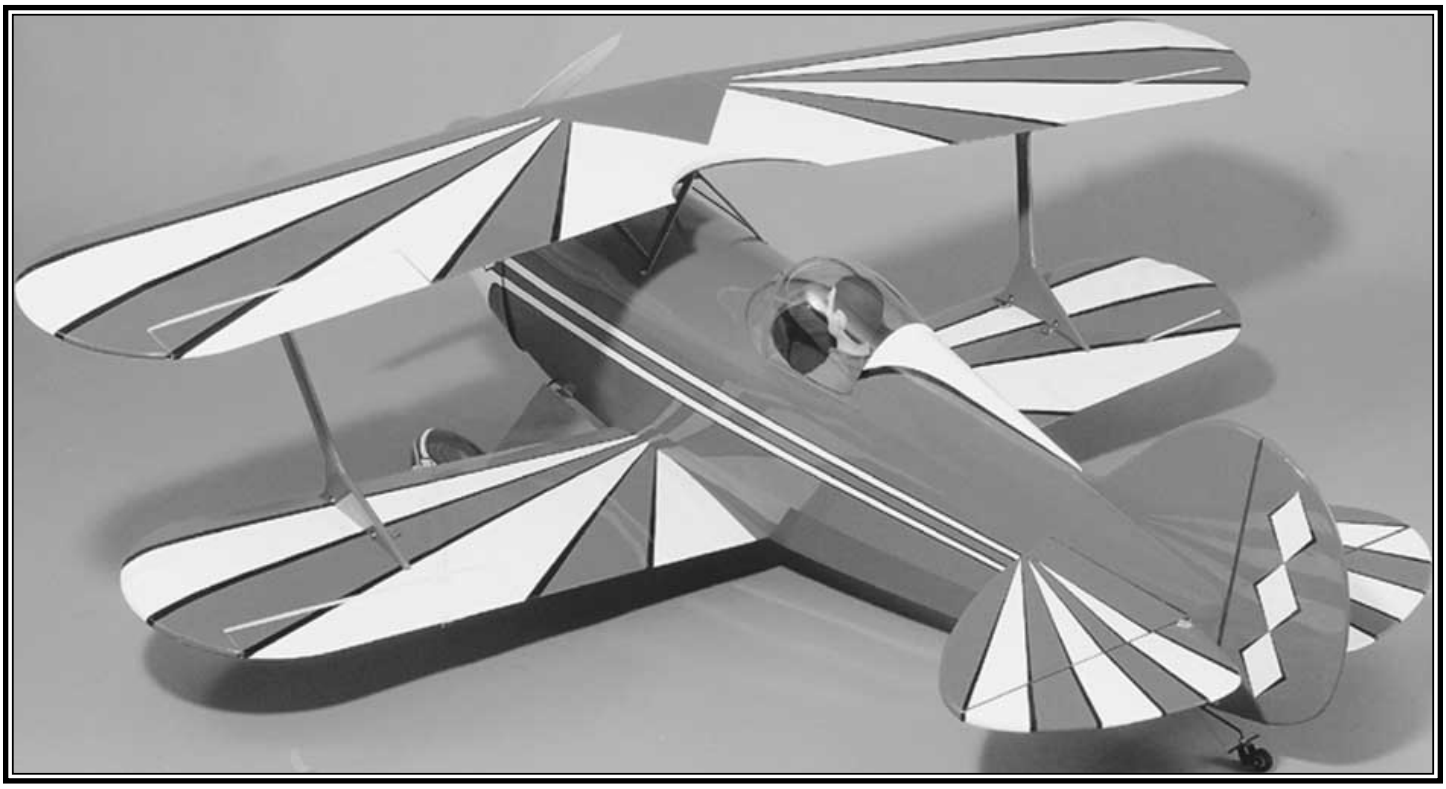
Pitts Special ARF

1/3 Scale
Almost-Ready-To-Fly
Aerobat

INSTRUCTION MANUAL



WARRANTY

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

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

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

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

GREAT PLANES® MODEL MANUFACTURING COMPANY
P.O. Box 788 Urbana, IL 61801 (217) 398-8970
productsupport@greatplanes.com

GPMZ0235 for GPMA1218 V1.1

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INTRODUCTION

Congratulations and thank you for purchasing the Great Planes Pitts Special S-2S ARF. We at Great Planes R&D were very pleased with the appearance and performance of this amazing model aircraft. Please look it over carefully and notice the quality with which this ARF has been built. It's expertly engineered, to provide excellent aerobatic potential AND a very stable and gentle flying R/C model at low speeds.

The full sized Pitts Special has won more unlimited class championships than any other airplane. Curtis H. Pitts started to design the Pitts Special in 1942 in Jacksonville, Florida. The initial Pitts Special, powered by a Franklin 90 hp engine, flew for the first time during 1944. Over the next 25 years, the Pitts Special was available only as a homebuilt aircraft. Over this period it was continuously refined to improve its aerobatic performance. By 1962, the standard engine had grown to 180 hp, and in 1966 its wings adopted a symmetric profile to make the inverted flight characteristics equal to those of normal flying.

The Pitts Special S-2S has a single seat in a fuselage that is 12 inches longer than previous models. The aircraft is light and strong. Built with steel tubes, wood, and canvas, the aircraft's only fully metallic part is a Lycoming AE10-540-D4A5 4 cylinder engine producing 260 hp. This allows the Pitts to reach extremely high levels of performance for the execution of the most demanding aerobatic maneuvers.

Aviat Aircraft Inc. purchased the manufacturing rights of the Pitts Special in March 1991. The Pitts Special remains in production in the original factory located in Afton, Wyoming.

For the latest technical updates or manual corrections to the Great Planes Pitts Special S-2S ARF, visit the web site listed below and select the Great Planes Pitts Special S-2S 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.

http://www.greatplanes.com/airplanes/index.html

IMAA INFORMATION

The Great Planes Pitts Special S-2S ARF is an excellent sport-scale model and is eligible to fly in IMAA events. The IMAA (International Miniature Aircraft Association) is an organization that promotes non-competitive flying of giant-scale models. If you plan to attend an IMAA event, contact the IMAA for a copy of the **IMAA Safety Code** at the address or telephone number below.

IMAA
205 S. Hilldale Road
Salina, KS 67401
(866) 366-4622
Or via the Internet at: http://www.fly-imaa.org

SCALE COMPETITION

Though the Great Planes Pitts Special is an ARF and 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 Great Planes ARFs in scale competition!). In Fun Scale, the "builder of the model" rule does not apply. To receive the five points for scale documentation, the only proof required that a full size aircraft of this type in this 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 Great Planes Pitts Special 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

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

1. Your Great Planes Pitts Special 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 Great Planes Pitts Special, 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 first-class condition, and a correctly sized engine and components (fuel tank, wheels, etc.) throughout the building process.

5. You must correctly install all R/C and other components so that the model operates correctly on the ground and in the air.

6. You must check the operation of the model before every flight to insure that all equipment is operating and that the model has remained structurally sound. Be sure to check clevises or other connectors often and replace them if they show any signs of wear or fatigue.

7. If you are not already an experienced R/C pilot, you should fly the model only with the help of a competent, experienced R/C pilot.

8. While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying, such as extreme aerobatics, the modeler is responsible for taking steps to reinforce the high stress points.

9. WARNING: The cowl, wheel pants and wing struts 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 kit and instructions, but ultimately the quality and flyability of your finished model depends on how you assemble 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 quality model that is straight and true.

If you 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.

In addition to joining an R/C club, we strongly recommend you join the AMA (Academy of Model Aeronautics). AMA membership is required to fly at AMA sanctioned clubs. There are over 2,500 AMA chartered clubs across the country. Among other benefits, the AMA provides insurance to its members who fly at sanctioned sites and events. Additionally, training programs and instructors are available at AMA club sites to help you get started the right way. Contact the AMA at the address or toll-free phone number below:

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

DECISIONS YOU MUST MAKE

This is a partial list of items required to finish the Pitts Special that may require planning or decision-making before starting assemble. Order numbers are provided in parentheses.

Radio Equipment
The Pitts Special requires a minimum 4 channel radio system such as the Futaba® 4VF (FUTJ62**). Due to the aerobatic capabilities of this model aircraft we strongly recommend that servos with a minimum of 50 oz.-in. of torque be used.

You will also need other extensions and Y-harnesses. These requirements will differ based on the manner in which you configure your set-up of this model aircraft. For example, you can set this model aircraft up with two aileron servos only on the bottom wing and mechanically connect those ailerons to the ailerons in the top wing with connecting rods. Using the four aileron servo set-up will take more extensions and Y-harnesses.

Also you may opt to not use a Y-harness set-up on your elevators by using a mixing function on your transmitter if it has those capabilities. The extensions needed will also vary based on the location of your battery pack and your receiver. So be sure to plan your set-up carefully. Then, based on your decisions, you can determine what items you will need.

Engine Recommendations
The following engines are recommended and have been tested for use in the Pitts Special:

O.S.® 1.60 FX two-stroke (OSMG0661)
O.S. 1.60 FX-FI two-stroke, fuel injected (OSMG0662)
SuperTigre® G-4500 two-stroke (SUPG0270)
O.S. FT-300 Gemini Twin four-stroke (OSMG1250)
US Engines™ 41cc 2.5 Gas Engine (USEG0041)

Remember that this is a scale model that is intended to fly at scale-like speeds, so throttle management should be practiced.

If you choose a lighter weight engine you will need to add nose weight to achieve the proper balance. This model has been tested with the lighter weight OS 1.60 FX plus added weight to balance. This combination flew very scale-like and aerobatic. Should you wish to minimize the total weight of your model, you may want to consider moving the servos from the tail location forward into the area behind the fuel tank and just inside the bottom wing. Of course, you will need to connect the servos to the control surfaces with pushrods that are not installed or supplied. This option would allow you to balance the model properly with less weight added to the nose of the model.

ADDITIONAL ITEMS REQUIRED

Hardware and Accessories

This is the list of hardware and accessories required to finish the Great Planes Pitts Special. Order numbers are provided in parentheses.

- ❏ Propellers-Follow engine manufacturer's recommendations
- ❏ R/C foam rubber 1/4" (HCAQ1000) or 1/2" (HCAQ1050)
- ❏ Servo extensions
- ❏ Y-Harnesses

Covering Accessories

- ❏ 21st Century® sealing iron (COVR2700)
- ❏ 21st Century trim seal iron (COVR2750)
- ❏ 21st Century cover sock (COVR2702)

Adhesives and Building Supplies

In addition to common household tools and hobby tools, this is the "short list" of the most important items required to assemble the Pitts Special. ***Great Planes Pro™*** *CA and Epoxy glue are recommended.*

- ❏ 30-Minute Epoxy (GPMR6047)
- ❏ 6-Minute Epoxy (GPMR6045)
- ❏ Threadlocker (GPMR6060)
- ❏ 1/2 oz. Thin Pro CA (GPMR6001)
- ❏ 1/2 oz. Medium Pro CA+ (GPMR6007)
- ❏ 3' Medium fuel tubing (GPMQ4131)
- ❏ Hobby knife (HCAR0105)
- ❏ #11 blades (HCAR0211)
- ❏ Mixing Sticks (GPMR8055)
- ❏ Small T-pins (HCAR5100)
- ❏ Builder's triangle (HCAR0480)
- ❏ Electric drill and 1/16" [1.6mm], 5/64" [2mm], 3/32" [2.4mm], 1/8" [3.2mm], 9/64" [3.5mm], 3/16" [4.8mm], 7/32" [5.6mm], and 17/64" [6.7mm], drill bits
- ❏ Small Phillips (HCAR1024) and flat blade (HCAR1002) screwdrivers
- ❏ Pliers with wire cutter (HCAR0630)

OPTIONAL ITEMS

Here is a list of optional tools mentioned in the manual that will help you assemble the Pitts Special ARF.

- ❏ Switch and Charge Jack Mounting Set (GPMM1000)
- ❏ Easy-Touch™ Bar Sander (GPMR6170)
- ❏ Easy Fueler™ fuel filling valve for glow fuel (GPMQ4160)
- ❏ Hobbico® Servo Horn Drill (HCAR0698)
- ❏ 1/3-scale pilot (DGAQ2000)
- ❏ Top Flite Precision Magnetic Prop Balancer™ (TOPQ5700)
- ❏ Great Planes Fingertip Prop Balancer (GPMQ5000)
- ❏ Straightedge with scale (HCAR0475)
- ❏ Cutting mat (HCAR0456)
- ❏ Masking Tape (TOPR8018)
- ❏ CA Debonder (GPMR6039)
- ❏ CA Applicator tips (GPMR6033)
- ❏ CA accelerator (GPMR6034)
- ❏ R/C-56 Canopy Glue (JOZR5007)
- ❏ Epoxy Brushes (GPMR8060)
- ❏ Denatured Alcohol (for epoxy clean up)
- ❏ Curved Tip Canopy Scissors for Trimming Plastic Parts (HCAR0667)
- ❏ Dead Center™ Engine Mount Hole Locator (GPMR8130)
- ❏ Great Planes Receiver Guard (GPMM1010)
- ❏ Great Planes AccuThrow™ Deflection Gauge (for measuring control throws, GPMR2405)
- ❏ Hobbico Hot Knife (HCAR0770)
- ❏ Hobby Retractable Tape Measure (HCAR0478)

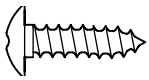
IMPORTANT BUILDING NOTES

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" long [19.1mm]

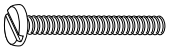
This is a number six screw that is 3/4" [19.1mm] long.

Truss head screws are designated by a number and a length. For example #8 x 5/8" [15.9mm]



This is a number eight screw that is 5/8" [15.9mm] long.

Machine screws are designated by a number, threads per inch, and a length. For example 4-40 x 3/4" long [19.1mm]



This is a number four screw that is 3/4" [19.1mm] 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 tell you what glue is recommended.

- Whenever just ***epoxy*** is specified you may use ***either*** 30-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.

MonoKote Information

The Pitts Special ARF is factory-covered with Top Flite MonoKote film. Should repairs ever be required, MonoKote can be patched with additional MonoKote purchased separately. MonoKote is packaged in six-foot rolls, but some hobby shops also sell it by the foot. If only a small piece of MonoKote is needed for a minor patch, perhaps a fellow modeler would give you some. MonoKote is applied with a model airplane covering iron, but in an emergency a regular iron could be used. A roll of MonoKote includes full instructions for application. Following are the colors used on this model and order numbers for six-foot rolls.

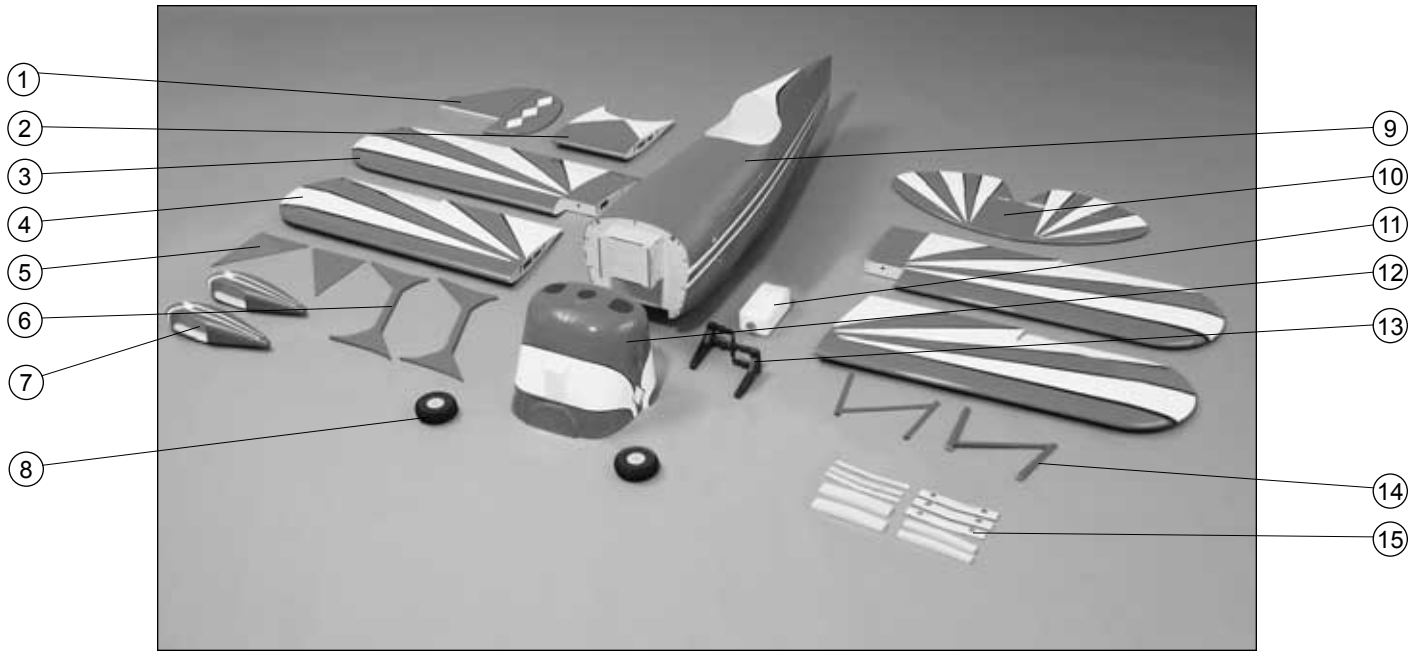
True Red	TOPQ0227
Black	TOPQ0208
White	TOPQ0204

Metric Conversions

1" = 25.4mm (conversion factor)

1/64" = .4mm	1" = 25.4mm
1/32" = .8mm	2" = 50.8mm
1/16" = 1.6mm	3" = 76.2mm
3/32" = 2.4mm	6" = 152.4mm
1/8" = 3.2mm	12" = 304.8mm
5/32" = 4mm	15" = 381mm
3/16" = 4.8mm	18" = 457.2mm
1/4" = 6.4mm	21" = 533.4mm
3/8" = 9.5mm	24" = 609.6mm
1/2" = 12.7mm	30" = 762mm
5/8" = 15.9mm	36" = 914.4mm
3/4" = 19mm	

Kit Contents



Parts photographed

Key #	Description	Qty
1.	FIN with/ RUDDER	(1)
2.	TOP WING CENTER SECTION	(1)
3.	BOTTOM WING with/AILERONS	(2 Pcs)
4.	TOP WING with/AILERONS	(2 Pcs)
5.	LANDING GEAR SPATS	(2)
6.	PAINTED FIBERGLASS STRUTS	(2)
7.	PAINTED FIBERGLASS WHEEL PANTS	(2)
8.	4" WHEELS	(2)
9.	FUSELAGE	(1)
10.	STAB with/ELEVATORS	(1)
11.	FUEL TANK W/HARDWARE	(1)
12.	PAINTED FIBERGLASS COWL	(1)
13.	ENGINE MOUNT L&R	(2 Pcs)
14.	PAINTED CABANE STRUTS	(2)
15.	WING JOINERS	(10 Pcs)

Parts not photographed

(1) PAINTED CANOPY
(1) DECAL SHEET
(1) PAINTED ALUMINUM LANDING GEAR
(1) ALUMINUM SPINNER
(1) PLYWOOD TRAY
(for optional mounting receiver and battery pack)
(4) 8/32" x 1" SHCS
(socket-head cap screws for attaching engine mount)
(4) 8/32" BLIND NUTS (for attaching engine mount)
(4) 6/32" x 1/8" SET SCREWS (for wheel collars)
(4) 5/32" WHEEL COLLARS (for attaching main wheels)
(2) 2" x 5/32" AXLES
(2) 5/16" LOCK NUTS (for attaching axles)
(2) ¼"-20 NYLON BOLTS (attach wing to fuse)
(1) NYLON CLEVIS (throttle)
(7) 4-40 SOLDER CLEVISES (ailerons, elevators, rudder servos)
(1) 2-56 NYLON FASLINKS (throttle)
(7) HEAVY DUTY CONTROL HORNS
(ailerons, elevators, rudder)
(3) HEAVY DUTY CONTROL HORN BACK-PLATES
(elevators and rudder)
(40) SILICONE CLEVIS RETAINERS (all clevis applications)
(1) 2" x 9" CA HINGE STRIP (all control surfaces)
(2) 2-56 x 12" THREADED ONE END ROD
(throttle and tail wheel control rod)
(7) 4-40 x 12" THREADED ONE END ROD
(control surfaces push rods)
(8) #8 WASHERS
(engine mount to firewall and engine to mount)
(13) 4-40 NYLON STOP NUTS (for attaching struts, cabanes, and brackets for tail surface flying wires)
(10) #4 WASHERS (for attaching struts and cabanes)
(6) #2 x 1/2" PHILLIPS HEAD SCREWS
(for attaching cowl)
(4) 8-32 x ¾" SOCKET HEAD SCREWS
(for mounting engine to mount)
(12) #2 FLAT WASHER
(for attaching landing gear spats and attaching cowl)
(7) 4-40 x 5/8" PHILLIPS HEAD MACHINE SCREWS
(for attaching wheel pants and brackets for tail surface flying wires)
(25) 2-56 THREADED METAL CLEVISES
(for flying wires, (1) tail gear linkage)
(25) 2-56 NUTS
(for flying wires and tail wheel steering pushrod)

Parts not photographed (continued)

(34) #4 x 1/2" WOOD SCREWS (for attaching cabanes to fuselage, brackets for struts and wires, aileron control horns, tail gear to fuselage)
(4) 4-40 BLIND NUTS (for attaching wheel pants)
(7) 4-40 THREADED METAL CLEVISES (control surfaces)
(7) 4-40 HEX NUTS (control surface push rods)
(6) 2-56 x 1/2" PHILLIPS MACHINE SCREWS (for attaching spats to landing gear)
(6) #8 x 5/8" PHILLIPS TRUSS HEAD SCREWS (for attaching landing gear)
(2) 3-32 WHEEL COLLARS (for attaching tail gear linkage)
(2) WHEEL COLLAR SET SCREW (for attaching tail gear linkage)
(1) NYLON TORQUE ROD HORN (tail gear linkage)
(1) 2-56 SOLDER METAL CLEVIS (for attaching tail gear linkage)
(24) ALUMINUM CRIMP TUBES (for attaching flying wires)
(20) 2-56 THREADED BRASS ENDS (drilled for flying wires)
(4) 3/32 [2.4 mm] x 1" [25 mm] x 2" [51 mm] PLYWOOD PLATES (for mounting wheel pants)
(4) 3/32 [2.4 mm] x 1" [25 mm] x 1" [25 mm] PLYWOOD PLATES (for wheel pant bearing blocks)
(1) FLYING WIRE
(2) 90-DEGREE COMPOUND BEND BRACKETS
(4) 90-DEGREE BRACKETS
(8) 45-DEGREE BRACKETS
(4) 110-DEGREE COMPOUND BEND BRACKETS
(4) 70-DEGREE COMPOUND BEND BRACKETS
(8) 70-DEGREE BRACKETS
(6) COWL MOUNTING BLOCKS (for attaching cowl to fuselage)
(2) 3/8" x 1" DOWEL (for bottom wing hold-down)
(10) 4-40 x 1/2" SOCKET HEAD CAP SCREWS (for attaching top wing to cabanes and interplane struts)
(12) 4-40 x 3/4" SOCKET HEAD CAP SCREWS (for attaching control horns to elevators and rudder)
(6) 2-56 STOP NUTS (for attaching spats onto landing gear)
(1) TAIL WHEEL ASSEMBLY

Ordering Replacement Parts

To order replacement parts for the Great Planes Pitts Special 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.greatplanes.com** and click on "Where to Buy." If this kit is missing parts, contact **Great Planes Product Support**.

