TOWER HOBBIES®

TOWER TRAINER™ 40 ARF

ALMOST READY-TO-FLY RADIO CONTROLLED MODEL AIRPLANE

ASSEMBLY INSTRUCTIONS

WINGSPAN: 60 IN.
LENGTH: 50 IN.
WING AREA: 660 SQ. IN.
WEIGHT: 5.5 LBS.
WING LOADING: 19.2 OZ./SQ. FT.

WARRANTY

Tower Hobbies® guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. In no case shall Tower Hobbies' liability exceed the original cost of the purchased kit. Further, Tower Hobbies reserves the right to change or modify this warranty without notice.

In that Tower Hobbies has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

If the buyers are not prepared to accept the liability associated with the use of this product, they are advised to return this kit immediately in new and unused condition to the place of purchase.

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INTRODUCTION

Congratulations! You're about to build in a few days what took pioneers years - a powered machine that flies. Specially created for you and other first-time radio control modelers, the Tower Hobbies Tower Trainer 40 ARF offers nearly all the excitement of piloting a real airplane...and develops skills that will take you anywhere you want in your new hobby.

PRECAUTIONS

READ THROUGH THIS INSTRUCTION BOOK FIRST. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.

PROTECT YOUR MODEL, YOURSELF & OTHERS
FOLLOW THIS IMPORTANT SAFETY PRECAUTION

Your Tower Trainer .40 is not a toy, but rather a sophisticated, working model that functions very much like a full size airplane.

Because of its realistic performance, the Tower Trainer .40, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage property.

To make your R/C modeling experience totally enjoyable, we recommend that you get experienced, knowledgeable help with assembly and during your first flights. You'll learn faster and avoid risking your model before you're truly ready to solo. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors.

You can also contact the national Academy of Model Aeronautics (AMA), which has more than 2,500 chartered clubs across the country. Through any one of them, instructor training programs and insured newcomer training are available.

Contact the AMA at the address or toll-free phone number below:

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Office: (765) 287-1256
Toll Free: (800) 435-9262
FAX: (765) 741-0057

SUGGESTED SUPPLIES & TOOLS

We recommend Great Planes®, Hobbico® and Tower brand glues and accessories for your modeling needs

- ❍ (2) Tower Build-It™ Thin CA 2 oz. – TOWR3800
- ❍ (2) Tower Build-It Medium CA+ 2 oz. – TOWR3801
- ❍ Tower Build-It Thick CA 1 oz. – TOWR3802
- ❍ Tower Hobbies 6-minute Epoxy – TOWR3806
- ❍ Tower Hobbies 30-minute Epoxy – TOWR3810
- ❍ Hand or Electric Drill
- ❍ Drill Bits: (1/16", 1/8", 5/32", 3/16")
- ❍ Hobby Saw (X-Acto® Razor Saw)
- ❍ Hobby Knife, #11 Blades
- ❍ Pliers
- ❍ Screwdrivers (Phillips and Flat Blade)
- ❍ Flat File (or Similar Tool)
- ❍ T-Pins (Short – HCAR5100, Long – HCAR5200)
- ❍ String
- ❍ Straightedge with Scale
- ❍ Masking Tape (Required for Construction)
- ❍ Sandpaper (Coarse, Medium, Fine Grit)
- ❍ Great Planes Easy Touch™ Bar Sanders (or Similar)
- ❍ Waxed Paper
- ❍ Dremel® Multi-Pro™ or Similar (Optional)

ACCESSORIES REQUIRED TO COMPLETE YOUR TOWER TRAINER 40

- ❍ 4-Channel Radio With 4 Servos
- ❍ Engine; *(See Engine Selection)*
- ❍ Spare Glow Plugs (Tower R/C Long – TOWG1001)
- ❍ Medium Fuel Tubing (GPMQ4131, 3')
- ❍ 1/4" Latex Foam Rubber Padding (HCAQ1000)
- ❍ 1/16" Foam Wing Seating Tape (GPMQ4422)
- ❍ #64 Rubber Bands (TOWQ1220)
- ❍ Screw-Lock Pushrod Connectors (GPMQ3870)
- ❍ Silicone Sealer

ENGINE SELECTION

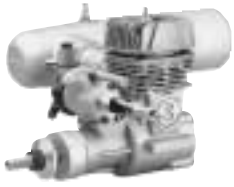
A quality brand .40-size engine will be needed. Also a prop will be required for the engine (follow the manufacturer's recommendations for appropriate sizes). We recommend the Top Flite® Power Point® brand of props.

We recommend the following engines:

Tower Hobbies .40 ABC
TOWG0040

O.S.® .40 LA
OSMG0040

O.S. .40 FX
OSMG0540



SuperTigre® GS-40
SUPG0122

ORDERING REPLACEMENT PARTS

Replacement parts are available from Tower Hobbies for your Tower Trainer 40. Our order assistance representatives are ready to answer your questions or to place your order. Call us at (800) 637-6050.

Replacement Parts
Wing Set – TOWA1111 (Includes wing halves, wing joiner and servo mounting tray)

Fuselage Set – TOWA1112 (Includes fuselage, engine mount, fuel tank, pushrods and servo tray)

Fin Set – TOWA1113 (Includes horizontal and vertical stabilizers)

Landing Gear Set – TOWA1114 (Includes nosegear wire, main gear wire, wheels, wheel collars, mounting hardware)

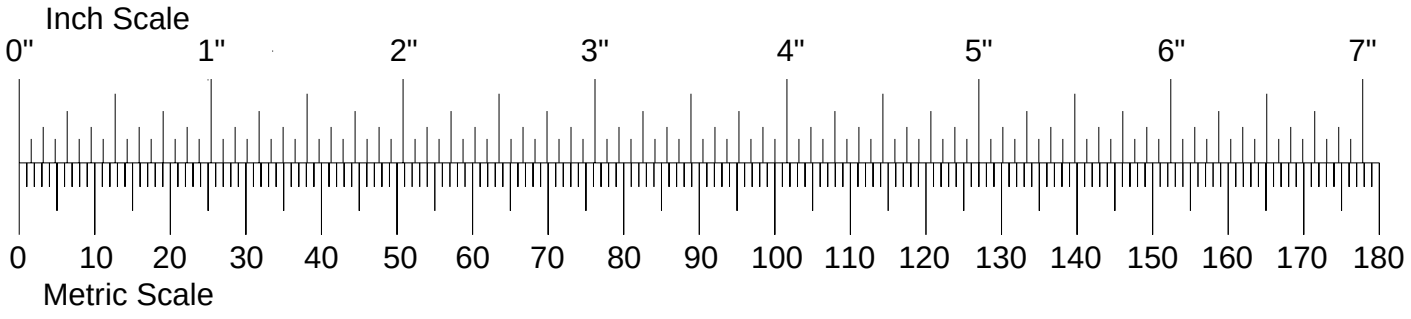
TOWER TRAINER GUARANTEE

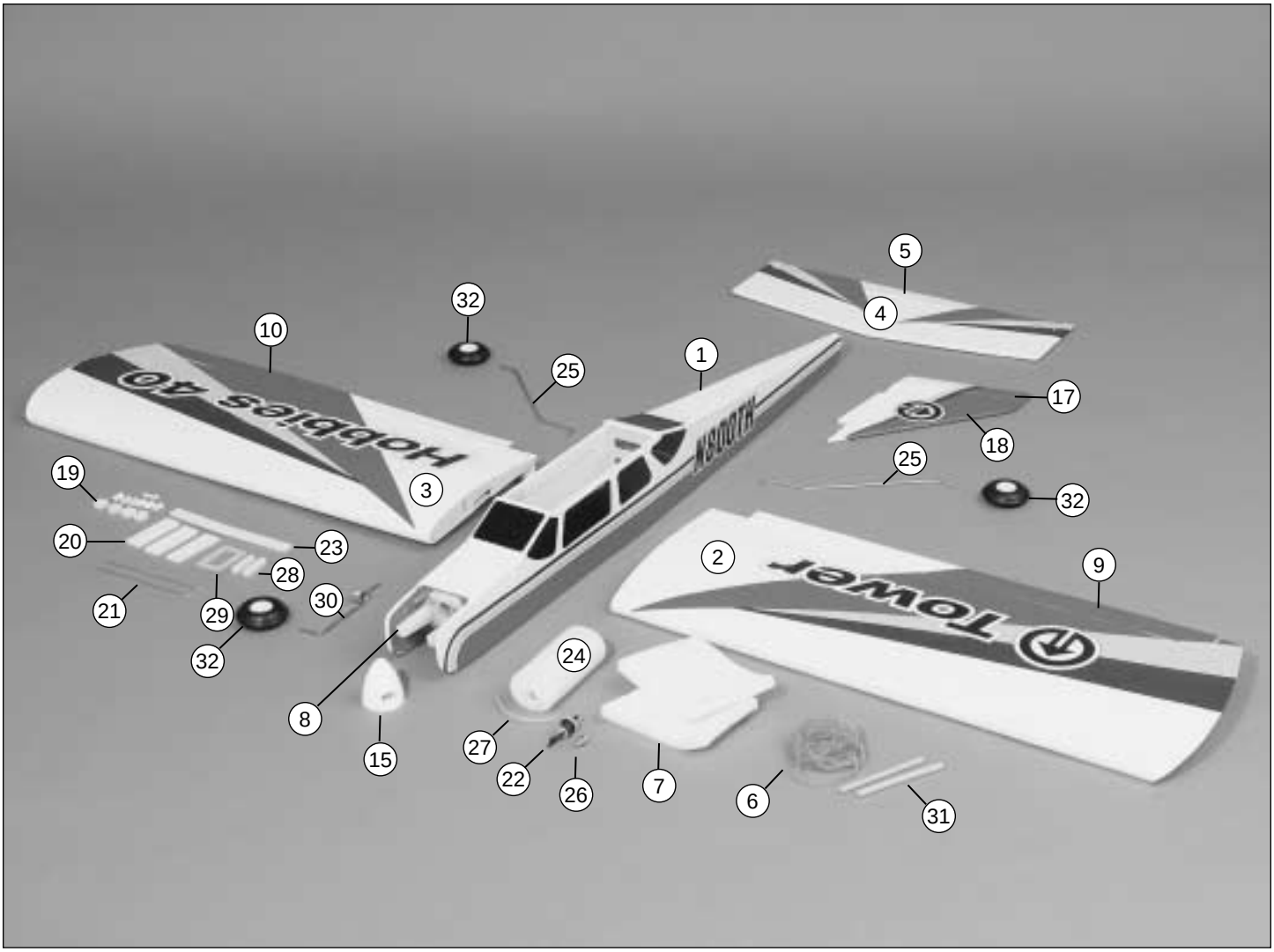
We are so confident that the Tower Trainer 40 ARF is the best almost-ready-to-fly trainer available that we make this guarantee. You will successfully learn how to fly with the Tower Trainer or we will replace it with your choice of another trainer of up to equal value. All we ask is that you learn under the supervision of a qualified, club-designated instructor, follow normal safety precautions, fly at an AMA-chartered club field and construct the kit as outlined in this instruction manual.

If for some reason, you find the design and/or workmanship of the Tower Trainer is not conducive to learning to fly under the conditions outlined above, contact Hobby Services at 1-217-398-0007 Monday through Friday 9am-5pm central time. Or send the Tower Trainer to Hobby Services, 1610 Interstate Drive, Champaign, Illinois 61822. The information Hobby Services will need is: a letter explaining what happened, (the letter is to be signed by the instructor and yourself), name of flying field, name of instructor, and a copy of invoice as proof of purchase.

This guarantee is effective for 60 days after you receive the kit and does not cover incidental items (engines, radio equipment and hardware, etc.). The kit, along with the above specifications must be sent to Hobby Services for inspection no later than 60 days after receipt of the kit. Hobby Services reserves the right to verify all information provided. Replacement trainer kit options are limited to flat-bottom wing trainer models and makes available from Tower Hobbies and one replacement per customer.

The Tower Trainer 40 ARF is a great trainer and we are pleased to make this unprecedented guarantee. If you have any further questions, feel free to contact Tower Hobbies at 1-800-637-6050.





PARTS LIST

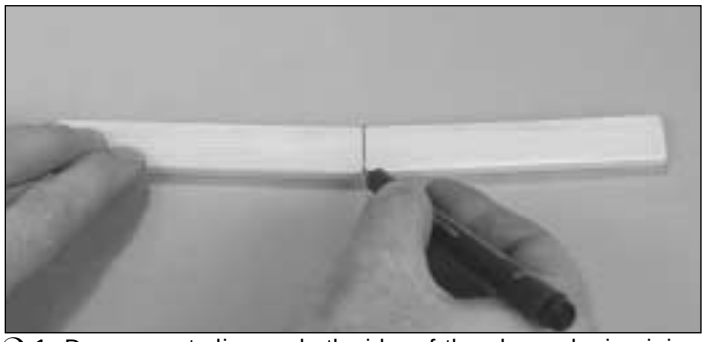
Before assembly match the parts in the photo with the parts in the kit. Check off each part as it is located. If any parts are missing or damaged, consult Tower Hobbies Order Assistance (see back cover page for phone numbers). ***Note: All Parts Are 1 Piece Unless Otherwise Stated.***

1 Fuselage
2 Left Wing Panel
3 Right Wing Panel
4 Stabilizer
5 Elevator
6 Rubber Bands
7 Foam Rubber
8 Engine Mount
9 Left Aileron
10 Right Aileron
11 Pushrod Assembly (2 pcs., Not Shown)
12 Pushrod Housing (2 pcs., Not Shown)
13 Pushrod Wire (Long – 2 pcs., Not Shown)
14 Pushrod Wire (Short – 2 pcs., Not Shown)
15 Spinner Assembly (53mm/2 in.)
16 Plastic Part Set (Not Shown)
17 Rudder
18 Fin
19 Pushrod Supports
20 Receiver Battery Retainers
21 Aileron Pushrods
22 Fuel Tank Stopper
23 Plywood Wing Joiner
24 Fuel Tank
25 Main Landing Gear (2 pcs.)
26 Fuel Tank Clunk
27 Silicone Fuel Tubing
28 Aileron Servo Tray Mounting Blocks
29 Aileron Servo Tray
30 Nose Landing Gear Wire
31 Wing Mounting Dowels (2 pcs.)
32 Wheels (64mm/2-1/2 in. – 3 pcs.)

Special Note:
It is suggested to charge your radio system before starting to build. Following the manufacturer's instructions, connect your transmitter and receiver batteries to the system's charger. This way the radio will be ready when it is time to install and test the radio components.

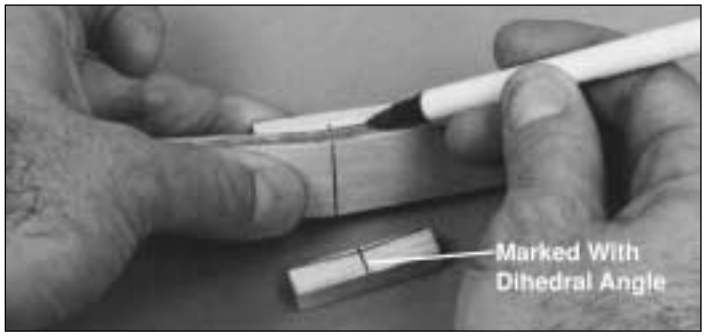
WING ASSEMBLY

MARK THE CENTERLINE ON THE JOINER



❍ 1. Draw a centerline on both sides of the plywood wing joiner as shown.

