 - Repeat this process with the other aileron.

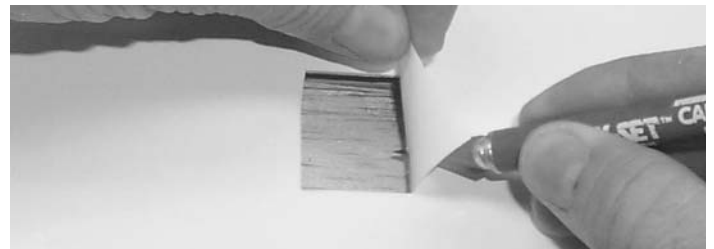


- Locate the pre-cut aileron hinge slots in both sides of the wing. Using a hobby knife (#11 blade), slide the blade into each slot to make sure it is cleanly cut.
 - Repeat this process with the ailerons, making sure all hinge slots are clean.

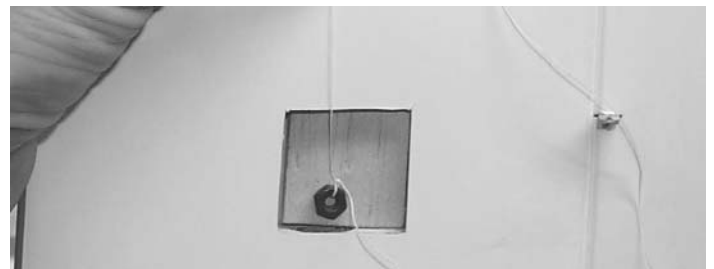
- Insert the CA hinges half way into the wing and the ailerons. (Use a pin inserted into the middle of the hinge to help keep the hinge in the middle.)
 - Make sure that the aileron is against the wing and evenly spaced at both ends of the wing cut out.
 - Using thin CA glue, place one drop on all four hinges top and bottom.
 - Repeat these steps for the other aileron.

Aileron Servo Installation

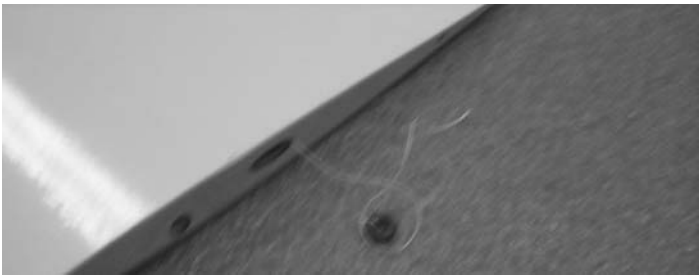
- Collect the following parts:
 - (2) Mini servos
 - (2) 6" servo extensions
 - (1) Electrical Tape
 - (1) Hex Nut
 - (1) 45cm length of string
 - (1) Double sided servo tape
 - (2) Nylon Clevises
 - (2) Threaded pushrods
 - (2) Nylon Swivel Keepers



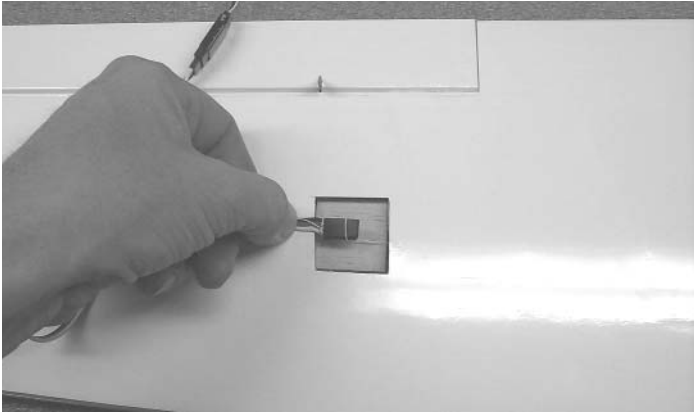
- Locate the servo hole in the bottom of the wing
 - Using a hobby knife (#11 blade), remove the covering over the hole.



- Tie the hex nut to one end of the 45cm string.
 - Tape the other end of the string to the bottom of the wing next to the servo hole.
 - Insert the hex nut into the servo hole and let it fall down into the wing rib hole through the wing till it exits the root wing rib hole.

