

# P-38/F-5E Lightning 400 ARF

Assembly Manual



## Specifications

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Wingspan:	48 in (1219mm)
Length:	35 in (889mm)
Wing Area:	307 sq in (19.8 sq dm)
Weight w/o Battery:	28-35 oz (794-992 g)
Weight w/Battery:	33-40 oz (936-1134 g)

**E-flite**<sup>®</sup>  
ADVANCING ELECTRIC FLIGHT

## Table of Contents

Specifications .....	1
Introduction .....	2
Using the Manual .....	3
Replacement Parts.....	3
Required and Recommended Radio Equipment.....	4
Important Information About Motor Selection.....	5
Recommended Brushed Motor Power System Setup.....	5
Recommended Brushless Motor Power System Setup.....	5
Optional Accessories .....	5
Note on Lithium Polymer Batteries .....	5
Required Tools and Adhesives.....	6
Warning .....	6
Warranty Period.....	6
Limited Warranty.....	6
Damage Limits.....	7
Safety Precautions.....	7
Questions, Assistance, and Repairs .....	7
Inspection or Repairs.....	7
Warranty Inspection and Repairs.....	7
Non-Warranty Repairs.....	8
Safety, Precautions, and Warnings.....	8
Elevator Servo Installation.....	9
Rudder Installation (Optional) .....	13
Brushless Motor Installation.....	18
Brushed Motor Installation .....	22
Aileron Servo Installation.....	26
Landing Gear and Drop Tank Installation (Optional).....	29
Final Assembly .....	31
Center of Gravity .....	33
Control Throws .....	33
Range Test Your Radio.....	34
Preflight .....	34
2007 Official AMA National Model Aircraft Safety Code.....	35

## Introduction

Thank you for purchasing the E-flite® P-38/F-5E Lightning 400 ARF. The P-38/F-5E is a highly detailed, highly prefabricated and factory assembled model of one of the most capable reconnaissance aircraft of the Allied arsenal during WWII.

Owing to its significant amount of prefabrication and factory assembly, the P-38/F-5E can be assembled in about 2 to 4 hours. The factory installed motor mount sticks allow for the use of inrunner motors and gearboxes, or outrunner motors using the included outrunner stick mounts. The included 10x8E counter-rotating props help to ensure the easiest and smoothest twin-motor flying experience ever by offering dead straight-ahead tracking during acceleration for takeoffs and in flight. They also substantially reduce adverse yaw should you ever happen to lose a motor during flight, and work perfectly with the recommended power systems.

And although the P-38/F-5E is not intended for first-time pilots, its superior design offers flying characteristics unlike any other similar model in its class, capable of being flown by most pilots with aileron-equipped model experience. The P-38/F-5E can be flown from smooth surfaces using the included landing gear and optional steerable nose wheel, or from grass with the landing gear and included drop tanks removed.

Few warbirds carry the mystique of the P-38/F-5E Lightning, and we hope you enjoy flying your new model.

## Using the Manual

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This manual is divided into sections to help make assembly easier to understand, and to provide breaks between each major section. In addition, check boxes have been placed next to each step to keep track of each step completed. Steps with a single circle (○) are performed once, while steps with two circles (○ ○) indicate that the step will require repeating, such as for a right or left wing panel, two servos, etc.

Remember to take your time and follow the directions.

## Replacement Parts

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EFL6030	Cowl and Nose Cover Set
EFL6031	Hardware and Pushrod Set
EFL6032	Landing Gear Set
EFL6034	Decal Set
EFLA284	Spinner, 2 1/4" Gray
EFLA284R	Spinner, 2 1/4" Gray, Reverse Rotation
EFLM1915	Outrunner Stick Mount
EFLP1080E	10x8 Electric Prop
EFLP1080ER	10x8 Electric Prop, Reverse Rotation

## Required and Recommended Radio Equipment

You will need a 3-channel or greater transmitter (at least 4-channel with optional rudders and/or steerable nose wheel), crystals (if applicable), micro receiver, and 3 sub-micro servos (or up to 6 if using the optional rudders and steerable nose wheel). You can choose to purchase a complete radio system that includes most of these items or, if you are using an existing transmitter, simply purchase the other required equipment separately.

**Note:** We highly recommend the crystal-free, interference-free Spektrum® DX6 2.4GHz DSM® 6-channel radio system (SPM2460). The complete system includes four S75 sub-micro servos and a 6-channel micro receiver.

### **Purchase Separately**

SPM6000 AR6000 DSM 6-Channel Receiver  
(For Spektrum Transmitters)

**Or**

JSP30600 RS600 6-Channel Universal FM Receiver  
w/o Crystal (For Any FM Transmitter)

**Or**

JRPR790 7-Channel ScanSelect PCM Receiver  
(For JR PCM Transmitters)  
JRPXFR\*\* Receiver Crystal (for JR Receivers)

**And**

EFLRS75 7.5-Gram Sub-Micro S75 Servo (3 required,  
or up to 6 with optional rudders and steerable  
nose wheel)  
EFLRYH3 3" Y-Harness (1, or up to 3 with brushless  
power system and optional rudders)  
JRPA096 Servo Extension 9" Standard, Gold (2 required,  
or up to 4 with brushless power system)  
JRPA100 Servo Extension 12" Standard, Gold (1 required,  
or up to 3 with optional rudders)

**Note:** When using our recommended Brushless Power System, you do not need to use a separate BEC or receiver battery pack to power the radio gear as long as you are using our recommended servos. This is because the BECs of the two brushless ESCs are working in parallel, allowing them to support up to 6 servos.

**Note:** When using our recommended Brushed Power System, you **MUST** use a separate BEC or receiver battery pack to power the radio gear if using more than 3 servos. This is because the BEC of the single brushed ESC cannot reliably support more than 3 servos.

We recommend the use of a separate BEC (like the Ultimate BEC), or a receiver pack and switch:

EXRB100 Expert 720mAh Ni-MH 4.8V Rx Pack  
EXRA050 Expert Standard Switch

## Important Information About Motor Selection

The P-38/F-5E has been extensively tested with the motors and power systems we recommend. The use of motors, especially those capable of higher power output than those suggested, is not recommended.

## Recommended Brushed Motor Power System Setup

This power system offers very scale-like performance and plenty of power for all aerobatic maneuvers.

DYN8840	14GA Silicone Wire 3', Red*
DYN8841	14GA Silicone Wire 3', Black*
EFLA239	Female Bullet Plug w/Lead (2 required if not soldering motors directly to ESC leads)
EFLAEC303	EC3 DEvice and BATTery Connector/Male and Female
EFLM232	480 Motor w/19T 0.5 Module Pinion (2 required)
EFLM236	400 Gearbox w/56T 0.5 Module Spur Gear (2 required)
CSEP20P	Pixie 20P Sub-Micro Brushed Motor ESC (1 required)
THP20703SX	2070mAh 3S 11.1V Li-Po, 13GA (1 required)

**Note:** If you intend to fly mostly at full throttle, especially in warm conditions, we suggest using a 30–35 amp ESC, like the Castle Creations Pegasus 35P (CSEP35P).

\*16GA silicone wire can be substituted

## Recommended Brushless Motor Power System Setup

This power system offers beyond scale-like performance with more power than necessary for all aerobatic maneuvers. It offers unlimited vertical and very good speed.

EFLA1025	25-Amp Pro Brushless ESC w/EC3 (2 required)
EFLAEC303	EC3 DEvice and BATTery Connector/ Male and Female
DYN8840	14GA Silicone Wire 3', Red*
DYN8841	14GA Silicone Wire 3', Black*
EFLM1400	Park 450 Brushless Outrunner Motor, 890Kv (2 required)
THP20703SX	2070mAh 3S 11.1V Li-Po, 13GA (1 required)

\*16GA silicone wire can be substituted

## Optional Accessories

EFLA110	Power Meter
EFLC3005	Celectra™ 1- to 3-Cell Li-Po DC Charger
HAN172	Hangar 9® Digital Servo and Rx Current Meter

## Note on Lithium Polymer Batteries



Lithium Polymer batteries are significantly more volatile than alkaline or Ni-Cd/Ni-MH batteries used in RC applications. All manufacturer's instructions and warnings must be followed closely. Mishandling of Li-Po batteries can result in fire. Always follow the manufacturer's instructions when disposing of Lithium Polymer batteries.

## Required Tools and Adhesives

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### Tools & Equipment

#0 Phillips Screwdriver (EFLA258)  
#1 Phillips Screwdriver (EFLA257)  
1.5mm Hex Driver/Wrench (EFLA253)  
Tapered Reamer (DYN5515)  
Pin Vise/Drill (XAC7144)  
Drill bit: .050"  
Hobby Knife (XAC3201)  
Needle-nose pliers  
Razor Saw (Optional for brushless motor power system installation)  
Thin or Medium Foam Safe CA (Optional for rudder hinge installation; EFLA209)  
Clear tape  
Felt-tipped pen (Optional for rudder hinge installation)  
Soldering iron and solder

## Warning

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An RC aircraft is not a toy! If misused, it can cause serious bodily harm and damage to property. Fly only in open areas, preferably at AMA (Academy of Model Aeronautics) approved flying sites, following all instructions included with your radio.