PREPARE THE AILERON SERVO TRAY MOUNTING BLOCKS

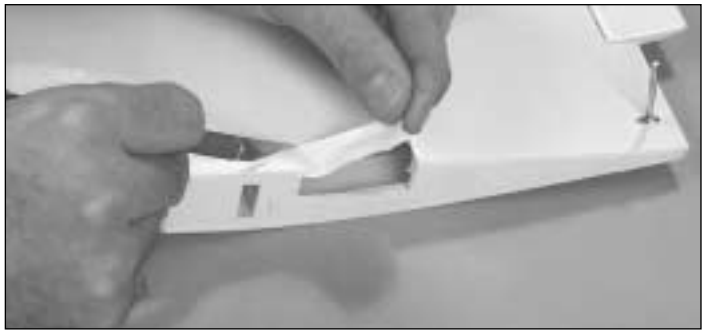


❍ 2. Locate the two 3/8" square x 1-11/16" (9.5mm square x 43mm) **aileron servo tray mounting blocks**. Mark a centerline on the blocks. Using the wing joiner as a guide, mark the wing dihedral angle on both of the aileron mounting blocks. Set the blocks aside for use in later steps.

EVEN THE WING ROOTS

❍ 3. Using a flat sanding block or similar tool and 120-grit sandpaper, sand the wing roots so they will fit together without any gaps. Do not sand too much or the dihedral angle could change.

PREPARING THE WING SERVO CAVITY

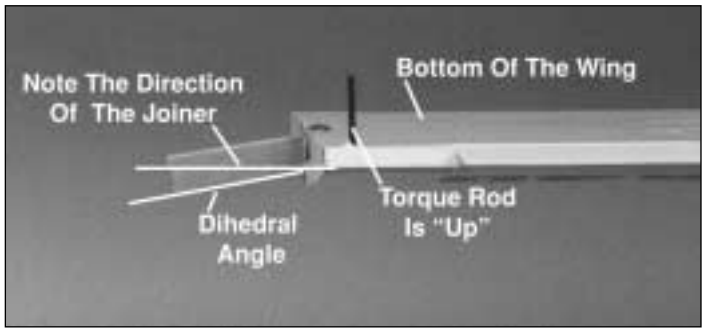


❍ 4. Using a sharp hobby knife, remove the covering from the wing panels for the aileron servo.

TEST FIT THE WING JOINER

❍ 5. Test fit the wing joiner in **both** wing panels by sliding the joiner into the joiner cavity in the wing. The joiner should slide in with little resistance up to the centerline that was drawn on the joiner. If the joiner will not fit in the cavity, lightly sand any uneven surfaces from the joiner edges, sides or ends. **Caution: A snug fit of the joiner in the joiner cavity is desired. Use caution not to sand the joiner excessively.**

VIEWING THE WING DIHEDRAL

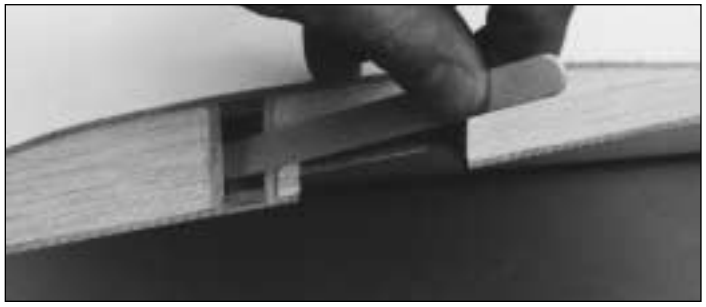


❍ 6. Pay close attention to the orientation of the wing joiner in relation to the wing panel, creating the dihedral angle as shown. Test fit the wing panels together. They should fit flush against each other without any gaps.

Note: When performing the following steps, be sure to use a sufficient amount of epoxy to form a complete and solid bond between the plywood wing joiner and the two wing halves. This is the most important glue joint in the entire airplane.

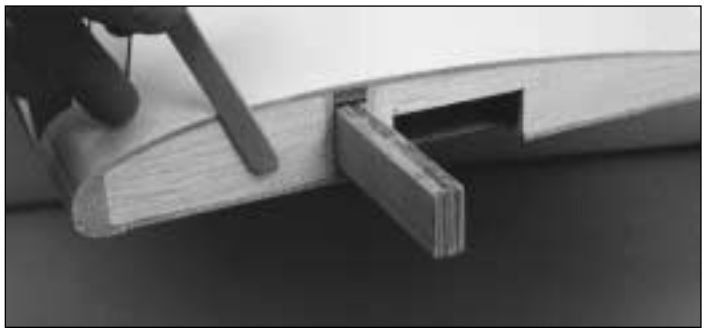
Please read through the following three steps before mixing any epoxy. You must complete these steps within 20 minutes from the time you mix the epoxy.

GLUE THE JOINER CAVITY



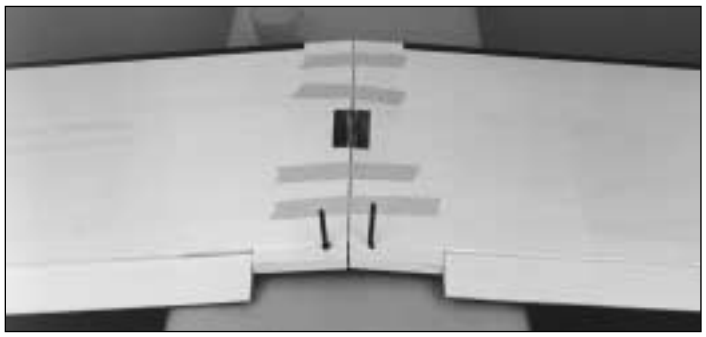
❍ 7. Mix 1/2 oz. (14ml) of 30-minute epoxy. Use a mixing stick or epoxy brush to apply epoxy to all four sides of the joiner cavity. Insert the joiner into the cavity up to the centerline marked on the wing joiner. Be sure you are installing the joiner to obtain the correct direction for the dihedral. Quickly proceed to the next step.

APPLY EPOXY TO THE WING ROOT



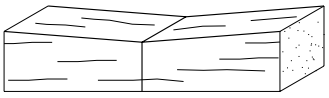
❍ 8. Apply epoxy inside the joiner cavity of the remaining wing panel. Next, coat the wing root ribs on **both** panels. Quickly proceed to the next step.

JOIN THE WING HALVES



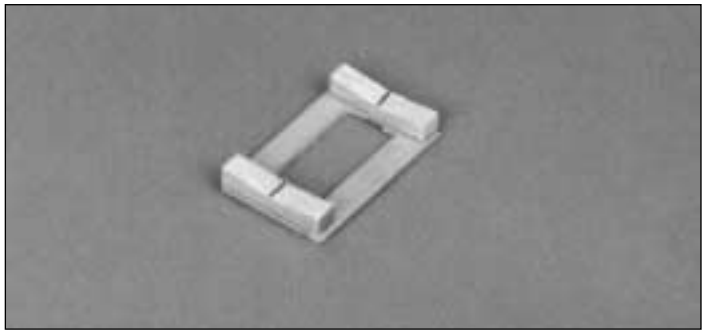
❍ 9. Assemble the two wing halves with the tightest seam possible. **No gaps** should be showing between the two halves. Clean up any excess epoxy from the outside of the wing using a paper towel and rubbing alcohol. Use several strips of masking tape on both sides of the wing to hold them securely together. Let the epoxy fully cure before continuing.

SHAPE THE AILERON SERVO MOUNTING BLOCKS



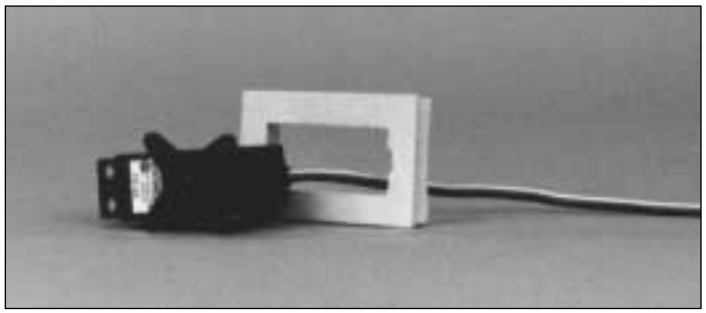
❍ 10. Locate the two aileron servo mounting blocks and position them with the dihedral line up. Cut or sand the marked angle out of the block. This angled side will be placed against the wing when the servo tray is installed.

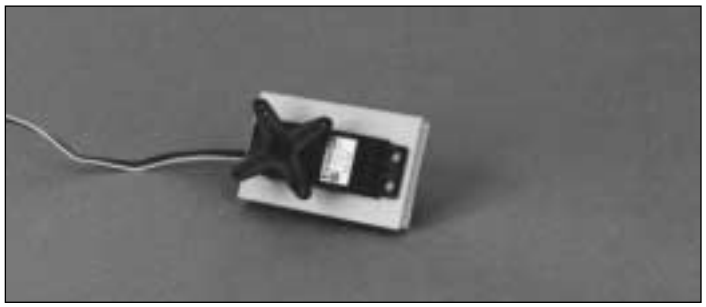
ASSEMBLE THE SERVO TRAY



❍ 11. Glue the balsa aileron servo mounting blocks onto the **aileron servo tray** using either 6-minute epoxy or medium CA. Make sure that the angled side you just cut is facing away from the plywood servo tray.

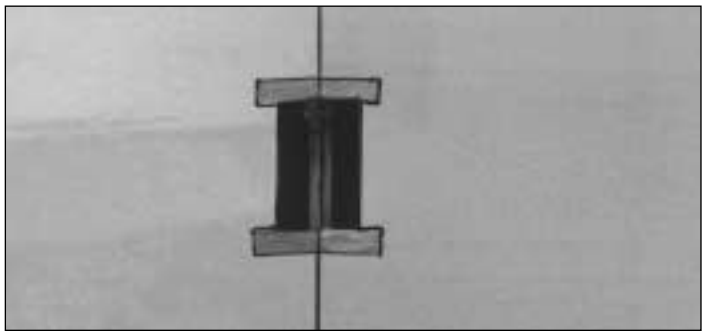
TEST FIT THE AILERON SERVO





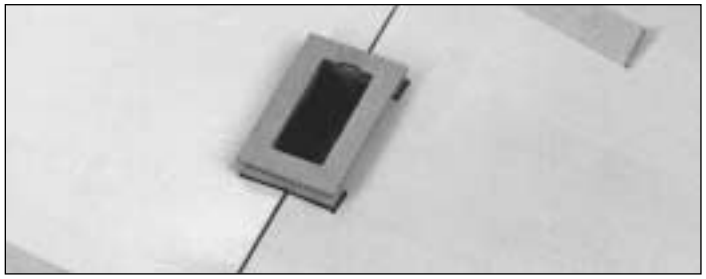
❍ 12. Test fit the **aileron servo** into the servo tray. Note that the notch in the tray corresponds to the location of the servo lead wire. Enlarge the opening in the servo tray, if needed, using a sharp hobby knife or fine toothed file. There should be a gap of about 1/64" (.5mm) between the servo and the servo tray when installed properly. Remove the servo for the time being.

TRIM THE WING COVERING



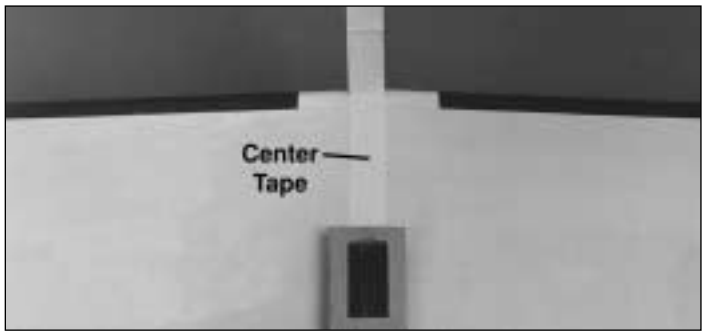
❍ 13. Hold the plywood aileron servo tray assembly over the hole in the bottom of the wing. Trace the **outside** of the blocks with a felt-tip marker, then remove the tray from the wing. **Carefully remove the covering within the lines using a sharp hobby knife with a new blade**, being careful not to cut into the balsa wing sheeting.

INSTALL THE SERVO TRAY



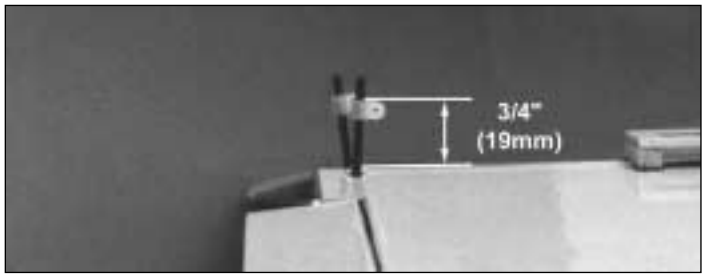
❍ 14. Mix 1/8 oz. (3.5ml) of 6-minute epoxy to glue the servo tray to the bottom side of the wing. Apply equal amounts of epoxy to the mounting blocks on both ends of the servo tray. Attach the servo tray to the bottom of the wing with the notch in the servo tray facing towards the leading edge of the wing. Allow the epoxy to fully cure before proceeding to the next step.

APPLY THE WING CENTER SECTION TAPE



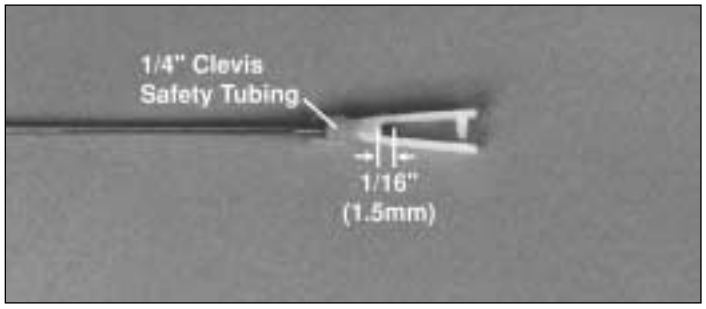
❍ 15. Starting at the front of the aileron servo tray, apply the 1/2" (13mm) white **wing center section tape** completely around the wing over the joint. A small amount of pressure should be applied to make a smooth seam.