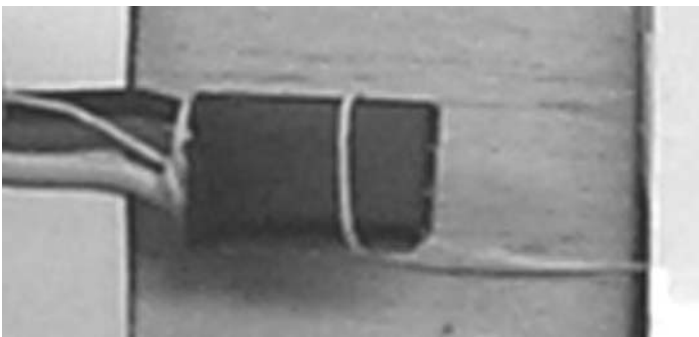


3. Tape the hex nut to the bottom of the wing.

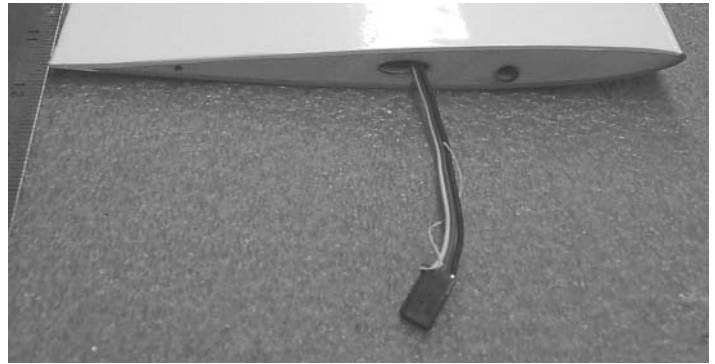


4. Plug one 6" extension wire into the servo.
 Tape the servo wire to the extensions.

IMPORTANT! To ensure that any connections located inside the wing will not come loose, either when the wires are pulled, or during flying, always tape them securely together with electrical tape.

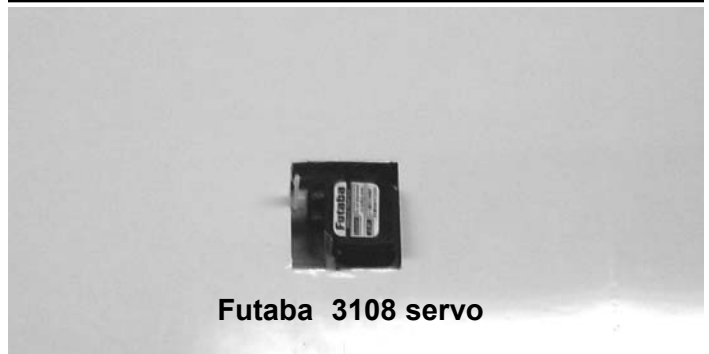


5. Un-tape the string that is next to the servo hole.
 Tie the end of the string to the end of the servo extension.
 Make sure that the string is pulling in the middle of the plug
 Tape the string to the servo plug.



6. Insert the servo wire plug into the hole in the rib in the aileron servo hole.
 Slowly pull the servo extension through the wing till it exits the center wing rib hole.

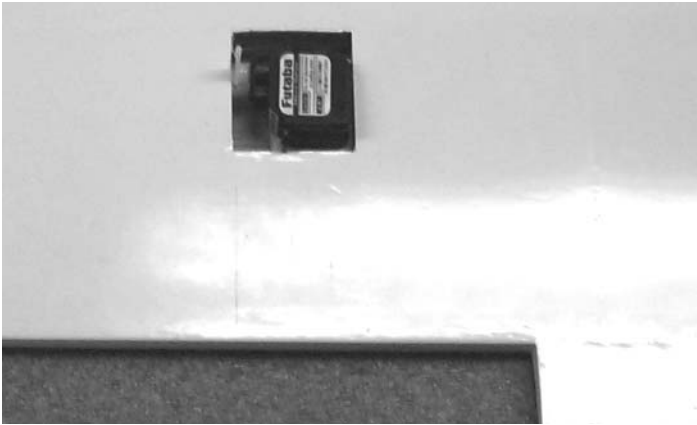
HINT: Look through the hole in the wing and pull back and forth on the string and the extension wire, too feed it through the wing. You can also use a length of music wire inserted through the wing with the extension plug taped to it.