Keep loose items that can get entangled in the propeller away from the prop, including loose clothing, or other objects such as pencils and screwdrivers. Especially keep your hands away from the propeller.

## Warranty Period

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Horizon Hobby, Inc., (Horizon) warrants that the Products purchased (the "Product") will be free from defects in materials and workmanship at the date of purchase by the Purchaser.

## Limited Warranty

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(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(b) Limitations- HORIZON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than Horizon. Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

## Damage Limits

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HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

Law: These Terms are governed by Illinois law (without regard to conflict of law principals).

## Safety Precautions

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This is a sophisticated hobby product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the Product or other property. This Product is not intended for use by children without direct adult supervision. The Product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

## Questions, Assistance, and Repairs

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Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the Product has been started, you must contact Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please direct your email to [productsupport@horizonhobby.com](mailto:productsupport@horizonhobby.com), or call 877.504.0233 toll free to speak to a service technician.

## Inspection or Repairs

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If this Product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the Product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as **Horizon is not responsible for merchandise until it arrives and is accepted at our facility**. A Service Repair Request is available at [www.horizonhobby.com](http://www.horizonhobby.com) on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

## Warranty Inspection and Repairs

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**To receive warranty service, you must include your original sales receipt** verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

## Non-Warranty Repairs

***Should your repair not be covered by warranty the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost.*** By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. ***Please note: non-warranty repair is only available on electronics and model engines.***

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Service Center  
4105 Fieldstone Road  
Champaign, Illinois 61822

All other Products requiring warranty inspection or repair should be shipped to the following address:

Horizon Product Support  
4105 Fieldstone Road  
Champaign, Illinois 61822

***Please call 877-504-0233 with any questions or concerns regarding this product or warranty.***

## Safety, Precautions, and Warnings

As the user of this product, you are solely responsible for operating it in a manner that does not endanger yourself and others or result in damage to the product or the property of others.

Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) that you use.

This model is controlled by a radio signal that is subject to interference from many sources outside your control. This interference can cause momentary loss of control so it is necessary to always keep a safe distance in all directions around your model, as this margin will help to avoid collisions or injury.

- Always operate your model in an open area away from cars, traffic, or people.
- Avoid operating your model in the street where injury or damage can occur.
- Never operate the model out into the street or populated areas for any reason.
- Never operate your model with low transmitter batteries.
- Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) that you use.
- Keep all chemicals, small parts and anything electrical out of the reach of children.
- Moisture causes damage to electronics. Avoid water exposure to all equipment not specifically designed and protected for this purpose.



# Elevator Servo Installation

## Required Parts

- Fuselage/center section assembly
- Double-sided tape
- Servo w/hardware
- Servo extension, 12 in (305mm)
- Pushrod wire w/clevis, 10 <sup>3</sup>/<sub>4</sub> in (273mm)
- Receiver

## Required Tools and Adhesives

- Phillips screwdriver (small)
- 1. Carefully remove the center section hatch from the fuselage by lifting it from the rear.



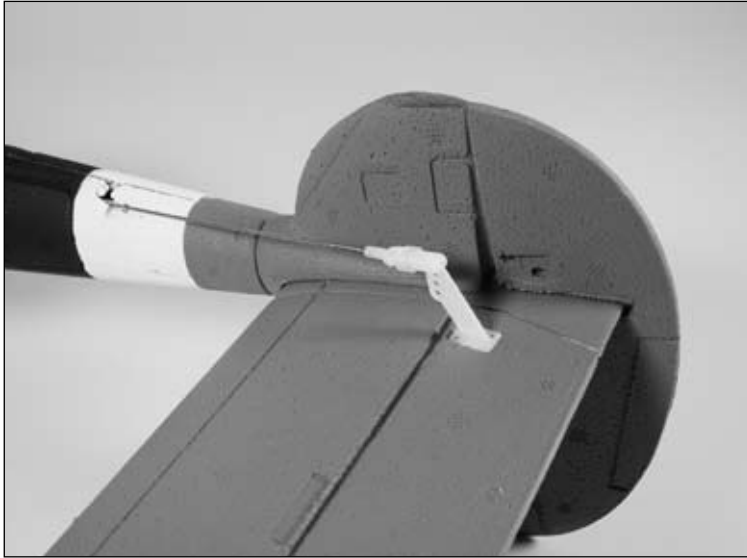
- 2. Remove the servo cover from the bottom of the left boom by lifting it from the rear.



- 3. Locate a 10 <sup>3</sup>/<sub>4</sub> in (273mm) pushrod wire and remove the clevis. Slide the wire into the pre-installed tube in the fuselage threaded end first. The correct tube will exit near the elevator control horn.



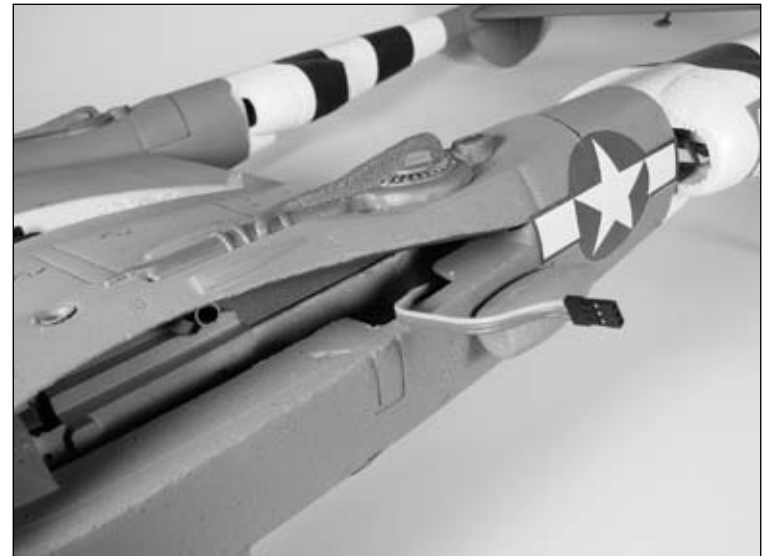
- 4. Thread the clevis back onto the pushrod wire.



- 5. Secure a 12 in (305mm) servo extension onto the servo lead. Use string to secure the servo lead to the servo extension.



- 6. Pass the extension forward in the boom and underneath the plywood servo tray. The extension will exit the boom in the opening for the wing.



- 7. Position the elevator servo in the servo tray on the side with the "S9" decal with the output shaft towards the front of the boom. Secure the servo using the hardware provided with the servo.



- 8. Route the servo extension through the channel in the bottom of the wing to the center fuselage.



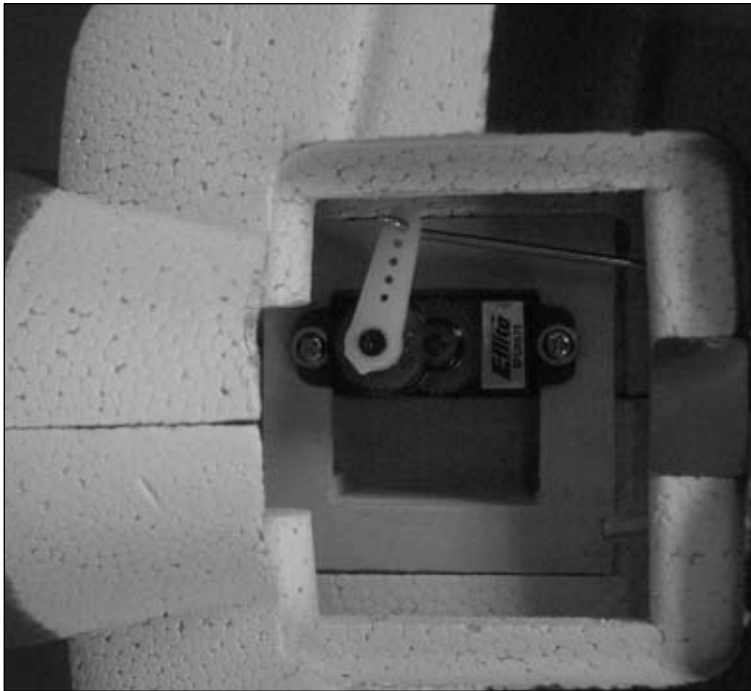
- 9. Attach the receiver to the fuselage using the included double-sided tape. Plug the elevator servo extension into the elevator channel of the receiver.

**Note:** Use the manufacturer's instructions for routing your antenna. Never cut the receiver antenna as this will greatly reduce the range of your radio system.



- 10. Turn on the transmitter and apply power to the receiver. Check that the elevator servo is operating properly. Center the elevator trim and control stick and set any sub-trims to 0.

