Perfect Appearance Excellent Performance

1700MM P-47 Thunderbolt

OPERATING MANUAL

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www.fmsmodel.com

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WARNING

⚠ **WARNING:** Read the ENTIRE instruction manual to become familiar with the features of the product before operating. Failure to operate the product correctly can result in damage to the product, personal property and cause serious injury.
This is a sophisticated hobby product and NOT a toy. It must be operated with caution and common sense and enquires 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.
This manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or serious injury.

Safety Precautions and Warnings

As the user of this product, you are solely responsible for operating in a manner that does not endanger yourself and others or result in damage to the product or the property of others. This model is controlled by a radio signal subject to interference from many sources outside your control. This interference can cause momentary loss of control so it is advisable to always keep a safe distance in all directions around your model, as this margin will help avoid collisions or injury.
Age Recommendation: Not for children under 14years. This is not a toy.

- Never operate your model with low transmitter batteries.
- 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 in the street or in populated areas for any reason.
- Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) 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.
- Never lick or place any portion of your model in your mouth as it could cause serious injury or even death.

FMS Kindly Reminder

Thank you for your great attention and support to our company.
If there is any problem regarding the plane, or any suggestion on our products, such as manual, package, color scheme, even structure, please feel free to contact us at info@fmsmodel.com

Table Of Contents

The control horns installation

1. Lay the in stored accessories out. Every control surfaces has its own special labeled accessory plastic bag.

2. Take the elevator accessory bag out. It has been labeled elevator.

3. Install the elevator control surface horns on the bottom of the elevator surface with the screws provided in the small plastic bag.
The side of the stabilizer that contains the plastic washer faces up, make sure to install the control horns on the opposite side.

4. Make sure the control surface horns are facing into the right direction before installing for the desired most reflection without any binding.

5. Always make sure that the screws are grabbing into the back plates of the control horns. It is very important that these parts are holding tight.

The control horns installation

6. Verify the completed elevator horns installation.
Note: Do not discard the extra screws, it will be preserved for the future model building.

7. Repeat the step 3.4&5 for the ailerons control horn installation.

8. Repeat the step 3.4&5 for the flaps control horn installation.

Hook on the linkage rod

1. Make sure implement the in stored rubber securing tube on the control rod.

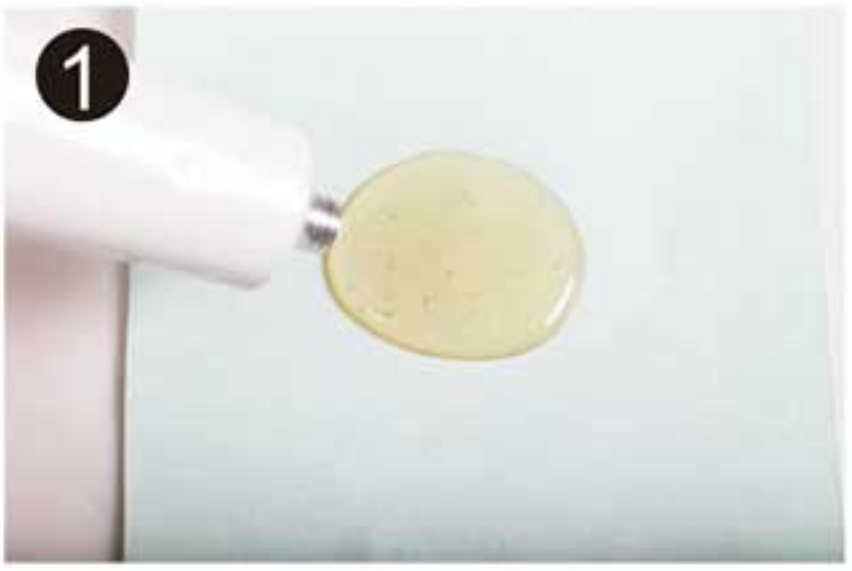
2. Put the Z-bend end of the linkage into the desired servo control horn hole.
It is a tight fit and should allow the linkage to move just slightly within the hole to avoid binding up.

3. Snap the clevis into the surface control horn.

4. Secure the horns with the tube, make sure do not slide the tube to the horn side too much, or it will binding with the horn.
Just make sure it's securing enough.

Install th stabilizer

1. Pre ready appropriate amount of glue for the next step model building.



2. Take the preserved elevator accessory bag and secure the horizontal stabilizer with two machine screws.
Make sure the top side of the stabilizer face up.(Screw: PM3.0*50 3PCS)

3. Fix the dorsal foam fin to the fuselage slot. we recommended only apply glue on the underside of the fin.

Install th stabilizer

4. Make sure align the slot on the horizontal stabilizer with the fuselage tail slot.

5. Install the vertical stabilizer, Apply glue to the place where the vertical stabilizer fitting together with the horizontal stabilizer and fuselage assembly.
Use a brush or spackle to thoroughly cover the notch with a thin layer of glue.
We recommend to apply glue to the fuselage and elevator as well for a better bond.
Let dry off for at least 5 minutes.

Note: Do not apply glue on the rudder side foam hinge and fuselage tail slot.

6. Insert the vertical stabilizer into the assembly slightly.

7. Make sure the rudder side foam hinge has inserted into the slot in the process of stabilizer mounting.
To protect the foam hinge from any damage or twisting we recommended you to clean the fuselage tail slot first for the smoothly hinge inserting.

Install th stabilizer

8. Make sure there is no gap in between the rudder and the stabilizer.

9. Install the rudder control horn the same with the elevator control horn, make sure the horn be installed in proper direction.

10. Apply a thin coat of glue on the elevator underside foam hinge it will great helpful for the hinge durability.
Do not apply excessive glue in this area which might prevent the surface from moving freely.

Glue the bomb rack

1. Make sure to install the oil tank racks on their designated sides.

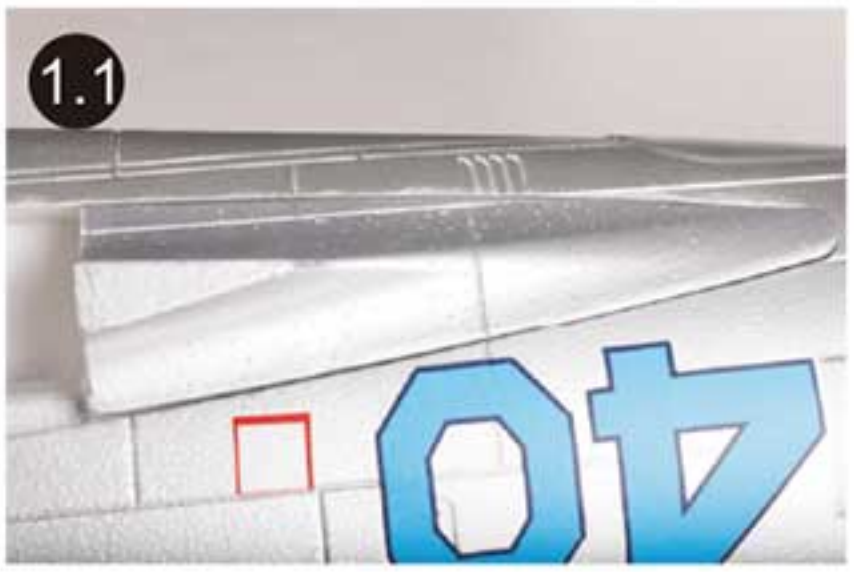
2. Rack mounted the wrong way round. Note that the rear part of the rack are asymmetrical and the rack will not fit into the notch if you try to mount it as shown in the picture.

3. This is how the plate should be mounted.

4. Remove the rack and glue them back into place.

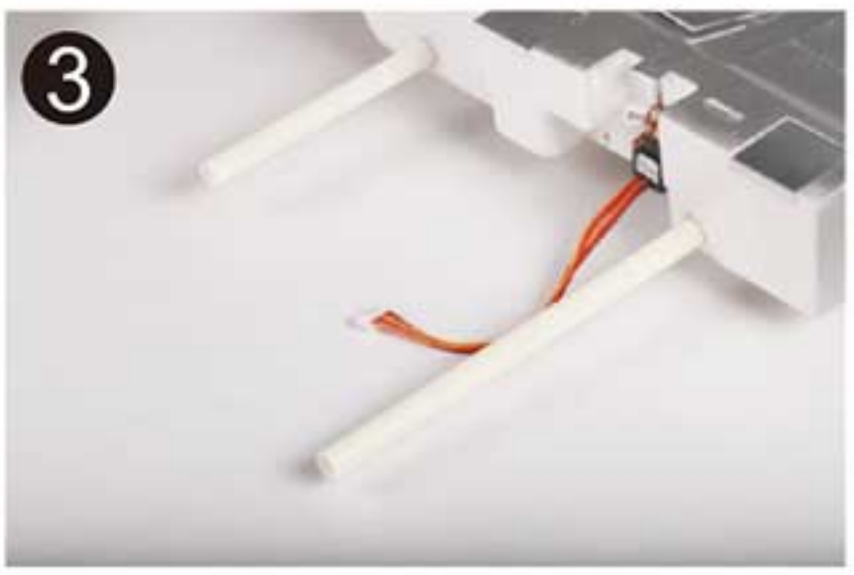
Mount the main wing to the fuselage

1. Fit the wing filler into place first.
There are two fillers in the kit, one for each side.
Make sure to install the fillers on their designated sides.