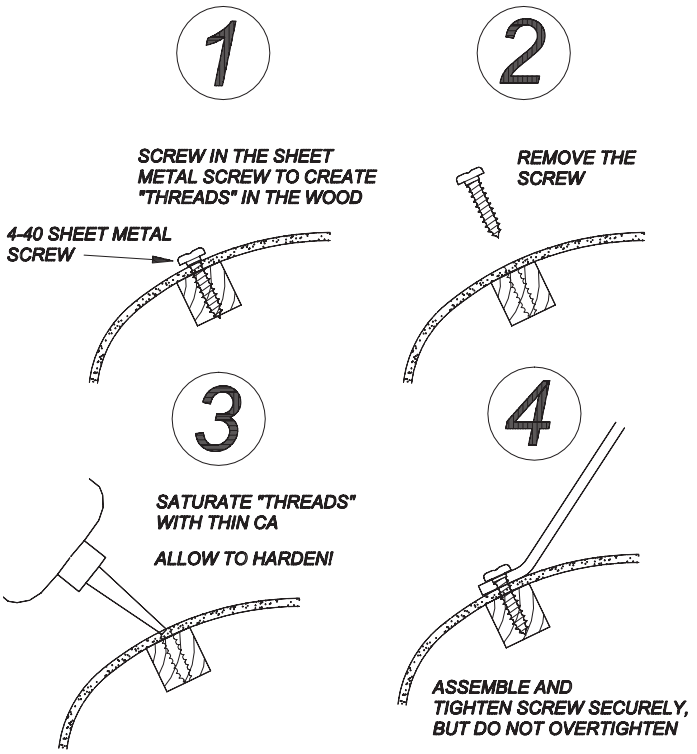
Replacement Parts List

Order Number	Description	How to purchase
GPMA2248	COWL	Contact hobby supplier
GPMA2249	WHEEL PANTS	
GPMA2250	TOP WING SET	
GPMA2251	BOTTOM WING SET	
GPMA2252	FUSE KIT	
GPMA2253	TAIL KIT	
GPMA2254	CANOPY	
GPMA2255	LANDING GEAR	
GPMZ0235	INSTRUCTION MANUAL	
	Missing pieces	Contact Product Support
	Full-size plans	Not available

Before starting to assemble, use the **Kit Contents** list to take an inventory of this kit to make sure it is complete. Inspect the parts to make sure they are of acceptable quality. If any parts are missing or are not of acceptable quality, or if you need assistance with assembly, contact **Great Planes Product Support**. When reporting defective or missing parts, use the part names exactly as they are written in the Kit Contents list on the previous page.

Great Planes Product Support:
Phone: (217) 398-8970
Fax: (217) 398-7721
E-mail: productsupport@greatplanes.com
You can also check our web site at for the latest Pitts Special updates.

PREPARATIONS



IMPORTANT NOTE: While assembling the Great Planes Pitts Special ARF, you will encounter a number of areas that require the installation of various brackets and other items. Most of the locations for these attachments have predrilled holes for these applications. The attachment screws do fit correctly but tightly. We highly recommend that you first drive the attachment screws into the predrilled holes with a regular screwdriver, then remove each screw, and thoroughly saturate the threads you have created in the hardwood with thin CA. After letting the CA set completely, continue with the assembly by driving the screws back into the threads you have created, being careful not to overtighten. Since these areas are subject to high stress, we strongly recommend that you DO NOT use an electric or battery powered drill or screwdriver for this as you can very easily overtighten the attachment screws and weaken the threads you have created in the hardwood blocks. Use this technique on all areas of the model when you attach anything to the model using screws. Extensive testing of this technique has shown that this method greatly increases the strength of the model.

❏ 1. If you have not done so already, remove the major parts of the kit from the box (wings, fuse, cowl, tail parts, etc.) and inspect them for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed on page 3.

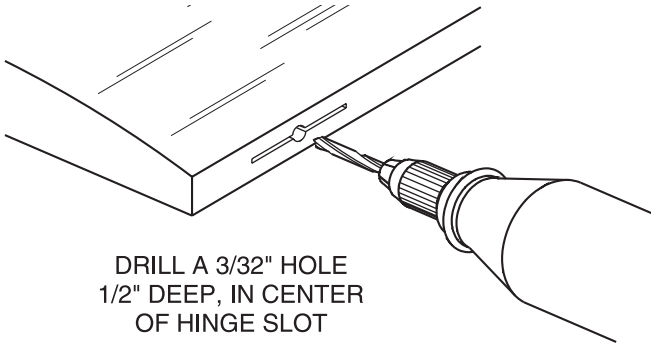
❏ 2. Remove the masking tape and separate the **ailerons** from the **wing**, the **rudder** from the **fin** and the **elevators** from the **stab**. If necessary, tighten the covering with a **covering iron** on high heat. Use a covering sock on the iron to prevent scratches on the covering. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

❏ 3. In this manual you will notice boxes placed in front of each assembly step. These boxes are provided so that you may place check marks in them as you progress through the assembly process. If multiple boxes are present, this step needs to be repeated.

ASSEMBLE THE WINGS

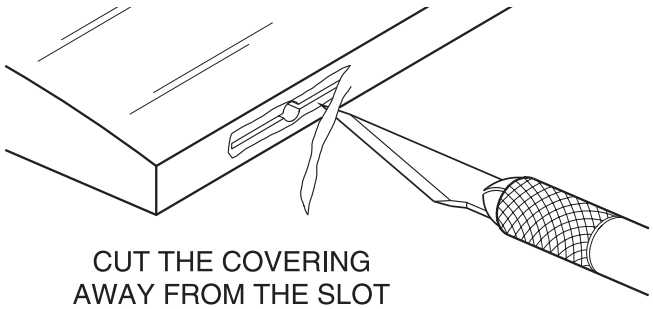
Install the Ailerons

Important note: The Pitts Special ARF is capable of being assembled with the option of using four aileron servos. Or two aileron servos could be used in the bottom wing only, along with connecting rods between the top and bottom ailerons. In this manual we will show only the use of four aileron servos, but extensive testing was performed with the two aileron servo equipped version. This testing resulted in very positive response. Even during our very demanding stress testing, no problems were found.



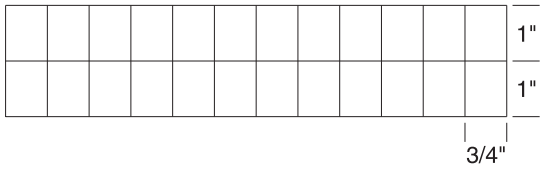
DRILL A 3/32" HOLE
1/2" DEEP, IN CENTER
OF HINGE SLOT

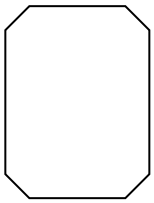
❏ 1. Drill a 3/32" (2.4mm) hole, 1/2" (13mm) deep in the center of each hinge slot to allow the CA to “wick” in. Follow-up with a #11 blade to clean out the slots. **Hint:** If you have one, use a **high-speed rotary tool** to drill the holes.



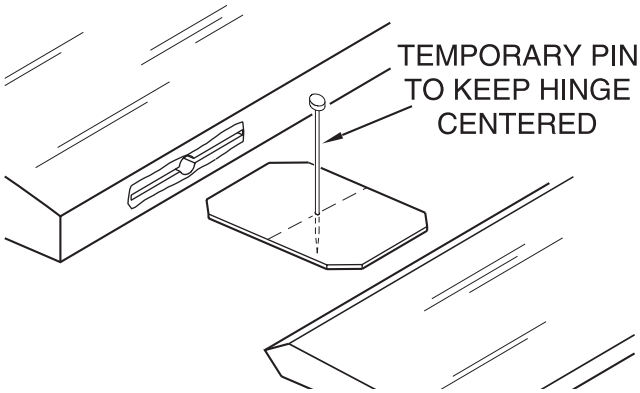
CUT THE COVERING
AWAY FROM THE SLOT

❏ 2. Use a sharp #11 blade to cut a strip of covering from the aileron hinge slots in **all four wing halves** and **ailerons**.





❏ 3. Cut twenty-one 3/4" (19mm) x 1" (25mm) **hinges** from the **CA hinge strip**. Snip off the corners as shown so they go in easier. Insert three of the hinges into the aileron hinge slots of each wing half. The rest of the hinges are for the elevators and rudder.



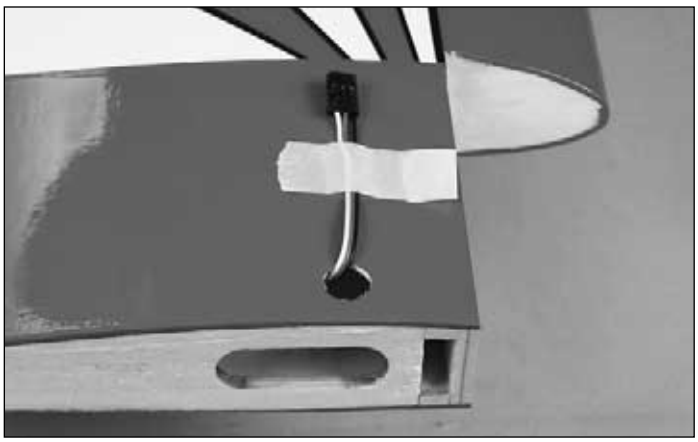
❏ ❏ ❏ ❏ 4. Test fit the aileron to the wing with the hinges. If the hinges don't remain centered, stick a pin through the middle of the hinge to hold it in position.

❏ ❏ ❏ ❏ 5. Remove any pins you may have inserted into the hinges. Adjust the aileron so there is a small gap between the LE of the aileron and the wing. The gap should be just small enough to see light through or to slip a piece of paper through.

❏ ❏ ❏ ❏ 6. Apply six drops of **thin CA** to the top and bottom of each hinge. Do not use CA accelerator. After the CA has fully hardened, test the hinges by pulling on the aileron.

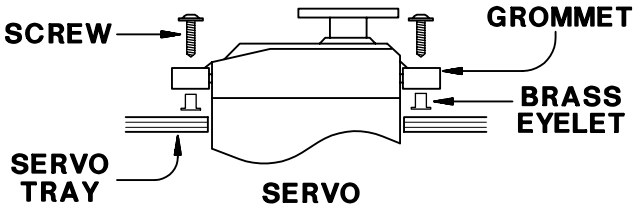
❏ ❏ ❏ ❏ 7. Cut the covering 1/8" (3mm) inside the opening in this wing half for the **aileron servo**. Use a trim iron to seal the covering to the edges of the opening.

❏ ❏ 8. Cut the covering away from the hole in the top of the bottom wing halves and feed the string, which is taped to the root rib, through the hole in top of the wing. Re-tape it securely near the hole. This step is different for the two top wing halves. There is one hole in the center of the top wing center section. Remove the covering from this hole also.

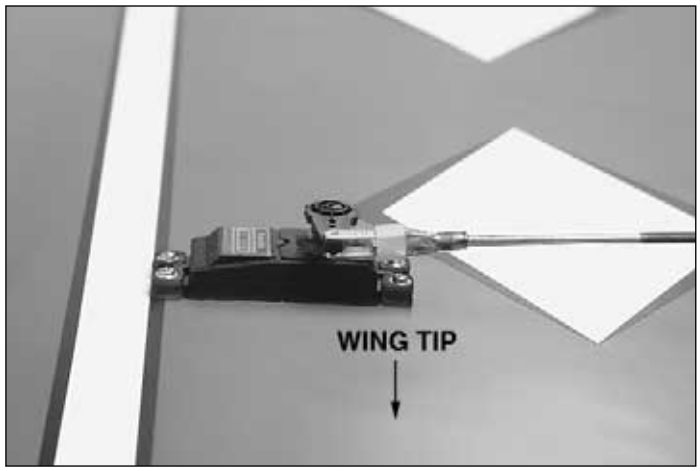


❏ ❏ ❏ ❏ 9. Connect a 12" (305mm) servo extension wire (HCAM2711) to an aileron servo lead and secure it with

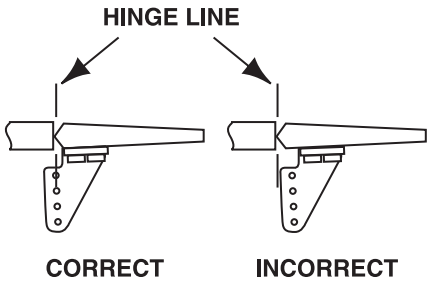
tape or heat shrink material. Tie the string to the aileron servo extension and pull the wire out of the hole on top of the bottom wing halves with the string. Tape the connector to the wing to prevent it from falling back inside the wing. Then discard the string. The end of the aileron extension in the top wing halves should be taped to the wing halves until it is time to join them with the center section of the wing. This is covered in detail later in this manual.

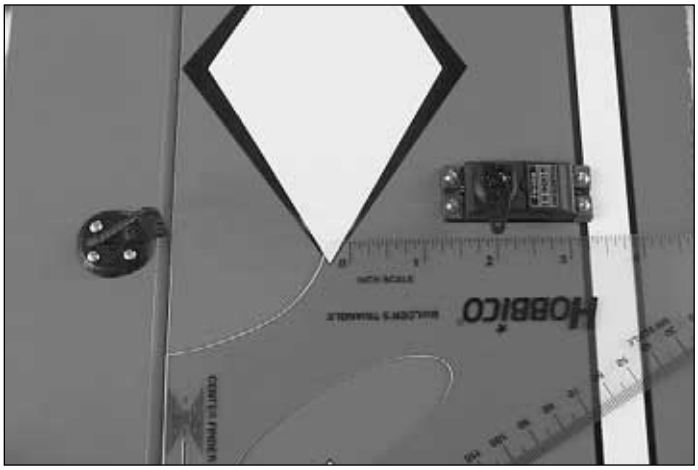


❏ ❏ ❏ ❏ 10. Insert the grommets and brass eyelets into the servo as shown. These are included with the hardware package for the servos. Place the servo into its opening in the wing half and drill 1/16" (1.6mm) holes in the wing for the **servo mounting screws** (also included in the hardware package). Use the techique shown on page 8 to harden the threads. Mount the aileron servos using the servo mounting screws.

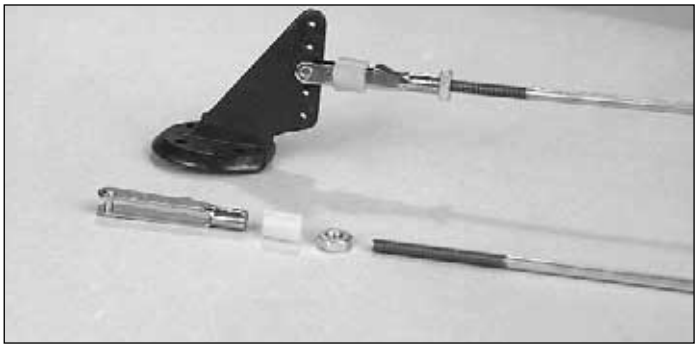


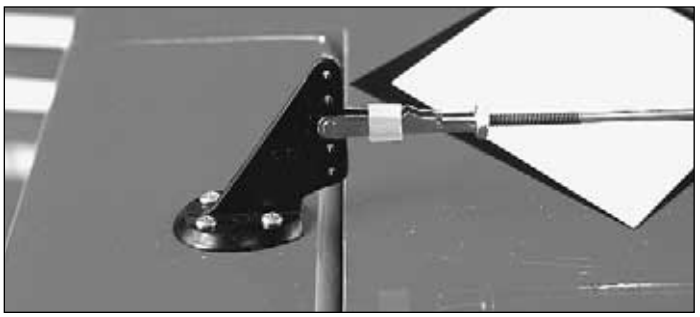
❏ ❏ ❏ ❏ 11. The **servo arms** for the aileron servos are installed so that they point outboard toward the wing tips as shown in the above photograph. This is necessary for proper function.



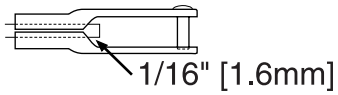


❏ ❏ ❏ ❏ 12. Use a builder's triangle to establish a line to the hole in the servo arm at 90 degrees from the trailing edge of the wing. At this location use a nylon control horn as a pattern to mark and drill the four 5/64" (2 mm) holes 1/2" (13 mm) deep into the bottom of each aileron for mounting the nylon control horns. As shown on page 8, run the #4 sheet metal screws into the wood. Then remove them, creating threads in the wood. Saturate these holes with thin CA, wipe away any residual CA and allow it to fully harden. Mount the aileron control horns to the ailerons with four #4 x 1/2" (13mm) sheet metal screws.





❏ ❏ ❏ ❏ 13. Install a **metal clevis**, a 4-40 **hex nut**, and a **clevis retainer** on the 4-40 x 12" (305mm) **threaded one end pushrod** approximately 15 turns. Remember to use **Great Planes Pro Threadlocker (GPMR6060)** on these clevises and hex nuts after the radio is set up and control throws have been finished later on in this manual.



❑ ❑ ❑ ❑ 14.Place the push rod assembly from step 13 on the aileron control horn. Center the servo arm on the servo and align the aileron with the trailing edge of the wing. Place a 4-40 Metal Solder Clevis onto the servo arm and mark the location of the push rod as shown in the sketch above with a felt tip pen. Cut the push rod off at this point and solder the clevis into place.

NOTE: In the above step you are asked to perform a soldering task. Please refer to the following tips to make these solder joints as strong as possible:

HOW TO SOLDER

A. Use denatured alcohol or other solvent to remove residual oil from the pushrod.

B. Use coarse sandpaper to thoroughly roughen the end of the pushrod where it is to be soldered.

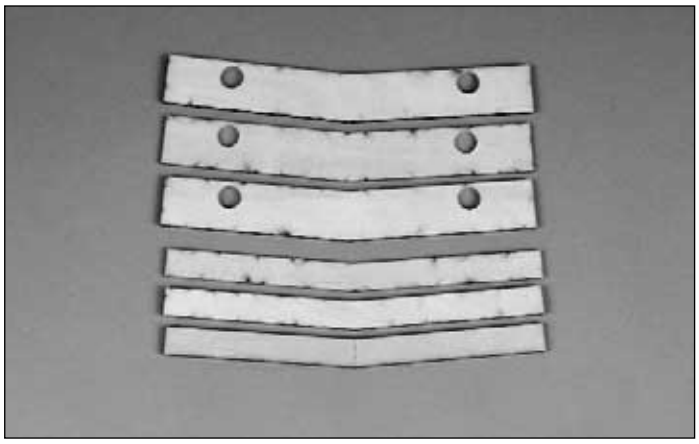
C. Apply a few drops of soldering flux to the end of the pushrod, then use a soldering iron or a torch to heat it. Coat the end of the pushrod with silver solder (GPMR8070) by touching the solder to it. The heat of the pushrod should melt the solder – not the flame of the torch or soldering iron – thus allowing the solder to flow.
Note: Do not use silver solder for electrical soldering.

D. Join the clevis to the pushrod. Add another drop of flux, then heat and add solder. The same as before, the heat of the parts being soldered should melt the solder, thus allowing it to flow. Allow the joint to cool without disturbing it. Avoid excess blobs, but make certain the joint is thoroughly soldered. The solder should be shiny, not rough. If necessary, heat the joint again and allow to cool slowly without disturbing it.

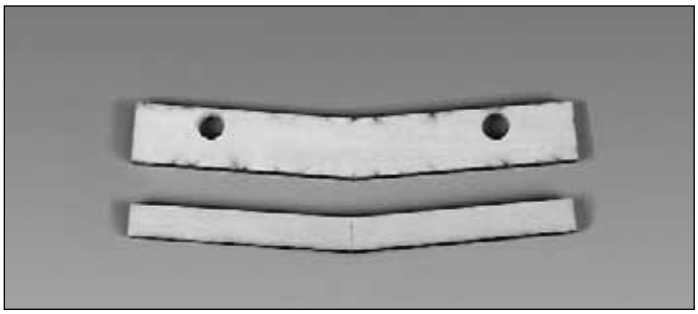
E. After the joint has solidified but while it is still hot, carefully use a damp cloth to wipe away the excess soldering flux. Important: After the joint cools, coat it with oil to protect it from rusting.

❑ 15. Return to step 4 and do the other 3 wing halves.

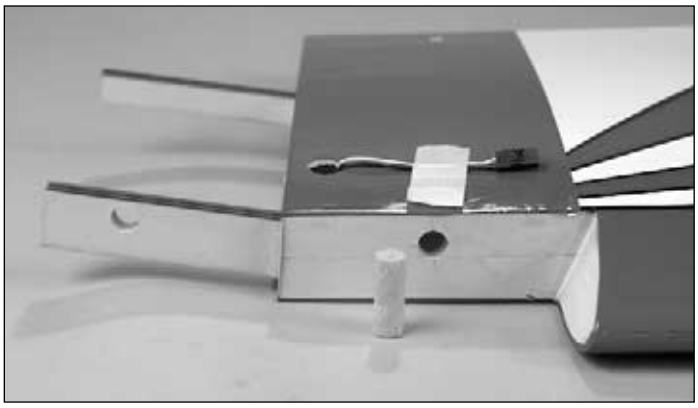
Join the Bottom Wing



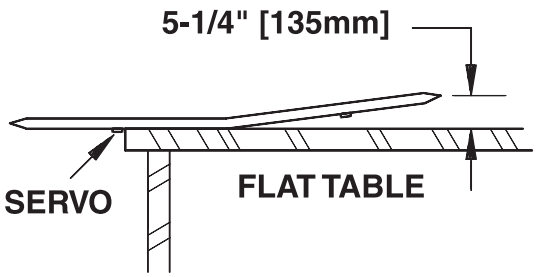
❑ 1. Locate the six die-cut ply **wing joiners** for the bottom wing. Note that there are two different sizes of wing joiners for the front and back of the bottom wing.



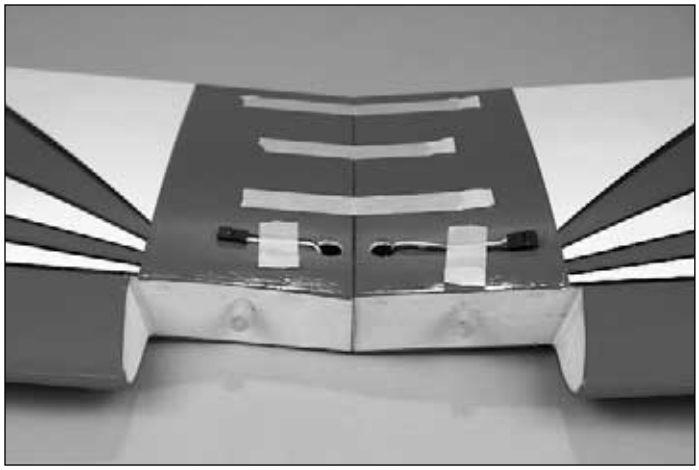
❑ 2. Use epoxy to glue the joiners together to form two plywood joiners as shown.



❑ 3. After the epoxy has cured, sand off any excess glue and test fit the two lower wing joiners into the two wing halves as shown above. Note that the two 3/8" (9.5mm) wood dowels will be placed into the front of the wing. Test fit them into the wing at this time also. Make sure the wing halves fit together properly and form a good fitting joint. If the wing does not fit properly, carefully sand the tips of the wing joiners until you get the proper fit.
Note: The wing joiners are not designed to fit as tightly as possible in order to allow epoxy to flow around the joiners for a more secure and stronger joint.



