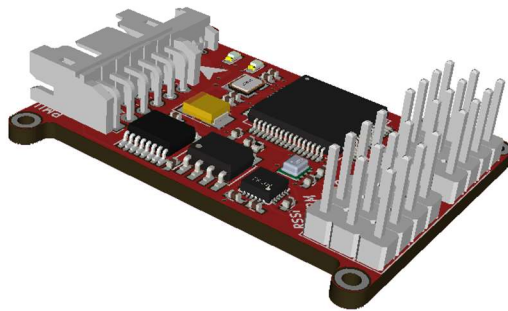


# SN-L

## FixedWingFLightController + Pixel OSD

Ver 2.0  
FW 5.0+



LeFeiRC

2018/10/10

## WARNING:

Please strictly observe the relevant national laws and regulations for safe flight. We do not advocate flying high, flying far, experience the fun of the model airplane in a fully safe environment, and create a good environment for model airplane sports! Before using the flight control, you must fully understand the various safety details and deeply understand that the flight is risky. It is impossible to be completely reliable on the equipment and any electronic products on the aircraft. You should use the Sinan (SN\_L) fixed-wing flight control to evaluate the product and use the system according to relevant regulations. The system provider does not use the product for any use. Responsible for direct or indirect losses and consequences.

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**FEATURE:**

- size, 38\*25mm; weight 6.8g
- Pixel OSD, no need to set parameters through the computer
- Built-in acceleration, gyroscope, magnetic compass, barometer
- Built-in high-performance AHRS algorithm for optimization of fixed wings
- Support for expanding high-precision digital airspeed meters
- Support SN\_AAT(Automatic Antenna Track), built-in AAT algorithm, no need for external AAT onboard module
- Support firmware upgrade
- Support PPM, SBUS interface receiver, independent RSSI interface
- Support 4-channel PWM output, 2-channel AUX
- Support wing, v-tail, T-tail, 6 flight modes

**Interface:**

RSSI	Connect to receiver RSSI channel
PPM	Connect to SBUS/PPM
A1	Extend other functional interfaces
A2	Extend other functional interfaces
AIL	Aileron servo interface
ELE	Elevator servo interface / Airspeed interface
THR	ESC interface
RUD	RUD servo interface
GPS	Connect to GPS
PMU	Power/Camera/VTX/Current, all in one interface

➤ **Connect AirSpeed Meter**

Step1: connect ELE servo to AUX1/AUX2 channel

Step2: set AUX1/AUX2 channel as ELE function

Step3: connect airspeed meter to ELE channel

Step4: power on again



If you should change ELE servo direction, you should set AUX1/AUX2 channel direction

➤ **Power Supply**

All the above interfaces are powered by the external 5v BEC module, and the flight controller does not output 5V to supply power to these interfaces.

**Flight Mode:**

MANUAL	Remote control directly controls the aircraft
STAB	Auto level
RTH	Return to home
HOVER	Altitude hold and cycle。
AH	Aircraft hold altitude and flight route(with GPS)
ACRO	Gyro mode
SUB-MODE	Switch mode to slave mode

➤ **RTH Mode**

When the return altitude is higher than the set height, for example, returning at a height of 150m. If the set return altitude is 120m, the aircraft will return at a height of 150m, and then decrease the altitude to 120m when approaching the home position. If the return altitude is less than 30m, the aircraft will climb to 30m before turning. The RC cannot control the aircraft during the RTH mode, but the throttle can be raised by the throttle stick.

In auto cruise mode, the throttle is automatically calculated based on the speed. In the case of a downwind or a large wind, the throttle can be raised by the remote control to prevent the aircraft from stalling. for example if auto throttle is 45%, but the RC throttle is 50%, then FC output 50% throttle.

➤ **subMode**

If you want to use subMode switch, you must set a subMode in mode switch,.

➤ **AltHold mode**

FC will lock the route if GPS is connect. Otherwise only hold altitude.

When GPS is connected, RUD stick can change the head direction, ELE stick can control climb down/up speed; if move AIL stick FC will enter stab mode.