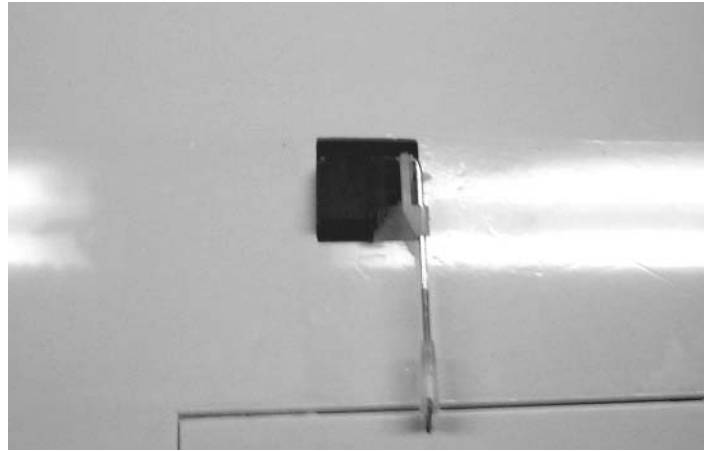
7. Insert the aileron servo in the hole in the wing.
 Cut open the servo hole if required.

Caution: Do not cut the spars or past the ribs.

8. Check for servo arm clearance.
 Also, check that you can get to the servo arm screw for adjustment and removal.
 We have include a 1/4" block of wood to be placed under the aileron servo if required.



9. Using rubbing alcohol, clean the bottom of the servo where the double sided tape will be applied.
- Making sure that the both the wing and the servo are dust free, apply a piece of double sided tape to the servo.
- remove the other side of the tape and mount the servo in the wing.
- To help secure the servo more, glue the servo in place using a hot glue gun.



10. Thread the nylon clevis onto the threaded rod..
- Attach the clevis to the wooden control horn.
- Mark where the pushrod wire meets the servo arm and make a 90 degree bend.
- put the wire through the servo arm and attach the nylon swivel keeper.
- Cut off any excess wire.

Fuselage

“V” TAIL INSTALLATION

1. Collect the following parts:
 - (1) “V” Tail
 - (1) Fiberglass Fuselage
 - (1) 120 Grit Sand Paper



1. Using a soft lead pencil, mark the location where the stab meets the fuselage.



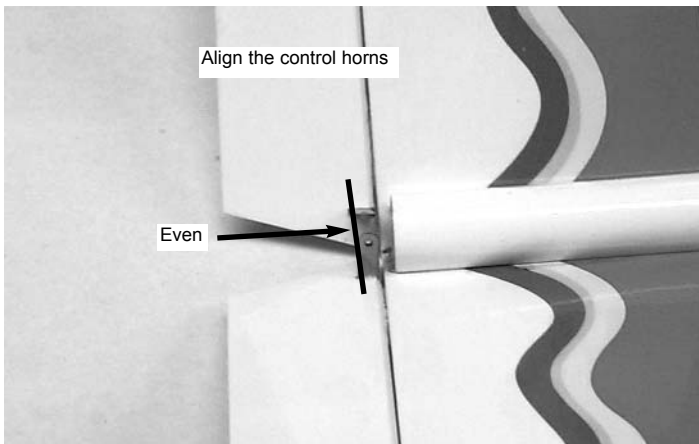
2. Remove the stab from the fuse and, working 1/16" inside the drawn lines, carefully remove the covering from the bottom of the stab. **BE CAREFUL TO AVOID CUTTING THE WOOD.**
- Sand the fuselage using 120grit sandpaper, at the location where the “V” tail will be glued. (Sand only enough to rough the surface for the glue to stick).



3. Spread epoxy on both the inside "V" of the stab and the stab platform of the fuse.
- Replace the stab on the "V" platform and, check that the stab is resting completely flat.
- Allow to dry.