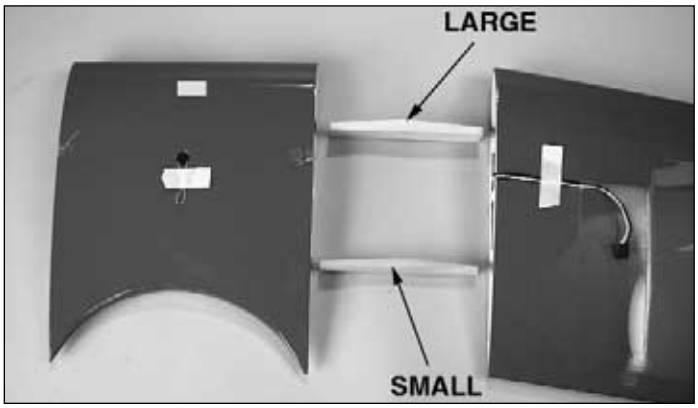
After properly fitting the wing halves together check for the correct dihedral angle. Place one wing panel on a flat surface and measure the distance from the elevated wing tip to the tabletop. This distance should be 5-1/4" (135 mm). **Note:** You will need to hang the aileron servo off the edge of the table in order to get the wing flat on the table as shown in the sketch above.



❏ 4. When satisfied with the fit and the dihedral angle, use 30-minute epoxy to thoroughly coat the root rib of both wing halves and the wing joiners. Be sure to apply a generous amount of epoxy into the inside of each of the wing joiner pockets. **Important:** Make sure the joiners are fitted **upright** to ensure the proper dihedral. Then, join the wing halves, holding them together tightly. Use a paper towel, dampened with alcohol, to wipe away excess epoxy that comes out of the joint. Securely hold the wing together with masking tape, making certain both halves are in full contact and that the leading and trailing edges align. Using the same 30-minute epoxy, coat the holes in the front of the wing and the ends of the two 3/8" (9.5mm) wood dowels. Then, insert them into the front of the wing assembly as shown, leaving 1/2" (13mm) of the dowel extending from the wing. You can use rubbing alcohol for any epoxy clean up. Do not disturb the wing until the epoxy has fully hardened.

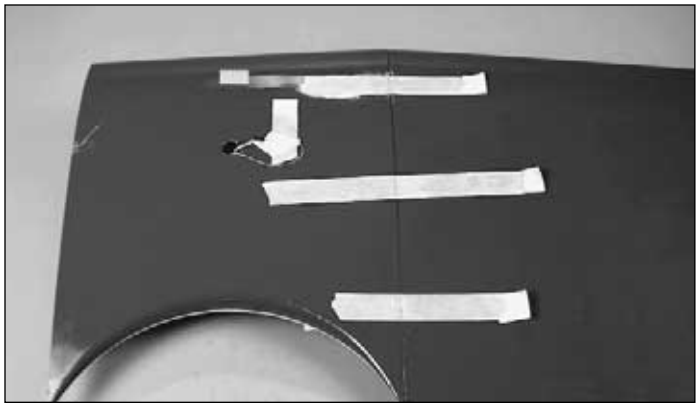
Join the Top Wing

❏ 1. If you haven't already, cut the covering away from the hole in bottom of the top wing center section and feed the string, which is taped to the sheeting, through the hole in bottom of the top wing center section. Retape it securely near the hole.



❏ ❏ 2. Locate two of the four shaped joiners and test fit the left wing half and the center section together with the two shaped joiners in place. Note that you will be using the large joiner in the front of the wing and the smaller one in the rear of the wing. Notice the placement of the angles of these joiners that allows the wing to taper back from the center section (when positioned properly). Should the fit not be correct, carefully sand the ends of the joiners to allow a proper fit. The top wing has no dihedral and is totally flat.

❏ ❏ 3. When satisfied with the fit, glue the joiners into the left wing panel using 30-minute epoxy. Place a generous amount of epoxy into the inside of the pockets and on the half of the joiners that will be inserted into the wing pockets. When the epoxy has cured, tie the string in the center section to the aileron servo extension wire as shown in the photo above.



❏ ❏ 4. We will now glue the left wing panel and the center section together as one unit. To do this use 30-minute epoxy to thoroughly coat the root rib of both the left wing section, the left outside rib of the center section and a generous amount in the inside of the wing joiner pockets in the center section and on the two joiners previously glued into the left wing panel. Make sure you feed the aileron servo extension wire into the center section as you slide them together, being careful not to get glue into the connector as you do. Hold the center section and the wing section together tightly with masking tape, making certain they are in full contact and that the leading and trailing edges align. Wipe away any excess epoxy and do not disturb the assembly until the epoxy has fully hardened. Pull the servo extension wire out of the hole and securely tape it to the center section so it will not slip back into the hole.

❏ 5. Repeat this process to join the right wing panel to the assembly of the left wing panel and the center section.

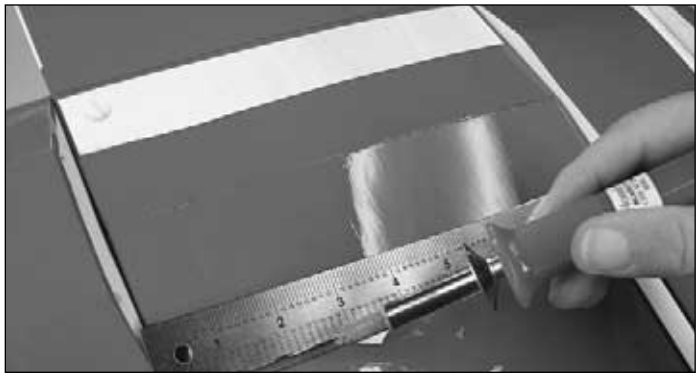
ASSEMBLE THE FUSELAGE

Mount the Bottom Wing

❏ 1. With the fuselage placed upside down, allowing you to work on the bottom of the aircraft, place the bottom wing onto the fuselage. Do not secure the wing with the 1/4" x 20 nylon wing bolts yet.

❏ 2. Locate the belly pan and cut the MonoKote from the two holes which allow access for the wing bolts. Saturate the exposed wood with thin CA to make it stronger, and paint this area after the CA has cured to make it fuel proof.

❏ 3. Place the belly pan on the bottom of the lower wing allowing it to center over the wing bolt holes (you may want to install the wing bolts to hold the belly pan in place as shown in the photo) and also match up to the bottom of the fuselage in front and behind the wing. When satisfied with the fit, mark the outline with a Top Flite Panel Line Pen (TOPQ2510).

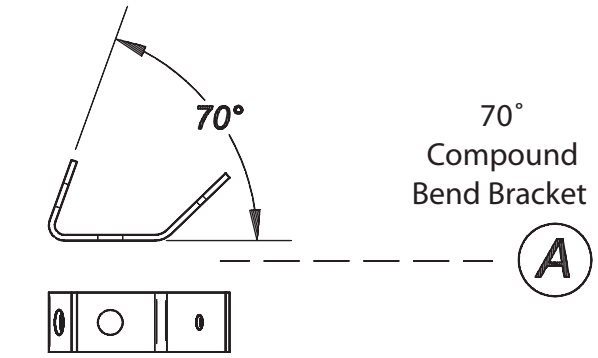


❏ 4. Using a Hobbico Hot Knife (HCAR0770), cut only the covering and NOT the underlying wood 1/8" (3 mm) inside the outer lines so that the covering will extend under the edge of the belly pan when you glue it on. You may also use a hobby knife with a #11 blade. Be sure to do this step gently as both of these methods can result in cutting into the wood under the covering which will weaken the structure if not done carefully. The Hobbico Hot Knife, as mentioned above, will allow you to cut the MonoKote using the least amount of pressure due to the heat helping to cut through the covering.

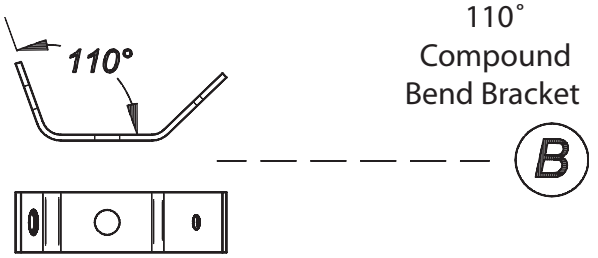
❏ 5. After removing the covering use epoxy to glue the belly pan to the wing. Allow the epoxy to cure completely. Be very careful not to get glue into the area where the belly pan fits into the fuselage; glue it only to the wing itself.

Mount the Top Wing

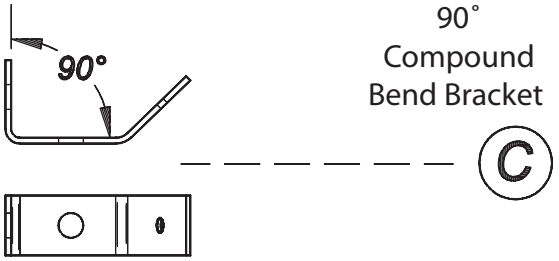
Note: Throughout the rest of the assembly process you will be installing different types of metal brackets. These are diagrammed below. Pay close attention to each metal bracket to make sure you are using the correct one for each particular application and that they are oriented as shown in the photographs. Also note that the holes in each bracket are of a different size. The larger hole allows the mounting screw to pass through and the smaller hole is for attachment of the metal clevis.



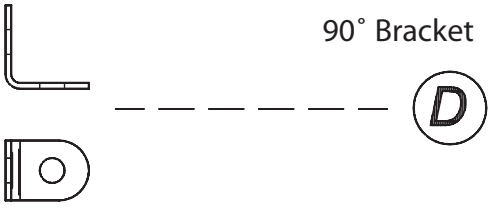
70˚ Compound Bend Bracket — A



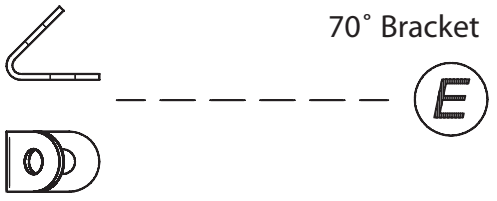
110˚ Compound Bend Bracket — B



90˚ Compound Bend Bracket — C



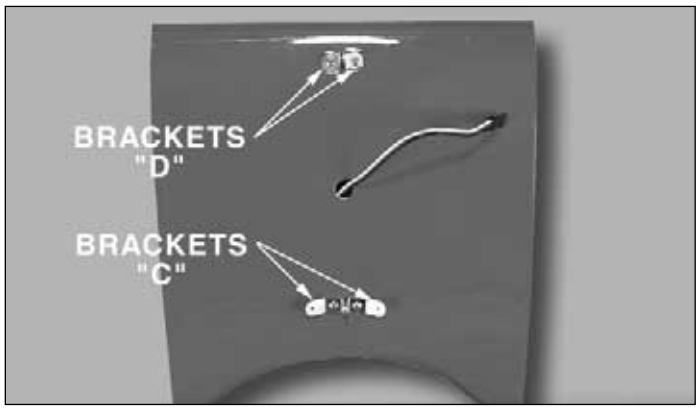
90˚ Bracket — D



70˚ Bracket — E

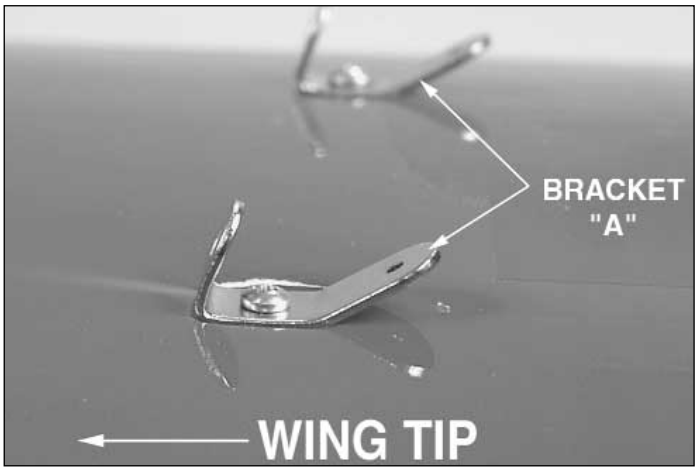
❏ 1. Locate the four predrilled holes in the bottom of the top wing center section.

IMPORTANT NOTE: IN THE FOLLOWING STEP IT IS VERY IMPORTANT TO INSTALL THE TWO 90-DEGREE BRACKETS PROPERLY. THESE BRACKETS HAVE ONE SIDE THAT IS LONGER THAN THE OTHER. WHEN INSTALLED CORRECTLY THERE SHOULD BE NO GAP BETWEEN THESE BRACKETS. IF THERE IS A GAP THEY ARE INSTALLED WRONG. CHECK THE PHOTOGRAPH ON PAGE 15, STEP 8 FOR THE PROPER POSITION OF THESE BRACKETS.



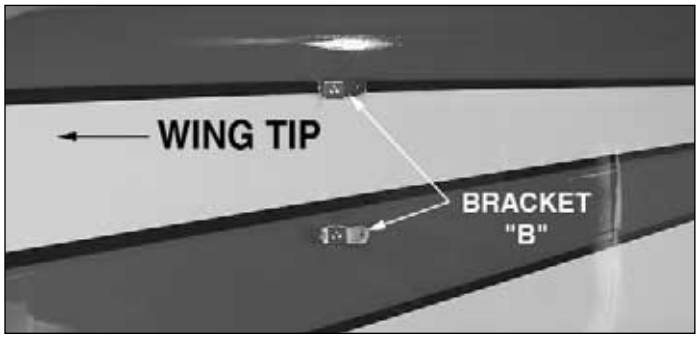
❏ 2. Using the technique described on Page 8, install two 90-degree metal brackets (Bracket D, as shown above) into the pre-drilled holes in the front of the bottom of the top wing center section with two #4 x 1/2" (13mm) wood screws. Mount two 90-degree compound bend metal brackets (Bracket C, as shown above) using two #4 x 1/2" (13mm) wood screws. The cabane struts and flying wires will attach to these "C" brackets in a later step.

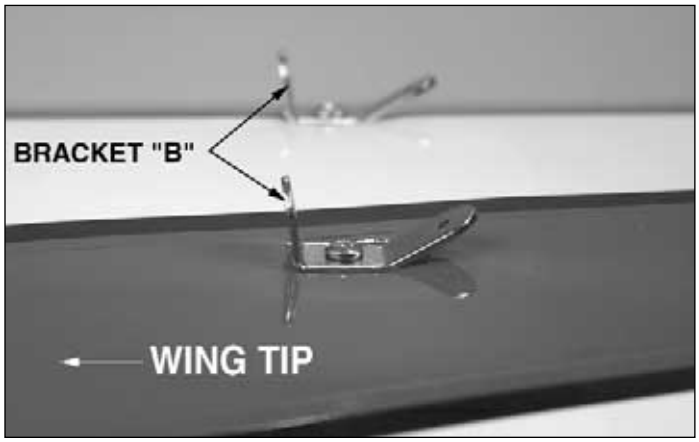
❏ 3. Next locate the four predrilled holes in the two outer panels of the bottom of the top wing just outboard of the aileron servos.



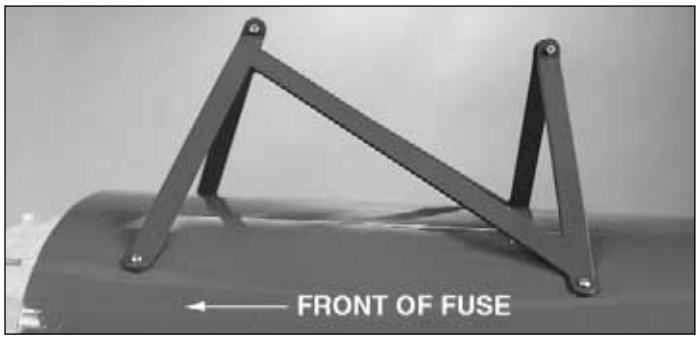
❏ 4. Again, using the technique described on Page 8, install the four 70-degree compound bend metal brackets (Bracket A, as shown in the diagram) in place (two on each wing panel) with four #4 x 1/2" (13mm) wood screws as shown in the photo above. The orientations of these brackets are shown in the photograph.

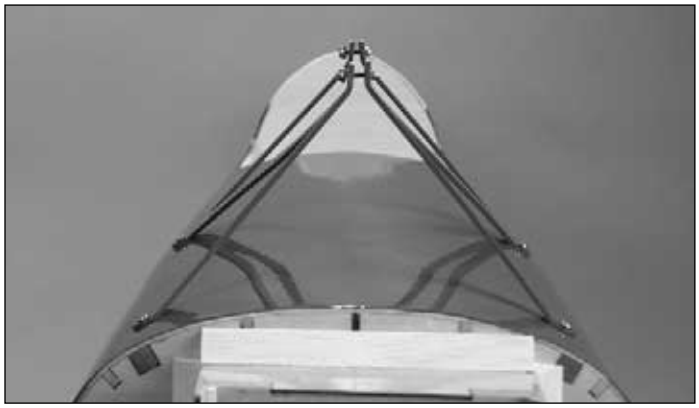
❏ 5. Next locate the four predrilled holes in the outer panels of the top of the bottom wing. See the exact locations and orientations of the brackets in the following two photographs.



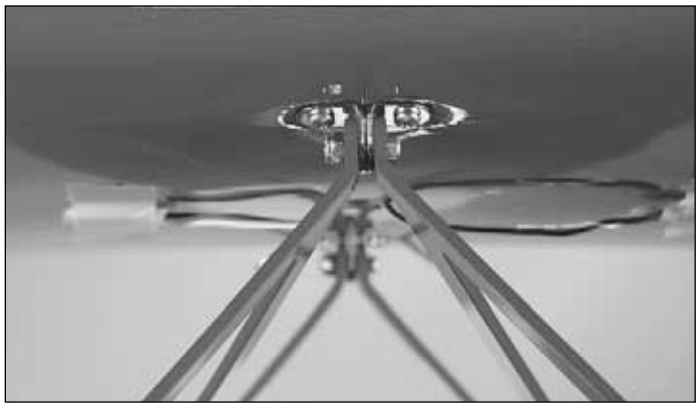


❏ 6. Again, using the technique described on Page 8, install the four 110-degree compound bend metal brackets (Bracket B as shown above) in place with four #4 x 1/2" (13mm) wood screws as shown in the photos above.





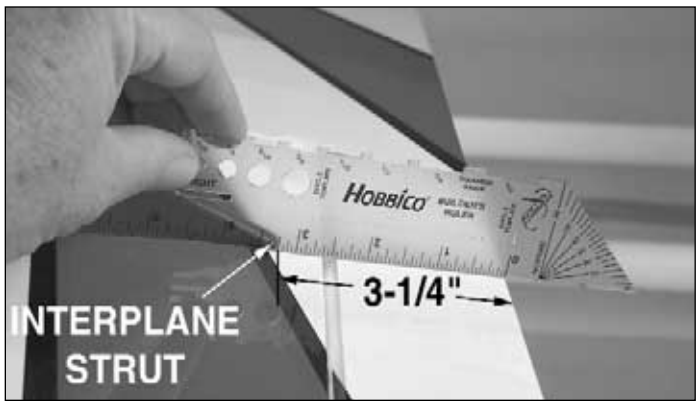
❏ 7. Locate the two painted metal cabane struts. Temporarily and loosely place two 4-40 x 1/2" (13 mm) Socket Head Cap Screws through the holes in the top of the cabane struts and hold them both together with two 4-40 Nylon Stop Nuts. Do not tighten them at this time. Make sure that you have the orientation of the cabanes correct as shown in the photographs. Locate the four predrilled holes in the top of the fuselage. Again, using the same technique described on page 8 that you used for attaching the wing brackets, install the cabane assembly exactly as shown in the photographs above using four #4 x 1/2" (13mm) wood screws.



❏ 8. Attach the top wing by first removing the two temporary 4-40 x 1/2" (13mm) Socket Head Cap Screws from the top of the cabane struts and re-inserting them through one cabane strut hole. Then continue through the two 90 degree brackets mounted in the top wing, and then back through the remaining cabane hole. Next, install 4-40 nylon stop nuts onto the 4-40 x 1/2" (13mm) Socket Head Cap Screws. Notice in the above photograph that the cabane struts fit on the outside of the two 90-degree brackets. Do this for both mounting points.

❏ 9. Locate the two interplane struts; note that there is a left and right. This is determined by the contour angles on the top and bottom of each interplane strut, which allow them to fit properly against the wing.

With the bottom wing still attached to the fuselage, position the struts on the outboard sides (toward the wing tips) of the 70-degree compound bend metal brackets on the bottom of the top wing and the 110-degree compound bend metal brackets on the top of the bottom wing.



❏ 10. For location of the interplane struts on the bottom wing, measure from the TE of the aileron to the rear tip of

the bottom of the interplane strut. This distance is 3-¼" (83mm). When satisfied with the position, mark the location for the two holes in the bottom of the interplane struts. Remove the interplane struts and drill these two holes with a 1/8" (3 mm) drill bit. Saturate these two holes with thin CA. When the CA is set, secure the strut using two 4-40 x 1/2" (13 mm) socket head cap screws, two 4-40 washers, and two 4-40 nylon insert stop nuts. Make sure it is tight, but not overly tight. Repeat this process for the remaining strut.

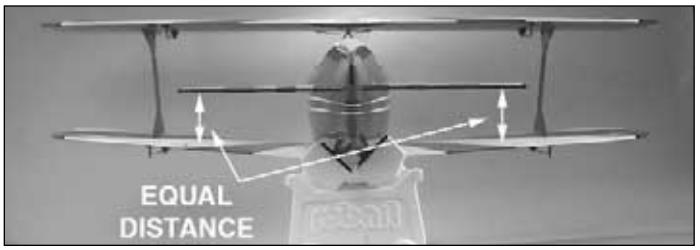
❏ ❏ 11. The placement of the struts in relation to the top wing is determined in the following manner. Measure the distance of the top rear tip of both interplane struts to the trailing edge of the top wing. If necessary, twist the top wing in order to make both distances equal. When satisfied with the alignment, mount the top of the interplane struts to the brackets installed in the top wing using the same method as the bottom of the interplane struts.

Mount the Stab and Fin

❏ 1. Cut and remove the MonoKote covering from the opening in the rear of the fuselage for the **horizontal stab** and the **fin**.

❏ 2. Locate the horizontal stab. Find the center by measuring from tip to tip of the stab. At this point mark a centerline at a 90-degree angle from the trailing edge of the stab to the leading edge. Trial fit the stab into the stab saddle. Check the position of the stab by measuring the distance from the center of the fuse at the tail post to each tip of the stab; this distance needs to be the same. Make adjustments as needed until the distance is equal by moving the "long" tip in the opposite direction half the distance it was too long.

❏ 3. With the wings still attached, place the model in a building stand such as a Robart Super Stand II (ROBP1402). Place a T-pin on the center line of the fuse at the forward most former. Measure from the pin to each tip of the stab. A Hobbico Retractable Fabric Tape Measure (HCAR0478) works well for this step. The distance from the pin to the stab tips needs to be equal on both sides.

