



# B-25J MITCHELL ARF



**Wingspan:** 88.5 in [2255mm]  
**Wing Area:** 1036 sq in [66.8 dm<sup>2</sup>]  
**Weight:** 17- 19 lbs [7710 - 8620g]  
**Wing Loading:** 38 - 42 oz/sq ft [115 - 129g/dm<sup>2</sup>]  
**Length:** 71 in [1795mm]  
**Scale:** 1/9th (11%)  
**Radio:** 8-channel, 13 servos  
**Engine:** .70 cu in [11.5cc] four-strokes,  
.46 - .50 cu in [7.5 - 8.0cc] two-strokes

**WARRANTY.....**Top Flite Models 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 Top Flite's liability exceed the original cost of the purchased kit.** Further, Top Flite reserves the right to change or modify this warranty without notice.

In that Top Flite 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 buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return this kit immediately in new and unused condition to the place of purchase.**

To make a warranty claim send the defective part or item to Hobby Services at the address:

*Hobby Services*  
3002 N. Apollo Dr. Suite 1  
Champaign IL 61822 USA

Include a letter stating your name, return shipping address, as much contact information as possible (daytime telephone number, fax number, e-mail address), a detailed description of the problem and a photocopy of the purchase receipt. Upon receipt of the package the problem will be evaluated as quickly as possible.

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

**Top Flite Models Champaign, IL**

**Telephone (217) 398-8970, Ext. 5**

**airsupport@top-flite.com**

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doors on the full-size B-25 close both after the gear has retracted **and** after it has extended (look at photos of a B-25 sitting on the tarmac—notice that the gear doors are closed!). But rather than duplicating the full-size configuration (which would require a larger radio with additional channels, air control valves on every door, additional pushrods, linkages, air lines, sequencers and considerable time, expense and skill), and rather than abandoning functioning doors altogether, we did it the “hard way” back in the shop by taking time to figure out how to incorporate operating, scale-appearing landing gear doors that the average ARF builder could both afford and assemble. The Top Flite B-25 ARF features operating, spring-loaded doors that use mechanical levers to open and close, thus eliminating all the aforementioned paraphernalia that would be required.

And while other scale details including the nose-gunner interior, cockpit interior, tail-gunner canopy and machine guns are not exact replicas, these scale features still “get the point across” with their presence and stand-off accuracy. With all this detail also comes the time commitment to put it all together, but in the end we know it will all be worthwhile when you’re executing slow fly-bys straight down the runway with the flaps and gear extended and everybody else at the field standing by watching.

The “Gold” B-25 is also a user-friendly model for breaking down for transport and set up. Most modelers will simply remove the outboard wing panels allowing the model to fit easily into a mini van. If it’s still too big, the inboard wing panels and vertical and horizontal stabilizers can also be easily removed with the sturdy building stand supporting the model during the process.

For the latest technical updates or manual corrections to this model visit the Top Flite web site at [www.topflite.com](http://www.topflite.com). Open the “GOLD EDITION ARFS” link on the left side of the page and click on image of the B-25 that appears. If there is new technical information or changes there will be an “Important! TECH NOTICE” box on the upper left corner of the page. Click on the Tech Notice box to read the info.

## INTRODUCTION

Thank you for purchasing the Top Flite Gold Edition 1/9<sup>th</sup>-scale B-25J Mitchell ARF. While no ARF model will provide the level of detail necessary to take “high-static” at premier scale competitions, you’ll still be amazed at the level of detail and the number of scale features included with this model! And we’ve done our best to balance the level of authenticity and detail with the requirements for simplicity that an ARF modeler expects. For example, the main landing gear

## SCALE COMPETITION

The scale of this model is 1/9<sup>th</sup> (or 11%). These figures were derived from comparing the wing span and fuselage length of this model to the wingspan and fuselage length of the full-size. Though the Top Flite B-25J Mitchell 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 our 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 a black-and-white photo is used, other written documentation of color must be provided. Contact the AMA for a rule book with full details. See below for the AMA contact information.

If you would like photos of the full-size B-25J 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](http://www.bobsairdoc.com)

## ACADEMY OF MODEL AERONAUTICS

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

### Academy of Model Aeronautics

5151 East Memorial Drive  
Muncie, IN 47302-9252  
Tele. (800) 435-9262  
Fax (765) 741-0057



Or via the Internet at: <http://www.modelaircraft.org>

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

## IMAA

The Top Flite B-25 ARF qualifies as a "giant-scale" model and is therefore eligible to fly in IMAA (International Miniature Aircraft Association) events. The IMAA is an organization that promotes non-competitive flying of giant-scale model aircraft. If you plan on attending an IMAA event refer to the **IMAA Safety Code** at [www.fly-ima.org](http://www.fly-ima.org) under the "Sanctions" heading in their site index. IMAA contact information is also available in *Model Aviation*, the monthly newsletter magazine from the AMA. The IMAA can also be contacted at the address or telephone number below:

**IMAA**  
205 S. Hilldale Road  
Salina, KS 67401  
(913) 823-5569

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

1. Your Top Flite B-25J Mitchell ARF should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, the B-25 ARF, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.
2. You must assemble the model **according to the instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. In a few cases the instructions may differ slightly from the photos. In those instances the written instructions should be considered as correct.
3. You must take time to **build straight, true and strong**.
4. You must use an R/C radio system that is in good condition and correctly sized engine and components as specified in this instruction manual. All components must be correctly installed so that the model operates correctly on the ground and in the air. You must check the operation of the model and all components before every flight.
5. If you are not an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.
6. While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying, or if engines larger than ones in the recommended range are used, the modeler is responsible for taking steps to reinforce the high stress points and/or substituting hardware more suitable for the increased stress.

**9. WARNING:** Some of the parts in this kit are made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow into one of these parts to remove fiberglass dust, as the dust will blow back into your eyes. Always wear safety goggles, a particle mask and rubber gloves when grinding, drilling and sanding fiberglass parts. Vacuum the parts and the work area thoroughly after working with fiberglass parts.

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

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

## DECISIONS YOU MUST MAKE

This is a partial list of items required to finish this model that may require planning or decision making before starting assembly. Order numbers are provided in parentheses.

### ENGINE RECOMMENDATIONS

As specified on the front cover of this instruction manual, the Top Flite B-25J ARF is intended for twin .70 four-strokes or .46-.50 two-strokes. There isn't much more that can be said other than it is unnecessary (as well as inadvisable) to overpower this model with larger engines. Engines in the specified range will provide more than enough thrust to fly this model in a scale-like manner with plenty of extra power to perform evasive maneuvers if the situation arises. Bottom line is with two-stroke .46's or four-stroke .70's you'll find yourself cruising around at half-throttle most of the time.

## RETRACTABLE LANDING GEAR

Your B-25J Mitchell ARF may be assembled with the included fixed landing gear or retractable landing gear. If fixed landing gear is used, no additional items will be needed to install the gear. If installing retracts, this model is designed for Robart pneumatic retracts. Following is the complete list of items required to install the Robart retracts:

- Robart #TFB25 Top Flite B-25J ARF pneumatic retractable main landing gear (ROBQ1624)
- Robart #157VRX Large-Scale Deluxe Air Control Kit—includes pressure vessel, air line tubing, variable-rate air valve, T-fittings (ROBQ2305)
- #190 Air Line Quick Disconnects (ROBQ2395)
- Standard size servo to operate air control valve

Additionally, a hobby can of compressed air such as Hobbico Duster™ (HCAR5500) will be helpful for cycling the retracts during assembly and setup without having to connect the gear to the air control valve, filler and air tank before it is ready.



An air pump will also be required for filling the onboard air tank when you get to the field and it's time to fly. The Robart Hand Pump & Gauge (ROBQ2363) could be used, but will require considerable time (and effort!) to fill the tank. Instead, we recommend an electric hobby air compressor (with a pressure gauge). What we use in our R&D shop is simply a small 12V

bicycle air compressor. The power cord may have to be converted from a cigarette lighter connector to alligator clips or something that can be connected to your 12V battery. Connect Robart's air filler to the compressor with a length of Robart air line.

## RADIO EQUIPMENT

If flying the B-25 with fixed landing gear seven channels will be required; one channel for the ailerons, one for elevator, one for each engine, one for the rudder, one for the flaps and one channel for the nose steering servo. The engines could be linked with a Y-harness, but it is recommended to link the throttles electronically via mixing in the transmitter. Then, the throttles can be "decoupled" using a switch on the transmitter for starting and tuning the engines individually. It is also recommended to link the rudder servos and nose steering servo electronically through mixing in your transmitter so the nose steering servo can be trimmed separately from the rudders.

If installing retractable landing gear eight channels will be required, with an additional standard servo to operate the air control valve.

Regarding servos, the ailerons, flaps, nose steering and air control valve may all be operated with standard servos (such as Futaba S3003—FUTM0031). A stronger ball bearing servo with no less than 50 oz. in. of torque (such as the Futaba 9001—FUTM0075) should be used on the elevator. Two mini servos with a torque rating of at least 35 oz.-in. (such as Futaba S3115—FUTM0415) are required on the rudders.

**Note:** Keep in mind that the standard servo recommendations for the flaps and ailerons are the minimums. Higher-torque, ball bearing servos could be used for more flight precision.

The following servo extensions and Y-harnesses were also used in this model. See the diagrams on pages 48-49 that shows where all the extensions are used.

- (4) 6" [150mm] extensions (HCAM2701 for Futaba)
- (2) 12" [300mm] extensions (HCAM2711 for Futaba)
- (5) 24" [600mm] extensions (HCAM2721 for Futaba)
- (1) 36" [910mm] extension (HCAM2726 for Futaba)
- (5) Y-harnesses (HCAM2751 for Futaba)

A minimum 2,000mAh receiver battery could be used, but you will have to closely monitor the battery's capacity and voltage to avoid draining the battery too far. A battery larger than 2,000mAh would be more suitable and provide more flight time between charges. Following are two suitable battery packs:

- HydriMax™ *Ultra* 4.8V 4,200 mAh sub C NiMH receiver battery w/Futaba connector (HCAM6335)
- HydriMax *Ultra* 4.8V 2,000 mAh AA NiMH receiver battery w/Futaba connector (HCAM6321)

## ADDITIONAL ITEMS REQUIRED

### HARDWARE AND ACCESSORIES

In addition to the items listed in the “**Decisions You Must Make**” section, following is the list of hardware and accessories required to finish the B-25. Order numbers are provided in parentheses.

- 1/4" R/C Foam Rubber (HCAQ1000)
- 3' [900mm] Standard Silicone Fuel Tubing (GPMQ4131)
- Ernst #124 Charge Receptacle
- Stick-on Segmented Lead Weights (GPMQ4485)
- Propellers (and spares) suitable for your engines

### ADHESIVES AND BUILDING SUPPLIES

In addition to common hobby tools and household tools, this is the “short list” of the most important items required to build the B-25 ARF. **Great Planes Pro™ CA and Epoxy glue are recommended.**

Foremost, a Great Planes Standard **3/32" Ball Wrench** (GPMR8002) and a Great Planes Standard **.050" Ball Wrench** (GPMR8000) are virtual necessities for

assembling this model. These are long-handle Allen wrenches that will be invaluable for mounting the cowls and other the scale details.

- 1 oz. [30g] Thin Pro CA (GPMR6002)
- 1 oz. [30g] Medium Pro CA+ (GPMR6008)
- CA Applicator Tips (HCAR3780)
- CA Activator 2 oz. [57g] Spray Bottle (GPMR6035), or 4 oz. [113g] Aerosol (GPMR634)
- Pro 30-Minute Epoxy (GPMR6047)
- Milled Fiberglass (GPMR6165) - *OR*- Microballoons (TOPR1090)
- Threadlocker Thread Locking Cement (GPMR6060)
- #1 Hobby Knife (HCAR0105)
- #11 Blades (5-pack, HCAR0211)
- #11 Blades (100-pack, HCAR0311)
- Drill Bits: 1/16" [1.6mm], 5/64" [2mm], 3/32" [2.4mm], 7/64" [2.8mm], 1/8" [3.2mm], 5/32" [4mm], #29 Drill and 4-40 Tap (or Great Planes 4-40 Tap and Drill Set (GPMR8101))

- Tap handle (GPMR8120)
- Soldering Iron or Hobby Heat™ Micro Torch II (HCAR0755)

- Silver Solder w/Flux (GPMR8070)
- Denatured Alcohol for Epoxy Cleanup
- Plastic-Compatible Oil for Hinge Pins
- Rotary Tool and Cutting Bits (See Page 20)
- Rotary Tool Reinforced Cut-Off Wheel (GPMR8200)
- Fine-point felt-tip pen (Top Flite® Panel Line Pen—TOPQ2510)
- Black Paint for Cockpit Interior
- Medium-Grit (220 – 320-Grit) Sandpaper

### OPTIONAL SUPPLIES AND TOOLS

Here is a list of optional tools that are also mentioned in the manual.

- Epoxy Brushes (6, GPMR8060)
- Mixing Sticks (50, GPMR8055)
- Mixing Cups (GPMR8056)
- CA Debonder (GPMR6039)
- Dead Center™ Engine Mount Hole Locator (GPMR8130)

- Curved-Tip Canopy Scissors for trimming plastic parts (HCA0667)
- Non-Elastic String for stab alignment (such as K&S #801 Kevlar thread or fishing Kevlar thread)
- 9/32" [7mm] O.D. K+S brass tube for fueling line (See page 22)
- Masking tape (TOPR8018)
- 3M 77 Spray Adhesive (MMMR1990)
- AccuThrow Deflection Gauge (GPMR2405)
- CG Machine™ (GPMR2400)
- Laser Incidence Meter (GPMR4020)
- Precision Magnetic Prop Balancer (TOPQ5700)

### COVERING TOOLS

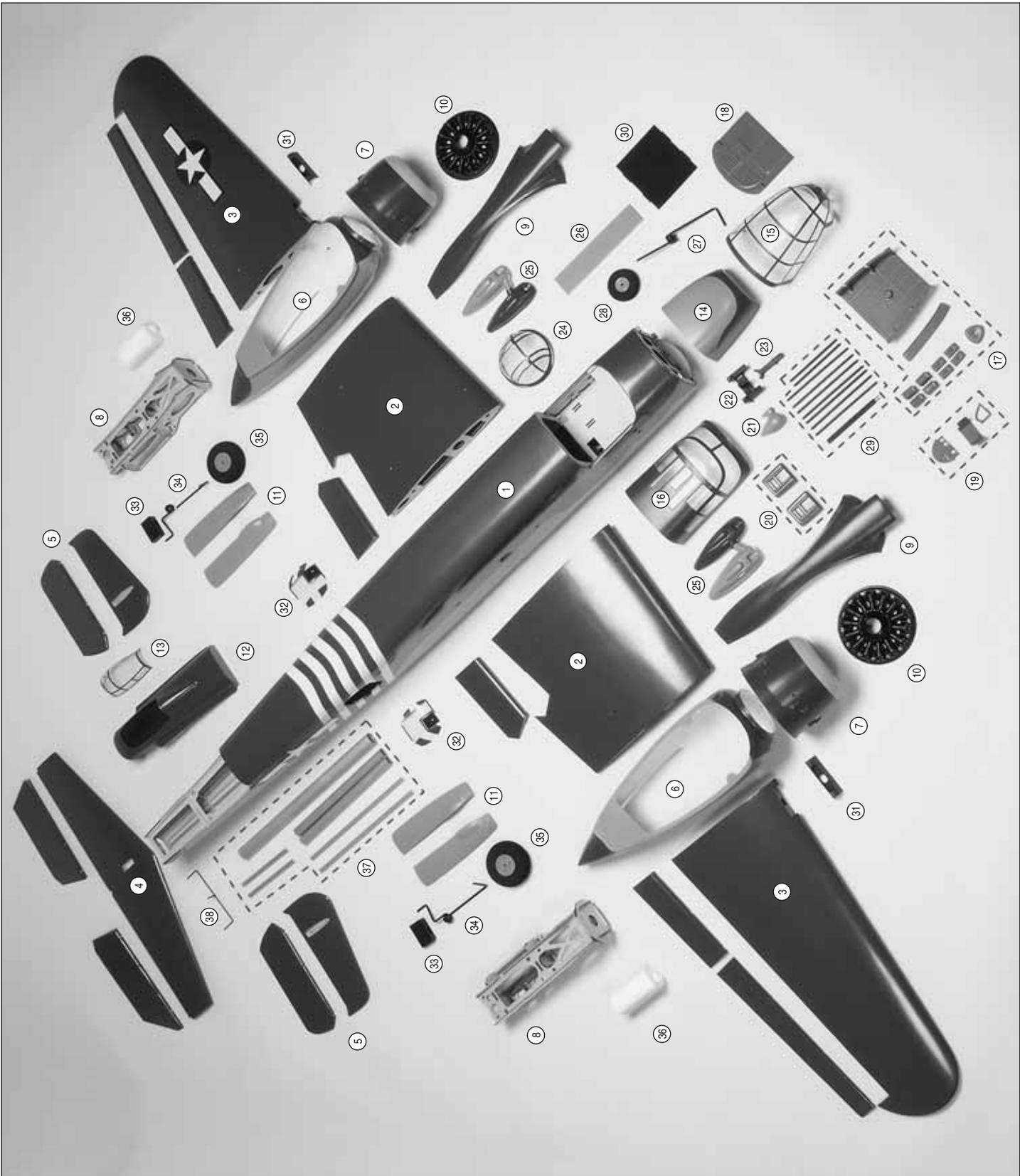
A covering iron will be required for tightening the covering on the model after it is removed from the box. Following are the covering tools recommended:

- 21<sup>ST</sup> Century® Sealing Iron (COVR2700)
- 21<sup>ST</sup> Century Iron Cover (COVR2702)
- 21<sup>ST</sup> Century Trim Seal Iron (COVR2750)

The Top Flite B-25 ARF is factory covered with Top Flite MonoKote film. Should repairs ever be required, following is a list of colors used on this model and order numbers for 6' [1.8m] rolls. (At some hobby shops MonoKote can also be purchased by the foot.)

- Flat Olive Drab (TOPQ0510)
- Flat Dove Gray (TOPQ0511)
- Flat Black (TOPQ0508)
- White (TOPQ0204)

**Note:** The stabilizer and wing incidences and engine thrust angles have been factory-built into the B-25. However, some technically-minded modelers may wish to check these measurements anyway. To view this information, visit the web site at [www.top-flite.com](http://www.top-flite.com) and click on “Technical Data.” Due to manufacturing tolerances which will have little or no effect on the way the model will fly, there may be slight deviations between your model and the published values.



## KIT INSPECTION

Before starting to build, 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 **Product Support**. When reporting defective or missing parts, use the part names exactly as they are written in the Kit Contents list on this page.

### Top Flite Product Support:

3002 N Apollo Drive Suite 1  
Champaign, IL 61822  
Telephone: (217) 398-8970  
Fax: (217) 398-7721  
**E-mail: [airsupport@top-flite.com](mailto:airsupport@top-flite.com)**

## KIT CONTENTS

1. Fuselage
2. R&L inboard wing panels, inboard flaps, flap servo hatches
3. R&L outboard wing panels, outboard flaps, ailerons, flap and aileron servo hatches
4. Horizontal stabilizer, elevators, rudder servo hatches
5. R&L vertical stabilizer, rudders
6. R&L fiberglass nacelle covers
7. Fiberglass engine cowls
8. R&L ply/balsa/hardwood nacelle assembly
9. R&L carburetor intakes
10. Replica engines
11. Main landing gear doors
12. Fiberglass tail-gunner cabin
13. Tail-gunner canopy
14. Nose-gunner canopy bottom
15. Nose-gunner window
16. Cockpit canopy
17. Nose-gunner cabin floor, ammo tray, kneeling pad, ammo boxes and tops (4)
18. Nose-gunner cabin back
19. Tail-gunner cabin bulkhead, armor plate, mounting bracket
20. Pilot/co-pilot seat backs
21. Fiberglass ADF "football" antenna w/magnets

22. Top turret tandem machine guns
23. Nose-gunner machine gun
24. Top machine gun turret canopy
25. R&L side gun packs
26. Nose gear door
27. Nose gear wire
28. 2-5/8" [68mm] nose wheel
29. (7) 6-1/8" [155mm] machine gun barrels (1-nose gun, 2-top turret, 4-external gun packs, (2) 4-7/8" [125mm] waist machine gun barrels, (2) 4-7/8" [125mm] tail-gunner machine gun barrels w/4-40 threaded inserts
30. Cockpit floor (painted flat black)
31. R&L oil cooler air scoops
32. R&L waist gun windows
33. Molded plastic fixed main landing gear blocks
34. R & L main landing gear wires
35. (2) 3-7/8" [98mm] main wheels
36. (2) 420cc Fuel tanks w/hardware
37. 30 x 440mm center main wing tube (1), 10 x 305mm forward and aft main wing tubes (2, one end threaded w/nylon inserts), 22 x 295mm outer panel wing tubes (2), 10 x 150mm outer panel wing tubes (2, one end threaded w/nylon inserts)
38. Elevator joiner wire

## ORDERING REPLACEMENT PARTS

To order replacement parts for the Top Flite B-25J Mitchell ARF, use the order numbers in the **Replacement Parts List** that follows. Replacement parts are available only as listed. Not all parts are available separately (an aileron cannot be purchased separately, but is only available with the wing kit). Replacement parts are not available from Product Support, but can be purchased from hobby shops or mail order/Internet order firms. Hardware items (screws, nuts, bolts) are also available from these outlets. If you need assistance locating a dealer to purchase parts, visit [www.top-flite.com](http://www.top-flite.com) and click on "Where to Buy." If this kit is missing parts, contact **Product Support**.

