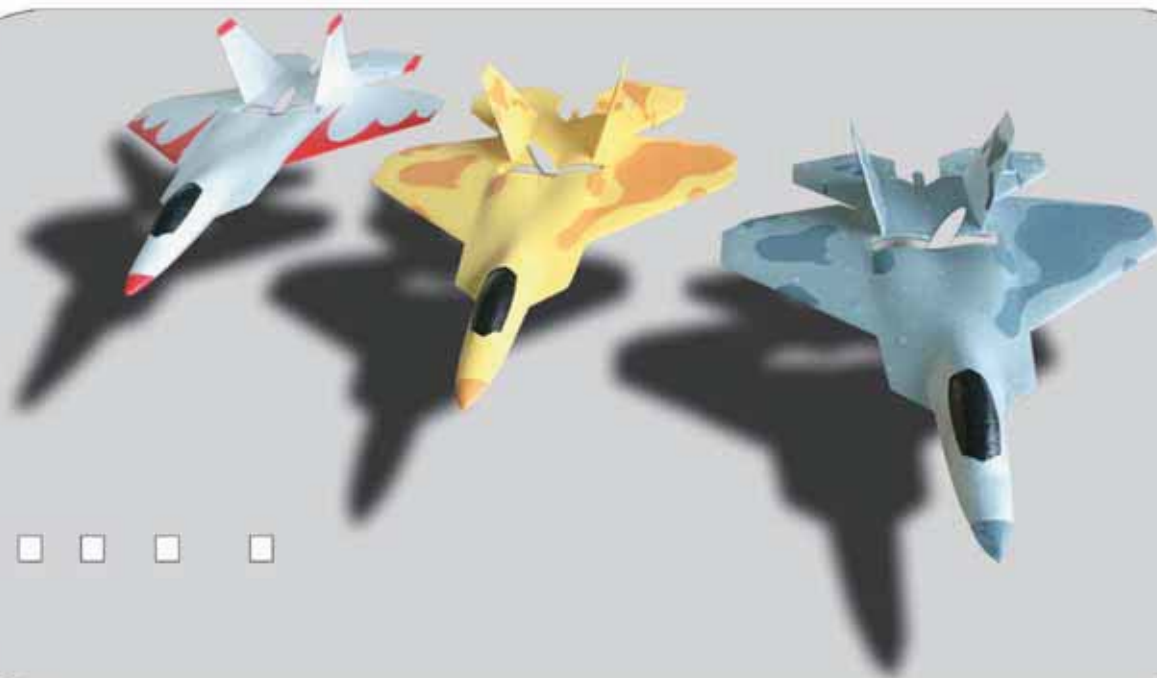




macfree



User Manual - Micro F22



SHENZHEN MACFREE INTELLIGENT TECHNOLOGY CO., LTD.

Item No: MCF2201

Website: <http://www.macfree.cn>

Please read this manual thoroughly before operating!



Contents



1、 Relevant Information	1
2、 RTF Contents	2
3、 Safety Notice	3
4、 Key Features	4
5、 Quick Start	4
6、 Flight Modes Introduction	5
7、 How to Install	6
8、 Transmitter Introduction	7
9、 Preflight Preparation 1	8
10、 Preflight Preparation 2	9
11、 Landing	10
12、 Control Surface Check	11
13、 Theory of Flight	12
14、 Flying Tips	13
15、 Transmitter Setup	14
16、 Transmitter Setup	15
17、 LCD Display Contents	16
18、 How to Adjust EPA	17
19、 Troubleshooting	18
20、 Supply Chain Management and Quality Control1/2	19/20
21、 Core Technology and Intellectual Property	21
22、 Repair and Parts	22
23、 Replacement Parts.....	23
24、 Specifications	24
25、 Warranty and Service.....	25



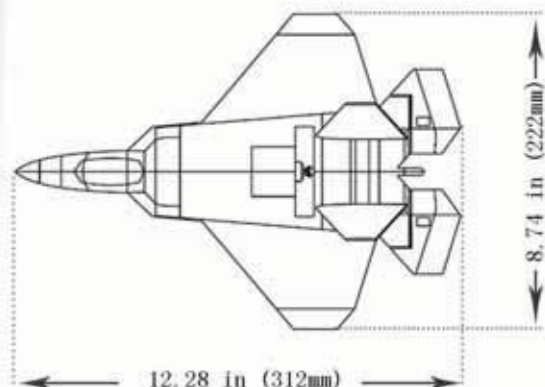
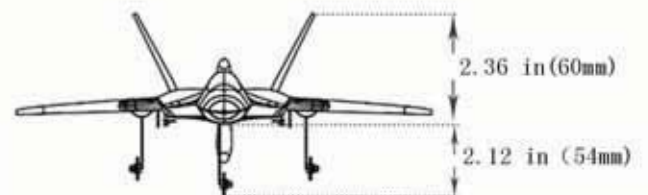
Relevant Information



F-22 Raptor is a fourth-generation heavy stealth fighter, co-designed by Lockheed Martin, Boeing and General Dynamics. Pilot fly conducted in 1990, and then it served the army since 2005. The fourth-generation fighter has broader static stability to increase the mobility. The flight control computer helps to maintain flying gesture.



Length: 62 ft 1 in (18.92 m)
Wingspan: 44 ft 6 in (13.56 m)
Height: 16 ft 8 in (5.08 m)
Wing area: 840 ft² (78.04 m²)
Empty weight: 31,700 lb (14,379 kg)
Loaded weight: 55,352 lb (25,107 kg)
Max. takeoff weight: 80,000 lb (36,288 kg)
Maximum speed: Mach 2.25 (2,414 km/h)
Cruise speed: Mach 1.82 (1,963 km/h)
Range: 1,600 nmi (2,960 km)
Service ceiling: 18,000 m



F22 model, was designed by SHENZHEN MACFREE INTELLIGENT TECHNOLOGY CO., LTD. in September 2015.

