TF TOP FLITE®

GOLD ARF EDITION™

Cessna®182 SKYLANE®
Cessna

Wingspan: 81 in [2060mm]
Wing Area: 898 sq in [57.9 dm²]
Weight: 11.5 – 12.5 lb [5220 – 5670g]

Wing Loading: 30 – 32 oz/ft² [92 – 98g/dm²]
Length: 64 in [1630mm]
Radio: 5+ channel with 6 – 7 servos

Engine: .60 – .91 cu in [10 – 15cc] two-stroke,
.91 – 1.20 cu in [15 – 20cc] four-stroke,
Motor: RimFire™ 1.20 (50-65-450kV) Out-Runner Motor

READ THROUGH THIS MANUAL BEFORE STARTING CONSTRUCTION. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.

Top Flite Models Champaign, IL   Telephone (217) 398-8970, Ext. 5   **airsupport@top-flite.com**

TABLE OF CONTENTS

INTRODUCTION

Congratulations on your purchase of the Top Flite Cessna 182 ARF! The Cessna 182 ARF is built using virtually the same airframe as the very successful Top Flite Cessna kit. With the time consuming tasks of building, covering, and painting already done for you, you can be flying your scale Cessna after as little as 15 to 20 hours of assembly! A pre-painted ABS cockpit kit is included for added realism. The corrugated control surfaces, functional pre-installed flying lights, and generous use of fiberglass are details you typically won't find in other scale ARF planes. Although the Cessna 182 ARF already includes an impressive list of these "extras" right out of the box, the sky is the limit for the amount of additional scale detail you can create while assembling the Cessna to be truly admired at the flying field or in competition.

Because of its 81" wingspan, the Top Flite Cessna 182 ARF is eligible to be entered at IMAA events. In order to be IMAA-legal, some of the control components and hardware may need to be replaced to conform to Giant Scale rules even though this model does not require heavy duty hookups.

For the latest technical updates or manual corrections to the Cessna 182 ARF visit the Top Flite web site at **www.top-flite.com**. Open the "Airplanes" link, then select the Cessna 182 ARF. If there is new technical information or changes to this model, a "tech notice" box will appear in the upper left corner of the page.

AMA

If you are not already a member of the AMA, please join! The AMA is the governing body of model aviation and membership provides liability insurance coverage, protects modelers' rights and interests and is required to fly at most R/C sites.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Tele. (800) 435-9262
Fax (765) 741-0057
Or via the Internet at:
http://www.modelaircraft.org

IMPORTANT!!! Two of the most important things you can do to preserve the radio controlled aircraft hobby are to avoid flying near full-scale aircraft and avoid flying near or over groups of people.

PROTECT YOUR MODEL, YOURSELF & OTHERS.....FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS

1. Your Cessna 182 ARF should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, the Cessna, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.

2. You must assemble the model **according to the instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. In a few cases the instructions may differ slightly from the photos. In those instances the written instructions should be considered as correct.

3. You must take time to **build straight, true** and **strong**.

4. You must use an R/C radio system that is in good condition, a correctly sized engine, and other components as specified in this instruction manual. All components must be correctly installed so that the model operates correctly on the ground and in the air. You must check the operation of the model and all components before **every** flight.

5. If you are not an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.

6. While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying, such as racing, or if an engine larger than one in the recommended range is used, the modeler is responsible for taking steps to reinforce the high stress points and/or substituting hardware more suitable for the increased stress.

7. **WARNING:** The cowl, wheel pants, wing struts, tail cone, wing tips and landing gear legs included in this kit are made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow into a part (wheel pant, cowl) to remove fiberglass dust, as the dust will blow back into your eyes. Always wear safety goggles, a particle mask and rubber gloves when grinding, drilling and sanding fiberglass parts. Vacuum the parts and the work area thoroughly after working with fiberglass parts.

We, as the kit manufacturer, provide you with a top quality, thoroughly tested kit and instructions, but ultimately the quality and flyability of your finished model depends on how you build it; therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

Remember: Take your time and follow the instructions to end up with a well-built model that is straight and true.

DECISIONS YOU MUST MAKE

This is a partial list of items required to finish the Cessna 182 ARF that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

BUILDING STAND
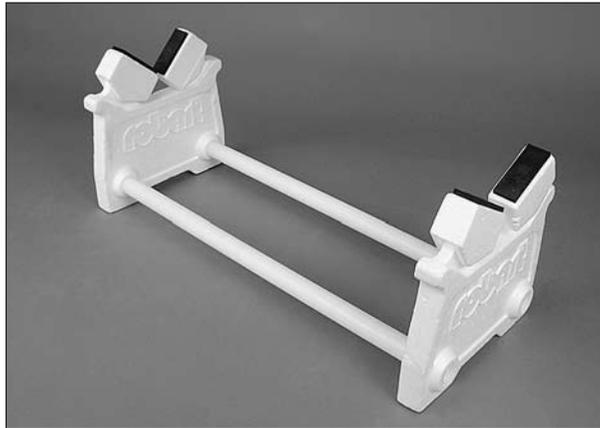
A building stand or cradle comes in very handy during the build. We use the Robart Super Stand II (ROBP1402) for most of our projects in R&D, and it can be seen in pictures throughout this manual.

RADIO EQUIPMENT

A 6-channel radio system such as a Futaba® 6EXAS with a standard receiver and six standard size servos with a minimum torque of 44 oz-in [3.2 kg-cm] are required for the control surfaces of the Cessna 182 ARF.

One standard torque servo such as an S3003 is required for the throttle. Two 24" [610mm] servo extensions (aileron servos), six 12" [305mm] servo extensions (ailerons, flaps and wing tip lights) and two Y-harnesses (aileron and flap servos) are also required. A receiver

battery pack with a minimum capacity of 1000mAh is recommended. A 600mAh receiver pack for the flying lights is also required. Order numbers are provided:

- Futaba S9001 Servo Aircraft Coreless BB (FUTM0075)
- Futaba S3003 Servo Standard (FUTM0031)
- Hobbico® Extension 24" Futaba J (HCAM2200)
- Hobbico Extension 12" Futaba J (HCAM2100)
- Futaba 6" Dual Servo Extension J (FUTM4130)
- Futaba NR4RB Receiver NiCd 4.8V 1000mAh J (FUTM1380)
- Futaba NR4J Receiver NiCd Flat 4.8V 600mAh J (FUTM1280)

ENGINE RECOMMENDATIONS

A .60 to .91 cu in [10 to 15cc] two-stroke or .90 to 1.20 [15 to 20cc] four-stroke engine is required. An O.S.® .61 FX two-stroke engine installation is shown in this manual and is plenty of power for scale flight and mild aerobatic maneuvers. Throttle management should be practiced if installing a larger engine. If a two-stroke engine is installed, a Pitts-style muffler is also required.

- O.S. .61 FX Non-Ringed w/Muffler (OSMG0561)
- Bisson O.S. .61 SF/FX Pitts Muffler (BISG4061)

The Cessna 182 ARF also includes provisions for installing a brushless out-runner motor and lithium-polymer batteries. Installation instructions are detailed in this manual for a brushless power system. The following components are recommended for the best performance:

- Great Planes® RimFire™ 1.20 (50-65-450) Out-runner Brushless (GPMG4770)
- Great Planes Brushless Motor Mount Large Motors (GPMG1260)
- Great Planes Silver Series 60A Brushless ESC High Volt (GPMM1850)
- Great Planes ElectriFly™ LiPo 11.1V 3200mAh 20C Power (GPMP0623)
- Great Planes ElectriFly LiPo 7.4V 3200mAh 20C Power (GPMP0622)

(Note: Both of the above referenced batteries are required and should be connected in series. One 18.5V pack will NOT work because it will not fit into the battery compartment.)

- Great Planes Series Deans® U 2 to 1 adapter (GPMM3143)
- Great Planes Velcro® Hook & Loop 1 x 6" (2) (GPMQ4480)
- Great Planes ElectriFly Equinox™ LiPo Cell Balancer 2–5 cell (GPMM3160)

A charger compatible with LiPo batteries such as:

- Great Planes PolyCharge4™ DC 4 Output LiPo Charger (GPMM3015)

(Note: Since the Great Planes PolyCharge4 charger is capable of charging four LiPo battery packs simultaneously, it is recommended to purchase an Equinox cell balancer for each battery pack in order to minimize charge times between flights.)

- APC 16 x 8 Thin Electric Propeller (APCQ4015)

SCALE COMPETITION

Though the Top Flite Cessna 182 ARF may not have the same level of detail as an "all-out" scratch-built competition model, it is a scale model nonetheless and is therefore eligible to compete in the Fun Scale class in AMA competition (we receive many favorable reports of Top Flite models in scale competition!). To receive the five points for scale documentation, the only proof required that a full size aircraft of this type in your paint/markings scheme did exist is a single sheet such as a kit box cover from a plastic model, a photo, or a profile painting, etc. If the photo is in black and white other written documentation of color must be provided. Contact the AMA for a rule book with full details.

If you would like photos of the full-size Cessna 182 for scale documentation, or if you would like to study the photos to add more scale details, photo packs are available from:

Bob's Aircraft Documentation
3114 Yukon Ave
Costa Mesa, CA 92626
Telephone: (714) 979-8058
Fax: (714) 979-7279
E-mail: www.bobsairdoc.com

ADDITIONAL ITEMS REQUIRED

HARDWARE & ACCESSORIES

In addition to the items listed in the *"Decisions You Must Make"* section, following is the list of hardware and accessories required to finish the Cessna 182 ARF. Order numbers are provided in parentheses.

- ❏ R/C foam rubber (1/4" [6mm] - HCAQ1000, or 1/2" [13mm] - HCAQ1050)
- ❏ 3' [900mm] Standard silicone fuel tubing (GPMQ4131)

ADHESIVES & BUILDING SUPPLIES

In addition to common household tools (screwdrivers, drill, etc.), this is the "short list" of the most important items required to build the Cessna 182 ARF. *We recommend **Great Planes Pro™** CA and Epoxy glue.*

- ❏ 1/2 oz. [15g] Thin Pro CA (GPMR6001)
- ❏ Pro 30-minute epoxy (GPMR6047)
- ❏ Drill bits: 1/16" [1.6mm], 5/64" [2mm], 3/32" [2.4mm], 3/16" [4.8mm]
- ❏ 8-32 Tap and drill set (GPMR8103) (glow engine installation only)
- ❏ Great Planes Pro Threadlocker (GPMR6060)
- ❏ #1 Hobby knife (HCAR0105)
- ❏ #11 Blades (5-pack, HCAR0211)
- ❏ Medium T-pins (100, HCAR5150)
- ❏ Masking tape (TOPR8018)
- ❏ Denatured alcohol (for epoxy clean up)
- ❏ Panel line pen (TOPQ2510)
- ❏ Hobbico pin vise 1/16" Collet w/6 bits (HCAR0696)
- ❏ J&Z R/C-56 glue 4 oz (JOZR5007)
- ❏ Hobbico 5-1/2" curved tip canopy scissors (HCAR0667)

- ❏ 220-grit Sandpaper
- ❏ Small clamps
- ❏ Petroleum jelly
- ❏ Oil

OPTIONAL SUPPLIES & TOOLS

Here is a list of optional tools that may help you build the Cessna 182 ARF.

- ❏ 21st Century® sealing iron (COVR2700)
- ❏ 21st Century iron cover (COVR2702)
- ❏ 21st Century trim seal iron (COVR2750)
- ❏ 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- ❏ 1/2 oz. [15g] Thick Pro CA- (GPMR6013)
- ❏ Pro 6-minute epoxy (GPMR6045)
- ❏ Small metal file
- ❏ Stick-on segmented lead weights (GPMQ4485)
- ❏ 2 oz. [57g] spray CA activator (GPMR6035)
- ❏ 4 oz. [113g] aerosol CA activator (GPMR6034)
- ❏ CA applicator tips (HCAR3780)
- ❏ CA debonder (GPMR6039)
- ❏ (6) Epoxy brushes (GPMR8060)
- ❏ Mixing sticks (GPMR8055)
- ❏ Mixing cups (GPMR8056)
- ❏ Pliers with wire cutter (HCAR0630)
- ❏ Compressed air 10 oz (TAEC1060)
- ❏ Switch & charge jack mounting set (GPMM1000)
- ❏ Ernst charge receptacle Futaba J (ERNM3001)
- ❏ Rotary tool such as Dremel®
- ❏ Rotary tool reinforced cut-off wheel (GPMR8200)
- ❏ Servo horn drill (HCAR0698)
- ❏ Hobby Heat™ micro torch (HCAR0755)
- ❏ Dead Center™ engine mount hole locator (GPMR8130)
- ❏ AccuThrow™ deflection gauge (GPMR2405)
- ❏ C.G. Machine™ (GPMR2400)
- ❏ Precision magnetic prop balancer (TOPQ5700)
- ❏ Hobbico flexible 18" ruler stainless steel (HCAR0460)
- ❏ Hobbico 8-piece ball tip hex "L" wrench (SAE, HCAR0520)
- ❏ Hobbico 7-piece ball tip hex "L" wrench (metric, HCAR0521)

❏ Great Planes precision prop reamer
   (standard, GPMQ5006)
❏ Great Planes precision prop reamer
   (metric, GPMQ5007)
❏ Great Planes clevis installation tool (GPMR8030)

IMPORTANT BUILDING NOTES

• There are two types of screws used in this kit:

Sheet Metal Screws are designated by a number and a length. For example #6 x 3/4" [19mm].
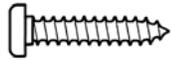
This is a number six screw that is 3/4" [19mm] long.

Machine Screws are designated by a number, **threads per inch,** and a length. For example 4-40 x 3/4" [19mm].
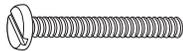
This is a number four screw that is 3/4" [19mm] long with forty threads per inch.

Socket Head Cap Screws (SHCS) are designated by a number, **threads per inch,** and a length. For example 4-40 x 3/4" [19mm].

This is a 4-40 SHCS that is 3/4" [19mm] long with forty threads per inch.

• When you see the term **test fit** in the instructions, it means that you should first position the part on the assembly **without using any glue,** then slightly modify or *custom fit* the part as necessary for the best fit.

• Whenever the term **glue** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will make a recommendation.

• Whenever just **epoxy** is specified you may use **either** 30-minute (or 45-minute) epoxy **or** 6-minute epoxy. When 30-minute epoxy is specified it is **highly** recommended that you use only 30-minute (or 45-minute) epoxy, because you will need the working time and/or the additional strength.

• **Photos** and **sketches** are placed **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

ORDERING REPLACEMENT PARTS

To order replacement parts for the Top Flite Cessna 182 ARF, use the order numbers in the **Replacement Parts List** that follows. Replacement parts are available only as listed. Not all parts are available separately (an aileron cannot be purchased separately, but is only available with the wing kit). Replacement parts are not available from Product Support but can be purchased from hobby shops or mail order/Internet order firms. Hardware items (screws, nuts, bolts) are also available from these outlets. If you need assistance locating a dealer to purchase parts, visit **www.top-flite.com** and click on "Where to Buy." If this kit is missing parts, contact **Product Support**.

REPLACEMENT PARTS LIST

Order Number Description   How to purchase
Missing Pieces.................. Contact Product Support
Instruction Manual .... Contact Product Support
Full-Size Plans..................................... Not Available

Contact your hobby supplier to purchase these items:

TOPA1755 Fuselage Set
TOPA1756 Wing Set
TOPA1757 Tail Set (Elevators and Stabilizers)

TOPA1758 Cowl
TOPA1759 Cockpit Kit
TOPA1760 Decal
TOPA1761 Window Set
TOPA1762 Aluminum Spinner
TOPA1763 Wing Struts
TOPA1764 Wing Tips
TOPA1765 Dummy Antennas
TOPA1766 Wheel Pants
TOPA1767 Landing Gear
TOPA1768 Lighting Kit

KIT INSPECTION

Before starting to build, compare the parts in this kit with the Replacement Parts List and note any missing parts. Also inspect all parts to make sure they are of acceptable quality. If any parts are missing, broken or defective, or if you have any questions about building or flying this airplane, please contact Top Flite at the address or telephone number below. If requesting replacement parts, please provide the full kit name (Cessna 182 ARF) and the part numbers as listed in the Replacement Parts List.

Top Flite Product Support:
3002 N. Apollo Drive, Suite 1
Champaign, IL 61822
Telephone: (217) 398-8970
Fax: (217) 398-7721
E-mail: productsupport@top-flite.com.

KIT CONTENTS

1. Right Wing Tip
2. Wheels (3)
3. Right Wheel Pant
4. Hook & Loop Material
5. Right Landing Gear
6. Right Wing Panel (with Flap & Aileron)
7. Right Wing Strut
8. Adjustable Engine Mount
9. Fuel Tank
10. Fuselage
11. Cowl
12. Spinner
13. Nose Gear Wire
14. Windshield
15. Nose Wheel Pant
16. Left Wing Panel (with Flap & Aileron)
17. Left Wing Strut
18. Horizontal Stabilizer
19. Right & Left Elevator Halves
20. Rudder
21. Tail Cone
22. Side Windows
23. CA Hinge Material
24. Rear Window
25. Left Landing Gear
26. Left Wheel Pant
27. Wing Joiners (6)
28. 3-Way Light Connector
29. Lights (2)
30. Lighting Switch
31. Wing Center Section
32. Servo Mounting Blocks (8)
33. Elevator & Rudder Servo Trays
34. Receiver Tray Parts
35. Left Wing Tip

PREPARATIONS

❏ 1. If you have not done so already, remove the major parts of the kit from the box and inspect for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed in the **"Kit Inspection"** section on page 5.
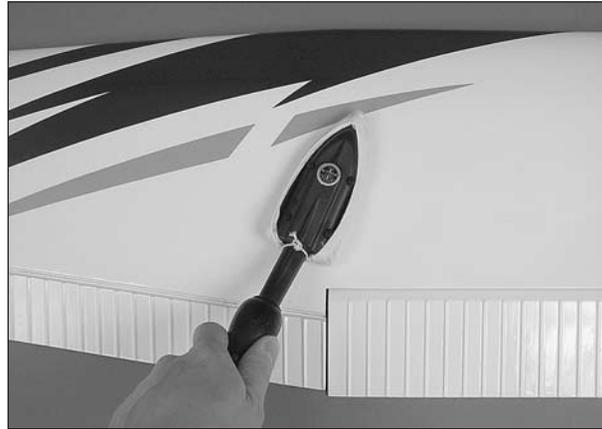
❏ 2. Remove the tape and carefully separate all the control surfaces. Use a covering iron with a covering sock on medium/high heat to tighten the covering if necessary. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

ASSEMBLE THE WING

HINGE THE AILERONS AND FLAPS

Do the right wing first so your work matches the photos the first time through. You can do one wing at a time, or work on them together. Also, we suggest reading the entire flap installation procedure before beginning this section so you will have an understanding of how they are hinged before gluing.
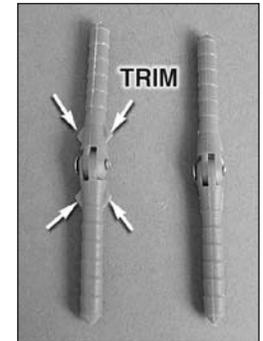
❏ ❏ 1. Trim the triangular tabs from both sides of three **hinge points** using a sharp hobby knife (protect your fingers by holding the hinges with pliers while trimming the tabs). Test fit (without glue) the hinge points into the pre-drilled pockets in the **flap** and **wing** so that the hinging direction of each hinge point is parallel with the leading edge of the flap. Press the hinge points into the pockets until the pin in each of the hinge points is positioned over the flap hinge line when the flap is in the **up** position as shown. Work the flap up and down, ensuring that the flap moves freely. When the flap is in the up position, it should sit **flush** against the trailing edge of the wing.
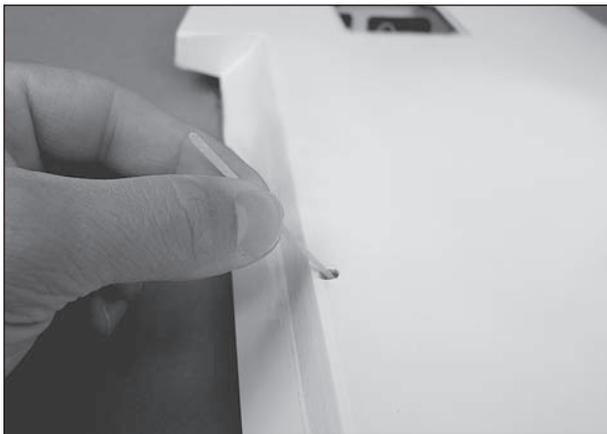
Before performing steps 2 and 3, have denatured alcohol and some paper towel pieces ready for epoxy cleanup.