2. Plug the leads from the main wing to the Multiple Connector Part 1 with the yellow signal at the channel label side.
This step has been factory completed, you may repeat it when you do the main wing maintenance or repair.

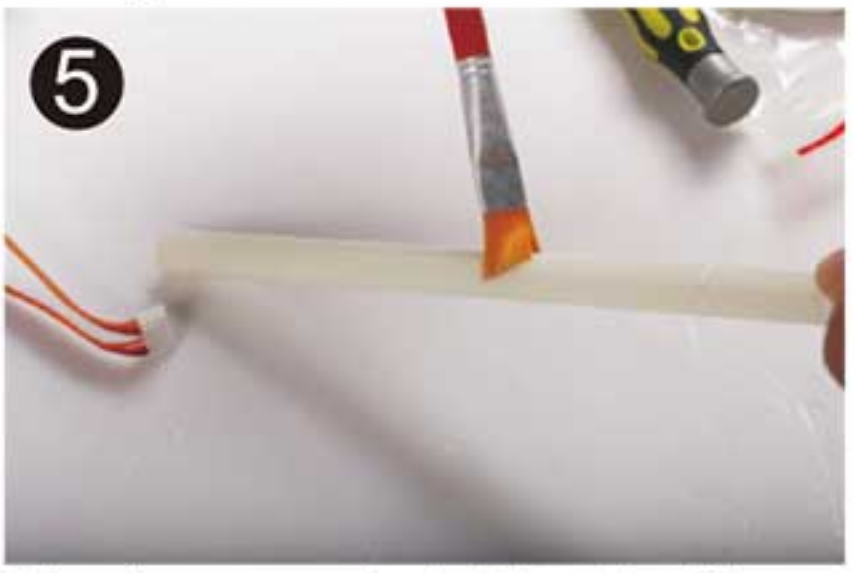
3. There are two glass fiber tubes in different lengths for the main wing connection.
The short one on the leading edge side the long one on the trailing edge side.



Mount the main wing to the fuselage

4. Insert the tubes into the main wing sockets till the white mark implement in factory.
Do not push them farther than they will go with little resistance.
That would push the wing tubes into the foam of the wing and prevent them from fully inserting into the opposite wing half.

5. Remove the wing tube, apply a thin coat of glue to the fiberglass wing tube from the end to the first white mark.
Let dry off for at least 5 minutes.
Then insert it into place, it will help the tubes grab into the socket more firm.

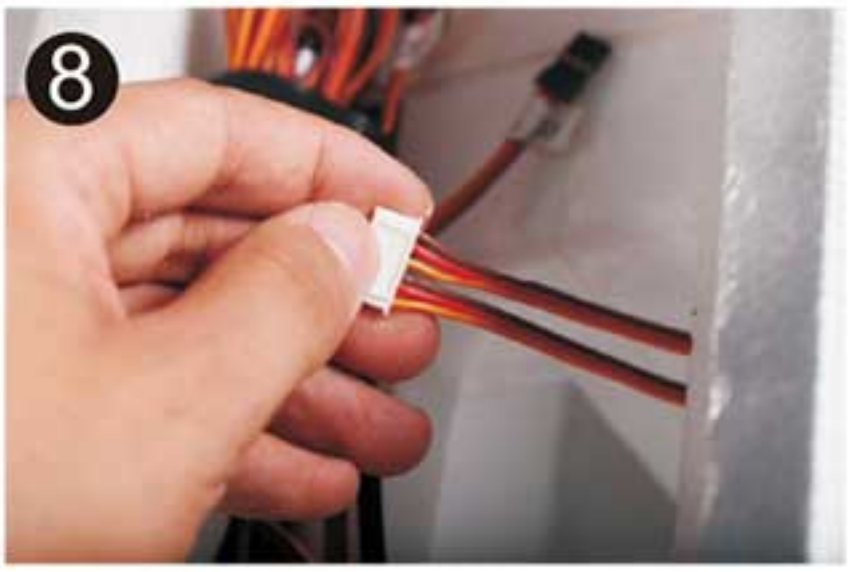


6. Rise the canopy by holding the ribbon on the rear of the canopy.

7. Mount the main wing with the tubes to the fuselage slot.
Make sure the wing tubes straight through the holes in bottom of the wing mount notch.

Mount the main wing to the fuselage

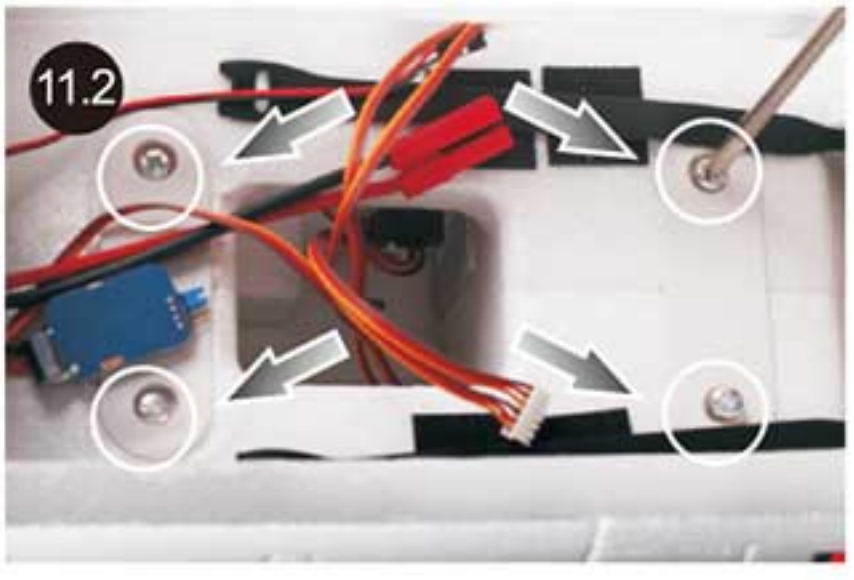
8. Guide the two aileron servo cables through the holes in the bottom of the wing mount notch, and gently pull the aileron servo cables from inside of the canopy simultaneously to avoid any tangling of the servo cables.



9. Mount the other wing panel to the tubes, make sure put the tubes into the sockets first, then push the wing into place slightly.

10. Two wing panels will perfectly fit into the notch with no gap reveal between the main wing root and the fuselage.

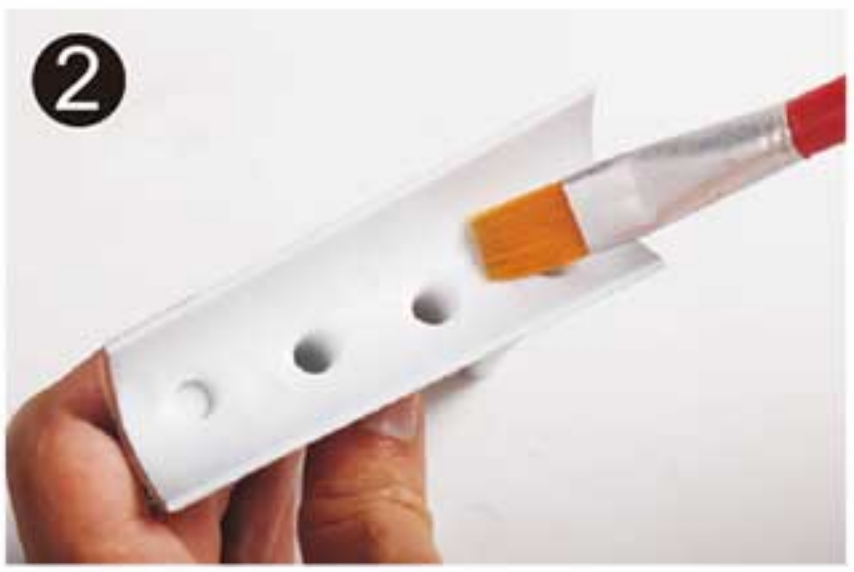
11. Secure the main wing from the canopy hatch using the four provided screws. Two extra pieces of the are spares. (Screw: 6.0*80 4PCS)



Install the small part

1. Fit the gun set into place the first, it will fitted perfectly into place or you have to fit another one with the yellow band aligning.

