SNAP&FLY — Modularized RC Airplanes

(Patent pending)

Owner's Manual

SNAP&FLY Advantages:

- ✓ **Flight components sharing – Flying a variety of RC airplanes for the price of one,**
- ✓ **Make and fly your choice of RC airplanes On-The-Go – Easy, convenient and fun,**
- ✓ **Non-destructive structural disconnection – Crash damage resistant.**

Disclaimer of Liability

The user understands that any and all items in this product and their operations including: motors, propellers, lithium batteries, magnetic actuators, charger, transmitter and receiver, and the combined systems and/or operations of these items/systems can be dangerous if used or handled improperly. A thorough understanding is necessary before the user handles the items and/or operates the systems in this product. ItCanFly, LLC cannot be responsible for any improper use or handling of this product and its component items by the user. The user waives all claims of damages against ItCanFly, LLC for any and all damages arising from the use of this product by the user, including, but not limited to, any bodily injuries or property damages sustained as a direct or indirect result of the user's use of this product.

SNAP&FLY Quick Start

Rotating propellers and moving airplanes can cause bodily injury or property damage. Do not operate this product in places where injury to people or damage to property might occur. For safe usage of LiPo batteries it is essential to follow the proper guidelines to handle them. Users are strongly recommended to read and understand the entire content of the "Owner's Manual".

A. Pre-flight

1. Insert 4 1.5 volts AA sized batteries into the transmitter battery compartment;
2. Charge the supplied LiPo batteries using the built-in LiPo battery charger in the transmitter;
3. Chose an airplane module;
4. Select control mixing type at the transmitter according to airplane selected;
5. Make the control frequency selection at the transmitter;
6. Connect a fully charged LiPo battery to the receiver to power it up;
7. Turn on the transmitter and establish frequency-lock with the receiver;
8. Connect the base module to the plane module;
9. Check control surface responses to confirm the proper mix selection and control linkage connections;
10. Check control surface neutral positions and travel ranges, apply necessary trim if needed;
11. Check throttle control response;

B. Switch the Plane Module

1. Disconnect the base module from the airplane module to be replaced;
2. Chose a desired airplane module;
3. Select control mixing type at the transmitter according to airplane selected;
4. Replace or reconnect the LiPo battery if needed. If so, or if the receiver LED is flashing turn the transmitter off then on again to establish frequency lock with the receiver.
5. Proceed from step 8 in section A with the desired airplane module.

C. Resume flight from crash

1. Check for damage in the base module and the plane module. Repair or replace parts if necessary.
2. Proceed from step 3 in section C.

D. After flight

1. Disconnect the base module from the plane module;
2. Disconnect the LiPo battery from the receiver;
3. Turn off the transmitter;
4. Charge the LiPo battery if needed, and store the LiPo batteries properly;

Contents

1. Package Content

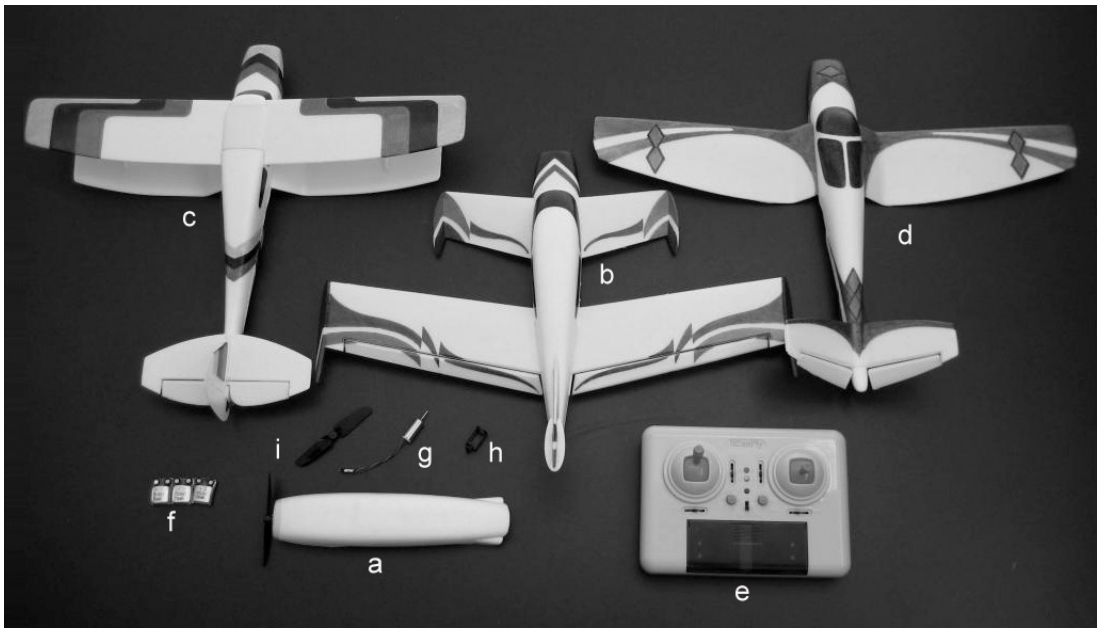


Photo 1. – Package Content

(a) 1 Base module, (b) 1 Canard airplane module, (c) 1 Biplane module, (d) 1 V-tail airplane module, (e) 1 Radio transmitter, (f) 3 LiPo batteries, (g) 1 Spare motor, (h) 1 Spare motor mount, (i) 1 Spare propeller,