❏ ❏ 2. Make note how deep the hinge points fit into the hinge pockets. Epoxy will be applied to the hinges only on the portion that fits into the pockets. Remove the flap from the wing panel and pull the hinge points from the pockets. Coat the center of each hinge point with petroleum jelly or oil. This will prevent epoxy from sticking to the pivoting portion of the hinges and will keep the hinges moving smoothly. Mix up a batch of 30-minute epoxy. Use a toothpick or something similar to coat the insides of the hinge point pockets in the flap and the wing panel. Wipe away any excess epoxy from around the pockets using a paper towel dampened with alcohol.
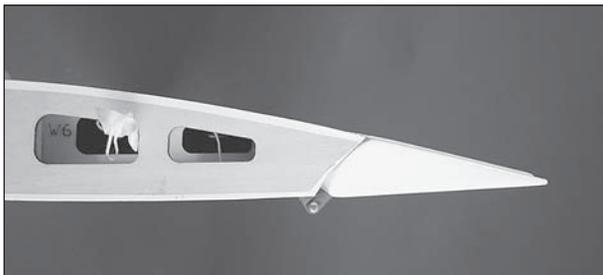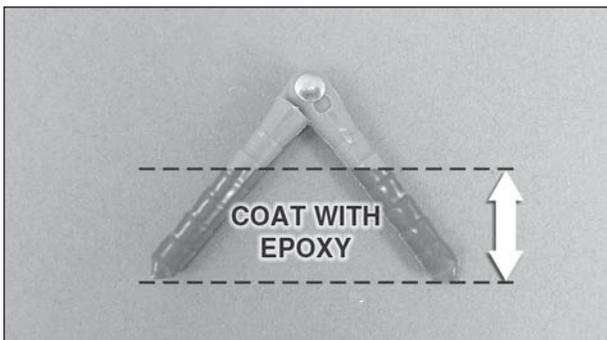
COAT WITH EPOXY

❏ ❏ 3. Coat the portion of each hinge point that fits into the hinge pockets with epoxy. Insert the hinges into the pockets in the flap and wing as was done in step 1. Use a paper towel dampened with denatured alcohol to clean up any epoxy. Work the flap up and down to ensure it moves freely. Look at the flap from the root rib and confirm that when the flap is all the way in the **up** position, the top of the flap follows the airfoil contour of the top of the wing. Also, confirm that the flap is flush with the TE of the wing. Make any small adjustments to the hinges as necessary. When satisfied, set the wing aside and let the epoxy cure undisturbed.
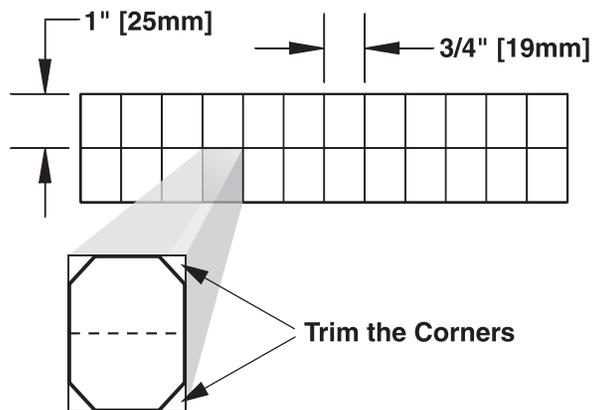
Trim the Corners

❏ ❏ 4. Cut the included 2" x 9" [51mm x 229mm] piece of CA hinge material into 3/4" x 1" [19mm x 25mm] individual hinges. Use a hobby knife or scissors to trim the corners from each hinge to make them easier to insert into the hinge slots.
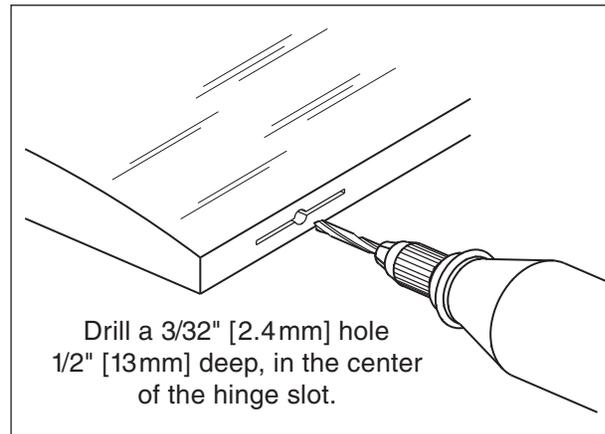
Drill a 3/32" [2.4mm] hole 1/2" [13mm] deep, in the center of the hinge slot.
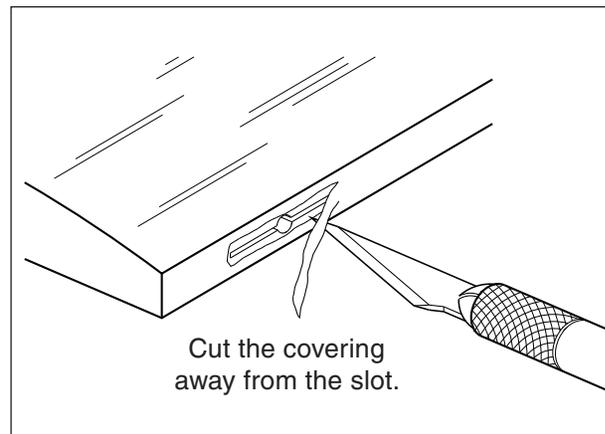
Cut the covering away from the slot.

❏ ❏ 5. Drill a 3/32" [2.4mm] hole 1/2" [13mm] deep in the center of each hinge slot in the wing panel and **aileron**. Use a sharp hobby knife to carefully cut away the covering just around each hinge slot in the wing.

Temporary pin to keep the hinge centered.
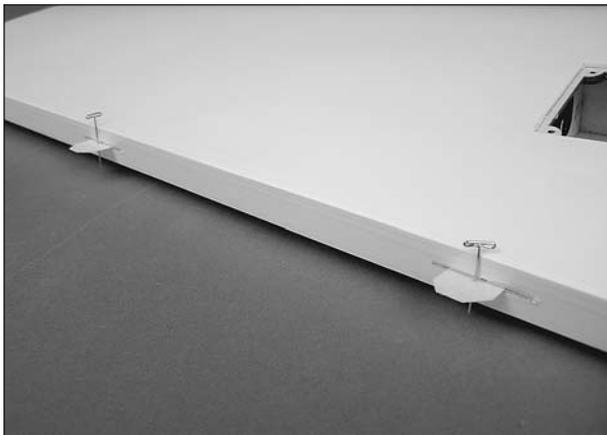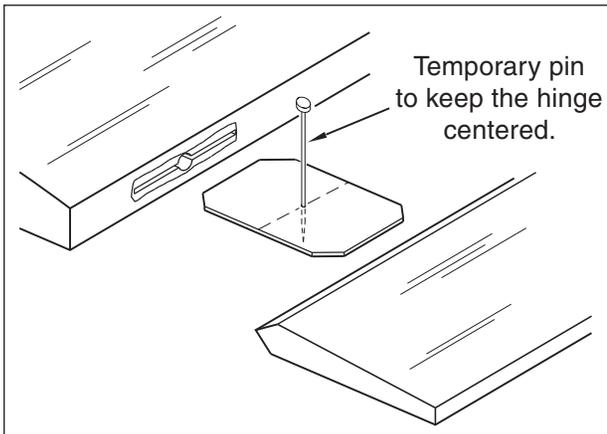
❏ ❏ 6. Fit a CA hinge into each hinge slot in the wing panel. If the hinges are difficult to install, use a hobby knife to slightly enlarge the slots. Push a pin (T-pins work well for this) through the middle of each hinge to keep them centered.

❏ ❏ 7. Fit the aileron to the hinges and align the root edge of the aileron with the root of the trailing edge for the aileron on the wing panel as shown. Remove the pins from the hinges and position the aileron against the trailing edge of the wing panel. The hinge gap between the aileron and wing should only be wide enough to allow a small line of light through. When satisfied, apply 6 drops of thin CA glue to the center of each hinge on both sides. When the CA has dried, gently pull on the aileron to confirm that it is securely glued in place.

❏ 8. Repeat steps 1-7 for the left wing panel.

INSTALL THE AILERON SERVO & LINKAGE

Before completing this section, confirm that the servos that you will be using will properly fit between the servo mounting block locations on the aileron and flap servo hatch covers. Make adjustments as necessary for your brand servos. The block locations shown in this section will fit a standard size Futaba brand servo.
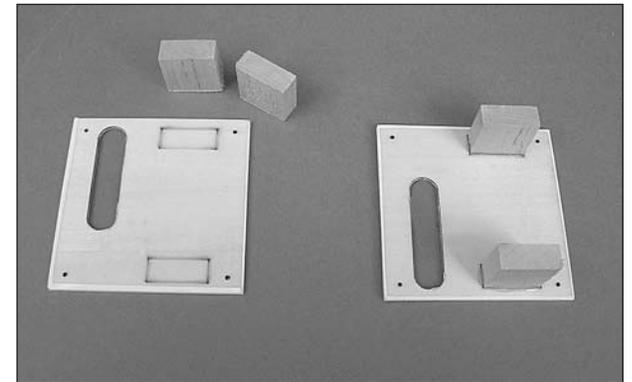
❏ ❏ 1. Use epoxy to glue the 3/4" x 3/4" x 5/16" [19 x 19 x 8mm] hardwood servo mounting blocks to the inside of the aileron hatch cover. Be sure that the blocks are aligned over the rectangles with the grain direction perpendicular to the covers as shown. Allow the epoxy to cure undisturbed.

Enlarge to 5/64" [2mm]

Cut off unused arms
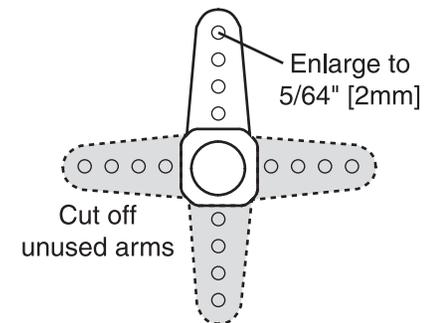
❏ ❏ 2. Cut three arms from a four-armed servo arm included with the aileron servo. Enlarge the outer hole of the remaining arm with a 5/64" [2mm] drill bit.

USE TAPE OR HEAT SHRINK TUBING
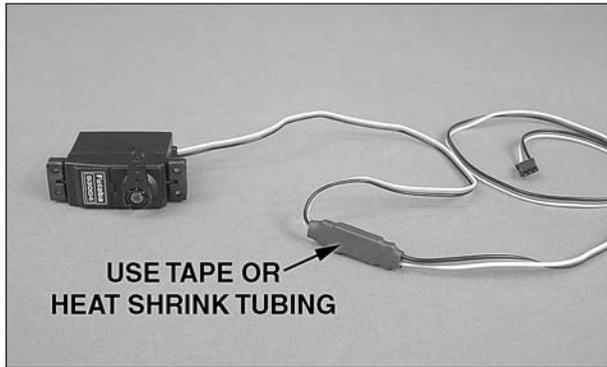
❏ ❏ 3. Attach a 24" [610mm] servo extension to each aileron servo and secure the connector using tape or heat shrink tubing. Center the servos with your radio system and install the servo arm to the servo perpendicular to the servo case as shown. Be sure to reinstall the servo arm screw into the servo.
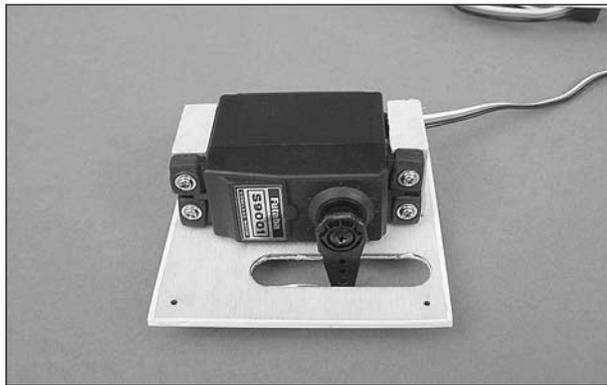
❏ ❏ 4. Position the servo against the underside of the aileron servo hatch cover between the mounting blocks. Shim the aileron servo away from the hatch cover approximately 3/64" [1.2mm] to isolate it from vibration (a business card folded in thirds works well for this). Drill 1/16" [1.6mm] holes through the mounting tabs on the servo case into the blocks. Thread a servo mounting screw (included with the servo) into each hole and back it out. Apply a drop of thin CA to each hole to harden the wood. When the CA has dried, install the servo onto the hatch cover using the hardware supplied with the servo.
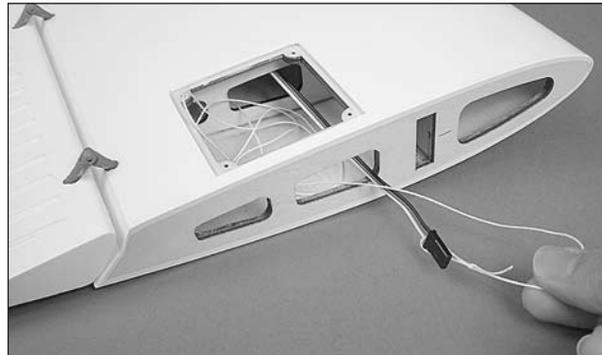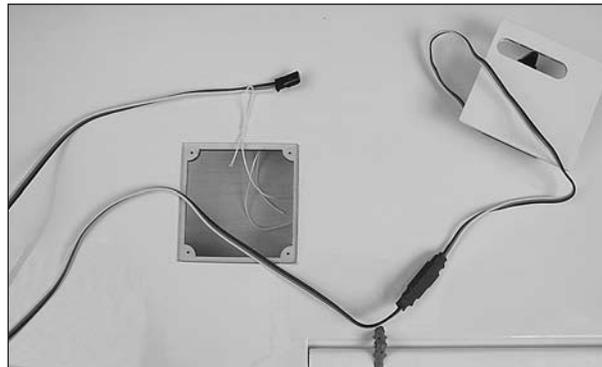
❏ ❏ 5. Use the strings taped inside the aileron servo hatches to pull the servo leads through the wing ribs.
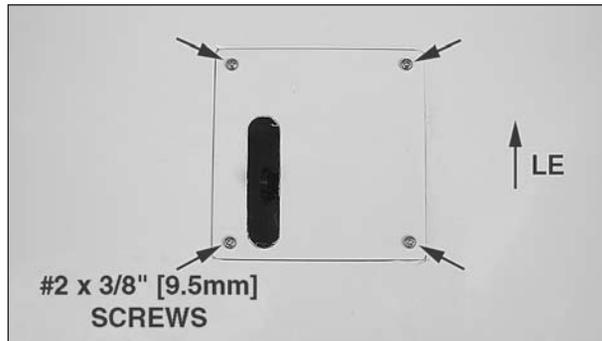
#2 x 3/8" [9.5mm] SCREWS

❏ ❏ 6. Thread a #2 x 3/8" [9.5mm] self-tapping screw into each hatch mounting hole in the wing and back it out. Apply a drop of thin CA to each hole to harden the wood. Install the aileron hatch cover to the wing as shown using four #2 x 3/8" [9.5mm] self-tapping screws.

6" [152mm] PUSHROD   SILICONE CLEVIS RETAINER   CLEVIS   CONTROL HORN
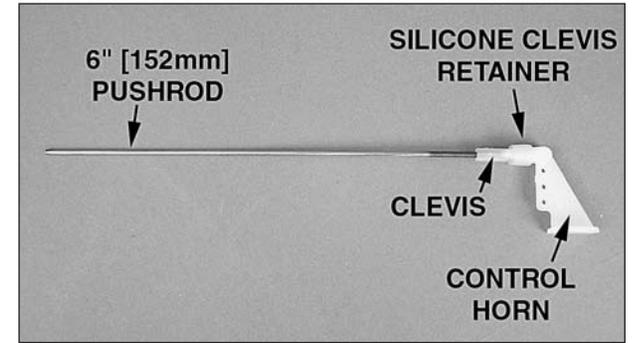
❏ ❏ 7. Thread a nylon clevis 15 complete turns onto a 6" [152mm] pushrod. Slide a silicone clevis retainer onto the clevis and connect the clevis to the outer hole of a nylon control horn.

HINGE LINE

CORRECT   INCORRECT
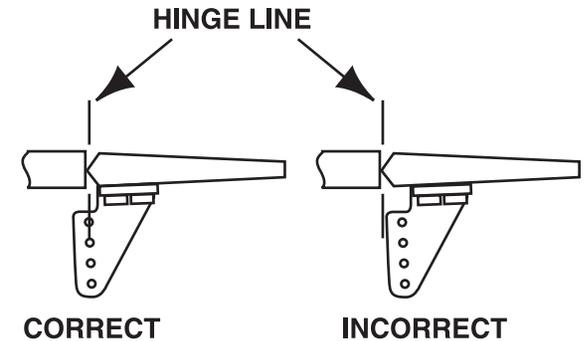
❏ ❏ 8. Position the control horn onto the aileron between the two corrugations that are inline with the aileron servo arm. Align the holes in the control

horn directly over the aileron hinge line and mark the location of the control horn mounting holes.
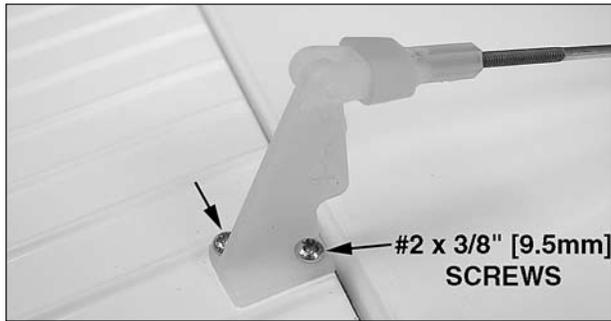
← #2 x 3/8" [9.5mm] SCREWS

❏ ❏ 9. Drill 1/16" [1.6mm] holes at the marks you made through the plywood plate inside the aileron. Do not drill all the way through the aileron! Thread a #2 x 3/8" [9.5mm] self-tapping screw through each hole and back it out. Apply a couple drops of thin CA glue to each hole to harden the wood. When the glue has dried, install the control horn onto the aileron using two #2 x 3/8" [9.5mm] self-tapping screws.