2. Remove the gun set and glue it back into place.



3. Glue the air speed indicator onto the port side pre-notched slot.

4. Glue the air speed indicator into the pre-notched slot in the dorsal fin.

The propeller blade assembly

1. Take the propeller back plate out, the one with a hex hole in center. Place the in stored nuts into the peripheral pre-notched nuts hole on back of the plate.

2. Then fit the blade in place with the letter side face up, use the shorter screw in stored with the spinner to secure the blade in the blade tip side screw hole.

3. Make sure holding the nut into place when we tighten the screw.
It will help a lot when you doing the screw installation and save you extra time.
(Screws: PM3*20 4PCS)

4. After the installation of the blade make sure there is no gap between the back propeller holder plate and the propeller root, if not, you will have to check to make sure there is nothing come to obstruct the fully installation of the blade, and then tighten the screw properly again.
Do the rest 3 pieces blade the same.

5. Place the front propeller holder plate into place as show.

The propeller blade assembly

6. Then implement the nuts into the inside track of the back plate.
Tighten the screws on the front plate.

7. After the four screws' tightening complete, make sure there is no gap between this two propeller holder plate.
(Screw: PM3*25 4PCS)

8. Verify the status of the propeller installation completed.

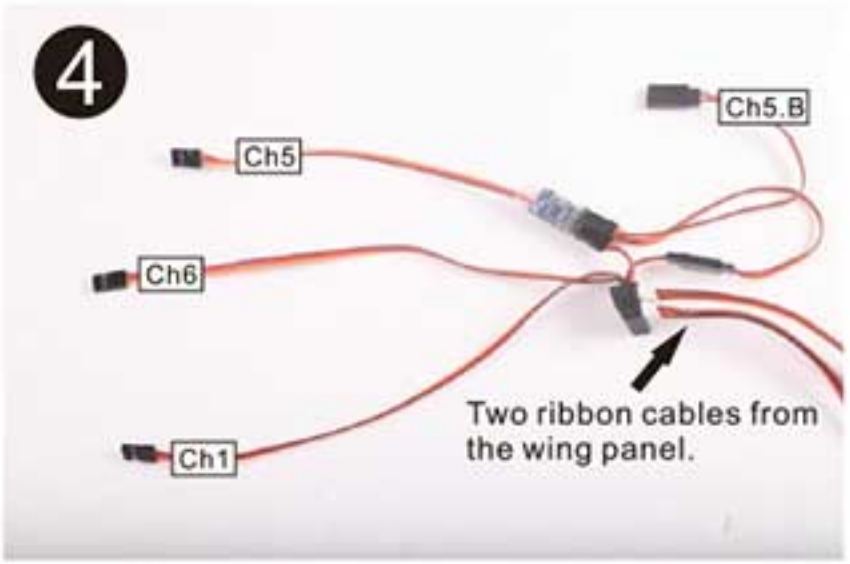
The wire connection

1. Multiple Connector Part 1

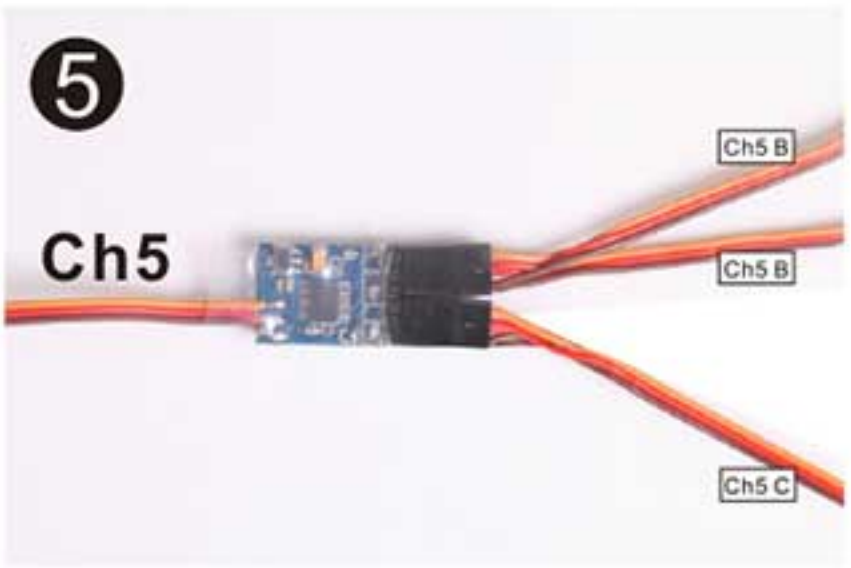
2. Multiple Connector Part 2

3. Plug the Part 1 to the part 2 properly as the picture show.

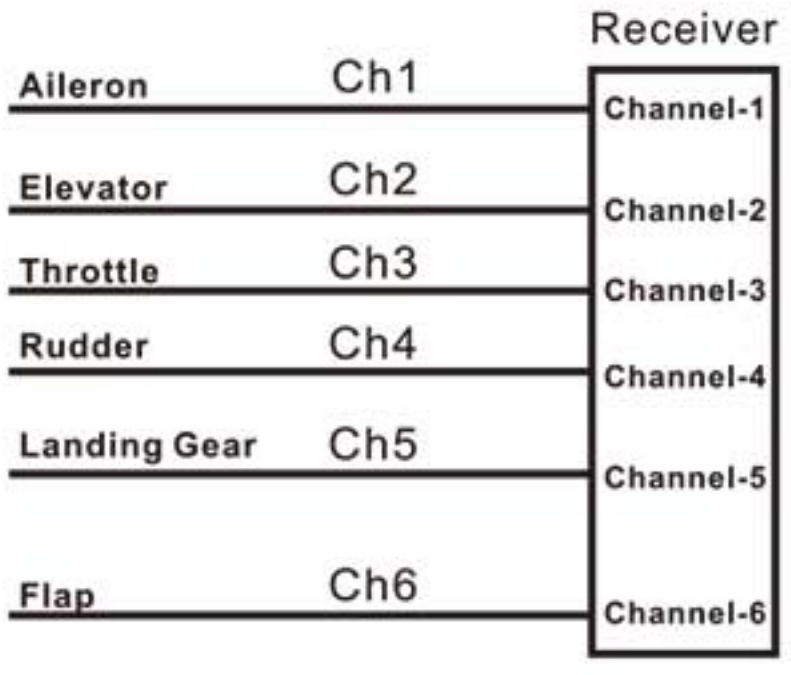
4. CH5.B for the rear landing gear retract.