Flying Weight: 32g / 1oz Control Range: 300m

Max Flying Time: 10 min (brushless version, in self-leveling mode) Battery: 200mAh

Thrust-to-Weight Ratio: 1.25 (brushless version)

FCC Compliant:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.





RTF Contents



Content Name	Quantity	Content Name	Quantity
Carrying Box	1	Charger	1
Plane	1	USB Cable	1
Transmitter	1	Flight Battery	2
Front Landing Gear	2	Decal Sheet	1
Rear Landing Gear	4	User Manual	1
propeller	3		



Safety Notice



Thank you very much for choosing Macfree's product. All the intellectual property and technical support are explained by Macfree.

- (1) This is a very smart flight vehicle, suitable for both training purpose of inexperienced modelers and sport usage of model flying fanciers.
- (2) Please fly this plane in a legal place.
- (3) If you had any questions regarding to operation and reparation, Please contact your local dealer for after-sales service and technical support.
- (4) Please follow the correct procedures while flying, and avoid any improper operating. Any damage caused by improper operating will not be warranted.

Safe Flying:



1. Don't fly close to electricity poles and trees, to avoid electricity wire shortcut or loss of plane.



2. Don't fly close to crowds.
3. Spinning propeller is dangerous and may injure the fingers.
4. Don't fly close to cars.



The plan may be lost because of the wind. Don't operate in storming or rainy weather.



This product contains Li-Po battery and plastic parts; please always follow these notices:

Li-Po battery is different from ordinary batteries. It is chemical materials packed by thin tinfoil. The weight is reduced significantly, while it will be more fragile in improper operating. Like all other batteries, improper operating will cause fire or explosion.

1. Don't disassemble or re-assemble the battery!
2. Don't use it if damaged or deformed!
3. Don't probe or press the battery. Don't shot cut or use for other purposes!
4. Use the charger from Macfree only!
5. Don't over charge or reverse charge!
6. Don't charge overtime!
7. Please store the battery in 3.8V if inactive for a long time, to avoid bulges!
8. Don't store the battery in hot or damp places!
9. Please stop use the battery and send it back to the dealer if leakage, unpleasant smell or any other abnormal damage happens!

This product includes some plastic parts. Toxic gas may be produced if burned in fire. The air frame is made of EPP, a flame-retardant material; foam liner is combustion-supporting.

Proper Operating

- Please don't modify the product; please operate correctly and legally.

Safe Operating

- Please operate the model according to your own physical status and flight skills. Fatigue or improper operating may increase the risk of accident. Please pause for 3 minutes at least to cool the motor. (Brushed motor can be up to 55°C after flight, please don't touch directly!)

Preflight

- 1. Make sure the batteries in transmitter and receiver are fully charged. Please fit the battery into place. Battery position will influence the center of gravity, which is important in smooth flying.
- 2. Make sure the throttle stick is at the lowest position before power on.
- 3. Always power on the transmitter first and then the plane. Always power off the plane first and then the transmitter. Wrong procedure can cause loss of control.
- 4. Make sure the servo works properly. Defective servo can cause unpredictable danger.



Key Features



- 1. Newly designed airframe: low air resistance, high speed, suitable for violent flying . Up to 10 min flying time for brushless version.
- 2. Exclusive 6-axis flight control system, with self-leveling function. The plane will self level within 1 second in vertical climb or dive, once sticks were released. Self level in 0.5 second in turns, once sticks were released.
- 3. One-click takeoff
- 4. Once-click landing (spiral landing. The landing point may be deviated according to the wind condition)
- 5. Circle automatically at a fixed altitude (automatic, flying altitude locked, circle flying)
- 6. Voice trainer function (the movement of sticks will be voice broadcasted to avoid wrong operating)
- 7. Telemetry, transmitter battery voltage, flight battery voltage (as showed in right picture), flying altitude, and low power alarm
- 8. LED lamp in the back of transmitter, works as a torch in dark

Telemetry Signal Flight Battery Transmitter

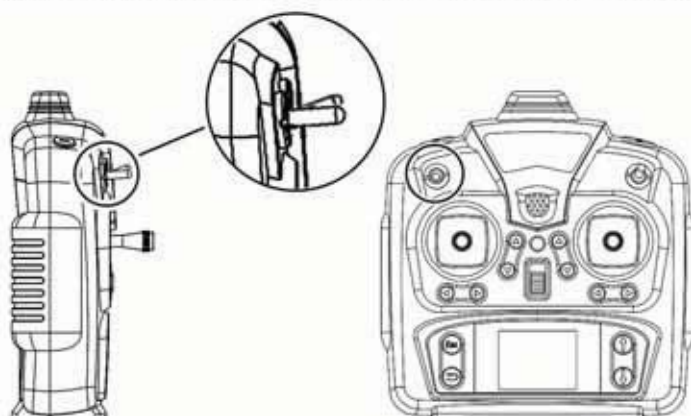


Quick Start



transmitter	transmitting distance : >300M
	transmitting frequency : 2.4GHZ
receiver	frequency : 2.4GHZ
	sensitivity : -97dBm

1. Install the landing gear.
2. Power on the transmitter while the throttle be at the lowest position. A voice notice will be heard.
3. Install the flight battery.
4. Put the plane on a level surface, and a voice notice will be heard after 10 seconds. The elevator will move up and down for 4 times, which indicates the gyro calibration completed. Check the control surfaces and change settings in the transmitter.
5. Push the throttle to 60% to take off.
6. Switch to smart trainer mode, long press the S button for 3 seconds, and release when the countdown completed (in hand launch, you can toss the plane out when the countdown completed), the plane will climb to an altitude of 10m and then bank left and circle up. Smart trainer mode (the S and H switch to the upper position) is recommended in the first flying!
7. Under the smart trainer mode, the throttle stick position does not influence the smart circling function (the plane circles at a fixed altitude automatically). After one-click takeoff, the smart circling will be influenced by throttle control if manual control was performed: if throttle > 50%, smart circling will go on; if throttle < 50%, the smart circling will be off, and plane goes into self-leveling mode. You can push the throttle up above 50% and wait for 3 seconds, the smart circling function will be re-activated. The factory default circling altitude is 20m.