INSTALL THE AILERON CONTROL HORNS



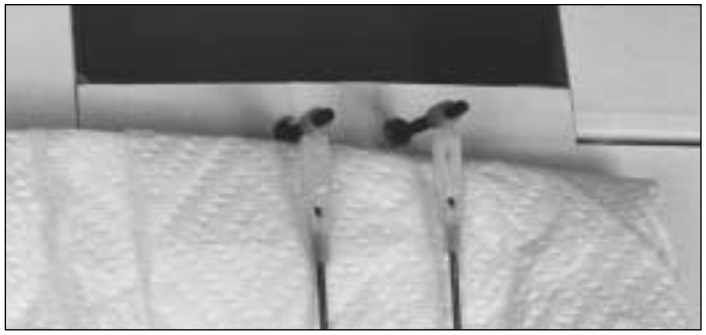
❍ 16. Thread the **aileron control horns** onto the torque rods until they are positioned 3/4" (19mm) above the bottom of the wing.

ASSEMBLE THE PUSHRODS



❍ 17. Locate two **plastic clevises** and two 6-3/4" (171mm) **aileron pushrods**. Thread the clevises onto the rods so that 1/16" (1.5mm) of the rod protrudes between the clevis forks.

INSTALL THE PUSHRODS



❍ 18. Attach the pushrods to the aileron control horns. If the pins from the clevises do not fit the holes in the horns, drill the holes out to 1/16" (1.5mm). Press the forks of the clevises together until the pin snaps into the opposite fork. Slide the safety tubing into position over the clevis. ***Note:*** *The paper towel in the photo is only there for photographic purposes. You do not need to install the paper towel on your aircraft.*

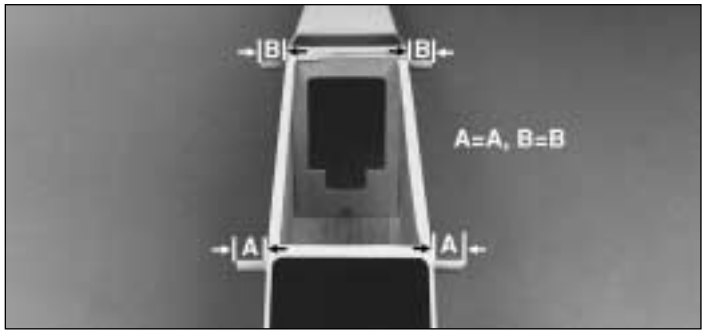
This concludes the wing assembly for now. Tape the pushrods to the wing to keep them in place until the aileron servo is installed.

FUSELAGE ASSEMBLY

LOCATE THE WING DOWEL HOLES

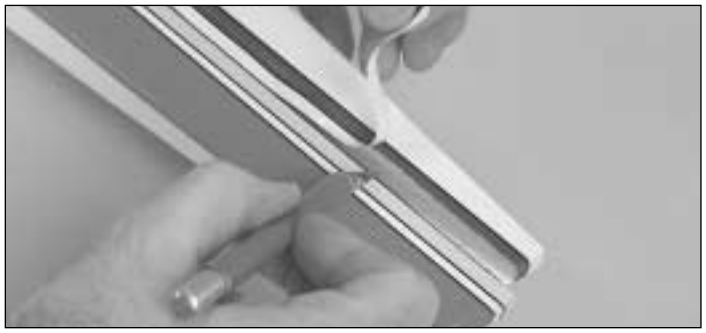
❍ 1. Locate the four positions for the 1/4" (6mm) wing dowel holes by gently pressing the covering in the areas in the photos. The position for the front wing dowels can be seen from the inside of the fuselage. Carefully cut out the holes using a sharp hobby knife. **Caution: Do not cut out any of the rectangular holes in the sides of the fuselage.**

INSTALL THE WING MOUNTING DOWELS



❍ 2. Insert both **wing mounting dowels** so they protrude an equal amount on both sides of the fuselage. Mix 1/4 oz. (7ml) of 30-minute epoxy. Apply glue around the dowels next to the fuselage and slide them in and out of the fuselage to help distribute the epoxy into the fuselage. Using a paper towel, spread the excess epoxy around the ends of the dowels. This will fuelproof and add strength to the wood. From the inside of the fuselage, apply more epoxy around the dowels where they meet the sides of the fuselage. These wing dowels will be used as the anchors for the rubber bands to hold the wing in position. Wipe off all excess epoxy using a paper towel and rubbing alcohol.

LOCATE THE STABILIZER SLOT



❍ 3. Locate the slot for the horizontal stabilizer under the covering on the tail section of the fuselage by gently pressing the covering with your finger. The slot is located on both sides of the fuselage. Using a sharp hobby knife, carefully remove the covering, exposing the slots. **Note: Do not cut into the wood around the slot.**

LOCATE THE VERTICAL FIN SLOT

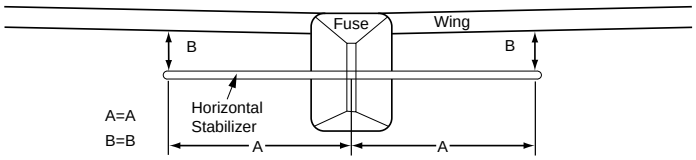
❍ 4. Using the same technique as in step 3, locate the slot for the vertical fin on the top of the fuselage. Remove the covering using a sharp hobby knife.

MARK THE CENTERLINE

❍ 5. On the top surface of the **horizontal stabilizer**, measure to find the exact center from side to side. Draw a "centerline" using a felt-tip pen. Next, extend that centerline onto the trailing edge, in the gap, as shown in the photo. (DO NOT MARK ON THE ELEVATOR WHEN PERFORMING THIS STEP.)

ALIGN THE STABILIZER WITH THE WING

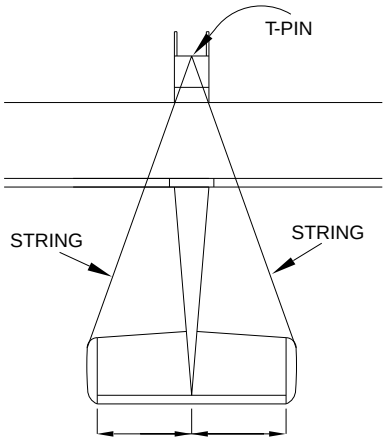
***Note: Do not** use any glue until instructed to do so.*



Wing/Stab Align

❍ 6. Insert the stabilizer into the horizontal stabilizer slot so it is centered in the fuselage (A). Place the wing onto the fuselage and secure with two rubber bands. View the plane from a distance of about 8 feet (2.4m) to check the alignment of the stabilizer to the wing (B). If the stabilizer is not parallel to the wing, remove the stabilizer and sand the stabilizer base **slightly** on the **high** side. Replace the stabilizer and check the alignment. Continue this process until the wing and stabilizer are parallel.

ALIGN THE STABILIZER WITH THE FUSE



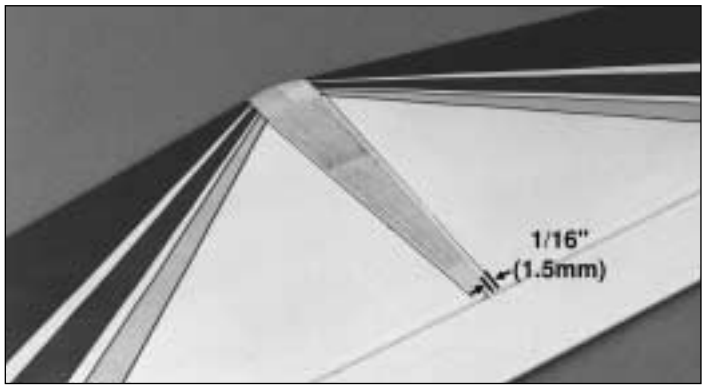
EQUAL MEASUREMENTS

❍ 7. Attach a piece of string with a T-pin to the center of the fuselage as shown. Hold the string to one corner of the horizontal stabilizer. Mark the position on the line, then swing the line over to the opposite tip on the stabilizer. If the mark does not line up, adjust the positioning of the stabilizer and repeat the "mark and swing" procedure until the stabilizer is in proper alignment.

MARK THE STABILIZER LOCATION

❍ 8. With the stabilizer properly aligned, use a felt-tip pen to trace around the tail of the airplane on the top and bottom of the horizontal stabilizer.

REMOVE THE CENTER COVERING

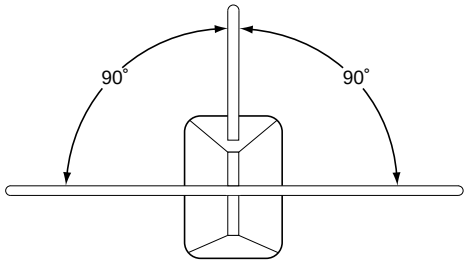


❍ 9. Remove the stabilizer and draw two additional lines, on the top and bottom, 1/16" (1.5mm) **inside** the lines drawn in the previous step. Next, carefully cut through the covering using a new #11 knife blade at the **inside** lines and remove the covering from the center. **Do not cut the wood under the covering! This will seriously weaken the stabilizer and could easily cause the stabilizer to break in flight.** If the stab breaks, the plane has a very good chance of crashing. It is best to be **very careful** when making this cut not to cut into the wood. The covering does need to be removed from the center of the stab, or the bond between the stabilizer base and stabilizer will be insufficient and the stab may simply come off in flight.

INSTALL THE STABILIZER

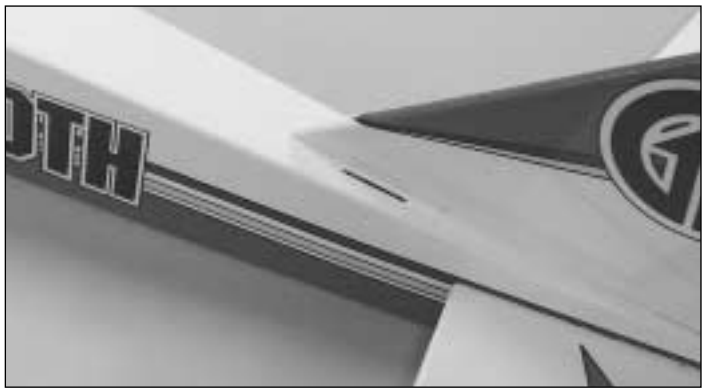
❍ 10. Mix 1/4oz (7ml) of 30-minute epoxy. Using a mixing stick, place glue inside the horizontal stabilizer slot on all sides, and a good layer of epoxy on the stabilizer base. Place a thin layer of epoxy on the stabilizer in the area where the covering was removed. Insert the stabilizer into the slot from the rear and check the alignment. Wipe off any epoxy that squeezes out using a paper towel and rubbing alcohol. Recheck the alignment several times while the epoxy cures.

INSTALL THE VERTICAL FIN



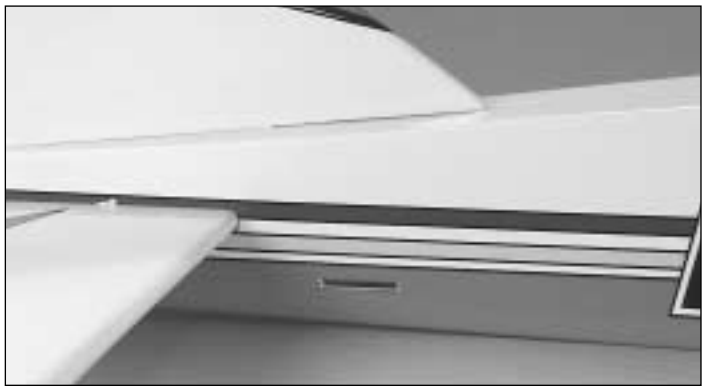
❍ 11. Test fit the **vertical fin** into the slot on the top of the fuselage. Sand the edges of the slot if necessary for a snug fit. When fit properly the bottom of the vertical fin will rest on the top of the horizontal stabilizer. Remove the fin and mix up 1/4oz (7ml) of 30-minute epoxy. Using a mixing stick, apply epoxy to the top of the stabilizer through the slot. Apply epoxy to the sides and bottom of the fin base that have the balsa wood exposed. Insert the fin into the slot. Check to make sure that the fin is perpendicular to the stabilizer when viewed from the rear of the airplane. (Use the sketch as a guide for checking the alignment.) Check this alignment several times as the epoxy cures. (You may find it beneficial to hold the fin in place using masking tape until the epoxy has cured.)

CUT THE RUDDER PUSHROD EXIT



❍ 12. The precut rudder pushrod exit hole is located on the top of the fuselage on the **left** side of the fin. Locate the exit hole by gently running your finger along the top of the fuselage over the covering. It should be beside the rudder as shown in the photo. Use a hobby knife to remove the covering from the rudder pushrod exit hole.

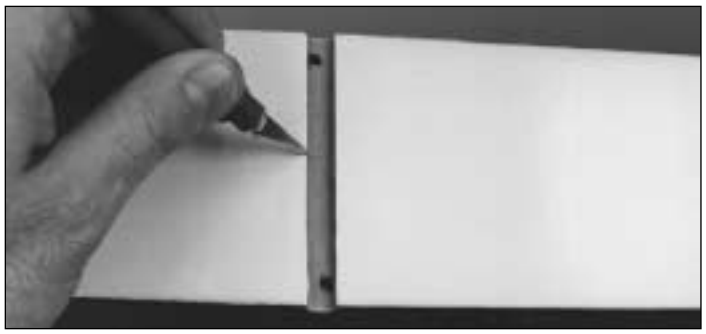
CUT THE ELEVATOR PUSHROD EXIT



❍ 13. The precut elevator pushrod exit hole is located on the **right** side of the fuselage. Locate the exit hole by gently running your finger along the side of the fuselage over the covering. It should be slightly in front of the elevator as shown in the photo. Use a hobby knife to remove the covering from the elevator pushrod exit hole.

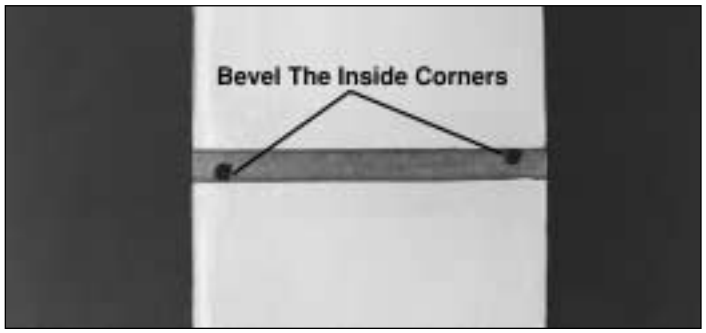
LANDING GEAR INSTALLATION

LOCATE THE LANDING GEAR CHANNEL



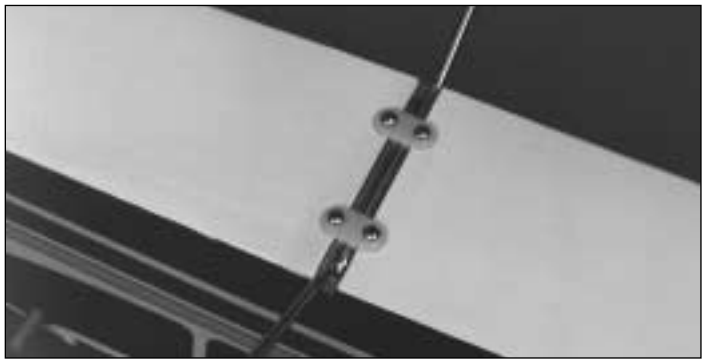
❍ 1. On the bottom of the fuselage, there is a channel for the main landing gear. Locate this channel by running your finger over the covering on the bottom of the fuselage. Use a hobby knife to remove the covering from this channel.