5. Diagram for the sequencer connection.

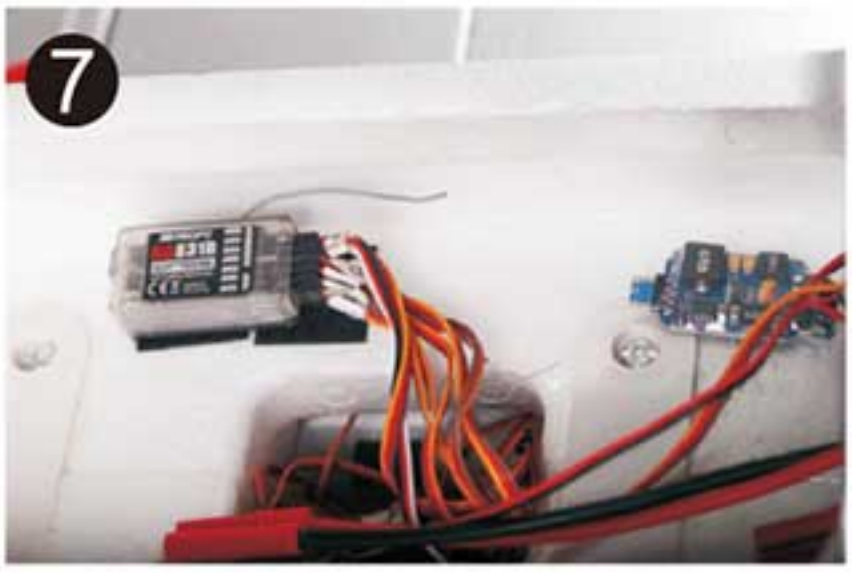


6. Diagram for the receiver connection. The recommended voltage input for the receiver is 4.8V-6V.



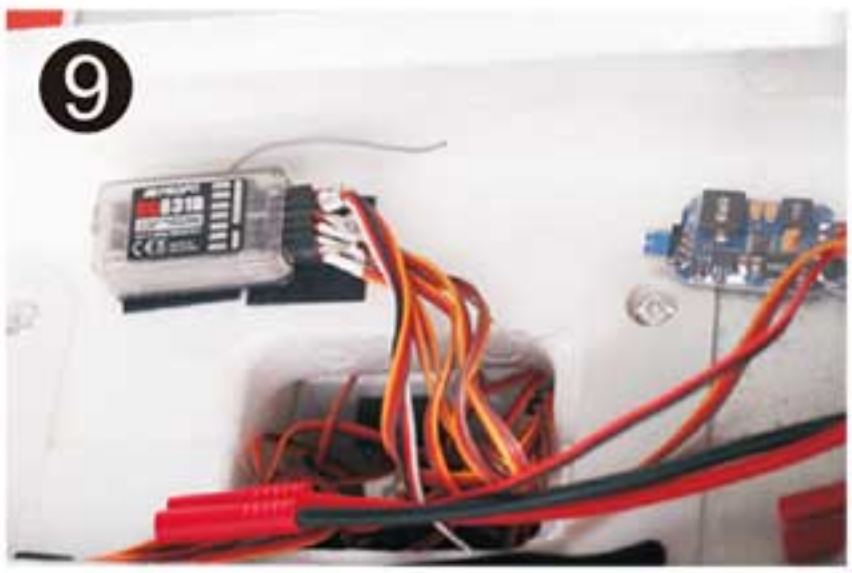
The wire connection

7. Attach the receiver to the cockpit hatch using the hook and loop straps. The minimum distance between the UBEC and receiver is 50mm/ 2in.



8. Try to fix the leads from the rear parts of the fuselage to avoid tangling with the servo arms.

9. Tuck the extra wire mess into the pit in the hatch for a neatly looking of the canopy hatch.



10. Battery hatch in front of the canopy hatch.
Note: Do not arm the ESC if the instruction manual do not required you perform it.

Control surface testing and setting

1. Bind your receiver with your transmitter the first, please refer to your**Transmitter Manual** and read it throughly for the safety operation.
Do not install the propeller assembly to the motor shaft while testing the control surface to make sure the motor does not start unexpectedly and cause personal injury..

Make sure all the control sticks in neutral positions (flight control, rudder, elevators and ailerons) or to low positions(throttle, throttle trim) .
Fully charge the battery before arming the ESC.

All of the servo have been factory set in neutral position .
Thread the clevis on the linkages rod of the ailerons to make the control surface align with the trailing edge of the win tip.
Note: Please secure the clevis again, when the adjusting process completed.

2. Adjust the flaps' flight position, make sure the up position align with the trailing edge of the wing filler.

3. Adjust the rear landing gear direction by trim the rudder channel.
Make sure the wheel align with the fuselage centerline.

Control surface testing and setting

4. Adjust the rudder neutral position by back and forth the linkage rod in the control connector, make sure to lock the control rod by tighten the hex head screw
Note: There will be no rudder trim used in this step.
It will keep the uniform of direction of the tail wheel and rudder.

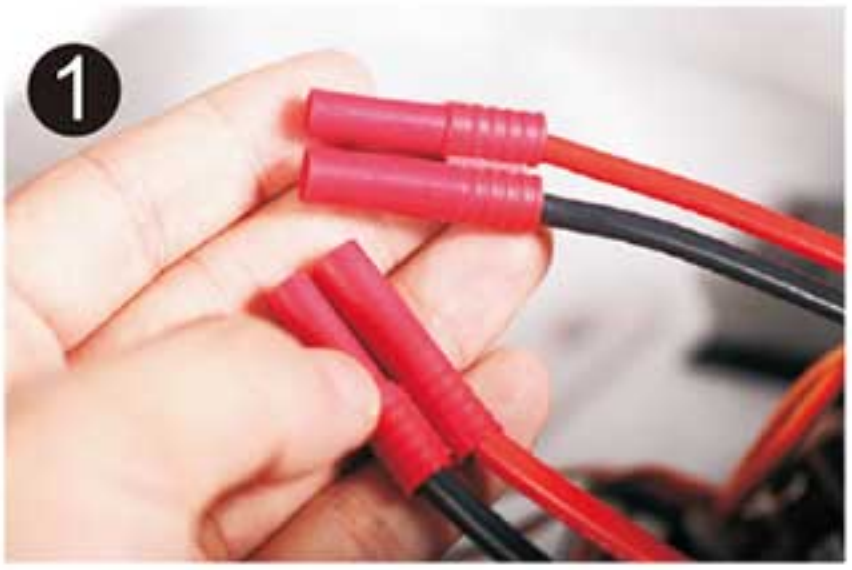
5. Adjust the elevator by back and forth the linkage rods of the elevator in canopy hatch.
Note : The two pieces split elevators must be keep in the same altitude.

6. Cycle the landing gear several times, make sure the landing gear perform well in every cycle and the three point gears move the same directions.

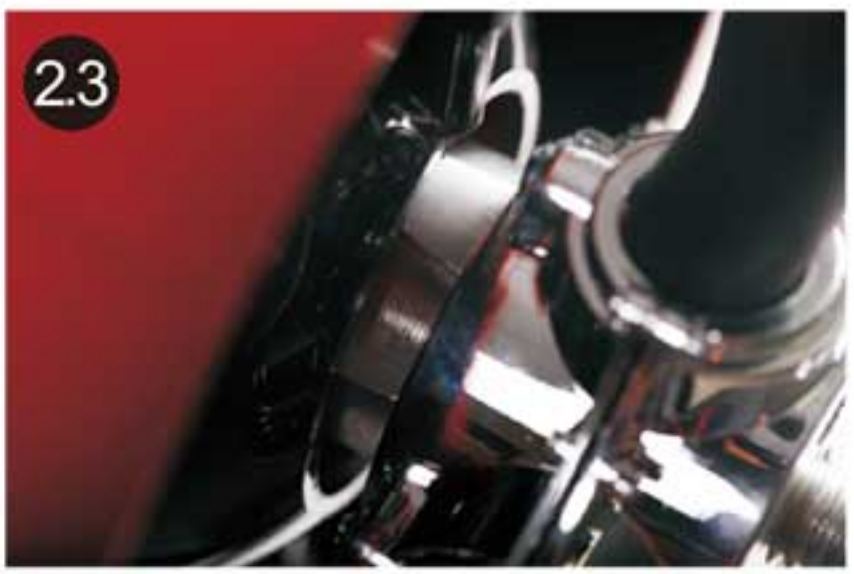
7. Test the motor make sure it is responsive to the throttle input and rotate the clock wise from the tail view, or you have to reset the throttle.

Install the propeller

1. Disarm the ESC first, then turn off the transmitter.



2. Keyed the propeller assembly to the motor shaft, make sure fit the assembly into the hex stage on the shaft, it will help to hold the assembly in fixed position when the engine contact.



Install the propeller

3. Take the washer and thread it to the motor shaft, it will help to prevent the propeller holder from the nut scrape.

4. Secure the propeller by tighten the nut use the wrench, do not over tighten, but make sure it's tight enough.

5. Install the spinner and tighten by hand firmly.

6. Hang on the bombs, two bombs are the same, you can take any one of them to hang on a rack.

Test the propeller: Drag the tail of the plane while test the propeller, make sure there are no people or any other creature in the propeller touchable range.

FMS User Manual of 6A UBEC

Specification Of 6A UBEC:

1. Switch Mode
2. Output:5.0V/6A , 5.5V/6A or 6.0V/6A switchable(Changeable with a Silver jumper)
3. Input:6V-25V (2-6S Lipo, 5-18S NiMH/NiCd)
4. Output Current:Continuous Current 6A, Burst Current 10A
5. Size:45.0mm*23.0mm*10.0mm(Length*Width*Height)
6. Weight:18.0g