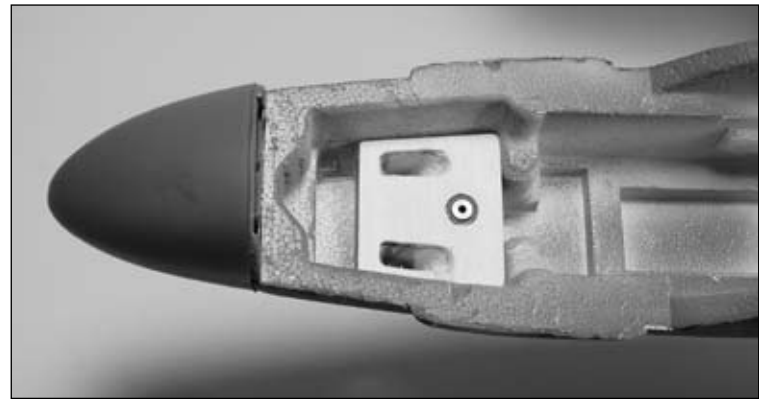
- 11. With the radio system still powered on, attach the pushrod wire to the servo arm. It may be necessary to enlarge the hole in the servo arm using a drill bit or sharp hobby knife so the Z-bend can move freely in the arm, but with no slop. Install the servo arm on the servo so it is as close to perpendicular with the pushrod as possible. Secure the servo arm to the servo using the screw provided with the servo. Thread the clevis on the pushrod in or out to adjust the length of the pushrod, positioning the elevator level with the stabilizer when the servo is centered.



- 12. Replace the servo hatch cover once the linkage has been installed. Turn off the radio system at this time as well.



- 13. Elongate the two openings near the nose gear rearward 3/8 in (10mm). Angle the foam back to the holes to allow for more airflow through and over the battery.



**Note:** Step 13 is optional to help with cooling of the ESC and battery. It is suggested to enlarge the openings if you plan to fly aggressive and at high throttle settings.

## Rudder Installation (Optional)

### Required Parts

- Fuselage/center section assembly
- CA hinge (6)
- 2mm x 12mm screw (4)
- Servo w/hardware (2)
- Control horn w/backplate (2)
- Servo extension, 12 in (305mm) (2)
- Pushrod wire w/clevis, 10<sup>3</sup>/<sub>4</sub> in (273mm) (2)
- Y-harness

### Required Tools and Adhesives

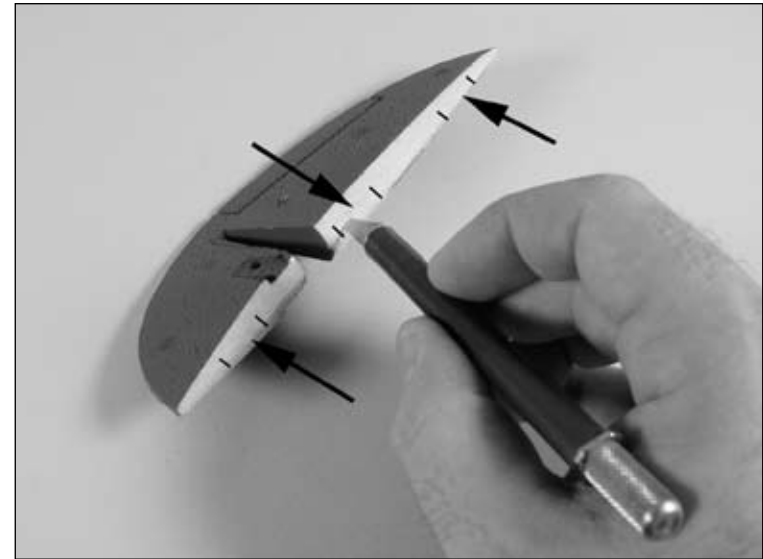
- Hobby knife
- Thin or medium foam-safe CA
- Felt-tipped pen

**Note:** The installation of the rudders is optional. If you choose not to install the rudders, skip to the next section for the installation of your motor system.

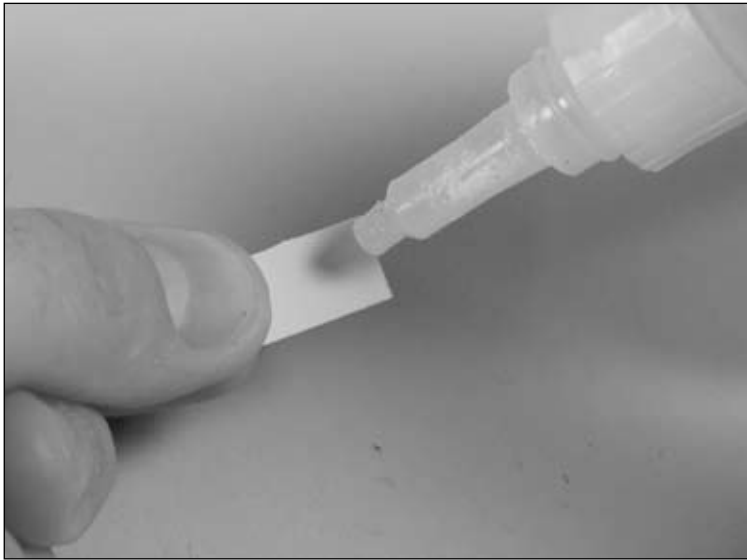
- ○ 1. Use a hobby knife with a sharp blade to separate the rudder from the fin at the molded hinge line.



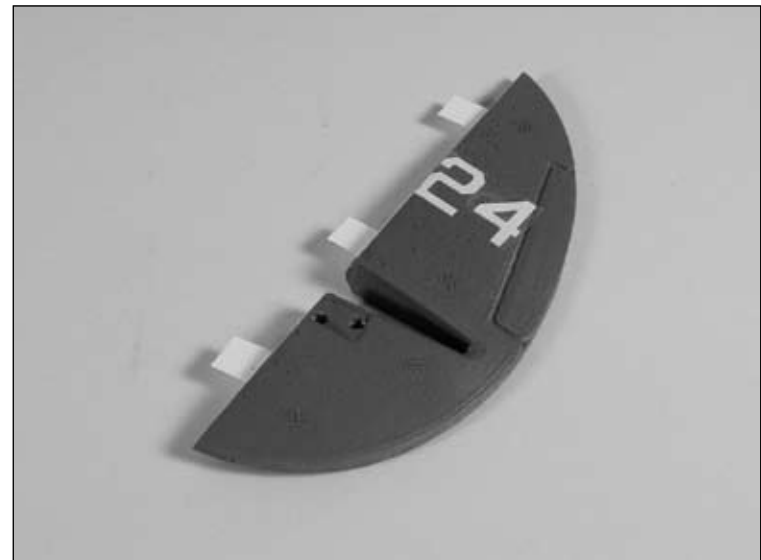
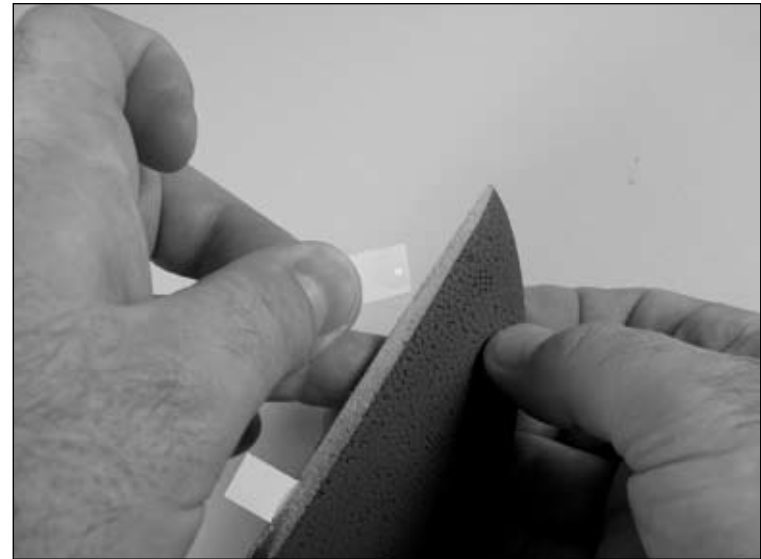
- ○ 2. Use a hobby knife to cut three slots into the rudder as shown.



- ○ 3. If using medium foam-safe CA, apply a small amount to one half of the hinge. Make sure to apply CA to both sides of the hinge where it will be inserted into the rudder. If using thin foam-safe CA, the hinges can be inserted into slots in the rudder and fin without glue. Then the CA can be applied in the middle of the hinge so that it will soak into both surfaces.