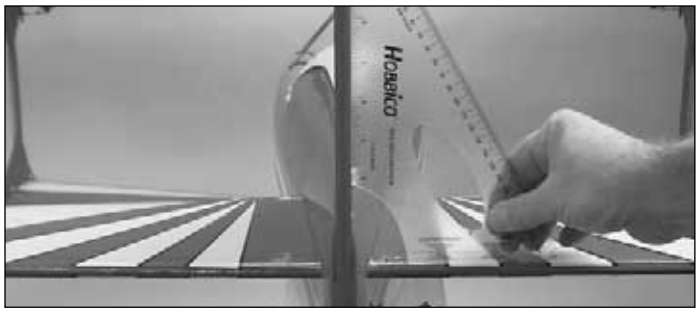


❏ 4. Stand ten to fifteen feet behind the model and view the stab and wings. If the stab and wings align with each other, proceed to the next step. If the stab and wing do not align, remove the stab and carefully sand the "high side" of the slot in the fuse where the stab fits until the stab aligns with the wing. If you needed to make any adjustments, reposition the stab into the fuselage, making sure the alignment is correct.

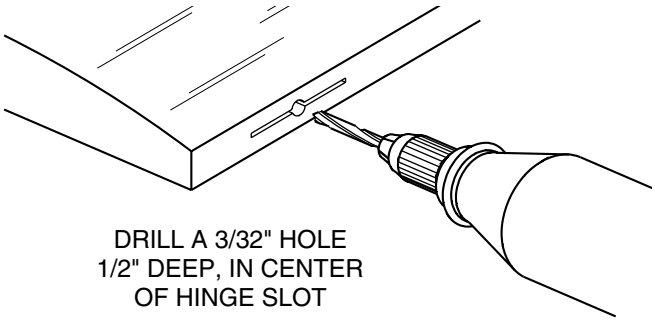
❏ 5. Using a felt-tipped pen, carefully mark the location of the fuse sides on both the top and bottom of the stab. Remove the stab from the fuselage and cut 1/8" inside the line in order to remove the MonoKote covering from the stab. Use a hot knife or sharp hobby knife with the same

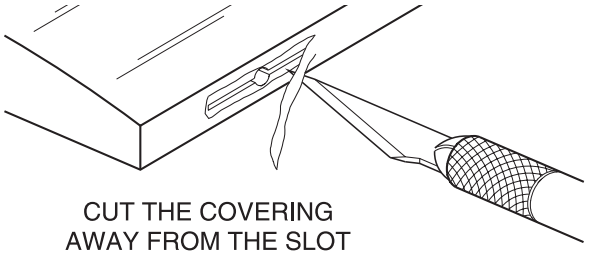
technique that was used while adding the belly pan onto the bottom wing. Again, be careful not to cut into the wood while removing the MonoKote.

❏ 6. Slide the stab back into the fuselage, leaving the exposed wood outside of the fuselage joining area.
Note: This will be a little messy but the epoxy will clean up easily and will allow you to obtain a strong joint of the stab to the fuselage. Apply 30-minute epoxy to the top and bottom of the exposed wood on the stab. Slowly work the stab into the fuselage to a point 1" (25 mm) beyond the first cut-line to appear on the other side of the fuselage. Since the fit of the stab into the fuselage is tight, doing this will push some of the epoxy back. Wipe away this excess epoxy. Apply more epoxy to the exposed wood on the stab where you pushed it past the center position and slowly move it back into place after doing so. Carefully re-position the stab into proper alignment. Using a paper towel, wipe away the excess epoxy. Using a generous amount of denatured alcohol on a paper towel, clean any epoxy residue from the model, but do not allow an excess amount of alcohol to flow into your joint. Also check the bottom of the fin slot on top of the fuselage to make sure you do not have an excess amount of epoxy in the area on top of the stab. The fin needs to fit securely and properly into this area. Allow the epoxy to thoroughly cure before moving the model.

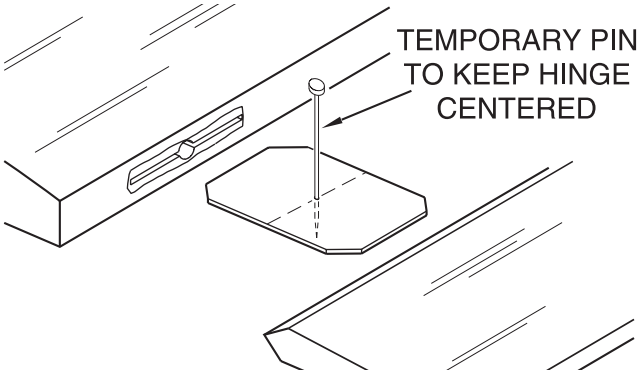


❏ 7. Trial fit the fin to the fuse. Use a triangle like the Hobbico Builders Triangle (HCAR0480) to make sure the fin is 90 degrees square to the stab. When satisfied that the fit and alignment are correct, mark the location of the fuse onto the fin. Carefully remove the MonoKote covering 1/8" inside these lines using the same method used on the stab. Apply a generous amount of 30-minute epoxy to the fin slot sides and the top of the stab at the bottom of the slot. Insert the fin into the slot and as with the stab remove any excess epoxy and residue. Using your triangle, re-check for the correct alignment in relation to the stab. Allow the epoxy to completely cure before proceeding.





❏ 8. To attach the elevators, drill a 3/32" (2.4mm) hole, 1/2" (13mm) deep in the center of each hinge slot to allow the CA to "wick" in. Follow up with a #11 blade to clean out the slots and cut a strip of covering from the hinge slots in the stab and elevators.



❏ 9. Install the hinges into the stab and then test fit both of the **elevators**. If the hinges don't remain centered, stick a pin through the middle of the hinge to hold it in position.

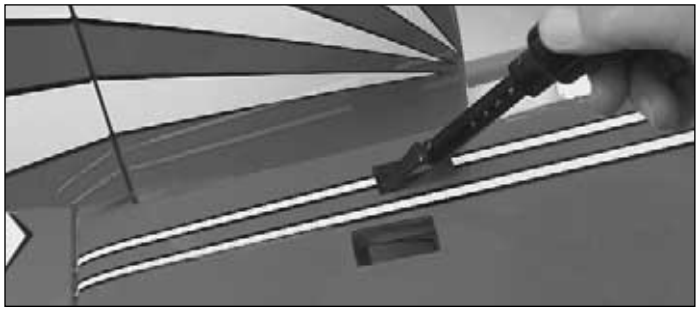
❏ 10. Remove any pins you may have inserted into the hinges. Adjust the elevator so there is a small gap between the LE of the elevator and the stab. The gap should be small — just enough to see light through or to slip a piece of paper through.

❏ 11. Apply six drops of thin CA to the top and bottom of each hinge. Do not use CA accelerator. After the CA has fully hardened, test the hinges by pulling on the elevators.

❏ 12. To attach the **rudder** drill a 3/32" (2.4mm) hole, 1/2" (13mm) deep in the center of each hinge slot to allow the CA to "wick" in. Follow-up with a #11 blade to clean out the slots and cut a strip of covering from the hinge slots in the fin and rudder. Trial fit the hinges into the rudder and place onto the fin. The gap should be small—just enough to see light through or to slip a piece of paper through.

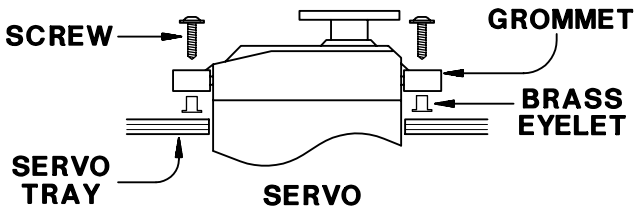
❏ 13. Apply six drops of thin CA to each side of each hinge. Do not use CA accelerator. After the CA has fully hardened, test the hinges by pulling on the rudder.

Install the Servos



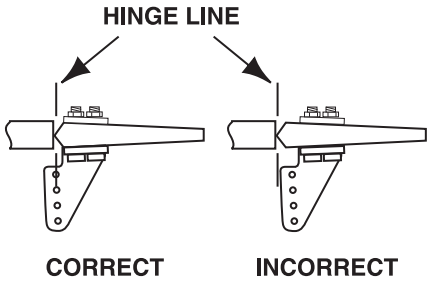
❏ 1. Cut the covering 1/8" (3mm) inside the opening in the fuselage for the two elevator and one rudder servos. Use a trim iron to seal the covering to the edges of the opening. When cutting the covering from the servo bays, refer to the photograph in STEP 8 on PAGE 19 for proper placement of servos. Cut the covering from two servo bays on the right side of the fuselage. On the left side of the fuselage cut only the covering from the servo bay closest to the stab. Note: You can place your rudder servo on either side of the fuse as a servo bay is provided on both sides. Do not cut the covering from both sides unless you intend to use two servos for the rudder.

Important: The installation of the two elevator servos presents a number of options that you must consider at this time as it does affect the manner in which you must mount these two servos. If you are using a radio system that is capable of setting up the two servos on different channels and then mixing them together for the elevator operation (see your radio system manual), you must mount both servos in the same direction with the servo arms placed in the same direction. This would also apply if you used one reversed servo. Another option, and probably the best, is the Futaba SR10 / Dual Servo Synchronizer and Reverser (FUTM4150). The SR-10 is also compatible with the majority of other R/C manufacturer's systems.
If you plan to use a simple Y-harness system for both elevator servos you must make sure that your servos are mounted in the same direction but with the servo arms pointing in opposite directions.



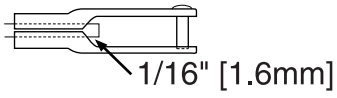
❏ 2. Place the grommets and brass eyelets onto your servos as shown in the sketch above. Depending on your choice of radio operation, connect either a 12" (305mm) servo extension wire (HCAM2711) or if using a Y-Harness (HCAM2751) connect it to one elevator servo, secure it with tape or heat shrink material, and place the servo into the servo bay. Run the remaining end of the Y-Harness through the opening and connect it to the second elevator servo, secure it with tape or heat shrink material, and place the servo into the servo bay.

❏ 3. With the servos in position in the fuselage, drill 1/16" (1.6mm) holes in the fuselage for the servo mounting screws. Using the technique described on Page 8, mount the elevator servo using the supplied screws.

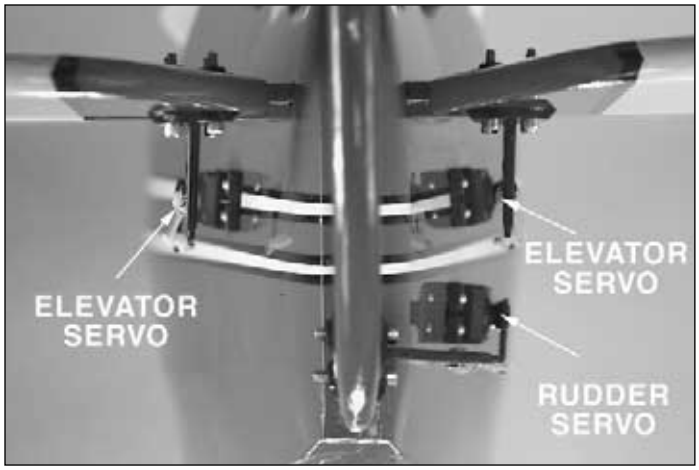


❏ 4. Position the elevator control horns directly in line with the servo arms and with the hinge alignment as shown above. At both locations mark and drill the four 1/8" (3mm) holes for each of the horns. Saturate these holes with thin CA, wiping away any residue and allow it to fully harden. Then re-drill the holes to allow the screws to pass through easily. Mount the control horns and back plates to the two elevators with eight 4-40 x 3/4" (19mm) socket head screws.

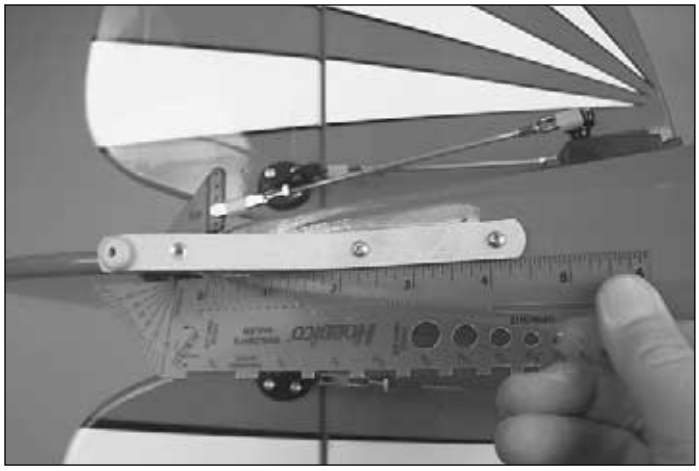
❏ 5. Install two 4-40 threaded metal clevises, two 4-40 hex nuts, and two clevis retainers onto two 12" (305mm) 4-40 pushrods approximately 15 turns. Attach these two push rod assemblies to the control horns. Attach two 4-40 solder clevises to the two elevator servo arms.



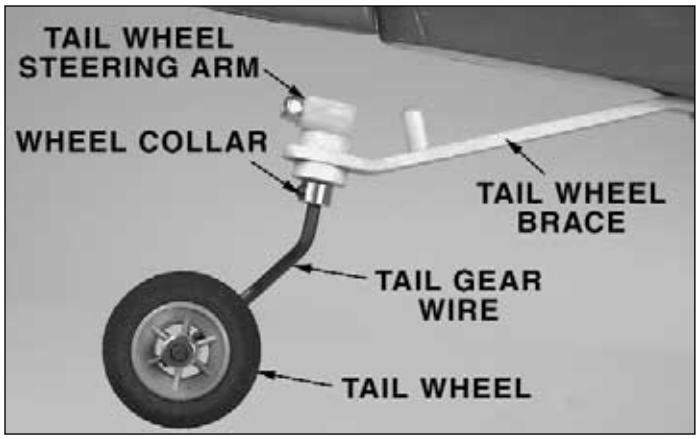
❏ 6. Center the servo arm on the servo and align the elevators with a straight edge. Holding the push rod assembly and the 4-40 Metal Solder Clevis on the servo arm in place, mark the location of the push rod as shown in the sketch above with a felt tip pen. Cut the push rod off at this point and solder the clevis into place. Repeat this procedure for the remaining elevator and also for the rudder servo.



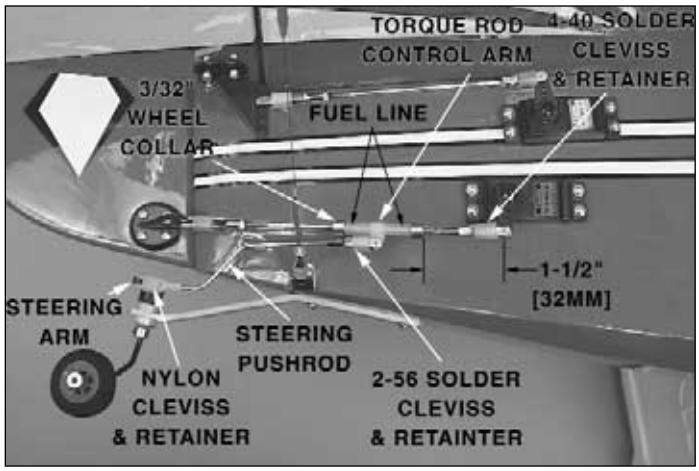
❏ 7. The photo above references the completed installation of elevator and rudder servos, control horns, and pushrods. Looking forward from the rear of the fuselage you can see that the rudder servo is placed below the elevator servo.



❏ 8. To install the **tail gear**, position it so the forward edge is 4-1/2" (115 mm) from the aft end of the fuselage as shown in the above photo. Mark the location of the holes in the tail gear on the fuselage and drill two 3/32" (2.4 mm) holes. Be sure to again use the method of installing screws into the model described on page 8 and install the gear with two #4 x 1/2" (13 mm) Phillips head wood screws.



❏ 9. Grind or file a flat spot on the tail wheel wire where the steering arm will be located. To locate its proper position align the tail wheel with the rudder and mark the tail wheel wire 90 degrees from the tail wheel. Assemble the tail gear by placing one of the 1/8" (3mm) wheel collars and 4-40 setscrew onto the vertical wire portion of the gear. Then slip it into the tail gear bracket. Attach the steering arm onto the wire on the top side of the bracket as shown in the photo. The steering arm must face the side of the fuse where the rudder servo is located and be at 90 degrees to the tail wheel. Install the tail wheel and the two 1/8" (3 mm) wheel collars onto the gear. File flat spots on the gear wire and be sure to use Threadlocker on all the wheel collar set screws during the final assembly, to prevent them from loosening.

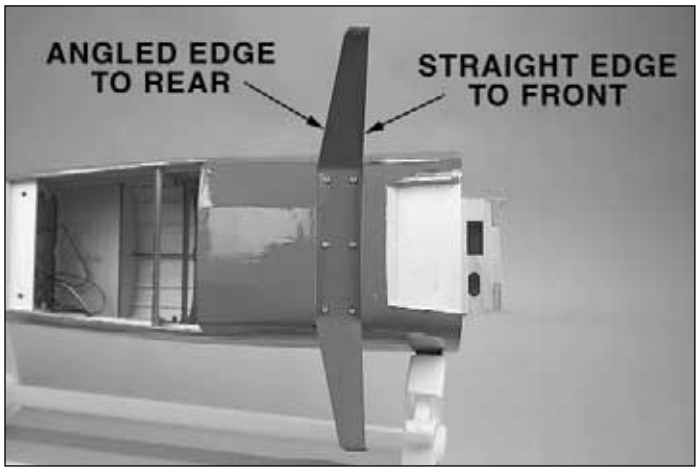


❏ 10. In order to make the ground steering as positive as possible we are using a 2-56 pushrod extended from the rudder control rod to the tail wheel steering arm. This is shown in the above photograph. It is assembled by first removing the rudder pushrod, metal clevis, clevis retainer and hex nut from one end of the assembled pushrod.

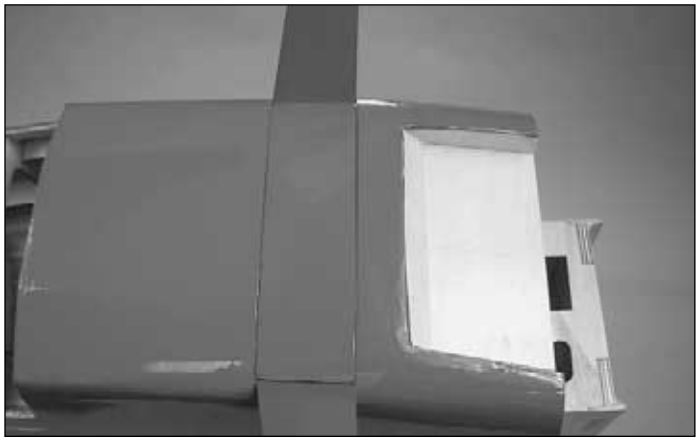
❏ 11. Place a 3/32" wheel collar onto the rudder pushrod and secure it into place with the set screw 1-1/4"(32mm) back from the clevis where it enters the servo arm. On any high performance model, always secure set screws with Threadlocker. Cut two lengths of fuel line 1/2"(13mm) long. Slip one piece of the fuel line onto the rod. Next slip the torque rod control arm onto the rod as shown, followed by the remaining piece of fuel line. Place another 3/32" wheel collar into place behind the last piece of fuel line and secure it with the set screw. Replace your hex nut and metal clevis and reattach the assembly onto the rudder servo and control horn.

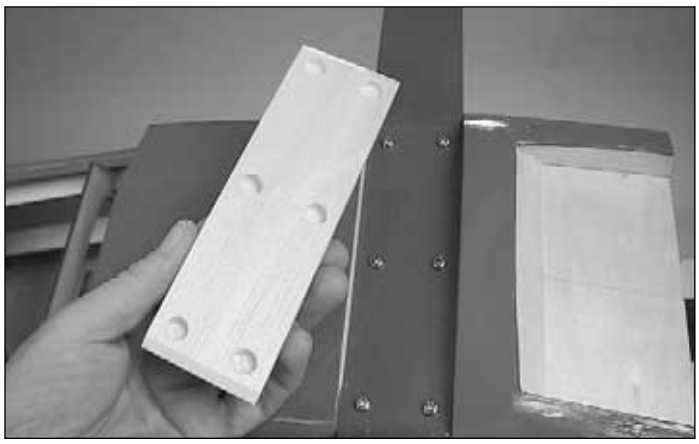
❏ 12. Place a nylon clevis onto the 2-56 x 12" (305mm) threaded one end push rod approximately 25 turns and add a silicone clevis retainer to it. Make a bend in the rod as shown to align with the steering arm. Attach a 2-56 metal solder clevis to the steering arm and hold it and the push rod assembly in place while you align the tail wheel with the rudder. Make a mark on the rod just as you did with the rudder and elevator push rods. Cut the rod at that location and solder the clevis into place. Attach the rod in place as shown in the photos. This completes the tail wheel assembly.

Mount the Landing Gear

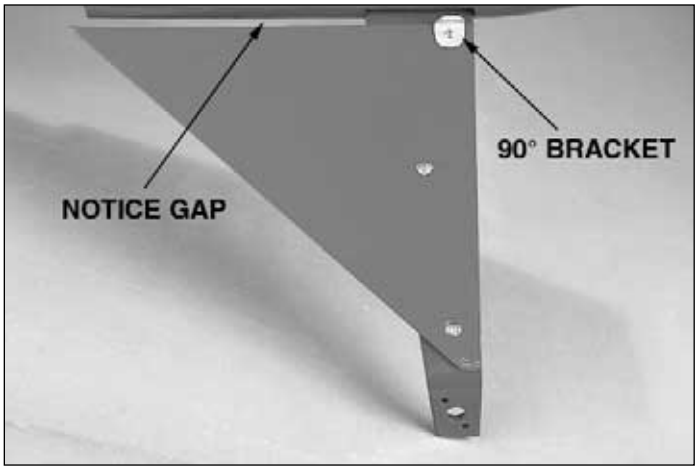


❏ 1. To mount the **main landing gear** set it into place using the above photograph for the proper orientation and mark the location of the six holes drilled in the landing gear on the landing gear plate. Using the technique described on Page 8, mount the landing gear using the six # 8 x 5/8" (16 mm) truss head screws.

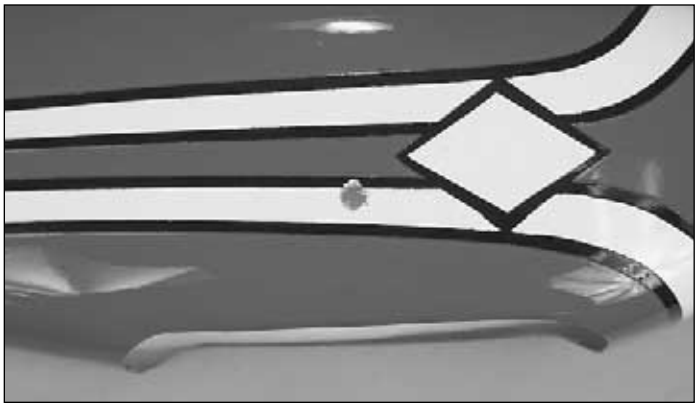




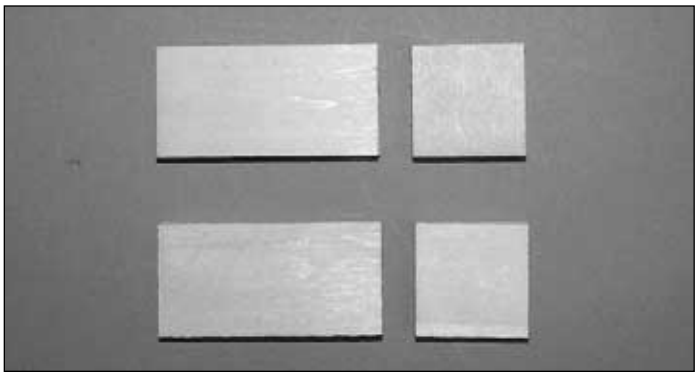
❏ 2. Place the **landing gear cover** on top of the landing gear itself and press on it firmly in order to mark the location of the six truss head screws. Using a drill or a rotary tool, make clearance holes for the heads of the six screws. You may glue this cover into place or attach it with landing gear straps in order to retain access to the landing gear and its hardware if you wish.