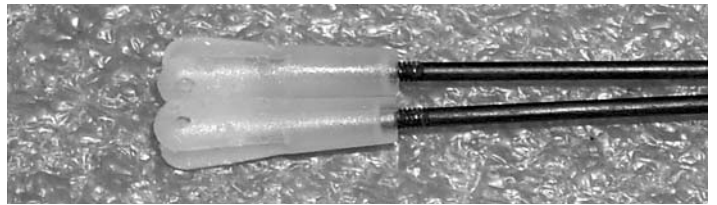
Elevator & Pushrod

1. Collect the following parts:
 - (1) Pushrod Assembly
 - (2) elevators
 - (2) Wooden control Horns
 - (2) Nylon Clevises
 - (6) CA Hinges

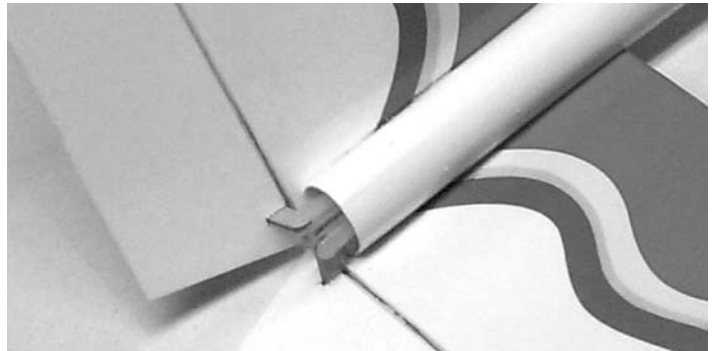


2. Locate the pre-cut control horn slots in both elevators.
 - Using a hobby knife (#11 blade), slide the blade into each slot to make sure the covering is cleanly cut. The slot is 3/8" from the end of the elevators.
 - Making sure that the elevator is upright, insert the wood control horn in the slot.
3. Keep the control horn perpendicular to you table top and the end flush with the top of the elevator.
 - Slide the elevator into the "V" tail using the hinges

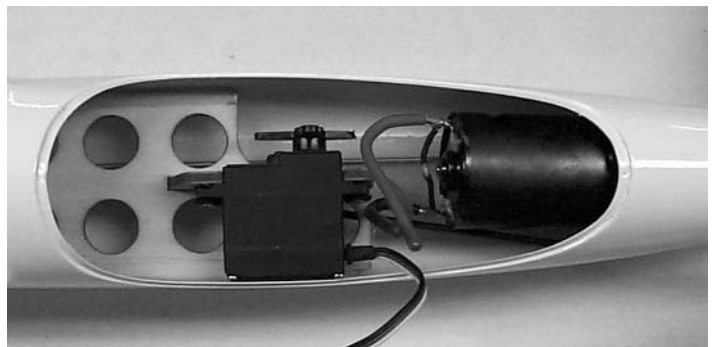
4. Repeat this process with the other elevator.
 - Align the two control horns so they are even with each other. (See Photo)
 - Carefully pull the elevators back out of the "V" tail and glue the control horns in place.
5. Re-insert the hinges into the elevators and placet them back onto the "V" tail.
 - Make sure the tip of the elevator is even with the tip of the "V" tail.
 - Using thin CA, glue the elevators in place.



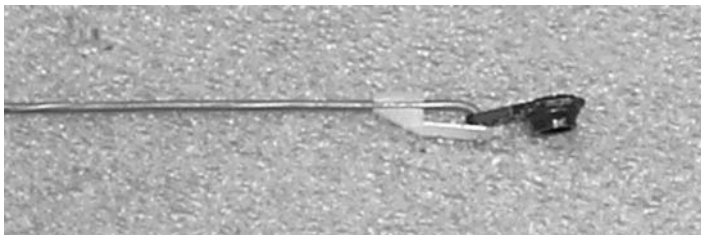
6. thread the nylon clevises onto the end of the elevator pushrod.



7. Insert the pushrod into the rear of the fuselage.
 - Make sure the front of the pushrod rest under where the servo arm will be.



7. Insert the elevator servo into the fuselage. (We used a Futaba 3101 servo).
 - Making sure that the servo arm is straight to the servo, mark the pushrod were the servo arm hole meet.
 - Remove the pushrod from the fuselage.



8. Lay the pushrod on the table top just like it sits inside the fuselage.
- Bend the pushrod 90 degrees at the mark you just made. Bend the wire so that you insert the pushrod thru the servo arm. (See Photo above)
- Put the servo arm and the swivel keeper on the pushrod. (See Photo above)
- Insert the pushrod into the hole in the rear of the fuselage.