FASLINK

Servo Horn

2-56 (.074") Pushrod Wire   FasLink   1/16" [1.6mm]
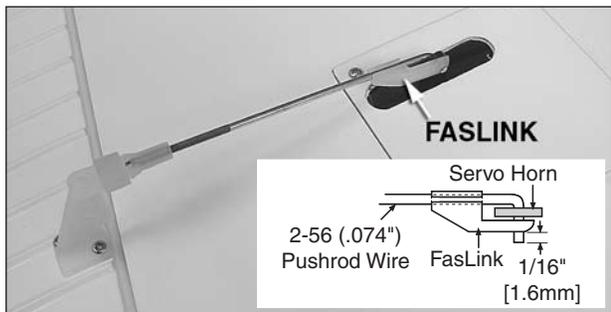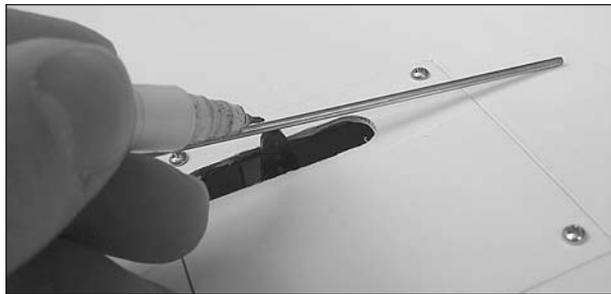
❏ ❏ 10. Use tape or a small clamp to hold the aileron in the neutral position. Make a mark on the

pushrod where it crosses the outer hole in the servo arm. Make a 90° bend at the mark on the pushrod and cut off the excess pushrod 3/16" [4.8mm] beyond the bend. Attach the pushrod to the servo arm using a nylon FasLink. Thread the clevis up or down on the pushrod as necessary to center the aileron with the servo arm centered. Slide the silicone clevis retainer to the end of the clevis to secure it.

❏ 11. Repeat steps 1 to 10 for the left wing panel.

INSTALL THE FLAP SERVO & LINKAGE

30°
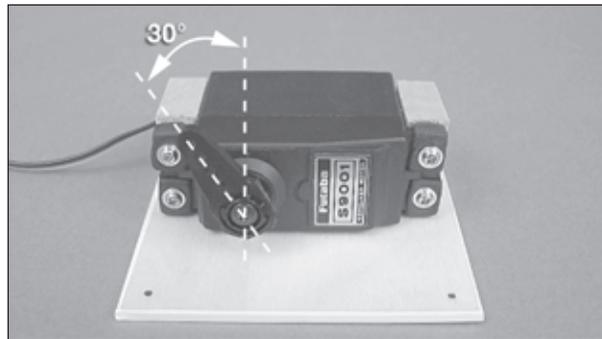
❏ ❏ 1. As you did with the aileron, glue the mounting blocks to the underside of the flap servo hatch cover. When the epoxy has cured, attach the flap servo to the hatch cover using the hardware included with the servo. Center the servo with your radio system and install a servo arm at a 30° angle as shown. The flap servo does not require a servo extension.

3/16" [4.8mm]

3-1/4" [83mm]
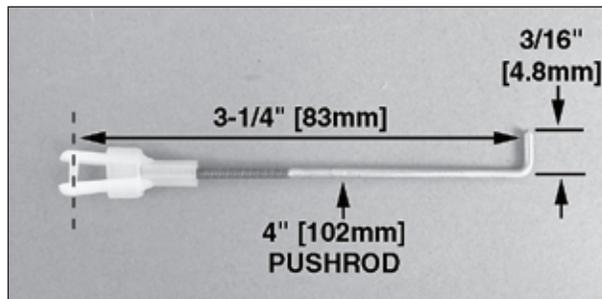
4" [102mm] PUSHROD

❏ ❏ 2. Prepare the flap linkage by threading a nylon clevis onto a 4" [102mm] pushrod 15 complete

turns. Install a silicone clevis retainer onto the clevis. Measure 3-1/4" [83mm] from the clevis pin and make a bend in the pushrod. Cut off the excess pushrod 3/16" [4.8mm] beyond the bend.

FLAP CONTROL HORN →

LE

❏ ❏ 3. Slide the pushrod through the access hole in the wing and connect the bent end of the pushrod to the outer hole in the flap control horn using a nylon FasLink. Connect the clevis to the outer hole in the flap servo arm. Put the flap servo hatch cover in place onto the wing. While holding the hatch cover down, use your radio system to test the operation of the flap. Make any adjustments necessary to the position of the clevis on the pushrod or the servo arm.

#2 x 3/8" [9.5mm]
SCREWS

FINISH THE WING

"V" SHAPE OF JOINER
POINTS TO BOTTOM
OF WING
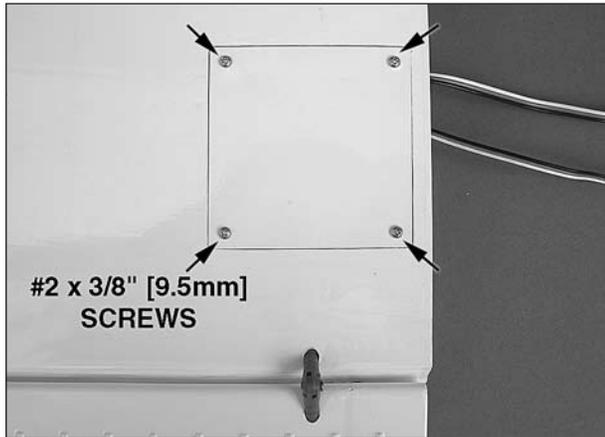
❑ ❑ 4. When satisfied with the operation of the flap, slide the silicone clevis retainer to the end of the clevis. Install the flap servo hatch cover onto the wing using four #2 x 3/8" [9.5mm] self-tapping screws. Be sure to reinforce the screw holes with thin CA glue.

❑ 5. Repeat steps 1 to 4 for the left wing panel. Make note that the flap servo arm will be mounted on the wing tip side of the left wing panel so that when the flap servos are joined together using a Y-harness, they will both move in the same direction (see diagram below).
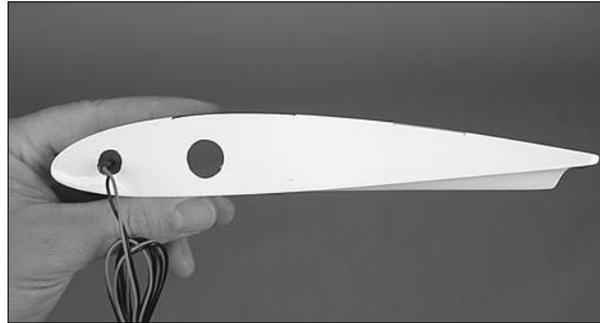
❑ 1. Sand the inside face of the **wing tips** with 220-grit sandpaper. Clean the surfaces with a cloth dampened with denatured alcohol. As you did with the ailerons, use the string to pull the wingtip light wires through the wing panels. Use epoxy to glue the wing tips to the wing, being sure that the curved tips point to the **underside** of the wing. Align the tops and bottoms of the wing tips flush with the wing and the LE of the tips with the LE of the wing. Use tape to hold the tips in position while the epoxy cures.

❑ 2. Locate the **wing joiner pieces** (two aluminum, four plywood). Roughen both sides of each aluminum joiner piece with 220-grit sandpaper or a rotary tool with a grinding bit. Clean the parts with alcohol. Glue three pieces together with the aluminum joiner piece sandwiched between the plywood pieces using 30-minute epoxy. Make sure that the sides are flush with each other. Glue the other three pieces together to make a second joiner. Wipe away any excess epoxy with denatured alcohol. Small clamps can be used to hold the pieces together while the epoxy cures.

NOTE FLAP SERVO ORIENTATION
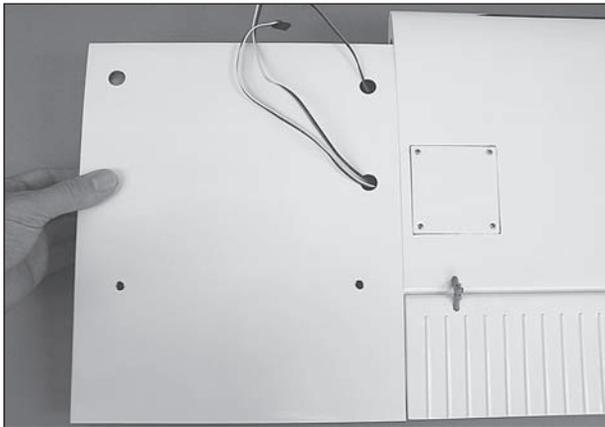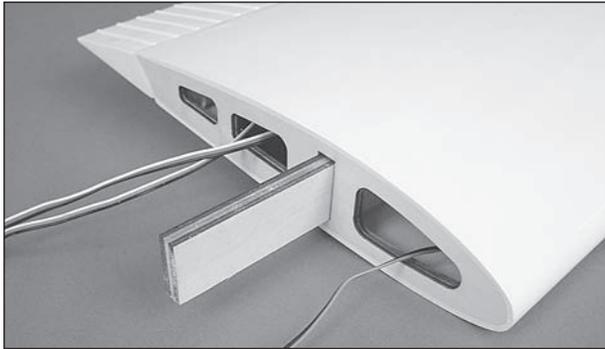
❏ 3. Test fit a joiner into the joiner pocket of one wing panel and the mating side of the **wing center section** with the "V" shaped side pointing to the bottom of the wing. The joiner should be able to fit halfway into each pocket and be slightly loose to allow room for epoxy. Sand the joiner as necessary for the proper fit. Repeat this procedure for the other wing panel. Dry fit the wing panels and center section together using the joiners. Route the servo leads and wingtip light leads through the large holes on the **bottom** of the center section. The root ribs of the panels and center section should sit flat against each other with no gaps. Lightly sand the face of the root ribs if necessary to eliminate any gaps between the wing panels and center section. Make note that the LE of the wing panels extend beyond the front of the wing center section and the TE of the center section extends aft of the root ribs of the wing panels. Use a fine-tip pen or a pencil to mark these edges so you will know where to apply epoxy in step 3.

Read through all of step 4 before proceeding. If you feel that you need extra working time, the wing panels can be joined to the center section one at a time.
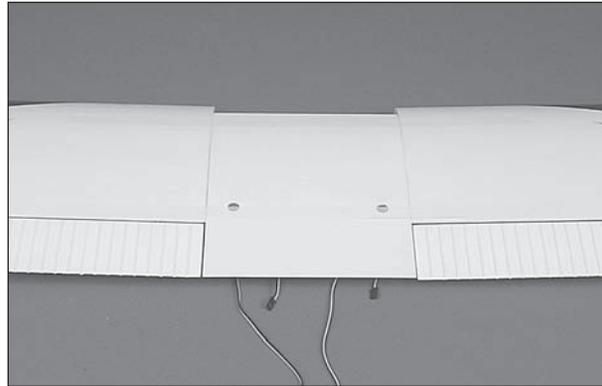
❏ 4. When satisfied with the fit of the wing panels and center section, mix up approximately 1 oz [30cc] of 30-minute epoxy and coat the inside of the wing joiner pockets in each wing panel and center section. Coat one half of each wing joiner and slide it into the wing panels. Coat the root ribs of both wing panels and center section as well as the exposed ends of the joiners. Join the wing panels to the center section and use paper towels dampened with denatured alcohol to wipe away any excess epoxy from the joint between the panels. Use masking tape to hold the wing assembly together tightly. Set the wing aside and let the epoxy cure undisturbed. For added working time, the wing panels can be glued to the center section one at a time.
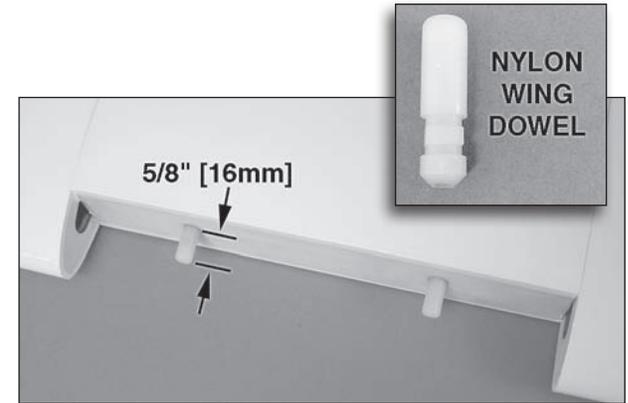
❏ 5. Locate the two nylon **wing dowels**. Use epoxy to glue the wing dowels into the holes in the LE of the wing center section. The smooth end of the dowels should protrude from the LE approximately 5/8" [16mm].

INSTALL THE TAIL, LANDING GEAR & SERVOS

INSTALL THE HORIZONTAL STABILIZER, ELEVATORS AND RUDDER

❏ 1. Temporarily attach the wing to the **fuselage** using two 1/4-20 nylon wing bolts. The nylon wing dowels fit into receiving holes in the former just behind the location of the windshield. Test fit the **horizontal stabilizer** into the saddle in the fuselage. The beveled TE on the stab should slope forward from the top of the stab to the bottom. If not, the stab is installed

upside-down (see the photo at step 2 for a close-up). Stand back 15 to 20ft [5 to 6m] and check to be sure the stab is parallel to the wing. If necessary, adjust the stab saddle as needed by lightly sanding it until the stab and wing are parallel.

ELEVATOR JOINER ROD ← CONTROL HORN

BEVEL OF TE ON STAB SLOPES FORWARD FROM TOP TO BOTTOM

A   A

A=A
B=B

B   B
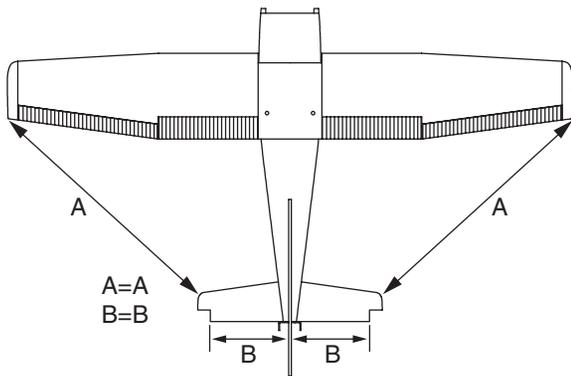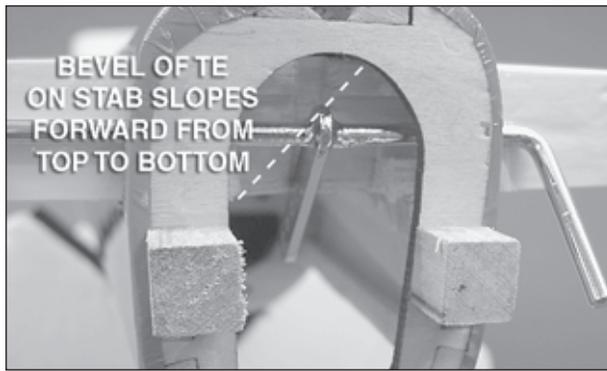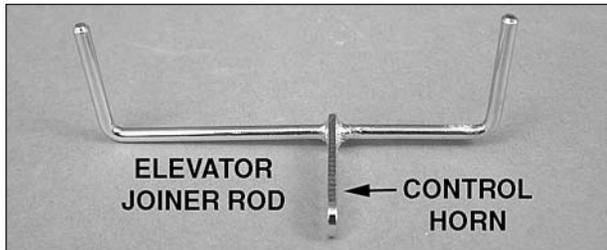
❏ 2. Remove the stab from the fuselage. Place the **elevator joiner rod** into the half-circle notches at the aft end of the stab saddle in the fuselage with the control horn pointing down. Mix up a batch of 30-minute epoxy and coat the top and bottom of the stab where it will contact the stab saddle in the

fuselage. Slide the stab into position in front of the elevator joiner rod. Center the stab left and right in the fuselage and measure the distance from the tip of each wing to the tips of the stab. Adjust the stab until the distance from the tip of the stab to the tip of the wing is equal on both sides. When satisfied, wipe away excess epoxy with denatured alcohol, confirm that you have not glued the elevator joiner wire to the stab, and let the epoxy cure undisturbed.
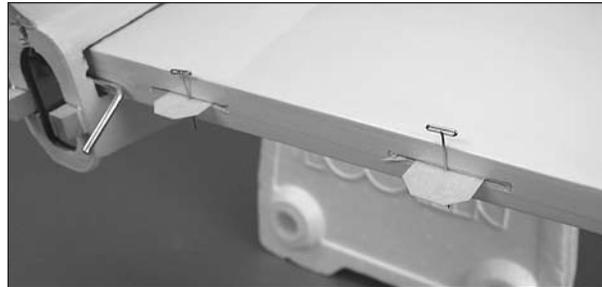
❏ 3. Fit a CA hinge into each hinge slot in the stab. If the hinges are difficult to install, use a hobby knife to slightly enlarge the slots. Roughen the ends of the

elevator joiner wire and clean them with alcohol. Test fit the elevators to the hinges in the stab and joiner wire. The joiner wire ends fit into the holes at the TE of both elevator halves. Look at the elevator halves from behind and confirm that they are parallel. If not, remove the elevators and gently bend the joiner wire as necessary. When satisfied, apply a light coating of epoxy to the ends of the joiner wire and join the elevators to the stab with the hinges. Be sure that the elevators are evenly spaced from the fuselage. Wipe away any excess epoxy from around the joiner wire. Remove the pins from the hinges and position the elevators against the TE of the stab. The hinge gap between the elevators and stab should only be wide enough to allow a small line of light through. When satisfied, apply 6 drops of thin CA glue to the center of each hinge on both sides. When the CA has dried, gently pull on the elevators to confirm that they are securely glued in place.