**How to Switch Flight Mode:**

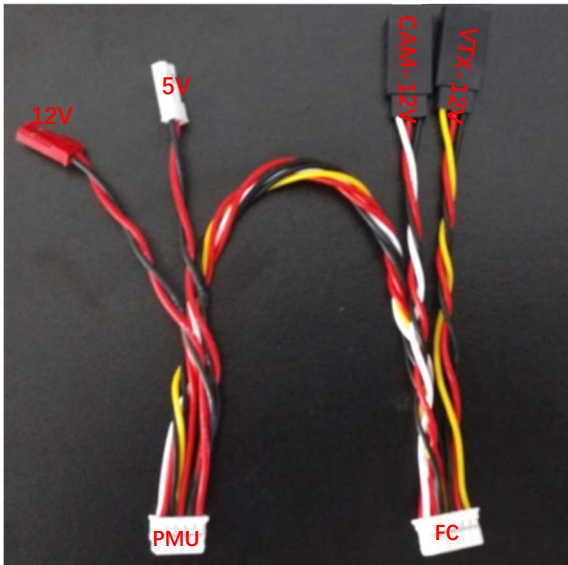
SN\_L sets the RC channel 5 as the main mode switch, so the 5<sup>th</sup> channel of the RC must be set to a three-segment switch; the subMode switch can be selected or not used when the remote controller is calibrated.

**Example:**

ModeSwitch	subModeSwitch
STAB	RTH
SUB-MODE	HOVER
MANUAL	ALtHold

FC instal:

① PMU Module



BAAT : BAAT connect to battery



old version



new version

② Power Interface

- PMU Module input 3S-6S battery, output 12v-3A & 5v-3A, max current 85A 。
- Servo and Receiver is powered by external 5v Power Module 。
- FC and GPS is powered by PMU 。
- Do not overload the PMU 。

③ Install direction

3 install direction: <BASE FUNCTION> -> <AP DIRECTION>

0°	Arrow point to head
180°	Arrow point to rear
90°	Arrow point to left



The FC installation should try to avoid the vibration source and keep away from the motor; try to install it near the center of gravity. Be sure to recalibrate the level after changing the installation direction

④ How to connect servo

Interface \ Type	AIL	ELE	THR	RUD	AUX1	AUX2
Wing	Servo1	Servo2	ESC		ALL	ALL
T tail	AIL servo	ELE servo	ESC	RUD servo	ALL	ALL
V tail	AIL servo	ELE servo1	ESC	ELE servo1	ALL	ALL

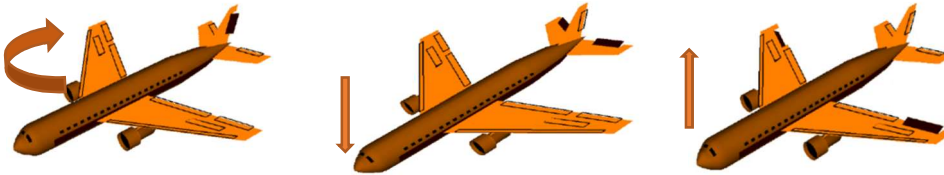
It is recommended that you use an external 5v power module to servos and receiver.

➤ **AUX channel**

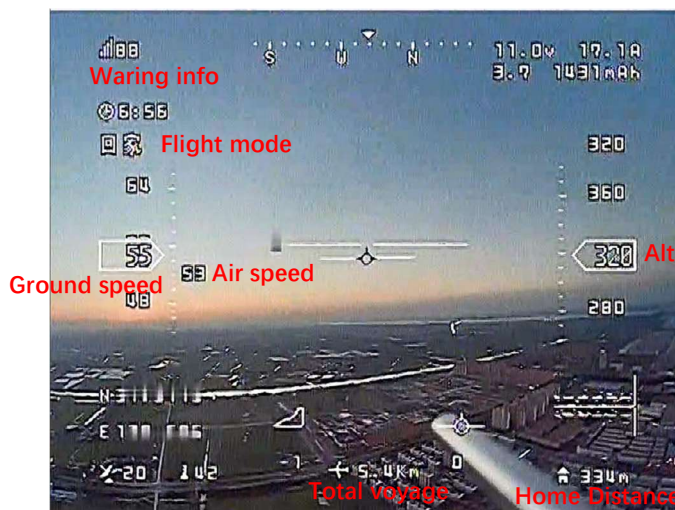
AUX channel can extend other functions, such as outputting RC channels, or multiplexing AIL, ELE, THR.