This transmitter is defaulted as smart trainer mode, so this 3P switch is not activated. You can activate it in transmitter settings. After been activated, the 3 modes are: self-leveling, stabilizing, gyro off (normal).

The right switch has more priority than the left switch: if the right switch is flipped to the upper position (smart trainer mode), the left switch will be deactivated. And all smart training functions will be available.



Flight Modes Introduction



Flying Tips:

1. It is highly recommended to switch to one-click takeoff and smart trainer mode for first flying and inexperienced pilots. Keep the throttle at 50%~100% after takeoff, perform rudder controls only. The flight control system will do adjustments automatically. And you will get familiar to the control soon.
2. When looking for a lost plane, you can check the signal strength indicator on the display to confirm if the plane is nearby. Push the throttle up if the signal appears, you may hear the propeller turning.
3. You can switch to smart trainer mode if in any emergency (lost the view of plane or low altitude), the plane will go to smart circling mode in 3 seconds (self-level in 1 second and circle and climb up to the default 20m altitude) to be saved.
4. The factory default altitude is 20m in smart circling mode. Press the H button to decrease height to minimum of 10m, press the S button to increase height to maximum of 30m. Factory default circle diameter is 30m (small circle). You can press the right stick to switch between small and large circle (50m diameter). Smart circling will be activated automatically in smart trainer mode. The smart circling will be influenced by wind, so it is recommended that inexperienced pilots practice under calm weather conditions.

"Selflevel Only" in "6.Setup" is factory defaulted as "On". So the left 3P switch is in self-leveling mode, no matter which position it is in. If "Selflevel Only" was set as "off" and the right switch put to "normal mode" (the lower position), the left switch has 3 modes available: self-leveling, stabilizing, gyro off (normal).

1. Smart Trainer Mode

This mode is for beginners or inexperienced pilots. The key features are: one-click takeoff, one-click landing, one-click height adjustment, smart circling, self-leveling. All the advanced assistant functions are on, to help the operating and reduce damages and crash to the minimum. The plane will climb up to defaulted height of 20m after takeoff, and perform all the functions as illustrated in the flying tips "4".

2. Self-leveling Mode

This mode is suitable for mediate pilots (who can fly free and safe. 5 hours training flight in smart mode is required to go to self-leveling mode). One-click landing, self-leveling are on in this mode, and more maneuverability and wind-resistance.

3. Stabilizing Mode

This mode is for advanced pilots. Most assistant functions are off in this mode. Only the stabilizing function is on, which will help maintaining the current flying gesture and counter the wind effect. Inverted flying, loops, rolls, vertical climb and dive can be performed accurately. (Factory setup is off. You can go to the setup menu in the transmitter to activate this mode.)

4. Gyro Off Mode

This is for top pilots. All assistant functions are off in this mode. All the maneuvers are at the control of pilot only. As the plane is small and lightweight, it can be interfered by the wind easily. It has high record on crash and damage, for top pilots' challenging experience only. (Factory setup is off. You can go to the setup menu in the transmitter to select this mode.)

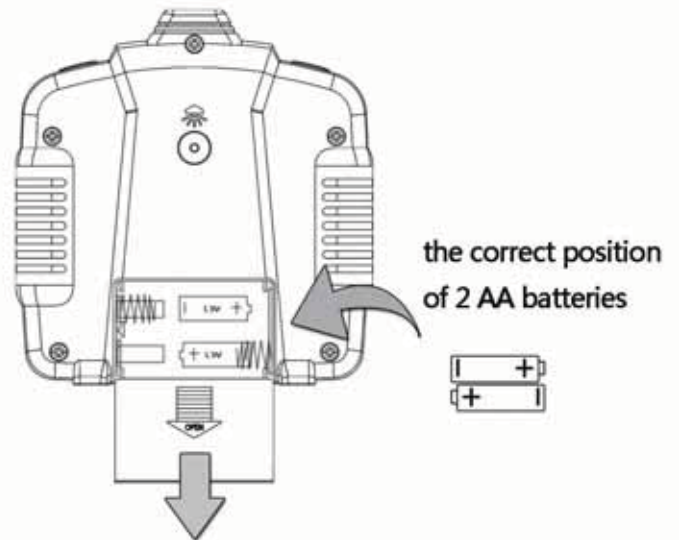


How to Install



Install Batteries

Push and open the battery cover, install the 2 AA batteries with the correct polarity, and then install the battery cover. (please don't mix with other batteries. You can use the battery cover to help removing the batteries.)