PREPARE THE CHANNEL FOR GEAR



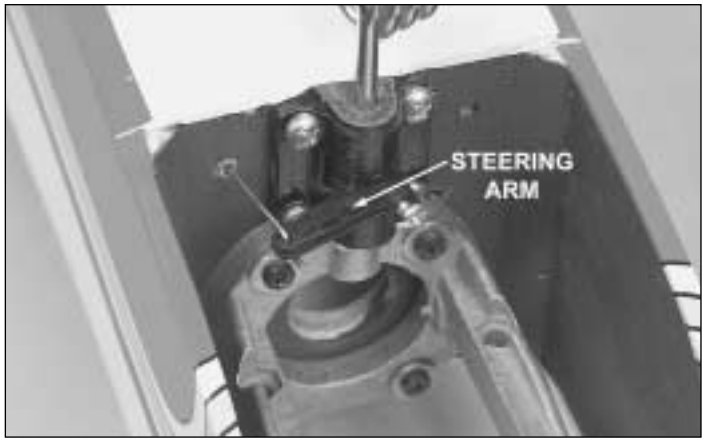
❍ 2. Test fit the chrome landing gear wires into the holes in the channel. If they will not go in easily, drill out the two holes using a 5/32" (4mm) drill bit. Next, use the drill bit or hobby knife to bevel the inside corners of the holes so that the bend in the wire will seat fully into the holes and the wire will be flush with the bottom of the fuselage.

ATTACH THE LANDING GEAR WIRES TO THE FUSELAGE



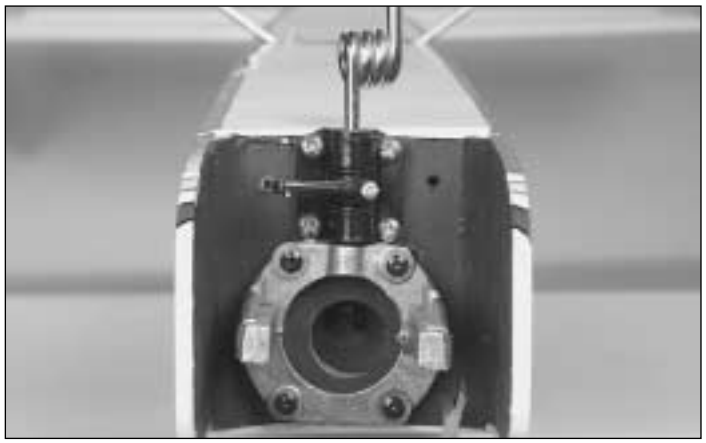
❍ 3. Install the landing gear wires into the channel. Attach the **nylon landing gear straps** to the fuselage using four **3 x 12mm sheet metal screws.** The holes for the screws are pre-drilled.

INSTALL THE STEERING PUSHROD



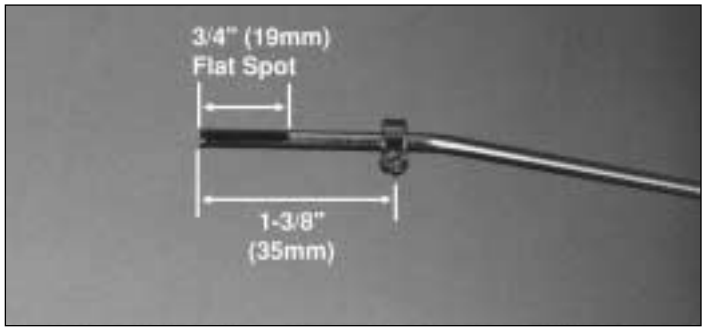
❍ 4. Attach the "Z" bend of the wire to the hole on the steering arm. Slide the wire into the pushrod housing so that the screw on the steering arm is facing forward. The wire should be on the **bottom** of the steering arm.

INSTALL THE NOSE LANDING GEAR WIRE



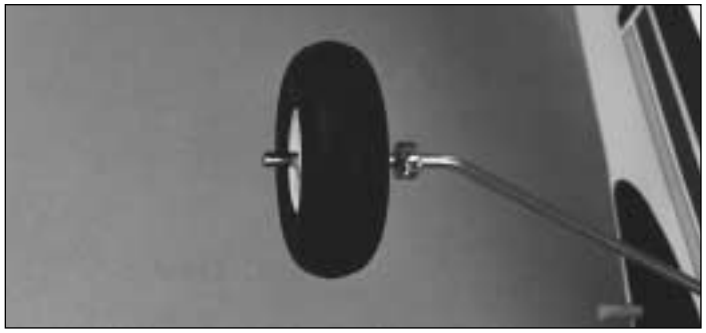
❍ 5. Install the **nose landing gear wire** through the nose gear bracket. Next, the wire will go through the steering arm. Holding the steering arm against the bearing, slide the wheel collar and tighten it into position.

PREPARE THE AXLES AND INSTALL THE WHEEL COLLARS



❍ 6. Prepare the axles for the wheel collars by filing a 3/4" (19mm) flat spot on the outer edge of the main and nose gear. This is done to prevent the wheel collar from turning or becoming loose during flight. Perform this step for both of the main gear and the nose gear. Secure one of the **wheel collars** 1-3/8" (35mm) from the end of the axle on the main gear using a **M3 x 6 machine screw**. The first wheel collar on the nose gear will slide fully onto the gear, against the bend. A total of three wheel collars and three 3 x 6mm machine screws should have been used during this step.

INSTALL THE WHEELS



❍ 7. Slide the wheels onto the axles, making sure that they spin freely on the axles. If not, drill the hole in the wheel out until it can spin freely.

SECURE THE WHEELS

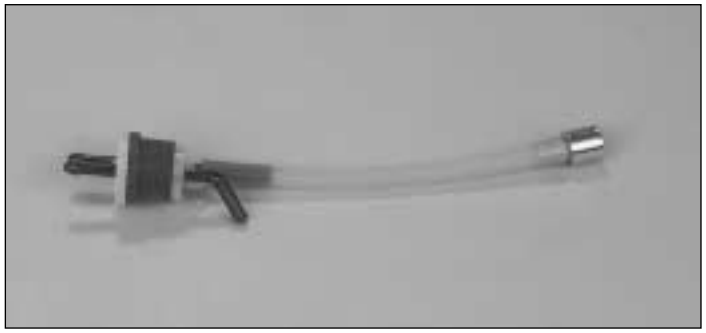
❍ 8. Install the wheel collars and 3 x 6mm screws onto the axles. Position the screw so that it will be tightened onto the flat spot you made on the axle. Slide the wheel collar next to the wheel, and tighten the screw. Double check the wheel to make sure it still spins freely. If not, move the wheel collar away from the wheel *slightly* and retighten the screw. *If you like, you can cut off the excess axle that extends past the wheel collar.*

FUEL TANK INSTALLATION

PREPARE THE VENT TUBE

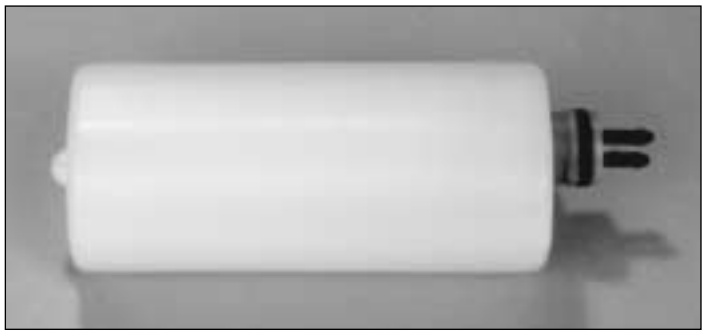
❍ 1. Bend one of the tubes (referred to as the vent tube) upwards at around a 45-degree angle. Heating the tube will make the bending process much easier. Be **very** careful not to melt the tube during the bending process. **Note:** When the stopper assembly is installed into the fuel tank, the vent tube should be 1/16" [1.5mm] from the top of the tank.

INSTALL THE CLUNK



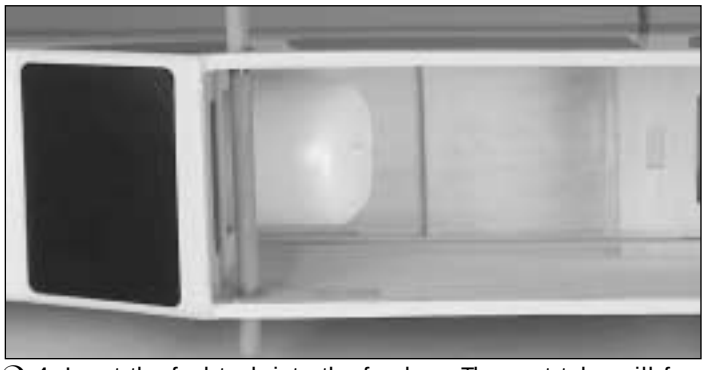
❍ 2. Locate the metal fuel pick-up weight (often referred to as the "clunk") and the 4-1/4" [108mm] piece of silicone fuel tubing. Install the clunk onto the tubing. Slide the other end of the tubing onto the tube that was not bent in the previous step. Measure the distance from the end of the clunk to the back of the stopper. Position the fuel tube so the distance measures 5" [127mm].

INSTALL THE STOPPER ASSEMBLY



❍ 3. The stopper assembly can now be inserted into the tank. The vent tube should be adjusted so that the tube is pointed straight up towards the top of the tank. The rubber stopper must seat over the lip of the tank. Make sure that the tubes are positioned side-to-side. Check to make sure that the vent tube is 1/16" [1.5mm] from the top of the tank. Also, check to make sure that the clunk can move freely inside the tank, without catching on the end of the tank. (It should clunk around in the tank!) Once everything checks out, tighten the screw to secure the stopper into the tank. **Don't over-tighten the screw and strip out the rear compression disk!** It would be a good idea to mark which tube is the vent tube at this time.

INSTALL THE FUEL TANK



❍ 4. Insert the fuel tank into the fuselage. The vent tube will face towards the top of the fuselage. Make sure the tank is pressed fully into position. The neck of the fuel tank will seat into the opening in the firewall.

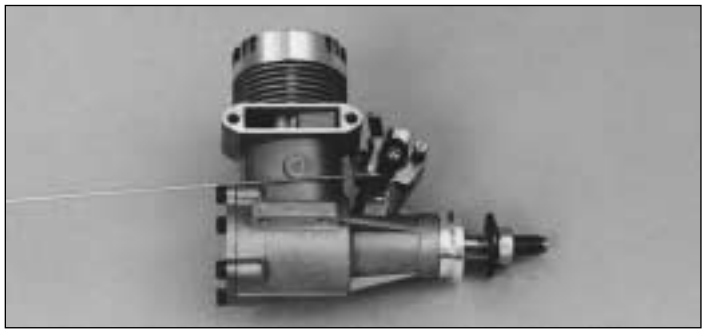
ATTACH THE FUEL LINES

❍ 5. Cut two pieces of fuel tubing (not included) 5" (127mm) in length. Attach these to the plastic tubes that are on the fuel tank. You may need to hold the tank in position with one hand while installing the tubes with the other.

ENGINE INSTALLATION

Note: It may be necessary to attach the carburetor to your particular engine. Follow the manufacturer's instructions for this procedure.

INSTALL THE THROTTLE PUSHROD

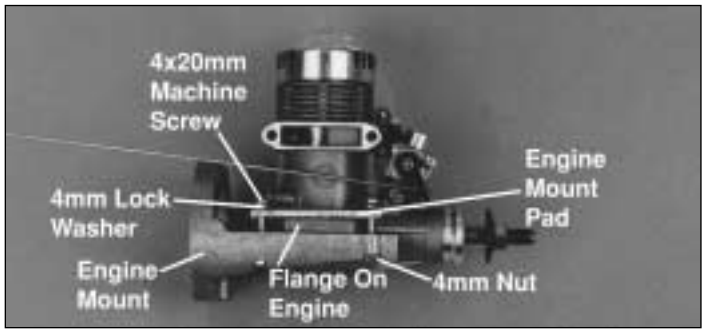


❍ 1. Attach the "Z" bend into the inside hole of the carburetor control arm. Make sure that the "Z" bend does not interfere with any parts of the engine.

The engine in your airplane is mounted slightly different from that of most R/C aircraft. This is done to allow the use of many different types of engines. It also allows a "no-drill" approach to ease the installation. Read through the procedure and understand all the steps before actually performing them.

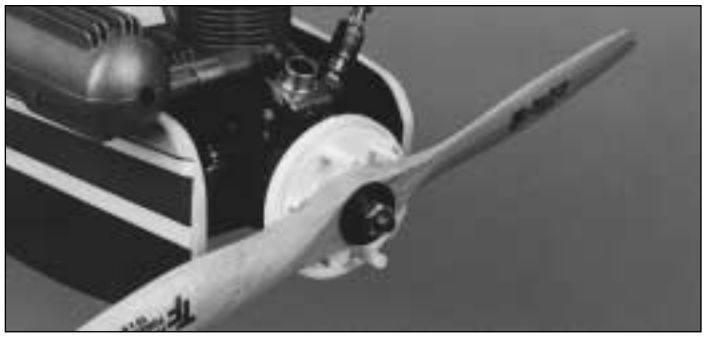
MOUNTING THE ENGINE

Note: *The engine and mount have been removed from the aircraft for photography.* ***Do not*** *remove the engine mount from the aircraft.*



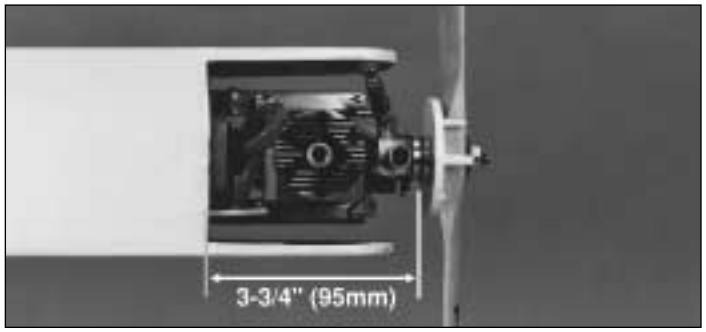
❍ 2. The engine is "sandwiched" between the **engine mount** and the **engine mount pads**. Slide the throttle pushrod into the pushrod tube in the fuselage and rest the engine on the mount. Slide a **4mm lock washer** onto a **4 x 20mm machine screw**. Repeat this process for the remaining screws and washers. Pass the screws through the engine mount pads. The screws then go through the mount, passing in front of and behind the engine mounting flange. The pads will be resting on the **top** of the engine's mounting flanges. The **4mm nuts** are then placed into the recesses on the bottom of the engine mount. Start the screws, but do not tighten them at this time. We still need to align the engine!