9. Screw the servo arm onto the servo.
- Mount the elevator servo like shown in the photo above.

Speed control

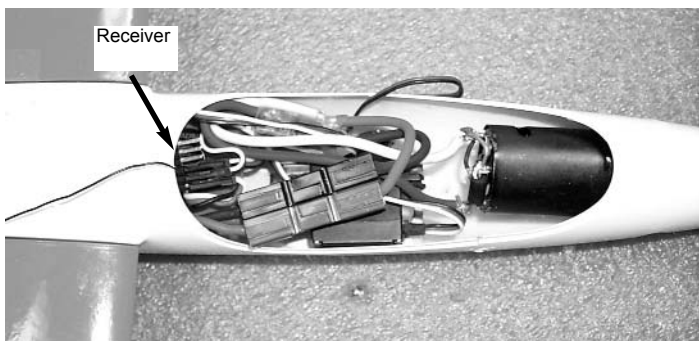
The motor in the **Endurance 400** is a standard 400 brushed motor. The **Endurance 400** uses a orbital drive with a 3.7:1 ratio. The **Endurance 400** works the best using Li-Po battery packs. A 2 cell 1500 mAh Li-Po battery or for the best performance a 3 cell 1500 mAh Li-Po battery.

The speed controller needs to be designed for Li-Po battery packs and able to handle no less than 25 amps of current draw. Connect your speed controller to the motor per the instructions that comes with the speed control.

Battery & Receiver Location



Slide the battery behind the elevator servo. Use foam to help hold the battery in place or glue velcro on the battery and the tray.



Plug in all the servos into the micro receiver and place the receiver on top or in front of the battery pack.



Stretch out the receiver antenna along the top of the fuselage and tape in place.

You will also have to tape the wings to the fuselage before flying.

CG Location and Control Throws

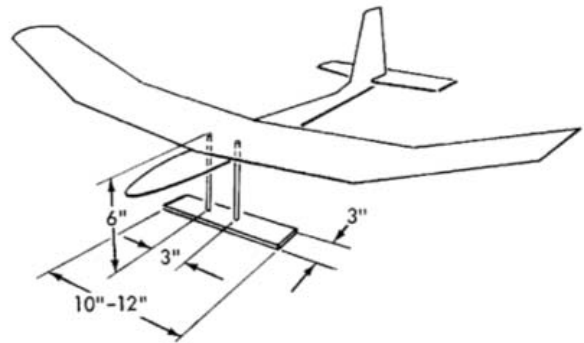
The **Endurance 400** balance point is 2-1/4 to 2-1/2" back from the leading edge of the wing next to the fuselage. It is always better to fly slightly nose heavy, then slowly move the balance point back till the plane flies the way you like it.

Control Throws

Aileron 1/4" to 3/8"

Elevator 3/8" to 1/2"

With everything installed, mount the wing and carefully check the Center of Gravity (CG). One way is to perch the model on the thumb and forefinger of your left hand (if you're right handed), while steadying the model with the other. A much better way is to use a balancing set-up, which can be made with a couple of 1/4" dowels with rounded tops, spaced just enough apart to clear the fuse. Mark the desired CG on the underside of the wing, and then set the model on the dowels at that location. Add weight if necessary for balance. The least weight is needed when added as far forward or back as possible.



DO NOT attempt to fly the model with the CG EVEN SLIGHTLY BEHIND the rear most recommended position.

Before going to the field to fly, with batteries fully-charged, turn on receiver and transmitter and actuate all controls many times until you are satisfied with all functions. **Prior to the beginning of each day's flying**, make a range check of your equipment in accordance with the manufacturer's instructions in general, with antenna collapsed, you should have at least 100 feet range on the ground. To check this, set the model facing away from you, turn on both the transmitter and receiver switches, and walk away while transmitting signals. Watch to see that no signals are missed until you are at least 100 feet away. Do not attempt any flights unless the equipment works perfectly. Be careful not to use your transmitter when someone else on the field is flying or testing on the same frequency.

LEARNING TO FLY

Flying R/C is both fun and challenging. As with other portions of this book, the following section is meant to introduce you to the basics. Read carefully before taking your model out to the field and attempting first flights. And remember, becoming an R/C pilot takes time and patience, but the rewards are well worth the effort.