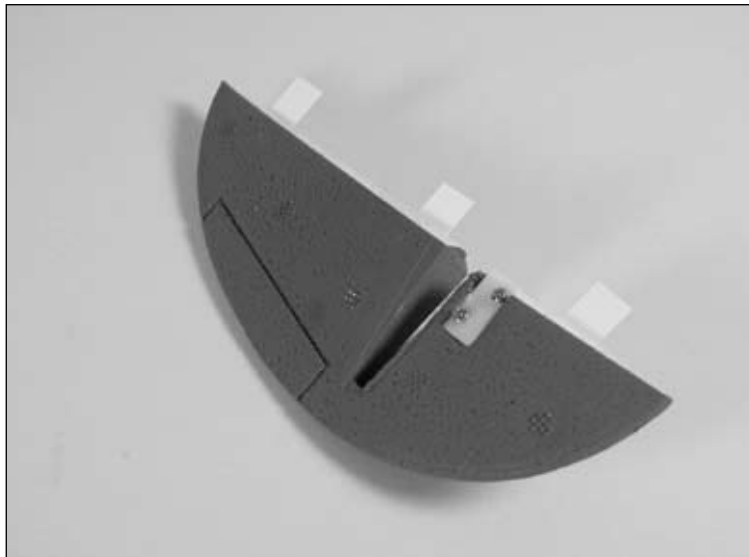
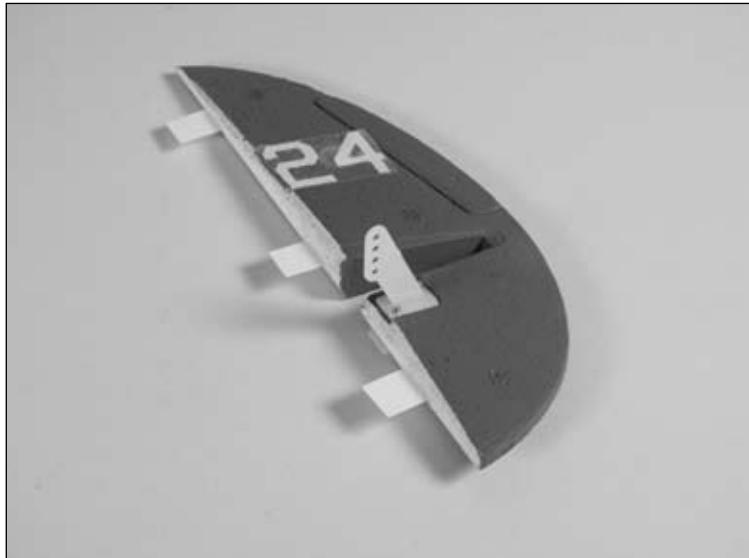


- ○ 4. Slide the hinge into the slot made in the previous step. Install the three hinges into the rudder.

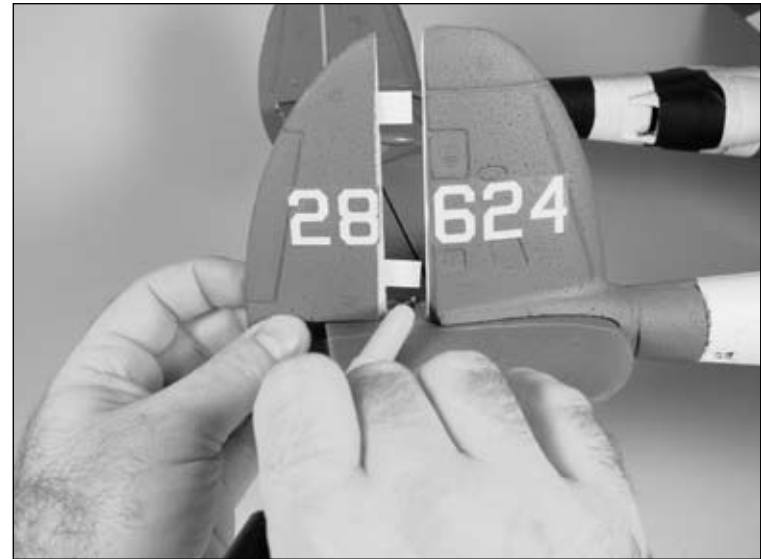


- ○ 5. Attach the control horn to the outside of the rudder using the backplate and two 2mm x 12mm screws.

**Note:** Make sure to mount the horn on the outside of each rudder.



- ○ 6. Position the rudder against the fin. Use a felt-tipped pen to mark the location of the hinges onto the fin.



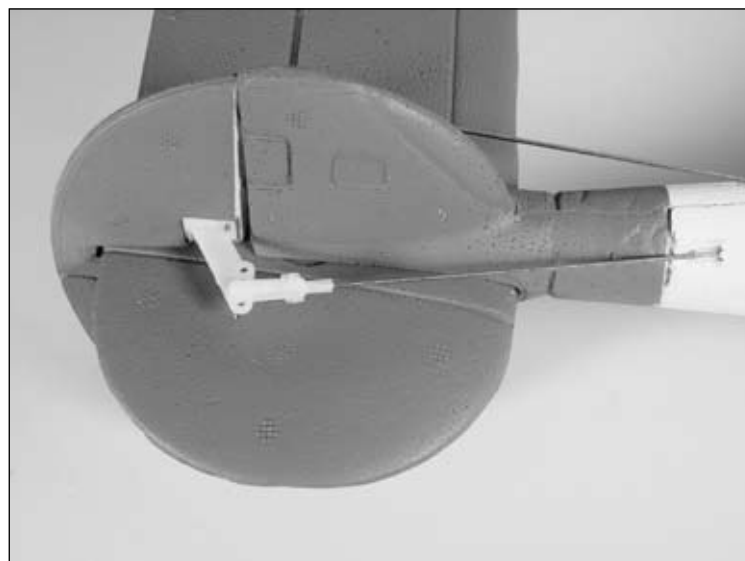
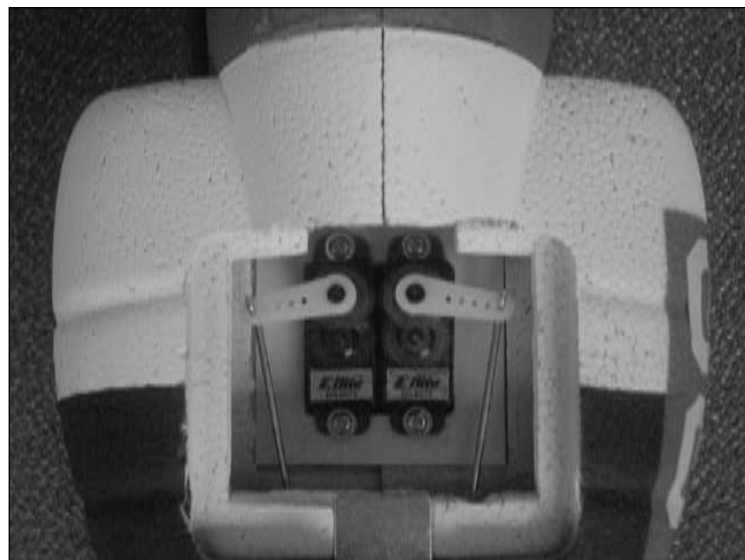
- ○ 7. Use a hobby knife to cut slots for the hinges in the fin.



- ○ 8. Test fit the rudder. Check that it can move freely without binding against the elevator. Trim the rudder or hinge slots in the fin as necessary. Complete the rudder installation by applying foam-safe CA to the hinges and sliding the hinges into the slots in the fin. Be sure to set just enough gap between the fin and rudder to allow free movement of the rudder to the left and right.

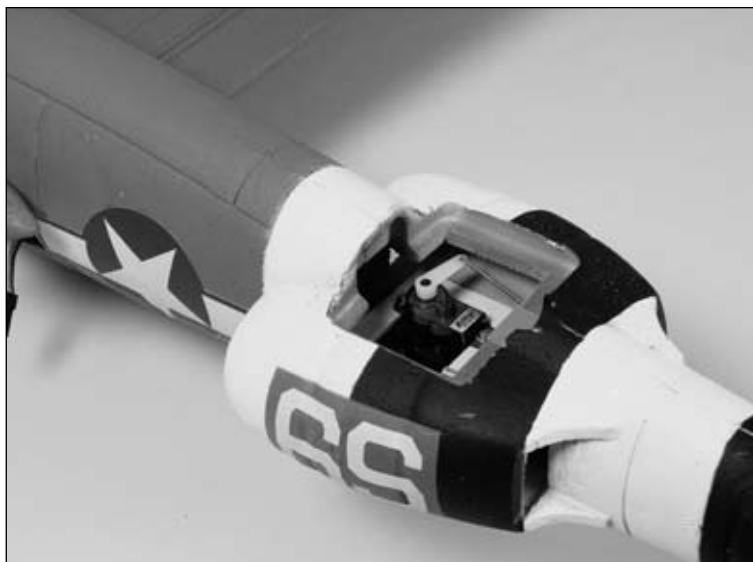
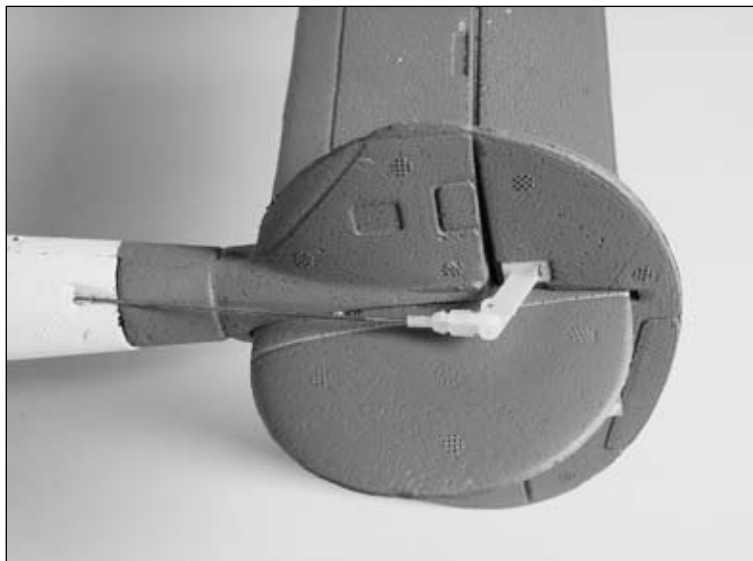


- ○ 9. Install the rudder servo using the same procedure used for the elevator servo.