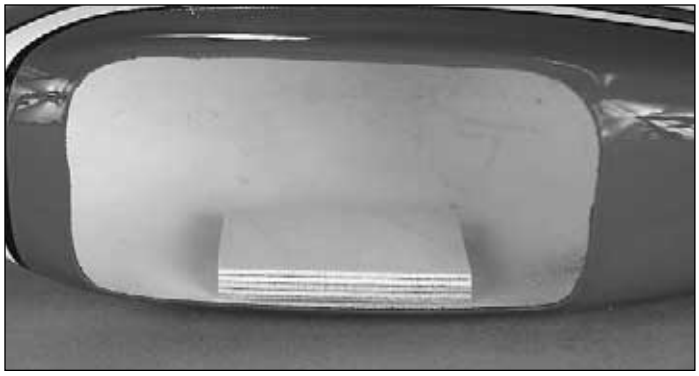


❏ ❏ 3. Position the **landing gear spats** onto the landing gear. Carefully align the leading edge of the spat with the leading edge of the landing gear. Drill the 3/32"(2.4mm) holes through the spats and the landing gear in the locations shown in the above photograph. Use three 2-56 x 1/2"(13mm) Phillips head bolts, three #2 flat washers, and three 2-56 lock nuts to secure the spats. The 90-degree bracket is to attach the flying wires and is mounted in the location shown in the above photograph. Repeat this step for the remaining side of the landing gear.



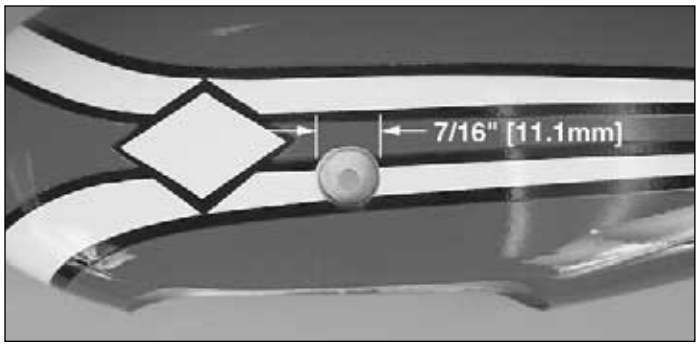
❏ ❏ 4. Look closely at the **painted fiberglass wheel pants** and you will notice there is a mark which indicates the correct position for the 5/32"(4 mm) hole to be drilled to allow the axle shafts to pass through.
Important: You must make one right and one left wheel pant so make sure that you drill the holes on the inboard side of both pants. **DO NOT** drill holes in both sides of the wheel pants.



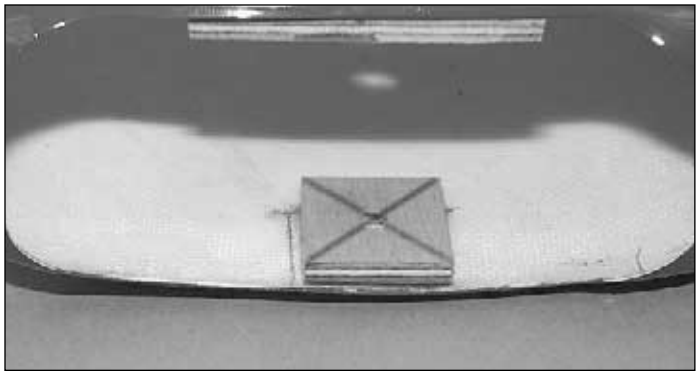


❏ ❏ 5. Locate the four 3/32"(2.4 mm) x 1"(25 mm) x 2"(51 mm) **plywood doublers** for mounting the wheel pants and the four 3/32"(2.4 mm) x 1"(25 mm) x 1"(25 mm) **plywood wheel pant bearing blocks.** Make two sets as shown in the above photograph by gluing them together using 6-minute epoxy.

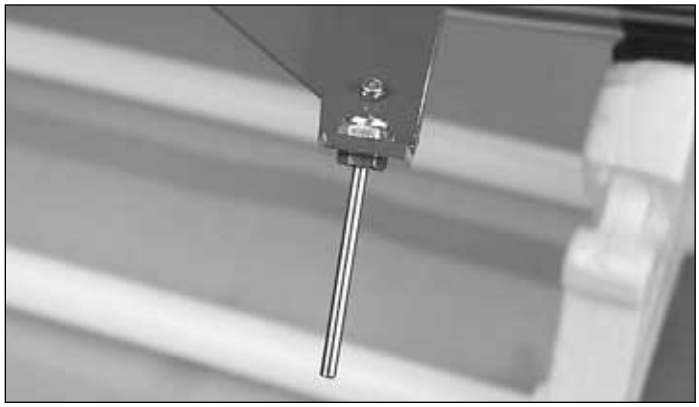
Position the large doubler centered over the hole you drilled previously in the wheel pant. When satisfied with the location, mark its position and rough up the fiberglass with 80 grit sand paper. Then glue it into place using 30-minute epoxy. When the epoxy has cured, drill another 5/32"(4 mm) hole through the plywood doubler using the hole in the wheel pant as a guide.



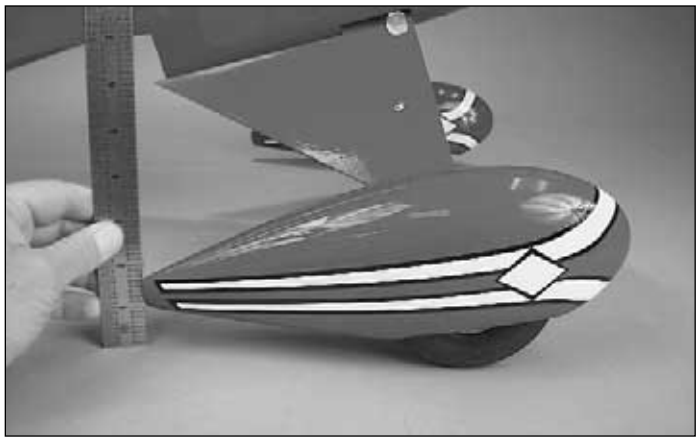
❏ ❏ 6. Use a rotary tool or a drill to carefully create a 7/16"(11.1mm) clearance hole in the fiberglass wheel pant and plywood doubler as shown in the above photo for the axle unit base to fit into. Do not make this hole deeper than 9/64" (3.6 mm).



❏ ❏ 7. Mark the location of the center of the plywood wheel pant bearing block you prepared earlier as shown in the photograph and drill a 5/32" (4mm) hole at this location. Slip the 5/32" x 2" **axle** through the wheel pant and place the bearing block over the axle shaft. Hold the block in place against the outboard side of the wheel pant so that the wheel pant is level and straight. Mark the location of the block on the inside of the wheel pant. Rough up the fiberglass with 80-grit sandpaper and glue the block into place with epoxy. **DO NOT DRILL THROUGH THE WHEEL PANT AT THIS LOCATION**.

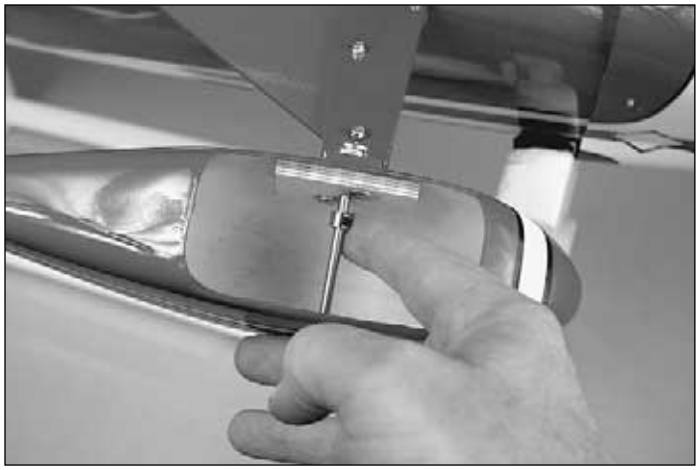


❏ ❏ 8. Install the axles onto the landing gear, making sure the **stop nuts** are securely tightened.



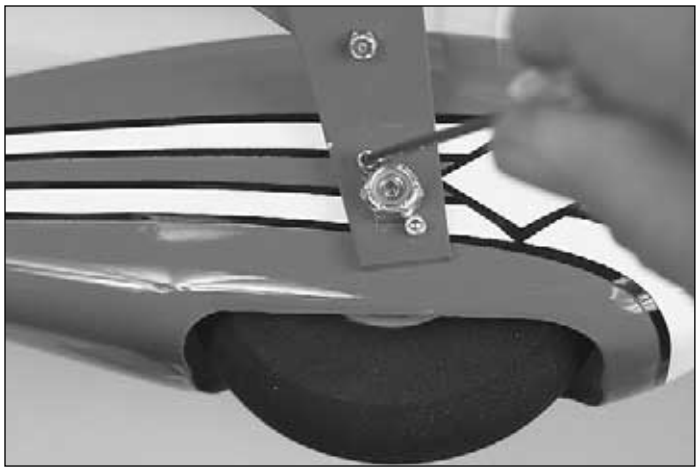
❏ ❏ 9. Temporarily place the wheels into the wheel pants and slip them onto the axle shaft. As shown in the above photograph, set the model on a flat surface and position the aft end of the wheel pants 1" (25mm) above the surface. Mark the locations, on the wheel pant, of the two holes drilled in the landing gear while the aft end of the pants are still elevated 1" (25mm) off your flat surface.

Remove the wheel pant from the landing gear and drill 1/8" (3mm) holes at the marked locations. Epoxy two 4-40 blind nuts into these holes inside the wheel pant but be careful not to get the glue into the threads.



❏ ❏ 10. Insert the axle shaft through the wheel pant and plywood doubler while at the same time slipping one 5/32" wheel collar with a 6/32" setscrew installed onto the shaft.

❏ ❏ 11. Next fit one of the supplied wheels onto each shaft followed by another 5/32" wheel collar with a 6/32" setscrew installed. Center the wheels within the wheel pants and temporarily tighten the 6/32" setscrews in the wheel collars to hold them in place.



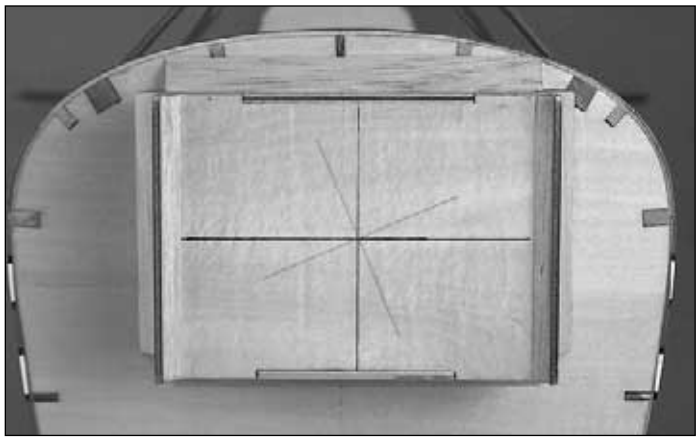
❏ ❏ 12. Install the 4/40 x 5/8" (15.9 mm) Phillips Head Machine Screws through the holes in the landing gear and into the blind nuts installed inside the wheel pant.

❏ ❏ 13. The photograph above shows the assembly of the wheels and pants. Mark the axle for location of the wheel collars. Remove everything from the axle and grind flat spots on the axle for securing the wheel collars. After doing this, reassemble the wheels and pants with the wheel collars, making sure they are tightened properly with Threadlocker applied. Align the wheel pants to their proper position and insert the two 4-40 x 5/8" (15.9 mm) Phillips Head Machine Screws through the holes in the landing gear and into the blind nuts in each wheel pant securing them to the landing gear.

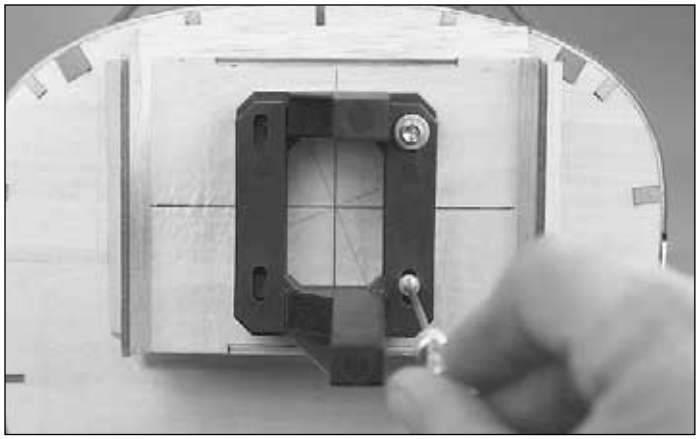
❏ 14. Repeat this process for the remaining wheel and pant.

Mount the Engine

Note: The following instructions are for the installation of a glow engine. If you are using a gas engine go to page 24.

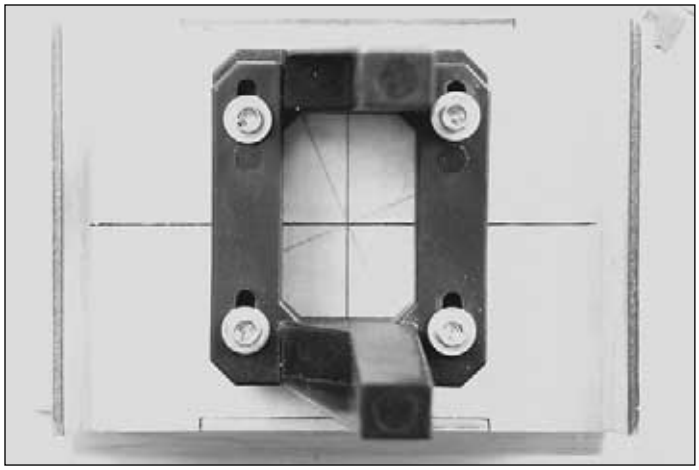


❏ 1. Notice the marks on the firewall. Extend the **horizontal** and **vertical** lines with a pen to see them more clearly as shown in the photo above. **Disregard any other marked lines on the firewall**.

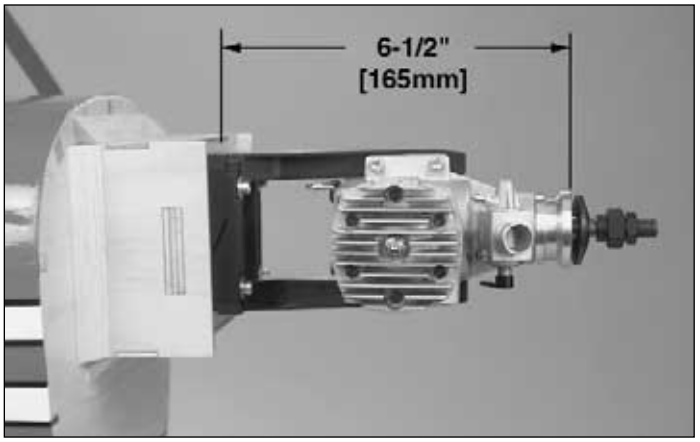


❏ 2. After removing the spreader bars from both **engine mount** halves, fit the two halves together using the engine to space the width properly. Notice that when you find the proper width for your engine, the tick marks on the two halves of the engine mount will no longer line up with each other. Measure the distance between the two tick marks and mark the center location between these tick marks. This location will be used to properly align the engine mount with the firewall markings.

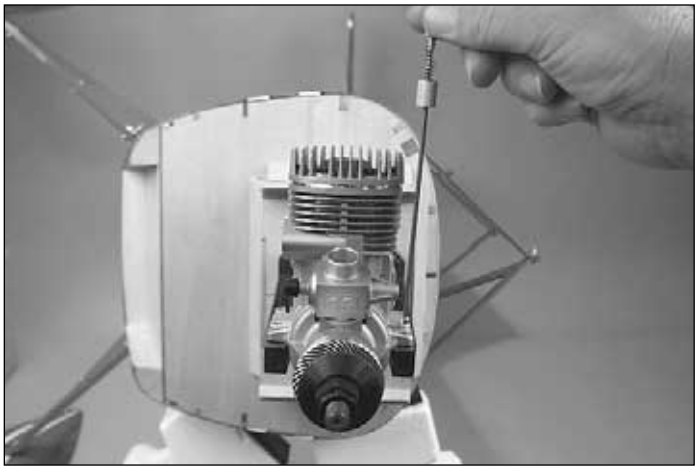
Being careful not to move the width of the engine mount, position the engine mount onto the firewall using the tick marks and the marks you just made on all four sides of the mount to align it with the horizontal and vertical lines on the firewall. Mark the location of the holes with a **Dead Center Hole Locator (GPMR8130)**.



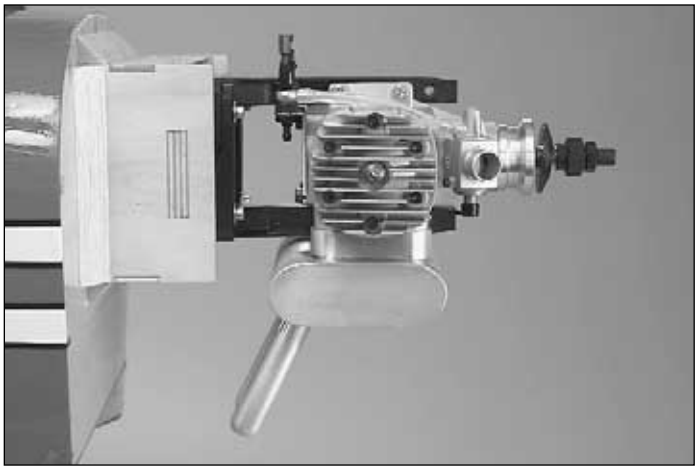
❏ 3. Drill four 7/32" (5.6mm) holes through the firewall at the marks. Apply 30-minute epoxy to the four **8-32 blind nuts,** being careful not to get the glue into the threads and place them into the holes on the back of the firewall. Attach the engine mount to the firewall with four 8-32 x 1" (25mm) socket head cap screws and #8 flat washers. This will draw the blind nuts into the back of the firewall. Allow the epoxy to cure.



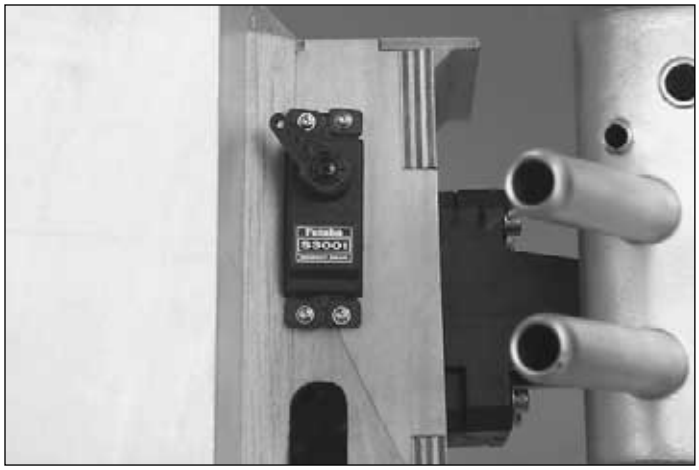
❏ 4. Position the **engine** on the mount so the engine drive washer is 6-1/2" (165mm) from the firewall. This will provide the correct clearance between the spinner and the cowl.



❏ 5. Using your Dead Center Hole Locator again, mark the hole locations on the engine mount. Drill #29 (or 9/64") holes through the engine mount at the marks you made, then tap 8-32 threads into the holes. Mount the engine to the mount with four 8-32 x 3/4" Socket Head Cap Screws and #8 washers.



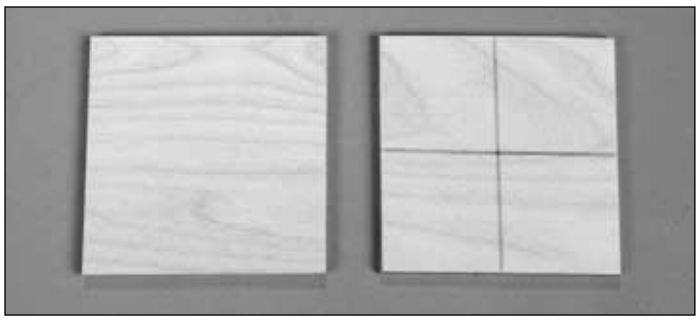
❏ 6. Test fit the **muffler** to be used on your engine. The **O.S. 1.60 FX (OSMG0661)** is shown in this manual. Bisson Custom Mufflers produce a **Pitts Style Muffler (BISG4116)** that is designed specially to fit this engine and is shown in the photo above.



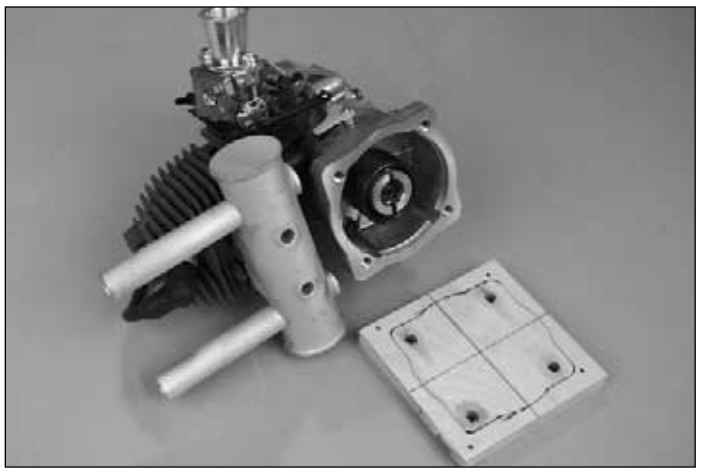
❏ 7. Attach a 12" servo extension to the throttle servo and use tape or heat shrink material to secure it in place. Insert the servo lead into the hole in the former located inside the engine-mounting box. Place the servo, noting its orientation in the photograph above, in the pre-cut space on the bottom of the engine mount box as shown in the photo. Using the same techniques shown on page 8, mount the servo by drilling four 1/16"(3mm) holes using the hardware that came with the servo to secure it into place.

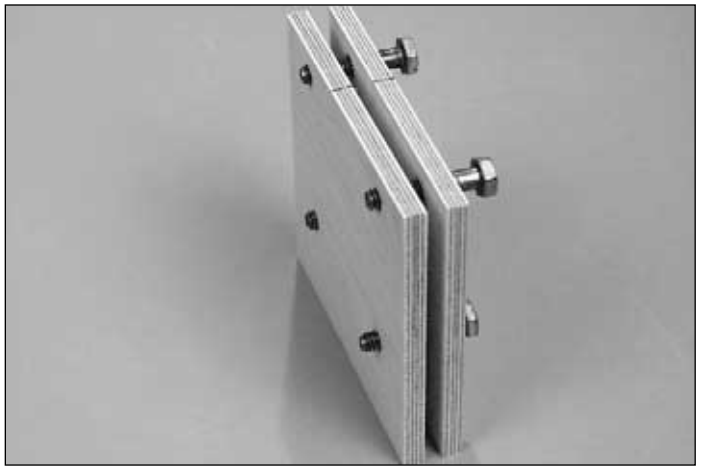
Make the throttle pushrod from the supplied 2-56 x 17-1/2" (466 mm) threaded one end throttle pushrod. Thread a nylon clevis onto the threaded rod approximately 25 turns, add a clevis retainer, and attach the clevis to the throttle arm on the carburetor on the engine. Make necessary bends in the rod to allow it to clear the engine and muffler. Then connect it to the throttle servo arm by making a 90-degree bend and using a nylon Faslink connector to secure it into place.