ATTACH THE PROPELLER TO THE ENGINE



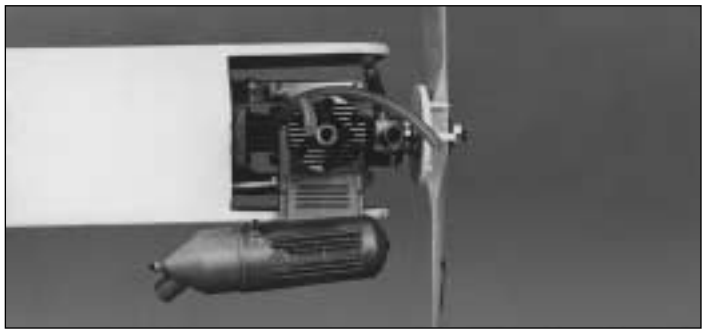
❍ 3. Install the **spinner backplate**, propeller, propeller washer and the propeller nut onto the engine. Turn the propeller counterclockwise until it is against the smallest pins on the backplate. Keep the propeller horizontal when the engine is against its compression (the point at which you feel resistance when you turn the crankshaft counterclockwise). This is a good habit to get into when installing propellers onto model airplanes. If the engine quits during flight, the propeller will stop horizontally, therefore reducing the chance of propeller breakage if you are forced to land on rough terrain. Use an adjustable wrench (not a pliers) to securely tighten the propeller nut.

ALIGNING THE ENGINE



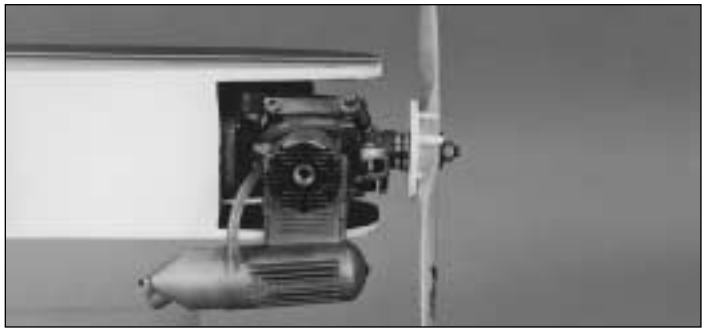
❍ 4. Measure the distance from the spinner backplate to the firewall. It should be 3-3/4" (95mm) on both sides. Adjust the engine if needed and tighten the screws **evenly** to secure the engine to the mount.

INSTALL THE MUFFLER



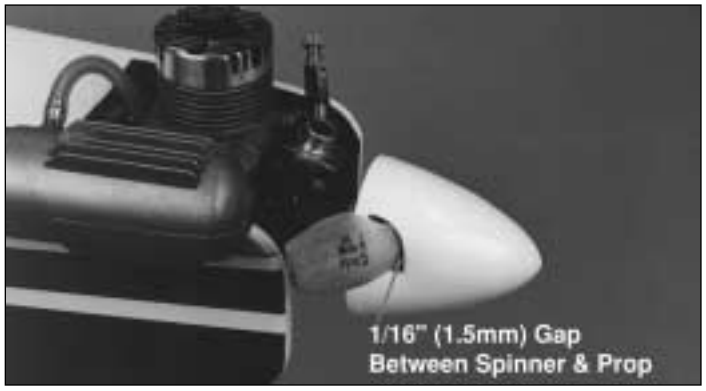
❍ 5. Following the engine manufacturer's instructions, install the muffler to the engine.

ATTACH THE FUEL LINES



❍ 6. Attach the fuel lines to the engine. The line marked with the "V" for vent should be attached to the muffler. The other line will be attached to the carburetor. Make sure there are no sharp bends in the lines. If so, carefully shorten the lines to allow for a smooth flowing bend to the appropriate fitting of the engine.

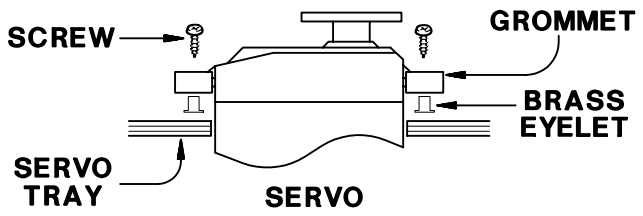
INSTALL THE SPINNER



❍ 7. Trim the **spinner cone** propeller slots if necessary so there is at least a 1/16" (1.5mm) gap between the cone and the propeller. Once satisfied with the fit, attach the cone with the screws provided. Be careful not to overtighten these screws. They are threaded into plastic which can strip out easily if they are over tightened.

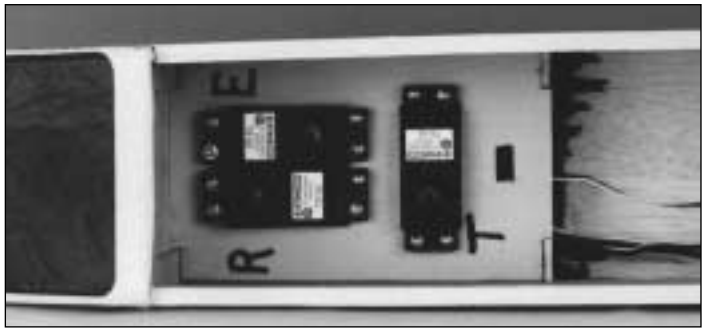
RADIO INSTALLATION

PREPARE THE SERVOS



❍ 1. Install the rubber grommets and brass eyelets, included with your radio system, onto the four servos. Use the sketch to assist in the installation of these items.

INSTALL THE SERVOS IN THE FUSELAGE



❍ 2. Route the servo wires forward. Drill 1/16" (1.5mm) pilot holes for the servo mounting screws. Install the servos into the tray as shown using the screws included with the radio system. It may be necessary to enlarge the openings for the servos. The arms should be removed from the servos during the installation. The servos in the photo are marked as to which is rudder (R), elevator (E) and throttle (T) to help in getting them plugged into the receiver correctly.

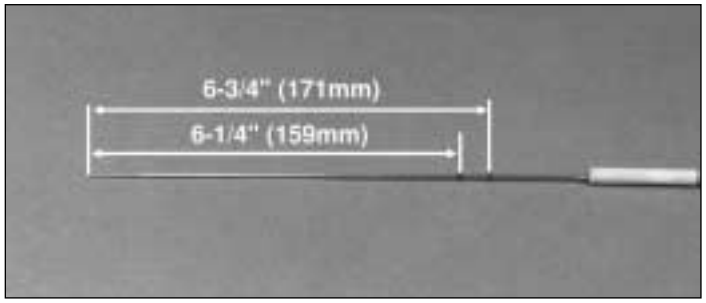
RECEIVER AND BATTERY INSTALLATION

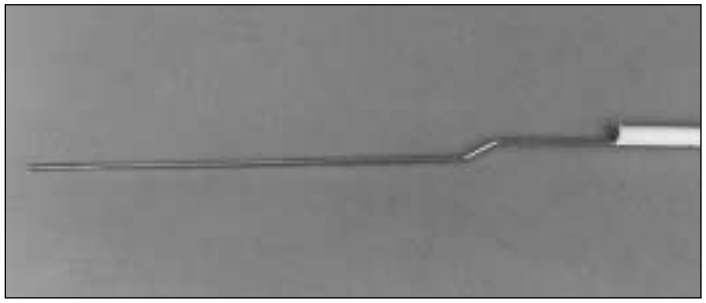
❍ 3. Following the radio system's instruction manual, plug the three servos into the receiver. Next, plug a servo extension into the aileron channel of the receiver. Finally, plug the switch harness into the receiver. Wrap the receiver and battery pack in foam rubber (HCAQ1050) using rubber bands or masking tape to hold the foam in position. Install the battery and receiver into the fuselage. The battery should be located forward of the receiver.

INSTALL THE SWITCH

❍ 4. Remove the covering from the square opening on the left side of the fuselage, opposite of the engine exhaust. Position the face plate so that it is centered over the opening. Drill two 1/16" (1.5mm) holes in the locations for the screws through the fuselage. Attach the switch using the screws that are included with the switch.

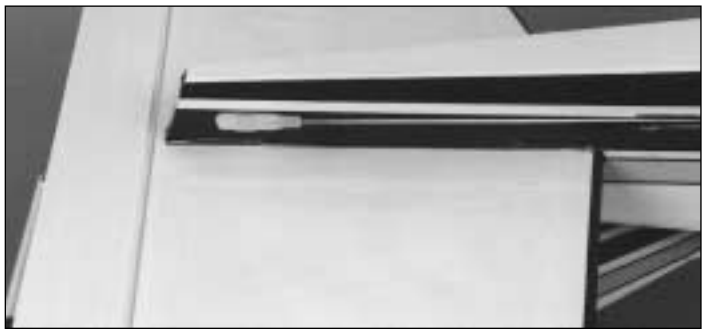
BENDING THE ELEVATOR PUSHROD





❍ 5. Make two marks that are 6-1/4" (159mm) and 6-3/4" (171mm) from the threaded end of the pushrod wire. Make two 45° bends at the marks as shown in the photo.

INSTALL THE ELEVATOR PUSHROD



❍ 6. Insert the elevator pushrod from the radio compartment back, threaded end first. Pass the rod through the opening in the fuse side previously cut for this purpose. Thread one of the plastic clevises onto the rod until the rod is flush with the plastic between the clevis forks.

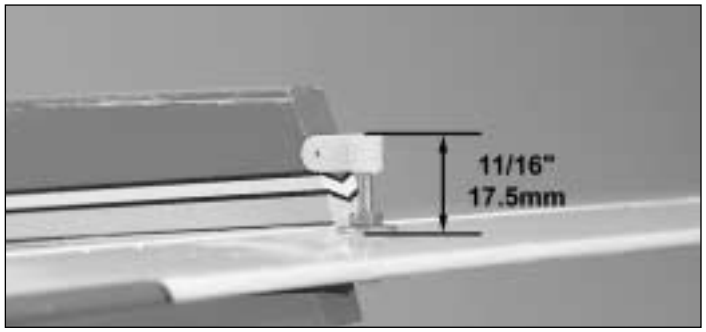
INSTALL THE ELEVATOR CONTROL SCREW

❍ 7. Locate a 3mm x 25mm machine screw and a 3mm washer. Slide the washer onto the screw. Pass the screw through the elevator from the top.

SECURE THE ELEVATOR CONTROL SCREW

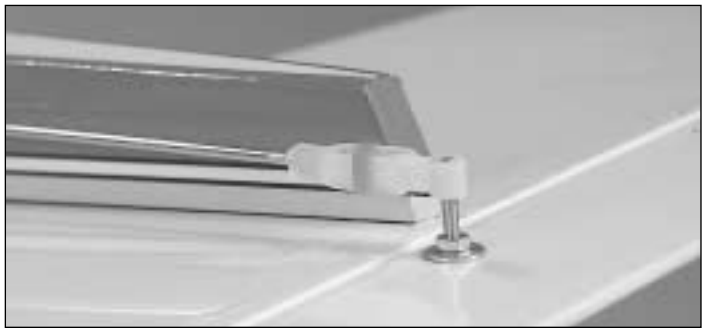
❍ 8. Slide a 3mm washer onto the screw from the bottom. Thread a 3mm nut onto the screw. Tighten the screw, but not too tight as to crush the underlying wood. Use threadlock on the nut to prevent loosening.

INSTALL THE ELEVATOR CONTROL HORN



❍ 9. Thread the elevator control horn onto the screw until it is positioned 1/16" [17.5mm] above the bottom of the elevator.

CONNECT THE ELEVATOR PUSHROD



❍ 10. Attach a clevis to a pushrod. Attach the clevis to the elevator control horn.

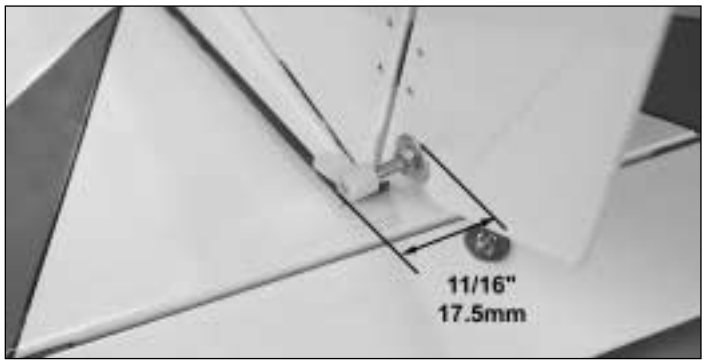
INSTALL THE RUDDER CONTROL SCREW

❍ 11. Locate a 3mm x 25mm machine screw and a 3mm washer. Slide the washer onto the screw. Pass the screw through the rudder from the left.

SECURE THE RUDDER CONTROL SCREW

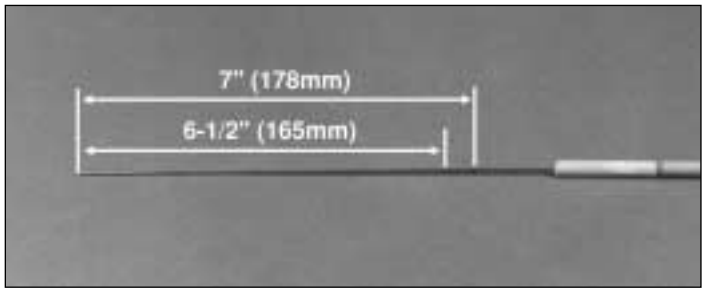
❍ 12. Slide a 3mm washer onto the screw from the bottom. Thread a 3mm nut onto the screw. Tighten the screw, but not too tight as to crush the underlying wood. Use threadlock on the nut to prevent loosening.

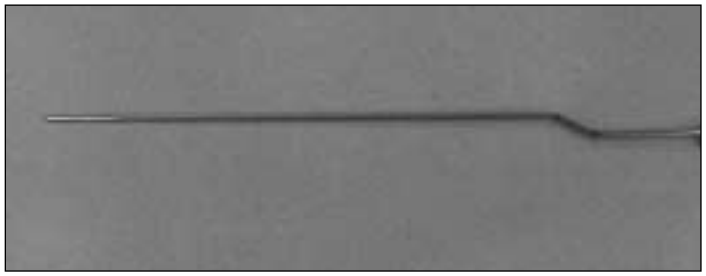
INSTALL THE RUDDER CONTROL HORN



❍ 13. Thread the rudder control horn onto the screw until it is positioned 11/16" [17.5mm] above the right side of the rudder.

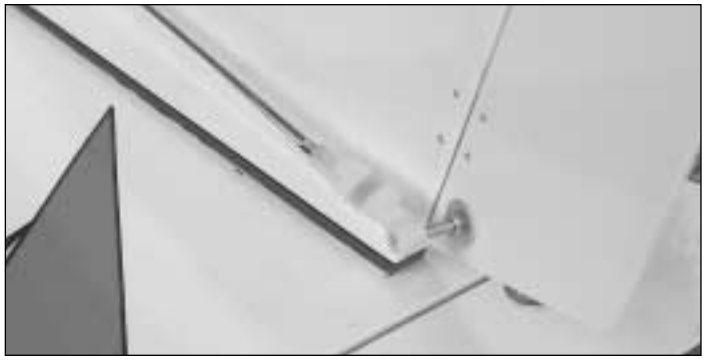
BENDING THE RUDDER PUSHROD





❍ 14. Make two marks that are 6-1/2" (165mm) and 7" (178mm) from the threaded end of the pushrod wire. Make two 45° bends at the marks as shown in the photo. Install the pushrod into the fuselage, making sure it exits the opening in the fuselage next to the fin.