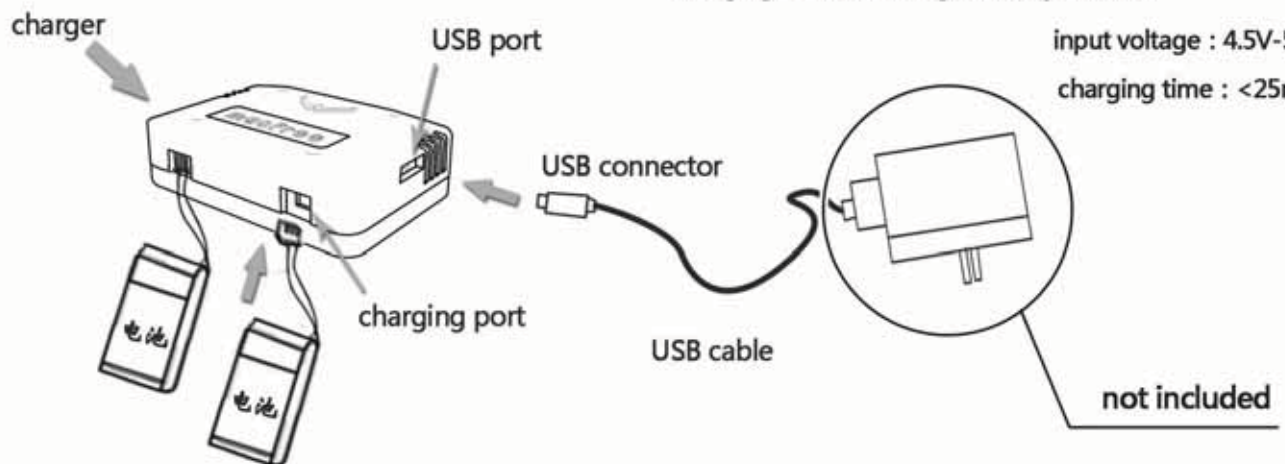
charging (can charge 4 batteries at the same time)

input current : recommended >1000ma

charging current for single battery : 600ma

input voltage : 4.5V-5.5V

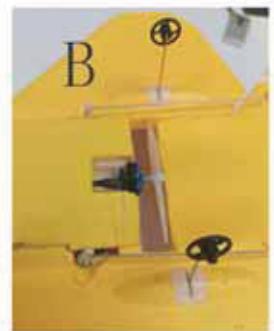
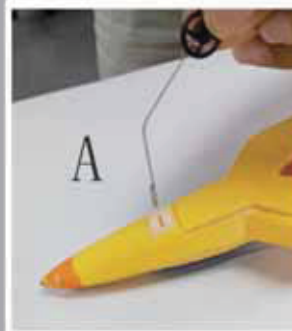
charging time : <25min



Notice: there are four charging ports in the charger. LEDs turn to be green when the charger connected to a power source. LEDs change to be red when charging, and green when fully charged. (If a LED turns to be green when connect the battery to the charging port, the reason might be that the battery not connected well or the battery is full already. Otherwise, a green LED indicates that the charging port is damaged.)

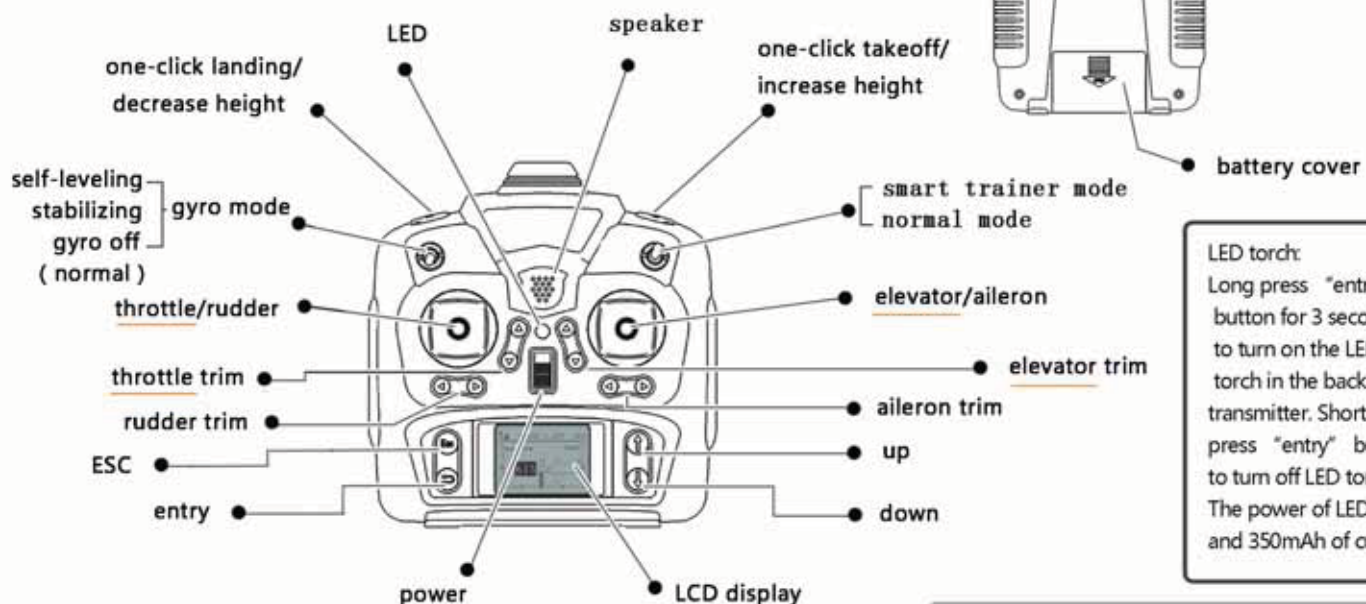
Install the Landing Gear

Install the front landing gear into the slot, as shown in picture "A" ; install the two rear landing gear into slots, as shown in picture "B" .





Transmitter Introduction



LED torch:
Long press "entry" button for 3 seconds to turn on the LED torch in the back of transmitter. Short single press "entry" button to turn off LED torch. The power of LED is 1w, and 350mAh of currency.

Notice: this is a MODE 2 (left-handed throttle) transmitter. The "throttle" and "elevator" will be in the exchanged position in a MODE 1 (right-handed throttle) transmitter.