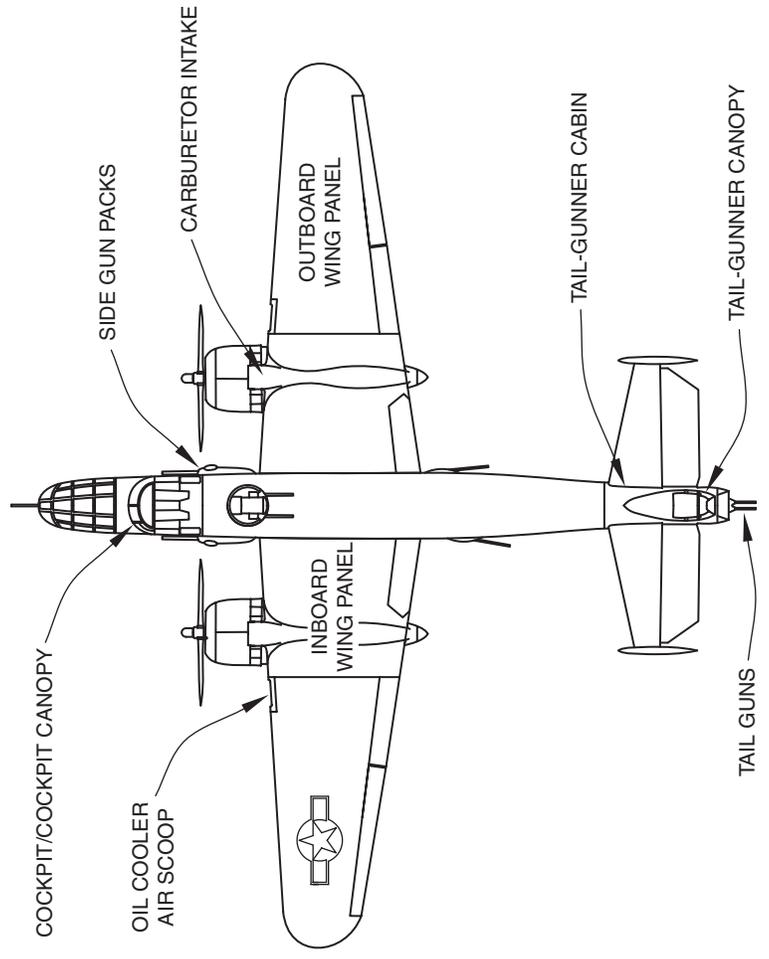
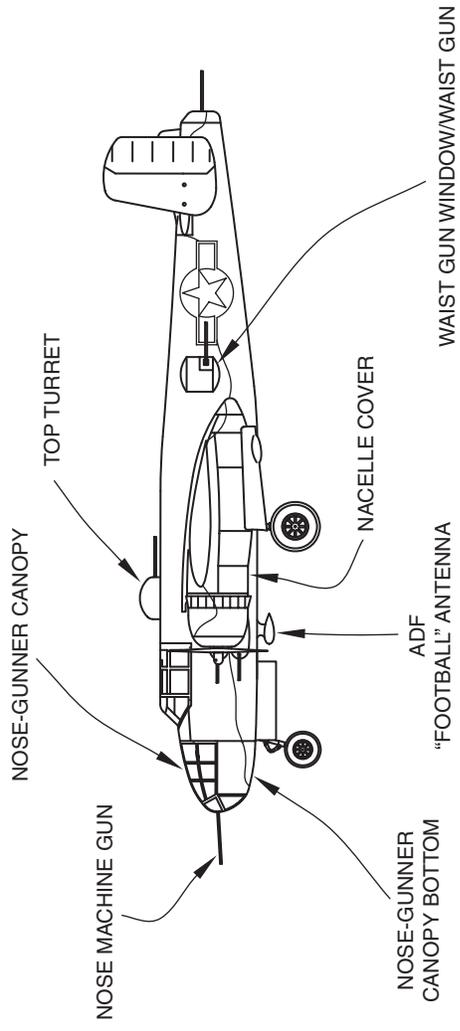
## REPLACEMENT PARTS LIST

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

Contact your hobby supplier to purchase these items:

**TOPA1700** Wing Set  
**TOPA1701** Fuselage Set  
**TOPA1702** Tail Set (Fins and Stabilizers)  
**TOPA1703** Left Engine Nacelle Assembly  
**TOPA1704** Right Engine Nacelle Assembly  
**TOPA1706** Cowl  
**TOPA1707** Dummy Engine  
**TOPA1708** Tail-gunner Cabin  
**TOPA1709** Gunner Windows  
**TOPA1710** Wing Tubes  
**TOPA1711** Landing Gear Set  
**TOPA1712** Landing Gear Doors (All)  
**TOPA1713** Cockpit Windscreen  
**TOPA1714** Cockpit Interior  
**TOPA1715** Nose-Gunner Window Assembly  
**TOPA1716** Nose-Gunner Cabin  
**TOPA1717** Machine Gun Set (All)  
**TOPA1718** Fuel Tank  
**TOPA1719** Propeller Hub  
**TOPA1720** Decal Set  
**TOPA1721** Building Stand

**THESE ARE THE NAMES OF SOME OF THE SCALE PARTS**



## PREPARATION

### PREPARE THE COVERING



□ Take time now to **thoroughly** seal the covering to the airframe. Areas of covering that aren't bonded to the wood underneath—even if you don't see any wrinkles now—may loosen and form wrinkles later. The best way to seal down and tighten all the covering is to use a covering iron with a protective covering sock to go over the entire model. Push down on the iron to bond the covering to the wood. If the covering bubbles you may be using too much heat or leaving the iron in one position too long. In some areas, where the sheeting is soft and there is no supporting structure underneath, the sheeting may bend inward making it difficult to remove the wrinkles in those areas. If this happens, use less pressure on the iron or don't press down at all. **Note:** This procedure takes time. If you don't feel like going over the entire model all at once, start with the inboard wing panels first and do the rest of the parts as you need them.

## ASSEMBLE THE WING PANELS

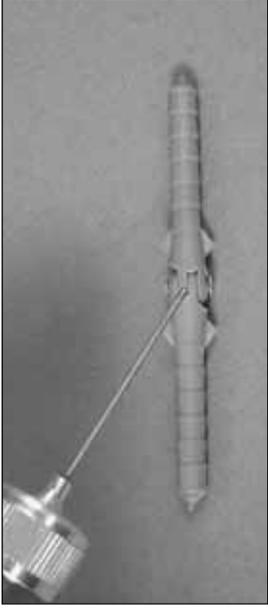
### HINGE THE FLAPS ANDAILERONS



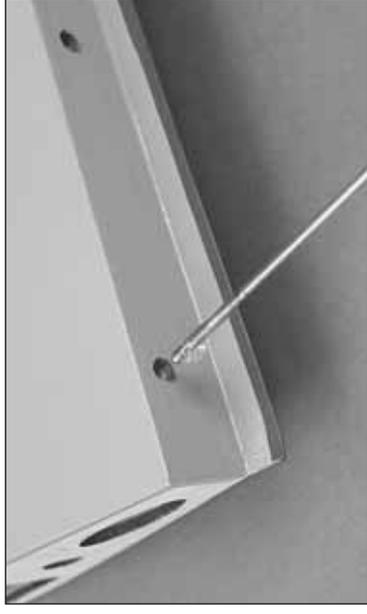
During construction there will be several occasions where epoxy cleanup will be necessary. Instead of wasting whole paper towels, stack three or four paper towels on top of each other and cut them into small squares. This will conserve paper towels and the little squares are easier to use than whole paper towels. For epoxy clean up dampen the squares with denatured alcohol.



□ 1. Test fit both **inboard** flaps to the **inboard** wing panels with the large pivot point hinges. Make sure the flaps fit well and pivot smoothly.



□ 2. Take out the hinges. Add a small drop of plastic-compatible oil or a small dab of petroleum jelly to the pivot point of each hinge. Work the oil into each hinge by pivoting it back and forth a few times.



□ 3. Mix approximately 1/4 oz. [5cc] of 30-minute epoxy. Use a piece of wire to apply epoxy into the hinge holes in both inboard wing panels and inboard flaps.



□ 4. Wipe off any excess epoxy from the outside of all the hinge holes (using your paper towel squares). One at a time, apply a thin coating of epoxy to **one**

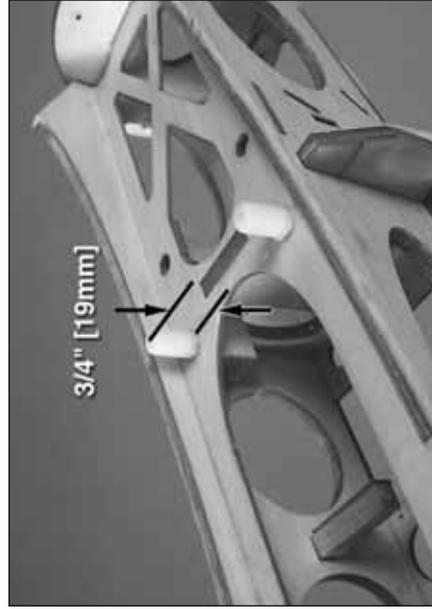
**side** of each hinge. Then, insert the hinges into the wing. When all the hinges are in, working quickly, coat the other end of the hinges with epoxy. Then, join both flaps. Do your best to wipe away any excess epoxy. Move the flaps up and down several times to align all the hinges. Set the wing panels aside and allow the epoxy to harden.

□ 6. Join the outboard flaps and ailerons to the outboard wing panels the same way using fresh batches of epoxy. Note that the ailerons use small hinges.

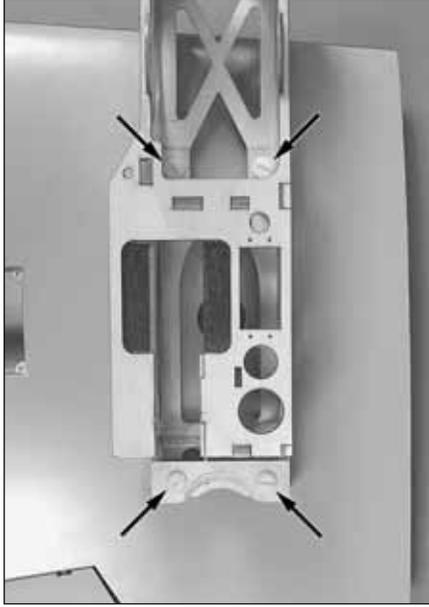
□ 7. After the epoxy on all the hinges has hardened, move the flaps and ailerons up and down several times to get them moving smoothly and easily.

*We'll install the servos and hook up the flaps and ailerons later.*

## MOUNT THE ENGINES



□ 1. Use medium CA or epoxy to glue two 8 x 30mm grooved nylon alignment pegs into the holes in each engine nacelle. Be certain the peg indicated protrudes above the base of the nacelle approximately 3/4" [19mm].



□ 2. After the epoxy from the previous step has hardened, use four 1/4-20 x 2" [50mm] nylon bolts (indicated by the arrows in the photo) to mount the left engine nacelle to the bottom of the left inboard wing panel.

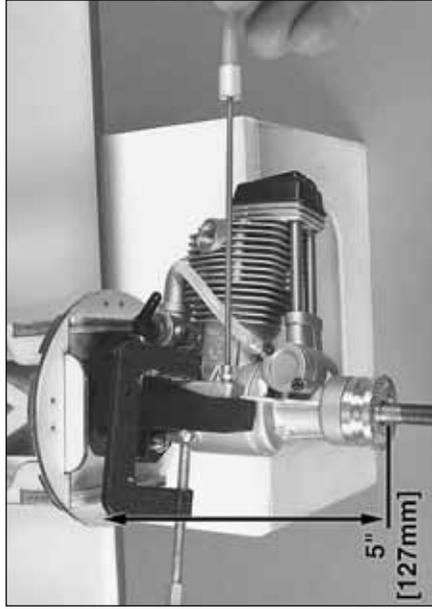


□ 3. Read the note following this step. Then, cut out the **left Engine Mounting Template** (since we're doing the left nacelle first) from the back of the manual for the type of engine you will be using—two-stroke or four-stroke. Use tape or spray adhesive to hold the template to the firewall. Then use a sharpened piece of wire or a large T-pin to mark the center of the holes in the template into the firewall.



**Note:** The four-stroke template is for the O.S. Max .70 Surpass and the two-stroke template is for an O.S. Max .40 or .50 two-stroke. Since the engine mounts are adjustable, they should fit other engines in the size range, but if you are using engines different than O.S. the positioning of the mounts may have to be rotated slightly to align the muffler with the muffler cutout in the fiberglass nacelle cover. If this is the case, you'll have to mount your engine to the mount before marking the holes in the firewall. Then, place the nacelle cover over the nacelle on the wing panel and position the mount (with the engine) so the muffler fits in the muffler cutout.

□ 4. Once the engine mount holes have been marked, drill 5/32" [4mm] holes through the firewall at each mark. Remove the template. Push 4-40 blind nuts into the holes in the back of the firewall—if necessary, trim away any plywood that interferes with the blind nuts.



□ 5. Loosely mount the engine mount to the firewall with 4-40 x 3/4" [19mm] socket-head cap screws (SHCS) and #4 flat washers. Adjust the mount to fit your engine. Tighten the screws to pull the blind nuts all the way into the back of the firewall. Temporarily clamp the engine to the mount so the front of the drive washer will be 5" [127mm] from firewall. Use a Dead Center™ Engine Mount Hole Locator (GPMR8130) or another method to mark the holes in the mount for the engine mounting screws. **NOTE:** The 3/4" [19mm] screws holding the mount to the firewall are intentionally short so they do not cut into the front of the fuel tank. Later, when mounting the engine for the final time, you will be instructed to add threadlocker to the threads of the screws so they do not come loose.

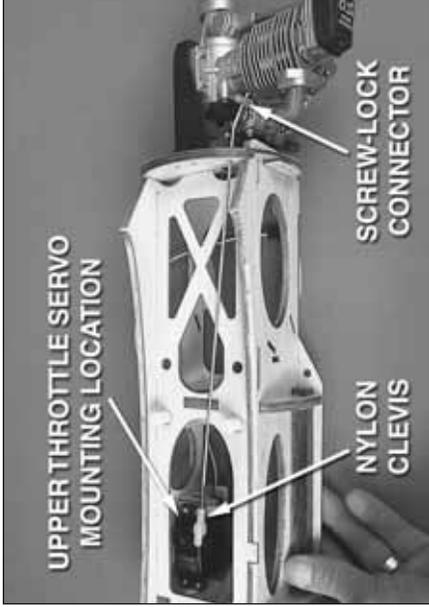
□ 6. Remove the engine from the mount and take the mount off the firewall. Add a few drops of thin CA to the edges of the blind nuts in the back of the firewall so they won't come out.

□ 7. Drill #29 holes at the marks you made in the engine mount halves for mounting the engine. Tap 4-40 threads into the holes. Remount the mount to the firewall and mount the engine to the mount with four 4-40 x 3/4" [19mm] SHCS, #4 lock washers and #4 flat washers.

□ 8. Mount the other engine to the right nacelle the same way. Make sure you use the **right** engine mounting template for marking the holes in the firewall.

## HOOK UP THE THROTTLE AND INSTALL THE FUEL TANK

Refer to this photo while hooking up the throttle.



The throttle servo may be mounted in either of two locations depending on the location of the carburetor arm on your engine. For most **two-stroke** engines, it will be easiest to mount the throttle servo in the **lower** location (the location in the bottom of the nacelle next to the landing gear mount). For some **four-stroke** engines (such as the O.S. Max .70 illustrated in this manual), it will be easiest to mount the throttle in the **upper** location (as shown in the photo). If using the O.S. Max .70, the carburetor will also have to be reversed to position the carburetor arm on the top. If using the O.S. .70, remove the engine, reverse the carburetor and carb arm, and then remount the engine. However you decide to hook up the throttle, make certain the pushrod will not interfere with the fuel tank when it is in position later (you could temporarily fit the fuel tank while working on the throttle).

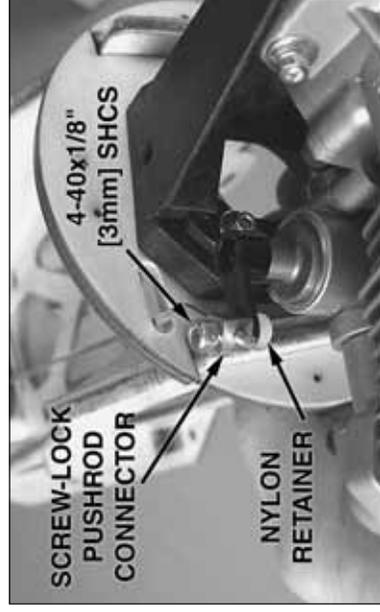
□ 1. Center the throttle servo by temporarily connecting it to the receiver with a battery and turning on the radio with the throttle trim on the transmitter centered. Cut off the unused servo arms so there is one arm remaining.

6" [150 mm]  
SERVO EXTENSION



□ 2. Connect a 6" [150mm] servo extension to the throttle servo. (There are diagrams on pages 48-49 that show all the servo extensions that were used.) Cut a piece of the 3/8" x 3" [10 x 75mm] black heat shrink tubing in half and fit it over the connection between the servo wire and the extension. Carefully shrink the tubing with heat from a heat gun or a lighter.

□ 3. Place the throttle servo in the mounting location you will be using—if using the upper throttle servo mounting location shown, the nacelle will have to be removed from the wing. Use the mounting holes in the servo as a guide to drill 1/16" [1.6mm] holes for the servo mounting screws that came with the servo. Temporarily mount the servo with the screws. Then, remove the screws and servo. Add a few drops of thin CA to each screw hole, allow to harden, and then remount the servo.



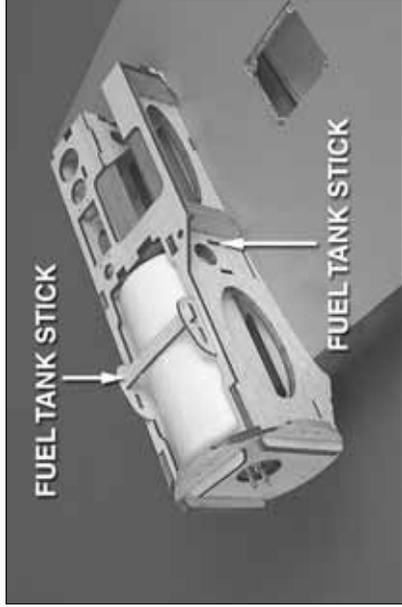
□ 4. Hook up throttle using a 2-56 x 17-1/2" [445mm] pushrod and a nylon clevis on the servo

end and a brass screw-lock connector with a nylon retainer and a 4-40 x 1/8" [3mm] socket-head cap screw (SHCS) on the carburetor arm. Cut a slot in the firewall for the throttle pushrod. Bend the pushrod as necessary to connect to the carburetor arm.

- 6. For installing the fuel tank, mounting the fiberglass nacelle cover and mounting the landing gear, it will be easier to have the engine out of the way. Remove the engine mount from the firewall and set the engine aside.



- 7. Assemble both fuel tanks—a three-line setup is recommended—one for the vent/pressure line going to the muffler, one for fuel pickup to the carburetor and a third line for fueling/defueling. This setup will allow fueling and defueling without having to disconnect any lines from the carburetor and without having to turn the model upside-down. To set up the fuel tank this way, cut two of the aluminum tubes to a length of 1-3/8" [35mm] and leave the other, longer tube as-is. Assemble the stopper assembly with the aluminum tubes, bend the longer vent tube upward so it will be at the top of the tank, and then cut the silicone lines to the correct length so the clunks will not contact the rear of the tank. Connect the lines to the tubes in the stopper and fit the stopper into the tank and tighten the screw. Make sure the clunks do not contact the rear of the tank; otherwise, they could get stuck.



- 8. Mount the left nacelle to the wing with the nylon bolts. Fit the fuel tank into the nacelle. Then, install and glue two 3/8" x 3-1/16" [10 x 78mm] plywood fuel tank sticks from the laser-cut plywood sheet into the slots to hold the fuel tank in position. **Note:** Even though fuel lines appear in a few of the following photos, there's no need to connect them until later after the cowl has been mounted—the manual will instruct you later.

- 9. Return to step 1 and mount the engine, hook up the throttle and install the fuel tank in the right nacelle the same way.

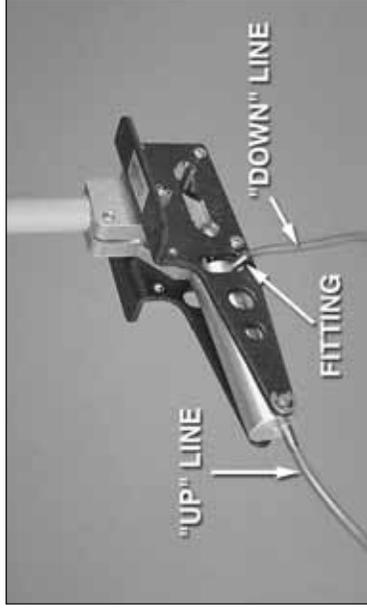
## MOUNT THE MAIN LANDING GEAR

### RETRACT INSTALLATION

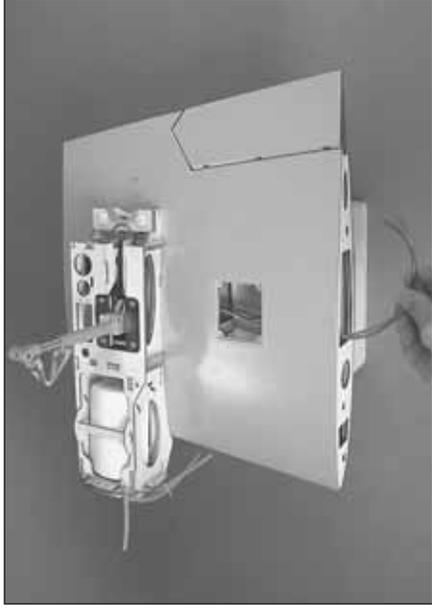
*(If not mounting retracts, skip to "Fixed Gear Installation" on the next page.)*

*Same as we've been doing so far, start with the left, inboard wing panel.*

- 1. Determine which color of air line you will be using for the "up" line and which color you will be using for the "down" line—the up line connects to the fitting on the back end of the air cylinder and the down line connects to the fitting on the front of the cylinder that comes out of the side. Cut the up line to a length of 21" [530mm] and cut the down line to a length of 18" [460mm].



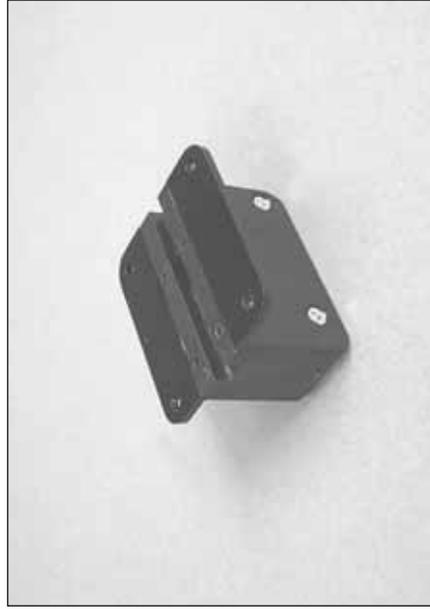
- 2. Connect the lines to the air cylinder. Rotate the fitting on the down line as shown so it will be easier to fit the gear between the rails.



- 3. Install the retract and guide the air lines through the hole in the bottom of the panel, past the flap servo hatch and out root end of the panel—note that the up line goes through the hole in the back of the nacelle first.

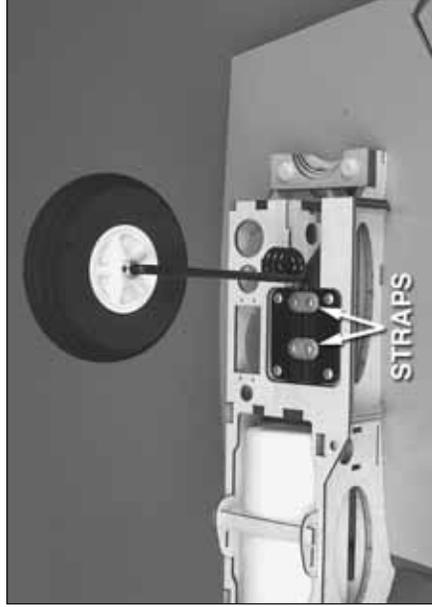
- ❑ 4. Holding the retract **centered** in the rails with the strut retracted so it will be out of the way, drill four 7/64" [2.8mm] holes for the mounting screws. Mount the retract with four #6 x 1/2" [13mm] Phillips screws.
- ❑ 5. Use a rotary tool with a fiber-reinforced cutoff wheel to cut the one of the main landing gear axles that came with the retracts to the correct length. File a flat spot on the axle for the set screw that mounts the axle to the strut. Mount the wheel with a drop of threadlocker on the set screw. Add a drop of oil to both sides of the wheel at the strut and the axle.
- ❑ 6. Mount the other retract to the right inboard wing panel the same way.