RUDDER STEERING ROD
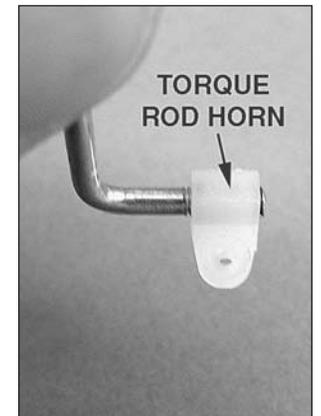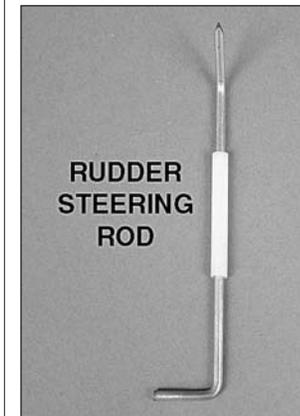
TORQUE ROD HORN

❏ 4. Roughen the plastic tube on the **rudder steering rod** with 220-grit sandpaper. Install a nylon torque rod horn onto the threaded end of the rudder steering rod.
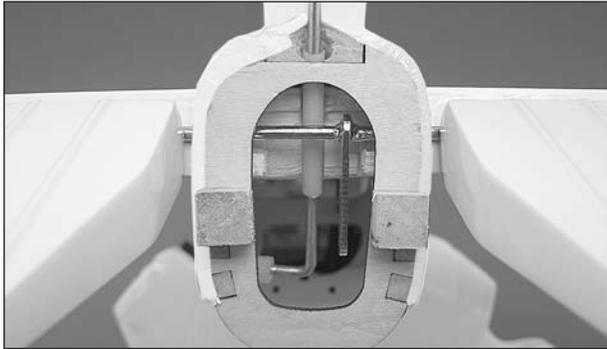
❏ 5. Insert the rudder steering rod up through the access hatch beneath the stab and in front of the elevator joiner wire. The rod should pass through the hole at the base of the vertical fin. Use epoxy or thick CA to glue the plastic tube on the rudder steering rod to the slot in the TE of the stab and vertical fin.
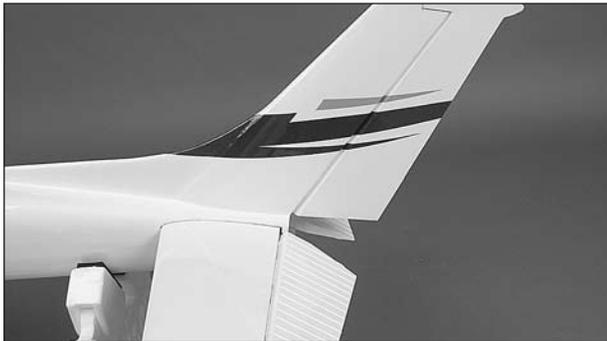
❏ 6. As you did with the elevators, install the rudder to the fin with CA hinges.

INSTALL THE LANDING GEAR

❏ 1. Cut the included 5/32" x 2" [4 x 51mm] bolt-on axles to 1-1/2" [38mm].

1-1/2" [38mm]
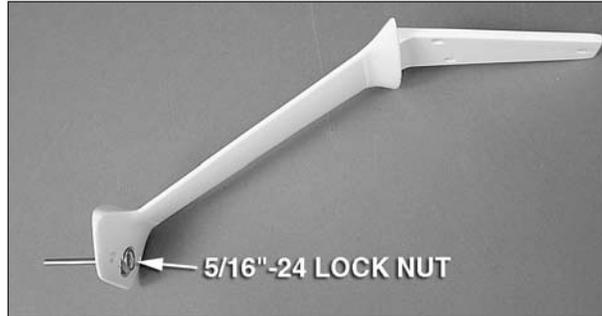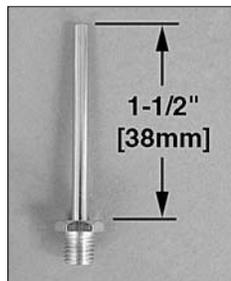
❏ 2. Install the axles onto the **main landing gear legs** using two 5/16"-24 nylon locknuts.

5/16"-24 LOCK NUT

5/32" [4mm] WHEEL COLLAR

FLAT SPOTS
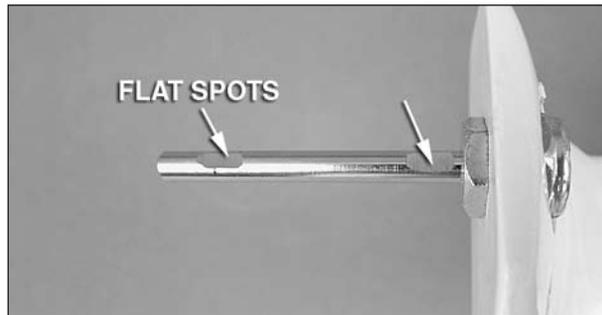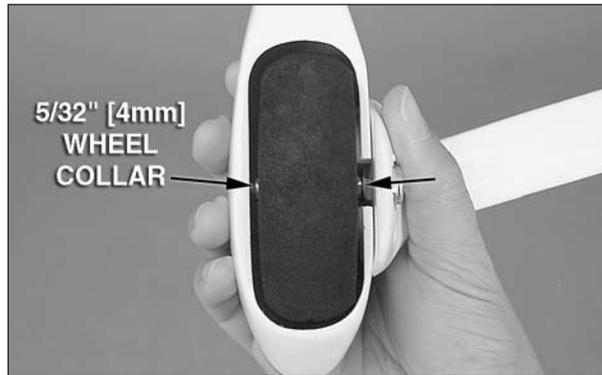
❏ 3. Slide a 5/32" [4mm] wheel collar onto each axle followed by a 3-1/4" [83mm] main wheel and another 5/32" [4mm] wheel collar. Hold a **wheel pant** against the base of each landing gear leg and center the wheels in the pants. Mark the location of the wheel collars onto the axles, remove the hardware, and file flat spots at the marks you made using a rotary tool or metal file.

4-40 x 3/8" [9.5mm] SCREWS
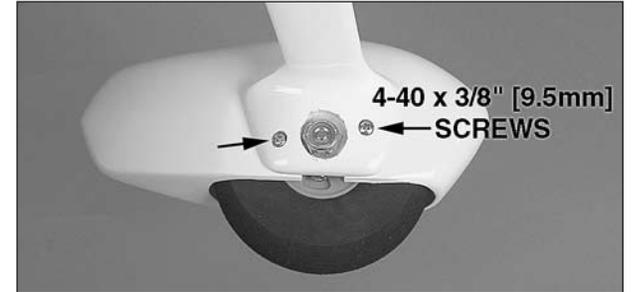
❏ 4. Loosely thread a 6-32 x 1/4" [6mm] SHCS into each wheel collar along with threadlocking compound. Reinstall the wheel collars and wheels onto the axles and tighten the SHCS against the flat spots. Confirm that the wheels spin freely on the axles. Oil the axles as necessary. Install the wheel pants onto the main landing gear legs using 4-40 x 3/8" [9.5mm] machine screws and threadlocking compound.

6-32 x 3/4" [9.5mm] SCREWS
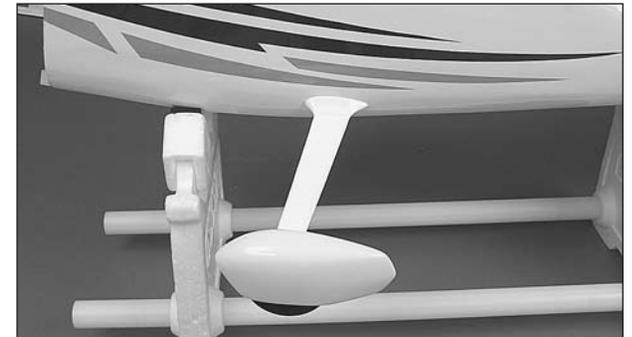
❏ 5. Insert the landing gear legs into the slots in the fuselage. Attach the gear to the fuselage using six 6-32 x 3/4" [19mm] SHCS, six #6 flat washers, six #6 lock washers, and threadlocking compound.

❏ 6. Insert the nose gear wire into the front wheel pant as shown. Slide a 5.5mm wheel collar onto the nose gear wire followed by the 2-3/4" [70mm] nose wheel, and another 5.5mm wheel collar. Center the wheel in the pant and mark the location of the wheel collars onto the nose gear axle. As you did with the main landing gear, file flat spots at the marks you made.

❏ 7. Loosely thread a 3 x 4mm machine screw with threadlocking compound into each 5.5mm wheel collar. Reinstall the wheel collars and nose wheel onto the nose gear wire along with the wheel pant. Tighten the screws in the wheel collars onto the flat spots you made on the axle. Confirm that the wheel spins freely on the axle. Add oil as necessary.
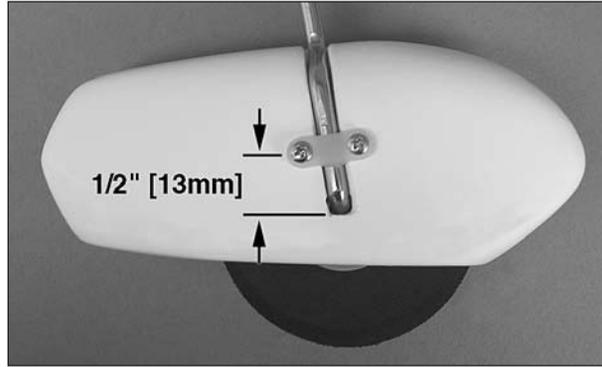
❏ 8. Center the nylon landing gear strap onto the nose gear wire 1/2" [13mm] above the axle. Mark the location for the mounting holes. Carefully drill 3/32" [2.4mm] holes at your marks. Thread a #4 x 3/8" [9.5mm] self-tapping screw into each hole and back it out. Apply a drop of thin CA to each hole to harden the wood. When the CA has hardened, attach the strap to the wheel pant using two #4 x 3/8" [9.5mm] self-tapping screws.
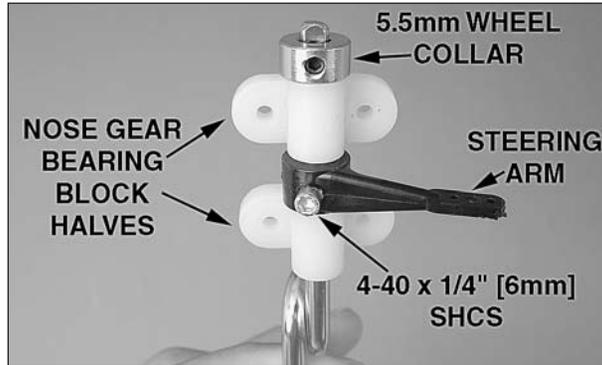
❏ 9. Cut the nylon nose gear bearing block into two pieces as shown and flip them over. Sand the top and bottoms of the pieces smooth. Loosely thread a 4-40 x 1/4" [6mm] SHCS with threadlocking compound into the nylon steering arm. Loosely thread a 3 x 4mm machine screw into the remaining 5.5mm wheel collar with threadlocking compound. Slide one of the bearing blocks onto the nose gear wire followed by the steering arm, the other bearing block, and then the wheel collar. Tighten the SHCS in the steering arm against the lower

flat spot on the nose gear wire and tighten the set screw in the wheel collar against the upper flat spot. Be careful when tightening the SHCS in the steering arm to prevent stripping the brass insert in the arm.
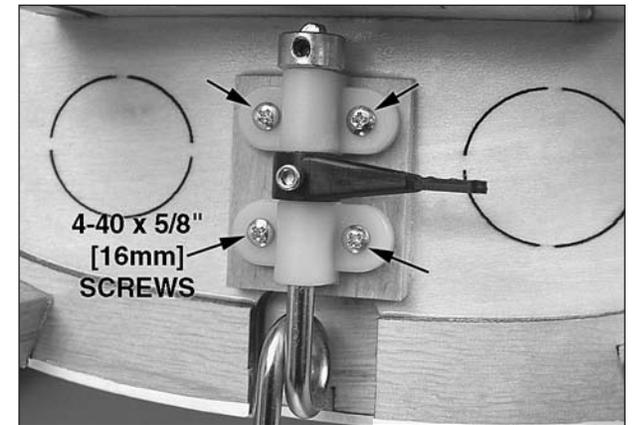
❏ 10. Mount the nose gear bearing block pieces to the firewall using four 4-40 x 5/8" [16mm] machine screws and threadlocking compound. If necessary, oil the nose gear wire to ensure that it rotates smoothly within the bearing block.

INSTALL THE TAIL SERVOS & PUSHRODS

❏ 1. Position the **elevator** and **rudder servo trays** onto the hardwood rails glued inside the fuselage as shown. Drill through the mounting holes in the trays into the

hardwood rails using a 1/16" [1.6mm] drill bit. Thread a #2 x 3/8" [9.5mm] self-tapping screw into each hole and back it out. Apply a drop of thin CA to each hole and let it harden. Install the trays into the fuselage using six #2 x 3/8" [9.5mm] self-tapping screws.
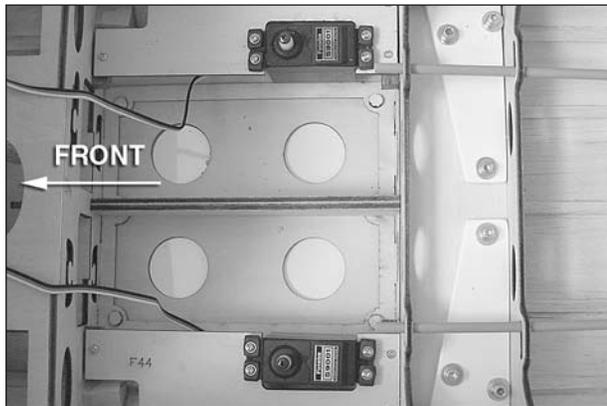
❑ 2. Install the elevator and rudder servos onto the trays with the servo splines toward the front of the plane. Use the hardware included with the servos to mount them to the trays. Be sure to reinforce the servo mounting holes with thin CA.
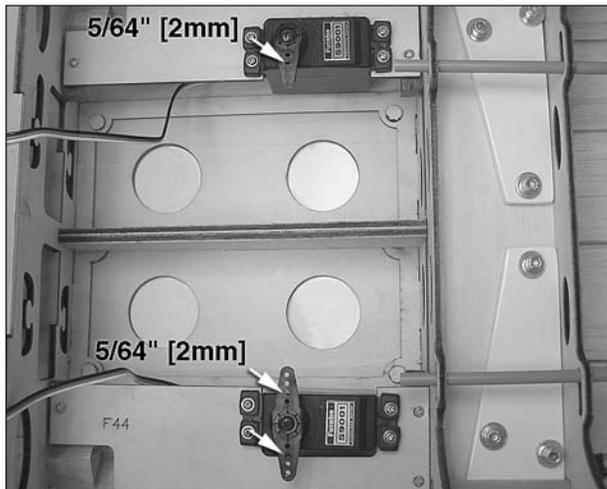
❑ 3. Center the elevator and rudder servos with your radio system. Cut three arms from a four-armed servo arm for your elevator servo. Enlarge the second inner

hole in the remaining arm with a 5/64" [2mm] drill bit. Install the servo arm perpendicular to the length of the fuselage pointing inward as shown. Cut two arms opposite each other from a four-armed servo arm for your rudder servo. Enlarge the second inner holes in both remaining arms with a 5/64" [2mm] drill bit. Install the servo arm perpendicular to the length of the fuselage.
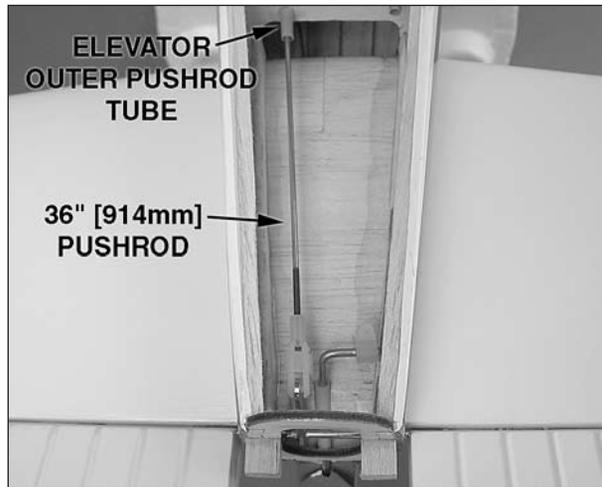
❑ 4. Thread a nylon clevis 15 complete turns onto a 36" [914mm] pushrod. Slide a silicone clevis retainer onto the clevis. Insert the pushrod through the aft end of the elevator outer pushrod tube and connect the clevis to the outer hole of the elevator control horn.
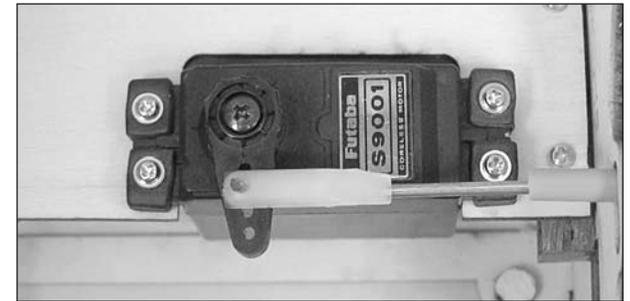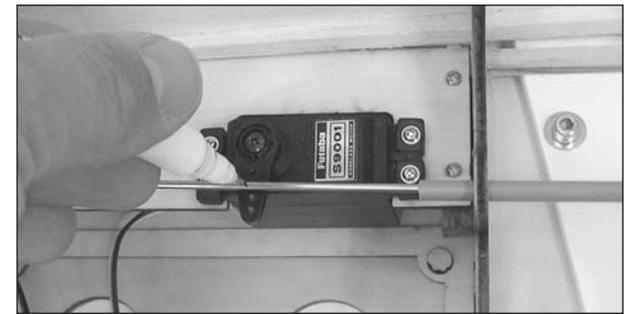
❑ 5. With the elevators in the neutral position, mark the pushrod where it crosses the second inner hole in the elevator servo arm. Make a 90° bend at the mark on the pushrod and cut off the excess pushrod 1/4" [6mm] beyond the bend. Attach the pushrod to the servo arm using a nylon FasLink. Thread the clevis up or down on the pushrod as necessary to center the elevators with the servo arm centered. Slide the silicone clevis retainer to the end of the clevis to secure it.

❑ 6. Install the rudder pushrod in the same manner.