Transmitter Functions

Button	Function	How to Use
One-click takeoff / increase height (Notice: these two functions are available only under smart trainer mode)	Elevator will be pulled to the highest position; throttle output will reach up to 90%; the plane will climb to the altitude of 10m and then bank left and circle up to default altitude of 20m; one click to rise for 5m.	Long press for 3 seconds, the speaker will count down from 5 to 1; and then release the button; cruise altitude will rise 5m by one short press (voice notice will be heard. Max height is 30m).
Decrease height (available under smarttrainer mode) one-click landing (available under smarttrainer mode and self-leveling mode)	One click to decrease height for 5m; entry spiral landing mode, lower the throttle output, decrease height; cut off the power when touch the ground (put the throttle stick to the lowest position and then push up to activate the throttle again)	One short press, the cruise altitude will be down for 5m (voice notice will be heard. Minimum height is 10m.); Long press for 2 seconds, and release when speaker begins to count down (the wind condition will influence the final landing point)
Self-leveling (the upper position)	keep the plane in level flying; the plane will be adjusted to level flying if no manual control	Can be switched between the 3 different modes, factory default setting is in self-leveling mode
Stabilizing (the middle position)	keep the plane in the current flying gesture until manual control received, even if the plane is doing maneuvers	Same as above
Gyro off (the lowest position)	Gyro off	Same as above
Normal mode (the lower position)	Voice broadcast off	
Smart mode (the upper position)	Voice broadcast on, and no matter which position the left switch is, the smart circling mode will be activated.	
Power and LED	The LED is red when transmitter powered on, and then changes into green; solid red when low power in transmitter	
Trim buttons	Trim adjustment on control sticks, press the button if the flying gesture is not proper	
Setting buttons	Consists of 4 buttons, one of them can control LED torch	
Elevator stick press down	Advanced function, to switch between dual rates (voice notice will be heard. Short voice indicates low rate; long voice indicates high rate)	
Throttle stick press down	Advanced function, its function can be defined by user; switch between big / small circling (voice notice will be heard. Short voice indicates small circling of 30m diameter; long voice indicates large circling of 50m diameter).	



Preflight Preparation 1



Binding

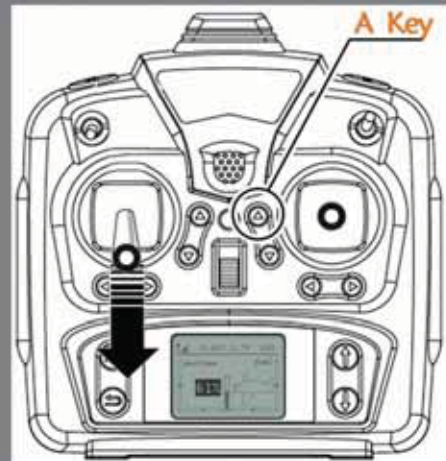
! It is factory bound already. Please follow the steps as below if re-bind is needed:

1. Install the flight battery, and put the plane on a level surface.
2. Put the transmitter close to plane, and long press and hold button "A" while powering on the transmitter. About 10 seconds later, the tails will move and voice notice will be heard, which indicate the binding success. Several seconds later, the tails will move up and down 4 times, which means the plane is ready to fly.
3. (1) Please keep the plane still while binding, to avoid any interference;
(2) Please avoid binding when other similar binding is going on.
4. The control surfaces will move accordingly if the plane moves, this is normal response.

Preflight Step 1

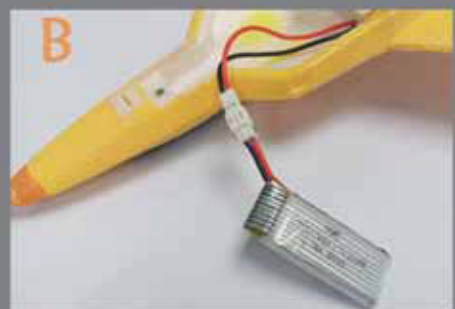
Power on the transmitter firstly; make sure the throttle stick is at the lowest position and other sticks are centered. (this is a Mode 2 (left-handed throttle) transmitter in the picture)

Notice: Please check transmitter battery voltage on the LCD display after power on. Please change batteries if the voltage is below 2.6V. (Some functions may not work correctly if the transmitter is below 2.6V: voice broadcast may not work properly.)



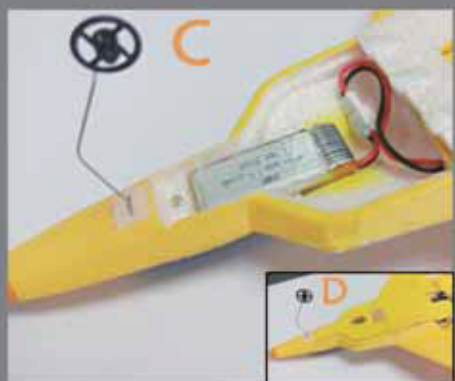
Preflight Step 2

Open the battery cover in the plane, and connect the flight battery to the extension connector in the dock, as shown in picture B.