⑤ **Correct Control Surfaces Movement**

Switch to stab mode, your servo should move like this:



OSD Picture:



Some wide dynamic (WDR) cameras may cause OSD images to be garbled or jittery. Try to turn off WDR. Although we have tested a variety of WDR cameras to work properly, inevitably there will be incompatibilities.

It is recommended to use a PAL camera to get a more detailed picture.

After Landing, OSD will show flight summary.

**Remote Controller:**

➤ **Calibrate RC**

Please make sure all channels of AIL,ELE,THR,RUD are in the first four channels.

Make sure the fifth channel as mode switch is a three-segment switch.

When a new RC is connected to the FC, it will pop up a calibration screen:

<b>Page1:</b> reset all channels, flip mode switch enter next step	Clear all offsets, sticks is homed, and the RC does not set the range limit
<b>Page2:</b> throttle <b>Up</b> , flip mode switch enter next step	Get throttle MAX value
<b>Page3:</b> throttle <b>Down</b> , flip mode switch enter next step	Get throttle MIN value
<b>Page4:</b> <b>Keep</b> the AIL stick to the <b>Left</b> , flip mode switch enter next step	Get AIL channel MIN value
<b>Page5:</b> <b>Keep</b> the ELE stick to the <b>Down</b> , flip mode switch enter next step	Get ELE channel MAX value
<b>Page6:</b> <b>Keep</b> the RUD stick to the <b>Left</b> , flip mode switch enter next step	Get RUD channel MIN value
<b>Page7:</b> flip subMode switch, flip mode switch enter next step	Detect subMode switch

➤ **Enter RC Calibrate:** <BASE FUNCTION> -> <CALI RC>

- ① When you can't enter RC calibrate menu for some reason; follow steps like this:  
Power on FC -> make RC sticks move to the side-> wait until RC calibrate menu display
- ② Before OSD initialization is complete, don't move sticks, otherwise you would enter RC calibrate menu again
- ③ After calibrate, don't change RC trim

➤ **FailSafe**

PPM receiver FC can't recognize whether the RC is out of control, need to be set in advance.

SBUS receiver can automatically identify if it is out of control

Enter OSD menu <BASE FUNCTION> -> <FAILSAFE MODE>

FAILSAFE MODE	GPS connect, satellites>6	GPS disconnect/GPS lose signal
HOLD	Hold current mode	Hold current mode
RTH	Return to home	Switch to stab mode, close throttle, Circling down①
STAB	Switch to stab mode, close throttle, Circling down	Switch to stab mode, close throttle, Circling down

①The AIL is 10 degrees to the left, the ELE is 15 degrees down, and the throttle is closed.

➤ **Calibrate ESC**

- ① Switch flight mode to manual
- ② Disconnect ESC from PMU, don't disconnect battery
- ③ Move throttle UP
- ④ Connect ESC
- ⑤ After "di-di", move throttle down

➤ **RSSI**

Support independent RSSI and RSSI signal channels in SBUS or PPM signals; can be selected by OSD menu.

The independent RSSI automatically recognizes the RSSI signal type, PWM or AD type; the RSSI signal of some models of receivers may cause the OSD picture to flicker due to the RSSI modulation into a high frequency pulse signal.

FC does not return to home based on the RSSI signal value.

➤ **ARM&DISARM**

Satellites	<=6	>6
GPS connect	DISARM	ARM
GPS disconnect	ARM	ARM

\*If flight mode is manual mode, you can control the throttle in any situation

**Pre Flight checklist:**

1	Check the rudder feedback is correct
2	Check the firmware version to keep the firmware up to date
3	Check if the FC attitude line is level. If it is not calibrated for a long time or the temperature changes too much, you need to recalibrate.
4	Check if the battery voltage
5	Confirm the position of each mode
6	Confirm that the Home location has been updated.
7	Confirm the vibration of the body and open the acceleration curve display. If the vibration is too large, the attitude will be disordered. It is recommended to keep the vibration amplitude within the warning line while maintaining horizontal flight.