2. Connecting Modules into Airplanes

A. The Base Module

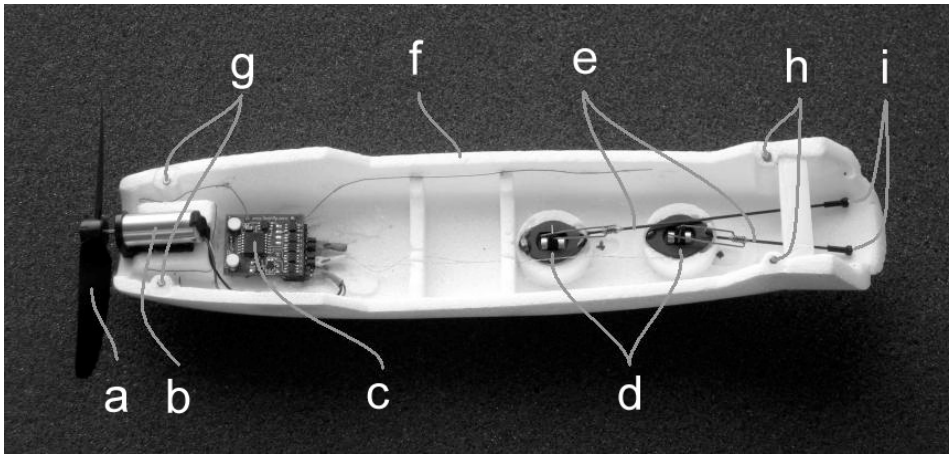


Photo 2A1. – The Base Module
(a) Propeller, (b) Motor, (c) Receiver, (d) Actuators, (e) Push/pull rods,
(f) Fuselage portion, (g), (h) Fuselage magnetic connectors.
(i) Push/pull rods' magnetic connectors.

The Base Module has a fuselage portion that houses the flight components: propeller, motor, receiver, actuators and push/pull rods. The magnetic connectors will connect the Base Module to an airplane module, and the magnetic connectors will ensure the control linkage connection between the Base Module and the airplane module.

The receiver and the supplied LiPo batteries have magnetic electrical-connectors. To power up the receiver connect a supplied LiPo battery to the receiver as indicated in Photo 2A2 (do not attempt to reverse the connection polarity). Energize the receiver before a flight. Disconnect the LiPo battery from the receiver immediately after the flight.

When not used the LiPo batteries should be kept apart in separate storage. Do not mix bare batteries together. Care should be taken to avoid short circuiting the LiPo batteries.

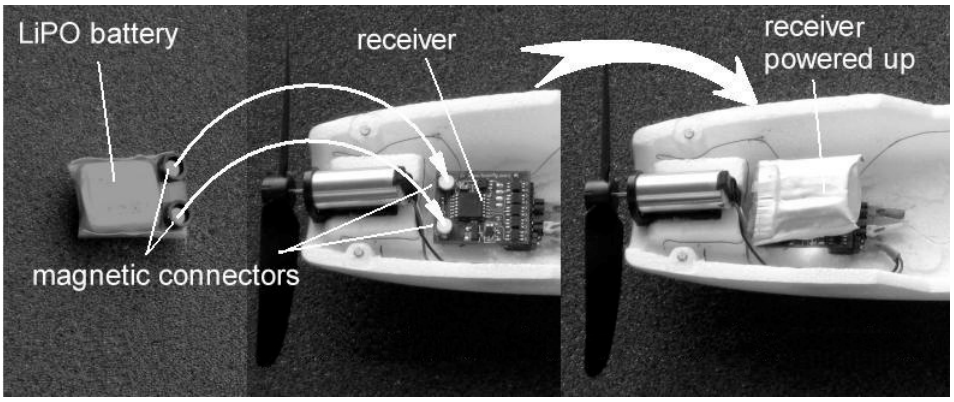


Photo 2A2. – Power up the receiver

B. The Airplane Modules

There are 3 different airplane modules in the package: the Biplane Module, the Canard Module and the V-tail Module.

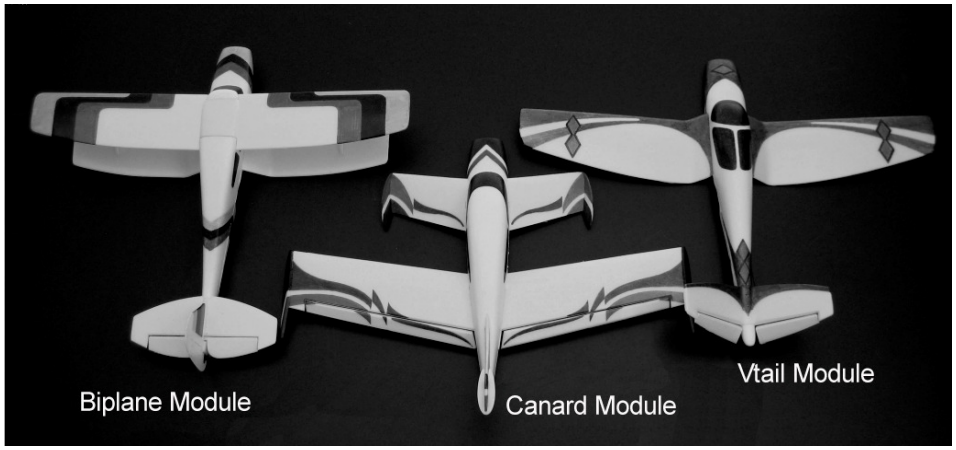


Photo 2B1. – The airplane modules

Each of the 3 airplane modules can be connected to the Base Module to form a functional airplane. The fuselage structure is held together by connecting the magnetic connectors (a) and (b) (Photo 2-B2) of the airplane module to the matching magnetic

connectors (g) and (h) of the Base Module (Photo 2A1). The push/pull rod linkages are formed by connecting the linkage rod connectors (i) of the Base Module (Photo 2A1) to the matching connectors (c) of the airplane module (Photo 2B2).