Preflight Step 3

Fit the battery into place as shown in picture C. Install the battery cover (as picture D)





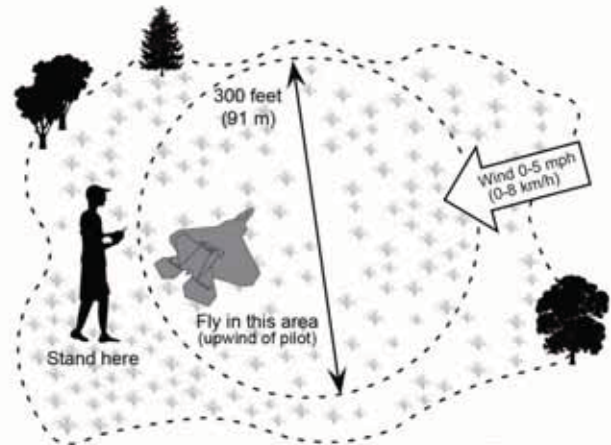
Preflight Preparations2



1. Choose a Proper Flying field

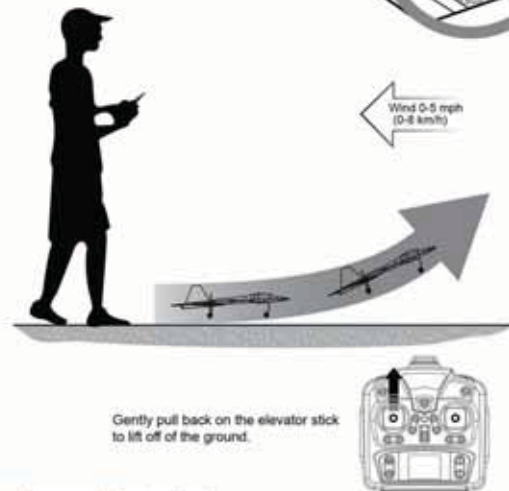
Please choose a wide open flying field, avoid crowds and cars, and keep the plane within 91m eyesight, in order to avoid loss of plane.

Keep your eyes on the plane, and spare some attention to the environments too. Don't look at the transmitter for a long time while flying.



2. Ground Takeoff

1. Make sure the flight battery was fully charged, put the plane on a level surface, check if the control surfaces were centered and in correct directions.
2. Gently push the throttle stick to 60% and more, and pull back the elevator stick to take off.
3. The throttle is 90% in one-click takeoff.



Gently pull back on the elevator stick to lift off of the ground.

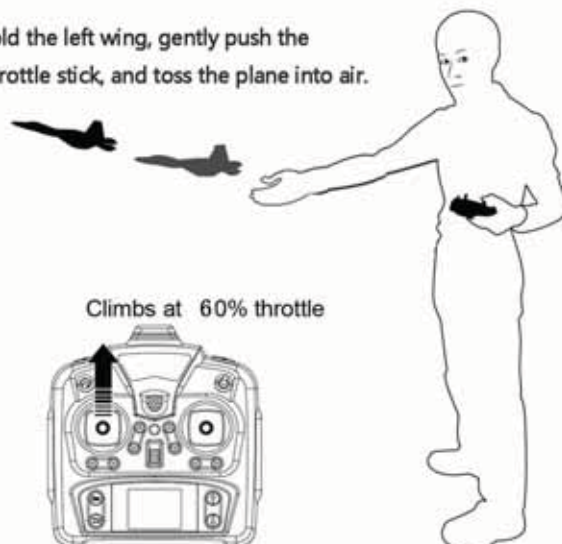
Caution: 1. A level ground is required.

2. Gently push the throttle, the plane will taxi for a distance to reach the takeoff speed.
3. Don't pull the elevator stick too much; too much elevator may cause stalling and loss of control.

3. Toss to Take off

Make sure the control surfaces are centered, gently push the throttle to 60% or more, face the wind and toss the plane in a level way or a bit of heading up, make small adjustments according to the flying gesture.

Hold the left wing, gently push the throttle stick, and toss the plane into air.



Climbs at 60% throttle



Landing



Landing Skills

Fly the plane to the downwind area, adjust the nose direction to ensure land facing the wind. Reduce the throttle to lower the flight speed, the plane will glide down gently. Cut off the throttle when the plane is 0.5m high to the ground, and gently pull back the elevator stick.

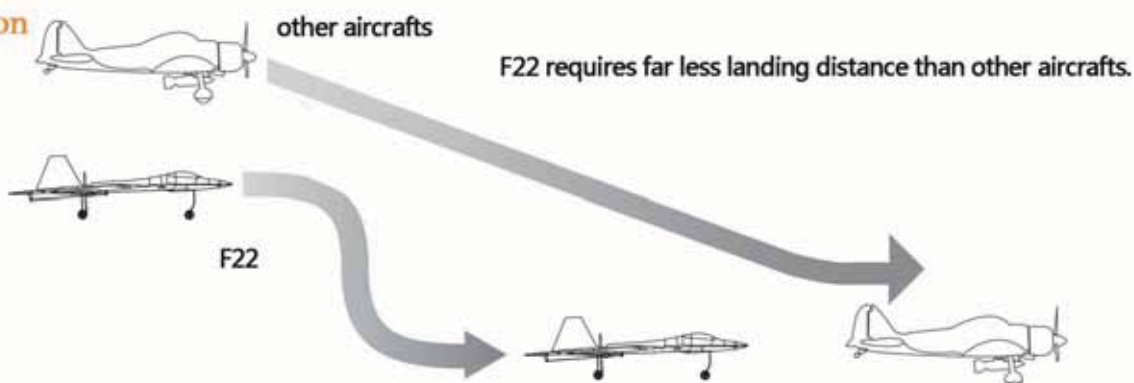
(Make proper adjustments while gliding, so that the plane lands smoothly)



Notice:

Perform proper control on the distance, if the wind is strong, to avoid that wind brings plane out of eyesight. Land before the flight battery is run out, to avoid loss of signal and being out of control.

