

SN-L

FixedWingFLightController + Pixel OSD

Ver 2.5
FW 5.8+



LeFeiRC

2019/1/10

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.

i. 目录

一、	INTERFACE.....	3
二、	FLIGHT MODE	3
三、	SWITCH FLGHT MODE	4
四、	INSTALLATION	4
五、	REMOTE CONTROLLER.....	6
六、	PRE FLIGHT CHECKLIST	7
七、	FLIGHT AND CONTROL.....	8
八、	OSD	9
九、	Firmware upgrade.....	10

一、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: set AUX1/AUX2 channel as ELE function
 Step2: connect ELE servo to AUX1/AUX2 channel
 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 above interfaces are powered by the external 5v BEC module, and the flight controller does not output 5V to supply power to these interfaces.

二、FLIGHT MODE

MANUAL	Remote control directly controls the aircraft
STAB	Auto level
HORIZON	ACRO mode + STAB mode
RTH	Return to home
HOVER	Altitude hold and cycle.
ALTHOLD	Aircraft hold altitude and flight route(with GPS)
GUID	Keep on the route
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(airspeed or ground 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.

➤ AltHold mode

FC will lock the route if GPS is connect. Otherwise only hold altitude. The throttle stick is placed in the middle position, meaning that the current speed is equal to the set speed. Move up or down to increase or decrease speed.

三、 SWITCH FLIGHT MODE

SN_L sets the RC channel 5 as the main mode switch, so the 5th 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:

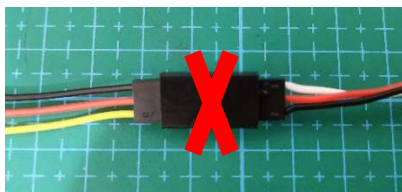
ModeSwitch	subModeSwitch
STAB	RTH
SUB-MODE	HOVER
MANUAL	AltHold

四、 INSTALLATION

① PMU Module



✧ Before power on FC, please check everything is correct.



Install direction

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

0°	Arrow point to head
180°	Arrow point to rear
90°	Arrow point to Left side of the nose
270°	Arrow point to right side of the nose



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

② How to connect servo

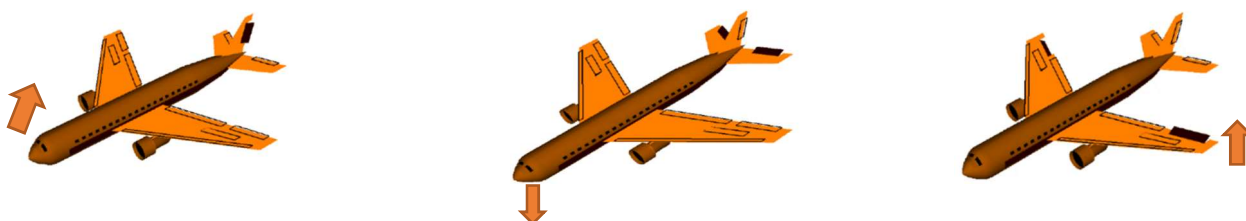
Interface Type	AIL	ELE	THR	RUD	AUX1	AUX2
Wing	Servo1	Servo2	ESC		ALL	ALL
T tail	AIL servo	ELE servo	ESC	RUD servo	ALL	ALL
V tail	AIL servo	ELE servo1	ESC	ELE servo1	ALL	ALL

AUX channel

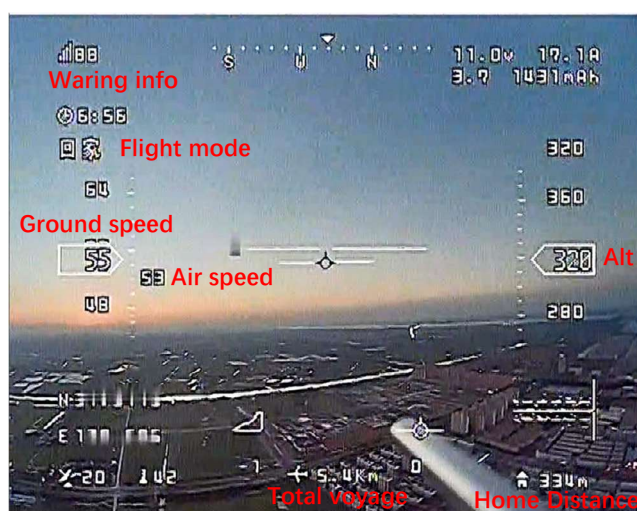
AUX channel can extend other functions, such as outputting RC channels, or multiplexing AIL, ELE, THR.

③ Correct Control Surfaces Movement

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



OSD Picture:



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

After Landing, OSD will show flight summary.



Speed unit 'Km/h' or 'Mile/h'; Altitude unit 'm' or 'Ft'.

五、 REMOTE CONTROLLER

➤ Calibrate RC

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

Make sure the 5 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:

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

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.

➤ 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.

If connect a SBUS receiver, you Set RSSI channel to 18 , <OSD SETTINGS MENU>-<SENSOR>-<RSSI CHANNEL> , FC will auto calculate RSSI according to SBUS signal packet loss rate.

➤ CALIBRATE ESC

Step1: switch to manual mode.

Step2: unplug the ESC signal line and wait for ESC to make a di---di---di--- sound.

Step3: move the throttle stick to the max position, then plug in the ESC signal line.

Step4: hear di—di—, then move the throttle stick to the lowest to complete the calibration.

➤ 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

六、 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.

七、 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. set the take-off speed to 0 in the RTH mode; push the throttle stick to unlock the motor, shake the aircraft, throw the airplane after the motor starts, the airplane will climb to 30m and start to turn

➤ Throttle and speed control

- ① Airspeed meter disconnect
Speed is controlled by the ground speed, cruise speed is set in <ADVANCE FUNCTION>-<CURISE 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.

八、 OSD

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.	
1.4 ELE BASE FUNCTION	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.	
1.5 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"; m="m,m/s, km/h"; Ft="Ft, Mile, Mile/h"	
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.

➤ **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.
	SPEED PID FACTOR	Reduce the effect of speed on servo sensitivity②
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; 0: shake airplane start motors
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) .

② The faster the speed, the smaller the servo PID sensitivity should be.

➤ OSD

4.8 RC CHANNEL TYPE	MODE1: JAPAN, MODE2:AMERICA
4.9 AAT (auto antenna tracking)	Open or close AAT function
5.1 LANGUAGE(语言)	EN: English

➤ SENSOR

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 "1-17"= Map the corresponding RC channel "18"=auto calculate RSSI (SBUS)
3.4 CALI RSSI	

九、Firmware upgrade

The way of get firmware and user manual:

www.lefeirc.com

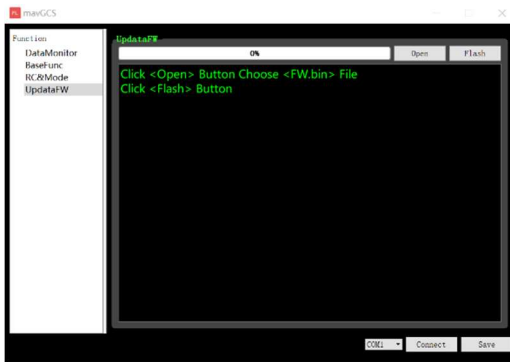
https://github.com/HelloLeFei/SN_L/releases

Step1: Download upgrade software and drivers and install: install "CP210x USB to UART Bridge" driver.



Step2: download firmware:

Step3: open GCS 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 update firmware is successfully!