#### FIXED GEAR INSTALLATION



- ❑ 1. Assemble one of the landing gear mounts by using eight 3 x 12mm flat-head Phillips screws to mount an aluminum mounting bracket to each side of one of the molded plastic main landing gear blocks.

Refer to this photo while mounting the landing gear.



- ❑ 2. Center the landing gear mount on the mounting rails. Then, drill four 7/64" [2.8mm] holes for the mounting screws. Mount the landing gear mount with four #6 x 1/2" [13mm] Phillips screws.
- ❑ 3. Mount the left, main landing gear wire into the landing gear mount using two nylon straps and four #4 x 1/2" [13mm] screws. Mount one of the main wheels to the landing gear wire with two 5mm wheel collars and 6-32 set screws with threadlocker on the threads.
- ❑ 4. Mount the other landing gear to the right inboard wing panel the same way. Add a drop of oil to both sides of the wheels where they contact the collars.

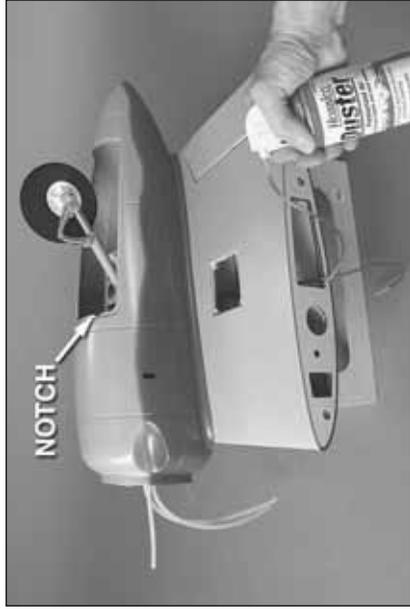
#### MOUNT THE FIBERGLASS NACELLE COVERS



- ❑ 1. If you haven't done so already, remove the left engine from the engine mount so the nacelle cover will fit over the nacelle. Place the left fiberglass nacelle cover over the nacelle on the wing. Use a pushrod sharpened on the end or a Dead Center™ Engine Mount Hole Locator to mark the location of the three mounting screws for the nacelle cover into the bottom of the wing.



- ❑ 2. Remove the nacelle cover. Drill 3/32" [2.4mm] holes into the wing at the marks. Enlarge the holes in the plywood mounting tabs **in the nacelle cover only** with a 1/8" [3.2mm] drill. Use a long #1 Phillips screwdriver to temporarily mount the nacelle cover to the wing with four #4 x 5/8" [16mm] Phillips screws, #4 flat washers and #4 lock washers.
- ❑ 3. Remove the nacelle cover. Add a few drops of thin CA to each of the screw holes for the nacelle cover mounting screws. Allow the CA to harden before mounting the nacelle cover back to the wing.



- ❑ 4. Re-mount the nacelle cover to the wing. If you've mounted retracts, read the **Hot Tip** that follows. Then, cycle the gear a few times to make sure everything works. (If necessary, use a sanding drum to enlarge the half-round notch at the front of the opening in the nacelle cover.)



The landing gear can be easily cycled with a can of compressed air such as a Hobbico Duster. Cut two 1" [25mm] pieces from the tube that comes with the can. Fit the tubes into the ends of both air lines coming from the wing that are connected to the gear. Connect one tube to the Duster to extend the gear and connect the other tube to retract the gear.

- ❑ 5. Mount the right nacelle cover the same way.

## MOUNT THE MAIN LANDING GEAR DOORS (FOR RETRACTS ONLY)

If using fixed landing gear, skip to "Mount the Cowl" on page 19.

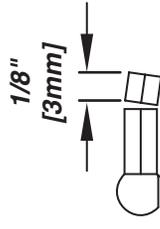
- ❑ 1. Remove the nacelle covers from the wing panels.
- ❑ 2. Look at the photos on page 15 to see where the door hinges are mounted. Use coarse sandpaper to roughen the inside of the left nacelle cover where the landing gear door hinges will go.



- ❑ 3. Use a hobby knife to scrape away the black paint from the recesses inside one set of fiberglass main landing gear doors so the glue will adhere for the door hinges.



- ❑ 4. Place the doors on the left nacelle cover. Use masking tape to tape the doors together, and then tape them to the nacelle cover.



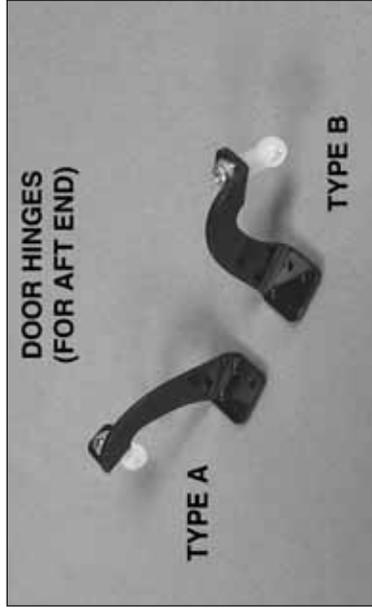
## BALL LINKS FOR REAR DOOR HINGES



- ❑ 5. Use a single-edge razor blade to cut 1/8" [3mm] off two nylon ball links—do your best to cut the ends square. Drill the holes for the screw in the ball links the rest of the way through with a 5/64" [2mm] drill bit.

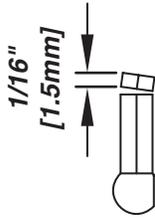
## DOOR HINGES

(These are the hinges that are glued onto the gear doors.)



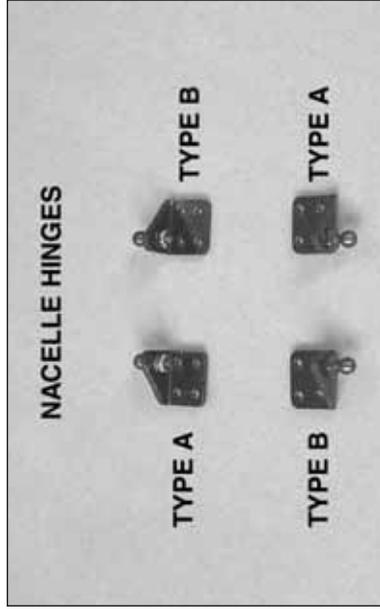
- ❑ 6. Mount one of the ball links you just cut off to a "TYPE A" door hinge and mount the other ball link you just cut off to a "TYPE B" door hinge with a

2-56 x 3/8" [9.5mm] screw, #2 lock washer and #2 flat washer. These hinges will go on the aft end of the gear doors.

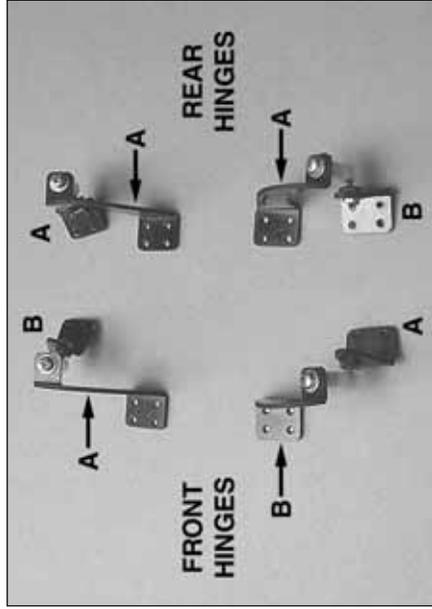


### BALL LINKS FOR FRONT DOOR HINGES

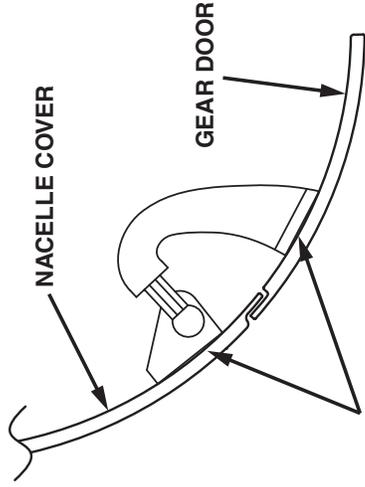
10. Cut 1/16" [1.5mm] from two more nylon ball links. Mount each ball link to another TYPE A and TYPE B door hinge. These door hinges will be for the front of the gear doors.



11. Prepare two "TYPE A" nacelle hinges and two "TYPE B" nacelle hinges by mounting an 0-80 ball link ball in the **bottom** hole of each hinge with an 0-80 nut and a drop of threadlocker on the threads.



12. Snap the ball link balls of the nacelle hinges onto the ball links on the door hinges as shown.



13. As best as you can, get the bases of the hinges to lay flat on the door and on the nacelle cover. Make sure the glue press up and fills the holes of the mounts.

14. Use coarse sandpaper to roughen the bottom of each hinge base so glue will adhere. Test fit the hinge assemblies to the doors and nacelles—each hinge assembly should be in the location and orientation shown. If necessary, adjust the length of any of the ball links by cutting them shorter so the hinges will rest flat, or nearly flat, on the doors and nacelle.

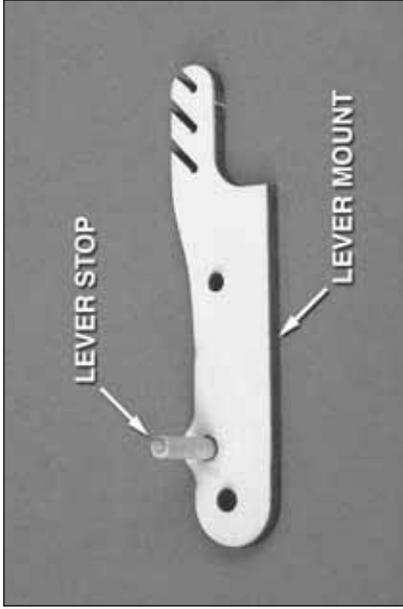
15. Use epoxy mixed with milled fiberglass or micro balloons to glue each door hinge to the doors. After the epoxy has hardened glue each nacelle hinge to the nacelle.



16. After the epoxy on the door hinges has hardened, remove the masking tape and open the doors.

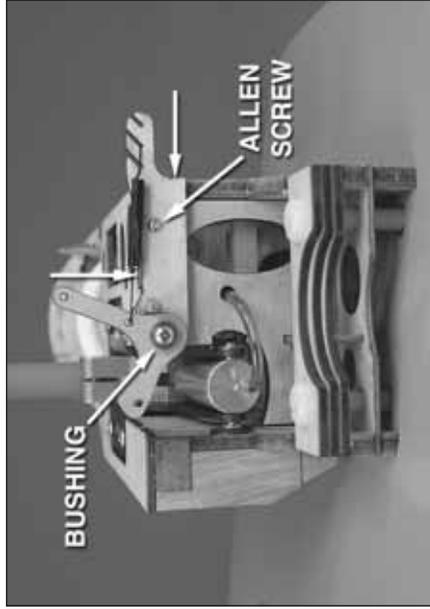
17. Hinge the doors to the other nacelle the same way.

## HOOK UP THE MAIN LANDING GEAR DOORS



1. Glue a 1/8" x 1/2" [3 x 15mm] hardwood dowel **lever stop** into one of the **lever mounts** as shown. The end of the stop should be flush with the other side of the mount.

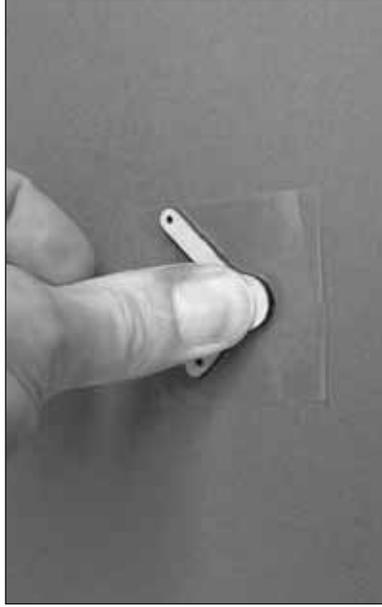
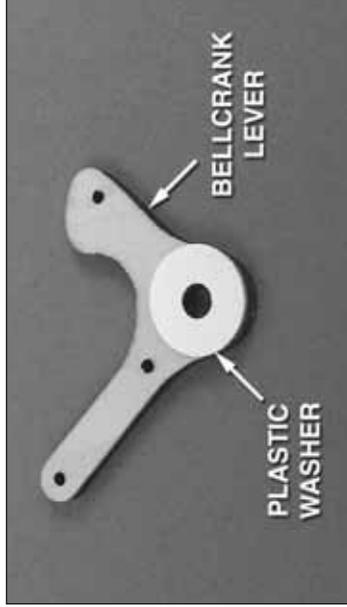
Use this photo for the next 8 steps.



2. Hold the lever mount on the back of the nacelle as shown—the outer edge of the mount should be even with the side of the nacelle and the top of the mount should be even with the bottom edge of the nacelle (where indicated by the arrows). Using the small hole in the right side of the lever mount as a guide, drill a 1/16" [.6mm] hole into the nacelle. Mount the lever mount to the nacelle with a #2 x 3/8" [9.5mm] button-head Allen screw.

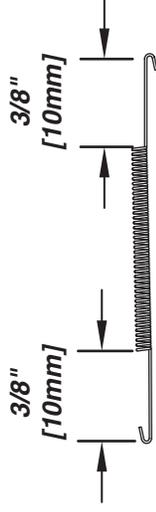
3. Use the other hole in the lever mount as a guide to drill a 3/32" [2.4mm] hole into the nacelle for the #4 screw that will hold in the bellcrank.

4. Remove the lever mount. Temporarily thread a #4 x 5/8" [16mm] Phillips screw into the larger hole you drilled. Remove the screw. Add a few drops of thin CA to both screw holes and allow to harden.



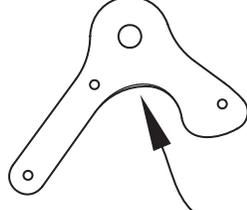
5. Use medium CA to glue a 5mm I.D. x 12mm O.D. thin, plastic washer to the front surface of the plywood bellcrank lever. (Six washers are included in the kit—two are for the levers on the main landing gear doors, one is for the lever on the nose landing gear and three are left over for spares.) The easiest way to glue on the washer is to pick it up with a hobby knife, apply a thin film of thin CA to it and place it on the lever centered over the hole. Then turn the lever over and press down over a piece of plastic film (from a sandwich bag or leftover MonoKote backing) or wax paper.

6. Remount the lever mount to the nacelle with the #2 x 3/8" [9.5mm] button-head screw. Fit a brass bushing into the plywood **bellcrank lever** as shown. Mount the bellcrank lever to the lever mount and the nacelle with the #4 x 5/8" [16mm] screw. Tighten the screw as much as possible without causing the lever to bind.



7. Bend a hook on each end of the spring where shown and cut off the excess wire. Connect the spring to the bellcrank lever and the lever mount as shown—there should be just enough tension in the spring to pull the lever to the lever stop. Later, if necessary, the spring tension can be adjusted by using another notch in the lever mount. Move the bellcrank up and down to make sure it moves smoothly with a small amount of resistance from the spring. Make any adjustments necessary.

8. Mount the nacelle cover with the doors attached to the wing panel. **Note:** If the doors ever require removal for repairs/servicing, do not pop off the ball links. Instead, unscrew the 2-56 screws from the ball links.

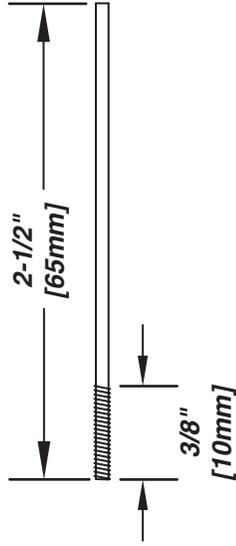


If necessary, trim the lever here.

9. Test the "action" of the landing gear and the lever mechanism by operating the system with

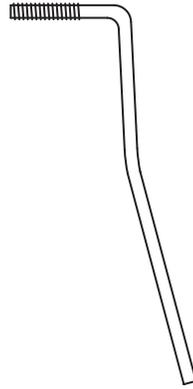
compressed air. Make sure the gear locks at both ends—up and down. It may be necessary to slightly trim the lever to allow the landing gear strut to move freely. If necessary, remove the lever, trim, reinstall and test.

- 10. Use coarse sandpaper to roughen the mounting base of two small nylon control horns (shown in the photo to the right).



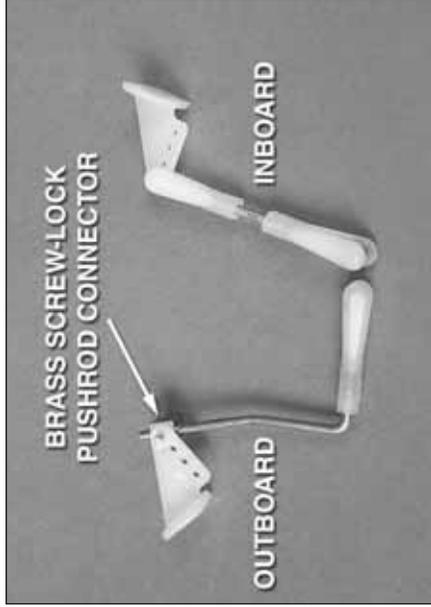
**INBOARD DOOR PUSHROD**

- 11. Make an **inboard door pushrod** first by cutting part of the threaded end and part of the unthreaded end of a 4" [100mm] pushrod as shown above.



**INBOARD DOOR PUSHROD**

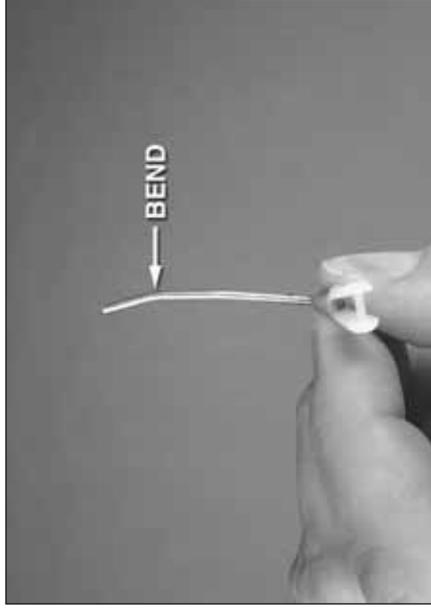
- 12. Use the sketch as a template to bend the pushrod as shown.



- 13. The same as was done on the ball links for the door hinges, cut 1/8" [3mm] from the end of two nylon clevises. Make the **outboard door pushrod** using the short clevises and complete the inboard pushrod using another regular clevis and the hardware shown. Do not install the nylon retainer on the brass screw-lock pushrod connector until instructed to do so later.



- 14. Connect the **outboard** pushrod to the bellcrank lever. Use medium CA to glue the control horn to the door in alignment with the lever. Retract and extend the gear by hand, adjusting the length of the pushrod so the door will close when the gear is retracted. Retract and extend the gear with air pressure, making sure it works. Make sure the rear hinge on the outboard door isn't rubbing against the wheel when the door is closed. If it is, you can use a hobby knife to **carefully** trim down the other side of the wheel around the hole for the axle to shift the wheel over, or remount the rear of the nacelle cover slightly over to the side—either of which will give the hinge and wheel more clearance.



- 15. Make one more bend in the inboard pushrod about 1/2" [13mm] from the end as shown.





17. Temporarily disconnect the outboard pushrod from the bellcrank lever. Retract the gear by hand and close the door. With the door closed, lock the pushrod to the screw-lock connector with a 4-40 x 1/8" [3mm] SHCS.

18. Extend the gear and open the door by hand. Reconnect the outboard pushrod and cycle the gear with compressed air—both with the nacelle upside-down and upright. Make sure both doors open and close and that the retract locks in both the retracted and extend positions. Make any necessary adjustments as described below to get the gear and doors operating correctly.

19. Mount and hook up the doors on the right inboard wing panel the same way. Keep the left panel nearby so it can be used as a reference.

20. Once you get both doors operating correctly and reliably, snap a nylon retainer onto both screw-lock connectors on the horns on the inboard doors.

**Retract and Door Adjustments:**

*If the retracts don't retract or extend all the way or if the doors don't fully close, following is a list of possible problems and solutions:*

A. One or both pushrods may be too long. Shorten the pushrods in small increments.

B. One or both pushrods may be too short not allowing the gear to retract fully. Lengthen the pushrods.

C. There may be too much or not enough tension in the spring. Move the spring to a different setting on the lever mount.

D. There may be too much friction in the retract unit, not allowing it to operate freely and all the way. Lightly oil moving parts in the retract unit.

E. Some of the parts in the door mechanism may be binding. Isolate moving parts and find out if any are too tight (ball links on ball link balls, clevises, screw-lock pushrod connector in inboard door, screw holding in bellcrank lever.)

F. The clevis on the inboard pushrod that is connected to the lever may be interfering with the inboard pushrod. Bend the inboard pushrod as necessary to clear the clevis on the other side of the lever.

G. There may not be enough air pressure to fully retract the gear—compressed air cans advertised as "dusters" typically put out approximately 90-100psi, but your can may be too low. 60-80psi should be adequate for fully retracting the gear—less for extending gear.

H. You may be extending or retracting the gear too slowly. A little momentum and a mild "slam" will help the strut and doors extend and retract all the way.

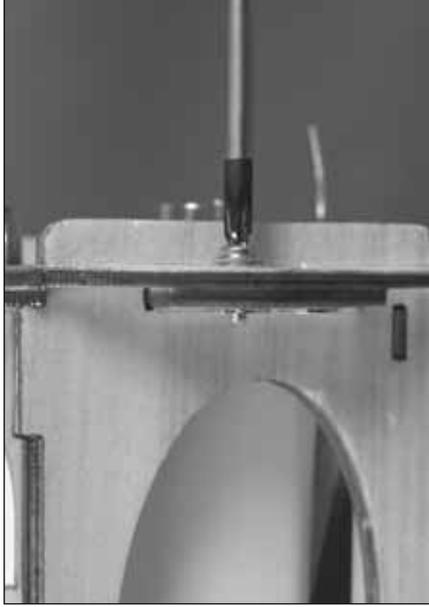
## MOUNT THE COWL

1. Take a few minutes to study how the cowl is mounted in the following photos. The cowl is mounted via a cowl ring which is permanently glued in the cowl. The cowl ring is attached to removable cowl mounting tabs with 4-40 x 1/2" SHCS—three of the cowl mounting screws are accessible from **behind** the cowl and the fourth one on the top of the cowl is accessible through the front. (Otherwise, the carburetor intake would have to be removed just to remove the cowl.) Each cowl mounting tab is attached to the firewall with two 4-40 x 3/8" [9.5mm] Phillips screws and blind nuts. The cowl mounting tabs are removable so that the fiberglass nacelle cover can be removed to access components in the nacelle.