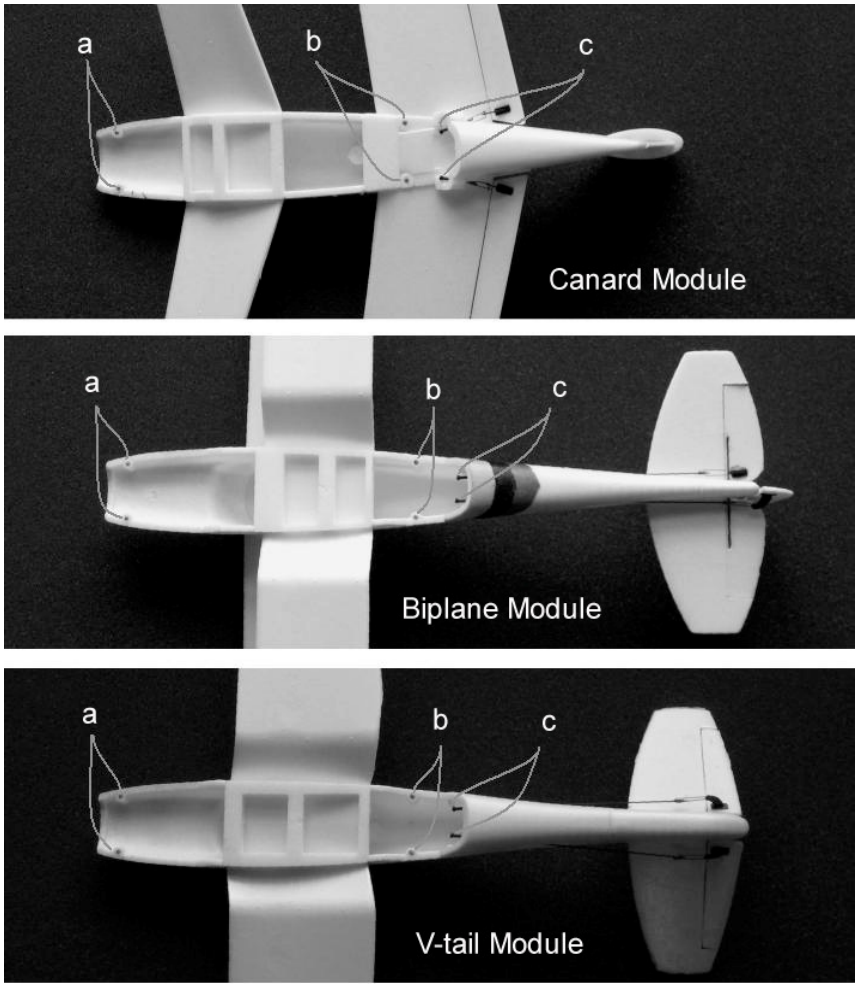


Photo 2B2. – The magnetic connectors
(a), (b) Fuselage connectors, (c). Push/pull rod connectors

C. **Connect Modules into Airplanes**

Hold the Base Module and the airplane module with each hand and connect the modules in a hinging motion about the back end of the Base Module. As an example, Photos 2C1 and 2C2 show the connecting procedure using the Biplane module.

Step 1: Align the magnetic connectors of the push/pull rods in both the Base Module ((i) in Photo 2B2) and the airplane module and connect the push/pull rods;

Step 2: Align the fuselage magnetic connectors on both the Base Module and the Airplane Module and connect the two modules into one airplane.

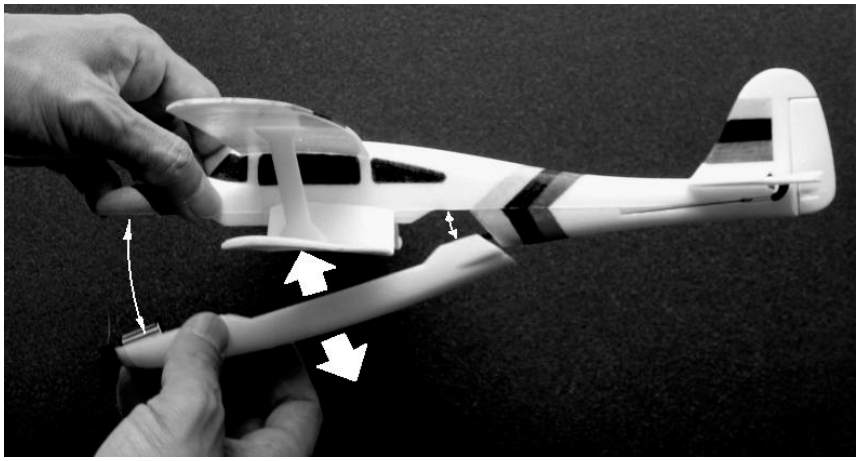


Photo 2C1. – Hinge the Base Module to connect to the airplane module

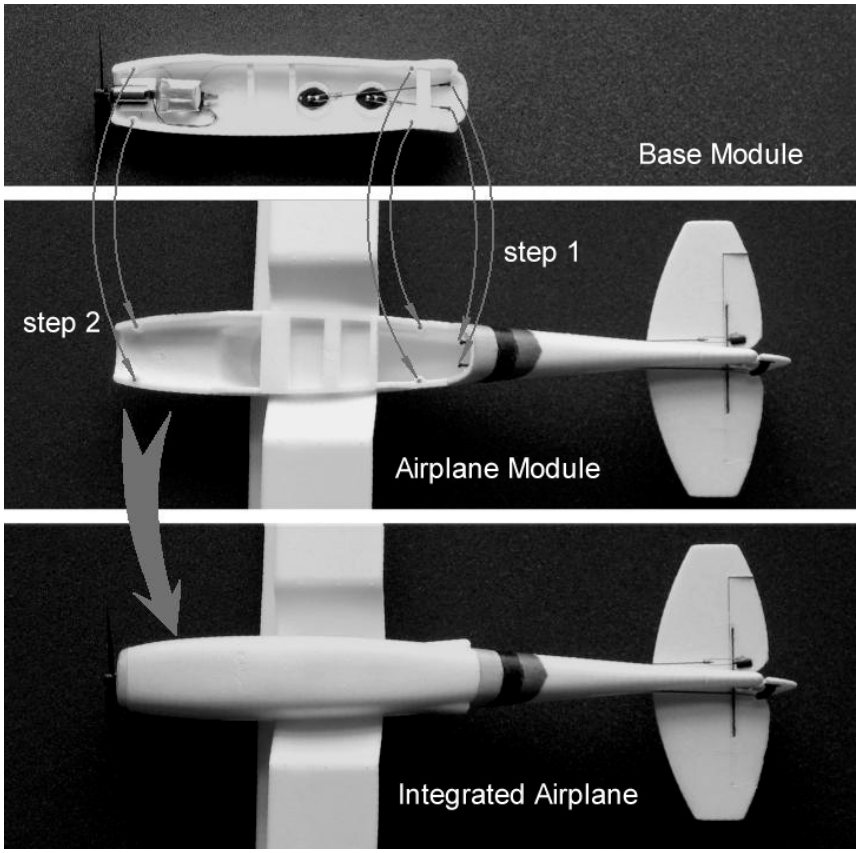


Photo 2C2. – Steps to connect modules into airplanes

To disconnect the modules reverse the above steps: disconnect the module fuselages first, and disconnect the control linkage by separating the modules in a hinging motion.