NOTE: This model will accept a number of different engines including gasoline-powered engines. We have just gone through the process of mounting a typical two-stroke engine in the previous steps. We will now go through the process of mounting a gas engine, using the US Engines 41cc 2.5 Gas Engine (USEG0041). Notice that the drive washer of any engine should be placed 6-1/2" (165 mm) forward of the firewall. The use of some engines may require alterations of the engine mounting box.

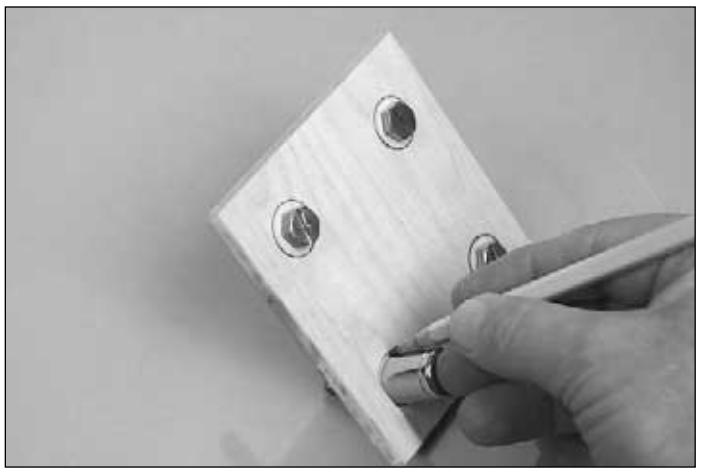


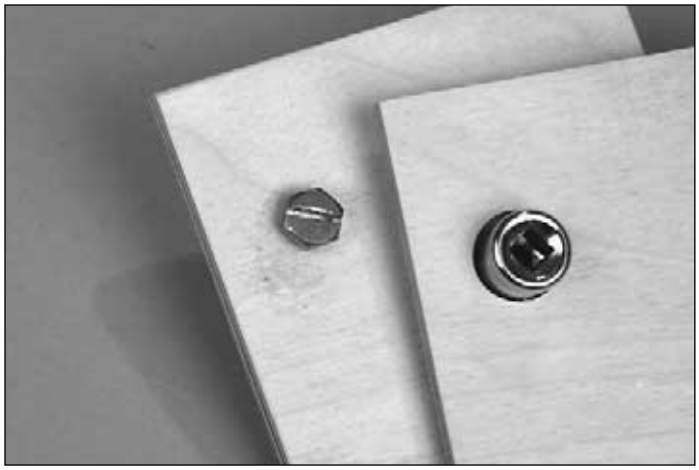
❏ 1. Since this engine mounts with bolts from the rear of a traditional firewall, we will make a plywood mount to be attached to the engine. After this mount is attached to the engine it will then be mounted to the existing firewall. First of all make two 4" [102mm] x 4" [102mm] x 1/4" [6 mm] plywood mounting plates [not supplied]. Draw center marks on one of these plates as shown above. This plate will be used as the front half of your mount. Do not glue these pieces together at this time.



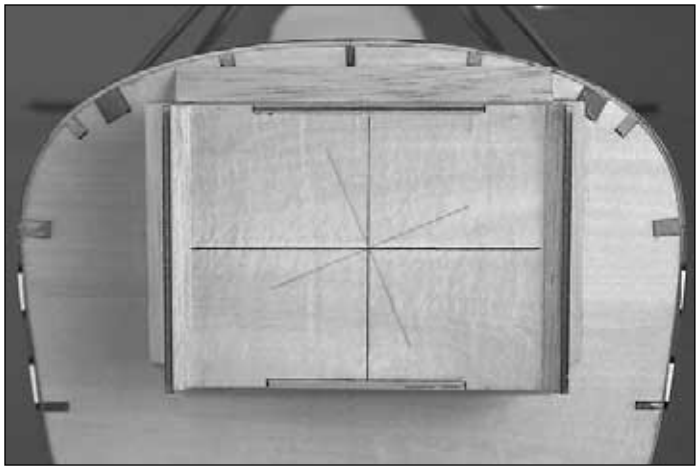


❏ 2. Place the front side of the front plate (the one with the center marks) against the back of the engine and mark the location of the mounting holes with the engine centered on the mount. Also draw the outline around the back of the engine as shown in the photograph. **Note**: Depending on the muffler used you may need to relieve a portion of the mount to accommodate your muffler. Drill 1/4" [6mm] holes in these four locations through both plates.

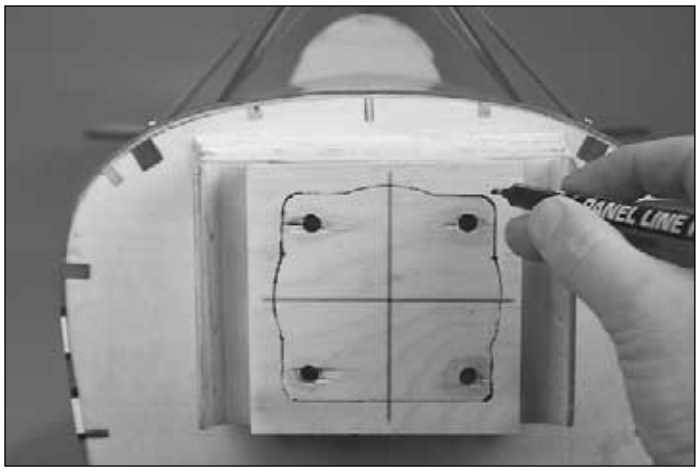




❏ 3. Place the four 1" (25 mm) x 1/4" (6 mm) x 20 engine mounting bolts (not supplied) into the rear plate. Place a socket that fits these bolts over the bolt heads and draw a line around all four as shown in the above photograph. Remove the wood from inside these four marks on the rear plate only. Doing this will allow the socket to fit inside the rear plate and countersink the bolt heads when the two halves are assembled.

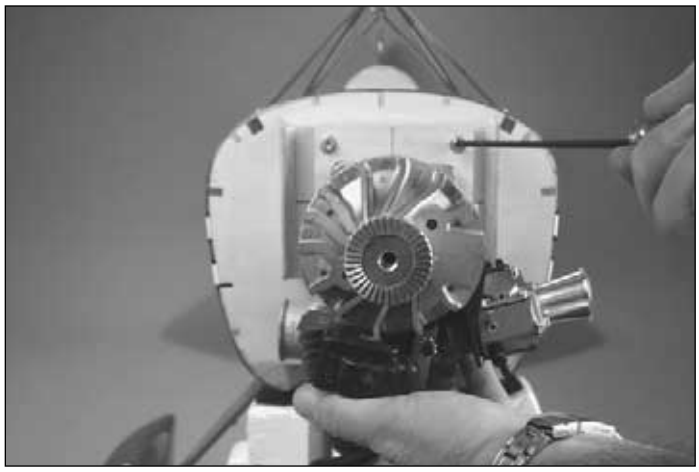


❏ 4. The existing firewall on the model has centering marks on the face of the firewall. Highlight and extend these lines with a felt tipped pen as shown in the above photograph.

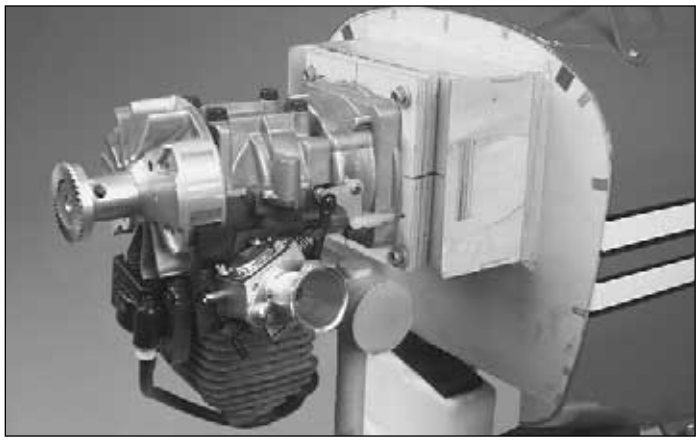


❏ 5. Glue the two halves of the plywood mount together using epoxy. Make sure that you assemble the two halves with the center marks and engine outline on the front. Clamp or add weight to the assembly and allow the epoxy to cure completely. Saturate the 1/4" (6 mm) holes with thin CA.

Place the assembly onto the firewall and line up the centering marks on the mount and the firewall. Mark four locations at which you will place 8-32 x 1" (25 mm) socket head cap screws and 8-32 blind nuts to secure the mount to the firewall. Check the spacing between the location of the engine and the edge of the mount. Drill 3/16" (4.8 mm) in these four locations. Again, hold the mount in place on the firewall and mark the locations of these holes on the firewall. At these four marked locations drill 7/32" (5.6 mm) clearance holes for the blind nuts.



❏ 6. Install the four 8-32 blind nuts in the firewall in the holes you just drilled. Install the mount onto the engine with the four mounting bolts through the mount and into the back of the engine. Next mount the engine to the firewall using the four 8-32 x 1" (25 mm) socket head cap screws.



❏ 7. Mark the location for the throttle push rod (the supplied throttle pushrod will not be long enough for this purpose) and drill a 1/8" (3 mm) hole through the mount, firewall and the front former.

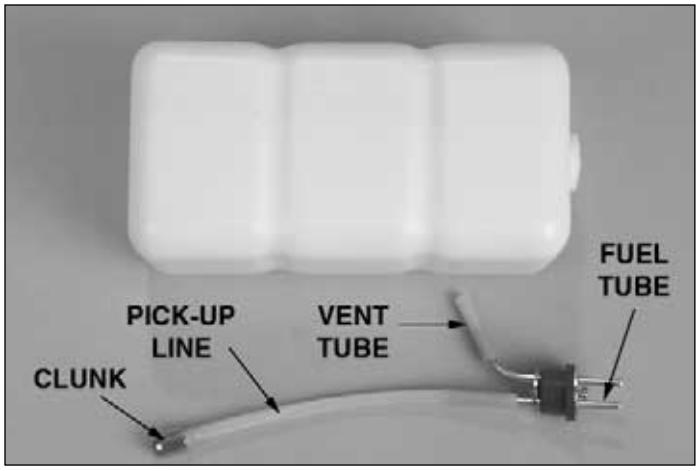
Note: Be very careful to avoid the area where the gas tank will be placed. Decide where you want to locate the throttle servo and make a plywood mount for it at that location. **Note**: If the throttle servo mount will interfere with the installation of the gas tank, move to the next section and install the tank before installing your throttle servo. Be sure

to install your servo properly using the same procedures that you used previously.

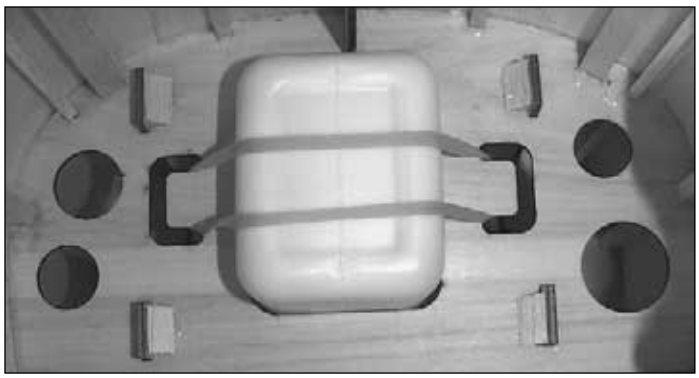
We recommend that prior to finalizing your engine mounting, remove the engine and the mount. Use epoxy or finishing resin to coat the mount to protect it from oils and gasoline residue. After the epoxy or resin has cured, re-assemble the engine and mount. Then mount it permanently onto the firewall. We also recommend that you use Threadlocker on all engine mounting bolts. At this point go back to the 2-cycle glow engine instructions and continue with any necessary steps there to complete your gas engine installation.

Important Note: The fuel tank supplied with this model is not set up for gasoline use. You will need to use the proper equipment and set-up that is compatible.

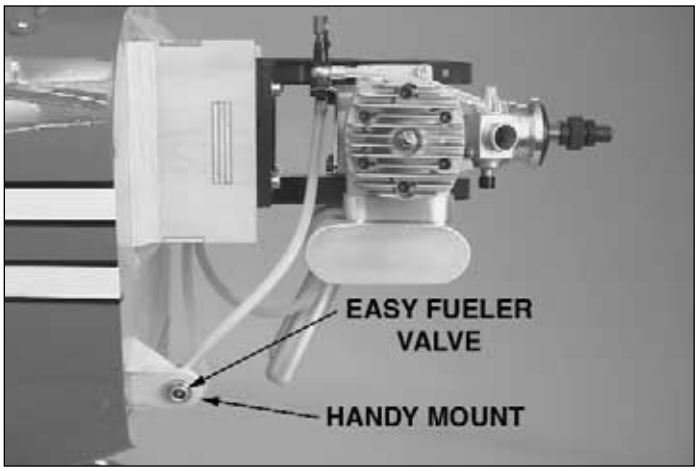
Assemble & Install the Fuel Tank



❏ 1. Assemble the fuel tank. Arrange the stopper and tubes as shown in the photo, then fit them into the tank. Tighten the screw to expand the stopper, thus sealing the tank. Be certain the fuel line weight (clunk) at the end of the fuel line inside the tank does not contact the rear of the tank. Otherwise, the line may become stuck during flight and discontinue fuel flow. Remember (or use a felt-tip pen to mark) which tube is the fuel pick-up tube and which tube is the vent (that will be connected to the pressure fitting on the engine muffler).

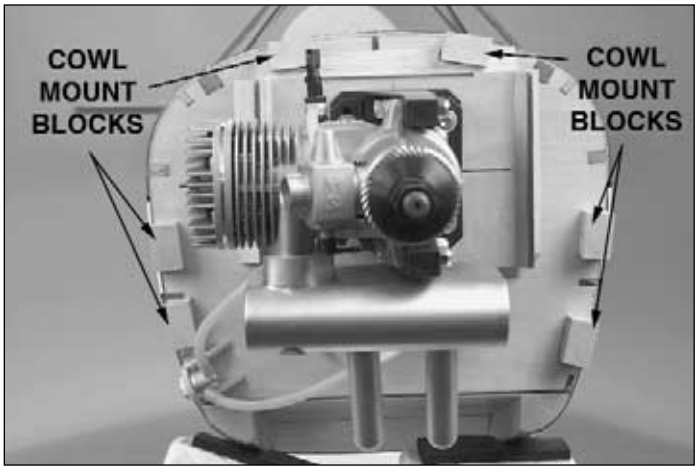


❏ 2. Install the fuel tank so the neck fits through the existing hole in the former behind the engine-mounting box. Be certain that you have installed the tank so the vent tube inside the tank is pointing upward. Notice in the above photograph that the former has been designed to allow rubber bands to hold the tank in place. However, **due to the aerobatic potential of this model aircraft, we strongly advise that you also secure it in place with silicone or epoxy. Note**: There is a hole in the bottom of the engine mounting box for the purpose of routing the fuel lines through.

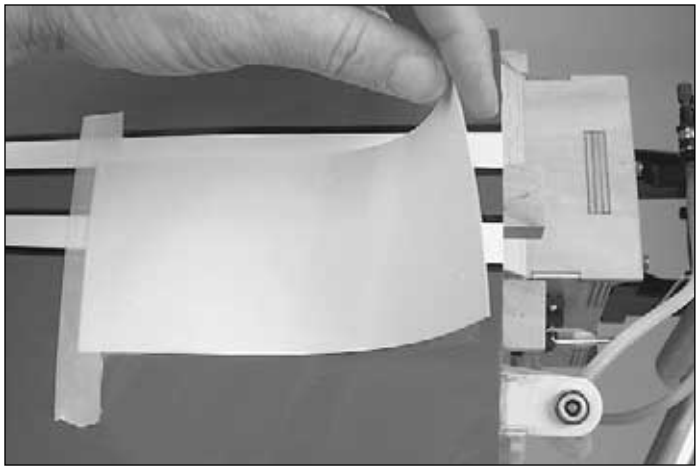


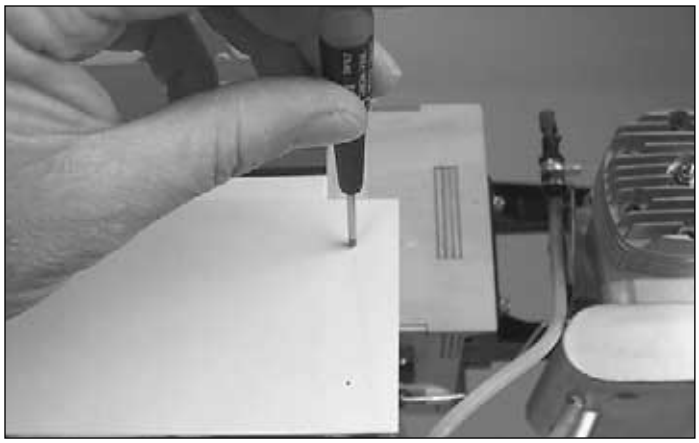
❏ 3. Run the fuel line to the needle valve or if you are using an **Easy Fueler Valve** (GPMQ4160) as shown in the photograph above, attach the fuel line to the valve first and then the needle valve. Attach the vent line to the pressure tap on the muffler. The Easy Fueler Valve can be mounted easily by using a **Great Planes Handy Mounts** (GPMQ6000) which is also shown in the photograph.

Mounting the Cowling

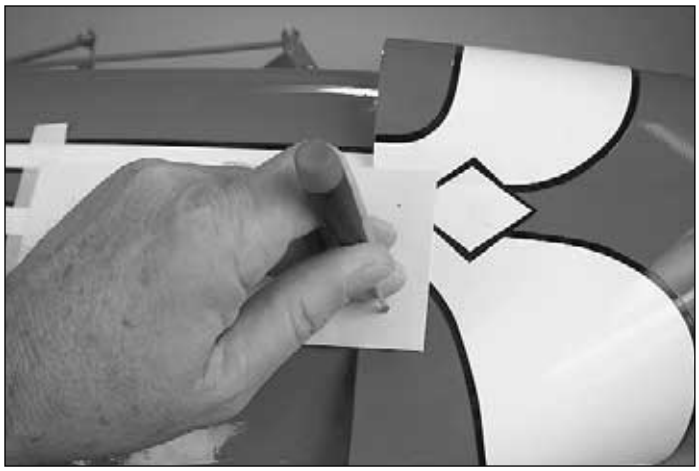


❏ 1. Mark the location of the six **cowl mounting blocks** on the forward fuselage former as shown in the photograph above. Using 80-grit sandpaper, rough up the surface in this area in order to allow a better glue joint. Use epoxy to glue the six cowl mounting blocks to the front of the fuselage in the locations shown in the above photograph. After the epoxy cures, fuelproof these blocks using additional epoxy.

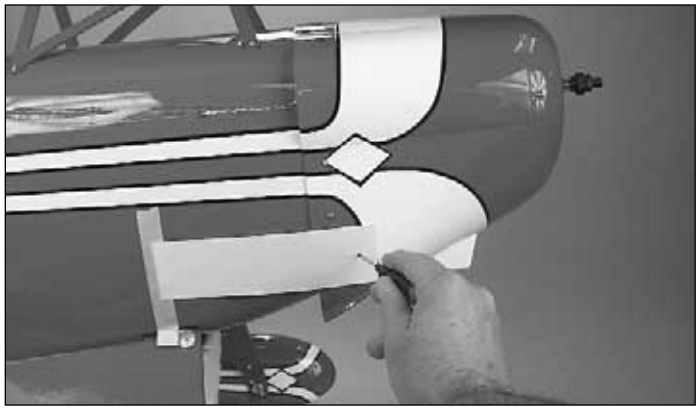




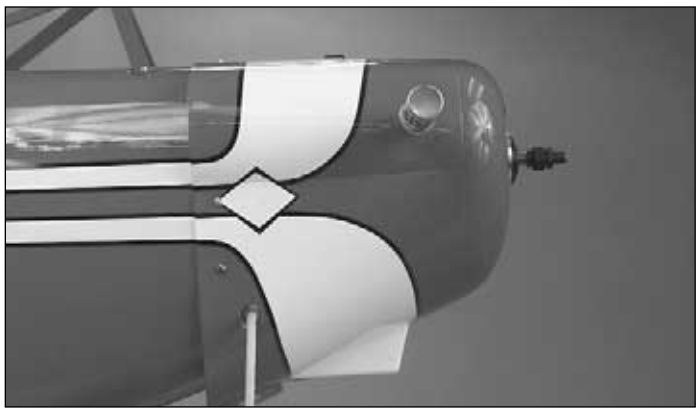
❑ 2. After the epoxy has cured cut a piece of a file folder, index card, or any similar material and securely tape it to the side of the fuselage so that it covers one of the mounting blocks. Find the center of the mounting block and place a mark on the card taped to the fuselage.



❑ 3. Place the **cowl** on the fuselage in the correct alignment and allow the engine drive washer to extend past the front of the cowl at least 1/8" (3mm). When satisfied with the alignment, tape the cowl in place and drill a 1/16"(1.6 mm) pilot hole through the cowl and the mounting block at the location you marked on the card stock taped to the fuselage. Enlarge the 1/16"(1.6 mm) hole in the cowl for clearance with a 3/32"(2.4mm) drill bit to allow the #2 x 1/2" (13mm) Phillips head screws to pass through the cowl.
Do not redrill the pilot hole in the cowl mounting blocks.

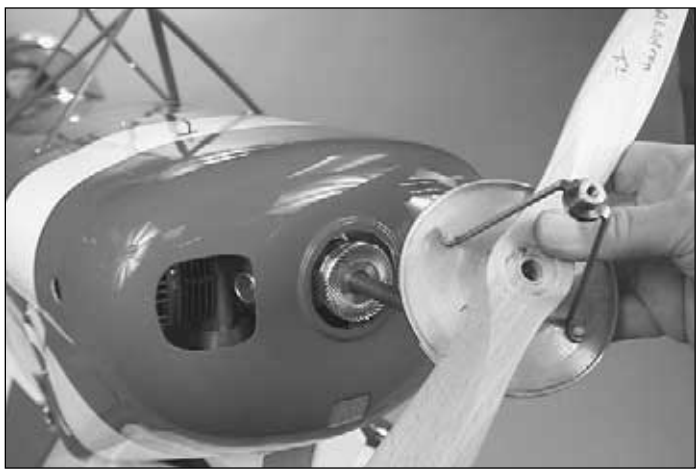


❑ 4. Repeat this process at the locations of the other five cowl mounting blocks. Mount the cowl using six #2 x 1/2"(13 mm) Phillips head screws and six #2 flat washers.