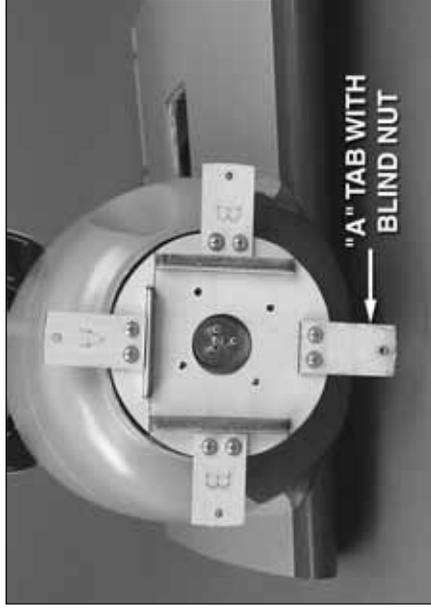
2. Disconnect the retract door pushrods and remove the nacelle cover from the left, inboard wing panel.



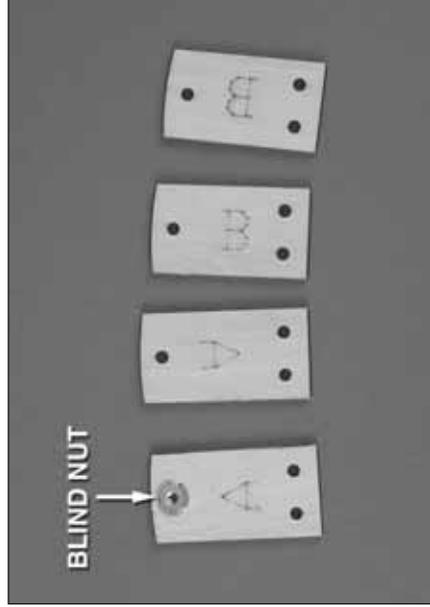
3. Drill 5/32" [4mm] holes through the firewall at the eight precut marks for the cowl mounting tabs. **IMPORTANT!** Use care **NOT** to drill into the fuel tank when drilling through the bottom two holes!



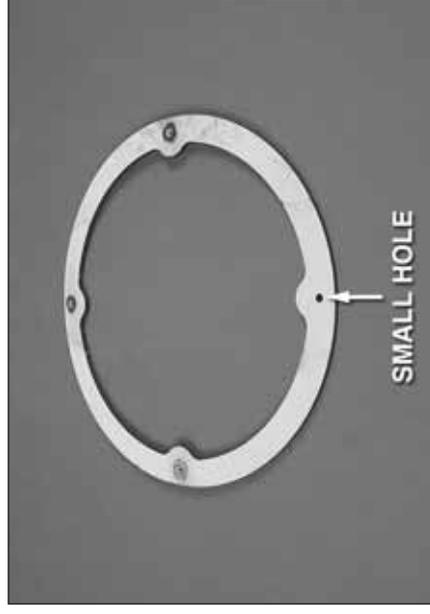
4. Use a 4-40 x 3/8" [9.5mm] Phillips screw and two #4 washers to pull 4-40 blind nuts into the back of each hole just drilled in the firewall. Use epoxy to glue in the blind nuts as they go in or use a few drops of thin or medium CA to glue in the blind nuts after they are all the way in.



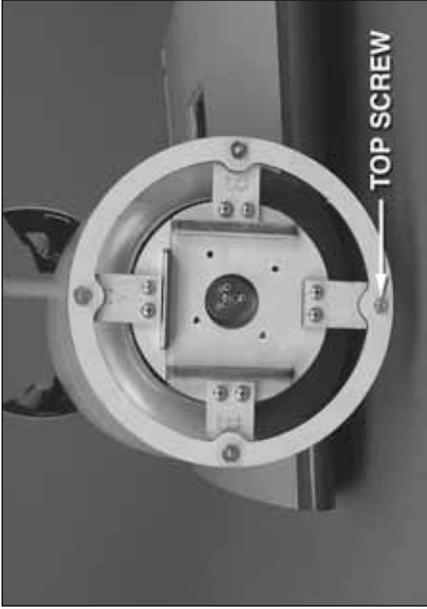
6. Mount the nacelle cover to the wing panel. Use two 4-40 x 3/8" [9.5mm] Phillips screws, #4 lock washers and flat washers to mount each cowl mounting tab to the front of the firewall—the short "B" tabs go on the sides of the firewall and the long "A" tabs go on the top and bottom of the firewall. The "A" tab with the blind nut goes on **top** of the wing and the blind nut goes toward the **back**. **Note:** Do not tighten the screws all the way so the tabs will be allowed to "float."



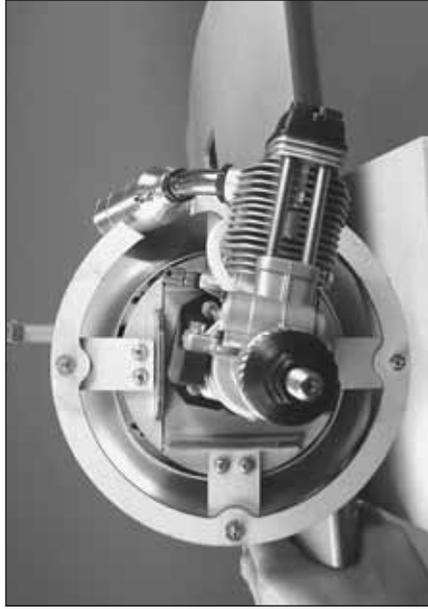
5. Note that there are two different plywood cowl mounting tabs—long ones ("A") and short ones ("B"). One of the longer, "A" tabs has a larger hole in the top. Press a 4-40 blind nut into the larger hole of that "A" tab.



7. Mount three more 4-40 blind nuts into the three **large** holes in one side of one of the cowl rings and glue them in—note that one of the holes is smaller than the other three—do not mount a blind nut into that small hole.



□ 8. Mount the cowl ring to the cowl mounting tabs with four 4-40 x 1/2" SHCS, #4 lock washers and #4 flat washers. Note that the top screw goes in from the front, but the other three go in through the back. A 3/32" ball end hex wrench (GPMR8002) is virtually a **must** from here on out. Once the cowl ring has been fastened to all the tabs, go ahead and tighten up the screws holding the tabs to the firewall.



□ 9. Mount the engine muffer and engine without the muffer. Trim the cowl ring as necessary until you can get the muffer to fit.

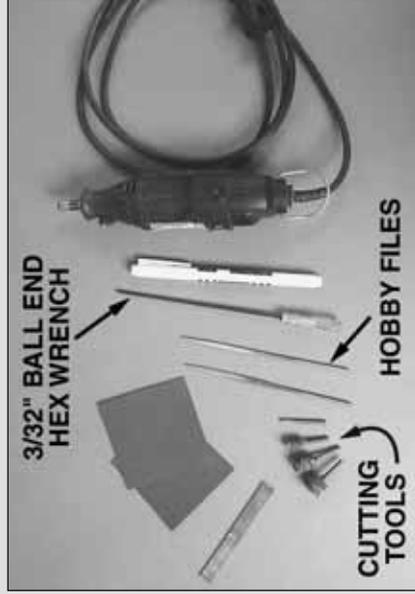
□ 10. Remove the muffer from the engine. Get ready to start cutting fiberglass and read the Hot Tip below that lists recommended tools, working tips and safety warnings for cutting fiberglass.



### Tools For Cutting Fiberglass

There are several fiberglass parts on this model. A few of them will require cutting and trimming to end up with the best fit. Follow these warnings and use the suggested tools for working safely with fiberglass.

- A. Do not be casual when working with fiberglass.** Always wear eye and respiratory protection.
- B. Work in a well-ventilated area**—working under an exhaust fan that will draw fiberglass dust away is best. If possible, cutting fiberglass outdoors may also be a good idea.
- C. Wear a long-sleeve shirt** when cutting fiberglass.
- D. If using a high-speed rotary tool**, hearing protection is recommended.



- E. Following are the best tools for cutting fiberglass:**
  - I.** A rotary tool.
  - II.** A fine-point, felt-tip pen for marking. (Afterward, ink can be removed with a paper towel and denatured alcohol.)

- III.** A 3/32" ball driver will be indispensable when fitting the cowl later.
- IV.** Curved and flat hobby files.



- V.** Various cutting bits for your rotary tool—the carbide cutter is best for making initial cuts. Abrasive drum sanders work well for "fine-tuning."
- VI.** A small sanding board made from a piece of plywood with sandpaper glued on.
- VII.** Small sheets of medium-grit sandpaper to smooth rough edges.

- 11. Retrieve your fiberglass cutting tools and safety equipment. Cut one of the fiberglass engine cowls to fit over the engine—it doesn't matter which of the two cowls you choose because they are both the same. Cutting the hole is basically a trial-and-error process where you cut-and-fit and cut-and-fit the cowl until it goes over the engine. If using a 4-stroke, the cowl fitting procedure will be easier if the valve cover is temporarily removed. If using a 2-stroke the cowl will be easier to fit if the head is temporarily removed. This will allow the cowl to fit without having to finalize the exact size, shape and location of the cutout until after the cowl has been permanently mounted. Start by trying to fit the cowl over the engine as far as it will go. Use a fine-point felt-tip pen or a lead pencil to mark the inside of the cowl in the approximate location where the engine will stick out.



□ □ 12. Using the marks inside the cowl as a guide, use your rotary tool with a carbide cutter to cut a **rough, undersize starter hole** in the cowl. See if you can fit the cowl over the engine. Continue fitting and cutting the cowl until you can get it into position over the head and the cowl ring—cut only as much as needed to get the cowl over the engine—final cutting and trimming will be done later after the cowl and cowl ring have been permanently joined.



□ □ 13. If you haven't yet done so, assemble the building stand that came with this kit by using epoxy or white glue to glue the plastic tubes into the foam cradles. Apply the foam cushion strips to the front and back of both cradles where they support the fuselage.

□ □ 14. Once you can get the cowl over the engine, place the fuselage in the building stand. Then, fit the inboard wing panel to the fuselage with the aluminum

joiner tubes—no need to use the screws to secure the tubes in the wing panel at this time. Counterweight made from bags of shot or something similar will be needed on the tubes coming out of the right side of the fuselage.

□ □ 15. Use medium-grit sandpaper to roughen the inside of the cowl all the way around where the cowl ring will go.



□ □ 16. Test fit the left, fiberglass **carburetor intake** to the top of the wing. Make any adjustments necessary for a good fit. Then, drill 1/16" [1.6mm] holes into the wing through the holes in the intake. Mount the carburetor intake to the wing with eight #2 x 3/8" [9.5mm] button-head Allen screws.



□ □ 17. Trim the top of the cowl as necessary to accommodate the intake. With the intake and cowl in

position, place a propeller on the engine and position the cowl so it looks best—due to the out thrust and down thrust of the engine, a compromise will have to be made between centering the propeller in the cowl and aligning the cowl with the nacelle cover—if the propeller was centered in the front of the cowl, the outward and downward angle of the cowl wouldn't look right. If the cowl were aligned perfectly with the nacelle the propeller would be too far off center in the cowl. Look at the cowl from different angles and get it positioned where it looks best.

□ □ 18. Once satisfied with the position of the cowl, use medium CA and accelerator to tack glue the cowl to the cowl ring in about four or six different spots.

□ □ 19. Without accidentally breaking the cowl ring free from the cowl, use your 3/32" ball-end hex wrench to loosen the screws and carefully remove the cowl from the nacelle. Use 30-minute epoxy mixed with milled fiberglass or microballoons to securely glue the cowl ring to the cowl with a **small** fillet all the way around both sides.



□ □ 20. Cut a small, rounded slot in the top of the cowl to accommodate the ball-end hex wrench to access the top cowl mounting screw. Access through this slot will be necessary after the replica engine has been installed.

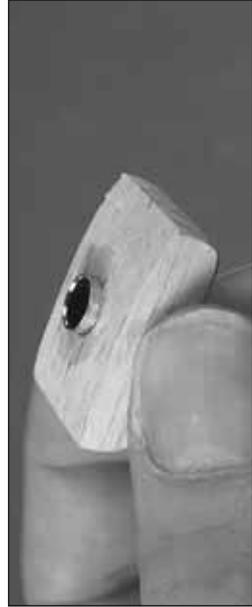
### Now it's time to finalize the engine cutout and make the cutout for the muffler.

- 21. Mount the muffler to the engine. Repeat the cut-and-fit procedure to cut out the cowl for the muffler. Proceed slowly, cutting a **little at a time** and test fitting the cowl often as you proceed.



- 22. Now that the cowl has been rough-cut to fit around the engine and muffler, use a rotary tool with a sanding drum to make any final cuts so there will be adequate clearance around the engine and muffler and so the cutouts look good with smooth lines, straight edges and nicely-rounded corners. You can also make additional cutouts for cooling air where necessary. Final-sand all the openings with 320-grit or 400-grit sandpaper.

- 23. Cut any other holes necessary for the needle valve, low-speed needle adjustment screw, glow plug igniter, fuel filling, etc.



- 24. To duplicate the fueling system shown in this manual, make a **fuel line mount** for the fuel filling line

from a balsa block (not supplied) and a 9/32" [7mm] O.D. K+S brass tube. Sharpen the end of the tube, and then use it to cut a hole through the balsa block. Round the top of the block to fit the inside of the cowl. Glue a 1/4" [6mm] piece of the brass tube into the balsa block so it sticks out the rounded side of the block 1/32" [.5mm].



- 25. Cut a 9/32" [7mm] hole in the cowl where you want the fueling line to come out. Use epoxy mixed with microballoons to glue the block into position.



- 26. Connect 8" [200mm] of silicone fuel tubing (not included) to the fill line coming from the fuel tank. When mounting the cowl later, guide the filling line through the brass tube in the cowl. After fueling the model at the field, close the line with an aluminum fuel line plug. Then, push the line back into the tube.

- 27. Mount the right cowl the same way.

### MOUNT THE REPLICA ENGINE



- 1. Sand all the way around the edge of one of the replica engines so glue will adhere. Sand the inside of the cowl where the engine will be glued as well.



- 2. Use curved-tip plastic-cutting scissors or your rotary tool to cut out two cylinders of the replica engine.



- 3. Carefully twist a hobby knife into the plastic making small holes for the wire replica pushrods. Fit

the pushrods into the holes. Then, use medium CA to glue the pushrods in.

4. Fit the replica engine in the cowl and align the two missing cylinders with the cutout for the engine. Level the replica engine inside the front of the cowl, double-check the alignment, and then use thin CA to carefully glue the replica engine into position. Use care not to use too much CA which could run onto the outside of the cowl.

5. If necessary, cut a hole in the top of the replica engine in alignment with the slot in the top of the cowl for the 3/32" Allen wrench.



6. Take the drive washer off the engine. If necessary, enlarge the hole in the front of the replica engine so the cowl will go over the engine. Mount the cowl to the nacelle and put the drive washer back on. If you prefer not to remove the drive washer for installing the cowl, the hole in the middle of the replica engine will have to be enlarged even more. Similarly, if you install the valve cover on the engine after you install the cowl, the hole in the cowl for the engine can remain small.

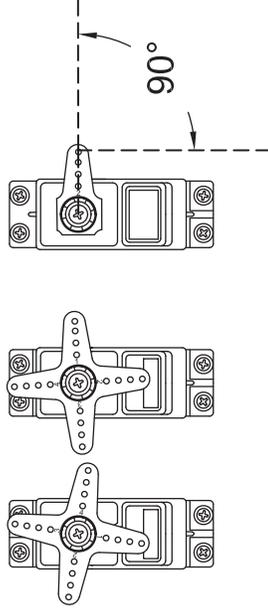
7. Mount the other replica engine in the other cowl the same way.

## HOOK UP THE FLAPS AND AILERONS

YES

90-degrees

(Cut off the unused arms.)



1. Retrieve your flap and aileron servos. Center each servo by connecting it to the receiver, centering the trims on the transmitter, and then turning on the transmitter and receiver. Once you find the servo arm that's 90-degrees, cut off the rest.



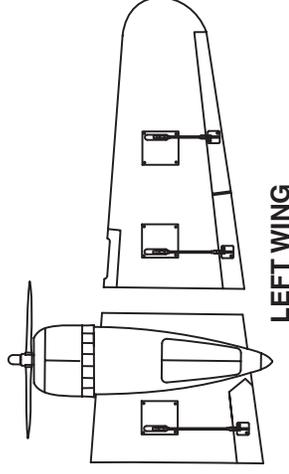
2. Mount the servos to the mounting blocks on each of the six hatches by using the holes in the servos as guides for drilling 1/16" [1.6mm] holes into the servo blocks. Temporarily mount the servos with the screws that came with them, remove the screws and servos, and then harden each hole with a few drops of thin CA. Allow the CA to harden. Then, remount the servos.

6" [150 mm]

SERVO EXTENSION

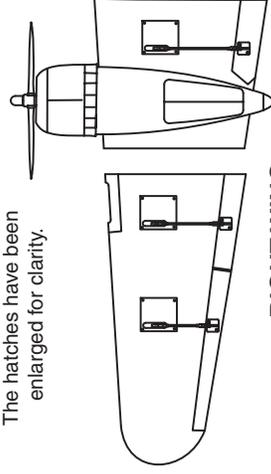


3. Connect a 6" [150mm] servo extension to each aileron servo. (Refer to the "Servo Extensions" sketches in the back of the manual for full diagrams of what servo extensions and Y-harnesses are used.) Same as the throttle servos, secure the connection with 1-1/2" [40mm] pieces of heat shrink tubing.



LEFT WING

The hatches have been enlarged for clarity.



RIGHT WING

4. Noting the orientation of the servo hatches in the bottom of the wing, place the servo hatches with the servos in the respective wing panels—be certain the screws that hold on the servo arms are in all the servos! Use the strings in the wings to guide the servo wires out the ends of the panels—or just drop them down through the holes while holding the wings on-end.

5. Prepare for making the flap and aileron pushrods by reading the following "Hot Tip" on how to solder. Then, gather your soldering equipment.



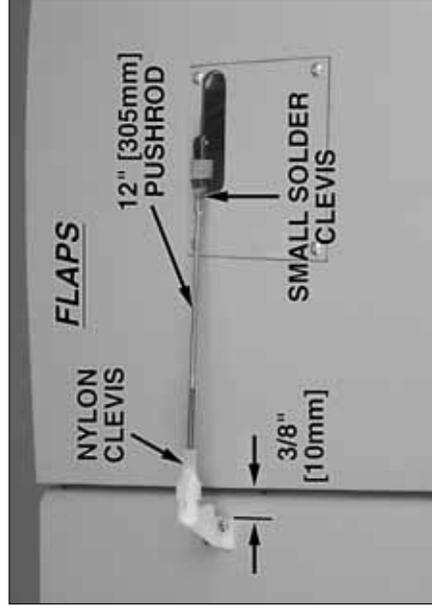
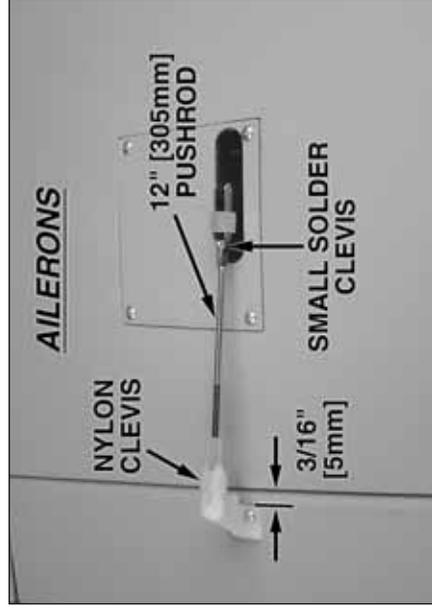
### How to Solder

- A. Use denatured alcohol or other solvent to thoroughly clean the pushrod. If necessary, cut the pushrod wire to the correct length. Roughen the end of the pushrod with coarse sandpaper where it is to be soldered.
- B. Apply a few drops of soldering flux to the end of the pushrod. Then, use a soldering iron or a torch to heat it. "Tin" the heated area with **silver solder** (GPMR8070) by applying the solder to the end. The heat of the pushrod should melt the solder—not the flame of the torch or soldering iron—thus allowing the solder to flow. The end of the wire should be coated with solder all the way around.
- C. Place the clevis on the end of the pushrod. Add another drop of flux, and 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 naturally without disturbing. Avoid excess blobs, but make certain the joint is thoroughly soldered. The solder should be shiny, not rough. If necessary, reheat the joint and allow to cool.

- D. Immediately after the solder has solidified, but while it is still hot, use a cloth to quickly wipe off the flux before it hardens. **Important:** After the joint cools, coat with oil to prevent rust. **Note:** Do not use the acid flux that comes with silver solder for electrical soldering.



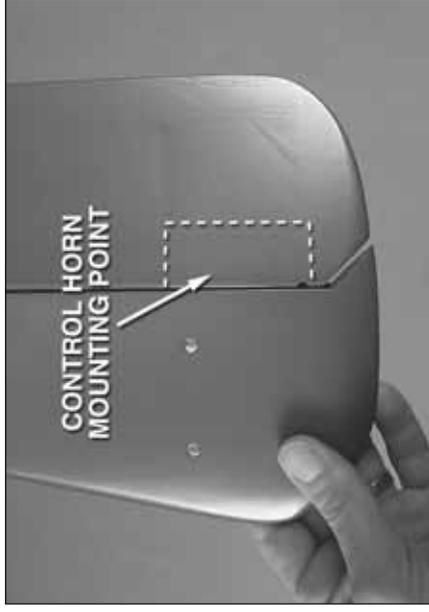
This is what a properly soldered clevis looks like—shiny solder with good flow, no blobs, flux removed.



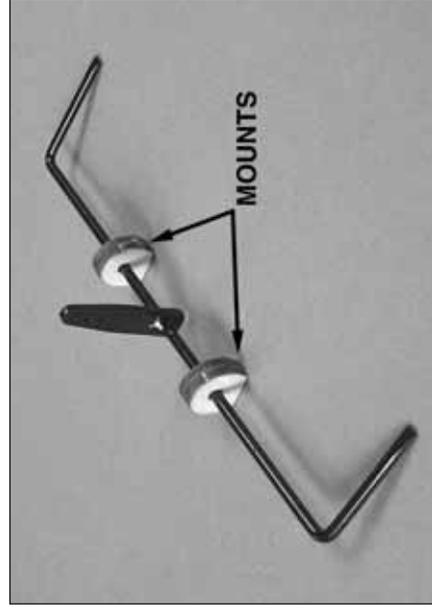
6. Hook up the flaps and ailerons using the hardware shown. For the flaps, note that when the flaps are fully retracted ("up") the servo arms should be back and when the flaps are extended the servo arms should be forward. Also note that the front edge of the flap control horns is set back 3/8" [10mm] from the TE of the wing and the front edge of the aileron control horns is 3/16" [5mm] from the TE of the wing. Drill 1/16" [1.6mm] holes for the control horn mounting screws. Mount the horns with #2 x 3/8" [9.5mm] Phillips screws and mount the hatches with #2 x 3/8" button-head Allen screws. After installing all the wood screws, temporarily remove the screws, add a few drops of thin CA to each hole, allow the CA to harden and then reinstall all the screws.