NOTCH

#2 x 3/8" [9.5mm] SCREWS

PRE-CUT HOLE

OUTER PUSHROD TUBE

2" [51mm]

FASLINK
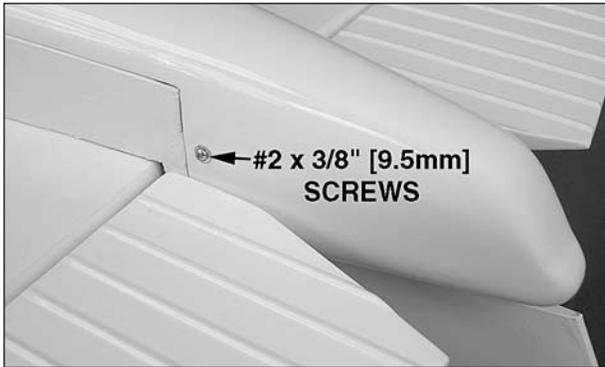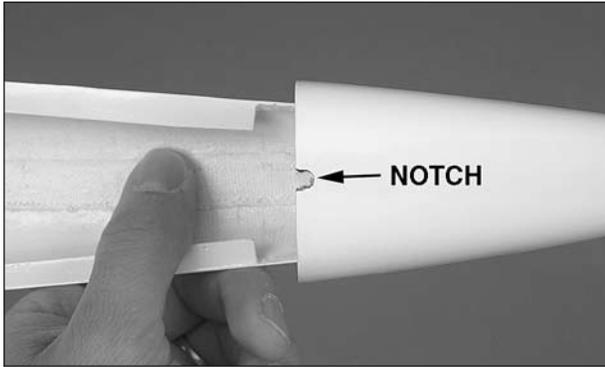
❏ 7. Make a small notch in the **tail cone** to accommodate the rudder steering rod. Install the tail cone onto the fuselage and mark and drill 1/16" [1.6mm] holes on both sides of the tail cone, being sure that you are drilling into the hardwood mounting blocks on the fuselage. Thread a #2 x 3/8" [9.5mm] screw into each hole and back it out. Apply a drop of thin CA into each hole to harden the wood. When the CA has dried, install the tail cone onto the fuselage using two #2 x 3/8" [9.5mm] screws and two #2 flat washers.
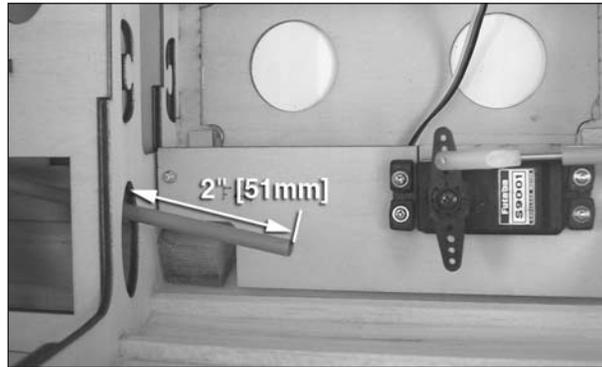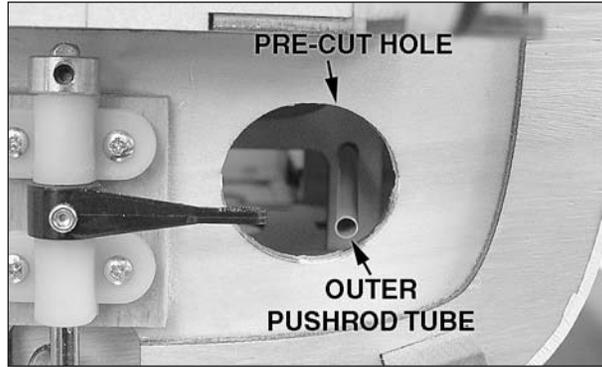
❏ 8. Use a hobby knife to score the perforations on the firewall in order to open the pre-cut hole behind the nose gear steering arm. With the perforations scored, the piece can be knocked out using a tool handle or something similar. Fuelproof the edges of the hole with epoxy as well as the accessible area behind the hole. Cut a piece from the included outer pushrod tube 7-1/4" [184mm] long. Insert the tube through the large hole behind the steering arm on the nose wheel and through the small hole in the former behind the firewall. Position the tube so that it protrudes aft of the third former approximately 2" [51mm] as shown. Remove the tube from the fuselage and use 220-grit sandpaper to roughen the tube where it will be glued to the second and third formers. Clean the sanding dust from the tube and glue it to the hole in the **second** former.
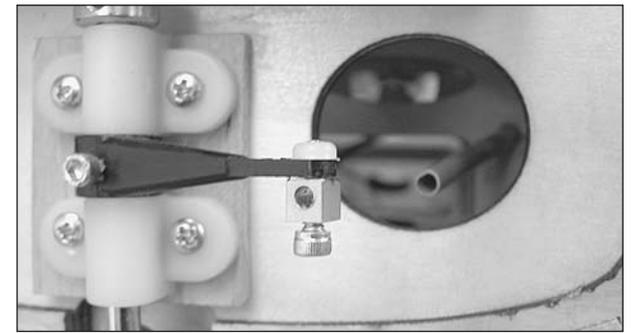
❏ 9. Install a brass screw-lock pushrod connector into the outer hole of the steering arm with a nylon screw-lock pushrod connector retainer. The connector should be installed on the underside of the arm. Loosely thread a 4-40 x 1/8" [3.2mm] SHCS into the screw-lock pushrod connector.
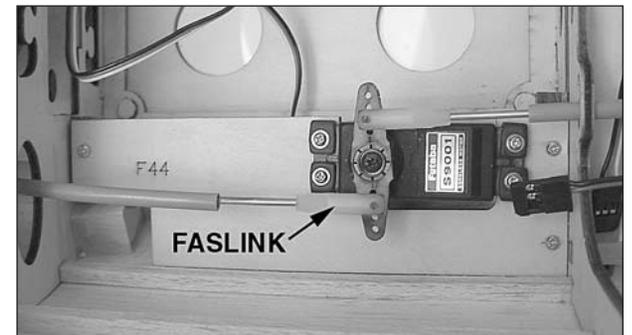
❏ 10. Slide the 12" [305mm] pushrod into the steering pushrod tube with the threaded end toward the rear of the plane. Fit the forward end through the screw-

lock pushrod connector and position it so that the forward end protrudes approximately 3/8" [9.5mm] beyond the connector. Align the nose gear so that the wheel is pointing straight ahead. With the rudder in the neutral position, mark where the pushrod crosses the second inner hole in the remaining rudder servo arm. Remove the pushrod from the tube, make a 90° bend at the mark on the pushrod and cut off the excess pushrod 1/4" [6mm] beyond the bend. Reinstall the pushrod into the tube and fit the forward end through the screw-lock pushrod connector. Attach the pushrod to the servo arm using a nylon FasLink. Make any fine adjustments necessary. Then, tighten the SHCS in the screw-lock pushrod connector against the pushrod.
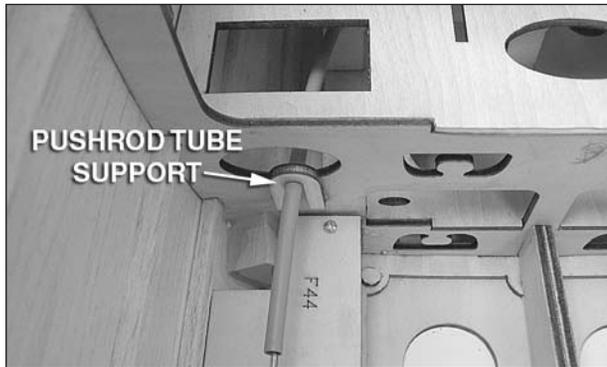
❏ 11. Use a plywood **pushrod tube support** to secure the steering pushrod tube to the third former. Glue the outer pushrod tube to the support and glue the support to the third former as shown.

INSTALL THE POWER SYSTEM

The following sections contain detailed instructions for mounting an O.S. .61 FX two-stroke glow engine and the Great Planes RimFire 1.20 (50-65-450kV) out-runner brushless motor. Each specific installation only contains information relevant to that particular power system so you can skip directly to the section that matches your choice of power systems.

GLOW ENGINE INSTALLATION

The installation of a brand of glow engine other than the O.S. .61 FX should be similar to the procedure listed below for the O.S. model.
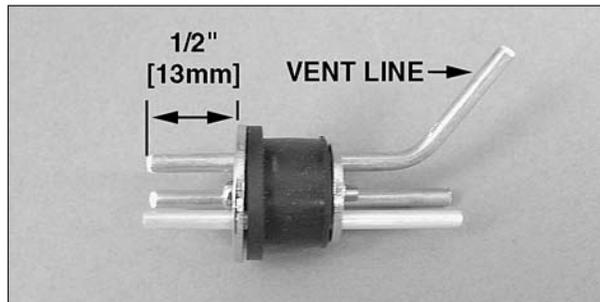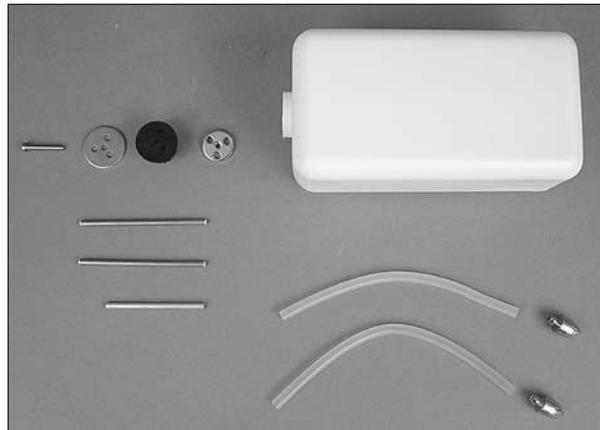
❏ 1. The fuel tank can be assembled as a two line system consisting of a vent (pressure) line to the muffler and a carb line. Filling and emptying of the

tank would need to be done through the carb line, or an optional fuel fill valve (not included). The tank can also be assembled as a three line system having a vent line, carb line, and fill line. If installing a fill line, puncture the top of the stopper above the sealed off fuel tube hole. The fill and carb lines should extend out 1/2" [13mm] beyond the stopper and the vent line should be bent upwards and left uncut. With the tubes installed in the stopper, fit the stopper plates loosely in place with the 3 x 25mm Phillips screw to hold the assembly together.
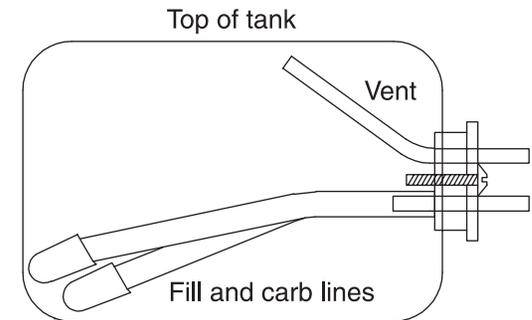
❏ 2. Fit the stopper assembly into the tank with the vent line pointing toward the top of the tank, but not touching. The fuel tubing and clunks (fuel pickup) on the carb and fill lines should almost reach the back of the tank but not touch. The clunks must be able to move freely inside the tank when assembled.

Adjust the length of the fuel tubing accordingly. When satisfied, tighten the 3 x 25mm screw in the stopper to secure it in place (do not overtighten). Mark the side of the tank that must face up when installed in the plane, and we also suggest marking the tubes in the stopper.
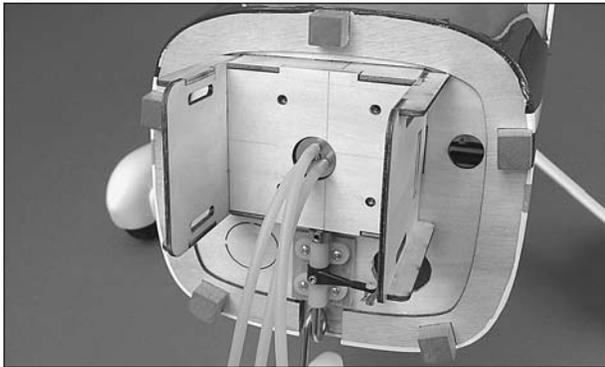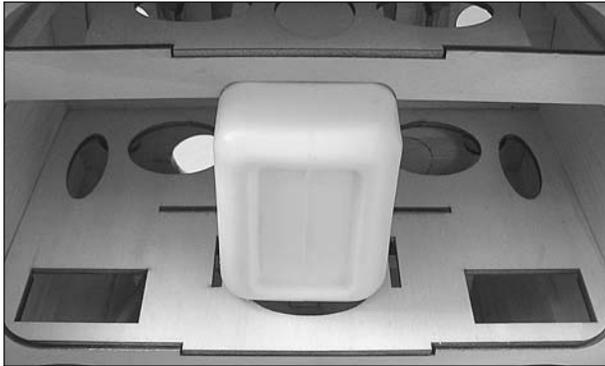
❏ 3. Attach a 6" to 7" [152 to 178mm] piece of fuel tubing onto each line coming from the tank. Insert the tank into the fuselage with the correct side facing up as far forward as it will fit.

1-1/4" [32mm] STICK
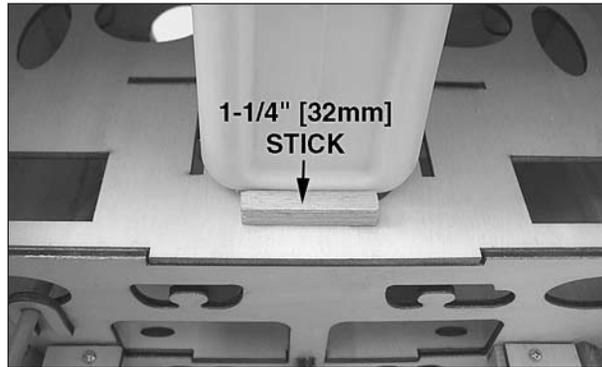
❏ 4. Glue the 1/4" x 1/4" x 1-1/4" [6 x 6 x 32mm] hardwood stick behind the fuel tank to secure it in place. (This step can also be performed after step 8. You may want to slide the tank back slightly when drilling a hole for the throttle pushrod.)
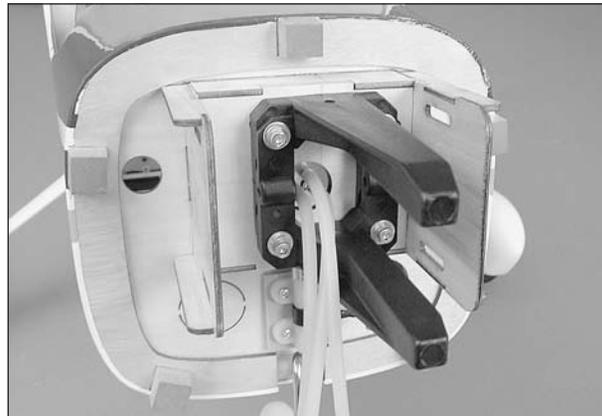
❏ 5. Using four 8-32 x 1-1/4" [32mm] SHCS, four #8 flat washers, four #8 lock washers, and threadlocking compound, attach the engine mount on its side to the firewall. Position the mount so the engine head will face the right side of the fuselage. Leave the screws slightly loose. Test fit your engine between the mount halves. Slide the mount halves against the sides of the engine and finish tightening the mount screws.
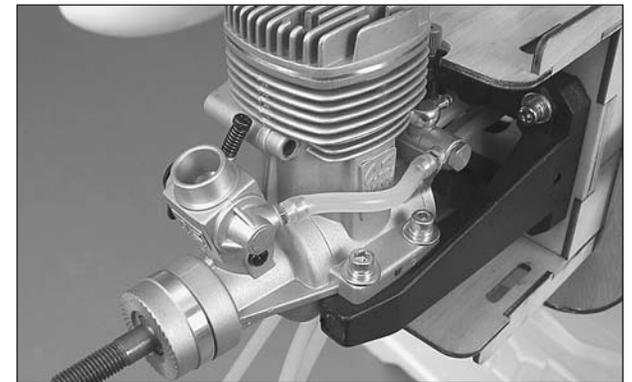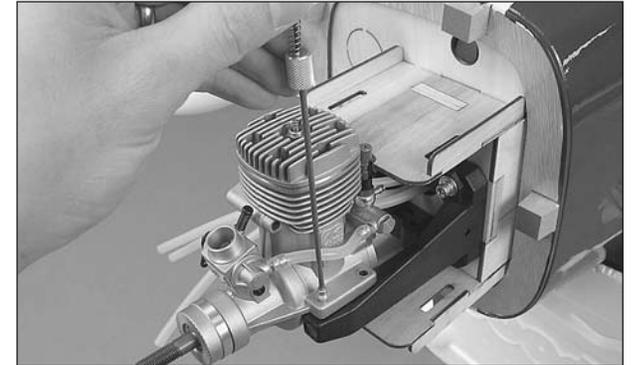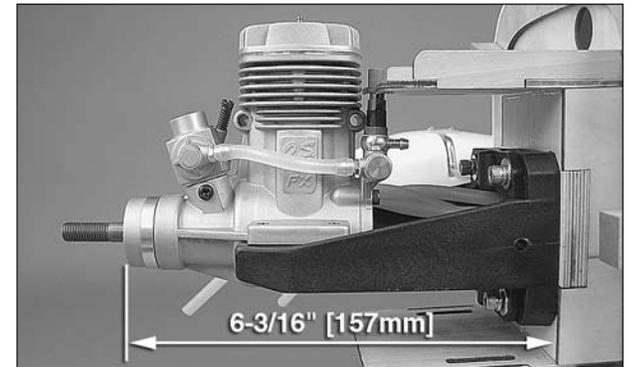
6-3/16" [157mm]

❏ 6. Position the front of the engine drive washer 6-3/16" [157mm] from the firewall. If installing a .61 FX, the side of the firewall mounting box will need to be notched to accommodate the needle valve. Mark the location of the engine mount holes onto the mount rails using a Dead Center Hole Locator. Remove the engine from the mount and use a 8-32 tap and drill set to create threads in the four mounting

holes. Attach the engine to the mount using four 8-32 x 1" [25mm] SHCS, four #8 flat washers, and four #8 lock washers.

❏ 7. Install the throttle servo in the location shown. Because of the tight working space here, a Hobbico Pin Vise (HCAR0696) is very useful in this step. Use the hardware included with the servo.

❏ 8. Drill a 3/16" [4.8mm] hole in the firewall inline with the throttle arm on the carburetor at a slight angle pointing to the throttle servo. We used an extra long drill bit (HIGR1020). If you do not have an extra long bit, you may need to mark the location for the hole on the firewall and temporarily remove the engine to drill the hole. **Make sure you do not drill into the fuel tank!**
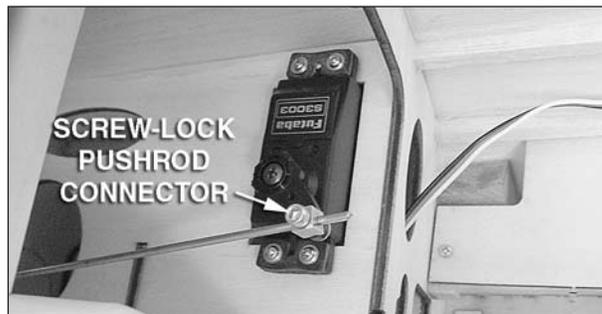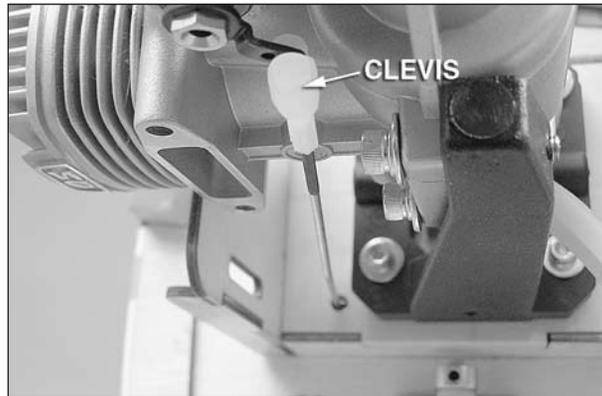
❏ 9. Cut three arms from a four-armed servo arm. Install a brass screw-lock pushrod connector into the second outer hole of the remaining arm using a nylon retainer. Loosely thread a 4-40 x 1/8" [3mm] SHCS into the screw-lock pushrod connector. Use your radio system to center the throttle servo and attach the arm perpendicular to the servo case pointing to the center of the fuselage. Be sure to install the servo arm screw. Thread a nylon clevis and silicone clevis retainer onto a 12" [305mm] pushrod. Fit the pushrod through the hole you drilled in the firewall and connect the clevis to the throttle arm on the carburetor. The other end should pass through the screw-lock pushrod connector. Make any necessary bends to the pushrod so it moves smoothly through the hole and does not contact the engine crankcase during any point in its travel. Operate the throttle servo with your radio system to confirm the servo properly opens and closes the carb. When satisfied, tighten the SHCS in the screw-lock pushrod connector against the pushrod, cut off the excess pushrod 3/8" [9.5mm] beyond the connector, and slide the silicone clevis retainer to the end of the clevis.