The magnetic connectors are designed to maintain the airplane integrity under normal flight conditions yet permit inter-modular disconnection under high impact events, such as a crash, to prevent the airplane from becoming damaged.

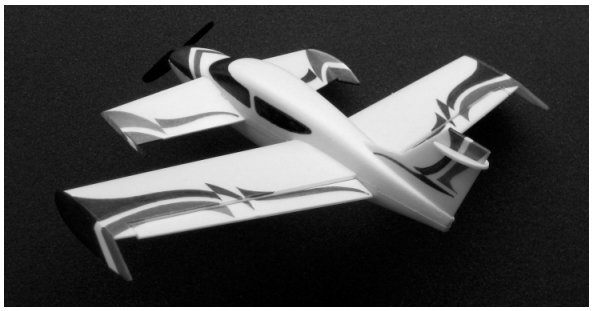


Photo 2C3. – The connected functional Canard Airplane

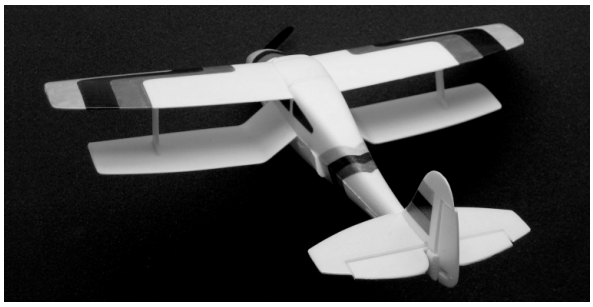


Photo 2C4. – The connected functional Biplane

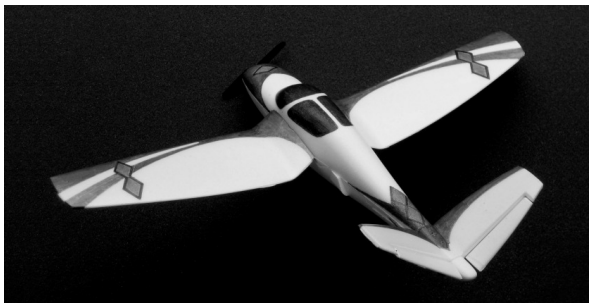


Photo 2C5. – The connected functional V-tail Airplane

Photo 2C3, 2C4 and 2C5 show the connected functional airplanes.

3. Radio System

A. Transmitter

Frequency bands: 900MHz(North America, CX960T, and CX960U)
868MHz(Europe, CX860T, and CX860U)
(where T/U denote Left/Right-hand throttle versions)
Operation frequency selections: 8
Proportional control channels: 4 (1 throttle and 3 actuator controls)
Switch control channels: 2 (not used in this product)
Control mixing selections: 6
Frequency locking procedure: at start up
Control distance: >100m (300ft) – working with the supplied receiver
Built-in dual-Position LiPo battery charger: for two 1-cell 85mAh batteries
Power supply: 6 volts (using 4 AA 1.5V batteries)

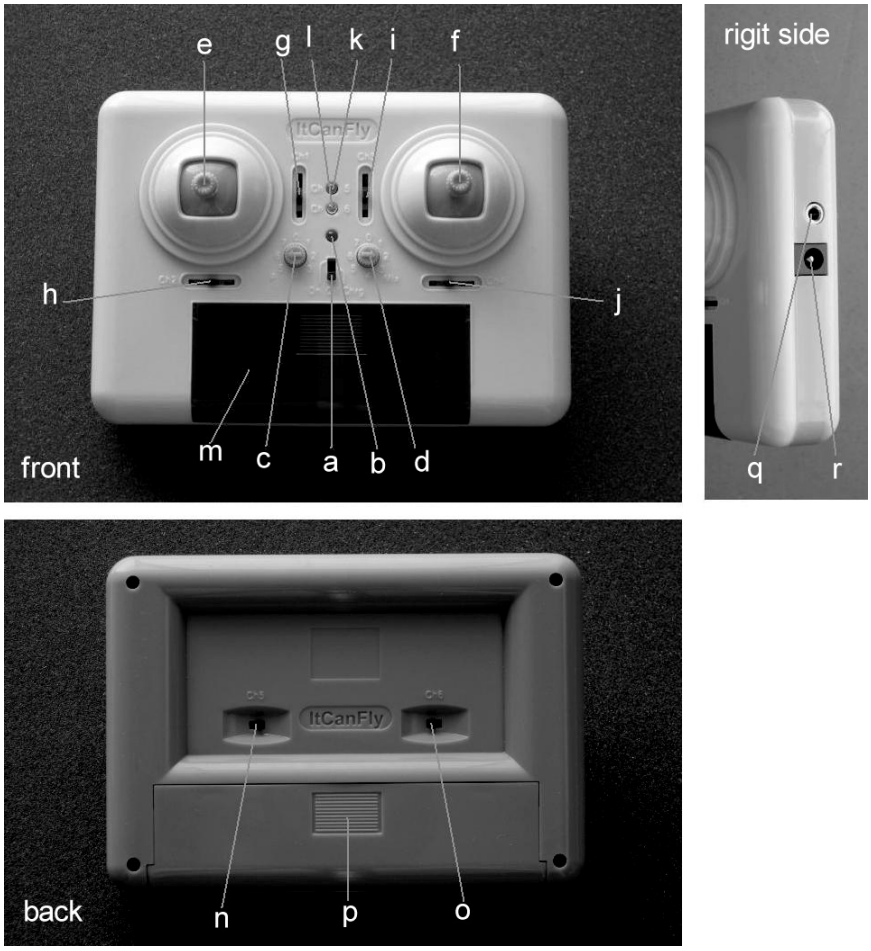


Photo 3A – The transmitter overview

(a) "On-Charge-Off" 3-position switch –
Switch to the "On"("Off") position to turn the transmitter on (off);
Switch to the "Charge" position to turn on the built-in dual-position LiPo battery charger;
(Make sure 4 AA 1.5V batteries are installed in the transmitter battery compartment before powering up the transmitter;)