Landing Illustration



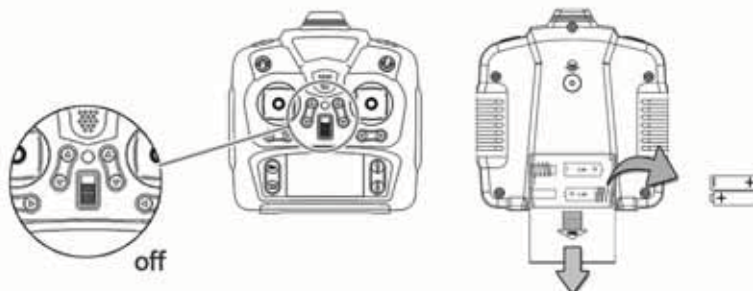
After Flight

Please disconnect the flight battery after flight. It is a good habit to avoid any damage.



Notice: The battery may be damaged by over discharging, if the battery is not disconnected after flight.

Please power off the transmitter after flight. Please take out the batteries if no use for a long time.



Notice: Damage may happen to the transmitter if keeping the batteries in the transmitter for a long time and no use.


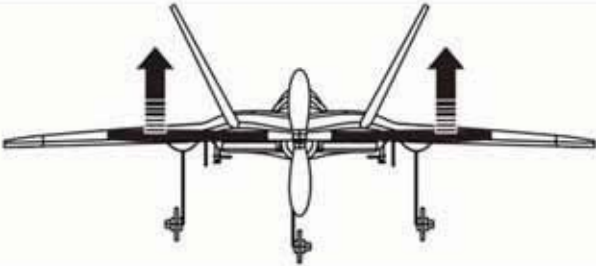

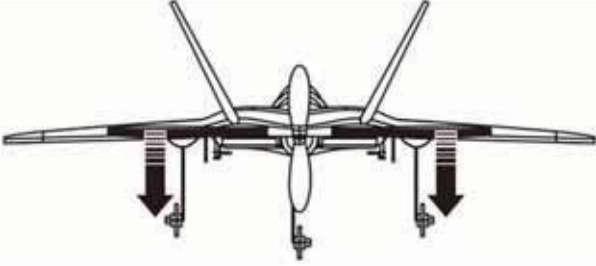

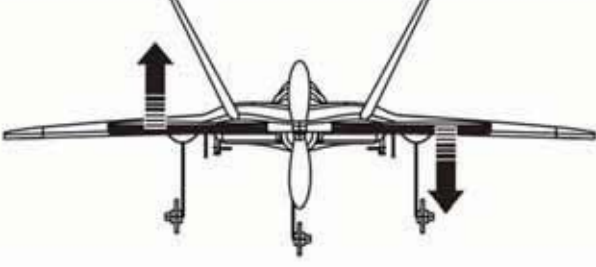

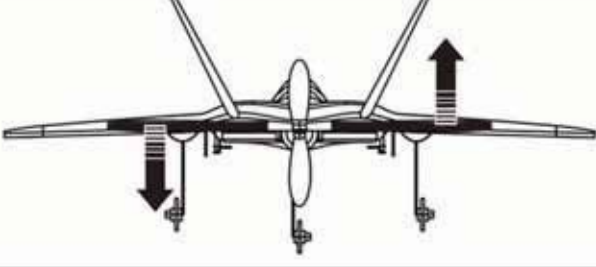
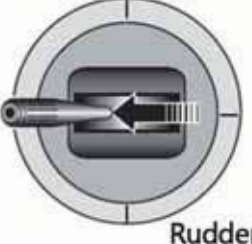
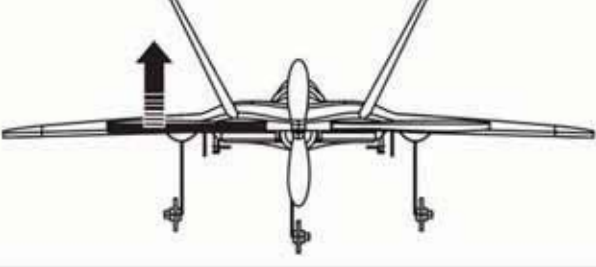
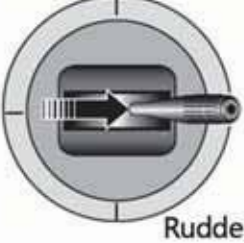
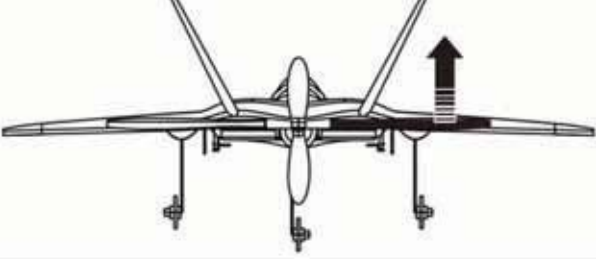
Tips: Don't panic if you lost your plane. Keep the transmitter on and take it with you to look for the lost plane. Search the position where the plane landed, and check the flight battery voltage indicator on the transmitter display. If flight battery voltage appears on display, the plane should be nearby.



Control Surface Check



Brief Introduction

 Elevator		Elevator Up, Plane Climbs
 Elevator		Elevator Down, Plane Decrease heights
 Aileron		Left Aileron Up, Right Aileron Down, Plane Banks Left or Rolls
 Aileron		Left Aileron Down, Right Aileron Up, Plane Banks Right or Rolls
 Rudder		Plane Turns Left
 Rudder		Plane Turns Right