FILL LINE CLIP PARTS
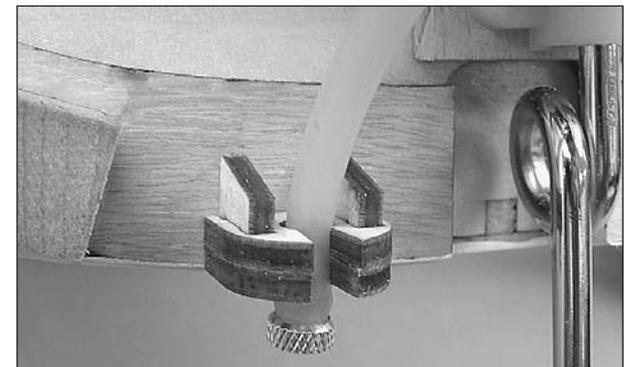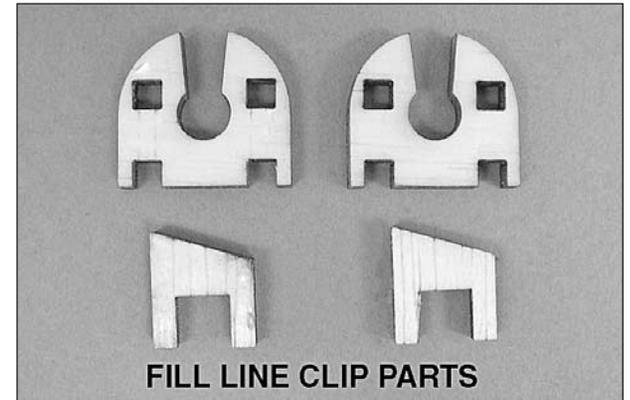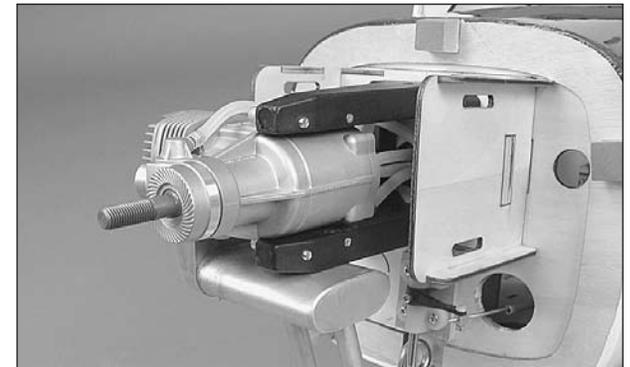
❏ 10. Install a Pitts-style muffler onto the engine. Cut the vent line and carb lines to the appropriate length and connect them to the engine and muffler. Use the included fuel line plug for the fill line. Parts are included for an optional fill line clip that can be glued to the bottom of the first former as shown. Glue the parts together and fuelproof the assembly with epoxy.

BRUSHLESS MOTOR INSTALLATION

The installation of a brand of out-runner brushless motor other than the Great Planes RimFire 1.20 (50-65-450kV) (GPMG4770) should be similar to the procedure listed below for the Great Planes model. Be sure to maintain the correct prop adapter distance from the firewall regardless of which motor you choose to install.

❑ 1. Attach the motor to the brushless motor mount using four 3 x 8mm machine screws, four 3mm flat washers, and threadlocking compound. You may need to remove the brass collar to fit the motor to the mount. Be sure and replace the collar after the motor is installed. If you haven't done so already, install the prop adapter to the front of the motor using the hardware included with the motor and threadlocking compound.
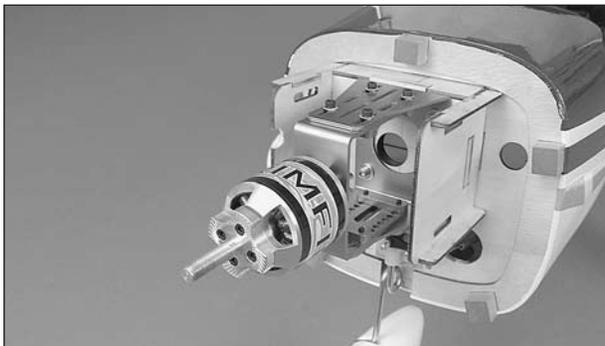
❑ 2. Attach the mount to the firewall on its side using four 8-32 x 1" [25mm] SHCS, four #8 flat washers, four #8 lock washers and threadlocking compound.
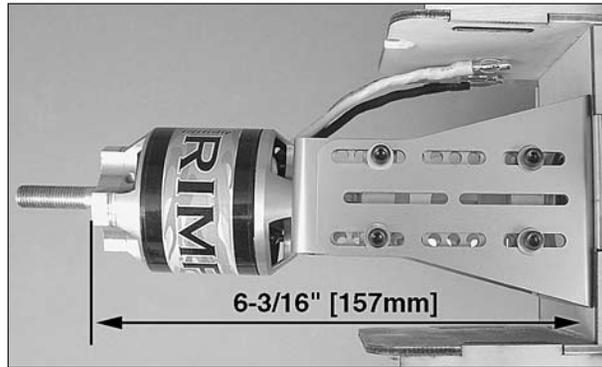
6-3/16" [157mm]

❑ 3. Loosen the motor mount assembly screws and adjust the mount halves so that the face of the prop adapter is 6-3/16" [157mm] from the firewall. Use threadlocking compound and securely tighten all screws.
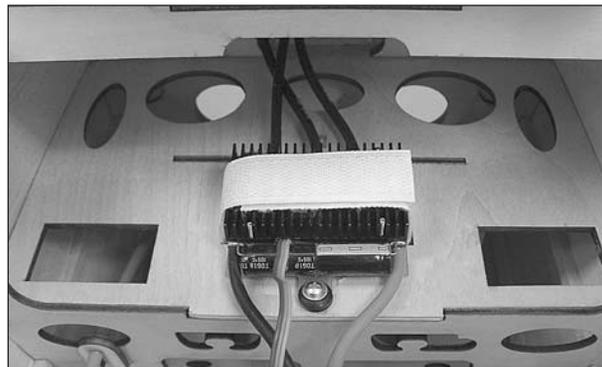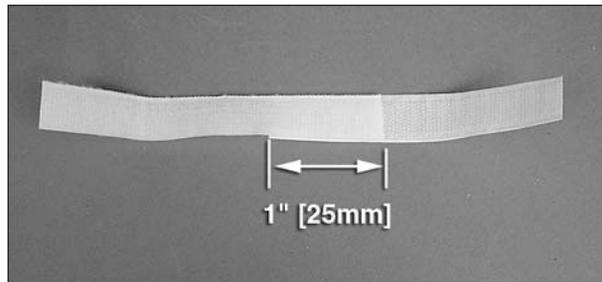
1" [25mm]

❑ 4. Make a hook and loop strap for your ESC from the included hook and loop material by overlapping mating ends by approximately 1" [25mm]. The total length of the strap will depend on the size of your ESC. Slots are provided on the fuel tank tray to strap the ESC in place. If your ESC has mounting tabs for screws, the hook and loop strap plus one screw at the aft end is sufficient to secure the ESC. If the ESC does not have mounting tabs for screws, use self-adhesive hook and loop material (not included) plus the hook and loop strap.

❑ 5. As you did for the nose gear pushrod, cut the perforations along the hole outline on the firewall and knock out the plywood piece. This hole, along with the nose gear pushrod hole, are inline with the battery pack locations and will provide cool air to the packs while in flight.

FINISH THE MODEL

INSTALL THE RECEIVER & BATTERIES
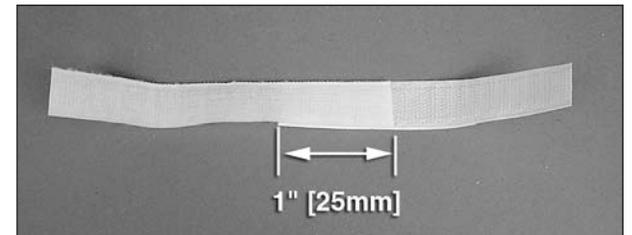
1" [25mm]

❑ 1. Make a hook and loop strap for your receiver pack from the included hook and loop material by overlapping mating ends by approximately 1" [25mm]. The total length of the strap will depend on the size of your battery. Wrap the pack in foam rubber (not included) and use the strap to secure it to the side of the motor mounting box as shown.
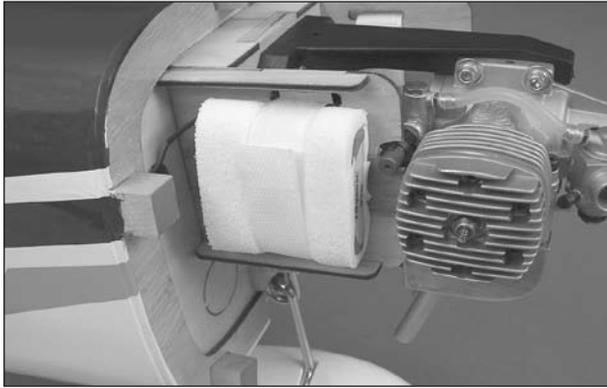
❏ 2. Install the battery pack for the lighting system in the same manner on the other side of the motor mounting box.

RECEIVER TRAY PARTS

←── KEY

KEY →
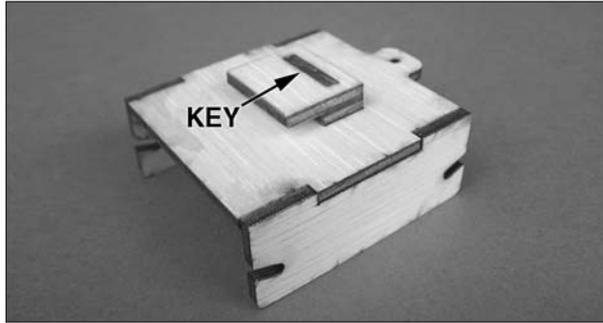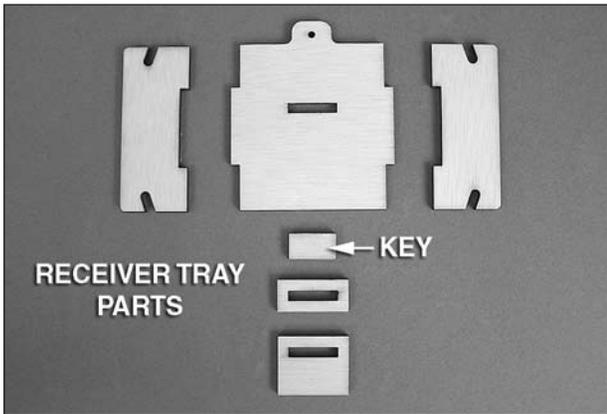
❏ 3. Locate the six pieces that make up the plywood **receiver tray**. Glue the pieces together as shown. The small rectangular piece fits into the three pieces with slots and keys these pieces together.
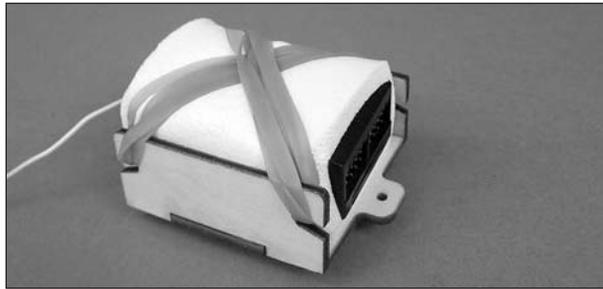
❏ 4. Wrap your receiver in foam rubber and use rubber bands to secure it to the receiver tray. Two rubber bands are recommended in case one should happen to break during flight.

#2 x 3/8" [9.5mm] SCREW

❏ 5. Slide the tab on the underside of the receiver tray onto the forward edge of the unused throttle servo cutout. With the receiver tray pushed as far forward as it will go, confirm that the tab is holding the receiver tray down by gently pulling upward on the tray. When satisfied, drill a 1/16" [1.6mm] hole through the screw hole on the receiver tray and into the fuel tank tray. Use a #2 x 3/8" [9.5mm] self-tapping screw and #2 flat washer to secure the receiver tray in place. Be sure to harden the hole with thin CA.

❏ 6. Install your receiver switch and charge jack on the side of your fuselage. Be sure that the location you choose will not interfere with servos, pushrods, or the cockpit (look ahead in the manual to see the position of the cockpit kit components).
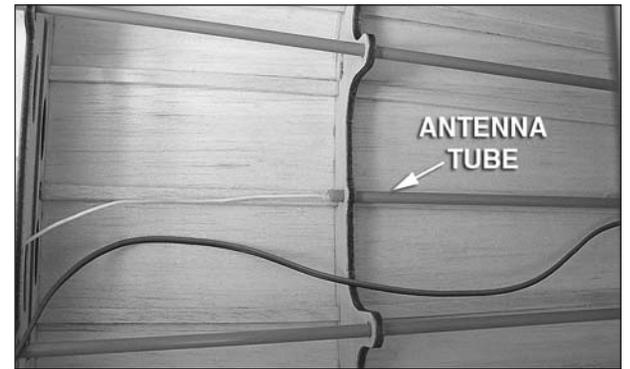
ANTENNA TUBE

❏ 7. Connect the servos to the receiver. Route the receiver antenna into the antenna tube that is preinstalled in the fuselage. Use tape or a dot of silicone adhesive to secure the antenna to the forward end of the tube.

INSTALL THE COWL
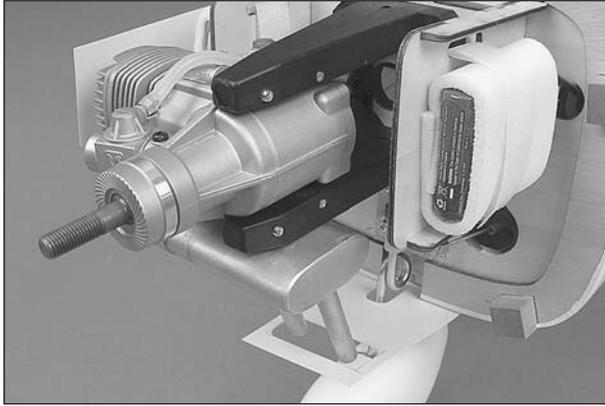
❏ 1. Make paper templates for the location of the muffler outlets, glow plug, needle valve, etc. Tape the templates to the fuselage.

MARK THE CENTER OF EACH COWL BLOCK
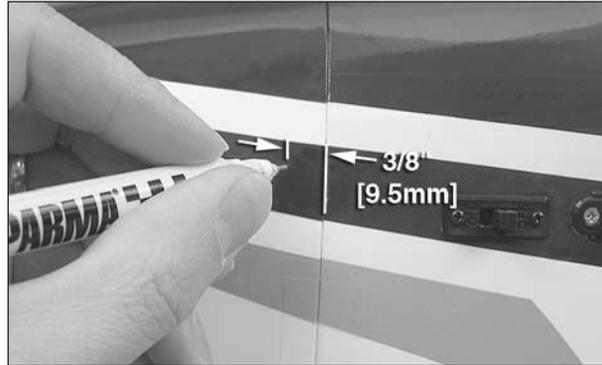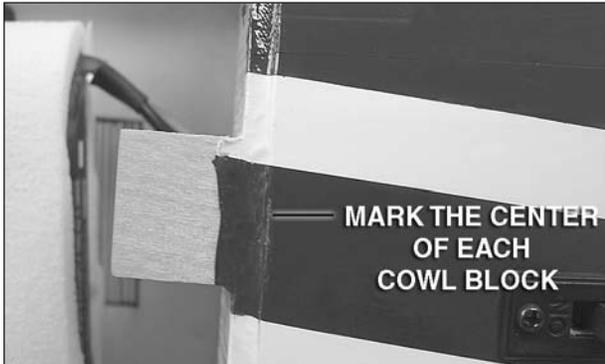
❏ 2. Remove the muffler from the engine. Mark the center of each cowl mounting block onto the fuselage with a felt-tip pen. Position the **cowl** onto the fuselage and mark where the bottom of the cowl will need to be cut for the nose gear wire. Make the necessary cut, reinstall the cowl onto the fuselage and make small adjustments to align the engine crankshaft in the opening in the front of the cowl. Use the spinner backplate to ensure that the cowl is centered. When satisfied, tape the cowl in place. Mark the cowl 3/8" [9.5mm] forward of the aft edge of the cowl at the center of each mounting block. Drill a 1/16" [1.6mm] hole at each mark through the cowl and into the mounting blocks.

3/8" [9.5mm]

AFT EDGE OF OPENING
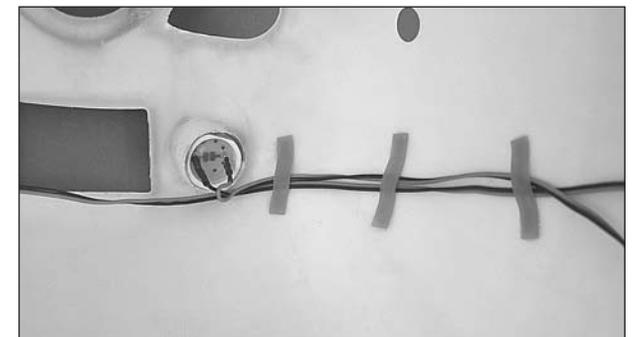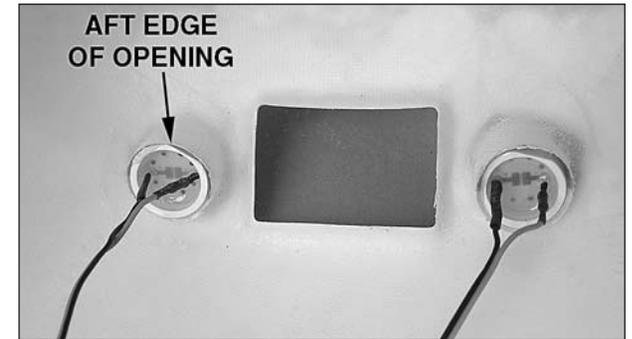
❏ 3. Before removing the cowl from the fuselage, use the paper templates to mark where cutouts will need to be made. Remove the cowl and make the necessary cutouts using a rotary tool. Use 220-grit sandpaper to roughen the openings in the cowl for the landing lights and also sand the light housings (do not sand the clear lenses on the lights). Glue the lights into the openings in the cowl with epoxy. Be sure that the lights are inserted forward of the aft

edge of the openings. If not, the light housings may interfere with the engine. When the epoxy has cured, use pieces of rubber band to hold the light wires out of the way of the engine.
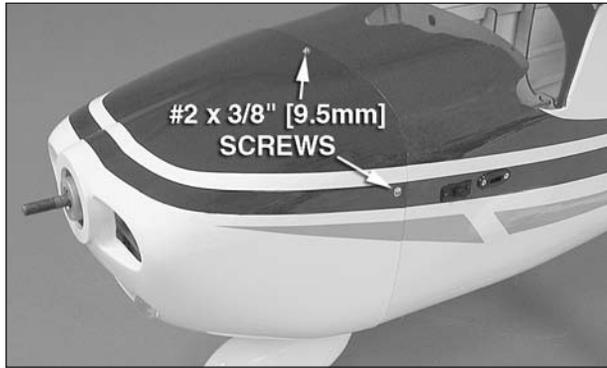
❏ 4. Route the landing light wires through one of the openings in the firewall and into the fuselage. Install the cowl onto the fuselage using five #2 x 1/2" [13mm] self-tapping screws and five #2 flat washers. Be sure to harden the holes in the cowl mounting blocks with thin CA.