(b) The transmitter state LED –
Off: the "On-Charge-Off" 3-position switch is at ether "off" or "Charge";
On continuously: the transmitter is on and in its normal working state;
Flashing in the first 4 seconds after the transmitter is turned on: the transmitter is executing its "frequency lock" sequence;
Flashing steadily for longer than 4 seconds: low transmitter battery is indicated;

(c) 8-position Frequency Dial –
Select the transmitter working frequency;

(d) 8-position Mixing Dial –
Select a control mixing to fly a particular airplane type;

(e) and (f): Left and Right Proportional-Control-Levers, (g), (h), (i), (j): trimmers –
are for the proportional controls of the throttle and 2 actuators. (The 3rd actuator control is not used in this product).

Transmitter	Lever (e), Trimmer (g) - up/down	Lever (e), Trimmer (h) - left/right		Lever (f), Trimmer (i) - up/down	Lever (f), Trimmer (j) - left/right	
		mix0,1,2	mix3,4,5		mix0,1,2	mix3,4,5
CX9/860T	Throttle +/-	3rd act.	Turn L/R	Elevator U/D	Turn L/R	3rd act.
CX9/860U	Elevator U/D	Turn L/R	3rd act.	Throttle +/-	3rd act.	Turn L/R

Table 3A -- Control lever and trimmer functions (L/R: left/right, U/D: up/down, act.: actuator)

(k) Switch-Channel 5 On/Off LED – not used in this product, keep it turned off;
(l) Switch-Channel 6 On/Off LED – not used in this product, keep it turned off;
(m) Dual-position LiPo battery charger compartment – for charging the LiPo batteries,
(n) Channel 5 On/Off Switch – not used, should be kept off (Channel 5 LED off);
(o) Channel 6 On/Off Switch – not used; should be kept off (Channel 6 LED off)
(p) Power Supply Battery Compartment –
Use 4 AA type 1.5V batteries for powering the transmitter and the charger;
(q) Control Signal Analog Output – not used in this product;
(r) External DC Power Input – not used in this product;

B. Select Working Frequency

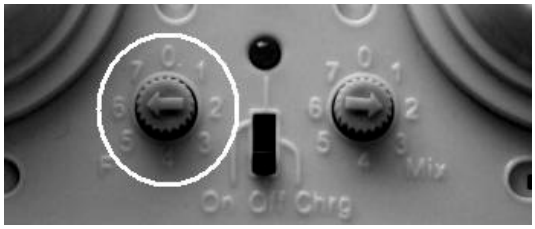


Photo 3B –
8-frequency selection dial
(marked “F”)

Select a frequency position before turning on the transmitter. If in a group environment be sure to choose a frequency unused by others.

C. Select Mixing Type

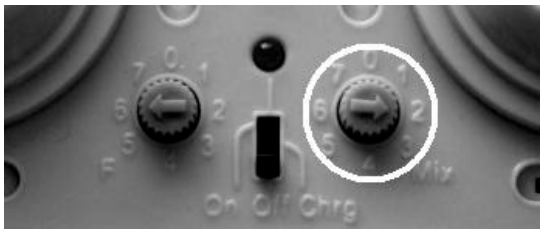


Photo 3C –
8-position mixing type dial
(Marked “Mix”, 6 types of mixing
and 2 analog control signal output.)

Select the control mixing type according to the choice of airplane, the transmitter type and the right or left hand turn/bank preference.

Airplane	Using transmitter CX9/860T Turn with -	Using transmitter CX9/860U Turn with -	Mixing selection
Canard plane	Right hand	Left hand	0
	Left hand	Right hand	3
V-tail plane	Right hand	Left hand	1
	Left hand	Right hand	4
Biplane	Right hand	Left hand	2
	Left hand	Right hand	5

Table 3C – Mixing selection

Select mixing type either before or after the transmitter is turned on. See section 5D for more details on control mixing selection. Refer to Table 3A for more control lever functions. The positions 6 and 7 on the mixing dial are reserved for transmitter analog control output and are unused in this product.

D. Receiver

Frequencies: 900MHz (North America) / 868MHz (Europe);
Proportional Channels: 4 (1 throttle and 3 actuator controls)
Control distance: >100m (300ft.) with supplied transmitter
Low Battery Voltage Protection
Frequency locking procedure: at start up
Power Supply: 1 cell LiPo battery (3.7V)

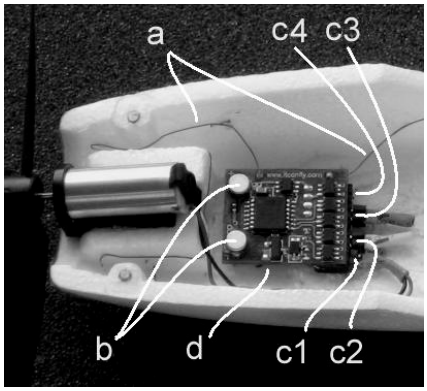


Photo 3D1 – The receiver mounted in the Base Module

a. Antenna, b. Magnetic battery connectors, c1. Proportional motor control channel output, c2, c3, c4 – 3 Proportional actuator control channel outputs (c4 is not used in this product) d. Receiver LED (on the under side)

Once the receiver is energized the motor/propeller could potentially move. Handle with care to avoid bodily injury and/or property damage. Energize the receiver only before a flight. Disconnect the LiPo battery from the receiver immediately after the flight.