- 10. Repeat Steps 1 through 9 to install the second rudder servo. The control horn is mounted on the rudder facing away from the elevator. The rudder servo is positioned with the servo arm pointing to the inside of the boom.



- 11. Install the servo hatches back into position.



# Brushless Motor Installation

## Required Parts

- Fuselage/center section assembly
- Brushless outrunner motor (2)
- Outrunner stick mount (2)      • 1.5mm x 12mm screw (2)
- Brushless ESC (2)              • 14- or 16-Gauge silicone wire
- 3mm x 10mm machine screw (4)      • 4mm spacer (4)
- Propeller (standard and reverse rotation)
- Spinner assembly (standard and reverse rotation)

## Required Tools and Adhesives

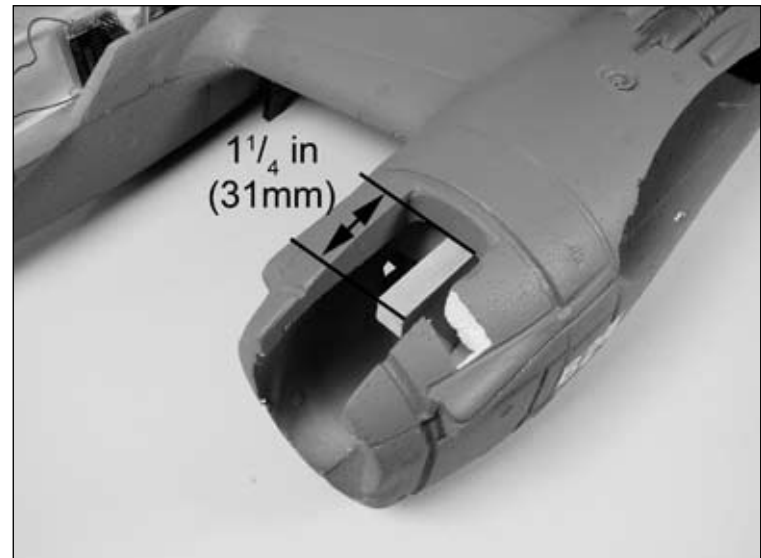
- Phillips screwdriver              • Double-sided tape
- Razor saw                          • Hobby knife
- Soldering iron                      • Solder

**Note:** The P-38/F-5E Lightning includes standard and reverse rotation propellers and spinners. This allows the use of counter-rotating propellers, just like the full-scale P-38/F-5E used, for improved handling and tracking during acceleration for takeoffs and flight. Make sure to note the direction of the propellers and spinners when it comes time to install them on the aircraft.

- ○ 1. Attach the outrunner motor to the outrunner motor mount using four 3mm x 10mm machine screws and four 4mm spacers.



- ○ 2. Use a razor saw to cut the motor mount stick to a length of 1 1/4 in (31mm) for the E-flite Park 450 outrunner motor.



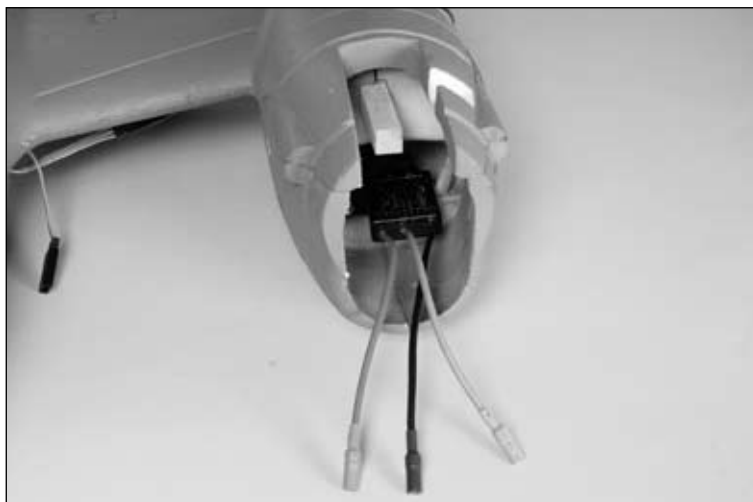
**Hint:** Use a hobby knife to cut a notch in the boom so you can use the razor saw to cut the mount.

**Note:** The dimension of 1 1/4 in (31mm) is for the E-flite Park 450 Brushless motor (EFLM1400). Using a different motor will change the length required for the mount.

### **Important Information About Your Brushless ESC**

Make sure your ESC brake is programmed to Off. Also, be sure to use an ESC with the proper 9V cutoff when using 3-cell Li-Po packs, or 6V cutoff when using 2-cell Li-Po packs.

- ○ 3. Remove the EC3 connector from the electronic speed controls. Cut a 16 in (406mm) length of red and black wire (14- or 16-gauge) for each ESC and solder them to the end of the battery leads on the speed control to extend them into the fuselage. Route the servo lead and battery connection through the channel in the bottom of the wing and into the center fuselage. Use double-sided tape to secure the ESC inside the boom where it can get air flow through the opening in the cowling.



- ○ 4. Plug the motor leads into the speed control motor leads. Check the motor stick to make sure it is secure in the boom. Apply foam-safe CA as necessary to make sure the motor stick is secure. Then slide the mount onto the stick and secure it using the included 1.5mm x 12mm screw.



- ○ 5. Solder both sets of motor leads together with a male EC3 connector. Make sure to solder the positive to positive and negative to negative. Check operation of the motors. The left-hand motor (when viewed from behind) should rotate counterclockwise when viewed from the front. The right-hand motor (when viewed from behind) should rotate clockwise when viewed from the front.



**Note:** If either motor is running in the opposite direction that it should, simply reverse any two of the wire leads that connect to the ESC.

- ○ 6. Remove the backing from the factory installed double-sided tape on the sides of the boom. Slide the cowling onto the boom, pressing it against the tape once you have confirmed proper alignment.



**Note:** Never check the motor rotation on the bench with the propeller installed. The plane could move and cause serious injury. Always check the motor without the propeller to avoid injury.

### **Important Information About Your Propeller**

It is very important to check to be sure the propeller is balanced before installing on the propeller shaft. An unbalanced propeller may damage the motor, airframe and other components, or cause poor flight and performance characteristics.

**Note:** If it is necessary to enlarge the hole in the propeller, make sure to check the balance of the propeller afterwards.

- ○ 7. Install the propeller and spinner backplate as shown using the adapter included with the motor. The spinner backplate will actually be installed in front of the propeller, and it will be necessary to use a drill bit or reamer to enlarge the hole in the prop and spinner backplate so they will fit the prop adapter shaft. Also, you will need to install the thick washer included in the kit between the spinner backplate and prop adapter nut so that the nut can seat properly on the backplate when secured.

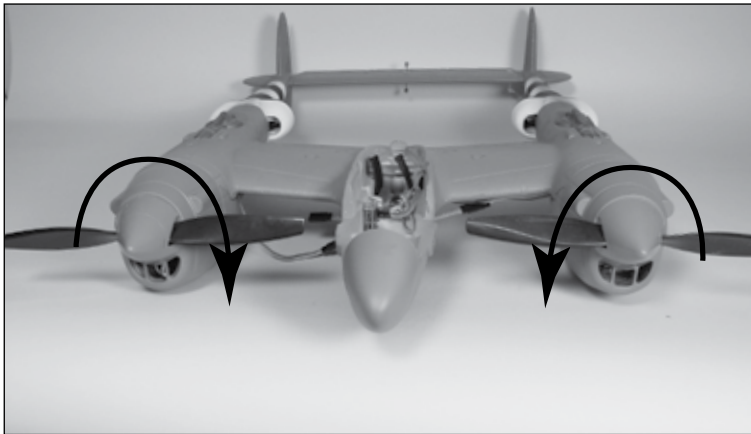


**Note:** Pay close attention to the orientation of the propellers as shown in the photos.

- ○ 8. Snap the spinner cone onto the spinner backplate.