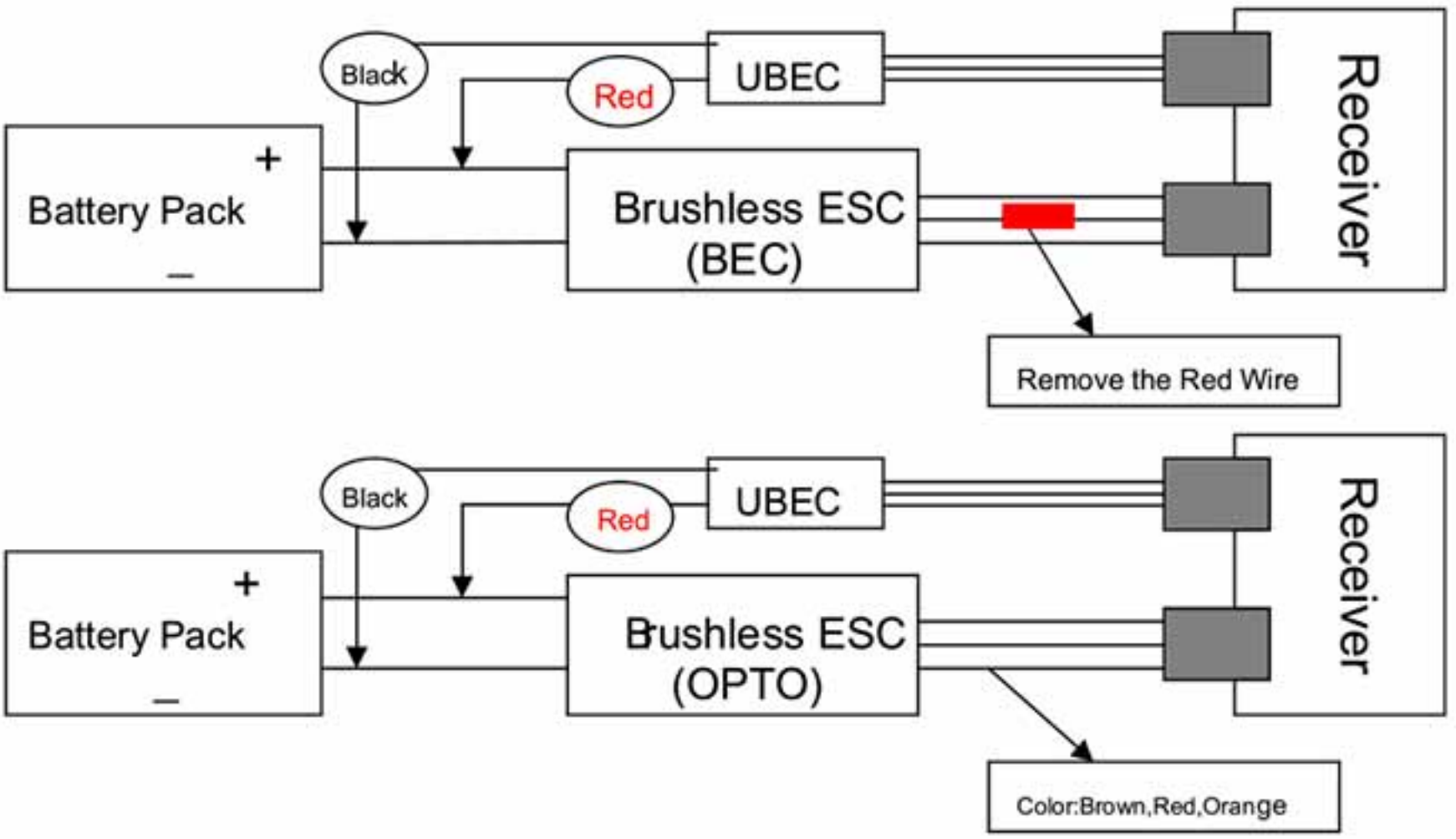
Note: We recommend use the jumper cap to connect the two middle pins in four for your safty flying.

Features:

1. Adopting the USA CPU and decreasing the electromagnetic interference, to be sure that receiver works well.
2. The working status of UBEC is shown by an indicator (LED). When UBEC works, the Silver LED lights.
3. Battery polarity reversal protection (If the connection is wrong, the UBEC can not work.)

How to Use the UBEC, please carefully look at the connections as follows :

1. Connecting UBEC with ESC OPTO, you just parallelly connect the input connector of UBEC with the battery pack, and plug the output connector of the UBEC into one of spare channels of the receiver.
2. Using ESC SBEC, you must remove the red wire of the signal wires of ESC SBEC to receiver before connecting with the UBEC. (the connection with ESC SBEC is same as connection with the ESC OPTO)



Note: Because of the weather and ground, please connect the UBEC at least in a distance 5cm far away from the receiver to avoid the electromagnetic interference.

Main specification

Specification

Wingspan	:	1700mm /66.9in
Length	:	1520mm /59.8 in
Weight	:	4300g /151.6 oz
CG Position	:	90mm
Battery	:	22.2V 3300mAh-4000mAh Li-Po Battery
ESC	:	85A
Motor	:	5060-KV300
Wing Area	:	53.1dm^2
Wing Load	:	80.9g/dm^2
RC System	:	6 Channel, 9 Servos And 1 Brushless ESC

Center Of Gravity(C.G.)

Center of Gravity

When balance your model, adjust the motor battery as necessary so the model is level or slightly nose down.

This the correct balance point for your model.

After the first flights, The **CG** position can be adjusted for your personal preference.

1. The recommended Center of Gravity(**CG**) location for your model is (**90mm/3.5in**) back from the leading edge of the top main wing as shown with the battery pack installed. Mark the location of the **CG** on top of the wing.
2. When balancing your model, support the plane inverted at the marks made on the top of the main wing with your fingers or a commercially available balancing stand. This is the correct balance point for your model, Make sure the model is assembled and ready for flight before balancing.
   Note: Always balance the plane with the retracts down.

Control throw setting

1. Turn on the transmitter and receiver of your model.
   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 elevator with the radio system.
   Moving the elevator stick toward the bottom of the transmitter makes the airplane elevator move up.
3. Check the movement of the ailerons with the radio system, moving the aileron stick right makes the right aileron move up and left aileron move down.
4. Use a ruler to adjust the throw of the elevator, aileron and rudder.
   Adjust the position of the pushrod at the control horn and the transmitter to achieve the following measurements when moving the sticks to the end point.
   Note: Always disassemble the propeller set when binding the transmitter and testing the control surface.

Main specification and spare parts

The suggested throws for the FMS P47 are as follows:

	High rate	Low rate
Elevator -	40mm/1.6in up an down	24mm/0.9in up and down
Rudder -	25mm/0.98in left and right	21mm/0.8in left and right
Ailerons -	28mm/1.1in up and down	17mm/0.7in up and down
Flap -	Mid 22mm/0.9in Full 45mm/1.8in	

Spare part list for silver scheme

Item#	Description
SH101 SIL	Fuselage
SH102 SIL	Main wing set (2 PCS)
SH103 SIL	Vertical Stabilizer
SH104 SIL	Horizontal Stabilizer
SH105 SIL	Cowl
SH106 SIL	Spinner (2 Hub halves and a spinner)
SH107 SIL	Canopy (One PC plastic canopy)
SH108 SIL	Canopy (One PC foam canopy without the scale plastic control desk)
SH109 SIL	Bomb (2 PCS)
SH206	E-Retract (For Rear Landing Gear)
SH207 SIL	Main landing gear set (with chock absorption function)
SH208 SIL	E-Retract system (For main landing gear, With two retracts and main landing gear installed)
SH209 SIL	E-Retract system (For rear landing gear, With one retract and rear landing gear installed)
SH301	Propeller (4 PCS blades)
SH302	Linkage rod (All of the control surface linkages with clevis and securing tube pre installed)
SH303	Motor mount
SH304 SIL	Stickers (A set of stickers)
SH305 SIL	Main landing gear door (SET)
SH306 SIL	Rear landing gear door (Rear landing gear box with two pcs door halves)
SH307	Screws set
SH308	Motor board
SH309	Motor shaft
SH310	Plastic scale cockpit (the plastic control desk set of the canopy)
SH311	Multiple connector part 1 (From the wing panels)
SH312	Multiple connector part 2 (For plugging to receiver)
SH314	Pipe
SH315	LED
SH316	Lamp Cover
Sequencer-6 sec	(Sequencer)
Motor-5060 Kv3009	(Brushless motor)
ESC 85A 8A SBEC	(85A ESC with 8A SBEC)
FMSSER9GP	9g Servo (Positive)
FMSSER25MG	25g Metal servo
Retract 002	E-retract (For Main Landing Gear)

Spare part list for green scheme

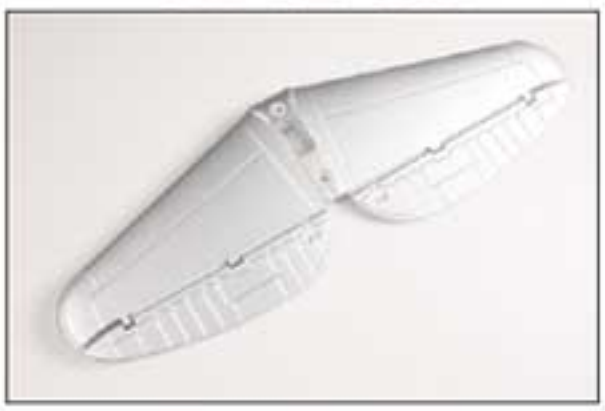
SH101-Green Fuselage
SH102-Green Main wing set (2 PCS)
SH103-Green Rudder
SH104-Green Elevator
SH106-Green Spinner (2 Hub halves and a spinner)
SH107-Green Canopy (One PC plastic canopy)
SH108-Green Canopy (One PC foam canopy without the scale plastic control desk)
SH109-Green Bomb (2 PCS)
SH207-Green Main landing gear set (A pair with chock absorption function
SH208-Green E-Retract system (For main landing gear, with two retracts and main landing gear installed)
SH209-Green E-Retract system (For rear landing gear, with one retract and rear landing gear installed)
SH304-Green Stickers (A piece of intact sticker sheet)
SH305-Green Main landing gear door (A pair of main landing gear inner fairing door with the installation base)
SH306-Green Rear landing gear door (Rear landing gear box with two pcs door halves)

Note: 1. All spare parts without decals.
2. The Item# without color marking could be applied universally for both color scheme.