## ASSEMBLE THE TAIL

### HINGE THE ELEVATORS AND RUDDERS



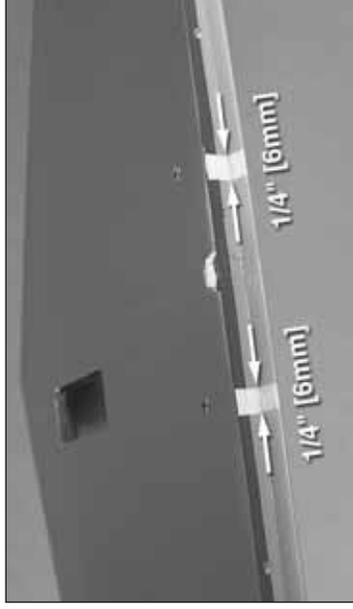
1. Use 30-minute epoxy to hinge the rudders to the vertical stabilizers. Be certain the mounting points in the rudders for mounting the control horns are on the **bottom** and also make sure the rudders aren't pushed too close up to the vertical stabilizers. Otherwise, control throw may be limited. Set the rudders aside while working on the elevators.



2. Use coarse sandpaper to roughen the *torque arm* portions of the elevator joiner wire so glue will adhere. Slide two plywood **elevator joiner mounts** over both ends of the elevator joiner wire. Then, glue the two sets of mounts together.



□ 3. Test fit both elevators to the elevator joiner wire. If necessary, carefully bend the joiner wire so that both elevators will be parallel with each other.



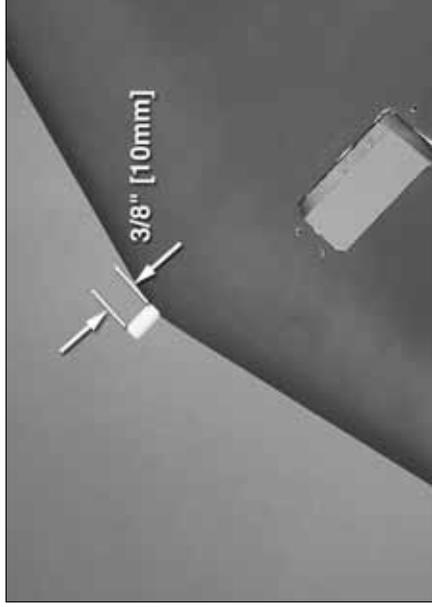
□ 4. Trim two 1/4" [6mm] strips of covering from the trailing edge of the horizontal stabilizer directly behind the mounting bolt holes.



□ 5. Test fit the elevators with the joiner wire and the hinges to the horizontal stabilizer. Hold the plywood joiner mounts in position and move the elevators up and down. Make any adjustments necessary so that everything operates smoothly.

□ 6. With the elevators and hinges still connected, glue the plywood joiner mounts to the stab, but do not glue any of the hinges yet.

□ 7. Remove the elevators and hinges from the stab and the joiner wire. Use 30-minute epoxy to permanently join the elevators to the stab and joiner wire with the hinges. Same as the rudders, don't push the elevators up too close to the stab. Otherwise, you may not be able to get full elevator throw (which is 1-1/4" [32mm] up and down).

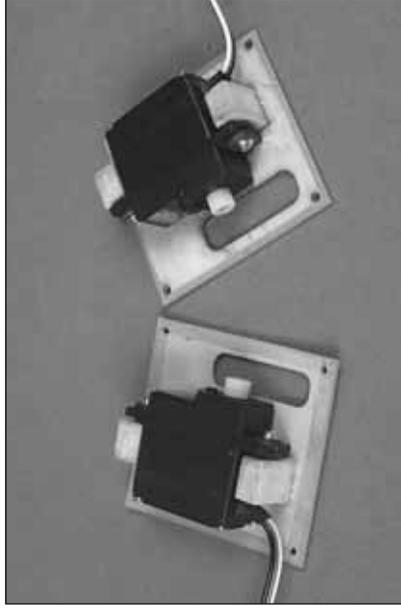


□ 8. While you've got some epoxy mixed up, round one end of the 1/4" x 1-1/2" [6 x 40mm] **stabilizer dowel**. Then, glue it into the leading edge of the stabilizer with 3/8" [10mm] protruding.

## HOOK UP THE RUDDERS AND ELEVATORS



□ 1. Take the rudder servo hatches off the horizontal stab. Reinforce the glue joint between the ends of the horizontal stab where the vertical stabs mount and the top and bottom of the stab sheeting with thin CA. Allow to harden, and then follow up with a small fillet of medium CA.



□ 2. Mount the rudder servos to the hatches—you should be an expert at mounting servos by now. (Drill 1/16" [1.6mm] holes, install the screws, remove, add a few drops of thin CA to each hole, allow to harden, and then mount the servo.)

□ 3. Center the rudder servos by connecting them to your radio. Cut off the unused servo arms. Then, connect the arms to the servos with the screws.

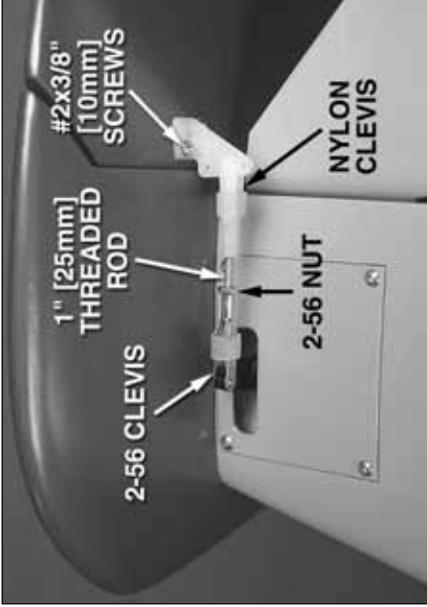


□ 4. The rudder servos move together, so they may be linked with a Y-harness connector (rather than using the mixing in your transmitter). Use the strings in the stab to guide two 12" [300mm] servo extensions through each hatch opening and out the round hole in the bottom. Connect the rudder servos to the extensions and secure the connections with heat shrink tubing.

□ 5. Temporarily mount the rudder servo hatches in the hatch openings with #2 x 3/8" [9.5mm] button-head Allen screws. Remove the screws and add a drop of thin CA to each screw hole. Allow the CA to harden and remount the hatches.

□ 6. Connect the ends of the servo extensions outside the stab to a Y-harness and secure those connections with heat shrink tubing too.

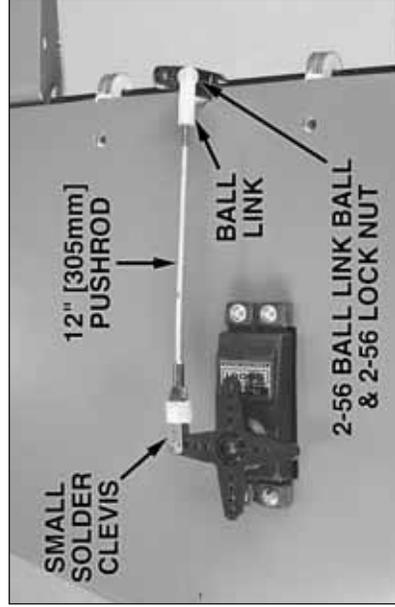
□ 7. Mount both vertical stabilizers to the horizontal stabilizer with 4-40 x 3/8" [9.5mm] Phillips screws and threadlocker on the threads.



□ 8. Connect the rudders to the rudder servos with pushrods and the hardware shown in the photo. Don't forget to add thin CA to the holes in the rudder for the wood screws.

□ 9. Now would be a good time to center the rudders by adjusting the length of the pushrods and setting the control throws as shown on page 43.

...Back to the elevator servo...



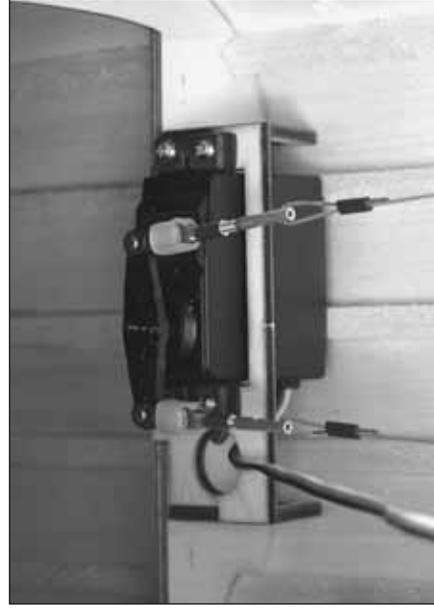
□ 10. Mount the elevator servo in the top of the elevator—if necessary, cut a notch in the servo opening in the bottom of the stab to accommodate the servo wire. Connect the elevator servo to the elevators using the hardware shown—don't forget to remove the servo mounting screws and harden the screw holes with thin CA. Remount the servo.

□ 11. Connect a 36" [910mm] servo extension to the elevator servo and secure the connection with heat shrink tubing.

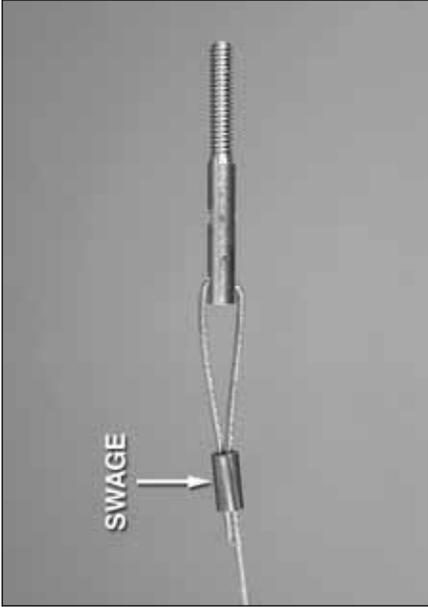
□ 12. Guide the servo extensions through the plastic tube in the fuselage up to the radio compartment. If you can't get the extensions to go down through, you could first insert a piece of string with a weight on the end down through the front of the tube, and then connect the string to the extensions and pull them back through. Mount the stab to the fuselage with two 4-40 1-1/2" [38mm] SHCS and #4 lock washers, flat washers and a drop of threadlocker on the threads. Connect the elevator and rudder servos to the receiver and operate the controls to make sure everything works smoothly. Make any adjustments necessary.

## MOUNT THE NOSE GEAR

Refer to this photo for the following four steps.



□ 1. Temporarily connect the servo you will be using for the nose steering to your radio and center the servo. Cut off the two unused arms.



❑ 2. Connect one of the 24" [610mm] braided steel cables to a brass coupler with a copper swage—if you can't get the end of the cable to go through the swage, use a hobby knife to scrape some of the plastic coating from the end of the cable. Tightly squeeze the swage with pliers so the cable won't come out.

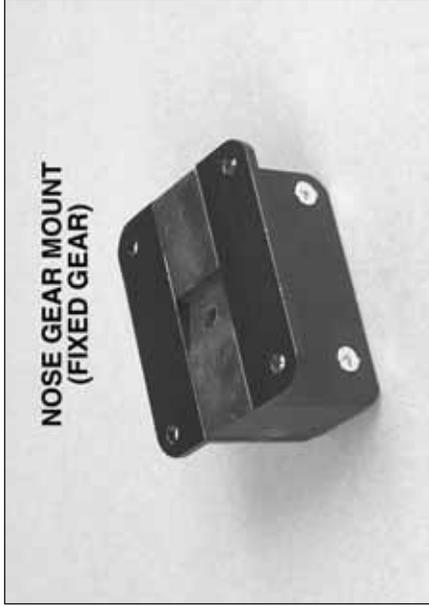
❑ 3. Prepare another cable the same way. Connect both cables to the nose steering servo with 2-56 metal clevises and silicone clevis retainers.

❑ 4. Mount the nose steering servo in the nose steering servo tray down inside the fuselage—it's almost out of reach, but not too difficult to get to.

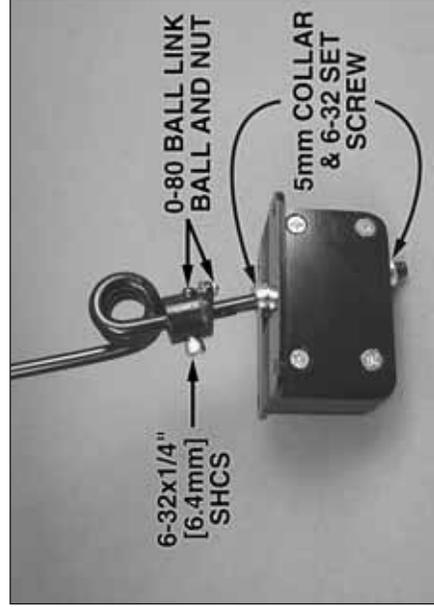
❑ 5. Guide the steering cables up through the plastic tubes in the front of the fuselage

*From this point forward steps that are for retracts only are preceded by an "R" and steps that are for fixed gear only are preceded by an "F."*

*If installing retracts skip the following two steps.*



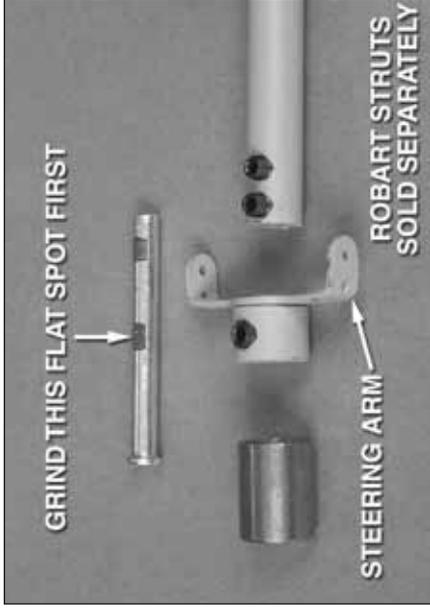
❑ F6. Assemble the nose gear mount by using eight 3 x 12mm flat head Phillips screws to attach the aluminum mounting brackets the plastic nose gear block. Note which side of the nose block is the bottom.



❑ F7. Attach the nose gear wire to the nose gear mount using the hardware shown and use threadlocker on all the screws.

*If installing fixed landing gear, skip the next six steps.*

*Refer to this photo for the following three steps.*



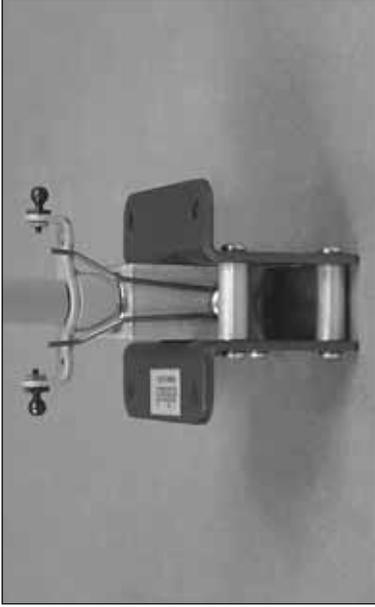
❑ R8. Remove the strut assembly from the retract unit of the retractable nose landing gear. Grind a flat spot in the steering shaft **for the set screw in the steering arm only**. This is best done with a cutoff wheel in a rotary tool to get the flat spot started, and then using a small metal file to square it up.

❑ R9. Reassemble the strut assembly, but do not fit it into the retract unit.



□ **R10.** With the strut assembly back together but still out of the retract unit, align the steering arm with the axle and hold it in position with the top set screw. Remove the bottom set screw and use a fine-point felt-tip pen to mark the location of the hole. Grind another flat spot at the mark. Reassemble the unit making sure the steering arm has remained parallel with the axle. Adjust the flat spot if necessary. When assembling the unit for the final time, use threadlocker on the threads of all the set screws.

□ **R11.** Reassemble the strut to the retract unit.



□ **R12.** Mount an 0-80 ball link to both steering arms with a drop of threadlocker and 0-80 nuts.

□ **R13.** Connect 18" [480mm] of air line to each fitting on the air cylinder on the nose gear. Do not connect the short pieces of tubing from your can of compressed air to the air lines until step R17.

□ **R14.** Holding the retract unit in your hand, retract the gear (put the gear up). Guide the air line attached to the side of the air cylinder through the small hole in former F2 in the fuselage. Then, place the retract in the mounting rails in the fuselage.

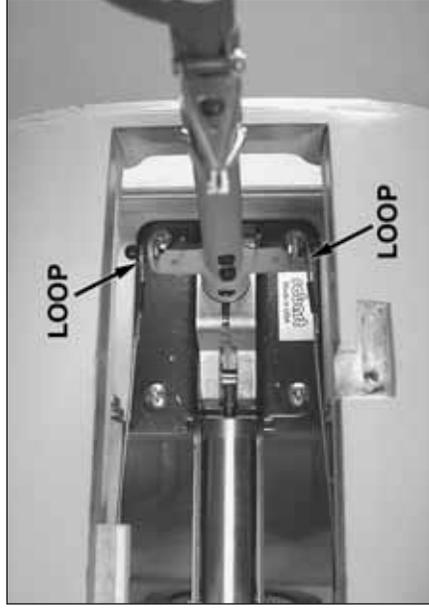
**NOTE: The rest of the nose gear mounting instructions are for both fixed gear and retractable gear even though retracts are shown. Where applicable, separate notes for each setup are provided.**

□ **R15.** Place the nose gear in the mounting rails in the fuselage. Mark the locations of the screw mounting holes onto the wood rails (for retractable nose gear this will be easier to do if the gear is retracted). If installing fixed gear, temporarily remove the nose gear. Drill four 7/64" [2.8mm] holes through the rails at each mark. Mount the gear to the rails with four #6 x 1/2" [13mm] Phillips screws.

□ **R16.** Mount the nose wheel to the gear. If using retracts, cut the axle to the correct length and grind or file a flat spot for the set screw. If using fixed gear mount the nose wheel with two collars and 6-32 set screws—and use threadlocker on all screws.

□ **R17.** If mounting retractable nose gear, operate the gear by hand and with your can of compressed air. Make certain the gear operates freely, does not hit the edges of the opening and is able to lock in both the up and down positions. Make any adjustments necessary.

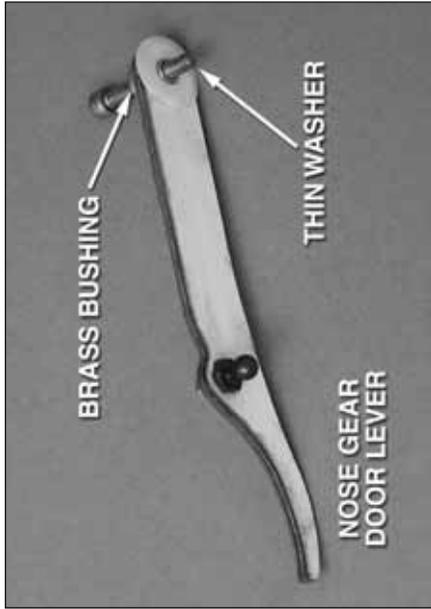
□ **R18.** Connect the nose steering servo to your radio and turn the system on. Make sure the servo arm is centered. **Note:** A good way to set up the nose steering is to connect the servo to an unused, available channel in your receiver. Use the mixing in your transmitter to electronically mix the nose steering servo to the rudder, but assign a dial or lever on the transmitter to the nose steering servo. At the flying field the dial or lever can be used to trim the nose wheel so the model will roll straight down the runway.



□ **R19.** With the radio system on (so the nose steering servo arm cannot move), loop the ends of the steering cables over the ball links on the nose gear and secure with another swage on each cable. The loops in each cable should be large enough to slip over the ball link, but small enough so that they won't come off on their own. Adjust the clevises on the servo end of the cables to center the nose wheel.

## HOOK UP THE NOSE GEAR DOOR (FOR RETRACTS ONLY)

Use this photo for the next three steps.

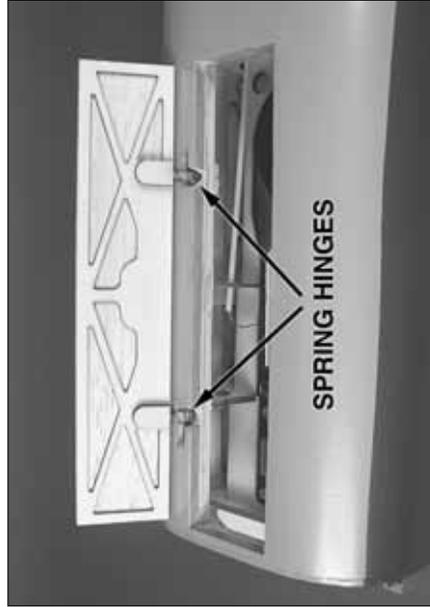
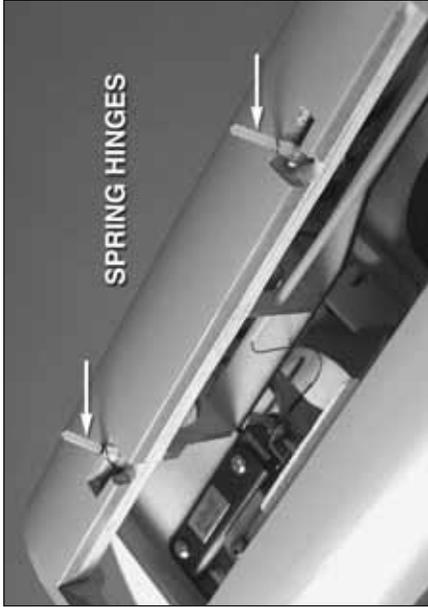


- ❑ 1. Same as was done for the levers on the main landing gear doors, glue one of the thin, plastic 5mm x 12mm washers to the **back** surface of the plywood **nose gear door lever**.
- ❑ 2. Mount a 2-56 ball link on the back of the lever with a 2-56 nut and a drop of threadlocker.



- ❑ 3. Fit a brass bushing into the front of the lever with a 4-40 x 1" [25mm] SHCS. Add a few drops of threadlocker to the threads on the end of the screw. Then, mount the lever to the wood block on the front of

former 2 inside the fuselage—there are access holes through the front two formers that you can guide your 3/32" ball end wrench through and there is a 4-40 blind nut in the back of the former. Tighten the screw as much as possible without binding the lever.



- ❑ 4. Test fit the nose gear door to the fuselage with the special spring hinges. **Note:** The hinges are installed to spring the door open, not closed. Holding the door closed, adjust the hinges so the door is centered in the opening.
- ❑ 5. Remove the door hinges. Paint the hinge recesses with black or gray paint.