CONNECT THE RUDDER PUSHROD

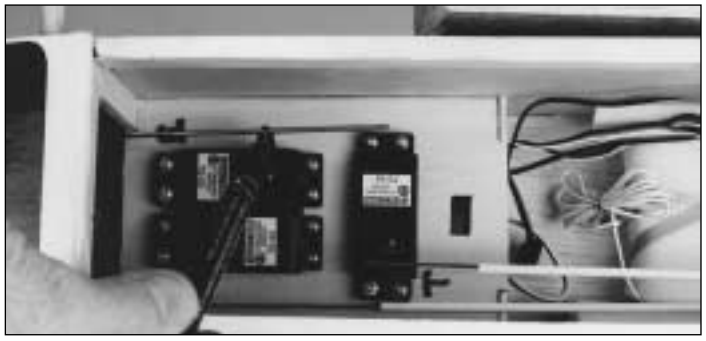


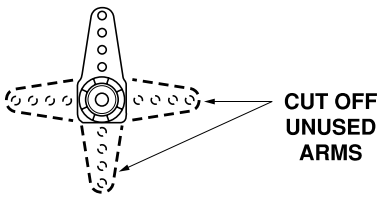
❍ 15. Attach a clevis to a pushrod. Attach the clevis to the rudder control horn.

CENTER THE SERVOS USING THE RADIO

❍ 16. Turn on the transmitter, then the receiver. Center all of the trim levers on the transmitter. Turn off the receiver and then the transmitter. By doing this, your servos will be at their centered (neutral) position when you begin to connect the pushrods.

MARK THE ELEVATOR PUSHROD



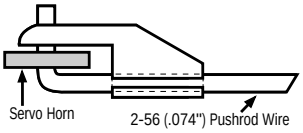


❍ 17. Trim as shown and install the elevator control horn in the photo and drawing. Hold the elevator in its neutral position, and mark the pushrod wire where it crosses the servo arm as shown using a felt-tip pen.

CUT THE ELEVATOR PUSHROD

❍ 18. Cut off the pushrods approximately 3/8" (10mm) past the mark. Removing the pushrods will make this and the next step easier.

CONNECT THE ELEVATOR PUSHROD



❍ 19. Make an "L" bend at the mark that crosses the servo arm. Remove the servo arm from the servo. Use the plastic keeper to secure the wire to the servo arm. You may need to enlarge the holes in the servo arms slightly to allow the wire to pass through the arm without binding.

POSITION THE RUDDER CONTROL HORN

❍ 20. Attach a control horn to the rudder servo. Mark the two arms that are 90° to the servo. Remove the arm and trim off the remaining arms. Attach a pushrod connector to the arm that will be **closest** to the fuselage side. The connector should be around 9/16" (14mm) from the center of the servo arm.

CONNECT THE RUDDER PUSHROD

❍ 21. Hold the rudder in its neutral position, and mark the pushrod wire where it crosses the servo arm using a felt-tip pen. Cut off the pushrods approximately 3/8" (10mm) past the mark. Removing the pushrods will make this and the next step easier. Make an "L" bend at the mark that crosses the servo arm. Remove the servo arm from the servo. Attach the rod to the servo arm. Use the plastic keeper to secure the wire to the servo arm. You may need to enlarge the holes in the servo arms slightly to allow the wire to pass through the arm. *Doesn't this sound like the same procedure as the elevator control horn too?*

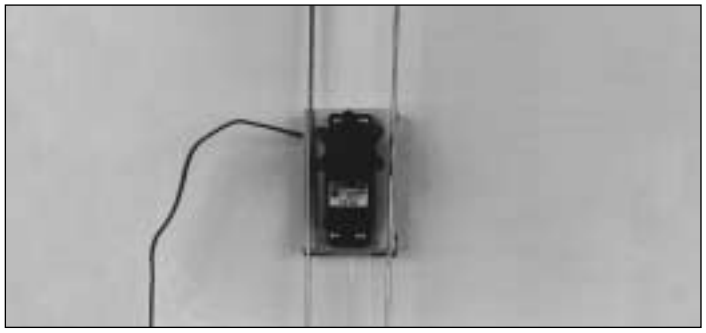
CONNECT THE STEERING PUSHROD

❍ 22. Slide the steering pushrod wire though the Screw-Lock Pushrod Connector. With the rudder servo in its neutral position, center the nose wheel so that the airplane will be able to taxi forward in a straight line. Secure the pushrod into position by tightening the screw on the connector.

CONNECT THE THROTTLE PUSHROD

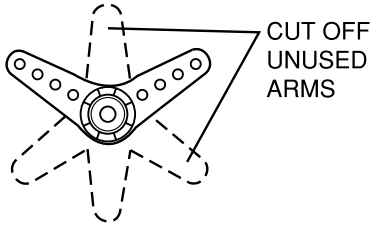
❍ 23. With the radio system on, place the throttle stick **and** the trim in the center or neutral position. Attach a servo arm to the throttle servo so that it is parallel to the servo. Remove the arm and trim off any remaining arms to match the arm in the photo. Install a pushrod connector into the servo arm as shown in the photo. Pass the throttle pushrod wire through the connector and attach the arm to the servo using the screw that was provided with the servo. Position the carburetor to roughly half open and hand-tighten the screw on the connector. Final adjustment of the throttle will be made later in the manual. *Remember to turn off the radio system to prevent draining the batteries.*

INSTALL THE AILERON SERVO



❍ 24. After preparing the servo with grommets and bushings, install the aileron servo, passing the servo lead between the servo tray and the wing. With the servo centered, install the servo horn as shown in the photo. If you don't have a 6-star horn, use a large wheel for this servo. We will be doing something a little different than you have seen before.

CONNECT THE AILERON PUSHRODS



❍ 25. Trim the servo horn as shown in the photo. Using the same technique that was used for the elevator and rudder, (hold ailerons in neutral, mark at horn, cut 3/8" (10mm) past the mark, make "L" bend) attach the aileron pushrods to the servo horn. **Note:** The reason for the odd servo horn is to provide aileron differential. Aileron differential will assist in allowing the aircraft to maintain a level attitude during the turns. This is common practice among aircraft that have a flat-bottom airfoil. *(See the glossary of terms starting on page 27 for a clearer explanation.)*

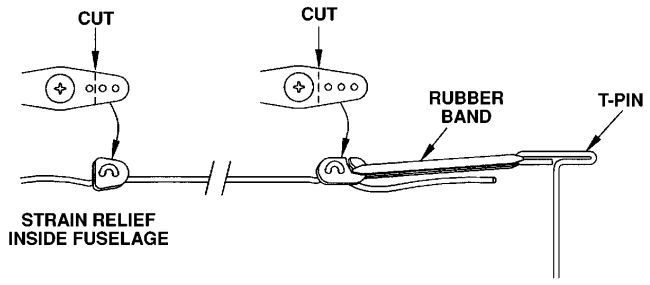
STRAIGHTEN THE ANTENNA

❍ 26. Unwind the antenna and straighten (do not stretch) the wire to its full length. **Do not cut the antenna wire** as this will greatly decrease the range and sensitivity of your receiver and void your radio warranty.

DRILL AN ANTENNA EXIT

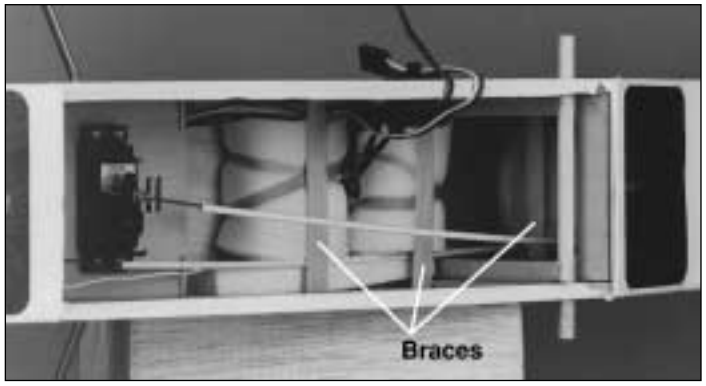
❍ 27. Using a 3/16" (4mm) drill bit, drill a hole centered approximately 3/4" (19mm) behind the wing saddle on top of the fuselage. Cut a 1/2" (13mm) long piece of fuel tubing and center it inside this hole.

SECURING THE ANTENNA



❍ 28. Route the antenna away from the servos, make a strain relief from a spare servo arm and route the antenna through the fuel tubing/antenna exit. Use a trimmed servo arm and small rubber band at the end of the antenna and attach to a T-pin. Push the pin into the top of the fin. Adjust the trimmed servo arm until there is a slight amount of tension on the antenna wire. The rubber band should be partially stretched. ***Note:*** *Never push a pin through the antenna or trim off the excess wire.*

FINAL RADIO INSTALLATION INSPECTION

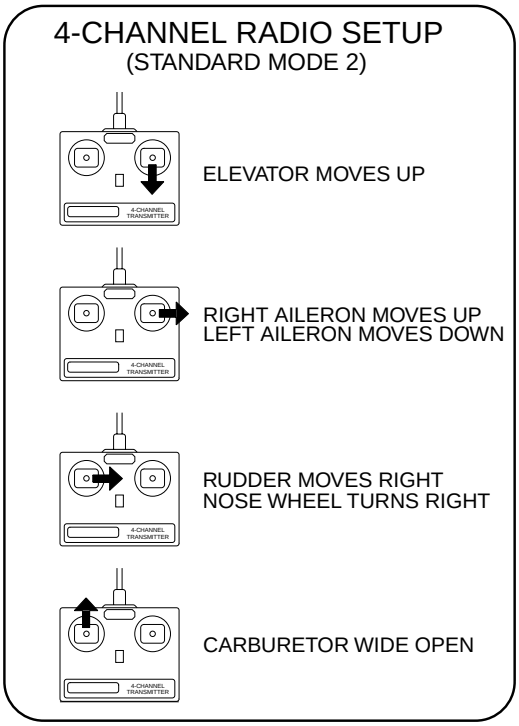


❍ 29. Using mixing sticks, secure the radio system and fuel tank as shown in the photo. It is best to save this step until after you have completed balancing your aircraft, but it is shown here to remind you that it is necessary to secure these components. If they are not secured, there is a possibility of them shifting around in the aircraft, and possibly upsetting the balance, or worse yet, becoming unplugged or entangled in the pushrods. Either situation could pose a threat to returning your aircraft to the ground safely and in one piece. Make sure that the receiver, battery and fuel tank will have no chance of moving in your aircraft during flight.

RADIO SYSTEM SET-UP

CHECK THE CONTROL DIRECTIONS

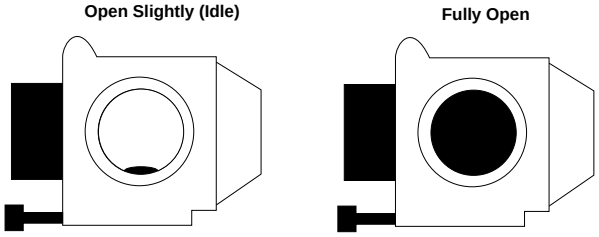
❍ 1. Turn on the transmitter and then the receiver. Standing behind the plane, make the following movements with the transmitter and observe the control surfaces:



If any of the servo movements are wrong, reverse the servo direction with the **servo reversing switches** on the transmitter.

ADJUST THE THROTTLE

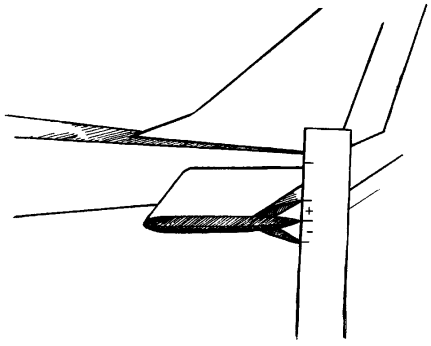
❍ 2. For added **safety** and **convenience**, the throttle should be set up so that the engine can be stopped using the throttle trim. To do this, loosen the screw on the Screw-Lock Pushrod Connector and move the throttle pushrod so that the carburetor is completely **closed** with the throttle stick and trim lever on the transmitter fully **back**. (**Note:** If the carburetor does not fully close, adjust the idle **stop screw** on the carburetor until it will.) Next, tighten the screw on the Screw-Lock Pushrod Connector. Test the trim lever by advancing it to full. This will be a **fast idle position** with the carburetor barrel open slightly (about 1/32" or .8mm).



Now move the throttle stick forward to full. Make sure that the carburetor barrel opens **all the way**. (See sketch.) If it doesn't open far enough or opens too far (bending the rod) move the Screw-Lock Pushrod Connector in or out on the servo arm and/or the carburetor arm to gain or reduce movement. Apply a **small** amount of thin CA onto the threads of the Screw-Lock Pushrod Connector when you are done. The throw will be correct when the carburetor barrel will stop fully open at the same time the throttle stick reaches full. With the throttle set up properly, you should be able to run the engine with the trim lever set midway to the full position (adjusted for a smooth but slow idle). Then when it is time to stop the engine, simply pull back the trim to close the carburetor and the engine will stop running.

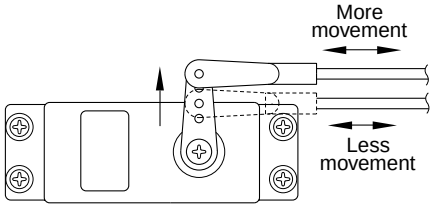
ADJUST THE CONTROL THROWS

❍ 3. Check the movement of the control surfaces. Use a ruler to match our measurements listed below. If your radio features dual rates, set up both the high and low rates following the radio system's instructions. If your radio does not have dual rates, set up the plane using low rates first and increase the throws as you get familiar with the plane.

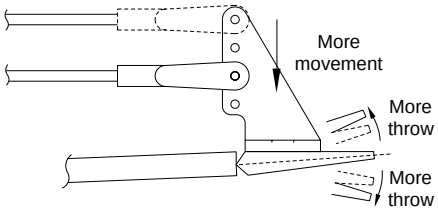


	Low Rate	High Rate
Aileron	1/2" (13mm) up 1/4" (6mm) down	5/8" (16mm) up 3/8" (9.5mm) down
Elevator	3/8" (9.5mm) up 3/8" (9.5mm) down	1/2" (13mm) up 1/2" (13mm) down
Rudder	1" (25mm) left 1" (25mm) right	Same as low rate Same as low rate

These are the suggested deflection from center of the control surface. If you need more control movement, you should move the clevis to a hole closer to the control surface or you can move the rod at the servo away from the center of the servo. If you have too much movement, do the opposite. See the following sketches:



Moving the clevis outward on the servo arm results in more pushrod movement.



Moving the clevis inward on the control horn results in more throw.