SH 101 SIL

SH 102 SIL

SH 103 SIL



SH 104 SIL

SH 105 SIL

SH 106 SIL

Spare Parts List for Silver Scheme

SH 107 SIL

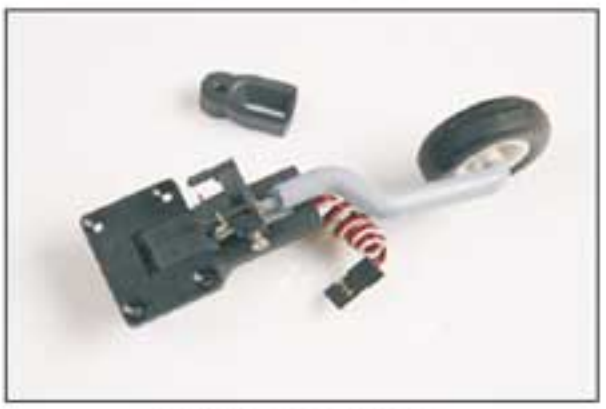
SH 108 SIL

SH 109 SIL

SH 206

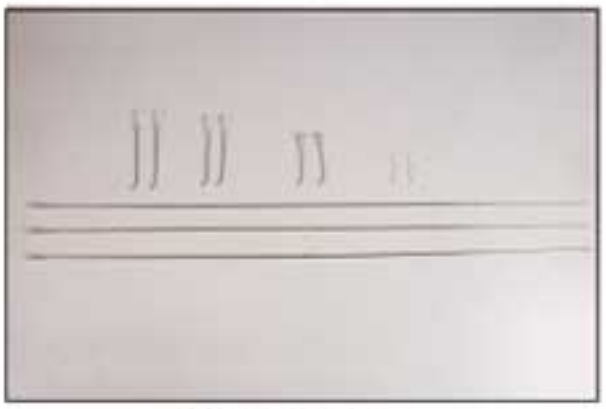
SH 207 SIL

SH 208 SIL



SH 209SIL

SH 301



SH 302

SH 303

SH 304 SIL

SH 305 SIL

SH 306 SIL

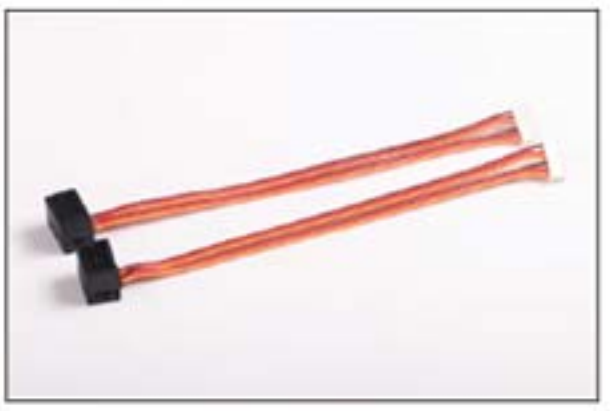
SH 307

SH 308

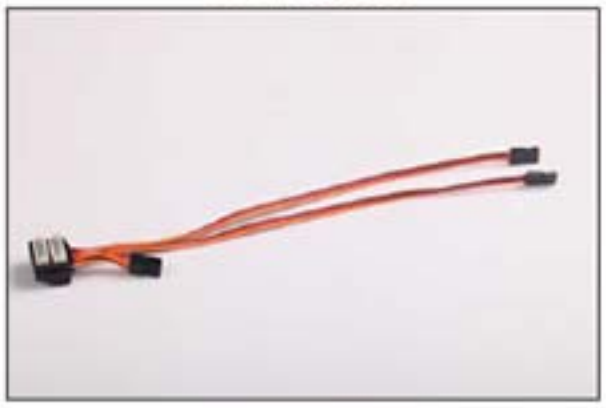
Spare Parts List for SHIver Scheme

SH 309

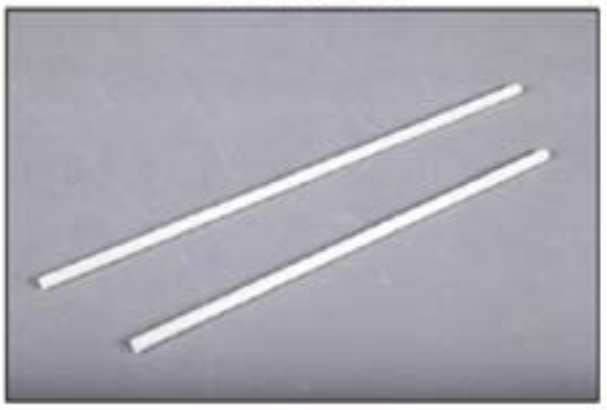
SH 310



SH 311



SH 312

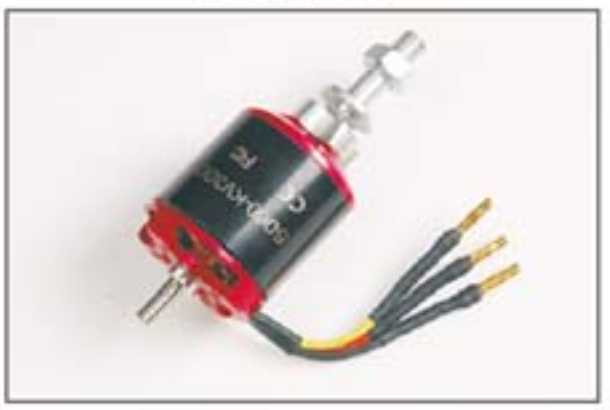


SH 314

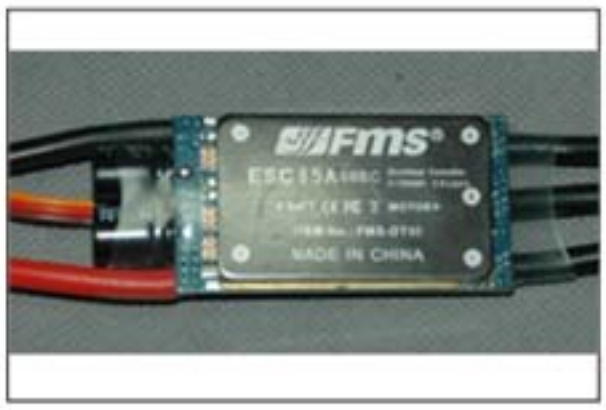
SH 315

SH 316

Sequencer-6 sec



Motor-5060 Kv3009



ESC 85A 8A SBEC

FMSSER9GP

FMSSER25MG

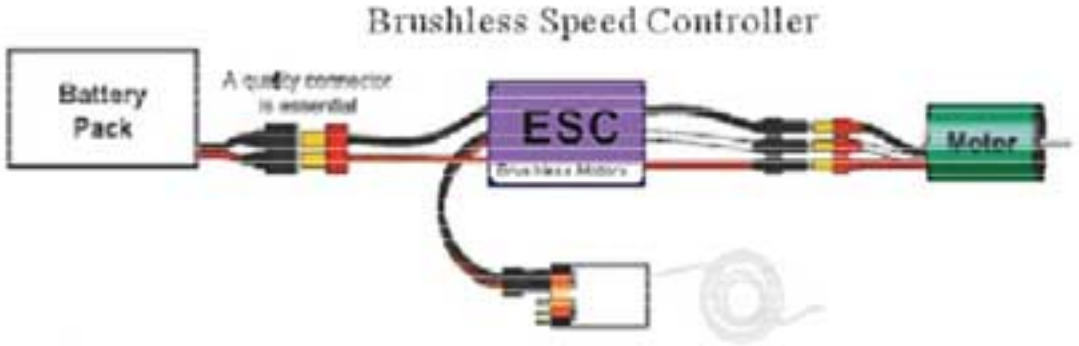
Retract 002

ESC instruction

Wires Connection:

The electronic speed controller can be connected to the motor by soldering directly or with high quality connectors. Always use new connectors, which should be soldered carefully to the cables and insulated with heat shrink tube. The maximum length of the battery pack wires shall be within 6 inches.