- ❑ 6. Glue the hinges in the doors and in the fuselage with 30-minute epoxy. Use masking tape and thin cardstock to hold the door closed and centered until the epoxy has hardened.



NOSE GEAR DOOR PUSHROD

- ❑ 7. Cut 1/2" [13mm] from the **threaded** end of a 4" [100mm] pushrod. Thread the pushrod about halfway into a nylon ball link. Cut the overall length from the end of the ball link to the end of the pushrod to 2-1/8" [55mm].



- ❑ 8. Sand the base of a small nylon control horn so glue will adhere. Connect a screw-lock pushrod

connector to the second-from-the-bottom hole in the horn. Connect the pushrod to the screw-lock pushrod connector with a 4-40 x 1/8" [3mm] SHCS.



- ❑ 9. Snap the ball link on the pushrod onto the ball on the door lever. Use medium CA to glue the horn to the nose gear door where shown.
- ❑ 10. Temporarily guide the air lines for the nose gear out the front of the fuselage so you can connect them to your air can to test the gear and door. Use compressed air to operate the door and adjust the pushrod in the screw-lock until the door closes fully when the gear is retracted.

## FINAL ASSEMBLY

### ASSEMBLE THE COCKPIT

*Most of the scale details will be done later, but it's best to work on the cockpit now before final radio installation.*



- ❑ 1. Cut both 3/16" x 3/16" x 5" [5 x 5 x 130mm] balsa sticks to fit between the forward cockpit floor and the cockpit bulkhead. Glue the sticks into position.



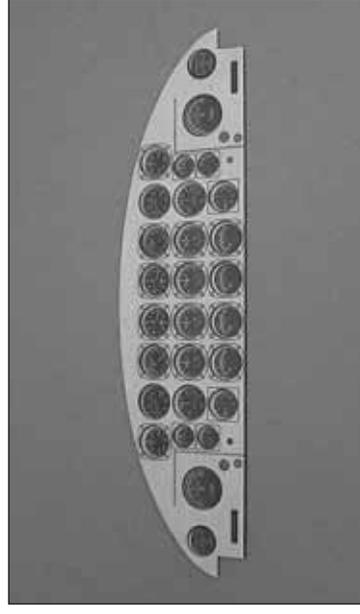
- ❑ 2. Using the holes in the plywood **cockpit floor** as a guide, drill 1/16" [1.6mm] holes through the balsa sticks for the mounting screws. Mount the cockpit floor with four #2 x 3/8" [9.5mm] button-head Allen screws. Remove the screws, harden the holes with a drop of thin CA and allow to harden.

- ❑ 3. If painting the cockpit, now is the best time to do so. The cockpit shown in this manual was simply painted flat black, but you could add more details if preferred. The best method for painting is with an airbrush because it coats evenly, but a regular bristle brush could also be used.



- ❑ 4. Cut both instrument panel decals from the decal sheet with an approximately 1/8" [3mm] border all the way around. Use 3M spray adhesive or similar craft adhesive to glue the back of the black, plastic instrument panel to the front of the instrument panel decal that has the instruments.

- ❑ 5. Use a hobby knife or a single-edge razor blade to trim the edges of the decal even with the edges of the instrument panel.



- ❑ 6. Stick the front of the other instrument panel decal that has only the faces of the instruments to the instrument panel. Trim the edges of the decal again.



- 7. Use a few dabs of RTV silicone rubber to glue the completed instrument panel into the cockpit.

**Refer to this photo for the next four steps.**



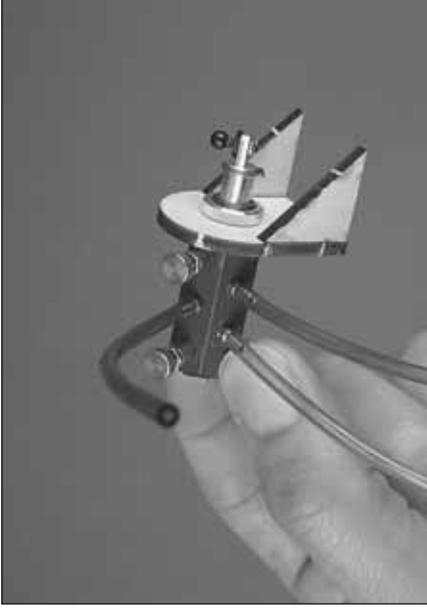
- 8. Paint the edges of the three pilot figures with plastic-compatible flat black paint. While the paint is drying, carefully cut the pilot figures from the decal sheet. After the paint has dried, attach the decals to both sides of each figure.
- 9. Set the tail-gunner figure aside until finishing the tail-gunner cockpit later. Glue the pilot and co-pilot figures to the cockpit floor.
- 10. Trim the bases of the cockpit seats as necessary. Glue the seats to the cockpit floor.

- 11. Trim the back of both control yokes to fit the yoke posts. Glue the control yokes to the posts. Paint any additional scale details preferred inside the cockpit. Then, cut the yoke posts to the correct height and glue them into position.



- 12. Position the cockpit canopy over the cockpit. Drill two 1/16" [1/6mm] holes through each side of the canopy into the fuselage where shown. Remove the canopy, enlarge the holes in the canopy only with a 3/32" [2.4mm] drill, and then mount the canopy to the fuselage with four #2 x 3/8" button-head Allen screws.

## HOOK UP THE AIR SYSTEM



- 1. Mount the air control valve to the plywood **air control valve mount** as shown and glue on the plywood triangular supports. Connect about 4" [100mm] each of "up," "down" and "fill" line to the valve and mount a 0-80 ball link ball to the valve with a 0-80 nut and a drop of threadlocker.



- 2. Mount the air filler valve to the plywood **fill valve mount pieces**. The valve should protrude from the front of the mount 7/32" [5.5mm] so it will be flush with the outside of the fuselage. Connect about one inch [25mm] of air line to the fill valve and connect one of the "T" fittings that came with the air system to the line.

Refer to this photo while hooking up the rest of the air system.



□ 3. Connect approximately 2" [50mm] of air line to the air tank that came with the retracts. Slide the air tank into the holes in the front two formers in the fuselage, but do not glue the tank in place yet.

□ 4. Glue the air control valve mount to the radio tray. Mount your retract servo. Then, connect the servo to the valve with a 4" [100mm] pushrod cut to the correct length, a nylon ball link and a screw-lock connector on the servo with a nylon retainer and a 4-40 SHCS.

□ 5. Cut the covering from the hole in the left side of the fuselage for the air valve mount. Glue the fill valve mount to the inside of the fuselage.



□ 6. Use the remaining "T" fittings to connect the rest of the air lines. Glue one of the plywood **guides** to the radio tray for keeping the air lines and servo wires organized. You can glue another guide to one of the formers farther aft inside the fuselage.



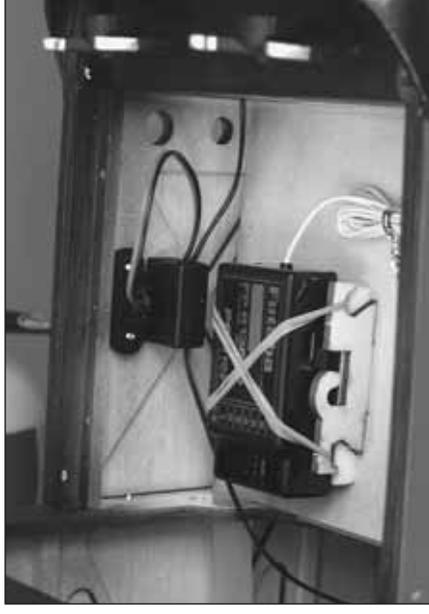
□ 7. If you haven't done so already, cut the covering from the holes in both sides of the fuselage for the air lines and servo wires to come out. Make sure the up and down lines going back through the fuselage for the main landing gear are long enough to come out of the holes in both sides of the fuselage for connecting to the lines coming from the inboard wing panels. Use quick disconnects on the ends of the lines.

□ 8. Use RTV silicone or epoxy to glue the air tank into position—be certain the base, or front of the tank (facing the front of the fuselage) does not protrude more than 1/8" [3mm] forward of the front former. Otherwise, it will interfere with the back of the scale nose-gunner cabin.

**One Final Note About Retracts:** Test the retract system either now, or later when you have completed the rest of the radio installation. With all three landing gears connected and operating, first test the system with the plane upside-down in the building cradle. This will allow you to identify and trouble-shoot any problems. Once the gear is working satisfactorily, retest the system with the model upright in the stand. Pressurizing the tank up to 120 psi. should allow for two full cycles, but we have pressurized ours up to 140 psi. Use caution when using extreme pressure. If the model sits in the sun for extended periods during hot weather the lines can soften and pressure in the system could rise.

## COMPLETE THE RADIO INSTALLATION

Refer to this photo while mounting the receiver and switches.



□ 1. Glue the plywood **receiver mounts** to the radio tray to fit your receiver. Mount the receiver with R/C foam rubber and a couple of rubber bands.

□ 2. Cut the sheeting on the outside of the fuselage over the mounting locations for the receiver on/off switch and an external charging receptacle. An Ernst #124 Charge Receptacle is shown. Before mounting the charge receptacle, slide the mounting back plate over the battery charging wire coming from the on/off

switch, guide the wire through the mounting hole in the fuselage, and **THEN** connect the charging plug to the receptacle mount. Mount the switch and charge jack to the fuselage.

3. Refer to the wiring diagrams in the back of the manual for the servo extensions and Y-harnesses used. Install and connect the wires as shown. Where appropriate, secure connections between wires with heat shrink tubing.

**Throttle hookup:** The wiring diagram for connecting the throttle servos shows each servo connected to separate channels in the receiver. They are linked electronically through the transmitter, but your receiver must also have an available channel for this mix. For our Futaba radio we connected one engine to channel 3 and the other engine to channel 8 (Auxiliary 2). Depending on the position of the assigned mixing switch, the throttles can be operated separately (for synchronization tuning and starting) or together with the throttle stick during flight. However, if you do not have enough available channels to link the throttles through the transmitter, they could be linked with a Y-Harness and connected to the same channel.



4. Mark the ends of all the servo wires that are to be connected and removed during assembly and disassembly at the field with masking tape and a pen.

5. Guide the receiver antenna down through the antenna tube in the fuselage.

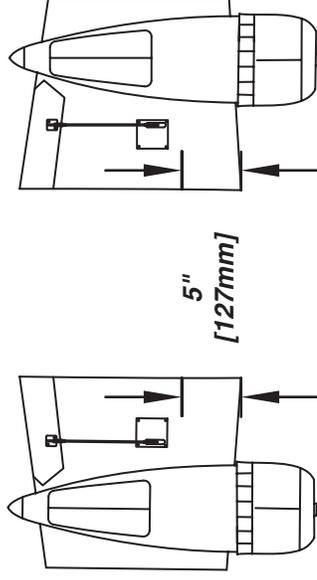
6. Temporarily attach the inboard and outboard wing panels and tail to the fuselage and connect all the servo wires. Turn on the radio and make sure everything operates correctly. Make any adjustments necessary. Now would also be a good time to connect the air lines, pressurize the system and operate the retractable landing gear as well.

**NOTE:** The receiver battery pack will be mounted after the nose-gunner cabin has been completed.

## MOUNT THE INBOARD WING PANELS

*We've already had the wings on and off the fuselage a couple of times, but now it's time to mount them "for real."*

One end of the forward and aft aluminum wing tubes is already drilled and tapped for 4-40 screws, but the other end has to be drilled and tapped too.



The balance point is 5" [127mm] from the leading edge of the wing where it contacts the fuselage.

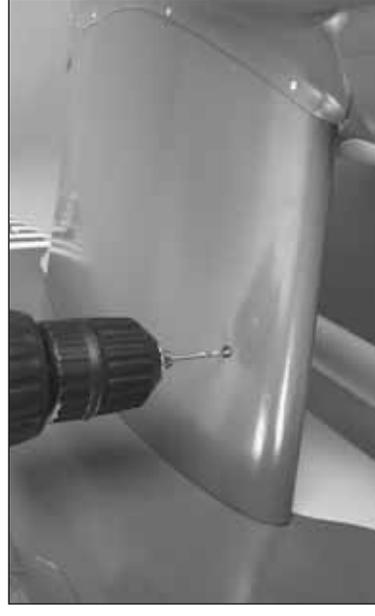
1. If you will not be balancing the model with a Great Planes C.G. Machine, you will need to mark the balance point on the bottom of the wing so you will know where to lift the model when it's time to check the C.G. later. Now would be a good time to do this. Use a fine-point felt-tip pen to mark the balance point

on the bottom of both inboard wing panels where they meet the fuselage 5" [127mm] back from the leading edge. There will be more information on C.G. and balancing the model later after assembly has been completed, but it's a good idea to mark the balance point now (if you won't be using a C.G. Machine).

2. Fit either inboard wing panel to the fuselage with the 30 x 440mm center main wing tube and both 10 x 305mm forward and aft main wing tubes. The ends of the smaller tubes that have the threaded holes should be inside the wing you are attaching to the fuselage first.

3. Turn and position the forward and aft tubes so the threaded holes align with the holes in the wing panel. If you cannot get both holes to align, try switching tubes. If the holes still don't align try switching wing panels. If one of the tubes won't go in quite far enough to get the holes to align, it is okay to file the end of the tube as necessary.

4. Once you have the holes in the tubes aligned with the holes in one of the wing panels, thread 4-40 x 1" [25mm] SHCS into the wing panel and the tubes.

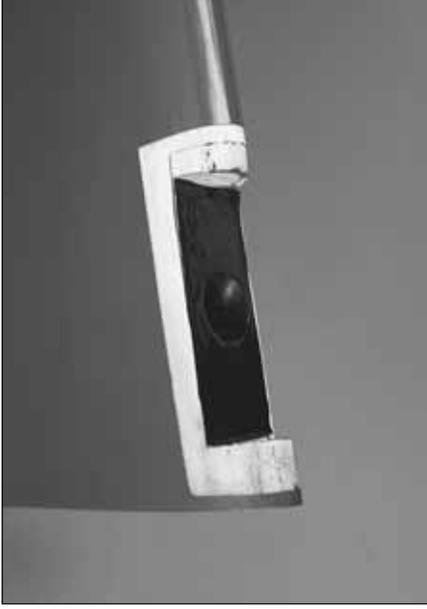


5. Tightly fit the other inboard wing panel to the fuselage and tubes. Using the holes in the wing panel as a guide, drill #43 holes through both tubes.

6. Remove the panel. Use a fine-point felt-tip pen to write on each tube which one is which and which way goes up.



7. Remove the tubes from the fuselage. Tap 4-40 threads through the holes you just drilled. Use a file to remove any burrs from the tapped holes. Remount the panels to the fuselage with 4-40 x 1" [25mm] SHCS and a drop of threadlocker in each tube.



2. Cut the covering from the wing 1/16" [2mm] inside the lines you marked, but leave the black covering in place. Wipe away the ink with one of your small paper towel squares and denatured alcohol.



5. Fit the end of one of the 10 x 150mm aluminum outer panel wing tubes that has the threaded hole into the left, inboard wing panel. Secure the tube in the wing with a 4-40 x 3/4" [19mm] SHCS. Also fit one of the 22 x 295mm outer panel wing tubes into the panel.

## MOUNT THE OUTBOARD WING PANELS



1. Determine which molded plastic oil cooler air scoop is the right and which one is the left by test fitting them to the outboard wing panels. Hold the left air scoop to the left outboard wing panel. Use a fine-point felt-tip pen to mark the outline of the scoop directly onto the wing.



3. Glue the air scoop to the wing with medium CA.



6. Join the outboard panel to the inboard panel with a 1/4-20 x 2" [50mm] nylon bolt. Tighten the outboard panel to the inboard panel

7. The same as was done for the inboard panels, drill a #43 hole through the end of the tube in the outboard panel.

8. Remove the outboard panel and the tube. Tap 4-40 threads into the hole you drilled in the tube. File off any burrs from the holes.



- ❑ 9. When you remove the outboard panel, if you have difficulty with the nylon bolt getting stuck in the hole of the inboard panel, use a rotary tool or a hobby knife to elongate the aft end of the hole for the wing bolt.
- ❑ 10. Re-fit the outboard panel. Bolt the other end of the tube in the wing with another 4-40 x 3/4" [19mm] SHCS.
- ❑ 11. Mount the other outboard wing panel the same way.

## SCALE FEATURES

### MOUNT THE NOSE-GUNNER CANOPY



- ❑ 1. Use medium CA to glue the plywood **rubber band hooks** inside the clear, plastic nose-gunner window.
- ❑ 2. Test fit the nose-gunner canopy window to the fiberglass nose-gunner canopy bottom. If necessary, use a bar-sander with medium-grit sandpaper to true the edges of the window frame where necessary for a good fit.



- ❑ 3. Use medium-grit sandpaper to scuff the edges of the bottom and the window frame where they will join.



- ❑ 4. Use masking tape to hold the top to the bottom—the best way is to lay both pieces upright on your workbench and tape them together.

**IMPORTANT:** For the following two steps a CA tip is necessary for gluing together the nose-gunner canopy.



- ❑ 5. **Working carefully and taking your time**, from inside the canopy use thin CA to glue only the side seams together. Start by first tacking the parts with a drop of thin CA at the back—don't apply any CA where there is masking tape. Otherwise, it could wick under the tape and get on the outside. Add another drop of CA to the same area on the other side of the canopy. Now tack the front of the side seams together. Remove the tape, then carefully glue the rest of the side seams together. Wait several minutes to allow the CA to dry before gluing the front seam in the next step.



- ❑ 6. Glue the bottom, front seam together from the outside.

**Note:** If any of the clear windows “fog” from curing CA, the fogging can be removed by using a cotton swab **lightly** moistened with CA debonder. Use care because the debonder can remove the paint and smear the clear plastic windows.



- ❑ 7. Glue one of the 6-1/8" [155mm] machine gun barrels into the nose machine gun—be certain to glue in the end of the barrel that does not have the holes in it. Use plastic-cutting scissors or a hobby knife to trim the pivot cup as shown. Glue the pivot cup to the barrel 1/4" [6mm] from the front of the gun.



- ❑ 8. Cut a 3/8" [9.5mm] diameter hole in the front of the nose-gunner canopy for the nose machine gun. Test fit the machine gun in the hole to make sure it fits well and can pivot up and down and side-to-side. Make adjustments as necessary.



- ❑ 9. Mount the nose machine gun by using a piece of leftover wire with an “L” bend on the end to hook two or four small rubber bands to the hooks on the machine gun and to the hooks in the canopy—two rubber bands on the top will make the gun droop as it would be when the plane is grounded or when the gun is not in use—rubber bands on the top and bottom will hold the gun level.

**Optional:** For added scale effect, insert eight 00-90 x 1/8" screws and 00-90 nuts into the canopy around

the machine gun pivot (to replicate the bolts on the full-size subject). The retainer ring can also be painted silver as the model on the kit box cover.

**Use this photo for the following two steps.**



- ❑ 10. Use a fine-point felt-tip pen and a straightedge to mark lines on the fuselage centered over the middle of each of the four mounting blocks for the nose-gunner canopy. Place the nose-gunner canopy on the fuselage and tape it into position.

- ❑ 11. Drill 1/16" [1.6mm] holes through the canopy and the mounting blocks centered on the lines 3/16" [5mm] from the aft edge of the canopy.

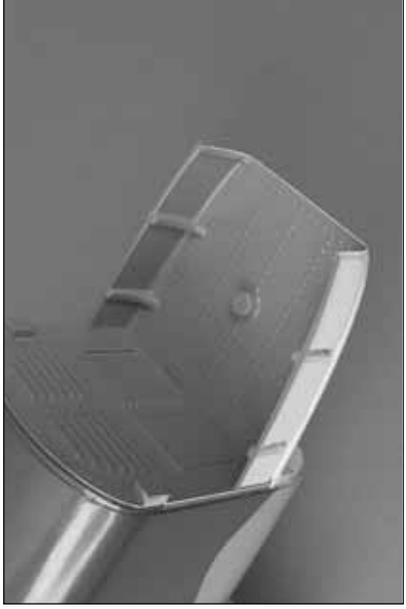
- ❑ 12. Remove the canopy. Enlarge the holes in the canopy **only** with a 3/32" [2.4mm] drill. Mount the nose-gunner canopy to the fuselage with four #2 x 3/8" [9.5mm] button-head Allen screws.

**CAUTION:** In direct sunlight, extreme heat may cause the top of the nose-gunner canopy to warp at the aft edge where it meets fuselage. To prevent this, it may be a good idea to keep the model in the shade or cover the nose with a white cloth or towel when temperatures are high.

## INSTALL THE NOSE-GUNNER CABIN

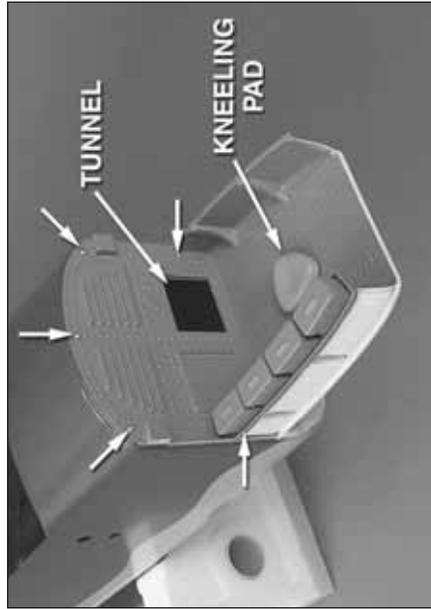


- ❑ 1. Glue together the plywood parts of the **nose-gunner cabin platform**. Fit, but do not glue the platform to the front of the fuselage.



- ❑ 2. Test fit the molded plastic nose-gunner cabin floor and cabin back to the fuselage. Trim the plastic parts where necessary for a good fit.

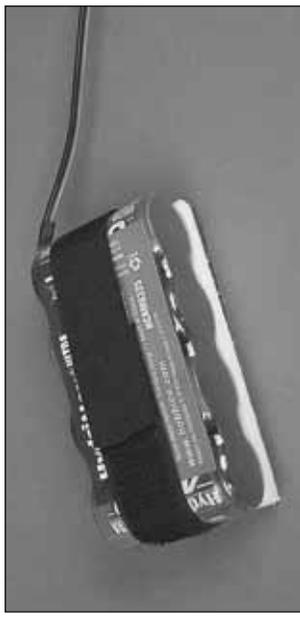
Refer to this photo while installing the rest of the nose-gunner cabin.