❏ 5. Install the included switch for the landing lights (be sure that the charge lead remains accessible). Connect the included 3-way parallel connector to the two lights in the cowl and the wire leading from the beacon light in the tail. Join the lights to the switch and connect the light battery to the switch. Confirm the operation of the lights by flipping the switch on and off.

INSTALL THE COCKPIT WINDOWS

❏ 1. Trim the covering from the window openings in the fuselage, leaving approximately 1/4" [6mm] covering to fold over and seal to the inside edges of the openings. Use a trim iron to seal down the covering. Small pieces can be cut from the scrap covering to fill in the exposed plywood edges at the corners of the windows. Trim off the remaining covering as necessary.
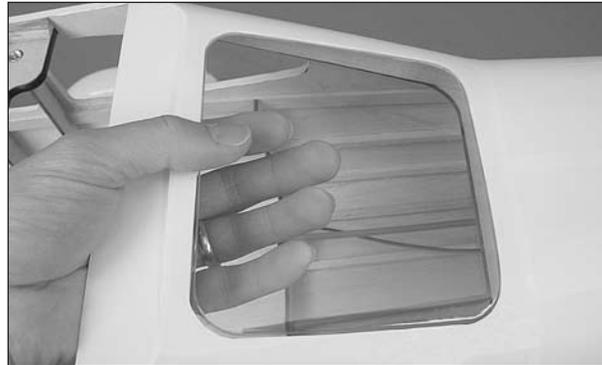
❏ 2. Use canopy scissors to trim the rear window to size. Leave a gluing flange around the window approximately 1/8" [3.2mm] wide. Glue the rear window in place. If canopy glue is used, you will need to tape the window in place and temporarily glue a stick on the inside of the window to hold it against the window opening while the glue dries overnight.

❏ 3. Install the side windows in the same manner.

❏ 4. Test fit the windshield onto the fuselage. If necessary, trim it for a good fit. When satisfied, glue the windshield into position. Tape the windshield in place and allow the glue to fully dry. For a cleaner look, apply glue only in the area that will be covered by the wing. Sapphire blue MonoKote trim sheet can be used to seal the front and bottom edges of the windshield to the fuselage. Drill 1/16" [1.6mm] holes in the location shown in the picture and secure the aft bottom corners of the windshield in place with two #2 x 3/8" [9.5mm] screws and two #2 flat washers. We suggest drilling the holes into the center of the wing dowel fuselage formers so the screw tips will not be seen inside the model when installed.

INSTALL THE COCKPIT KIT

When installing the cockpit kit, be sure to go slowly and only trim small amounts at a time. Remember, it is easy to remove material, but it is much more difficult to put it back! Several different glues could be used during the assembly. We suggest keeping the cockpit floor removable in case access to the servos or receiver is necessary. Hot glue or silicone sealant can be used to glue parts that should be removable. Strategically placed pieces of self-adhesive hook and loop material could also be used. Thin and thick CA glue or epoxy can be used to permanently glue parts together.

❏ 1. Before installing the cockpit kit, servo extensions must be routed for the flap and aileron servos. Attach a dual servo extension to the flap channel and aileron channel on your receiver. Shrink a 1" [25mm] piece of 3/8" [9.5mm] heat shrink tubing around two 12" [305mm] servo extensions. Make another pair of 12" [305mm] servo extensions using another 1" [25mm] piece of 3/8" [9.5mm] heat shrink tubing. Shrink the tubing around the servo extensions. Connect the servo extensions to the dual servo extensions plugged into the flap and aileron channels. Be sure that each pair of servo extensions has one plugged into the flap channel and one plugged into the aileron channel. Glue the heat shrink tubing to the sides of the fuselage in the location shown. Doing so will provide easy access to plug in the flap and aileron servos after the cockpit kit has been installed. Do the same for the leads for the wingtip lights.

❏ 2. Begin by cutting out the seat bottoms for the front seats. Canopy scissors work well for this. There are cut lines on the parts. However, we suggest cutting approximately 1/4" [6mm] beyond the cut lines and assembling the halves by overlapping the edges. (If you choose, you could cut along the cut lines and edge glue the two halves together. Because the pieces come pre-painted, a good fit would be difficult doing it this way). Small slits will need to be

made in the back of the top half as shown. Test fit the top half over the bottom half. The total height of the seat bottom is not critical, but ours is 1" [25mm]. When satisfied with the fit, separate the parts and finish sand the edges of the pieces. Glue the halves together (thin CA works well).
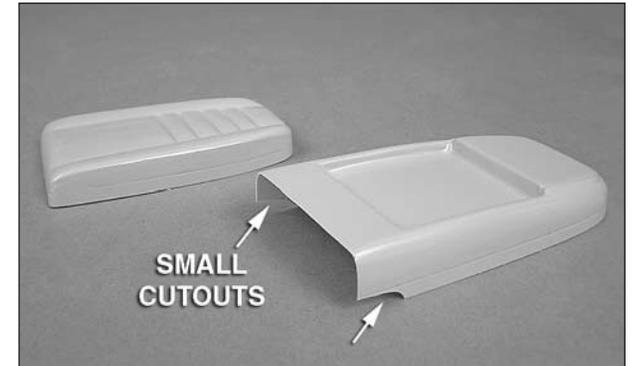
❏ 3. The seat back halves are cut and assembled the same way. Make note how the bottom edge of the seat back is trimmed to fit inside the seat bottom. This is a trial and error fit, so trim away small amounts at a time and test fit the piece until a good fit is achieved. When satisfied with the fit, finish sand the edges and glue the halves together.

❏ 4. Fit the assembled seat back to the seat bottom. Make any final adjustments to the fit and glue the assemblies together.
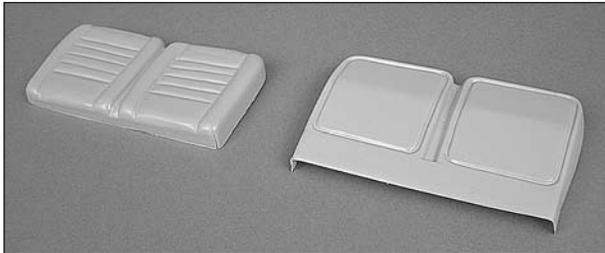
PUSHROD TUBE SLOTS

❏ 5. The back seat is assembled in the same manner as the front.
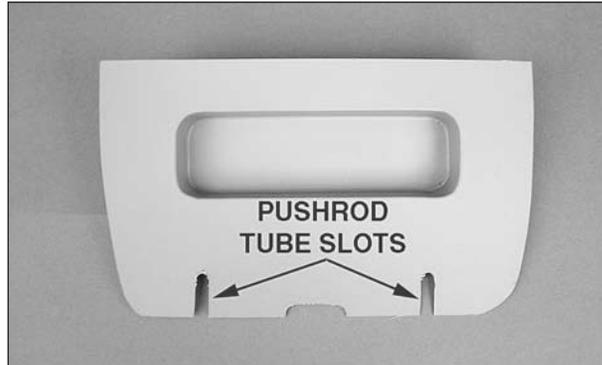
❏ 6. Cut out the cockpit back panel. Slots will need to be made for the elevator and rudder pushrod tubes, as well as a cutout for the tail light wire to pass under. The piece should sit flat against the fuselage former just behind the back window. Glue the cockpit back in place.
Work slowly during step 7 to cut cockpit side panels that fit well.

CUTOUTS FOR FUSELAGE FORMERS
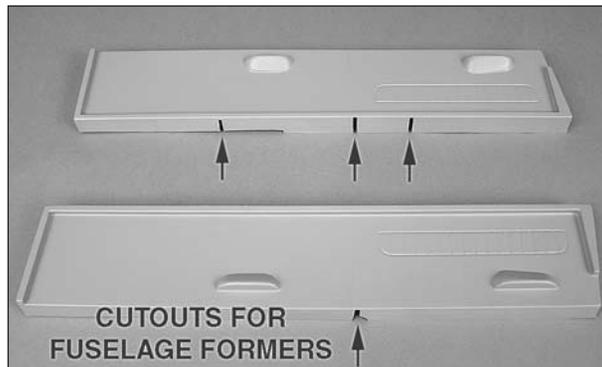
❏ 7. Rough cut the cockpit side panels leaving as much material as possible. Slots will need to be cut at the top and bottom of the pieces to fit around the fuselage formers. Temporarily fit the pieces in place and use a felt-tip pen or pencil to mark the center of each former onto the side pieces where they will need to be trimmed (be careful not to get pen marks in areas that will not be cut away since the ink would be difficult to remove from the painted pieces). With the slots cut in the correct positions, carefully start trimming the top, outside edges of the side panels. The top of the panels should rest on the fuselage stringers that are located just below the side windows. Trim these edges so that there are no gaps between the top edges of the side panels and the fuselage sides. The panels will need to be gently forced against the fuselage sides to follow the contour of the fuselage. When satisfied with the fit, finish sand the edges and glue the panels in place.

Before installing the cockpit floor, review the inside of the fuselage one more time and confirm that all fine adjustments to the servos have been made, connections to the receiver are made and in place, etc.! You do not want to install the cockpit floor only to discover later that you forgot to connect the Y-harnesses for the flap and aileron servos to the receiver. We suggest testing the servo operation for ALL of the control surfaces using the radio system before proceeding.

FOLD FRONT OF
COCKPIT FLOOR
AS SHOWN
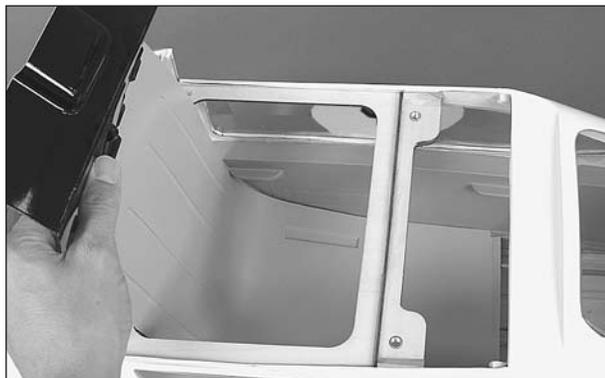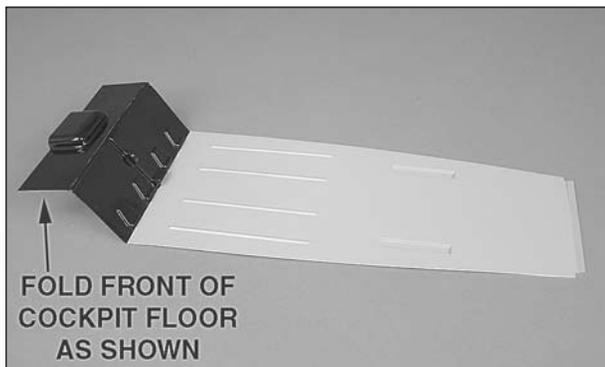
❏ 8. Rough cut the cockpit floor to shape. Leave as much material as possible to test fit the floor into the fuselage. The front side should be carefully folded as shown to fit around the fuel tank and fuel tank tray. The floor is installed into the fuselage by sliding it into the cockpit in front of the forward arm rests. Pull the floor all the way back to the cockpit back panel. The floor should rest on top of the bottom shoulders of the side panels. If the floor will not fit between the side panels, remove it and carefully trim it narrower until a good fit is achieved. We notched the back of the panel and folded the aft edge upward to clear the rudder and elevator pushrod tubes. Fit the forward end of the cockpit floor up and over the fuel tank and tray. When a good fit has been achieved, glue the floor in place (the front of the floor panel that fits around the top of the fuel tank will be held down in place by the instrument panel). We cut sticks from scrap balsa (not included) and tightly fit them between the panel sides to hold the floor down while the glue hardens.
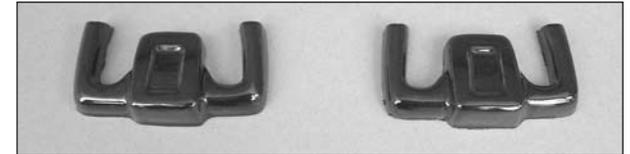
SLIGHT ANGLE

❏ 9. Cut out the steering yokes and sand the bottom edges smooth. Fill the inside center of the yokes with epoxy and embed the included 1/8" x 1-1/2" [3 x 38mm] dowel rods into the epoxy. Set them at a slight angle as shown. Just as the epoxy begins to get hot and harden, hold the dowels in the desired position while the epoxy finishes hardening.
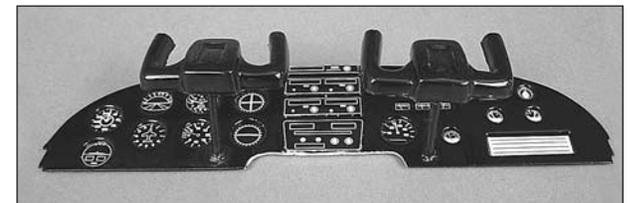
❏ 10. Glue the steering yoke dowel rods into the recesses in the instrument panel. Test fit the instrument

panel in place in the fuselage. It should fit snugly over the portion of the cockpit floor that rests on top of the fuel tank. Glue the instrument panel in position.

❏ 11. Glue the seats to the cockpit floor. Remember, the seats should also be removable in case the floor needs to be taken out. Hot glue works well for this. Small dots of medium or thick CA could also be used.

INSTALL THE SPINNER & PROPELLER
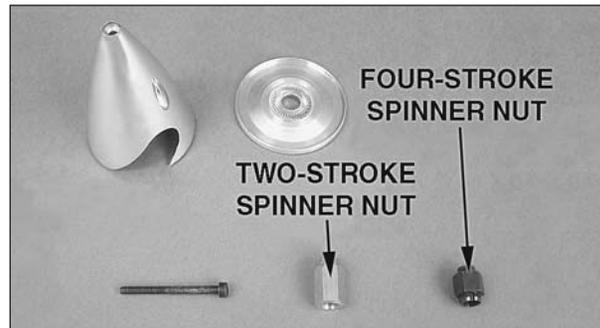
❏ 1. Locate the **spinner hardware**. A two-stroke and four-stroke spinner nut are provided.

❏ 2. Ream your prop as necessary. Install the spinner backplate, propeller, propeller washer and spinner nut onto the engine crankshaft. If you installed a four-stroke engine, use the four-stroke spinner nut.

❏ 3. Tighten the spinner cone to the backplate using the 4 x 45mm SHCS.

FINAL TOUCHES

❏ 1. Locate the small pin holes in the covering on the fuselage and wing for the **wing struts**. Align the holes in the wing struts over the pin holes in the covering and confirm that they will line up (the end of the strut with the flat base is installed on the wing). If not, make new pin holes that align with the holes in the struts as near to the original pin holes as possible. When satisfied, drill 3/32" [2.4mm] holes at the pin holes into the strut mounting blocks underneath the fuselage sheeting. Thread a #4 x 5/8" [16mm] self-tapping screw into each hole and back it out. Apply a couple drops of thin CA to each hole to harden the wood. Install the struts between the wing and fuselage using four #4 x 5/8" [16mm] self-tapping screws.
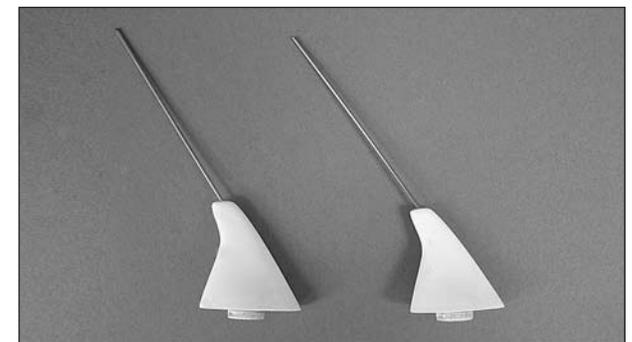
❏ 2. Roughen 1/4" [6mm] from one end of each metal antenna wire and clean the area with alcohol. Glue the antennas into the antenna bases as shown. We used thick CA. However, epoxy could also be used.
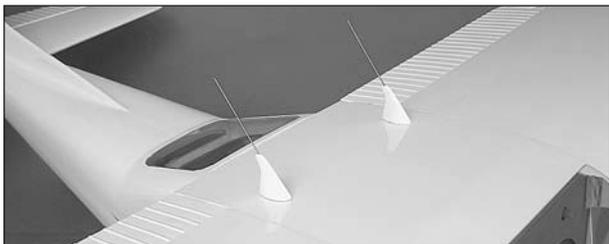
❏ 3. The antenna bases fit into the wing bolt holes and are held securely in place with magnets.

IMPORTANT: Before experimenting with different battery combinations and connecting multiple battery packs with adapter plugs, refer to the *"Battery Precautions"* on page 30.
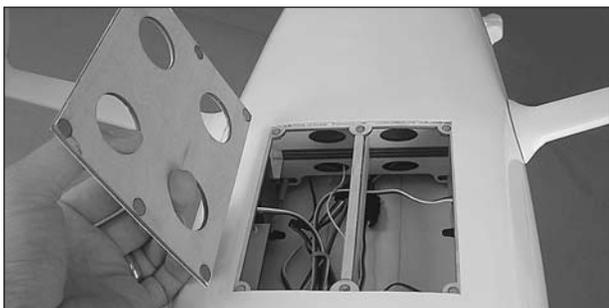
❏ 4. If you installed a brushless motor, cut the covering around the perimeter of the battery hatch. Remove the covering from the four cooling holes in the hatch. The hatch is held on magnetically. Extra white covering is provided to seal the edges of the hatch and compartment.

❏ 5. LiPo battery compartments are located inside the battery hatch. Since the recommended battery

configuration includes a 3-cell and a 2-cell LiPo connected in series, the 2-cell pack should be installed in the **left battery compartment** to avoid interfering with the nose gear pushrod. Tabs are provided above and below each battery compartment to loop rubber bands around for securing the packs in the compartments. The 2-cell pack should also have a strip of self-adhesive hook and loop material (not included) applied to prevent it from moving up and down in the compartment.

❏ 6. This completes the Cessna 182 ARF assembly!

APPLY THE DECALS

1. Use scissors or a sharp hobby knife to cut the decals from the sheet.

2. Be certain the model is clean and free from oily fingerprints and dust. Prepare a dishpan or small bucket with a mixture of liquid dish soap and warm water–about one teaspoon of soap per gallon of water. Submerse the decal in the soap and water and peel off the paper backing. **Note:** Even though the decals have a "sticky-back" and are not the water transfer type, submersing them in soap and water allows accurate positioning and reduces air bubbles underneath.