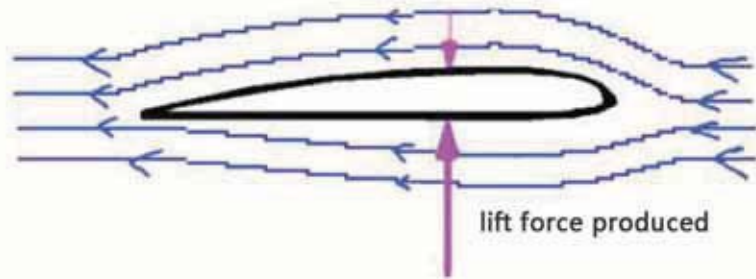
Theory of Flight



lift force

flying criteria

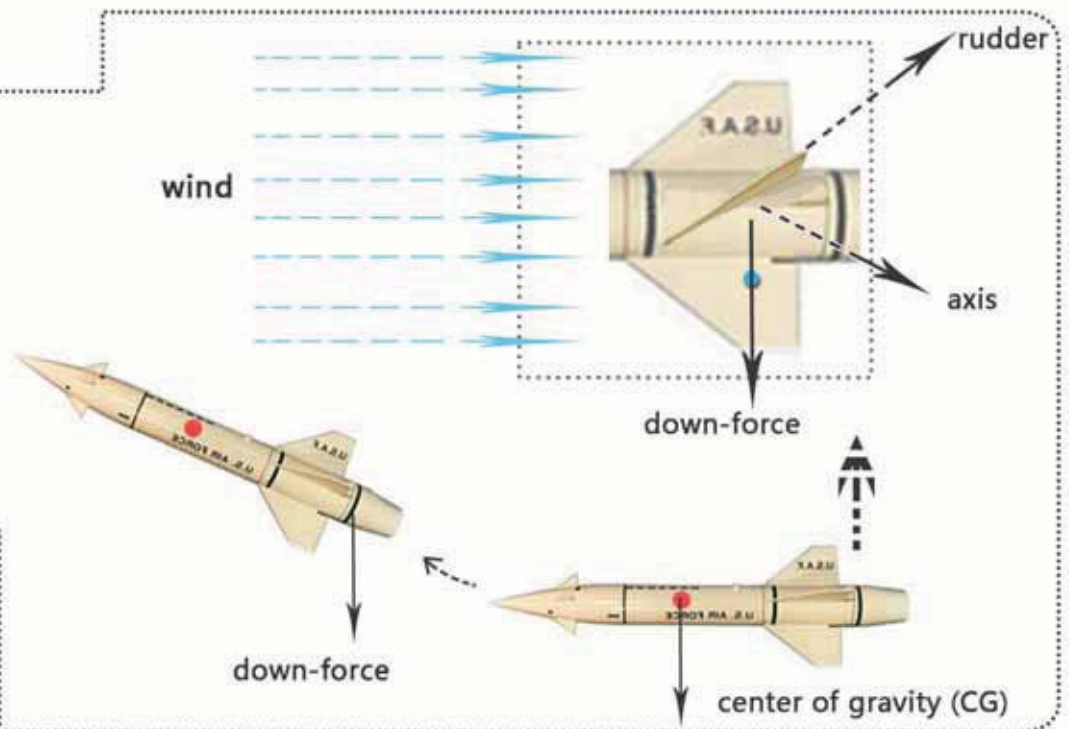
● fast flowing, low pressure



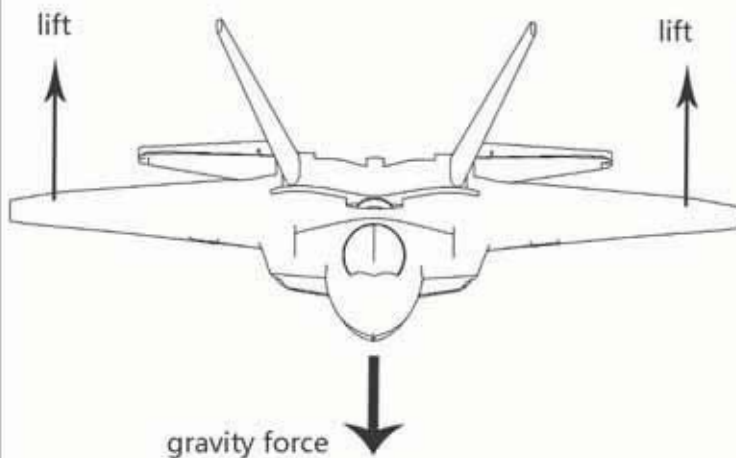
● slow flowing, high pressure

Elevator Theory

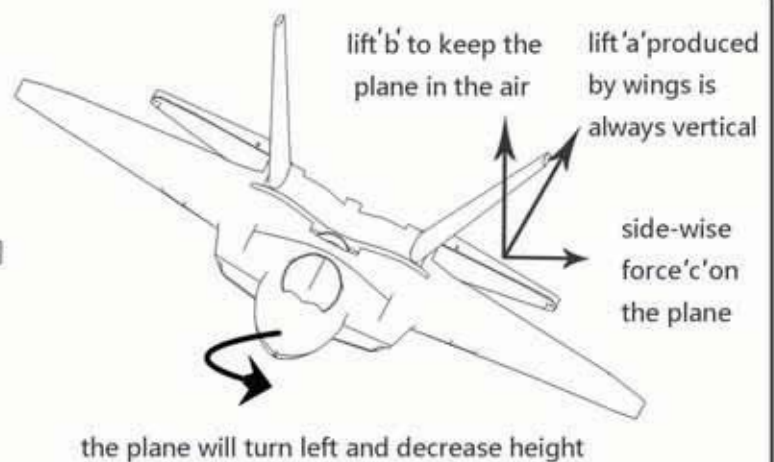
down-force far from center of gravity (CG), the plane will head up (lever principle)



Force Analysis in Aileron Turn



The lift produced by wings and gravity force will be balanced on CG; the plane will keep level flight



Quadrilateral decomposition principle. When the plane is banking, lift 'a' can be decomposed to lift 'b' to counter the gravity, and force 'c' to bank which makes the plane turns left. As $b < a$, so the plane will decrease height.