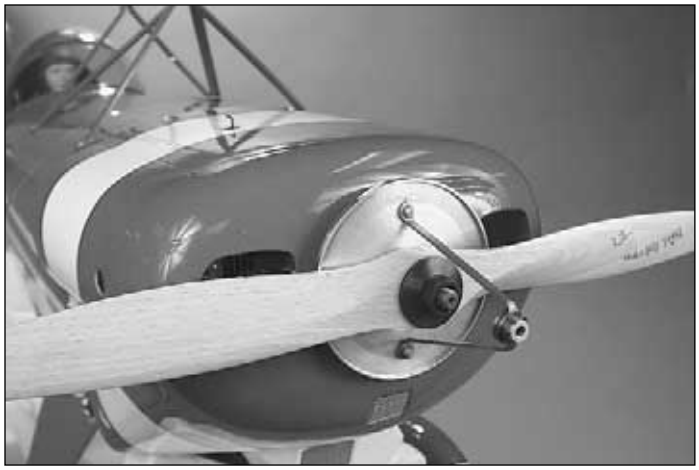


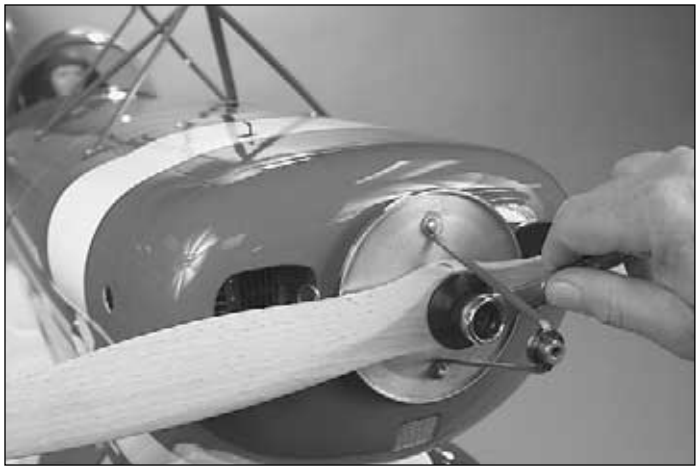
❑ 5. You will need to cut other access holes in the cowling for things like the fueling valve, needle valve, and glow driver access to start the engine. Use this same method to locate these holes. When finished you will have accurate locations for these functions.

Assemble and Install the Spinner

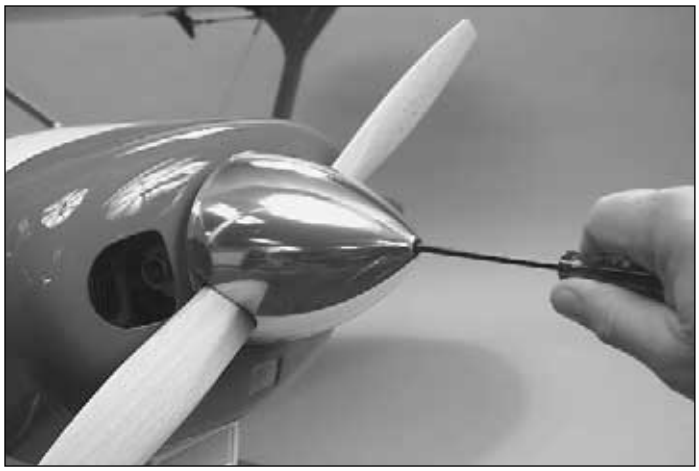


❑ 1. The **aluminum spinner** supplied with this model is a new and innovative design, which is universal and eliminates the need for adapter nuts. To assemble the spinner, hold the backplate and propeller (not supplied) together as one unit and place onto the drive shaft.





❑ 2. Place the drive washer and the propeller nut onto the drive shaft. Tighten the nut securely with a box-end wrench of the correct size to fit your engine. Next install the lock nut, again with a box-end wrench.

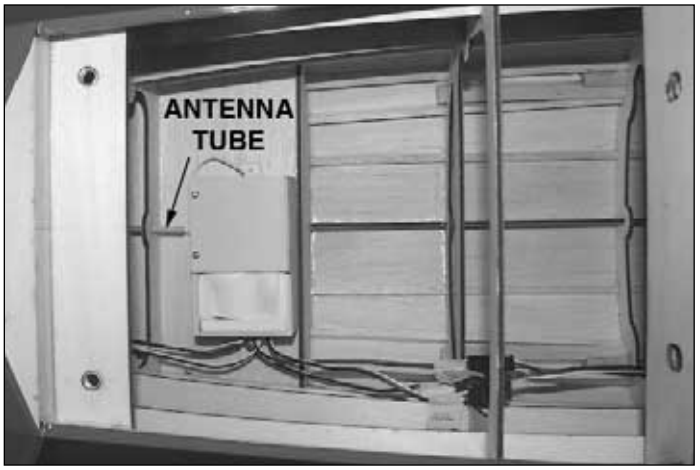


❑ 3. Place the spinner cone over the blades of the propeller and secure it with the supplied bolt.

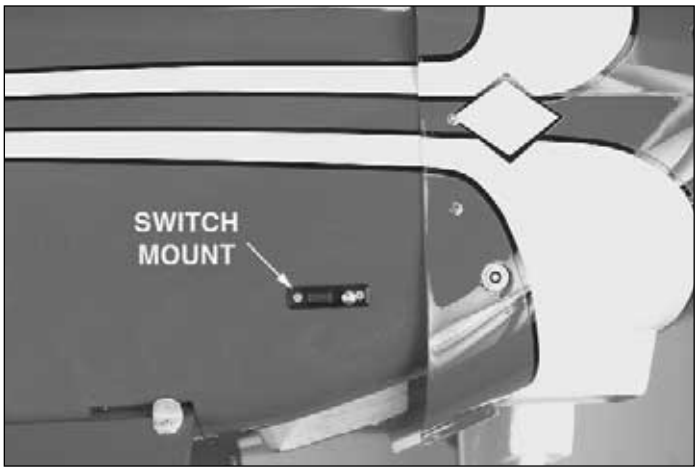
Install Radio Gear

❑ 1. The radio system installation is very simple; we have already installed all the servos on the exterior of the aircraft so there is very little to be placed inside the fuselage. To power the system and the maximum of eight servos we used a **Futaba® NR4RB 4.8V 1000mAh battery pack (FUTM1380)** in all our test models. In order to keep the weight as far forward as possible, the battery was mounted just behind the most forward former.

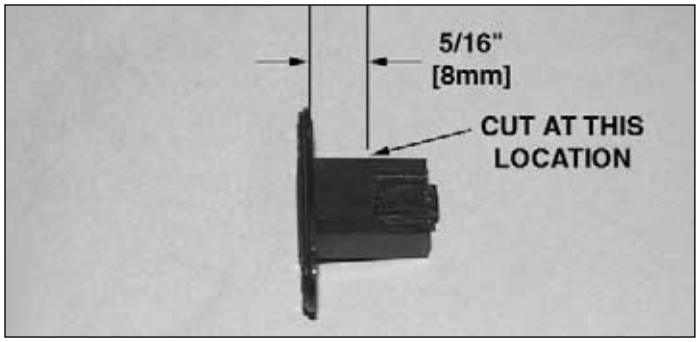
Included with the model is a ply tray that can be installed behind the fuel tank to hold the battery pack and receiver if you wish to use that method.

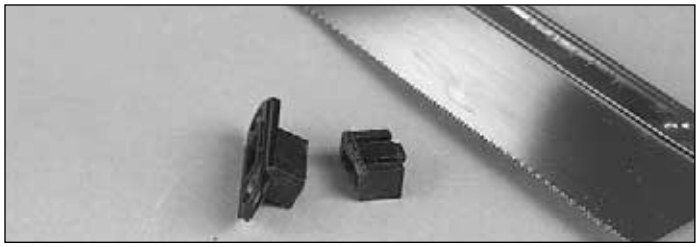


❑ 2. To mount the receiver we used a Great Planes Receiver Guard Protective Case (GPMM1010) and mounted it to the bottom of the cockpit floor. There is a tube installed for the receiver antenna that is located at the bottom of the cockpit floor as shown in the above photograph. The Receiver Guard should be mounted first, then servo leads attached to the receiver. Then simply insert the receiver antenna into the tube.

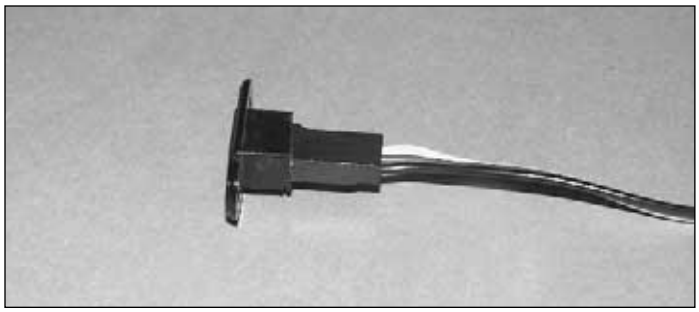


❑ 3. A **Great Planes Switch & Charge Mounting Set** (GPMM1000) was used to mount the switch and charge jack into the fuselage as one unit.



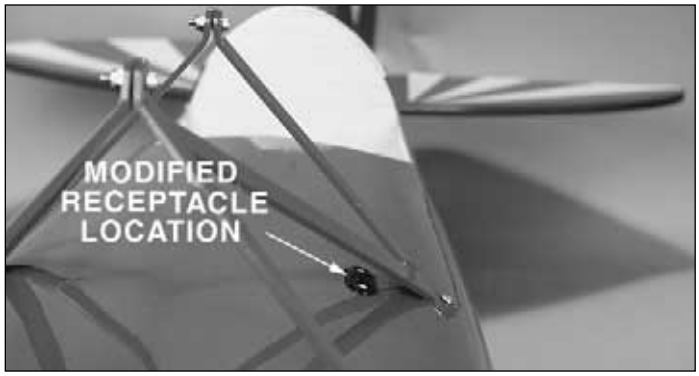


❏ 4. The top wing ailerons need to be connected to the receiver. Any number of methods can be used to achieve this. If you have a favorite method that you are comfortable with feel free to use that method. The procedure we used for this airplane was to start with an **Ernst 124 Charge Receptacle (ERNM3001)**. This unit is made to receive the charge plug from your radio system so it will require a small amount of modification for it to work in this application. The photo above shows the plug-holding unit. For our purposes here we need to cut this piece 5/16" (8mm) down from the bottom of the mounting surface as shown in the photographs above. This will allow the servo plug to fit into the back of the unit.



❏ 5. Using a Hobbico Pro Series 24" Extension (HCAM2200) insert the female end into the back of the receptacle unit as shown in the photographs above.

Note: Depending on where you locate your aileron extension plug-in receptacle and the location of your receiver, you may be able to use a shorter extension here. Just make sure it will reach your receiver. Glue this solidly into place with thin CA once you have it positioned. This modified unit will now allow you to plug the Y-harness from your aileron servos into it.



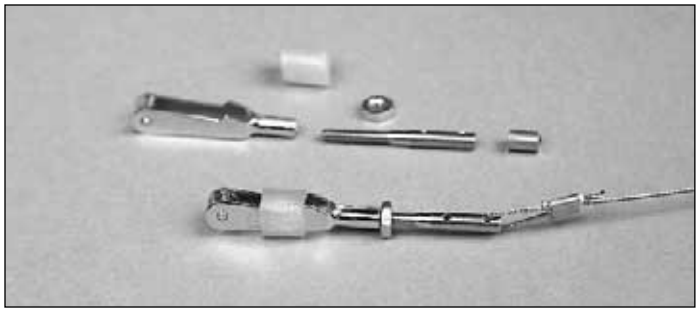
❏ 6. The photograph above, looking back from the front of the airplane, shows the placement of your modified receptacle. Make sure that you can access the screws and that it is placed to avoid the spars and formers in this area.

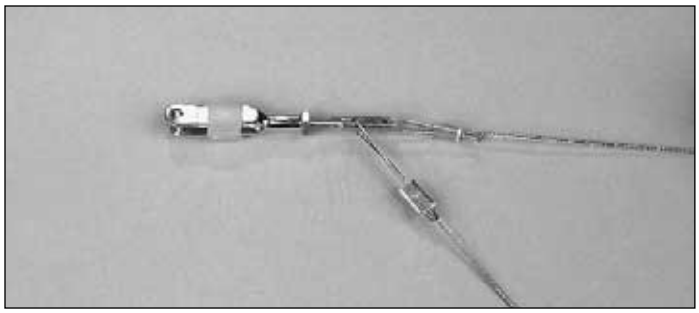
❏ 7. The photographs above illustrate the Y-harness plugged into the receptacle. You can secure and hide the wire on the cabane with zip ties, Velcro, tape, or just leave it loose depending on your preference. Use a Y-harness (FUTM4130) to plug into your receiver. Plug the extension from your modified receptacle to one side of the Y-harness and the other side will be available when you attach the bottom wing and plug the bottom wing aileron servos into it.

If you are using a computer radio system, refer to the manual that came with your system for other options of setting up the aileron operations without using the Y-harness.

Install the Flying Wires

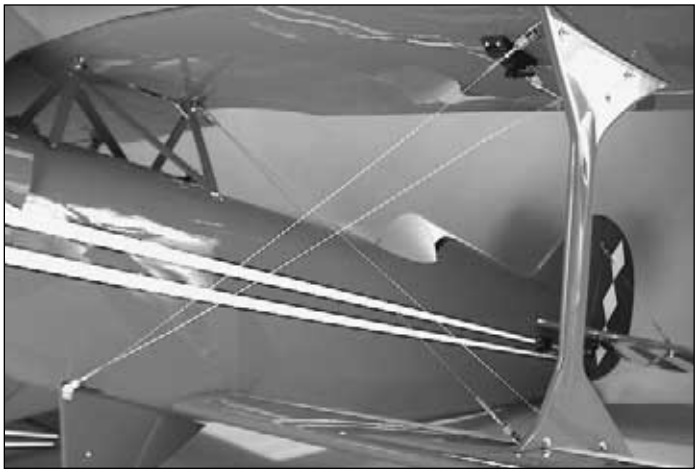
NOTE: The flying wires included with the Pitts Special ARF are not functional or required for structural integrity.





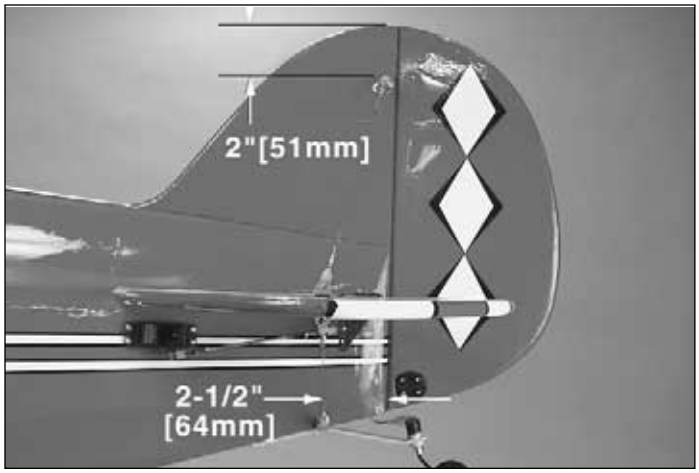
❏ ❏ 1. Use the photos above as a reference guide in assembling the flying wires. We are going to start by making the left side flying wires. We will make the wires for the stab/fin area later. Use the **coil of flying wire**, six **2-56 threaded metal clevises**, six **2-56 threaded brass ends**, six **2-56 nuts**, six **aluminum crimp tubes**, and six **silicone clevis retainers**. Start by placing two metal clevises and nuts onto the threaded brass ends approximately 15 turns. Place a silicone clevis retainer on the clevis. Note that you will be making ends for the flying wires that have a single attaching point and also ends that have double attachment points. Also note that the assemblies with two wires attached to the threaded brass ends are located next to the fuse. All the 2-56 brass ends have two holes placed in the base for attaching the wire (s).

Start by cutting four lengths of wire from the coil, 21" (533mm) long. We will be making two sets of wires for this side of the fuselage. Attach four wires (two each) to two of the 2-56 clevises. We suggest that you double the wire back through the crimp tube for a better hold as shown in the above drawing.



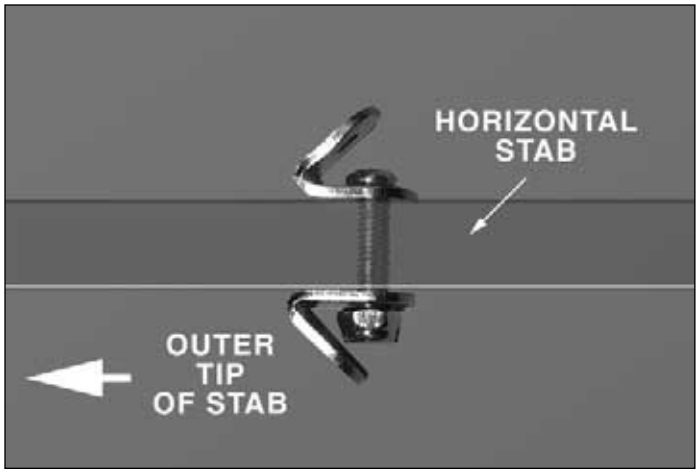
❏ ❏ 2. **Note**: You will notice in the close-up photograph above that we have used a piece of electronic heatshrink material to dress the flying wires up a bit. These connections are now covered and protected as shown in the photographs. Please note that if you shrink this material with the wires in place, be careful not to over-heat the covering and interplane struts. You can also remove each wire and shrink the material in a manner that is less apt to damage your model. If you would like to do this place a length of shrink material onto the wire at this time. Attach one of your pre-assembled double wire sets to the bracket located on the aft upright of the cabane and the other to the bracket installed onto the landing gear. Using the same procedure as above, assemble four more clevises, four threaded brass ends, four hex nuts, and four silicone clevis retainers and place them on the brackets you installed with the interplane struts on the bottom of the top wing and the top of the bottom wing. Run one of the two wires from the assembled clevis attached to the landing gear to one of the assembled clevises you attached to the bracket under the top wing, slip the aluminum crimp tube over the wire and run the wire through the bottom hole drilled in the threaded brass end. Pull the wire tight, slip the wire back through the crimp tube twice and use a pair of pliers to squeeze the crimp tube holding the wire in place. Cut off any excess wire protruding from the crimp tube. Repeat this process to the remaining three clevises on the interplane struts. Once you have your wires adjusted for the proper tension use Great Planes Threadlocker (GPMR6060) on the threaded brass ends and hex nuts to keep them from loosening in flight.

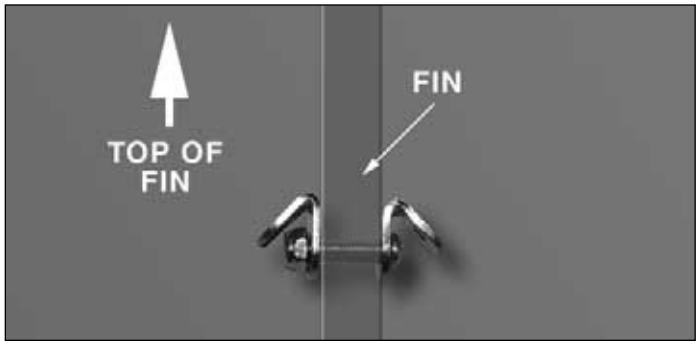
When you are finished installing the flying wires on the left side of the model, repeat the process to make the flying wires on the right side.



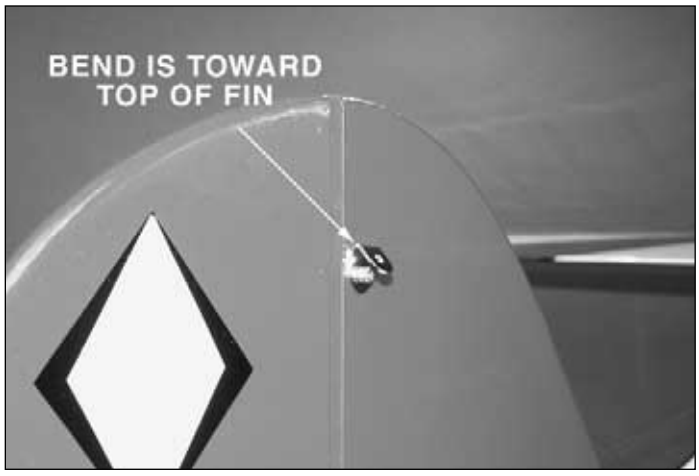
❏ 3. To make the flying wires for the tail surfaces start by installing the 70-degree metal brackets. Note the locations in the photograph above. Measure from the top of the fin to a point 2" (51mm) down and 1/4" (6mm) forward from the trailing edge of the fin and mark that location. Next, measure from the outboard tip of each stab trailing edge to a point 5" (127mm) inboard and 1/4" (6mm) forward from the trailing edge of the horizontal stab and mark those locations. In these three marked locations drill a 1/8" (3mm) clearance hole through the fin and stabilizer. Saturate these holes completely with thin CA.

At the bottom end of the fuselage, measure forward from the tail post of the fuselage to a point 2-1/2" (64mm) and drill a 1/16" (1.6mm) hole at these locations on both sides of the fuselage. Again, use the described procedure on page 8 to install the brackets using two #4 x 1/2 " (13 mm) Phillips head wood screws.



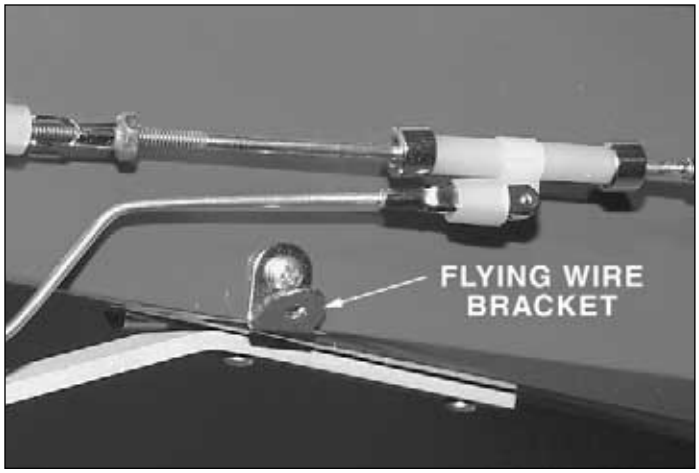


❏ 4. Locate three 4-40 x 5/8" (15.9 mm) Phillips Head Machine Screws, three 4-40 stop nuts, and eight 70-degree metal brackets as shown in the photograph. Mount six brackets at the three drilled locations; two brackets are placed on top of the stab and two under it. The proper installation is shown in the photographs.
Note: The fit of the 4-40 x 5/8" (15.9 mm) Phillips Head Machine Screws into the bracket is a bit tight but will fit; you may need to thread it into place.



❏ 5. Notice that the brackets are mounted on the fin as shown with the indicated "bend" at the top as shown in the photograph above.

❏ 6. The brackets that are mounted on the stab have the “bend” toward the outboard end of the stab as shown in the photograph above.

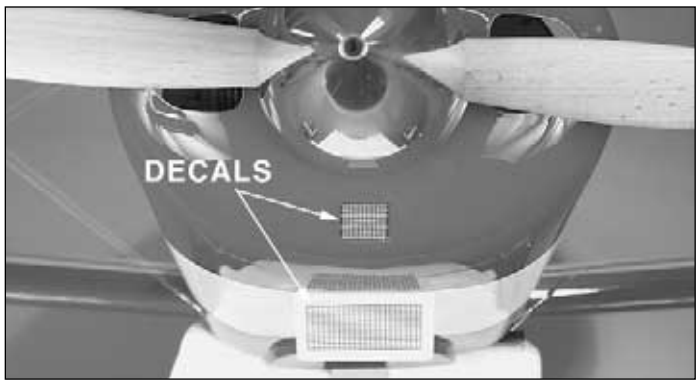


❏ 7. Mount the brackets at the bottom of the fuselage, with the "bend" to the bottom as shown in the photograph above, use two #4 x 1/2" Phillips head wood screws to attach the brackets using the procedure described on page 8.