BALANCE YOUR MODEL

CHECK THE LATERAL BALANCE

Special Note: Do not confuse this procedure with "checking the C.G." or "check the fore-aft balance."

Now that you have the basic airframe completed, this is a good time to balance the airplane laterally (side-to-side). Here is how to do it:

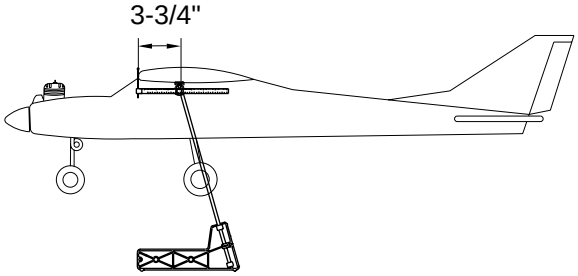
❍ 1. Temporarily attach the wing and engine (with muffler) to the fuselage using fourteen #64 rubber bands (*see page 25 for suggestions on using rubber bands).*

❍ 2. With the wing level, lift the model by the engine propeller shaft and the fin post (this may require two people). Do this several times.

❍ 3. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by gluing weight to the other wing tip. **Note:** An airplane that has been laterally balanced will track better in loops and other maneuvers.

CHECK THE FORE-AFT BALANCE

Note: This section is **VERY** important and must **NOT** be omitted! A model that is not properly balanced will be unstable and possibly unflyable.



❍ 1. **The balance point (C.G.) is located 3-3/4" [95mm] back from the leading edge of the wing against the fuselage.** Balance your Tower Trainer using a Great Planes C.G. Machine™ Airplane Balancer (GPMR2400) for the most accurate results. This is the balance point at which your model should balance for your first flights. After initial trim

flights and when you become more acquainted with your Tower Trainer, you may wish to experiment by shifting the balance up to 1/4" [6mm] forward or backward to change its flying characteristics. Moving the balance forward may improve the smoothness and stability, but the model may then require more speed for takeoff and may become more difficult to slow for landing. Moving the balance aft makes the model more agile with a lighter, snappier "feel." In any case, please start at the location we recommend. Do not at any time balance your model outside the recommended range.

❍ 2. With the wing attached to the fuselage, all parts of the model installed (ready to fly), and an **empty** fuel tank, hold the model at the marked balance point with the stabilizer level.

❍ 3. Lift the model. If the tail drops when you lift, the model is “tail heavy” and you must add weight* to the nose. If the nose drops, it is “nose heavy” and you must add weight* to the tail to balance.

Note: Nose weight may be easily installed by using a heavy spinner hub or gluing lead weights to the firewall. Tail weight may be added by using Great Planes (GPMQ4485) “stick-on” lead weights.

*If possible, first attempt to balance the model by changing the position of the receiver battery and receiver. If you are unable to obtain good balance by doing so, then it will be necessary to add weight to the nose or tail to achieve the proper balance point.

PREPARING TO FLY YOUR TOWER TRAINER 40

If you are a novice, there is one thing that you will need to fly your Tower Trainer 40 safely that is not furnished with the kit: You will need a **qualified** instructor to teach you how to fly. No model ever made will let you teach yourself to fly safely. It can be done, but you would be seriously risking more than just the airplane. To find an instructor, you should join an R/C flying club. If there is not a club nearby, then you should find an experienced model pilot who is willing to help you. The chosen instructor should fly well enough to allow you to concentrate on your own flying. If you are worried about your instructor crashing your model, you will not be able to concentrate on learning to fly. After you have found an instructor, you should spend some time just **talking** with the instructor about what you will be trying to learn. The instructor should inspect the model to be certain that it is ready to fly. Listen to the instructor and learn from their experience.

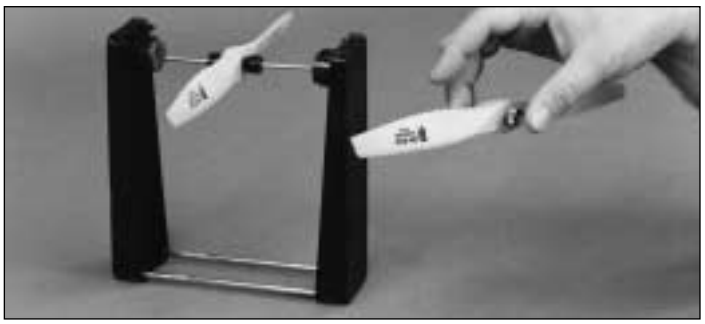
Now that you have a good model and an instructor that you can trust, you can go out and start learning to fly. You can expect to be very nervous at first, and will make some mistakes. There will be several instances where the instructor will prevent you from crashing. This will be unsettling, but the thing to do is jump right back into flying the model (after your knees stop shaking, of course). This is one of the most important things about learning to fly model airplanes...**you have to fly!** Fly as often as you can. Be sure to make several flights each time you go to the flying field, but give yourself time after each flight to calm down and discuss the flight with your instructor. Spending some time after each flight talking about what happened and what you need to work on to improve your skills will pay off with greater confidence in your own growing abilities.

CHARGE THE BATTERIES

Follow the battery charging procedures in your radio instruction manual. You should always charge your transmitter and receiver batteries the night before you go flying, and at other times as recommended by the radio manufacturer.

BALANCE THE PROPELLER

Balance your propellers carefully before flying. An unbalanced prop is the single most significant cause of damaging vibration. Not only will engine mounting screws and bolts vibrate out, possibly with disastrous effect, but vibration will also damage your radio receiver and battery. Vibration will cause your fuel to foam, which will, in turn, cause your engine to run rough or quit.



We use a Top Flite Precision Magnetic Prop Balancer (#TOPQ5700) in the workshop and keep a Great Planes Fingertip Balancer (#GPMQ5000) in our flight box.

FIND A SAFE PLACE TO FLY

The best place to fly your R/C model is an AMA (Academy of Model Aeronautics) chartered club field. Ask your hobby shop dealer if there is such a club in your area and join. Club fields are set up for R/C flying and that makes your outing safer and more enjoyable. The AMA also can tell you the name of a club in your area. We recommend that you join the AMA and a local club so you can have a safe place to fly and have insurance to cover you in case of a flying accident. (The AMA address and phone numbers are listed on page 2 of this instruction manual).

If a club and its flying site are not available, you need to find a large, grassy area at least 6 miles away from any other R/C radio operation like R/C boats and R/C cars and away from houses, buildings and streets. A schoolyard may look inviting but it is too close to people, power lines and possible radio interference.

GROUND CHECK THE MODEL

If you are not thoroughly familiar with the operation of R/C models, ask an experienced modeler to check to see that you have the radio installed correctly and that all the control surfaces do what they are supposed to. The engine operation also must be checked and the engine “broken-in” on the ground by running the engine for at least two tanks of fuel. Follow the engine manufacturer’s recommendations for break-in. Check to make sure all screws remain tight, that the hinges are secure and that the prop is on tight.

RANGE CHECK YOUR RADIO

Wherever you do fly, you need to check the operation of the radio before every time you fly. First, make sure no one else is on your frequency (channel). With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have someone help you. Have them stand by your model and, while you work the controls, tell you what the various control surfaces are doing.

Repeat this test with the engine running at various speeds with an assistant holding the model. If the control surfaces are not always acting correctly, do not fly! Find and correct the problem first.

ENGINE SAFETY PRECAUTIONS

Note: Failure to follow these safety precautions may result in severe injury to yourself and others.

• Keep all engine fuel in a safe place, away from high heat, sparks or flames, as fuel is very flammable. **Do not** smoke near the engine or fuel; and remember that the engine exhaust gives off a great deal of deadly carbon monoxide. Therefore do not run the engine in a closed room or garage.

• Get help from an experienced pilot when learning to operate engines.

• Use safety glasses when starting or running engines.

• **Do not** run the engine in an area of loose gravel or sand, as the propeller may throw such material in your face or eyes.

• Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you start and run the engine.

• Keep items such as these away from the prop: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects (pencils, screwdrivers) that may fall out of shirt or jacket pockets into the prop.

• Use a "chicken stick" device or electric starter; follow the instructions supplied with the starter or stick. Make certain the glow plug clip or connector is secure so that it will not pop off or otherwise get into the running propeller.

• Make all engine adjustments from behind the rotating propeller.

• The engine gets hot! Do not touch it during or after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.

• To stop the engine, cut off the fuel supply by closing off the fuel line or follow the engine manufacturer's recommendations. Do not use hands, fingers or any body part to try to stop the engine. Do not throw anything into the prop of a running engine.

AMA SAFETY CODE

Read and abide by the following Academy of Model Aeronautics Official Safety Code excerpt:

General

1. I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously successfully flight tested.

2. I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right of way to, and avoid flying in the proximity of, full scale aircraft. Where necessary an observer shall be used to supervise flying to avoid having models fly in the proximity of full scale aircraft.

3. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

7. I will not fly my model unless it is identified with my name and address or AMA number, on or in the model.

9. I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind)

Radio control

1. I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.

2. I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3. I will perform my initial turn after takeoff away from the pit or spectator areas, and I will not thereafter fly over pit or spectator areas, unless beyond my control.

4. I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

FLYING YOUR TOWER TRAINER 40

The moment of truth has finally arrived. You've put a lot of effort into building your model and it looks great! Protect your investment by following a few simple tips:

1. If possible, have an experienced modeler look over your work before you head out to your flying field. It's easier to fix problems in the workshop instead of on the flight line.

2. Become familiar with starting your engine, and break it in before going for your first flight. Be sure the engine will stop when the trim lever is pulled all the way back.

3. Assemble a simple flight kit (a shoe box is fine to start with) which should include a starting battery and glow-plug clip (or ni-starter), "chicken stick" for flipping the prop, fuel and a means of filling the tank, a couple of small screwdrivers, #64 rubber bands (or wing bolts), spare prop and glow-plug, 6" adjustable wrench, and a pair of needle nose pliers. In addition to tools, you should also take along some paper towels and spray window cleaner to remove fuel residue after each flight.

4. When you load up to go to the flying field be sure that the batteries have charged for at least 14 hours, and that you have your fuselage, wing, transmitter and flight box. And, most important, you have your AMA license.

5. Range check the radio! See page 19.

USING RUBBER BANDS

The rule of thumb is to use two #64 rubber bands per pound of model weight. If your model tipped the scales at 7 pounds, you need 14 rubber bands. It doesn't matter too much how many you run straight across the wing or how many are criss-crossed, so long as the last two are criss-crossed. This trick stops the other bands from popping off. Do not use oily rubber bands for more than a few flying sessions. Check each rubber band before using it; watch out for cracks. Rubber bands can be conditioned by storing the oily ones in a zip-top storage bag partially filled with talcum powder or corn starch. Both products will absorb the oil.

TAXIING

Start the engine and set the throttle trim for a slow, steady idle. Have your instructor or a helper hold the plane while you work the controls. Upon release advance the throttle slightly to start rolling, then back-off the power to prevent going too fast and possibly taking off. Stand behind the plane as it taxies away from you and note the direction it turns as you move the rudder control. One thing to keep in mind with R/C models (whether it be cars, boats, or planes) is that the steering controls may seem to "reverse" when the model is moving toward you. For example, if you are flying toward yourself, and you give a right control input (ailerons or rudder), the model will move off to your left. The fact of the matter is, of course, that the controls are not reversed and the aircraft did actually enter a right turn. The plane does move off to your left from your vantage point, but if you imagined yourself in the cockpit you would realize the plane turned to the right as commanded. All it takes is a little practice to maintain proper orientation of your aircraft, but that's why we recommend finding an instructor.

When you feel comfortable, advance the throttle a little while standing behind the plane to get the feel of a takeoff roll, but pull back on the power before the model lifts off. Try this several times, adding a little more power each time. Use the rudder stick on your transmitter to steer the plane with the nose wheel while on the ground If the plane starts to veer off, immediately cut the power to prevent a mishap.

Although many R/C pilots have taught themselves to fly, we strongly recommend that you find an instructor to help get you started. Although trainers offer the greatest opportunity of success for the self-taught, there is a high probability that you will crash your airplane on the first flight. Protect your investment of time and money—obtain the assistance of an experienced R/C pilot.

TAKEOFF

Your first flights should be made in little or no wind. If you have dual rates on your transmitter, set the switches to "low rate" for takeoff. Taxi into position, pointing directly into the wind. Although this model has good low speed characteristics, you should always build up as much speed as your runway will permit before lifting off, as this will give you a safety margin in case of a "flame-out." Advance the throttle smoothly to the wide open setting. When the plane has sufficient flying speed (you won't know until you try), lift off by smoothly applying a little up elevator (don't force it off into a steep climb!), and climb out **gradually**, trying to keep it straight and the wings level. Climb to about 100 feet before starting a VERY gentle turn by moving the aileron stick. Apply a little more back pressure on the elevator stick as the model turns. Stop the turn by moving the aileron stick in the opposite direction until the wings are level, then return the stick to the neutral position. Pull the power back to 1/2 throttle.

FLYING

We recommend that you take it easy with your model for the first several flights and gradually "get acquainted" with the plane as your engine becomes fully broken-in. Trainers are designed to fly level with neutral elevator trim at approximately 1/3 - 1/2 throttle — this is the best speed for learning to fly. On later flights, if you want your model to maintain level flight at full throttle, you will need to give it a little down trim.

Your first flights should consist of mostly straight and level flight with gentle turns to keep the model over the field. These flights will give you practice at coordinating your control inputs and maintaining the proper orientation of the airplane. As mentioned earlier, turns are accomplished by banking the aircraft with the ailerons then gently adding some back stick (up elevator). Enough back stick should be held in to keep the aircraft at a constant altitude. To stop turning, apply opposite aileron to level the wings, then release the stick. There is a memory aid that may help keep you out of trouble when the plane is flying toward you — "put the stick under the low wing." In other words, move the aileron stick in the direction of the low wing to raise that wing. When you are comfortable flying the aircraft, you can practice using the rudder along with the ailerons to "coordinate" the turns — usually, a small amount of rudder applied in the direction of the turn will keep the tail following in the exact same track as the nose.

The most common mistake when learning to fly is "over control." Think of pressure instead of large movements of the control sticks. Remember, most trainers will recover from almost any over control situation (given enough altitude) if you simply let go of the sticks.

Add and practice one maneuver at a time, learning how your model behaves in each one. For ultra-smooth flying and normal maneuvers, we recommend using the "low rate" settings as listed on page 18. High rate control throws will give your model enough control for loops, barrel rolls, and many other basic aerobatic maneuvers.

After you have several flights on your model, it's time to reward yourself with your first aerobatic maneuver — a loop. Climb to a safe altitude and turn into the wind. Apply full throttle, level the wings, then slowly pull back on the elevator stick to about 1/2 to 3/4 up elevator (depending on your throws), and hold this control input. After you go over the top and start down the back side of the loop, pull the throttle back to about half. This will keep the stresses on the airplane low and the airspeed relatively constant. Keep holding "up" elevator until the plane is level, then slowly release the stick. You're done! It's really that easy!

CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice any unusual sounds, such as a low-pitched "buzz," this may be an indication of control surface "flutter." Because flutter can quickly destroy components of your airplane, any time you detect flutter you must immediately cut the throttle and land the airplane! Check all servo grommets for deterioration (this will indicate which surface fluttered), and make sure all pushrod linkages are slop-free. If it fluttered once, it will probably flutter again under similar circumstances unless you can eliminate the slop or flexing in the linkages. Here are some things which can result in flutter: excessive hinge gap; not mounting control horns solidly; sloppy fit of clevis pin in horn; elasticity present in flexible plastic pushrods; side-play of pushrod in guide tube caused by tight bends; sloppy fit of Z-bend in servo arm; insufficient glue used when gluing in the elevator joiner wire or aileron torque rod; excessive flexing of aileron, caused by using too soft balsa aileron; excessive "play" or "backlash" in servo gears; and insecure servo mounting.

LANDING

APPROACH TOO STEEP

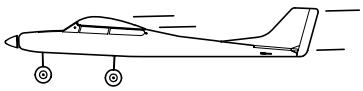
Apply Up Elevator.

TOO MUCH FLARE

Danger of Stalling!

Release Elevator.

GOOD LANDING FLARE



Hold This Angle Until Touchdown.

When it's time to land, fly a normal landing pattern and approach as follows: Reduce the power to about 1/4 throttle and fly a downwind leg far enough out from the runway to allow you to make a gentle 180° turn. As you make the turn into the wind for your final approach, pull the throttle back to idle. Most trainer planes have a lot of lift, so you will need a slow, reliable idle in order to achieve a nice, slow landing. Allow the plane to keep descending on a gradual glide slope until you are about 3 feet off the runway. Gradually apply a little up elevator to flare for landing. You should apply just enough up elevator to hold the plane just off the runway while the excess speed bleeds off. The model should settle onto the runway for a slow, slightly nose-high landing.

Good luck and have fun flying your model, but always stay in control and fly in a safe manner.

SOME MODELING TERMS & TRIVIA

...so you'll know what they are talking about at the flying field.

Adverse Yaw - The tendency of an airplane to yaw in the opposite direction of the roll. For instance, when right aileron is applied, the airplane yaws to the left, thus opposing the turn. Adverse yaw is common in trainer type airplanes having flat bottom wings. It is most noticeable at slow speeds and high angles of attack, such as ring takeoffs and when stretching a landing approach. Caused by the unequal drag of the upward and downward deflection of the ailerons, this undesirable trait can be minimized by setting up the ailerons with Differential Throw or by coordinating the turns, using aileron and rudder control simultaneously. *See differential throw.*

Ailerons - Hinged control surfaces located on the trailing edge of the wing, one on each side, which provide control of the airplane about the roll axis. The control direction is often confusing to first time modelers. For a right roll or turn, the right hand aileron is moved upward and the left hand aileron downward, and vice versa for a left roll or turn.

Angle Of Attack - The angle that the wing penetrates the air. As the angle of attack increases so does lift and drag, up to a point.

ARF - A prefabricated model - Almost Ready to Fly.

Buddy Box - Two similar transmitters that are wired together with a "trainer cord." This is most useful when learning to fly — it's the same as having dual controls. The instructor can take control by using the "trainer switch" on his transmitter.

Boring Holes In The Sky - Having fun flying with an R/C airplane, without any pre-determined flight pattern.

CA (Abbreviation for "Cyanoacrylate") - An instant type glue that is available in various viscosities (Thin, Medium, Thick, and Gel). These glues are ideal for the assembly of wood airplanes and other materials. **Note:** Most CA glues will attack Styrofoam.

Carburetor - The part of the engine which controls the speed or throttle setting and lean/rich mixture via setting of the needle valve.

CG ("Center of Gravity") - For modeling purposes, this is usually considered the point at which the airplane balances fore to aft. This point is critical in regards to how the airplane reacts in the air. A tail-heavy plane will be very snappy but generally very unstable and susceptible to more frequent stalls. If the airplane is nose heavy, it will tend to track better and be less sensitive to control inputs, but, will generally drop its nose when the throttle is reduced to idle. This makes the plane more difficult to land since it takes more effort to hold the nose up. A nose heavy airplane will have to come in faster to land safely.

Charge Jack - The plug receptacle of the switch harness into which the charger is plugged to charge the airborne battery. An expanded scale voltmeter (ESV) can also be plugged into it to check battery voltage between flights. It is advisable to mount the charge jack in an accessible area of the fuselage side so an ESV can be used without removing the wing.

Charger - Device used to recharge batteries and usually supplied with the radio if NiCd batteries are included.

Chicken Stick - A hand-held stick used to flip start a model airplane engine.

Clunk - A weighted fuel pick-up used in a fuel tank to assure the intake line is always in fuel.

Dead Stick - A term used to describe unpowered flight (glide) when the engine quits running.

Differential Throw - Ailerons that are set up to deflect more in the upward direction than downward are said to have Differential Throw. The purpose is to counteract Adverse Yaw.

Dihedral - The V-shaped bend in the wing. Typically, more dihedral causes more aerodynamic stability in an airplane, and causes the rudder to control both the roll and yaw axis. This is why some trainers and sailplanes require only 3 channels of radio control—i.e., having no ailerons.

Ding - Minor dent or damage to the structure. Also, a nick in a prop. Dinged props must be replaced.

Down Thrust - Downward angle of the engine relative to the centerline of the airplane. Down thrust helps overcome the normal climbing tendency of flat bottom wings.

Electric Starter - A hand-held electric motor used for starting a model airplane engine. Usually powered by a 12-volt battery.

Elevator - Hinged control surface located at the trailing edge of the horizontal stabilizer, which provides control of the airplane about the pitch axis and causes the airplane to climb or dive. The correct direction of control is to pull the transmitter elevator control stick back, toward the bottom of the transmitter, to move the elevator upward, which causes the airplane to climb, and vice versa to dive.
Epoxy - A two-part resin/hardener glue that is extremely strong. It is generally available in 6 and 30-minute formulas. Used for critical points in the aircraft where high strength is necessary.

Expanded Scale Voltmeter (ESV) - Device used to read the battery voltage of the on-board battery pack or transmitter battery pack.

Field charger - A fast battery charger designed to work from a 12-volt power source, such as a car battery.

Flaps - Hinged control surface located at the trailing edge of the wing inboard of the ailerons. The flaps are lowered to produce more aerodynamic lift from the wing, allowing a slower takeoff and landing speed. Flaps are often found on scale models, but usually not on basic trainers.

Flare - The point during the landing approach in which the pilot gives an increased amount of up elevator to smooth the touchdown of the airplane.

Flight Box - A special box used to hold and transport all equipment used at the flying field.

Flight Pack (or Airborne pack) - All of the radio equipment installed in the airplane, i.e., Receiver, Servos, Battery, Switch harness.

Flutter - A phenomenon whereby the elevator or aileron control surface begins to oscillate violently in flight. This can sometimes cause the surface to break away from the aircraft and cause a crash. There are many reasons for this, but the most common are excessive hinge gap or excessive "slop" in the pushrod connections and control horns. If you ever hear a low-pitched buzzing sound, reduce throttle and land immediately.

Frequency Control - The FCC has allowed the 72MHz band to be used for R/C aircraft operations. This band is divided up into many different channels in which you can choose a radio system. You should be aware that certain areas have frequencies in which there is pager interference. This is why it is always a wise move to check with your local hobby shop to find out any channels that may be troublesome in the area you wish to fly.

Fuel Overflow Line (Vent) - The fuel line is either open to atmospheric pressure or attaches to the muffler pressure nipple to pressurize the fuel tank for better fuel flow to the engine. This is the line through which the fuel will overflow when the tank is full.

Fuel Pick Up-Line - The fuel line in the fuel tank through which fuel travels to the carburetor. Typically a flexible tube with a weight or "Clunk" on the end which allows it to follow the fuel with changes in aircraft attitude. This is the line through which the tank is filled.

Fuselage - The body of an airplane.

Glitch - Momentary radio problem that never happens unless you are over trees or a swamp.

Glow Plug - The heat source for igniting the fuel/air mixture in the engine. When starting the engine a battery is used to heat the filament. After the engine is running, the battery can be removed. The wire filament inside the plug is kept hot by the "explosions" in the engine's cylinder. *See next heading and "idle bar plug."*

Glow Plug Clip/Battery - A 1.2-volt battery, which is connected to the glow plug on a model airplane engine for starting. The battery is removed once the engine is running steadily.

Grease-In - A very smooth, gentle landing without a hint of a bounce.

Hit (or to be hit) - Sudden radio interference which causes your model to fly in an erratic manner. Most often caused by someone turning on a radio that is on your frequency, but can be caused by other radio sources miles away.

Horizontal Stabilizer - The horizontal tail surface at the back of the fuselage which provides aerodynamic pitch stability to the airplane.

Idle Bar Plug - This type of glow plug has a "bar" across the tip to help prevent raw fuel from being splashed onto the glow element. Too much raw fuel will cool the plug and prevent it from igniting the fuel/air mixture. An idle bar is helpful in maintaining a low idle speed.

Lateral Balance - The left-right or side-to-side balance of an airplane. An airplane that is laterally balanced will track better through loops and other maneuvers.

Leading Edge (LE) - The very front edge of the wing or stabilizer. This is the edge that hits the air first.

Muffler - A device attached to the exhaust stack of the engine to reduce noise and increase back pressure which helps low speed performance. **Note:** Most R/C Clubs require the use of mufflers.

Muffler Baffle - A restrictor plate inside the muffler which reduces engine noise. This plate can be removed to increase power, but only if there are no noise restrictions where you fly.

Needle Valve - Adjustment on a carburetor used to set proper fuel/air mixture. Some carburetors have separate needle adjustments for low and high throttle. Typically, turning the needle clockwise (screwing in) leans the mixture (less fuel), and vice versa. However, there are a few exceptions—refer to the engine manufacturer's instructions.

NiCd (Nickel Cadmium battery) - Rechargeable batteries which are typically used as power for radio transmitters and receivers.

Nitro (Nitromethane) - A fuel additive which increases a model engine's ability to idle low and improves high speed performance. Ideal nitro content varies from engine to engine. Refer to the engine manufacturer's instructions for best results. Nitro content in fuel is indicated by the percent of the fuel.

Ni-Starter - A self-contained battery and glow plug clip, used when starting the engine. *See glow plug clip.*

One-Point Landing (or a figure 9) - Synonymous with "stuffing it in." Something we hope you never do.

Pitch Axis - The airplane axis controlled by the elevator. Pitch is illustrated by holding the airplane at each wingtip. Raising or lowering the nose is the pitch movement. This is how the climb or dive is controlled.

Power Panel - 12-volt distribution panel that provides correct voltage for accessories like glow-plug clips, fuel pumps and electric starters. Usually mounted on a field box and connected to a 12-volt battery.

Prop Pitch - Props are designated by two numbers, for instance 10 - 6. The first number is the prop's length, 10". The second number is the

pitch or angle of the blades. The 6 represents the distance the propeller will move forward in one revolution, in this case 6".

Re-Kitting Your Airplane - Changing your finished model back into a kit, as a result of "stuffing it in."

Receiver (Rx) - The radio unit in the airplane which receives the transmitter signal and relays the control to the servos. This is somewhat similar to the radio you may have in your family automobile, except the radio in the airplane perceives commands from the transmitter, while the radio in your car perceives music from the radio station.

Roll Axis - The airplane axis controlled by the ailerons. Roll is illustrated by holding the airplane by the nose and tail. Dropping either wingtip is the roll movement. This is used to bank or turn the airplane. Many aircraft are not equipped with ailerons and the Roll and Yaw motions are controlled by the rudder. This is one reason why most trainer aircraft have a larger amount of dihedral.

Rudder - Hinged control surface located at the trailing edge of the vertical stabilizer, which provides control of the airplane about the Yaw axis and causes the airplane to Yaw left or right. Left rudder movement causes the airplane to Yaw left, and right rudder movement causes it to Yaw right.

Servo - The electro-mechanical device which moves the control surfaces or throttle of the airplane according to commands from the receiver. The radio device which does the physical work inside the airplane.

Servo Output Horn - The removable arm or wheel which bolts to the output shaft of a servo and connects to the pushrod.

Shot Down - A "hit" that results in a crash landing. Sometimes caused by radios miles away.

Slop - Unwanted, excessive free movement in a control system. Often caused by a hole in a servo arm or control horn that is too big for the pushrod wire or clevis pin. This condition allows the control surface to move without transmitter stick movement.
Also, *see flutter.*

Solo - Your first totally unassisted flight that results in a controlled landing.

Spinner - The nose cone which covers the hub of the propeller.

Sport Airplane - A model which possesses some attributes of many of the specialty airplanes and are best for general flying as they are the most versatile and durable.

Stall - What happens when the angle of attack is too great to generate lift regardless of airspeed. (Every airfoil has an angle of attack at which it generates maximum lift — the airfoil will stall beyond this angle).

Tachometer - An optical sensor designed specifically to count light impulses through a turning propeller and read out the engine RPM.

Tip Stall - The outboard end of one wing (the tip) stops developing lift, causing the plane to roll suddenly in the direction of the stalled wing. This situation is not fun when you are only a few feet off the runway trying to land.

Trainer Airplane - A model designed to be inherently stable and fly at low speeds, to give first-time modelers time to think and react as they learn to fly.

Trailing Edge (TE) -The rearmost edge of the wing or stabilizer.

Transmitter (Tx) - The hand-held radio controller. This is the unit that sends out the commands that you input.

Touch-And-Go - Landing and taking off without a pause. Often confused with a good bounce.

Vertical Fin - The non-moving surface that is perpendicular to the horizontal stabilizer and provides yaw stability. This is the surface to which the rudder attaches.

Washout - An intentional twist in the wing, causing the wing tips to have a lower angle of attack than the wing root. In other words, the trailing edge is higher than the leading edge at the wing tips. Washout helps prevent tip stalls.

Wheel Collar - A small, round retaining device used to keep wheels from sliding off an axle.

Wing - The main lifting surface of an airplane.

Wing Loading - This is the amount of weight per square foot that has to be overcome to provide lift. It is normally expressed in ounces per square foot. This specification can be easily calculated as follows: If you know the square inches of the wing, simply divide by 144 to obtain square feet. Divide the total weight (in ounces) of the airplane by the wing area (in square feet). This information is valuable when deciding on which airplane to build next. Planes with high wing loading numbers must fly faster to stay in the air. These are generally "performance" airplanes. Conversely, planes with lower numbers do not need as much air flowing around the wing to keep it flying. Gliders and trainer airplanes fall into this category because slow, efficient flight is desirable.

Wing Root - The centerline of the wing, where the left and right wing panels are joined.

Yaw Axis - The airplane axis controlled by the rudder. Yaw is illustrated by hanging the airplane level by a wire located at the center of gravity. Left or right movement of the nose is the Yaw movement.

Z-Bend - A simple Z-shaped bend in the wire end of a pushrod, which is used to attach the pushrod to a servo output arm.

Z-Bend Pliers - An inexpensive plier type tool used for easily making perfect Z-bends.

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