FLYING THE ENDURANCE 400

CHECK YOUR EQUIPMENT

Prior to going to the flying field, with radio batteries fully charged, turn on both receiver (Rx) and transmitter (Tx) and actuate all controls many times until you are satisfied with all functions.

Before beginning each day's flying, make a range check of your equipment in accordance with the manufacturer's instructions. In general, with transmitter antenna collapsed to 6"-8", you should have an at least 100 foot range on the ground. To check this, turn on both the transmitter and the receiver switches, set the model heading away from you, and walk away while transmitting signals to move the control surfaces. Watch to see that no signals are missed until you are at least 100 feet away. Only if the equipment works perfectly should any flights be attempted. Again, **be careful to not use your transmitter when anyone else at the field is flying or testing on the same frequency!**

After the range check, stand behind the model and make sure the control responses are correct. Moving the control stick to the right should give right rudder (on a 3-channel set-up). Moving the stick back or down on the Tx should move the elevator up, and vice versa.

Finally, make sure that everything on your aircraft is neatly and firmly in place-motor fastened down, servos snugged down, receiver and battery wrapped in foam rubber, etc. Prop and spinner must be tight. The receiver antenna must be extended, not coiled up inside the model. Nothing should be loose, or unfinished, or unchecked.

With everything ready, the motor should be started for a short time. While the motor is running, make sure the control surfaces do not jitter or move until you command them and that the motor switch also responds properly to your command.

With transmitter and receiver switched on, hand launch the model directly into the wind. Gently correct the flight path as necessary. If any adjustments are needed to maintain straight and level flight, get experienced help to move the clevises.

In flight control, most of the beginner's trouble comes from over-controlling or holding a signal too long. It is better to operate your transmitter slowly and smoothly.

A troublesome tendency is letting the model get downwind. New flyers should try to keep the model upwind at all times prior to the landing approach.

If you are a novice, seek the help of an experienced flyer. Do not hesitate to ask one of the better flyers at the field for help. Usually, they are glad to spend a little time to get somebody started right, and they very likely were helped in the same manner themselves.

WHERE TO FLY

Fly only in areas sanctioned for R/C and known to be

free of radio interference. Ask your hobby dealer or other modelers if there is an R/C flying field that is used by a local R/C club. This is the ideal place to fly. If you don't know of an R/C club nearby, contact the Academy of Model Aeronautics (AMA), at the address on the front of this booklet, for information on a club in your area. Remember: R/C flying fields need to have rules to help prevent accidents, so ask about them before you turn on any of your equipment! **DO NOT TEST your transmitter in the parking lot or anywhere nearby until you are sure no one else is using your radio frequency. This could cause another flyer to crash and make you very unpopular!**

If there is no club or other R/C flying site available, locate a square area (preferably a grassy field), at least **four or five football fields long**, which is free of power lines, trees, poles, houses, busy streets and other obstructions. It must be at least three miles away from any areas where other R/C models, such as boats or cars, are operated. It should also have a relatively smooth surface, as it will take practice to learn precision landings. If you find a suitable location, turn your receiver on for 2 or 3 minutes to check that no one in the vicinity is operating an R/C device which could affect your receiver and cause your plane to crash.

The **Endurance 400** was designed for long, slow, relaxed flying - not loops or similar aerobatic maneuvers. Save that kind of flying for your next, higher performance sport plane. Practicing precise control and glide planning on the **Endurance 400** is good preparation for the demands of advanced aerobatic flying.

We recommend you use 3 channels, as this will allow you to cut power whenever you wish to do so. On your first few flights, after a couple of minutes, you may feel you have "had enough" and want to land and relax. A 2-channel system without motor control will not give you this option; you will have to keep flying until the battery power runs down.

You can expect a good solid 4 or 5 minutes of powered flight with a properly charged battery. In this amount of time, **Endurance 400** will gain several hundred feet of altitude and will allow you time to get oriented and familiar with the control "feel." When the battery power begins to run out, climb will slow down and the model will begin a slow descent. You should continue flying your same flying pattern as the model slowly glides.

For your initial landings, you should not be concerned about trying to land at a specific spot. Your prime concern should be a controlled landing, always into the wind, with wing level. With practice, you will be able to plan your approaches to land just about where you want.