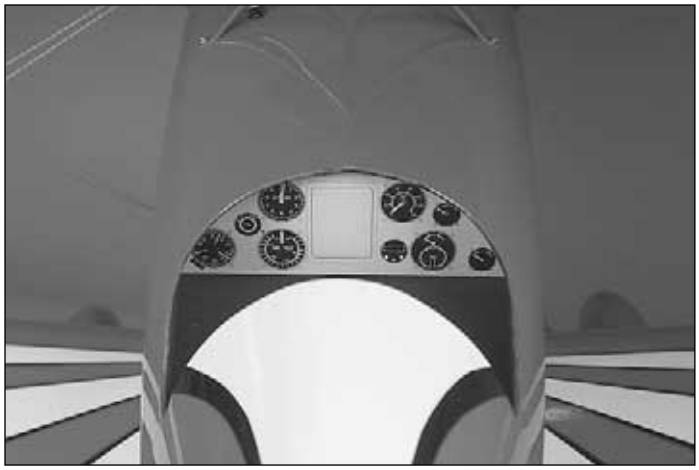
❏ 8. Start assembling the flying wires for the tail surfaces by cutting two lengths of wire from the coil 8-1/2" (216mm) long for the top of the stab to the sides of the fin. Cut two 7" (178mm) long for the bottom of the stab to the bottom of the fuselage on each side. Using the same technique as before, assemble eight clevises, eight hex nuts, and eight silicone clevis retainers onto eight of the threaded brass ends. Make-up all four wires with one end complete by placing the wires you cut off above into the bottom hole of the brass ends and securing it into place with the crimp tubes in the manner shown previously. You should now have all four wires with the metal clevis assembly attached to one end of these wires.

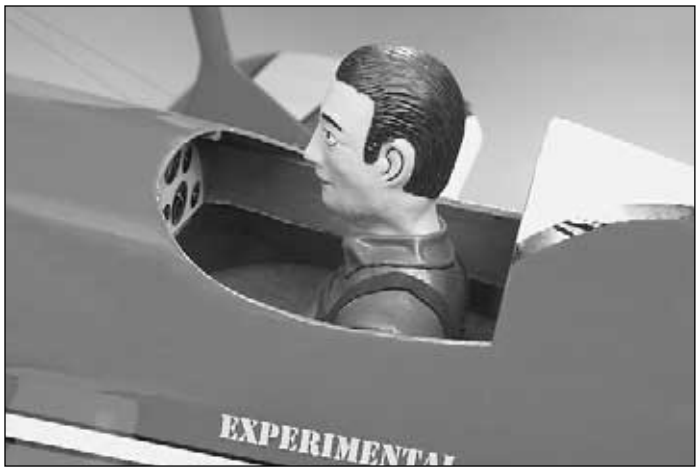
Attach the longer wire assemblies to the brackets on the top of the stab on each side and the shorter wire assemblies to the brackets on the bottom of the stab. Place the four clevis assemblies on the metal brackets located on both sides of the fin and the bottom of the fuselage. Using the same method as you did with the flying wires on the wings, connect the wires to the clevis assemblies you placed onto the brackets. After securing the ends of the wires to the clevis assemblies, as tightly as possible, using the crimp tubes, take up any excess slack in the wires by adjusting the clevises onto the threaded brass ends and securing them into place with the hex nuts. When satisfied with the fit use Threadlocker to keep them from loosening in flight.

Finishing Touches



❏ 1. Apply the **decals** as shown in the photos. The easiest and most accurate way to position the decals is to first cut them from the sheet. When ready to apply one of the decals, even though these are the sticky back type, submerge it in a tub of **warm water** mixed with **liquid dish soap** (about a tablespoon of soap per gallon of water) and peel the decal from the backing. Lay the decal on the model and position it exactly where you want it. Use a **paper towel** to wipe away most of the water, then use a **soft balsa sheet** or something similar to squeegee the rest of the water from under the decal. Allow to dry overnight before flying the model.





❏ 2. Paint the cockpit area flat black or your favorite color. You may want to consider that the paint can possibly bleed through the wood and show up under your MonoKote covering. To avoid this, simply coat the cockpit interior with 30-minute epoxy thinned with denatured alcohol or clear paint before applying the black paint to the interior. Apply the decal for the **instrument panel** as shown in the photo. You may also wish to place a pilot figure in the cockpit for added realism. A 1/3 scale **DGA Scale Model Pilot** (DGAQ2000) was used in the photographs.

❏ 3. Carefully cut the excess plastic away from the **painted canopy**. Glue the canopy into position using **R/C-56 Canopy Glue (JOZR5007).**

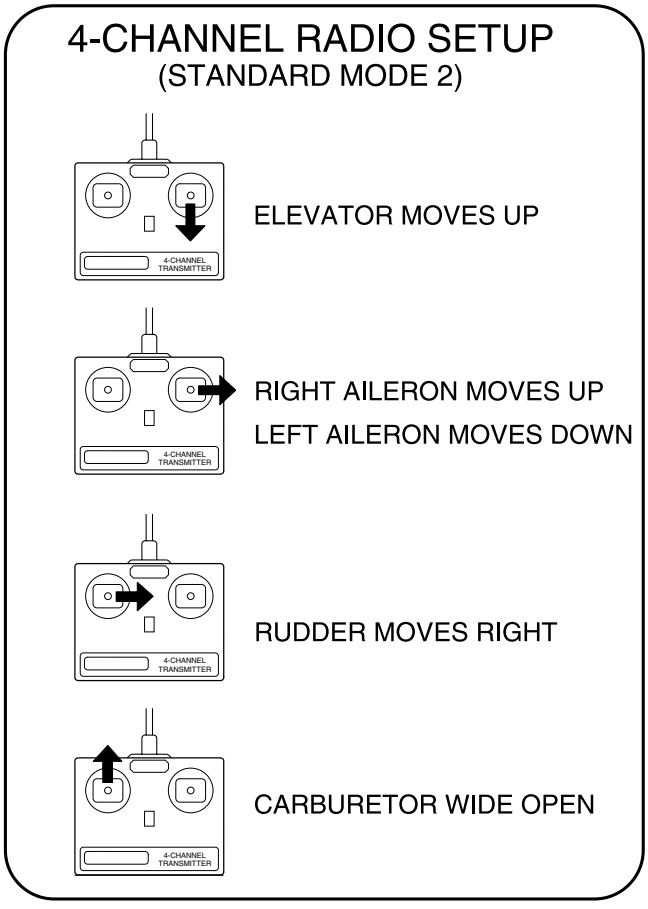
GET THE MODEL READY TO FLY

NOTE: SOME MODELERS LIKE TO HAVE A BIT MORE TECHNICAL INFORMATION FOR THEIR MODELS THAN OTHERS. FOR THOSE WHO DO, THE WING INCIDENCE OF BOTH THE TOP AND BOTTOM WING IS 0 DEGREES WHEN THE STAB IS SET AT 0 DEGREES. THE ENGINE THRUST IS ALSO BUILT-IN AT 0 DEGREES DOWN AND 2 DEGREES RIGHT.

Check the Control Directions

❏ 1. Turn on the **transmitter** and receiver and center the **trim tabs**. 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.



❏ 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 Deflection Gauge** (GPMR2405) 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.

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

These are the recommend control surface throws:

	High Rate	Low Rate
ELEVATOR:	1-5/8(40.9mm] up 1-5/8(40.9mm] down	1" [25mm] up 1" [25mm] down
RUDDER:	2-1/2" [64mm] right 2-1/2" [64mm] left	1-1/2" [38mm] right 1-1/2" [38mm] left
UPPER AILERONS:	1-1/8" [28mm] up 1-1/8" [28mm] down	5/8" [15.9mm] up 5/8" [15.9mm] down
LOWER AILERONS:	1-1/8" [28mm] up 1-1/8" [28mm] down	5/8" [15.9mm] up 5/8" [15.9mm] down

IMPORTANT: The Pitts Special ARF has been **extensively** flown and tested to arrive at the throws at which it flies best. Flying your model at these throws will provide you with the greatest chance for successful first flights. If, after you have become accustomed to the way the Pitts Special ARF flies, you would like to change the throws to suit your taste, that is fine. However, too much control throw could make the model difficult to control, so remember, "more is not always better."

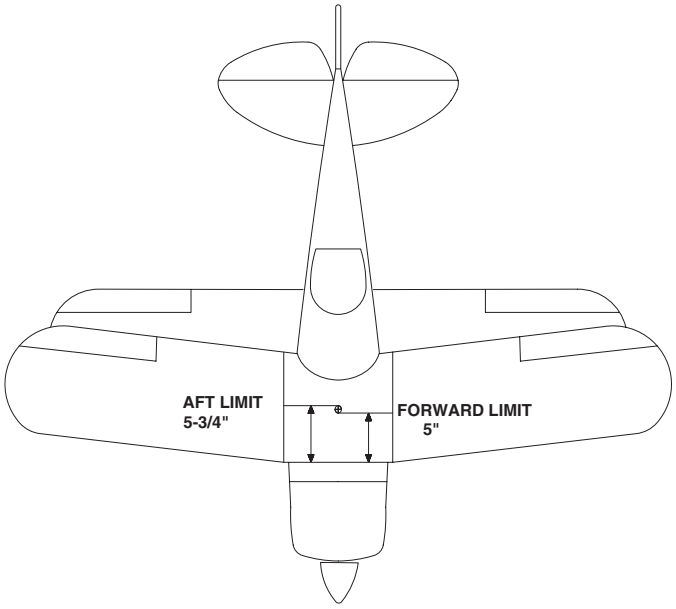
Balance the Model (C.G.)

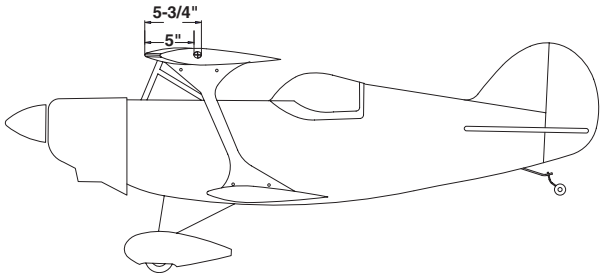
More than any other factor, the **C.G.** (balance point) can have the **greatest** effect on how a model flies, and may determine whether or not your first flight will be successful. If you value this model and wish to enjoy it for many flights, **DO NOT OVERLOOK THIS IMPORTANT PROCEDURE.** A model that is not properly balanced will be unstable and possibly unflyable.

At this stage the model should be in ready-to-fly condition with all of the systems in place including the engine, landing gear, covering and paint, and the radio system.

IMPORTANT NOTE: The ideal CG location for this model aircraft is at 5-3/8"(136.5mm). The CG range for this model is from 5"(127mm) to 5-3/4"(146mm) back from the leading edge of the top wing center section. Do not exceed these limits for this model.

❏ 1. Use a felt-tip pen or 1/8" (3mm)-wide tape to accurately mark the C.G. on the bottom of the top wing on the center section. The recommended C.G. is located 5-3/8" [136.5mm] back from the leading edge **measured at the center section of the top wing**.





❏ 2. With the wings attached to the fuselage, all parts of the model installed (ready to fly) and an empty fuel tank, lift the model with your finger tips 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. weight, or GPMQ4646 for the 2 oz. weight). If spinner weight is not practical or is not enough, use **Great Planes "stick-on" lead weights** (GPMQ4485). 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 top of the fuse 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 fuse 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 fuse 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

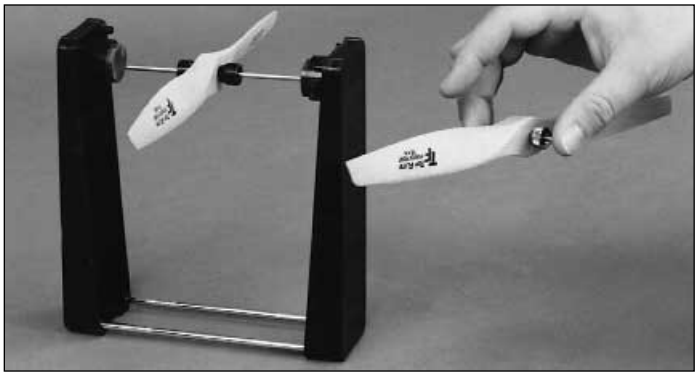
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events.

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.

NOTE: Checking the condition of your receiver battery pack is **highly recommended**. All battery packs, whether it's a trusty pack you've just taken out of another model, or a new battery pack you just purchased, should be cycled, noting the discharge capacity. Oftentimes, a weak battery pack can be identified (and a valuable model saved!) by comparing its actual capacity to its rated capacity. Refer to the instructions and recommendations that come with your cycler. If you don't own a battery cycler, perhaps you can have a friend cycle your pack and note the capacity for you.

Balance the Propeller



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 Academy of Model Aeronautics Official Safety Code:

GENERAL

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

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

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

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

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

RADIO CONTROL

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

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

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

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

Since the Great Planes Pitts Special S2S ARF qualifies as a "giant scale" model and is therefore eligible to fly in IMAA events, we've printed excerpts from the IMAA Safety Code which follows.

IMAA Safety Code (excerpts)

Definition:
For the purpose of the following IMAA Safety Code, the term Giant Scale shall refer to radio controlled model aircraft, either scale or non-scale, which have a wingspan of 80 inches or more for monoplanes and 60 inches or more for multi-winged model aircraft and have a ramp weight (fueled and ready to fly) of 55 lbs. or less.

Section 1.0: SAFETY STANDARD

1.1 Adherence to Code:
This safety code is to be strictly followed.

1.2 The most current AMA Safety Code in effect is to be observed. However, the competition sections of the code may be disregarded.

Section 3.0: Safety Check

3.4 Flight Testing: All Giant Scale R/C aircraft are to have been flight tested and flight trimmed with a minimum of six flights before the model is allowed to fly at an IMAA Sanctioned event.

3.5 Proof of Flight: The completing and signing of the Declaration section of the Safety Inspection form by the pilot (or owner) shall document as fact that each aircraft has been successfully flight-tested and proven airworthy prior to an IMAA event.

Section 5.0: EMERGENCY ENGINE SHUT OFF (kill switch)

5.1 All magneto spark ignition engines must have a coil grounding switch on the aircraft to stop the engine. This will also prevent accidental starting of the engine. This switch shall be readily available to both pilot and helper. This switch is to be operated manually and without the use of the radio system.

5.2 Engines with battery power ignition systems must have a switch to turn off the power from the battery pack to disable the engine from firing. This will also prevent accidental starting of the engine. This switch shall be readily available to both pilot and helper. This switch shall be operated manually and without the use of the Radio System.

5.3 There must also be a means to stop the engine from the transmitter. The most common method is to close the carburetor throat completely using throttle trim, however, other methods are acceptable. This requirement applies to all glow/gas ignition engines regardless of size.

Section 6.0: RADIO REQUIREMENTS

6.1 All transmitters must be FCC type certified.

6.2 FCC Technician or higher-class license required for 6 meter band operation only.

Additional IMAA General Recommendations

The following recommendations are included in the Safety Code not to police such items, but rather to offer basic suggestions for enhanced safety.

Servos need to be of a rating capable to handle the loads that the control surfaces impose upon the servos. Standard servos are not recommended for control surfaces. Servos should be rated heavy-duty. For flight-critical control functions a minimum of 45 inch/ounces of torque should be considered. This should be considered a minimum for smaller aircraft and higher torque servos are strongly encouraged for larger aircraft. The use of one servo for each aileron and one for each elevator half is strongly recommended. Use of dual servos is also recommended for larger aircraft.

On-board batteries shall be 1000 mAh up to 20 lbs., 1200 mAh to 30 lbs., 1800 mAh to 40 lbs. and 2000 mAh over 40 lbs. flying weight. The number and size of servos, size and loads on control surfaces, and added features should be considered as an increase to these minimums. Batteries should be able to sustain power to the onboard radio components for a minimum of one hour total flying time before recharging.

Redundant and fail-safe battery systems are recommended.

The use of anti-glitch devices for long leads are recommended.

There is no maximum engine displacement limit, as it is the position of this body that an underpowered aircraft presents a greater danger than an overpowered aircraft. However, the selection of engine size relative to airframe strength and power loading mandates good discretionary judgments by the designer and builder. Current AMA maximums for engine displacement are 6.0 cu. in. for two-stroke and 9.6 cu. in. for four-stroke engines. These maximums apply only to AMA Sanctions concerning competition events (such as 511, 512, 515 and 520) and, as such, the maximums apply. All IMAA (non competition) events should be sanctioned as Class "C" events; in which these engine size maximums do not apply.

Generally, it is recommended that no attempt should be made to fly a radio controlled model aircraft with a gasoline engine in which the model aircraft weight would exceed twelve (12) pounds (underpowered) per cubic inch of engine displacement, or be less than five (5) pounds (overpowered) per cubic inch of engine displacement. Example: Using a 3 cu. in. engine, a model would likely be underpowered at an aircraft weight greater than 36 pounds. With the same engine, an aircraft weighing less than 15 pounds would likely be overpowered.

Servo arms and wheels should be rated heavy duty. Glass-filled servo arms and control horns are highly recommended.

Control surfaces linkages are listed in order of preference:

1. Cable system (pull-pull). A tiller bar is highly recommended along with necessary bracing.

2. Arrow Shaft, fiberglass or aluminum, 1/4" or 5/16" O.D. bracing every six (6) to ten (10) inches is highly recommended.

3. Tube-in-tube (nyrod). Bracing every few inches is highly recommended. Inner tube should be totally enclosed in outer tube.

4. Hardwood dowel, 3/8" O.D. bracing every six (6) to ten (10) inches is highly recommended.

Hinges should be rated heavy duty and manufactured for Giant Scale use primarily. Homemade and original design hinges are acceptable if determined to be adequate for the intended use.

Clevis (steel, excluding heavy-duty ball links) and attachment hardware should be heavy duty 4-40 threaded rod type. 2-56 threaded size rod is acceptable for some applications (e.g. throttle). Clevis is to have lock nuts and sleeve or spring keepers.

Propeller tips should be painted or colored in a visible and contrasting manner so as to increase the visibility of the propeller tip arc.

CHECK LIST

During the last few moments of preparation your mind may be elsewhere anticipating the excitement of your first flight. Because of this, you may be more likely to overlook certain checks and procedures that should be performed after your model is built. To help avoid this, we've provided a checklist to make sure you don't overlook these important areas. 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 you complete them.

- ❏ 1. Fuelproof all areas exposed to fuel or exhaust residue such as the cowl mounting blocks, wing saddle area, etc.
- ❏ 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 fuse. Simply stuffing them into place with foam rubber is not sufficient.
- ❏ 4. Extend your receiver antenna and make sure it has a strain relief inside the fuselage to keep tension off the solder joint inside the receiver.
- ❏ 5. Balance your model *laterally* as explained in the instructions.
- ❏ 6. Use thread locking compound to secure critical fasteners such as the set 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-harness 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, thread locking compound or J.B. Weld.
- ❏ 15. Make sure the fuel lines are connected and 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. Perform the range check with the engine running and without the engine running.

FLYING

The Pitts Special ARF is a great-flying model that flies smoothly and predictably. The Pitts Special ARF does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots. This model is truly the best flying Pitts Special on the market today; it is extremely stable at slow speeds, very solid in any flying attitude, but remains remarkably aerobatic. You can have a great deal of confidence in this model.

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 any unusual sounds, such as a low-pitched "buzz," this may indicate control surface *flutter.* Because flutter can quickly destroy components of your airplane, any time you detect flutter you must **immediately** cut the throttle and land the airplane! Check all servo grommets for deterioration (this may indicate which surface fluttered) and make sure all pushrod linkages are secure and free of play. If the control surface fluttered once, it probably will flutter again under similar circumstances unless you can eliminate the free-play or flexing in the linkages. Here are some things which can cause flutter: Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of pushrod in guide tube caused by tight bends; Poor fit of Z-bend in servo arm; Insufficient glue used when gluing in the elevator or flap joiner wire; Excessive *play* or *backlash* in servo gears; and Insecure servo mounting.

Takeoff

Before you get ready to takeoff, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold "up" elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel so the model will roll straight down the runway.

Remember to takeoff into the wind. When you're ready, point the model straight down the runway, hold a bit of up elevator to keep the tail on the ground to maintain tail wheel steering, then gradually advance the throttle. As the model gains speed, decrease up elevator, allowing the tail to come off the ground. Be ready to apply **right** rudder to counteract engine torque if necessary. Gain as much speed as your runway and flying site will practically allow before gently applying up elevator, lifting the model into the air. At this moment it is likely that you will need to apply more right rudder to counteract engine torque. Be smooth on the elevator stick, allowing the model to establish a **gentle** climb to a safe altitude before turning into the traffic pattern.

Flight

For reassurance and to keep an eye on other traffic, it is a good idea to have an assistant on the flight line with you. Tell him to remind you to throttle back once the plane gets to a comfortable altitude. While full throttle is usually desirable for takeoff, most models fly more smoothly at reduced speeds.

Take it easy with the Pitts Special for the first few flights, gradually getting acquainted with it as you gain confidence. Adjust the trims to maintain straight and level flight. After flying around for a while, and while still at a safe altitude with plenty of fuel, practice slow flight and execute practice landing approaches by reducing the throttle to see how the model handles at slower speeds. Add power to see how she climbs as well. Continue to fly around, executing various maneuvers and making mental notes (or having your assistant write them down) of what trim or C.G. changes may be required to fine tune the model so it flies the way you like. Mind your fuel level, but use this first flight to become familiar with your model before landing.

Landing

To initiate a landing approach, lower the throttle while on the downwind leg. Allow the nose of the model to pitch downward to gradually bleed off altitude. Continue to lose altitude, but maintain airspeed by keeping the nose down as you turn onto the crosswind leg. Make your final turn toward the runway (into the wind) keeping the nose down to maintain airspeed and control. Level the attitude when the model reaches the runway threshold, modulating the throttle as necessary to maintain your glide path and airspeed. If you are going to overshoot, smoothly advance the throttle (always ready on the right rudder to counteract torque) and climb out to make another attempt. When you're ready to make your landing flare and the model is a foot or so off the deck, smoothly increase up elevator until it gently touches down. Once the model is on the runway and has lost flying speed, hold up elevator to place the tail on the ground, regaining tail wheel control.

One final note about flying your model. Have a goal or flight plan in mind for **every** flight. This can be learning a new maneuver(s), improving a maneuver(s) you already know, or learning how the model behaves in certain conditions (such as on high or low rates). This is not necessarily to improve your skills (*though it is never a bad idea!)*, but more importantly so you do not surprise yourself by impulsively attempting a maneuver and suddenly finding that you've run out of time, altitude or airspeed. Every maneuver should be deliberate, not impulsive. For example, if you're going to do a loop, check your altitude, mind the wind direction (anticipating rudder corrections that will be required to maintain heading), remember to throttle back at the top, and make certain you are on the desired rates (high/low rates). A flight plan greatly reduces the chances of crashing your model just because of poor planning and impulsive moves. **Remember to think.**

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

Fill in this identification tag and put it in your model.