- 9. Repeat Steps 1 through 8 to install the remaining motor. When checking the second motor in Step 5 (without the propeller installed), the motors will rotate opposite directions as shown in the photo.



## Brushed Motor Installation

### Required Parts

- Fuselage/center section assembly
- Gearbox assembly (2)
- Brushed motor (2)
- Electronic speed control
- Propeller (standard and reverse rotation)
- Spinner assembly (standard and reverse rotation)
- 14 or 16GA silicone wire
- 1.5mm x 12mm screw (2)
- Double-sided tape

### Required Tools and Adhesives

- Phillips screwdriver
- Soldering iron
- Double-sided tape
- Solder

**Note:** The P-38/F-5E Lightning includes standard and reverse rotation propellers and spinners. This allows the use of counter-rotating propellers, just like the full-scale P-38/F-5E used, for improved handling and tracking during acceleration for takeoffs and flight. Make sure to note the direction of the propellers and spinners when it comes time to install them on the aircraft.

- ○ 1. Cut two 16 in (406mm) length pieces of either 14- or 16-gauge wire to replace the leads pre-installed on the motor. Use a soldering iron to change out the motor leads.

- ○ 2. Install the brushed motor in the gearbox using the hardware provided with the gearbox. Check the gear mesh to make sure it is not set too loose or tight and adjust as necessary.



### ***Important Information About Your ESC***

Make sure your ESC brake is programmed to Off. Also, be sure to use an ESC with the proper 9V cutoff when using 3-cell Li-Po packs, or 6V cutoff when using 2-cell Li-Po packs.

- ○ 3. Check the motor stick to make sure it is secure in the boom. Apply foam-safe CA as necessary to make sure the motor stick is secure. Then slide the gearbox onto the stick and secure it using a 1.5mm x 12mm screw. Route the motor wires through the channel in the bottom of the wing to the center fuselage.

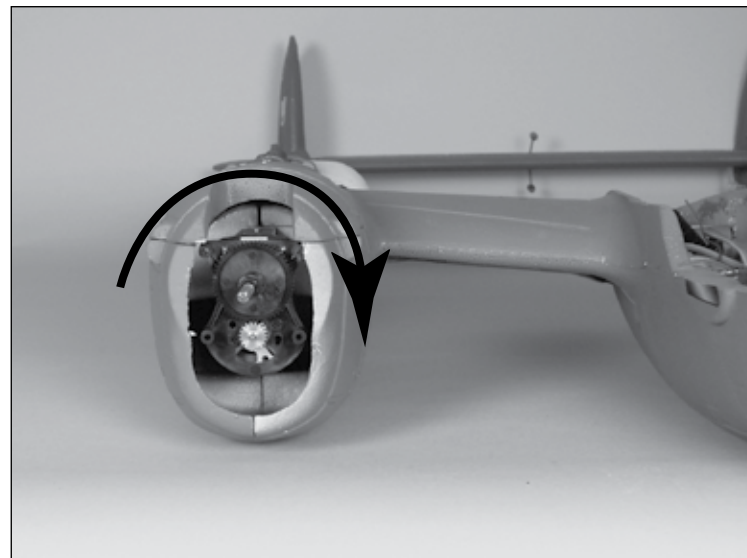


- ○ 4. Repeat Steps 1 through 3 for the second motor.

- 5. Install the speed control inside the fuselage. Solder both sets of motor leads to the speed control, positive to positive and negative to negative.



- ○ 6. Check the operation of the motors. The left-hand gearbox shaft (when viewed from behind) should rotate counterclockwise when viewed from the front. The right-hand gearbox shaft (when viewed from behind) should rotate clockwise when viewed from the front.



**Note:** If either motor is running in the opposite direction that it should, simply reverse the two wire leads that connect the ESC to the motor.



- ○ 7. Remove the backing from the double-sided tape on the sides of the boom. Slide the cowling onto the boom, pressing it against the tape once you have confirmed proper alignment.



**Note:** Never check the motor rotation on the bench with the propeller installed. The plane could move and cause serious injury. Always check the motor without the propeller to avoid injury.

### ***Important Information About Your Propeller***

It is very important to check to be sure the propeller is balanced before installing onto the shaft. An unbalanced propeller may strip the gears or cause poor flight characteristics.

- ○ 8. Install the propeller and spinner backplate as shown on the prop shaft of the gearbox. The spinner backplate will actually be installed in front of the propeller.

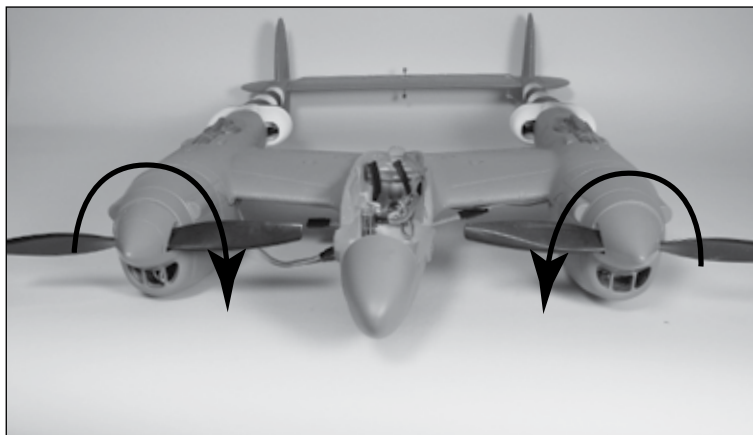


**Note:** Pay close attention to the orientation of the propellers as shown in the photos.

- ○ 9. Snap the spinner cone onto the spinner backplate.



- 10. Repeat Steps 6 through 9 to install the remaining motor. When checking the second motor in Step 4 (without the propeller installed), the motors will rotate opposite directions as shown in the photo.



## Aileron Servo Installation

### Required Parts

- Fuselage/center section assembly
- Double-sided tape
- 3mm x 35mm screw (2)
- Servo w/hardware (2)
- Y-harness
- Pushrod wire w/clevis, 2 1/4 in (57mm) (2)
- Wing panels
- Servo extension, 9" (228mm) (2)
- 3mm x 25mm screw (2)

### Required Tools and Adhesives

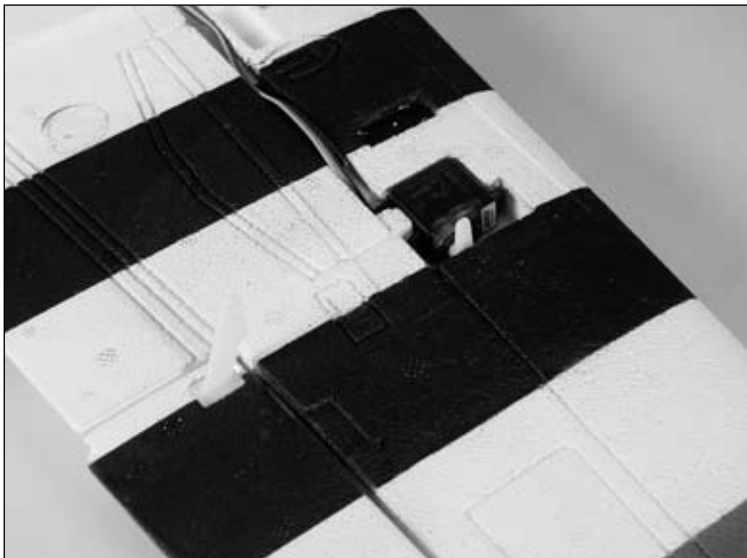
- Phillips screwdriver
- ○ 1. Plug the Y-harness for the aileron servos into the receiver. Connect a 9" (228mm) extension to the harness and route the extension out where the wing will plug into the fuselage; run the ends out each side of the wing slots in the center section.



- ○ 2. Turn on the transmitter and apply power to the receiver. Check that the aileron servo is operating properly. Center the aileron trim and control stick and set any sub-trims to 0. Attach the servo arm to the servo so it is as close to perpendicular as possible when the servo is in the neutral position.

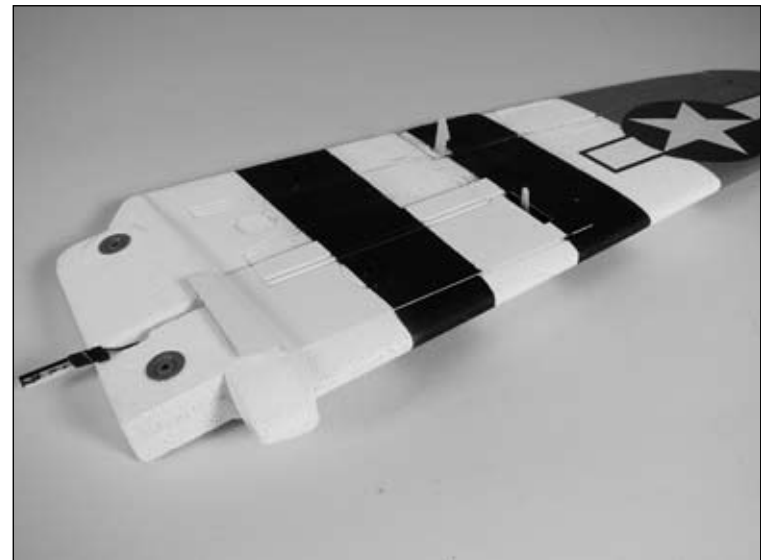


- ○ 3. Use the included double-sided tape to install the servo in the wing with the output shaft toward the trailing edge and control horn.