The receiver and the supplied LiPo batteries have matching magnetic electrical connectors. To power up the receiver connect a supplied LiPo battery to the receiver as indicated in Photo 3D2. Do not attempt to reverse the connection polarity.

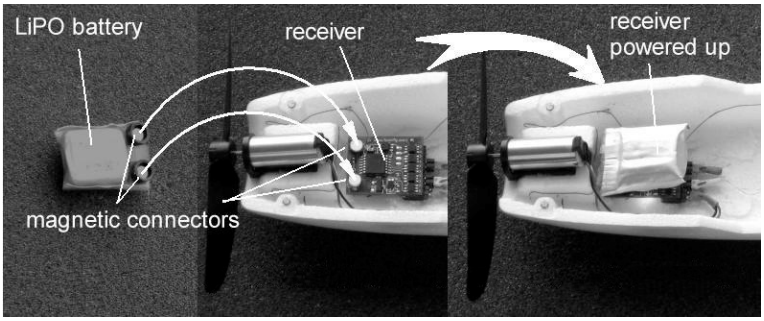


Photo 3D2 – LiPo battery connects to receiver to energize the receiver

E. Frequency Locking

To work properly the receiver needs to lock its frequency to the transmitter frequency.

Step 1. Power up the receiver -- the receiver red LED starts flashing;
Step 2. Select a frequency position on the frequency dial at the transmitter -- If in a group environment be sure to choose a frequency unused by others.

Step 3. Turn on the transmitter – the transmitter LED (red) will flash for 4 seconds, the receiver will play music for 3 seconds, and both the transmitter and the receiver LEDs will become continuously lit. The frequency locking is then established.

To prevent interference if the selected frequency is already occupied then the frequency-lock will not happen. In this case, disconnect the receiver battery, turn off the transmitter, select another frequency and repeat steps 1-3.

After establishing the frequency-lock the actuators and the motor in the Base Module should react to the control lever movements. For safety reasons the throttle control becomes active only after the throttle lever has been pulled all the way down.

4. Flying the Airplanes

Rotating propellers and moving airplanes can cause bodily injury or property damage. Do not operate this product in places where injury to people or damage to property might occur.

A. Getting Ready

1) Connect a fully charged LiPo battery to the receiver in the base module to power up the receiver (Photo 3D2);
2) Select a frequency with the transmitter frequency dial (Photo 3B);
3) Turn on the transmitter and wait for the frequency-lock music from the base module; (If frequency-lock doesn't happen, then make sure the LiPo battery connection is good, and switch off the transmitter, select another frequency and repeat 3.)
4) Choose an airplane module (the canard plane, the biplane or the V-tail plane) and connect it to the base module to form an airplane;
5) Select the mixing type according to the airplane type;
6) Verify proper responses of all the control channels:
   i. the throttle response – pull the throttle lever all the way back to activate the control, then apply throttle and make sure the motor responses accordingly;
   ii. the mixing responses for the selected airplane:

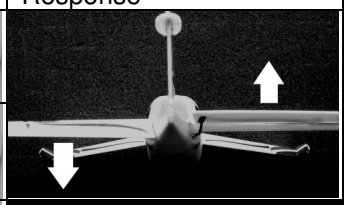
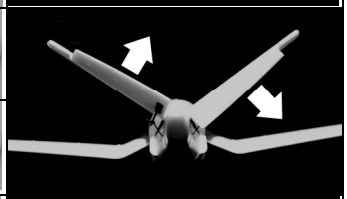
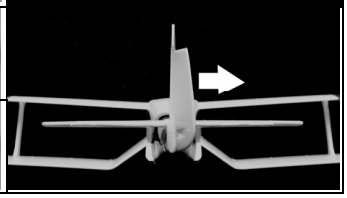
Plane	Mixing	CX9/860T (throttle on left)	CX9/860U (throttle on right)	Control Surface Response
Canard	0			
	3			
V-tail	1			
	4			
Biplane	2			
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Table 4A – Verify the correct mixing type selection
(Reverse the lever control for reversed control surface responses.)

iii. the control surfaces (elevon for the Canard plane, v-tails surfaces for the V-tail plane, and rudder/elevator for the Biplane) – verify the neutral positions (i.e. the control surface positions without any control lever inputs) and movement range and smoothness. Keep the neutral positions within about 3 degrees of the extensions of the wings to which they attach. Use the respective trimmers to adjust the neutral control surface positions if necessary. Control surfaces should be able to move at least +/-15 degrees about their neutral positions. Insufficient control surface travel may be caused by control linkage miss-connection and/or physical interference. The control surface's neutral-position-trimming depends on desired flying speed and style. Adjust accordingly.

The motor and the actuators emit audible tones. The pitches of the tones vary with the control inputs.

B. Flying

For smooth handling in flight use moderate, steady control lever motions. Avoid uncoordinated or abrupt control inputs.

1) Recommended minimum flying field – an area equivalent to the size of a full basketball court.
2) Recommended maximum wind speed – 8 km/hr (5 mph).
3) Launch the airplane – Use one hand to hold the transmitter. With the other hand hold the airplane by holding the base module fuselage near the center of gravity, and level the wings. Give the plane 40 – 60% throttle and then lightly toss it at an angle of 10 to 30 degrees up. Be ready to give immediate control input after the launch.
4) Trimming – if the airplane does not trace a reasonably straight flying path at a desired throttle level without other control inputs then adjust the respective control surface trimmer(s) (see Table 3A) to straighten the flying path.

    i. If the plane tends to fly nose-down (or up) slightly adjust the elevator trimmer down (or up) (Table 3A);
    ii. If the plane tends to turn left (or right) adjust the trimmer below the turn/bank control lever ("g" or "h" in Photo 3A depending on left- or right-lever-turn mixing selection) to the right (or left);

5) Throttle control – Once the airplane is successfully launched control the throttle input according to the flight situations. 30 – 60% throttle input should be sufficient for most normal flights. Use higher throttle for aerobatic flights. In order to save battery charge for longer flying durations avoid using full throttle for extended periods of time.
6) Turns – when turning in flight it is essential to coordinate and combine banking control with elevator and throttle controls.

    i. The left-right banking of the Canard plane results from the differential up-down deflection of the left-right elevon surfaces. Up-down maneuvers result from the collective up-down deflection of the elevon surfaces.
    ii. The left-right banking of the V-tail plane results from the differential down-up deflection of the two V-tail control surfaces (opposite differential deflections if compared with the elevon Canard plane). Up-down maneuvers result from the collective up-down deflection of the two V-tail control surfaces.
    iii. The left-right banking of the Biplane results from the left-right deflection of the rudder. Up-down maneuvers result from the up-down deflection of the elevator.