3. Position decal on the model where desired. Holding the decal down, use a paper towel to wipe most of the water away.

4. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

GET THE MODEL READY TO FLY

INSTALL & CONNECT THE MOTOR BATTERY

IMPORTANT: If using multiple battery packs that are connected with an adapter, never charge the batteries together through the adapter. Always charge each battery pack separately. Charge the batteries, then read the following precautions on how to connect multiple packs for flying the model:
Battery Precautions:

There are two ways to connect multiple battery packs: In **Series** and in **Parallel**.

These are four 11.1V, 3200mAh batteries. When joined in Series, the result will be a 44.4V, 3200mAh battery.

OKAY

These are Series adapters that connect two batteries in Series.
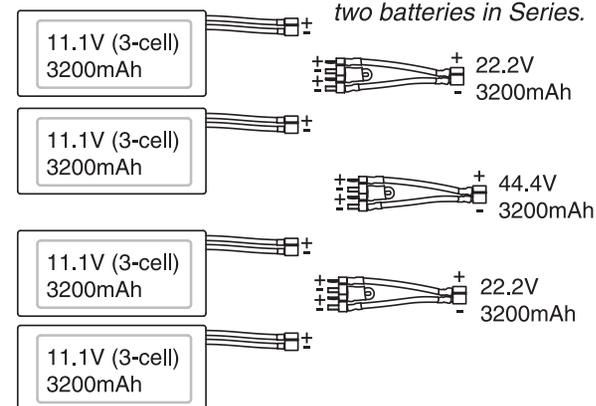
❏ 1. Connecting batteries in **"Series"** means to connect the +'s to the –'s and the –'s to the +'s. This combines the batteries' Voltages, but the capacity remains the same.

These are three 11.1V, 3200mAh batteries. When joined in Series, the result will be a 33.3V, 3200mAh battery.

OKAY

11.1V (3-cell) 3200mAh

11.1V (3-cell) 3200mAh

11.1V (3-cell) 3200mAh

33.3V 3200mAh

22.2V 3200mAh
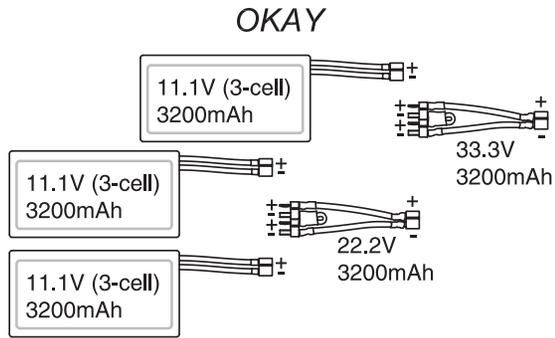
❏ 2. Connecting batteries in **"Parallel"** means to connect the +'s to the +'s and the -'s to the -'s. This combines the batteries' capacities, but the Voltage remains the same.

NO!!

Parallel adapter

Different voltages

11.1V (3-cell) 3200mAh

7.4V (3-cell) 3200mAh
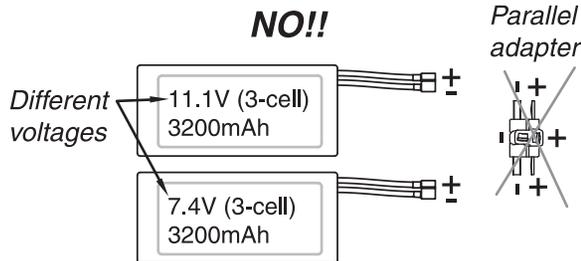
NEVER connect battery packs with different Voltages in **Parallel**–only combine in **Series**. Otherwise, the batteries will try to "equalize" with the larger one trying to "charge" the smaller one, thus causing heat and likely a fire.

NO!!

11.1V (3-cell) 3200mAh

11.1V (3-cell) 2500mAh

11.1V (3-cell) 3200mAh

Different capacities
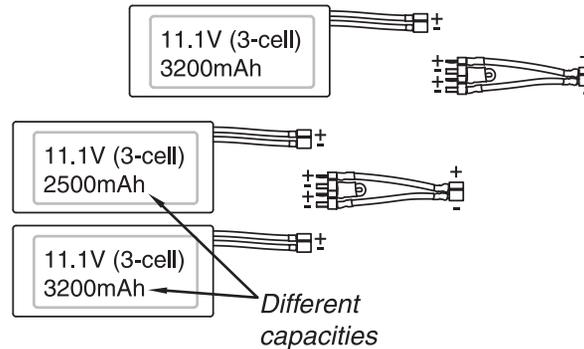
Also **NEVER** connect battery packs with different capacities in Series or in Parallel.

NO!!

Different capacities

11.1V (3-cell) 3200mAh

11.1V (3-cell) 1250mAh
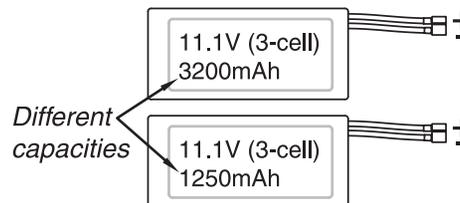
CHECK THE CONTROL DIRECTIONS

❏ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

❏ 2. With the transmitter and receiver still on, check all the control surfaces to see if they are centered. If necessary, adjust the clevises on the pushrods to center the control surfaces.

4-CHANNEL RADIO SETUP (STANDARD MODE 2)

ELEVATOR MOVES UP

RIGHT AILERON MOVES UP LEFT AILERON MOVES DOWN

RUDDER MOVES RIGHT

FULL THROTTLE
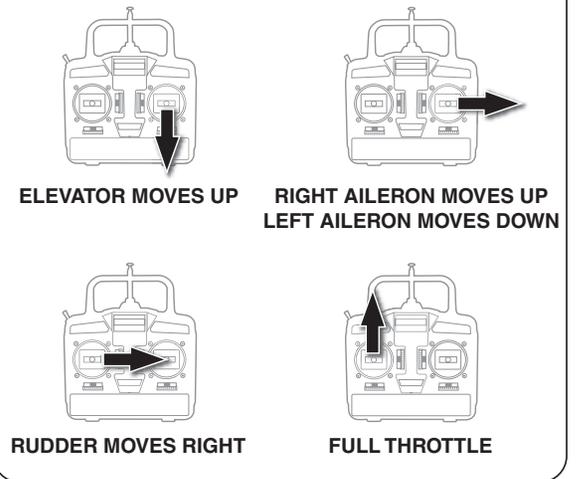
❏ 3. Make certain that the control surfaces and the carburetor respond in the correct direction as shown in the diagram. If any of the controls respond in the wrong direction, use the servo reversing in the transmitter to reverse the servos connected to those controls. Be certain the control surfaces have remained centered. Adjust if necessary.

SET THE CONTROL THROWS

Use a Great Planes AccuThrow™ (or a ruler) to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If

your radio does not have dual rates, we recommend setting the throws at the **low rate** setting for your first few flights.

Note: The throws are measured at the **widest part** of the elevators, rudder, ailerons and flaps.

These are the recommended control surface throws:
HIGH RATE

ELEVATOR:	1-1/16" [27mm], 15° up
	1-1/16" [27mm], 15° down
RUDDER:	1" [25mm], 15° left
	1" [25mm], 15° right
AILERONS:	5/8" [16mm], 17° up
	5/8" [16mm], 17° down

LOW RATE

ELEVATOR:	3/4" [19mm], 10° up
	3/4" [19mm], 10° down
RUDDER:	5/8" [16mm], 9° left
	5/8" [16mm], 9° right
AILERONS:	1/2" [13mm], 14° up
	1/2" [13mm], 14° down

FLAPS
1/2 – 1" [25mm], 18° down
full – 2" [51mm], 36° down

IMPORTANT: To ensure a successful first flight, fly your Cessna set up only according to the C.G. and control surface throws specified in this manual. The throws and C.G. are not arbitrary, but have been determined through extensive testing and accurate record-keeping. This provides you with the best chance for success and enjoyable first flights that should be surprise-free. Additionally, the throws and C.G. shown are true, real data which will allow the model to perform in the manner in which it was intended when flown by a pilot of the skill level for which it was intended. **DO NOT OVERLOOK THESE IMPORTANT PROCEDURES.** A model that is not properly set up may be unstable and possibly unflyable.

BALANCE THE MODEL (C.G.)

At this stage the model should be in ready-to-fly condition with all of parts of the model installed in place including the LiPo batteries (if applicable).

❏ 1. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the bottom of the wing on both sides of the fuselage. The C.G. is located 4-5/16" [110mm] back from the LE of the wing.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 5/16" [8mm] forward or 5/16" [8mm] back to change the flying characteristics. Moving the C.G. forward may improve the smoothness and stability, but the model may then require more speed for takeoff and make it more difficult to slow for landing. Moving the C.G. aft makes the model more maneuverable, but could also cause it to become too difficult to control. In any case, **start at the recommended balance point** and do not at any time balance the model outside the specified range.

❏ 2. With the wing attached to the fuselage, all parts of the model installed (ready to fly) and an empty fuel tank, place the model on a Great Planes C.G. Machine, or lift it at the balance point you marked.

❏ 3. If the tail drops, the model is "tail heavy" and the battery pack and/or receiver must be shifted forward or weight must be added to the nose to balance. If the nose drops, the model is "nose heavy" and the battery pack and/or receiver must be shifted aft or weight must be added to the tail to balance. If possible, relocate the battery pack and receiver to minimize or eliminate any additional ballast required. If additional weight is required, nose weight may be easily added by using a "spinner weight" (GPMQ4645 for the 1 oz. [28g] weight, or GPMQ4646 for the 2 oz. [57g] weight). If spinner weight is not practical or is not enough, use Great Planes (GPMQ4485) "stick-on" lead. A good place to add stick-on nose weight is to the firewall (don't attach weight to the cowl–it is not intended to support weight). Begin by placing incrementally increasing amounts of weight on the fuselage over the firewall until the model balances. Once you have determined the amount of weight required, it can be permanently attached. If required, tail weight may be added by cutting open the bottom of the fuselage and gluing it permanently inside.

Note: Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. Over time, fuel and exhaust residue may soften the adhesive and cause the weight to fall off. Use #2 sheet metal screws, RTV silicone or epoxy to permanently hold the weight in place.

❏ 4. **IMPORTANT:** If you found it necessary to add any weight, recheck the C.G. after the weight has been installed.

BALANCE THE MODEL LATERALLY

❏ 1. With the wing level, have an assistant help you lift the model by the engine propeller shaft and the bottom of the fuselage under the TE of the fin. Do this several times.

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

PREFLIGHT

IDENTIFY YOUR MODEL

No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 35 and place it on or inside your model.

CHARGE THE BATTERIES

Follow the battery charging instructions that came with your radio control system to charge the batteries. 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.

CAUTION: Unless the instructions that came with your radio system state differently, the **initial** charge on **new** transmitter and receiver batteries should be done for 15 hours **using the slow-charger that came with the radio system**. This will "condition" the batteries so that the next charge may be done using the fast-charger of your choice. If the initial charge is done with a fast-charger the batteries may not reach their full capacity and you may be flying with batteries that are only partially charged.

BALANCE PROPELLERS
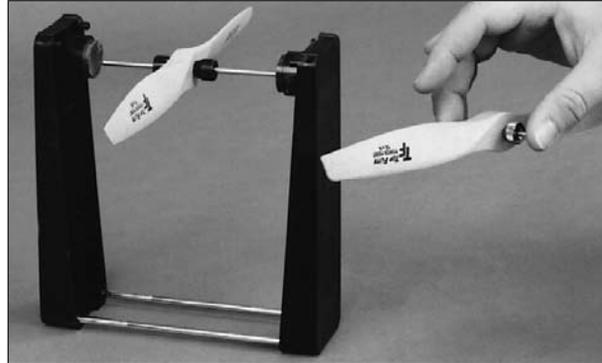
Carefully balance your propeller and spare propellers before you fly. An unbalanced prop can be the single most significant cause of vibration that can damage your model. Not only will engine mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause your fuel to foam, which will, in turn, cause your engine to run hot or quit.

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

GROUND CHECK

If the engine is new, follow the engine manufacturer's instructions to break-in the engine. After break-in, confirm that the engine idles reliably, transitions smoothly and rapidly to full power and maintains full power–indefinitely. After you run the engine on the model, inspect the model closely to make sure all screws remained tight, the hinges are secure, the prop is secure and all pushrods and connectors are secure.

RANGE CHECK

Ground check the operational range of your radio before the first flight of the day. 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 an assistant stand by your model and, while you work

the controls, tell you what the control surfaces are doing. Repeat this test **with the engine running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

ENGINE SAFETY PRECAUTIONS

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

Use a "chicken stick" or electric starter to start the engine. Do not use your fingers to flip the propeller. 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 right after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.

To stop a glow engine, cut off the fuel supply by closing off the fuel line or following the engine manufacturer's recommendations. Do not use hands, fingers or any other body part to try to stop the engine. To stop a gasoline powered engine an on/off switch should be connected to the engine coil. Do not throw anything into the propeller of a running engine.

AMA SAFETY CODE (excerpts)

Read and abide by the following excerpts from the Academy of Model Aeronautics Safety Code. For the complete Safety Code refer to *Model Aviation* magazine, the AMA web site or the Code that came with your AMA license.

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 and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized 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.

5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. **Note:** This does not apply to models while being flown indoors.

7) 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) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in the front of the flight line. Intentional flying behind the flight line is prohibited.

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

5) **I will not knowingly operate my model within three miles of any pre-existing flying site except in accordance with the frequency sharing agreement listed** (in the complete AMA Safety Code).

9) Under no circumstances may a pilot or other person touch a powered model in flight; **nor should any part of the model other than the landing gear, intentionally touch the ground, except while landing**.

CHECK LIST

During the last few moments of preparation your mind may be elsewhere anticipating the excitement of the first flight. Because of this, you may be more likely to overlook certain checks and procedures that should be performed before the model is flown. To help avoid this, a check list is provided to make sure these important areas are not overlooked. Many are covered in the instruction manual, so where appropriate, refer to the manual for complete instructions. Be sure to check the items off as they are completed.

❏ 1.   Fuelproof all areas exposed to fuel or exhaust residue that are not already fuelproofed.
❏ 2.   Check the C.G. according to the measurements provided in the manual.
❏ 3.   Be certain the battery and receiver are securely mounted in the fuselage. Simply stuffing them into place with foam rubber is not sufficient.
❏ 4.   Extend your receiver antenna into the receiver antenna tube.
❏ 5.   Balance your model *laterally* as explained in the instructions.
❏ 6.   Use threadlocking compound to secure critical fasteners such as the screws that hold the wheel axles to the struts, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.
❏ 7.   Add a drop of oil to the axles so the wheels will turn freely.
❏ 8.   Make sure all hinges are **securely** glued in place.
❏ 9.   Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, cowl mounting screws, etc.).
❏ 10. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
❏ 11. Make sure there are silicone retainers on all the clevises and that all servo arms are secured to the servos with the screws included with your radio.

12. Secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat shrink tubing or special clips suitable for that purpose.

13. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).

14. Secure the pressure tap (if used) to the muffler with high temp RTV silicone, threadlocking compound or J.B. Weld.

15. Make sure the fuel lines are connected and are not kinked.

16. Use an incidence meter to check the wing for twists and attempt to correct before flying.

17. Balance your propeller (and spare propellers).

18. Tighten the propeller nut and spinner.

19. Place your name, address, AMA number and telephone number on or inside your model.

20. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.

21. If you wish to photograph your model, do so before your first flight.

22. Range check your radio when you get to the flying field.

FLYING

The Cessna 182 ARF is a great-flying model that flies smoothly and predictably. The Cessna does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

FUEL MIXTURE ADJUSTMENTS

A fully cowled engine may run at a higher temperature than an un-cowled engine. For this reason, the fuel mixture should be richened so the engine runs at about 200 rpm below peak speed. By running the engine slightly rich, you will help prevent dead-stick landings caused by overheating.

CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice an alarming or unusual sound such as a low-pitched "buzz," this may indicate control surface *flutter*. Flutter occurs when a control surface (such as an aileron or elevator) or a flying surface (such as a wing or stab) rapidly vibrates up and down (thus causing the noise). In extreme cases, if not detected immediately, flutter can actually cause the control surface to detach or the flying surface to fail, thus causing loss of control followed by an impending crash. The best thing to do when flutter is detected is to slow the model **immediately** by reducing power, then land as soon as safely possible. Identify which surface fluttered (so the problem may be resolved) by checking all the servo grommets for deterioration or signs of vibration. Make certain all pushrod linkages are secure and free of play. If it fluttered once, under similar circumstances it will probably flutter again unless the problem is fixed. Some things which can cause flutter are; Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of wire pushrods caused by large bends; Excessive free play in servo gears; Insecure servo mounting; and one of the most prevalent causes of flutter; Flying an over-powered model at excessive speeds.

TAKEOFF

If you have dual rates on your transmitter, set the switches to "high rate" for takeoff, especially when taking off in a crosswind. 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." When you first advance the throttle the plane will usually turn left slightly. Correct by applying sufficient right rudder to hold it straight down the runway. When the plane has sufficient flying speed, lift off by smoothly applying up elevator (don't pull it hard into a steep climb!), and climb out gradually. Do not use flaps for your initial takeoff. After you have

the feel of the Cessna, takeoffs may be made with the flaps set at 50%.

FLYING

We recommend that you take it easy with your Cessna for the first several flights, gradually "getting acquainted" with this realistic model as your engine gets fully broken-in. Add and practice one maneuver at a time, learning how she behaves in each. For ultra-smooth flying and normal maneuvers, we recommend using the "low rate" settings as listed on page 31. "High rate" elevator may be required for spins. Though the full-scale Cessna 182 is not rated for aerobatics, the Top Flite Cessna 182 ARF is capable of some graceful aerobatic maneuvers. A beautiful barrel roll may be accomplished by advancing the throttle to full, then pulling the nose about 25 degrees above the horizon. Apply about 3/4 aileron in one direction, and let the Cessna 182 ARF roll 360 degrees without touching any of the other controls. If the proper roll rate is established, the wings should come back to level with the plane in a 20° to 25° dive. Reduce power and gently raise the nose to level flight. Loops are easily accomplished, but you should reduce power as the plane goes over the top to reduce stresses and enhance realism.

LANDING

When it's time to land, fly a normal landing pattern and approach. The Cessna 182 ARF may bleed off airspeed more rapidly than the sport planes you are used to. For this reason, be prepared to carry a little power during approach. For your first landings, plan to approach slightly faster than stall speed and flare a few inches off the runway onto the main wheels.

FLAPS

Full flaps make the Cessna 182 ARF very steady in the landing pattern, but just carry a little extra power to make up for the extra drag. The extra drag of the flaps also allows you to make shorter, steeper approaches. Like the full-scale Cessna 182, the Top Flite Cessna

182 ARF needs to touch down with a nose high attitude to avoid whacking the nose gear and skipping back into the air. For this reason, landings with flaps require a deliberate flare with high rate elevator to raise the nose. Touch and go's and go-arounds can be accomplished with full flaps. Just use the elevator to establish a shallow climb. It is preferred to have the flaps up or at "half" setting for takeoffs and climb-outs because the plane will accelerate and climb much better.

Have a ball! But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!

This model belongs to:

Name

Address

City, State, Zip

Phone number

AMA number

Make a copy of this identification tag and put it on or inside your model.

TF TOP FLITE®