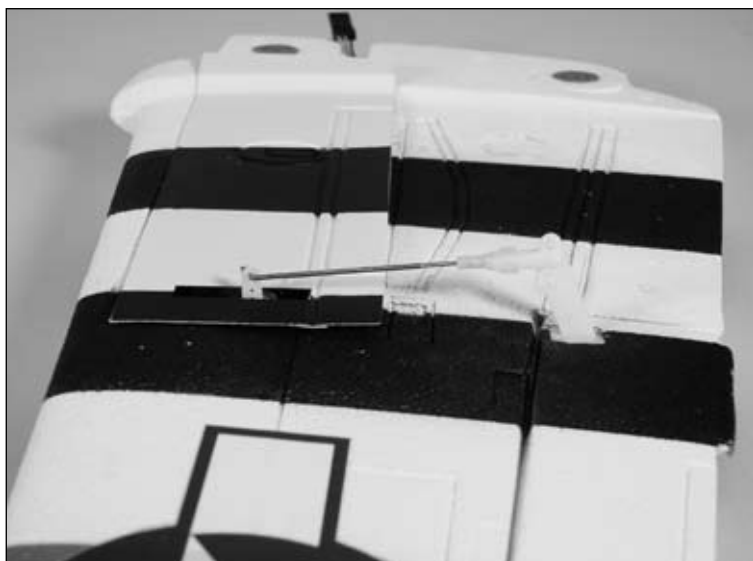


- ○ 4. Remove the backing from the pre-installed double-sided tape on the wing panel cover. Position the servo lead in the channel in the wing and attach the wing panel cover after removing the backing from the factory-installed double-sided tape. You can also use clear tape around the edges of the bottom cover so it is more secure during flight.

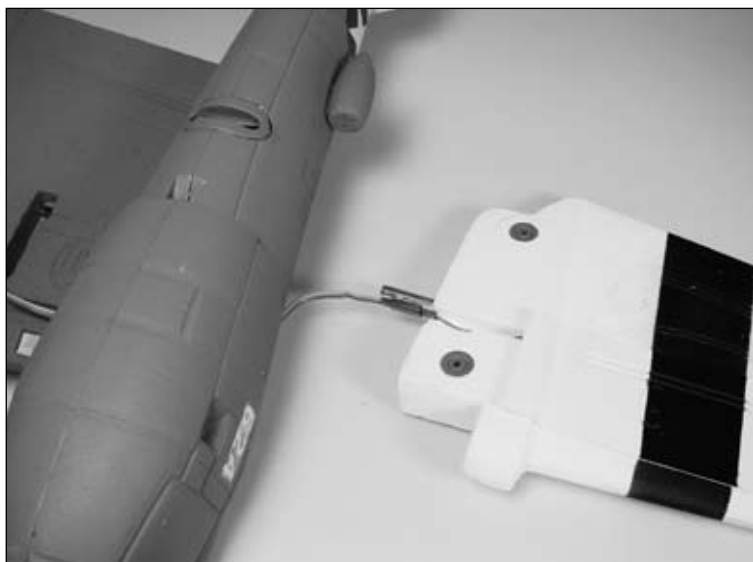
**Note:** If you need to remove the servo cover after you have taped it down, use caution as it could pull up your paint with it.



- ○ 5. Attach the aileron servo pushrod and linkage as shown.



- ○ 6. Plug the servo extension and servo lead together.



- ○ 7. Slide the spar from the wing panel into the tube located in the fuselage. Slide the wing into the fuselage and secure it using the 3mm x 45mm screw in the front and the 3mm x 35mm screw in the rear.

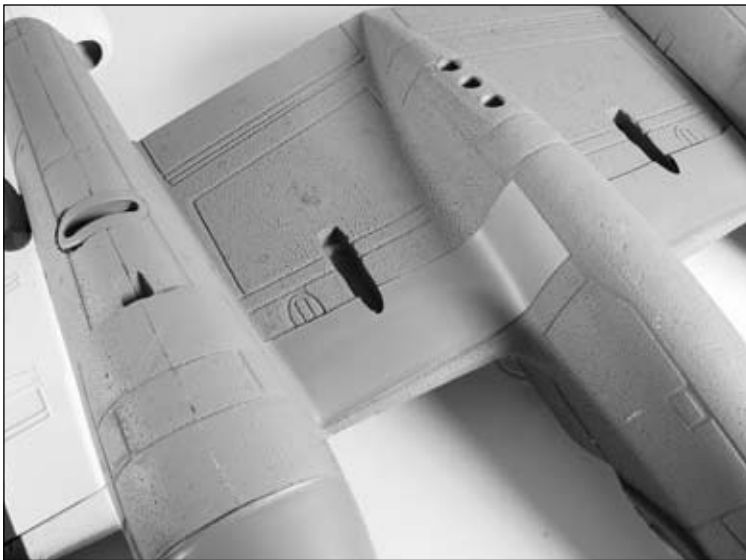


**Note:** It may be necessary to slide the wing in and out of the slot in the boom a few times so that the fit is not too tight. Also, be sure that the plastic bushings located on the bottom of the wing panel do not interfere and damage the fuselage when installing the wing panel.

- ○ 8. Repeat Steps 1 through 7 for the remaining aileron servo and wing panel.

- 9. Remove the backing from the pre-installed double-sided tape on the center section cover. Position the servo and motor/ESC leads in the channel in the wing and attach the center section cover after removing the backing from the factory-installed double-sided tape. You can also use clear tape around the edges of the cover so it is more secure during flight.

**Note:** If you need to remove the center section cover after you have taped it down, use caution as it could pull up your paint with it.



## Landing Gear and Drop Tank Installation (Optional)

### Required Parts

- Assembled airframe
- Nose gear
- Steering arm
- Servo w/hardware
- Main gear (right and left)
- 2mm x 10mm panhead screw (4)
- Steering linkage
- Double-sided tape

### Required Tools and Adhesives

- Phillips screwdriver
- Hex wrench: 1.5mm

**Note:** The installation of the landing gear and drop tanks are optional. If you are flying from a rough surface or in a situation that may not be conducive to having these items installed you can select to skip this section.

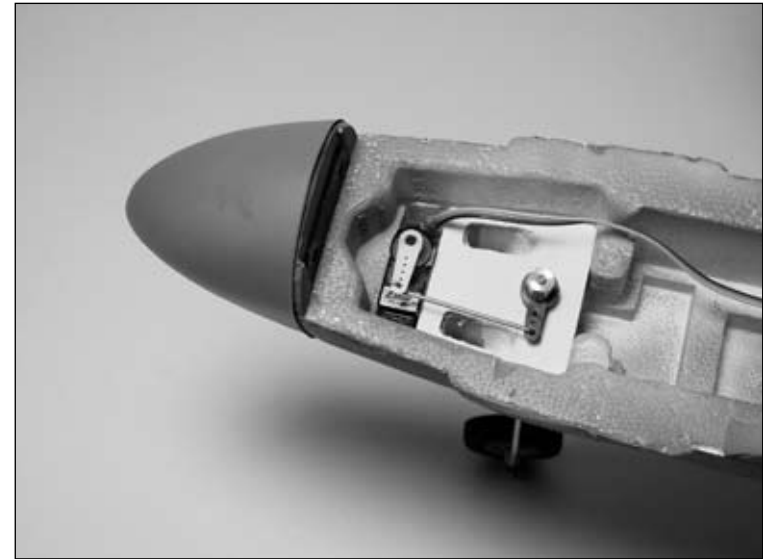
- 1. Slide the main gear into the slots in the booms. Use two 2mm x 10mm panhead screws to secure the gear.



- 2. Slide the nose gear into position.



- 3. Place a piece of double-sided tape onto the bottom of the steering servo and install it in the nose as shown. Use a 1.5mm hex wrench to secure the steering arm on the nose gear wire so that the arm is as close to perpendicular to the nose wheel as possible. Install the servo arm so it is as close to parallel with the steering arm as possible when the servo is in the neutral position. Use a knife or drill bit to enlarge the hole in the servo arm so the linkage will fit and move smoothly with no slop.



**Note:** You will need to use an unused channel and mix the rudder to the channel for the nose gear to operate in the correction direction. This also allows you to adjust the nose steering servo travel independently of the rudder servo travel. The other option is to use a reversing Y-harness if your transmitter does not offer programmable mixing.