\* Recalibration level is also required after changing the direction of FC installation

\* If you do not calibrate for a long time, or if the temperature changes too much, you need to recalibrate level (even if the attitude line looks level)

## ➤ Check accel health <OSD>-<SCOPE>-<HEALTH>

- ① The vibration is in good condition. When the plane is flying flat, the vibration point is scattered within the two warning lines.



- ② The vibration is large, and most of the vibration points fall outside the warning line, which easily leads to the FC can't calculate the correct attitude



## ➤ Calibrate Level

Ensure that the aircraft is level and stationary during horizontal calibration.

- ① Horizontal calibration is required after changing the mounting direction.
- ② If you have not calibrated for a long time or the temperature difference has changed too much, you need to recalibrate.

## ➤ Sensitivity adjustment

Sensitivity adjustment follows a simple rule that the smaller the wingspan, the smaller the sensitivity; the faster the flight speed, the smaller the sensitivity.

*Two points to note for gain adjustment:*

1 <BASE FUNCTION>---<AIL BASE GAIN> <ELE BASE GAIN> <RUD BASE GAIN>: The larger the value, the faster the reaction speed and the excessive jitter.

2 <ADVANCE FUNCTION>---<STAB GAIN>---<FEED FORWARD GAIN>: The larger the value, the faster the response joystick will be, and the jitter will be exceeded.

*Adjustment steps:*

Step1: set <FEED FORWARD GAIN>, normally reduce feed forward gain to 40

Step2: Set the <AIL BASE GAIN> <ELE BASE GAIN> <RUD BASE GAIN>. The span of 1m or less can set The parameter to about 45. If it exceeds 1m, it can be defaulted.

After the parameters are set, you can fly test; firstly fly in **manual** mode, check whether the aircraft is mechanically balanced; then switch to the **stabilization** mode. If the aircraft is found to be shaking during the flight, reduce the sensitivity in the basic settings. If the aircraft is found to be unresponsive, then The sensitivity of the basic setting can be appropriately increased; under the premise that the basic sensitivity is set, the size of <FEED FORWARD GAIN>, can be appropriately increased. The larger the value, the more the aircraft follows the action of the RC sticks, but too large will cause the aircraft to shake.

## Flight and control:

When a small arrow appears in the center of the screen, it indicates that FC has get "home" position; it can take off right now. You do not need to check this if you don't connect GPS.

## ➤ Auto TakeOff



- ① AltHold Mode: Push the throttle to enough power and the aircraft will automatically climb to a height of 10m.
- ② RTH Mode: Push the throttle stick away from the lowest position (if the throttle stick is at the lowest level below 20m, the motor will never start), give plane a speed until motor start. It is recommended that the hand throw speed be 2-3m/s and the ejection speed be 10-15m/s.

➤ **Throttle and speed control**

- ① Airspeed meter disconnect

Speed is controlled by the ground speed, cruise speed is set in <ADVANCE FUNCTION>-<CRUISE SPEED>.

- ② Airspeed meter connect

Airspeed control keeps the aircraft from getting enough lift.

In the case of connecting an airspeed meter, the speed of the aircraft is determined by the airspeed meter, and the airspeed is also controlled in the altitude mode. When the aircraft is less than <MIN GROUND SPEED>, the speed of the aircraft is kept at the minimum ground speed, preventing the aircraft from stopping in the event of a headwind and swinging left and right. In general, it is recommended to set<MIN GROUND SPEED> to about 10m/s.

## OSD Menu

Enter OSD menu	Flip mode switch twice
AIL move left	Exit the current menu or exit the selected mode
AIL move right	Enter menu or select setting item
ELE move up or down	Change item index or select parameter

\* in flight can't enter the setup menu

➤ **Flight summary**

After the landing, the OSD screen will display the flight summary, and each component will display the maximum value. Restart the flight control to eliminate the flight summary.