- ❑ 3. Drill five 1/16" [1.6mm] holes through the cabin back where shown for mounting it to the front of the fuselage. Enlarge the holes in the cabin back only with a 3/32" [2.4mm] drill. Then, mount the cabin back with five #2 x 3/8" [9.5mm] button-head Allen screws.
- ❑ 4. Use medium CA to glue the cabin floor to the plywood platform, but still do not glue the platform to the fuselage.
- ❑ 5. Test fit the nose-gunner canopy to the fuselage. Trim the nose-gunner cabin floor where necessary so it does not interfere with the fit of the nose-gunner canopy.
- ❑ 6. Paint the back of the nose-gunner tunnel flat black, or cut out the tunnel and cover the former on the front of the fuselage with a piece of thin plastic or paper that has been painted flat black. Add any other additional scale details you prefer or do any extra painting that may be more difficult to paint after the parts have been glued in.
- ❑ 7. Glue the tops to the ammo boxes, and then glue the ammo boxes to the ammo tray. Glue the ammo tray to the top edge of the cabin floor where shown. Glue the kneeling pad to the post coming up from the floor.

- ❑ 8. Add any other final, scratch-built, scale details you like.

- ❑ 9. Securely glue the plywood nose-gunner cabin platform to the fuselage.



- ❑ 10. Glue the plywood strips to the bottom of the **battery mount** to make room for the Velcro strap that goes all the way around. Use the included Velcro material to make a strap for mounting the battery to the mount with 1/4" [6mm] R/C foam in between. Mount the battery to the mount. **Note:** It is likely that, by mounting the battery to the bottom of the nose-gunner platform, little or no additional lead ballast will be required to get the model to balance at the specified balance point. If, however, you would like to make certain you eliminate or minimize any ballast required, you could mount the battery later after you find out where the model balances without it. If this is your preference, set the battery aside until it's time to balance the model when you get to page 41. Or, go ahead and glue the battery mount to the bottom of the nose-gunner platform now.

## MOUNT THE TOP TURRET AND MACHINE GUNS

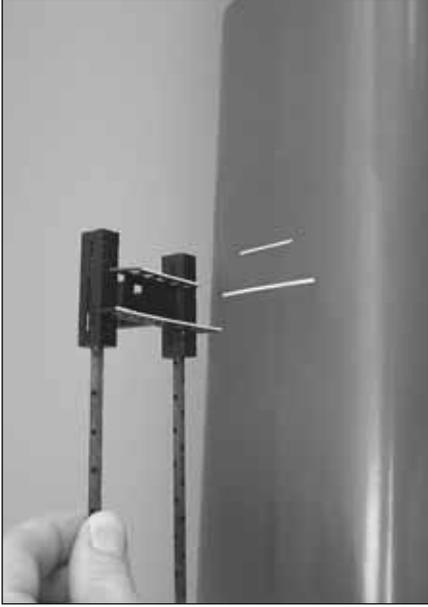


1. Glue two 6-1/8" [155mm] machine gun barrels into each of the two top turret machine guns.

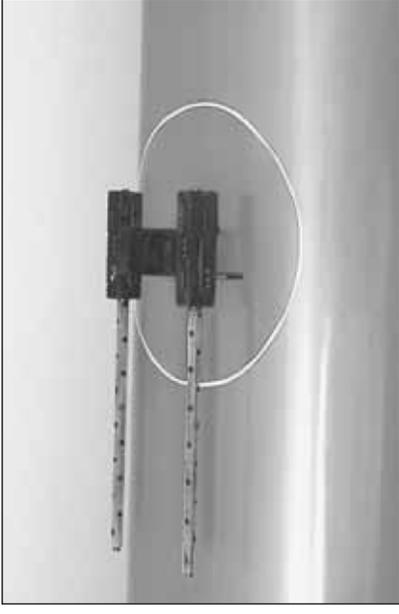


2. Place the top turret machine guns on top of the fuselage so the aft vertical bracket is 5" [127mm] from the opening for the cockpit and so the guns are centered from side-to-side. Push down on the machine guns hard enough to mark the balsa under the covering.

3. Using the marks in the top of the fuselage as a guide, use a straightedge to cut the covering from the top of the fuselage so that the guns will be glued directly to balsa.



4. Sand the paint from the bottom of the top turret machine gun mounting brackets. Securely glue the machine guns to the top of the fuselage.

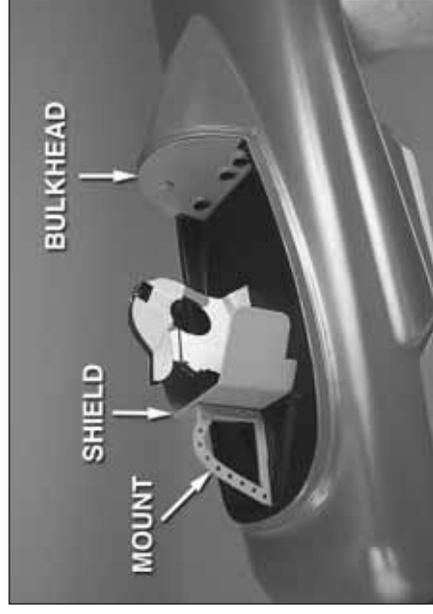


6. Cut the covering 1/16" [1-2mm] inside the line you marked all the way around. Cut another line 1/16" [1-2mm] inside the first. Remove the strip of covering so the turret will be glued directly to balsa.
7. Position the turret canopy on the fuselage so the gun barrels will be centered in the openings and the canopy will be centered over the cutout in the covering. Carefully use thin CA to glue the turret canopy to the fuselage.

## FINISH THE TAIL-GUNNER CABIN



5. Position the top turret canopy on the fuselage over the guns. Center the openings in the turret canopy on the guns. Then, use a fine-point felt-tip pen to mark the outline of the canopy directly onto the fuselage.



1. Test-fit, trim if necessary, and then glue the molded plastic **tail gunner bulkhead**, **armor shield** and **bracket mount** into position. Use foam-safe CA or epoxy to glue the tail-gunner pilot figure into position.

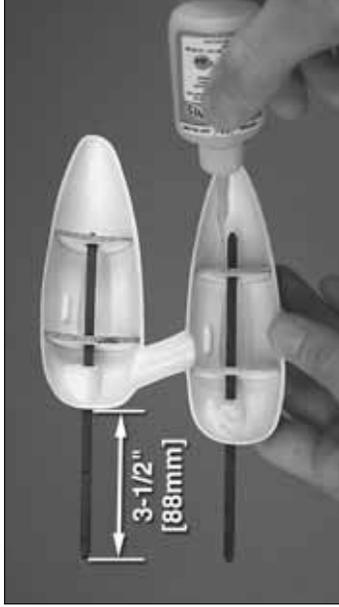
- ❑ 2. Add any other additional scale details you prefer. Then, glue the tail-gunner canopy to the tail-gunner cockpit.



- ❑ 3. Mount the tail-gunner cabin to the fuselage with both of the two machine gun barrels that have the 4-40 threaded inserts. Drill 1/16" [1.6mm] holes through the front of the tail-gunner cabin into the plywood mounting blocks on each side of the fuselage. Enlarge only the holes in the cabin with a 3/32" [2.4mm] drill. Mount the tail-gunner cabin using two #2 x 3/8" [9.5mm] button-head screws and the threaded machine guns.

## MOUNT THE SIDE GUN PACKS AND THE WAIST GUN WINDOWS

**Note:** When mounting the side gun packs, make certain you don't inadvertently position the first side so the second side ends up interfering with the air fill valve or the on/off switch or charge jack. If you've mounted the switches and air fill valve on the left side, mount the left gun pack first.



- ❑ 1. Use medium CA to glue two 6-1/8" [155mm] machine gun barrels into the left side gun pack. The front of the bottom gun should protrude from the front of the blister 3-1/2" [88mm] and the front of the top guns should be even with the bottom one.

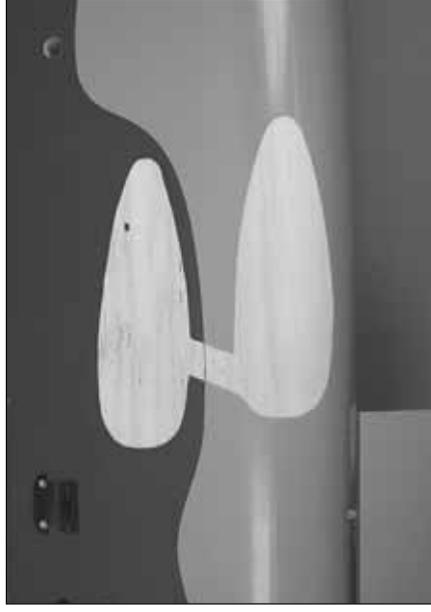
**The following steps will be easier to do with the wings removed and the fuselage laying on its side.**



- ❑ 2. Position the left gun pack where it fits the fuselage and so the gray and green paint line on the guns

matches the fuselage. Once positioned, hold down the **bottom** gun pack and use a fine-point ballpoint pen to mark its outline directly onto the fuselage.

- ❑ 3. Carefully cut the covering from the fuselage 1/16" [1.5mm] inside the line and peel off the covering.
- ❑ 4. Hold the bottom gun pack back onto the fuselage where it was before so it covers the exposed balsa. Now hold the top gun pack down and mark its outline onto the fuselage.



- ❑ 5. Cut the covering from the fuselage for the top gun pack. Set the left gun pack aside.
- ❑ 6. Glue the gun barrels into the right gun pack and prepare the right side of the fuselage for the right gun pack the same way.
- ❑ 7. Use a covering iron and a covering sock to reseal any loose edges of covering back down to the fuselage. Wipe off any ink with a paper towel square and denatured alcohol.

### Now back to the gun packs...

Do not glue on the side gun packs yet. Prepare the fuselage for gluing on the waist gun windows as described below. Waiting to glue on the side gun packs and waist guns until after the fuselage has been prepared for them makes it easier to lay the fuselage on its side.



❑ 8. Glue one of the 4-7/8" [125mm] waist machine gun barrels into the left waist gun window as shown.

❑ 9. Same as for the top gun turret and the gun packs, use a fine-point ballpoint pen to mark the outline of the waist gun window directly onto the fuselage. Cut and remove the covering 1/16" [1.5mm] inside the line.

❑ 10. Prepare the right waist gun window and the right side of the fuselage the same way.



❑ 11. Paint the inside edges of the window openings for the waist guns flat black.



❑ 12. Place the left gun pack on the fuselage. First glue the bottom, and then the top gun pack down using thin CA with a CA applicator tip.



❑ 13. Glue on the right gun pack, then the right and left waist gun windows, with thin CA and a CA applicator tip.

### MOUNT THE ADF "FOOTBALL" ANTENNA

The ADF football antenna is attached to the model with magnets. This way it can be easily removed for transportation.



❑ 1. Use the plywood template as a guide to cut holes in the fuselage for the magnets with a 3/16" [4.8mm] brass tube sharpened on the end or a 3/16" [4.8mm] drill. The holes should be centered over the middle stringer in the bottom of the fuselage. **Note:** The *Executive Sweet* had the antenna on the bottom of the fuselage, but some B-25s had the football antenna in other locations. You can mount the antenna wherever you prefer.

❑ 2. Stick the two magnets to the other magnets already glued in the antenna so you'll know which way to glue them in.



❑ 3. Use medium-grit sandpaper to lightly sand the bottom of each magnet so glue will adhere. Making

certain the magnets are in the correct orientation to attract the magnets in the antenna, press the magnets into the holes you cut in the fuselage and glue them into position with thin CA.

- ❑ 4. “Snap” the ADF football antenna into position. Don’t forget to remove it when transporting the model.

### MOUNT THE PROPELLER HUBS

This model comes with two painted, aluminum propeller hubs with 5/16"-24 threads that fit the O.S. .70 four-stroke engines. If using these propeller hubs, be certain to use threadlocker on the threads so the hubs will not loosen if one of the engines backfires. Securely tighten the hubs with a round, metal bar (such as a screwdriver shaft) through the holes in the hubs. If using different engines that the propeller hubs do not fit, Harry Higley makes similar propeller hubs with different threads that will fit your engines.

### APPLY THE DECALS

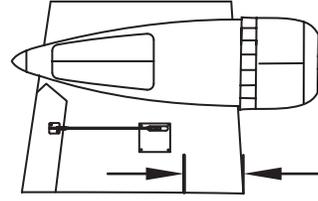
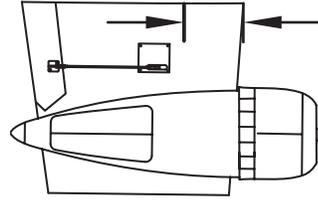
- ❑ 1. Use scissors or a sharp hobby knife to cut the decals from the sheet.
- ❑ 2. Be certain the model is clean and free from oily fingerprints and dust. Prepare a dishpan or small bucket with a mixture of liquid dish soap and warm water—about one teaspoon of soap per gallon of water. Submerge the decal in the soap and water and peel off the paper backing. **Note:** Even though the decals have a “sticky-back” and are not the water transfer type, submersing them in soap & water allows accurate positioning and reduces air bubbles underneath.
- ❑ 3. Position the decal on the model where desired. Holding the decal down, use a paper towel to wipe most of the water away.
- ❑ 4. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

## GET THE MODEL READY TO FLY

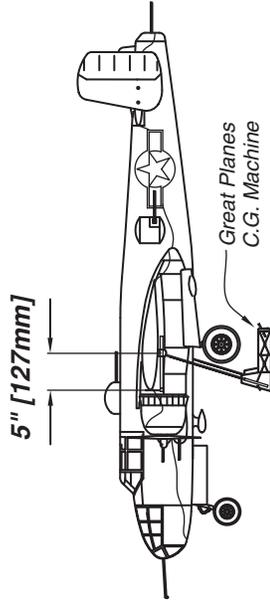
### BALANCE THE MODEL (C.G.)

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 (with the possible exception of the receiver battery pack if you decided to find out where the model balances first), including the engines with propellers and propeller hubs, landing gear, the complete radio system and all the scale details that you will have in place when you fly the model. If using retracts, the landing gear should be down.



The balance point is 5" [127mm] from the leading edge of the wing where it contacts the fuselage.



(For illustration purposes the supports of the C.G. Machine are shown outboard of the engine nacelles, but as specified in the instructions, the model should actually be supported where the wings meet the fuselage.)

- ❑ 1. If you will be using a Great Planes C.G. Machine to check the balance point, set the rulers to 5" [127mm]. If not using a Great Planes C.G. Machine, and if you haven't already done so, use a straightedge and a fine-point felt-tip pen to mark the balance point on the bottom of both inboard wing panels 5" [127mm] back from the leading edges where they meet the fuselage. Place 1/16" to 1/8" [1.5 to 3mm] strips of tape over the lines you marked so you will be able to feel the balance point with your fingers when lifting the model to balance.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/2" [13mm] forward or 1/2" [13mm] back to change the flying characteristics. Moving the C.G. forward may improve the smoothness and stability, but the model may then require more speed for takeoff and make it more difficult to slow for landing. Moving the C.G. aft makes the model more maneuverable, but could also cause it to become too difficult to control. In any case, **start at the recommended balance point** and do not at any time balance the model outside the specified range.

- ❑ 2. If you haven't yet done so, join the wings to the fuselage with all the aluminum joiner tubes and fasteners. If you haven't yet mounted the receiver battery keep it within reach so you will be able to place it on the fuselage to find out where it should be mounted inside.

❑ 3. With all parts of the model installed, the model ready to fly (less receiver battery), the landing gear down and an empty fuel tank, place the model on a Great Planes CG Machine, or lift it with your fingers on the balance point marked by the thin strips of tape on the bottom of the wings.

❑ 4. If the tail drops, the model is “tail heavy” and the battery pack must be mounted forward or weight must be added to the nose to balance. If the nose drops, the model is “nose heavy” and the battery pack must be mounted aft or weight must be added to the tail to balance. If you haven’t yet mounted the battery pack, place it on top of the fuselage to see where it should be mounted inside to achieve the perfect balance point without having to add any additional ballast. If you already mounted the battery, or if additional weight is required, use Great Planes (GPMQ4485) “stick-on” lead. The best place to add stick-on nose weight is to the bottom of the nose-gunner platform. The best place to add tail weight is inside the very back of the fuselage behind the horizontal stabilizer. Begin by placing incrementally increasing amounts of weight on the fuselage over the location where it will be permanently attached inside the model until you can get it to balance. Once you have determined the amount of weight required (or the battery positioning), it can be permanently attached.

❑ 5. If you haven’t yet done so, mount the battery pack inside the fuselage, or attach any required lead ballast inside the nose or tail. **Note:** Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. Over time, the adhesive may weaken causing the weight to fall off. Use #2 sheet metal screws, RTV silicone or epoxy to permanently hold the weight in place.

❑ 6. Connect the receiver battery to the on/off switch using a servo extension if necessary. Secure the connections with heat shrink tubing.

❑ 7. **IMPORTANT:** Once you’ve mounted the battery or added any additional weight, recheck the C.G. after it has been installed.

## BALANCE THE MODEL Laterally

❑ 1. With the wing level, have an assistant help you lift the model under the middle of the fuselage behind the nose-gunner canopy and under the tail-gunner cockpit. 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 flight and maintain its heading better during maneuvers when the plane is climbing.**

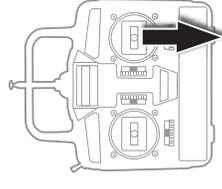
## PREFLIGHT

### CHECK THE CONTROL DIRECTIONS

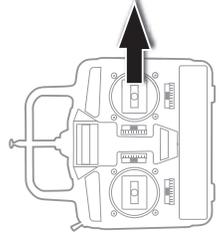
❑ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

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

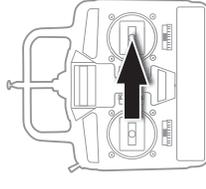
### 4-CHANNEL RADIO SETUP (STANDARD MODE 2)



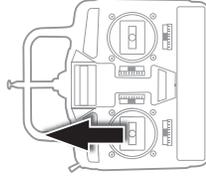
ELEVATOR MOVES UP



RIGHTAILERON MOVES UP  
LEFTAILERON MOVES DOWN



RUDDERS MOVE RIGHT



FULL THROTTLE

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

## SET THE CONTROL THROWS



Use a Great Planes AccuThrow or a ruler to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the low rate setting.

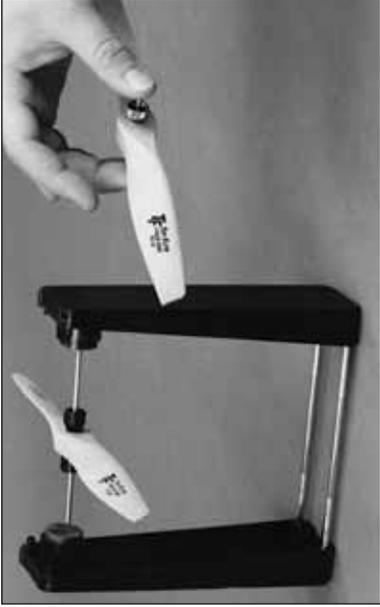
**NOTE:** For the ailerons, the throws are measured at the **widest part** (at the root end).

**These are the recommended high and low rate control surface throws.**

	<b>High Rate</b>	<b>Low Rate</b>
<b>ELEVATOR:</b>	1-1/4" up 1-1/4" down [32mm]	1" up 1" down [25mm]
<b>RUDDER:</b>	1-1/4" right 1-1/4" left [32mm]	3/4" right 3/4" left [19mm]
<b>AILERONS:</b>	5/8" up 5/8" down [16mm]	3/8" up 3/8" down [10mm]
<b>*FLAPS:</b>	1/2" [13mm] (1/2 flap)	1" [25mm] (full flap)

\* 1/4" [6mm] of down elevator should be mixed in with full flap deflection to control "pitch-up" when flaps are extended.

## BALANCE PROPELLERS



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

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

## GROUND CHECK

**If the engines are new, follow the engine manufacturer's instructions to break-in the engines.** After break-in, confirm that the engines idle reliably, transition smoothly and rapidly to full power and maintain full power—indefinitely. After you run the engines on the model, inspect the model closely to make sure all screws remained tight, the hinges are secure, the props are secure and all pushrods and connectors are secure.

**IMPORTANT:** The Top Flite B-25J Mitchell 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 B-25 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."

## IDENTIFY YOUR MODEL

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

## CHARGE THE BATTERIES

Follow the battery charging instructions that came with your radio control system to charge the batteries. You should always charge your transmitter and receiver batteries the night before you go flying, and at other times as recommended by the radio manufacturer.

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

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

## ENGINE SAFETY PRECAUTIONS

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

- Keep all engine fuel in a safe place, away from high heat, sparks or flames, as fuel is very flammable. Do not smoke near the engine or fuel; and remember that engine exhaust gives off a great deal of deadly carbon monoxide. Therefore **do not run the engine in a closed room or garage.**
- Get help from an experienced pilot when learning to operate engines.
- Use safety glasses when starting or running engines.
- Do not run the engine in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.
- Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you start and run the engine.

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

- Use a “chicken stick” or electric starter to start the engine. Do not use your fingers to flip the propeller. Make certain the glow plug clip or connector is secure so that it will not pop off or otherwise get into the running propeller.
- Make all engine adjustments from behind the rotating propeller.
- The engine gets hot! Do not touch it during or right after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.
- To stop a glow engine, cut off the fuel supply by closing off the fuel line or following the engine manufacturer’s recommendations. Do not use hands, fingers or any other body part to try to stop the engine. To stop a gasoline powered engine an on/off switch should be connected to the engine coil. Do not throw anything into the propeller of a running engine.

## AMA SAFETY CODE (EXCERPTS)

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

### GENERAL

- 1) I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.
- 2) I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.
- 3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.
- 5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. Note: This does not apply to models while being flown indoors.
- 7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind).

### RADIO CONTROL

- 1) I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.
- 2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.
- 3) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in the front of the flight line. Intentional flying behind the flight line is prohibited.

- 4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.
- 5) **I will not knowingly operate my model within three miles of any pre-existing flying site except in accordance with the frequency sharing agreement listed** [in the complete AMA Safety Code].

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

## CHECK LIST

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

1. Make sure you have checked the C.G. according to the measurements and procedures provided.
2. Balance your model *laterally* as explained.
3. Be certain the battery and receiver are securely mounted. Simply stuffing them into place with foam rubber is not sufficient.
4. Extend the receiver antenna all the way down the antenna tube in the fuselage.
5. Use threadlocking compound to secure critical fasteners such as the set screws on the retractable landing gear struts and axles or wheel collars, screw-lock pushrod connectors, etc.
6. Be certain the screws holding the horizontal stabilizer and the vertical stabilizers have been securely tightened with threadlocker on the threads.

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, canopy 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.
12. Make sure all servo arms are secured to the servos with the screws that came with them.
13. Where appropriate, secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat shrink tubing or special clips suitable for that purpose.
14. Make sure any servo extension wires you may have used do not interfere with other systems (servo arms, pushrods, cables, etc.).
15. Make sure the fuel lines are connected and are not kinked.
16. Balance the propellers (and spare propellers).
17. Securely tighten the propeller hubs. Be certain to use threadlocker on the threads.
18. Place your name, address, AMA number and telephone number on or inside your model.
19. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.
20. If you wish to photograph your model, do so before your first flight.
21. Range check your radio when you get to the flying field.