Normal turn maneuver -- Initiate the turn by a moderate banking control input to induce the airplane banking, followed by a moderate up-elevator input to maintain the altitude while banking. A banking-alone turn will cause the airplane to lose altitude. The proper amount of elevator input for a turn depends on many factors, such as the airplane speed, the throttle and the degree of banking.

Avoid steep turns -- When the Biplane and the V-tail plane are in steep turns efforts to bring the airplanes out of the turns take a longer time to take effect or they may not be effective at all. It is a good practice to “plan ahead” for turns, and avoid steep turns at low altitude if possible.

Effectiveness of actuators – unlike a servo the actuator directly controls its torque output rather than its angle. Since the amount of torque at the control surfaces necessary to effectively control a flying airplane generally varies with the airplane speed, it may become apparent that the control’s effectiveness changes with the airplane speed.

7) Landing – choose a relatively open area in which to land the planes. Gradually reduce the throttle and control the glide for a smooth landing.
8) Low LiPo battery voltage protection – During flight if the LiPo battery voltage drops below its limit the receiver will shut down the motor while still maintaining actuator controls, so the airplane is still controllable while gliding. If the LiPo battery voltage rises above the minimum voltage during motor shutdown powered flight can be resumed by first pulling the throttle lever all the way back to zero, and then applying throttle, similar to the throttle activation procedure, section 4A6i. The motor may soon shutdown again however. It is then time to land and replace the LiPo battery.
9) Aerobatics – the following are possible: loop, inverted flight, barrel roll, half point-roll from inverted flight, etc.
10) Airplane crash –
    i. Non-destructive modular de-coupling - during crashes the Base Module and the Airplane Module will disconnect and separate from one another, and the LiPo battery may also disconnect from the base module. This in most cases prevents the airplane from being structurally damaged. To resume flights just reenergize the receiver, reconnect the modules, and turn the transmitter off, then on to establish the frequency lock with the receiver. In the case of broken foam parts be sure to use foam-safe glue for the repair work.
    ii. High impact induced receiver power cycling – the mechanical shocks resulting from high impact events such as crashes or rough landings may cause the LiPo battery to momentarily disconnect and then reconnect the receiver while appearing to have never disconnected from the receiver. In this case the receiver will be in seeking frequency-lock mode with flashing LED and not responding to the transmitter. To regain control, switch the transmitter off and on again to reestablish frequency lock with the receiver.

5. Maintenance

A. Charging LiPo Batteries

The built-in dual-position LiPo charger can charge up to 2 supplied LiPo batteries at the same time. Use the charger to charge only the supplied LiPo batteries. The supplied LiPo batteries and the built-in charger have matching magnetic electrical connectors to ensure proper connections. Do not attempt to reverse the connection polarity. Keep the charger cover closed while charging. Do not leave the charging process unattended. Do not attempt to alter the charger circuitry.

1) Align the LiPo battery's magnetic connectors with the matching magnetic connectors of the charger, and connect the battery to the charger, as shown in Photo 5A;
2) Repeat 1) for the second battery at the second charging position if needed;
3) Close the charger cover;
4) Switch the "On-Charge-Off" 3-position switch to the "Charge" position. The charger LED(s) will turn on, indicating that charging is in progress; Depending on the degree of the battery depletion, the charging time may be up to 40 to 60 min.
5) When charging is complete the Charger LED dims. At this point turn the 3-positon switch to "Off", open the charger cover and remove the fully charged battery.

Photo 5A – charging the LiPo batteries

A dim, blinking Charger LED indicates no-battery-connected. If the LED is still blinking after a battery is connected for charging, consider the following possibilities:

1) Dirty connector(s) – clean the connectors;
2) Broken battery lids – replace the battery;
3) Bad LiPo battery – replace the battery;

B. Replacing the Propeller

Remove the old propeller by carefully and progressively prying it loose using a pair of tweezers against the motor mount. Use small (less than 5 degree) prying motions each time as shown in Photo 5B.

To install a new propeller:

1) Use light pressure to insert the motor shaft tip into the propeller center hole; (The shinier propeller blade surface should face the motor)
2) Place the end of the propeller hub against a hard surface, and gently push the motor retaining lever of the motor mount toward the propeller hub to further insert the motor shaft into the propeller center hole until the shaft tip reaches the end of the hole.

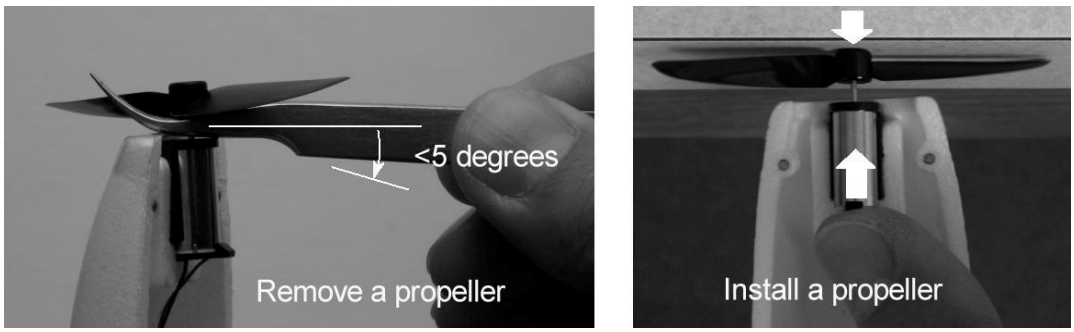


Photo 5B – replacing propeller

C. Replacing the Motor

To remove the motor:

1) Slightly push the motor retaining lever backward to release the motor;
2) Remove the motor from the motor mount, as shown in Photo 5C1.