- Solder controller to the motor wires.
- Solder appropriate connectors to the battery wires.
- Insulate all solder connectors with heat shrink tubes.
- Plug the "JR" connector into the receiver throttle channel.
- Speed Controller Red and Black wires connects to battery pack Red and Black wires respectively.



Specification:

Model #	Cont. Current(A)	Burst Current (A) 10s.	Battery cell NiXX/Lipo	Weight (g)	BEC Output	Size (mm) W*L*H	User Program
6A	6A	8A	5-10 NC \ 2-3 Lipo	5	5volts / 2amps	13 x 21 x 4	yes
12A	12A	16A	5-12 NC \ 2-4 Lipo	8	5volts / 1amps	21 x 22 x 4	yes
20A	20A	30A	5-12 NC \ 2-4 Lipo	18	5volts / 3amps	13 x 21 x 4	yes
30A	30A	40A	5-12 NC \ 2-4 Lipo	30	5volts / 3amps	23 x 43 x 6	yes
35A	35A	45A	5-12NC \ 2-4 Lipo	47	5volts / 4amps	28 x 38 x 8	yes
40A	40A	50A	5-12 NC \ 2-4 Lipo	44	5volts / 3amps	28 x 38 x 8	yes
45A	45A	55A	5-12 NC \ 2-4 Lipo	42	5volts / 3amps	31 x 58 x11	yes
50A	50A	70A	5-18NC \ 2-6 Lipo	45	5.5volts / 5amps	31 x 58 x 11	yes
60A	60A	70A	5-12NC \ 2-4Lipo	50	5.5volts / 3amps	36 x 50 x 8	yes
65A	65A	85A	5-18NC \ 2-6Lipo	58	5.5volts / 5amps	30 x 56 x 11	yes
70A	70A	75A	5-12NC \ 2-6 Lipo	56	5.5volts / 5amps	34 x 52 x 14	yes
85A	85A	100A	5-18NC \ 2-6Lipo	63	5.5volts / 5amps	34 x 52 x 14	yes

Features:

- Extremely low internal resistance
- Super smooth and accurate throttle linearity
- Safety thermal over-load protection
- Auto throttle shut down in signal loss situation
- Supports high RPM motors
- Power arming protection (prevents the motor from accidentally running when switched ON)
- New advanced programming software

Our ESC allows you to program parameters to fit your specific needs:

Our ESC allows you to program parameters to fit your specific needs:

1. User programmable brake setting (we recommend using brake for only folding props applications)
2. User programmable battery type (LiPo or NiCd/NiMh)
3. User programmable low voltage cutoff setting
4. User programmable factory default setting restore
5. User programmable timing settings (to enhance ESC efficiency and smoothness)
6. User programmable soft acceleration start ups (for delicate gearbox and helicopter applications)
7. User programmable governor mode (for helicopter applications)
8. User programmable motor rotation (clockwise\counterclockwise)
9. User programmable switching frequency
10. User programmable low voltage cutoff type (power reduction or immediate shutdown)

Settings:

1. Brake: ON/OFF

* ON-Sets the propeller to the brake position when the throttle stick is at the minimum position (Recommended for folding props).
* OFF-Sets the propeller to freewheel when he throttle stick is atthe minimum position.

2. Battery type: LiPo or NiCad/NiMh

* NiCad/NiMh – Sets Low Voltage protec tion threshold for NiCad/NiMh cells.
* LiPo – Sets Low voltage protection threshold for LiPo ce lls and automatically detects the number of cells within the pack.

Note: Selecting the NiCad/NiMh option for the battery type, triggers the ESC to automatically set the cutoff threshold to the factory default of 65%. The cutoff threshold can then be subsequently altered through the Low Voltage protection function, if required. The ESC will read the initial voltage of the NiCad/NiMh pack once it is plugged in and the voltage read will then be used as a reference for the cutoff voltage threshold.

3. Low Voltage Protection Threshold (Cutoff Threshold):

Low / Medium / High

1) For Li-xx packs- number of cells are automatically calculated and requires no user input apart from defining the battery type. This ESC provides 3 setting options for the low voltage protection threshold; Low (2.8V)/ Medium (3.0V)/ High (3.2V). For example: the voltage cutoff optionsfor an 11.1V/ 3 cell Li-Po pack would be 8.4V (Low)/ 9.0V (Med)/ 9.6V (High)

2) For Ni-xx packs-low / medium / high cutoff voltages are50%/65%/65% of the initial voltage of the battery pack. For example: A fully charged 6 cell NiMh pack' s voltage is 1.44Vx 6=8.64V,when "LOW" cutoff voltage is set, the cutoff voltage is: 8.64V x 50%=4.3V and when "Medium" or "High" is set, the cutoff voltage is now 8.64V X 65%=5.61V.

4. Restore factory setup defaults:

Restore - Sets the ESC back to factory default settings;

Brake :	Off
Battery type Detect :	LiPo with Automatic Cell
Low voltage cutoff threshold :	Medium (3.0V/65%)
Timing setup :	Automatic
Soft Acceleration Start Up :	Medium
Governor mode :	OFF
Frequency :	16kHz
Low voltage cutoff type :	Reduce power

5. Timing setup: Automatic / Low / High.

* Automatic – ESC automaticallydetermines the optimum motor timing
* Low (7-22 deg) – Setting for most 2 pole motors.
* High (22-30 deg)-setting for motors with 6 or more poles.

In most cases, automatic timing works well for all typesof motors. However for high efficiency we recommend the Low timing setting for 2 pole motors (general in-runners)and high timing for 6 poles and above (general outrunners). For higher speed, High timing can be set. Some motors require different timing setupstherefore we suggest you follow the manufacturer recommended setup or use the automatic timing setti ng if you are unsure.

Note: Run your motor on the ground first after making any changes to your motor timing!

6. Soft Acceleration Start ups: Very Soft / Soft Acceleration/ Start Acceleration

* Very Soft – Provides initial slow1.5 sec ramp-up from start to full rp m intended to protect delicate gears from stripping under instant load. This setting is recommended for either fixed wing models equipped with gearboxes and / or helicopters.
* Soft Acceleration- Provides initial slow 1 sec ramp-up from start to full rpm. This setting is recommended for either fixed wing models equipped with gearboxes and or helicopters.
* Start Acceleration – Provides quick a cceleration start ups with a linear throttle response. This is recommended for fixed wing models fitted with direct drive setups.

7. Active RPM Control (Heli Governor Mode)

* RPM control off

* First range:There will be a 5-second delay from start to full rpm, but if the throttle is cutoffafter starting,then the next startwill be as normal start.

* Second range:There will be a 15-second delay from start to full rpm, but if the throttle is cutoffafter starting,then the next startwill be as normal start.

Note: Once the Governor Mode is enabled, the ESC' s Brakeand Low Voltage Cutoff Type settings will automatically be reset to No Brake and Reduce Power respectively regardless of what settings they were previously set.

8. Motor Rotation: Reverse

In most cases motor rotation is usually reversed byswapping two motor wiresHowever, in cases where the motor cables have been directly soldered tothe ESC cables, motor rotation can be reversed by changing the value of setting on the ESC.

9. Switching Frequency: 8 kHz/16kHz

* 8 kHz – Sets ESC switching frequency for 2 pole motors, e.g. in-runners.
* 16 kHz – Sets ESC switching frequency for motors with more than 2 poles, e.g. out-runners.

Although 16 kHz is more efficient withour Thrust motors, the setup
default is 8 kHz due to the higher RF noises caused at 16 kHz.

10. Low Voltage Cutoff Type: Reduce Power / Hard cutoff

* Reduce Power – ESC reduces motor power when the pre-set (recommended).
* Hard Cutoff – ESC instantly cuts motor power when the pre-set Low Voltage Protection Threshold value is reached.

Programming Mode Audible Tones

Programming Mode Audible Tones	ESC Functions
0 Throttle Calibration (within the first 4 Sec) ● ● ● ●	

1 Brake	
_ * _ * _ * _ *	Brake On /Off
2 Battery type	
~ ~ ~ ~	NiCad
~~ ~~ ~~ ~~	LiPo
3 Low Voltage Cutoff Threshold	
* * * * * * * * _ _ _ _ _ _ _ _	Low2.8V/50%
* * * * * * * * _ _ _ _ _ _ _ _	Medium3.0V/60%
* * * * * * * * _ _ _ _ _ _ _ _	High3.2V/65%
4 Restore Factory Setup Defaults	
— — — —	Restore
5 Timing Setup	
– – – –	Automatic (7-30°)
– – – – – – – –	Low (7-22°)
– – – – – – – –	High (22-30°)
6 Soft Acceleration Start Ups	
V V V V V V V V	Very Soft
V V V V	Soft Acceleration
V V V V V V V V	Start Acceleration
7 Governor Mode	
* * * * _ _ _ _	Rpm off
** ** ** ** _ _ _ _	Heli first range
*** *** *** *** _ _ _ _	Heli second range
8 Motor Rotation	
W W W W	Positive/Reverse
9 Switching Frequency	
// // // //	8kHz
\\ \\ \\ \\	16kHz
10 Low Voltage Cutoff Type	
☒ ☒ ☒ ☒	Reduce Power
☒ _ ☒ _ ☒ _ ☒ _	Hard Cut Off

Using Your New ESC

Improper polarity or short circuit willdamage the ESC therefore it is your responsibility to double check all plugs for proper polarity and firm fit BEFORE connecting the battery pack.