- 4. Use glue to install the drop tanks permanently, or use double-sided tape so they can be removed in the future.



## Final Assembly

### Required Parts

- Assembled airframe
  - Motor battery
- 1. Install the motor battery into the fuselage. Use the hook and loop strap to keep it from falling out during flight.



**Note:** When using our recommended Brushed Motor Power System, you **MUST** use a separate BEC or receiver battery pack to power the radio gear if using more than 3 servos.

Also, you must be sure to disable the BEC of the ESC by removing the positive lead from the servo connector that plugs into the throttle channel of the receiver. Failure to do so when using a separate BEC or receiver battery pack may result in ESC failure and a crash.

- 2. Install the receiver battery and switch in the fuselage and plug the switch into the receiver. Or, you can choose not to use a switch and simply plug and unplug the receiver battery from the receiver directly before and after flight.



- 3. Install the center section hatch to complete the assembly of your P-38/F-5E Lightning.



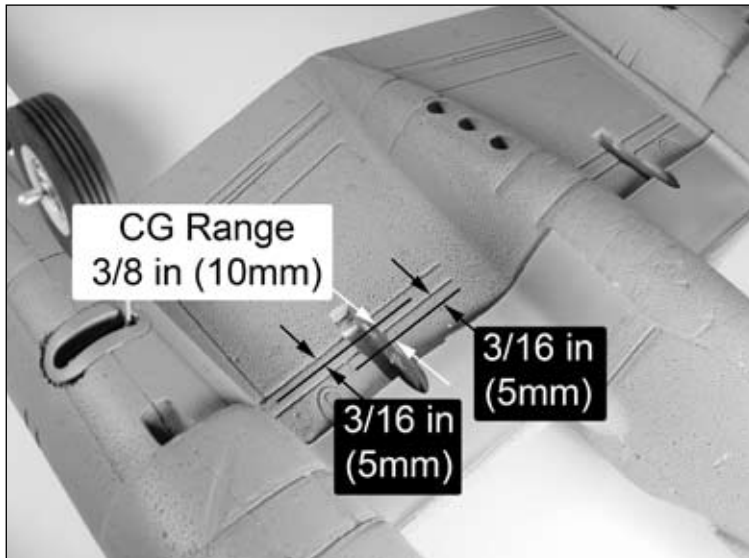


## Center of Gravity

An important part of preparing the aircraft for flight is properly balancing the model.

**Caution: Do not inadvertently skip this step!**

The recommended Center of Gravity (CG) range is 3/16 in (5mm) forward of the rear panel line to 3/16 in (5mm) forward of the front panel line for a range of 3/8 in (10mm).



Place or lift the airplane so it is supported between the marks made in the previous step. The plane will rest level when balanced correctly. If not, move the motor battery forward or backward, or add a small amount of weight to the nose or tail, to correct any balancing problems.

## Control Throws

- 1. Turn on the transmitter and receiver of your aircraft. Check the movement of the rudder using the transmitter. When the stick is moved right, the rudder should also move right. Reverse the direction of the servo at the transmitter if necessary.
- 2. Check the movement of the ailerons using the transmitter. When the stick is moved right, the right aileron will move up and the left aileron will move down. Reverse the direction of the servo at the transmitter if necessary.
- 3. Check the movement of the elevator with the radio system. Moving the elevator stick down will make the airplane elevator move up.
- 4. Use a throw gauge to adjust the throw of the elevator, ailerons and rudder. Adjust the position of the pushrod at the control horn, or the travel/endpoint adjustments of your computer transmitter, to achieve the following measurements when moving the sticks to their endpoints.

### **Ailerons**

5/8" (16mm) Up/Down

### **Elevator**

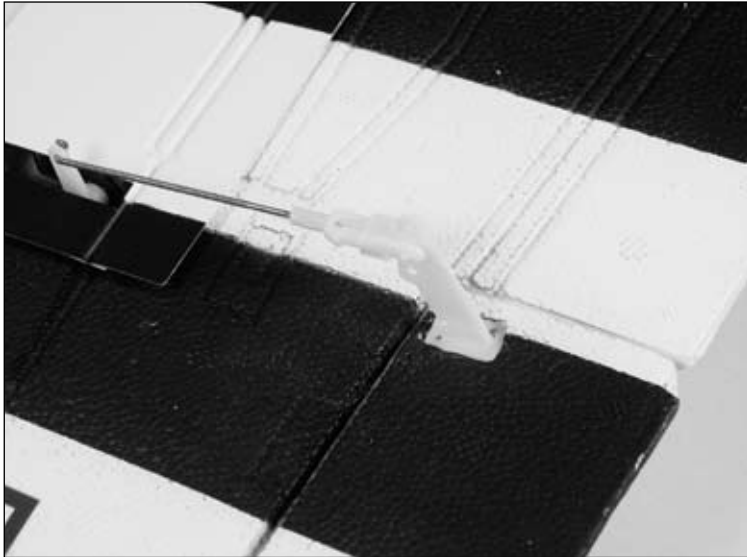
1/2" (13mm) Up/Down

### **Rudders (Optional)**

1/2" (13mm) Left/Right

These are general guidelines measured from our own flight tests and serve as a good starting point. You can experiment with lower or higher rates to match your preferred style of flying.

- 5. Once the control throws have been verified, slide the clevis retainers onto the clevises to prevent them from opening during flight.



## Range Test Your Radio

- 1. Before each flying session, be sure to range check your radio. This is accomplished by turning on your transmitter with the antenna collapsed. Turn on the receiver in your airplane. With your airplane on the ground and the engine running, you should be able to walk 30 paces (approximately 100 feet) away from your airplane and still have complete control of all functions.

If not, don't attempt to fly! Have your radio equipment checked out by the manufacturer.

- 2. Double-check that all controls (aileron, elevator, rudder and throttle) move in the correct direction.
- 3. Be sure that your transmitter batteries are fully charged, per the instructions included with your radio.

## Preflight

### Check Your Radio

Before going to the field, be sure that your batteries are fully charged per the instructions included with your radio. Charge both the transmitter and receiver pack for your airplane. Use the recommended charger supplied with your particular radio system, following the instructions provided with the radio. In most cases, the radio should be charged the night before going out flying.

Before each flying session, be sure to range check your radio. See your radio manual for the recommended range and instructions for your radio system. Each radio manufacturer specifies different procedures for their radio systems. Next, start the motor. With the model securely anchored, check the range again. The range test should not be significantly affected. If it is, don't attempt to fly! Have your radio equipment checked out by the manufacturer.

**Note:** Keep loose items that can get entangled in the propeller away from the prop. These include loose clothing, or other objects such as pencils and screwdrivers. Especially keep your hands away from the propeller.

Double-check that all controls (aileron, elevator, rudder and throttle) move in the correct direction.

Check the radio installation and make sure all the control surfaces are moving correctly (i.e. the correct direction and with the recommended throws). Test run the motor and make sure it transitions smoothly from off to full throttle and back. Also ensure the engine is installed according to the manufacturer's instructions, and it will operate consistently.

Check all the control horns, servo horns, and clevises to make sure they are secure and in good condition. Replace any items that would be considered questionable. Failure of any of these components in flight would mean the loss of your aircraft.

# 2007 Official AMA National Model Aircraft Safety Code

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## 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 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 or deliberately fly my models in a careless, reckless and/or dangerous manner.
- 4) The maximum takeoff weight of a model is 55 pounds, except models flown under Experimental Aircraft rules.
- 5) I will not fly my model unless it is identified with my name and address or AMA number on or in the model. (This does not apply to models while being flown indoors.)
- 6) I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.

## RADIO CONTROL

- 1) I will have completed a successful radio equipment ground range 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 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. (Only properly licensed Amateurs are authorized to operate equipment on Amateur Band frequencies.)
- 5) Flying sites separated by three miles or more are considered safe from site-to-site interference, even when both sites use the same frequencies. Any circumstances under three miles separation require a frequency management arrangement, which may be either an allocation of specific frequencies for each site or testing to determine that freedom from interference exists. Allocation plans or interference test reports shall be signed by the parties involved and provided to AMA Headquarters.

Documents of agreement and reports may exist between (1) two or more AMA Chartered Clubs, (2) AMA clubs and individual AMA members not associated with AMA Clubs, or (3) two or more individual AMA members.

- 6) For Combat, distance between combat engagement line and spectator line will be 500 feet per cubic inch of engine displacement. (Example: .40 engine = 200 feet.); electric motors will be based on equivalent combustion engine size. Additional safety requirements will be per the RC Combat section of the current Competition Regulations.
- 7) At air shows or model flying demonstrations, a single straight line must be established, one side of which is for flying, with the other side for spectators.
- 8) With the exception of events flown under AMA Competition rules, after launch, except for pilots or helpers being used, no powered model may be flown closer than 25 feet to any person.
- 9) Under no circumstances may a pilot or other person touch a powered model in flight.



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