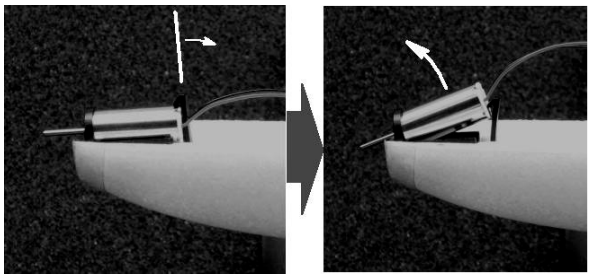


Photo 5C1 – remove the motor

To install a motor:

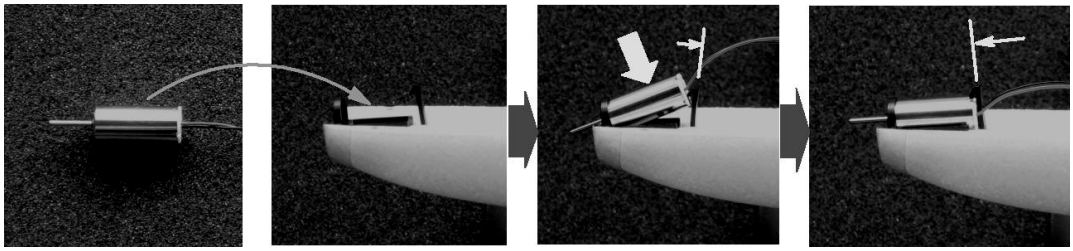


Photo 5C2 – install a motor

1) Situate the motor such that the motor shaft is inserted through the motor mount front hole,
2) Slightly push the motor retaining lever backward, making room for the motor to slide into position,
3) Press the motor body toward the motor mount,
4) Assist the motor retaining lever back into position to lock the motor in place, as shown in Photo 5C2.

D. Replacing the Transmitter Batteries

Replace the transmitter batteries (4 1.5V AA sized) when the following signs appear:

1) The transmitter-state LED - (b) in Photo 3A, becomes steadily flashing, indicating low battery voltage;
2) LiPo battery charging time become excessively long, or the charging-state LEDs behave abnormally;
3) The transmitter can not establish frequency-lock with a receiver, or often loses control;

6. Appendices

A. Determine Control Mixing

The mixing type selection of a certain airplane determines the responses of the actuators to the control inputs. To properly fly an airplane it is essential to select the control mixing type properly.

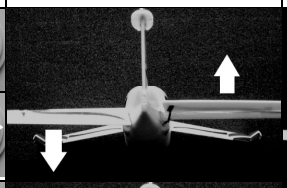
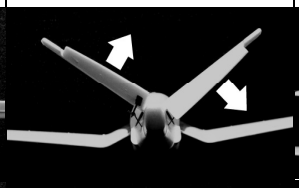
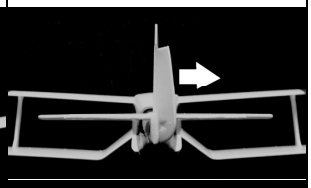
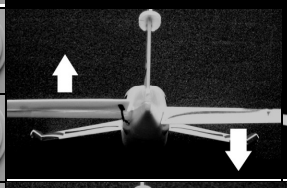
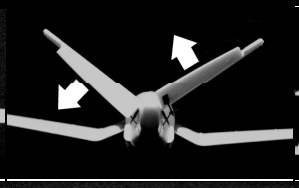
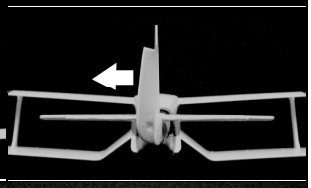
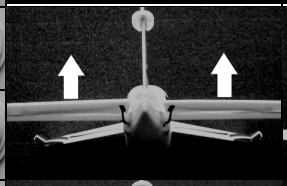
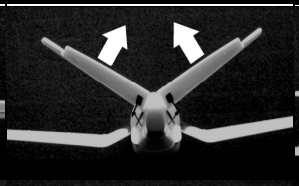
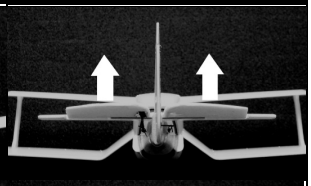
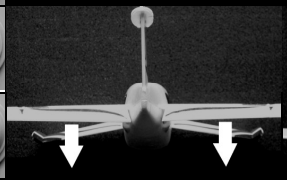
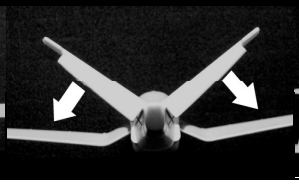
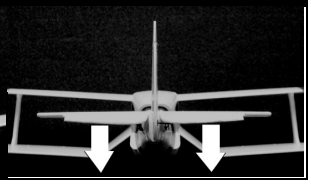
maneuver	CX9/860	Control lever movement		Control surface responses (rear view)		
		Mix selection 0,1,2	Mix selection 3,4,5	Canard plane Select mix: 0 or 3	V-tail plane Select mix: 1 or 4	Biplane Select mix: 2 or 5
BR	T					
	U					
BL	T					
	U					
U	T					
	U					
D	T					
	U					

Table 6A – Control mixings
Maneuvers: BL/R -- bank left/right, U/D -- up/down;
Transmitter type: CX9/860T/U -- left/right-hand throttle control

B. LiPo Battery Care

Handle the LiPo batteries with care. Avoid high temperature and moist environments, Avoid shorting the batteries, and avoid puncturing the batteries with sharp objects. Keep the connectors clean to ensure proper electrical connections.

When a LiPo battery cannot be fully charged, or when it is unable to deliver sufficient power to fly the airplanes properly, or if the battery is punctured or starts to “balloon up” it is time to replace the battery. Dispose of batteries properly.