Alert Tones

The ESC is equipped with audible alert tones toindicate abnormal conditions at power up.

If the ESC can't enter into working mode after powering up, itndicates that you have not setup throttle calibration.

1. Continuous beeping tone (****) – Indicates that th rottle stick is not in the minimum position.
2. Single beeping tone followed by a one second pause (* * * *) – Indicates that the battery pack voltage is not within the acceptable range. (The ESC automatically checks and verifies the battery voltage once the battery is connected).
3. A single beeping tone followed by a short pause (* * * *) – Indicates thatlte ESC is unable to detect the normal throttle signal from the receiver.

Built-in Intelligent ESC Safety Functions

1. Over-heat protection: When the tem perature of ESC exceeds110 deg C, the ESC will reduce the output power to allow it too cool.
2. Lost Throttle signal protection: The ESC will automatically reduces output power to the motor when it detects a lost

of throttle signal for 2 second, a subsequent loss of throttle signal beyond 2 seconds, will cause the ESC automatically to cut power to the motor.

Powering up the ESC for the first time and setting the Automatic Throttle Calibration

The ZTW ESC features Automatic Throttle Calibration to attain the smoothest throttle response and resolution throughout the entire throttle range of your transmitter. This step is done once to allow the ESC to "learn and memorize" your Transmitter's throttle output signals and only repeated if you change your transmitter.

1. Switch your Transmitter ON and set the throttle stick to its maximum position.

2. Connect the battery pack to the ESC. Wait for about 2 seconds, the motor will beep for twice, then put the throttle in the minimum position, the motor will also beep, which indicates that your ESC has got the signal range of the throttle from your transmitter.

The throttle is now calibrated and your ESC is ready for operation.

Normal ESC start up procedure:

1. Switch your Transmitter ON and set the throttle to its minimum position.
2. Connect the battery pack to the ESC.
3. When the ESC is first powered up, it emits two sets of audible tones insuccession indicating the status of its programming state.
   * The first set of tones denotes the number of cells in the LiPo pack connected to the ESC. (Three beeps (***) indicates a 3 cell LiPo pack while 4 beeps (****) indicates a 4 cell LiPo pack).
   * The second set denoting Brake status. One beep (*) for Brake "ON" and two beeps (**) for Brake "OFF".
   * The ESC is now ready for use.

Entering the Programming Mode:

1. Switch your Transmitter ON and set the throttle to its maximum position.
2. Connect the battery pack to the ESC.
3. Wait until you hear two short beeps (_ _**) confirming that the ESC has now entered the programming mode.
4. If within 5 seconds, the throttle stick is lowered to its minimum position, an audible tone is emitted confirming that the throttle calibration setting has changed. If the throttle stick is left in the maximum position beyond 5 seconds, the ESC will begin the sequence from one function and its associated setting options to another. (Please refer to the table below to cross reference the functions with the audible tones).
5. When the desired tone for the function and setting option is reached, move the throttle stick down to its minimum position. ESC will emit two beeps (**)confirming the new setting has been stored.
6. The ESC only allows the setting of one function at a time.
   Therefore should you require making changes to other function, disconnect the battery pack and wait 5 seconds to reconnect the battery and repeat the above steps.

General Safety Precautions

Do not install the propeller (fixed wing) or drive pinion (helicopter) on the motor when you test the ESC and motor for the first time to verify the correct settings on your radio. Only install your propeller or pinion after you have confirmed that the settings on your radio is correct.

- Never use ruptured or punctured battery cells.
- Never use battery packs that are known to overheat.
- Never short circuit battery or motor terminals.
- Always use proper insulation material for cable insulation.
- Always use proper cable connectors.
- Do not exceed the number of cells or servos specified by the ESC.

Wrong battery polarity will damage the ESC and void the warranty.

- Install the ESC in a suitable location with adequate ventilationfor cooling. This ESC has a built-in over heat cutoff protection feature that will immediately cut power to the motor once the ESC temperature exceeds the 230 Deg F/ 110 Deg C high temperature limit.
- Use only batteries that are supported by the ESC and ensure the correct polarity before connecting.
- Switch your Transmitter ON and ensure the throttle stick is in the minimum position before connecting the battery

pack.

- Never switch your transmitter**OFF** while the battery is connected to your ESC.
- Only connect your battery pack just before flying anddo not leave your battery pack connected after flying.
- Handle your model with extreme care once the battery pack is connected and keep away from the propeller at all times. Never stand in-line or directly in front of any rotating parts.
- Do not immerse the ESC underwater while powered up.
- Do fly at a designated flying site and abide by the rules and guidelines set by your flying club.

Troubleshooting:

Issue	Possible Reason	Action
Motor doesn´ t work, but there are audible tones of automatically detection of the number of cells after powering up ESC.	The ESC throttle calibration has not set up.	Set up the ESC throttle calibration.
Motor doesn´ t work and no audible tone emitted after connecting the battery. Servos are not working either.	Poor/loose Connection between battery Pack and ESC.	Clean connector terminals or replace connector.
	No power	Replace with a freshly charged battery pack
	Poor soldered connections (dry joints)	Re-solder the cable connections
	Wrong battery cable polarity	Check and verify cable polarity
	ESC throttle cable connected to receiver in the reverse polarity	Check the ESC cable connected to the ESC to ensure the connectors are in the correct polarity.
	Faulty ESC	Replace ESC
Motor doesn´ t work and no audible tone emitted after connecting the battery BUT servos are working.	Poor / loose connection between ESC and motor	Clean connector terminals or replace connectors
	Burnt motor coils	Replace motor
Motor doesn´ t work after powering up the ESC. An alert tone with two beeping bones followed by a short pause (** ** ** **) is emitted.	Poor soldered connections(dry joints) The battery pack voltage is not within the acceptable range.	Re-solder the cable connections Replace with a freshly charged battery pack Check battery pack voltage
Motor doesn´ t work after powering up the ESC. An alert tone with a single beeping tone followed by a short pause (* * * *) is emitted.	The ESC is unable to detect the normal throttle signal from the receiver	Check and verify that the ESC cable is connected to the Throttle channel on the receiver. Check the transmitter and receiver to verify that there is throttle signal output. (Connect a spare servo to verify throttle channel operation)
Motor doesn´ t work after powering up the ESC .An alert tone with continuous beeping tones (****) is emitted.	The throttle stick is not in the minimum position at power up.	Move the throttle stick to the minimum position.

Motor doesn’ t work after powering up the ESC. ESC emits two long audible tones followed by two short beeps(_ _ * *)	Reversed throttle channel caused the ESC to enter the programming mode.	Enter the servo reverse menu on your transmitter and reverse the throttle channel. Note: For Futaba radios set the throttle channel to Reverse.

Issue	Possible Reason	Action
Motor runs in reverse rotation Motor stops running in flight.	Wrong cables polarity between the ESC and the motor.	Swap any two of the three cable connections between the ESC and the Motor or __ access the Motor Rotation function via the ESC programming mode and change the pre-set parameters.
	Lost throttle signal	Check proper operation of the radio equipment. Check the placement of the ESC and the Receiver and check the route of the receiver’ s aerial and ESC cables to ensure there is adequate separation to prevent RF interference. Install a ferrite ring on the ESC’ s throttle cable.
	Battery Pack voltage has reached the Low Voltage Protection threshold.	Land the model immediately and replace the battery pack.
	Possible bad cable connection	Che ck and verify the integrity of the cable connections
Motor restarts abnormally ESC Overheats	P ossible RF Interference at the flying field.	The normal operation of the ESC may be susceptible to surrounding RF interference. Restart the ESC to resume normal operation on the ground to verify recurrence. If the problem persists, test the operation of the ESC at a different flying field.
	Inadequate Ventilation	Relocate the ESC to allow better ventilation
	Servos drawing too much current and over loading the ESC.	Use servos that are adequately sized for the ESC. The maximum BEC current drawn should be within the BEC limits.
	Over sized motor or prop	Prop down or resize the motor

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