The Top Flite B-25J Mitchell ARF is a great-flying model that flies smoothly and predictably. The B-25 does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

## FLYING

## MOUNT THE WINGS

Assuming the outer panels and tail have been mounted to the model at the work shop and you've transported it in this configuration, connect the aileron and flap servo wires and mount the outboard panels to the inboard panels.

## FUEL MIXTURE ADJUSTMENTS

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

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

## TAKEOFF

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. If necessary, hold a small amount of “down” elevator to keep the nose wheel on the ground. If necessary, adjust the nose wheel so the model will roll straight down the runway—if your rudders and nose steering servos are connected to different channels in your receiver (and are electronically mixed), you should be able to do this with one of the dials on your transmitter. If you need to calm your nerves before the maiden flight, shut the engines down and bring the model back into the pits. Top off the fuel, and then check all fasteners and control linkages for peace of mind.

Remember to takeoff into the wind. When ready, point the model straight down the runway. Gradually advance the throttle and use the rudders and nose steering to keep the model tracking straight. 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 you may need to apply 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 and retracting the gear (should you choose to do so on your maiden flight).

## 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, the B-25 should fly well at approximately 1/2-throttle.

Take it easy with the B-25 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. Extend the flaps at low throttle settings to see how the model reacts. 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.

## B-25 ENGINE-OUT FLYING PROCEDURES

One of the primary concerns when flying a twin-engine model is “what if one engine quits?” While “engine-out” is never desirable, through experience and testing we have developed a model that will not react suddenly or unexpectedly and can be controlled well enough to get it safely back to the ground if one engine does quit.

There are two different approaches that can be taken if an engine quits. “Plan A” is to follow the **Single Engine-Out Procedures** to carefully fly the model on one engine allowing you to bring it closer to the landing zone or runway. If, however, you become confused or find yourself not able to execute or understand the procedures, it would be safer to go to “Plan B” which is simply to cut the throttle on the remaining running engine and perform a dead-stick landing same as you would with any other model. Of course, you won’t have the ability to fly the model closer and will have to land with the altitude and distance given. To execute a single-engine landing follow the **Single Engine-Out Procedures** below:

## SINGLE ENGINE-OUT PROCEDURES

The first thing to do is recognize that an engine has quit. This may not be easy because the plane may not react immediately or the single running engine may be difficult to hear if other models are also in the air. Once you’ve noticed that an engine has quit, the next thing to do is decide! Decide whether to continue to fly on one engine until you can get the plane closer, or to just kill the running engine and make a dead-stick landing. The Top Flite B-25 has flown both left and right-hand turns on a single engine, turning both into the dead and into the running engine. Both situations will require the coordinated use of rudder and ailerons. **The key to making turns on one engine is to steer the plane with the rudder and use the ailerons only for keeping the wings level.** Using the ailerons to make banked turns may result in a stall or a spin, so be certain to use the rudder for turning.

The other thing to keep in mind when flying on one engine is that when turning *toward* the dead engine (making a left-hand turn with the left engine not running) turns may be tighter than you expect. And when turning *away* from the dead engine (making a right-hand turn with the left engine out) turns may be wider than you expect. If using the ailerons for turning away from the dead engine the nose will pitch up the plane will slow until it stalls, so again, do your turning with the rudder and use the ailerons to keep the wings level.

In either scenario the other thing to remember is to keep the airspeed up. Powered by one engine, there will be enough thrust to extend the flight, but the plane will slowly lose altitude. If too much airspeed is lost, one engine will not be able to provide enough power recover, so you will have to point the nose down to gain airspeed. If the plane is already too low this may not be an option, so **flat, large turns** are the key. When on the final leg approaching the runway, cut the running engine just the same as you would if performing a normal approach. Flaps are not recommended for a single-engine landing unless you are surely going to overshoot.

If not proficient with the rudder or if anxious about becoming confused with single engine-out procedures, it may be safer just to cut the throttle and perform a dead-stick landing the same as you would any other single-engine plane. Of course, you will have to land with the altitude and distance given. Again, do not extend the flaps on a single-engine or engine-out landing (unless you are already over or very near the runway).

### Here's a review of the Single Engine-Out Procedures:

1. **Recognize** that an engine has quit.
2. **Decide** whether to continue flying on one engine or to cut the other engine and dead-stick immediately.
3. **Remember**—use the rudder to do the turning and use the ailerons to keep the wings level. Turns around the dead engine will be tighter and turns away from the dead engine will be wide.
4. **Maintain** your airspeed.

## LANDING

The B-25 may be landed with or without flaps. Flaps increase lift and drag, so the plane may be landed with less ground speed, thus shortening rollout after touchdown (not as much of a factor on grass runways). To initiate a landing approach, lower the throttle while on the downwind leg (parallel with the runway, but going the opposite direction). If using flaps, allow the model to slow, then extend the flaps. Continue to lose altitude, but maintain airspeed by keeping the nose down as you turn onto the crosswind leg. Make the final turn toward the runway (into the wind) keeping the nose down to maintain airspeed and control. If landing with flaps keep a few additional "clicks" of power so the model doesn't slow **too** much. Level the attitude when the model reaches the runway threshold and is approximately ten feet [3 meters] above the ground, modulating the throttle as necessary to maintain the glide path and airspeed. If you are going to overshoot the runway, smoothly advance the throttle (always ready on the

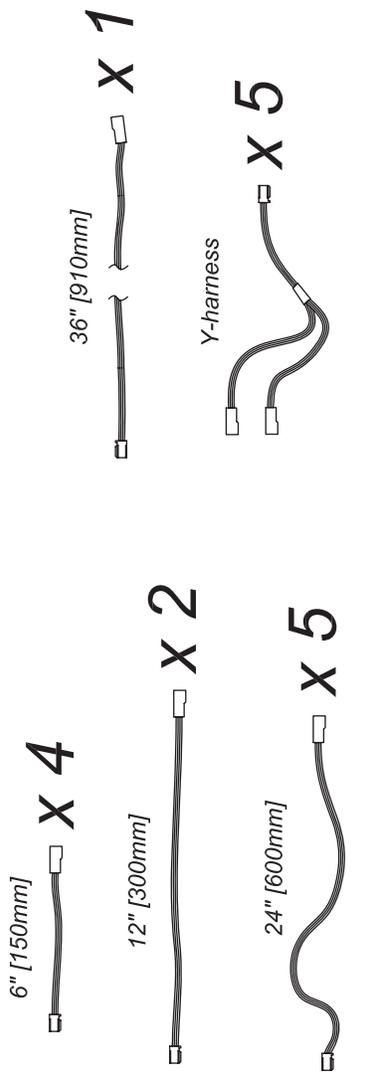
right rudder to counteract torque) and retract the flaps when enough airspeed is gained. Climb out to make another attempt. When finally ready to land and the model is a foot or so off the deck and you are ready to make the landing flare, smoothly increase up elevator until the wheels gently touch down. Once the model is on the runway and has lost flying speed, hold down elevator to hold the nose on the ground. **Note:** If ever the occasion arises when a dead-stick landing must be performed, do not extend the flaps until **certain** the model will be able to reach the landing zone (on dead-stick landings it is common to land with no flaps at all). Without engine power, flaps can unexpectedly reduce the model's range, thus causing you to come up short of the field.

One final note about flying your B-25 ARF. Have a goal or flight plan in mind for **every** flight. The goal could be learning a new maneuver, perfecting known maneuvers, 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 without planning. Every maneuver should be deliberate. For example, if performing a loop, plan it out—check your altitude, mind the wind direction (anticipating rudder corrections that will be required to maintain heading), remember to throttle back on the down side, and make certain you are on the desired rates (high/low rates). A flight plan greatly reduces the chances of crashing 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.**

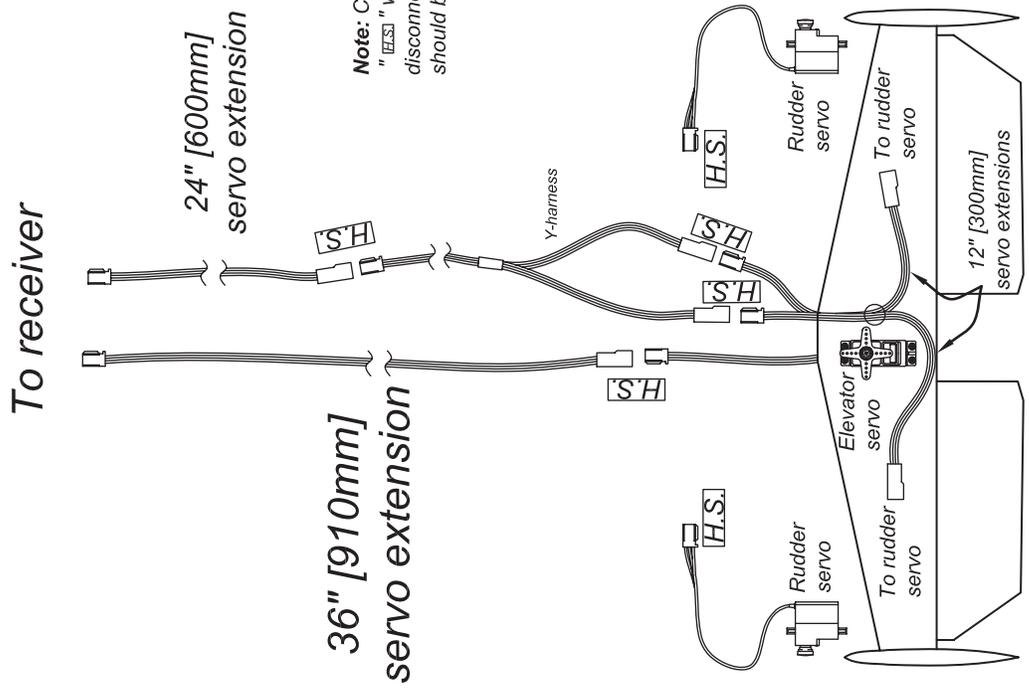
**GOOD LUCK AND GREAT FLYING!**

These are the total extensions and Y-harnesses used



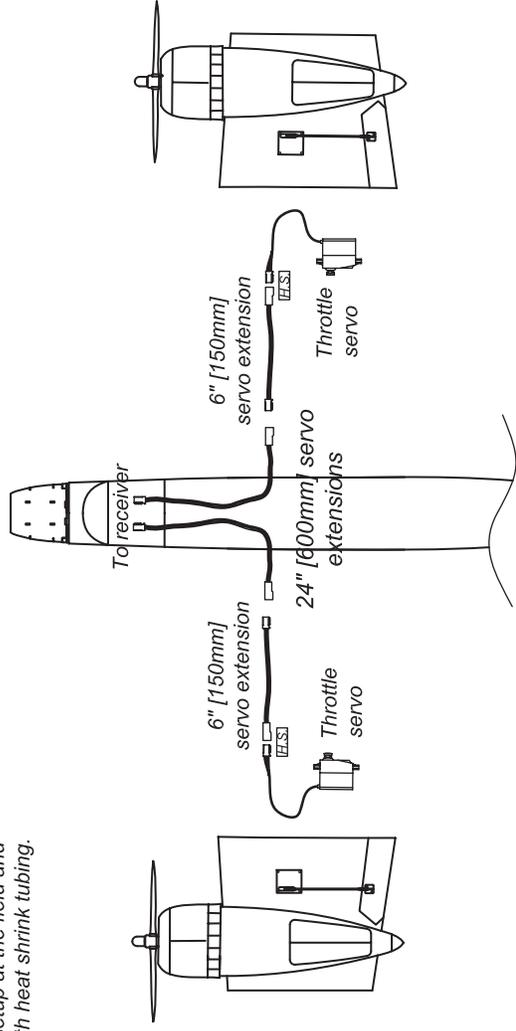
*These are the extensions for the elevator and rudders*

[H.S.] "H.S." = 1-1/2" [40mm] heat shrink tubing.



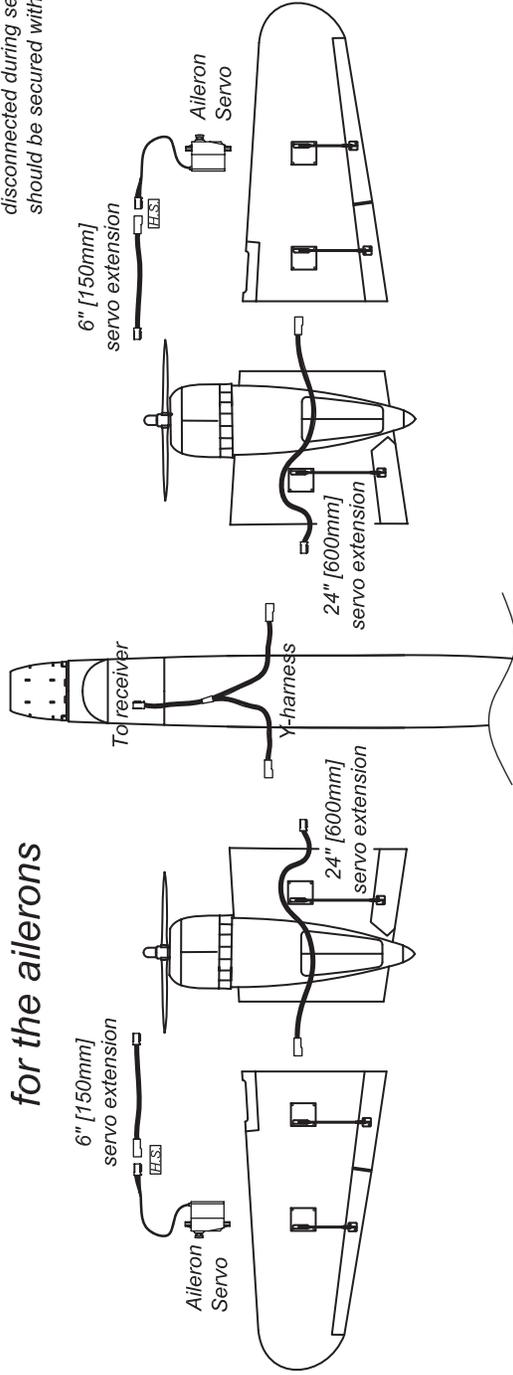
**Note:** Connections noted by the symbol "[H.S.]" will not be connected or disconnected during setup at the field and should be secured with heat shrink tubing.

*These are the extensions for the throttles*



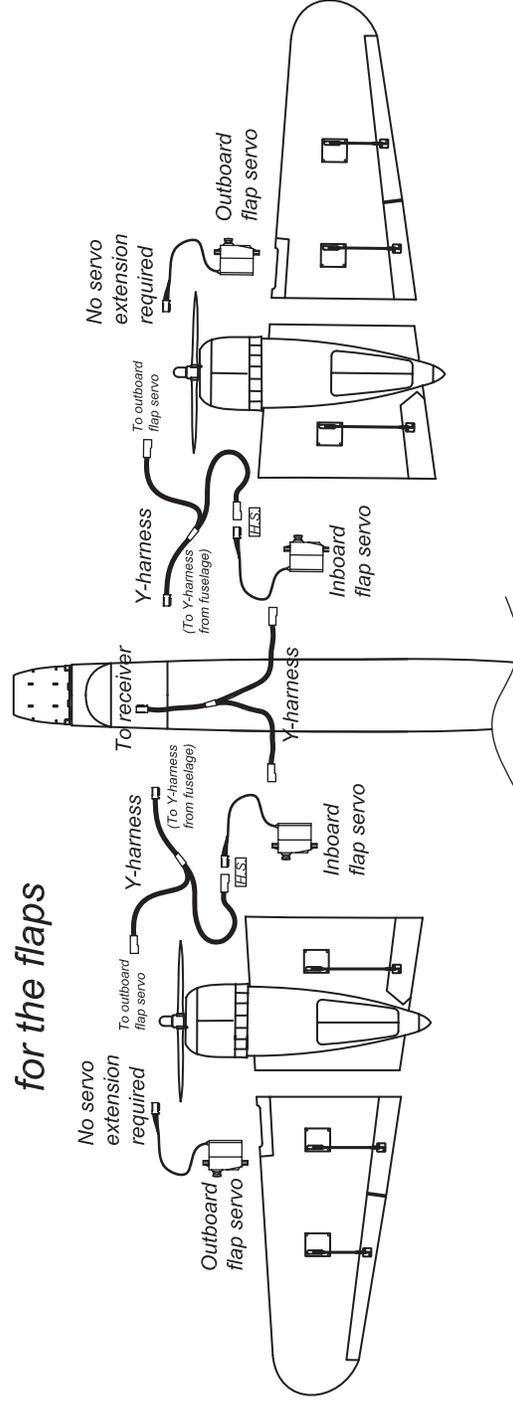
[H.S.] "H.S." = 1-1/2" [40mm] heat shrink tubing.

### These are the extensions for the ailerons



**Note:** Connections noted by the symbol "[H.S.]" will not be connected or disconnected during setup at the field and should be secured with heat shrink tubing.

### These are the extensions for the flaps



## ITEMS AVAILABLE FOR YOUR B-25J MITCHELL

### Robart Tri Gear Retracts



Maximize the realism of your Gold Edition B-25J Mitchell with 3-gear air pneumatic retracts from Robart! They're made of strong, lightweight steel and aluminum, and are custom-designed specifically for this model. Nose gear and main assemblies are included. Air kit is required (ROBQ2302).  
**ROBQ1624**

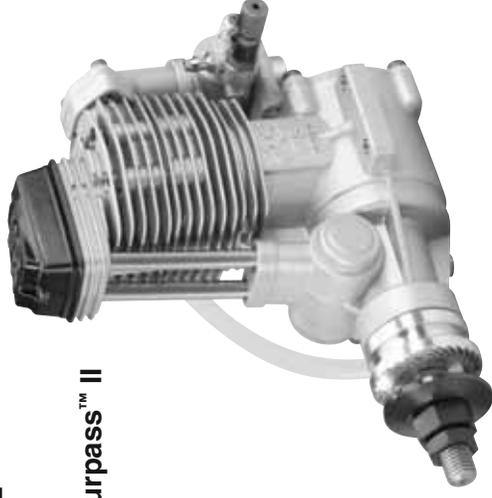
### O.S.® Engines .46 AX ABL

**Displacement:** 0.455 cu in (7.5 cc)  
**Bore:** 0.866 in (22.0 mm)  
**Stroke:** 0.772 in (19.6 mm)  
**Output:** 1.65 bhp @ 16,000 rpm  
**RPM Range:** 2,000-17,000  
**Weight w/muffler:** 17.2 oz (489g)  
**Includes:** #A3 glow plug, E-3010 muffler  
**Requires:** glow fuel, prop  
**Suggested prop sizes:** 10.5x6, 11x6-8, 12x6-7

Ask the pilot who owns one, and the reasons to buy mount up fast. Start with 1.65 hp output from a 17.2 oz. engine. Add ABL (Advanced Bimetallic Liner) durability, a self-leveling and aligning head design, a tapered low-speed needle to eliminate transition "surge" and the.46 AX still has more to offer. There's a simple rotor guide screw for low-end adjustment - and the high-speed needle includes both a ratchet spring and O-ring seal to lock settings in for the long haul. Includes A3 glow plug, E-3010 muffler, and 2-year warranty protection.  
**OSMG0547**

### O.S.® FS-70 Surpass™ II

**Displacement:** 0.70 cu in (11.50cc)  
**Bore:** 1.02 in (25.8mm)  
**Stroke:** 0.866 in (22.0mm)  
**Output:** 1.1hp @ 11,000 rpm  
**Practical rpm range:** 2,000 to 12,000 rpm  
**Weight w/muffler:** 20.65 oz (585.4g)



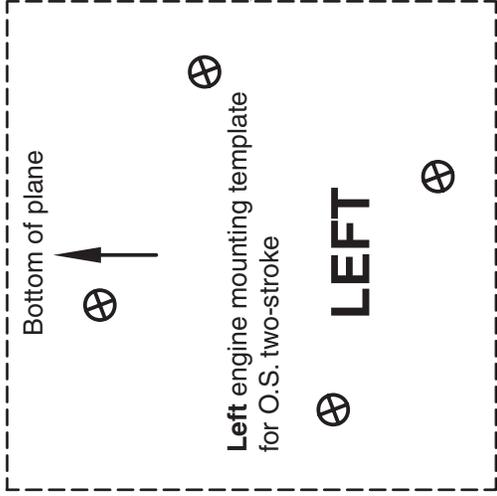
Improve your fuel economy and increase your power with the FS-70 Surpass II. It puts out an impressive 1.1 horsepower at 11,000 rpm – with all the power you need to execute big maneuvers. Its Type 60R carb provides more precise fuel flow control and smoother throttle control than the original FS-70 Surpass. The FS-70 Surpass II also features easier installation, adjustment and maintenance. Muffler and glow plug included. Two-year warranty.  
**OSMG0872**

### Hobbico® HydriMax™ 4200mAh Sub-C NiMH Flat Receiver Pack

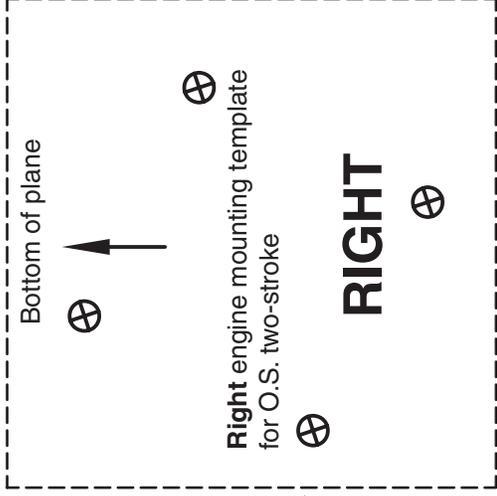


**Capacity:** 4200mAh  
**# of Cells:** 4  
**Rated Voltage:** 4.8V  
**Dimensions:** 3.6 x 1.9 x 0.95 in (93 x 47 x 24 mm)  
**Weight:** 10.05 oz (285 g)

Assembled from the highest-capacity cells that HydriMax has produced to date — a whopping 4200mAh — this sub-C flight pack ensures that you'll have the power you need to keep multiple digital servos moving. Gold-plated terminals on the universal connectors provide excellent conductivity.  
**HCAM6335**

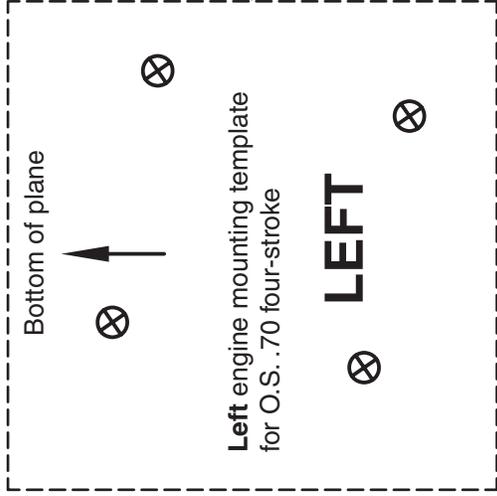


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dotted line*



This model belongs to:

_____	Name
_____	Address
_____	City, State, Zip
_____	Phone number
_____	AMA number



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