➤ **BASE FUNCTION**

1.3 AIL BASE FUNCTION	The default gain can be adapted to most models. The heading gain only works in the T-tail type. The V-tail and the delta-wing heading are manually controlled, and the flight control does not participate.	
1.4 ELE BASE FUNCTION		
1.5 RUD BASE FUNCTION		
1.1 AIRFRAME TYPE	T-Tail, V-Tail, Wing	
1.2 AP DIRECTION	0, 180, 90	
1.7 FLIGHT MODE		
1.8 WARNING BATTERY	Voltage warning value, OSD will prompt low voltage information	
1.9 AUX		
2.0 CALI RC	Remap RC channel, get channel range and direction	
2.1 FAIL-SAFE MODE		
2.2 RESET HOME	update home location	
2.4 UNIT	Switch metric system: "M"/"Ft"	
2.3 RESET SETTINGS	Reset all settings	
1.6 SERVO	AIL EXP	Adjust the exp of the RC, the larger the value, the smaller the control amount near the center of the joystick; it only takes effect in the MANUAL mode.
	AIL TRIM	Adjusting the servo offset, can be used to fine tune the rudder surface.

	AIL RANGE	Adjust the rudder amount of the RC. The smaller the value, the smaller the stroke of the joystick control servo.
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➤ **ADVANCE FUNCTION**

2.1 ADVANCE STAB GAIN	ALT-HOLD GAIN	NO NEED
	SPEED GAIN	In the case of automatic cruising, if the throttle changes in a wave shape, this value needs to be reduced.
	FEED-FORWARD GAIN	The adjustment range is 0~100; the larger the value, the more flexible the hand feel, the default is 70. If this value is too large, it will cause the aircraft to shake. The small aircraft is recommended to be set to around 35-45.
2.2 CONTROL RATE	Control the rotation speed of the aircraft's roll and pitch. The larger the value, the more flexible the aircraft, and the larger the wingspan can be set larger.	
2.3 MAX ROLL ANGLE		
2.4 MAX PITCH ANGLE		
2.5 RTH ALT	The lowest altitude in the home mode, when the aircraft returns, it will hover according to this height	
2.6 HOVER RADIUS		
2.7 MIN GROUND SPEED	When airspeed is connect	
2.8 TAKE-OFF SPEED	In the home mode, trigger the speed at which the motor starts (ground speed); used to assist the takeoff; hand throw 3-5m / s; ejection 15m / s;	
2.9 CURISING SPEED		
3.0 CURISING BASE THR		
3.1 CURISING MAX THR		
3.2 FAILSAFE TIME	0-3s ①	

① For example, if it is set to 3s, when the remote control is out of control, wait for 3s before entering the failsafe mode (RTH mode) .

➤ **传感器**

3.1 CALI LEVEL&GYRO	Keep the aircraft level, and still
3.2 CALI BATT	
3.3 CALI COMPASS	NO NEED
RSSI CHANNEL	RSSI CHANNEL: "0"= Independent RSSI channel wiring "1-18"= Map the corresponding RC channel
3.4 CALI RSSI	

Firmware upgrade

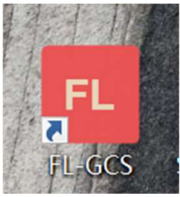
The way of get firmware and user manual:

[www.lefeirc.com](http://www.lefeirc.com)

[https://github.com/HelloLeFei/SN\\_L/releases](https://github.com/HelloLeFei/SN_L/releases)

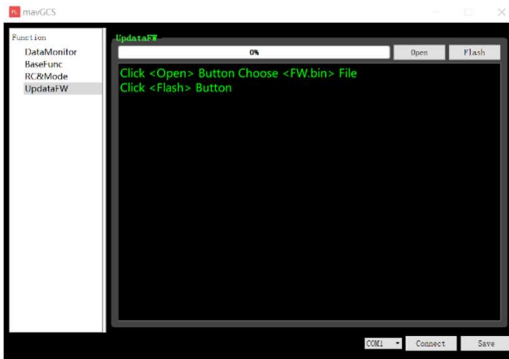
**Step1:** Download upgrade software and drivers and install:

Please install "CP210x USB to UART Bridge" driver.



**Step2:** download firmware:

**Step3:** open FL software:



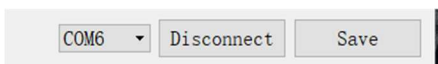
**Step4:** connect FC:



**Don't power on FC at first !**

Connect the upgraded board like this picture; check the serial port number in the computer management. Then select the corresponding serial port number in the software.

And click on "connect"



**Step5:** Load firmware and update

Click the "open" button to load the bin file, then click flash;;

The computer will have a 10s countdown, please power on the FC within 10s;

After the FC is powered on, the firmware will be written; 100% indicates that the updata firmware is successfully!