

SN-NAVI 司南飞控

FixedWingFLightController + Pixel OSD

Verv2.0

FW 2.3+



LeFeiRC

2019/7/29

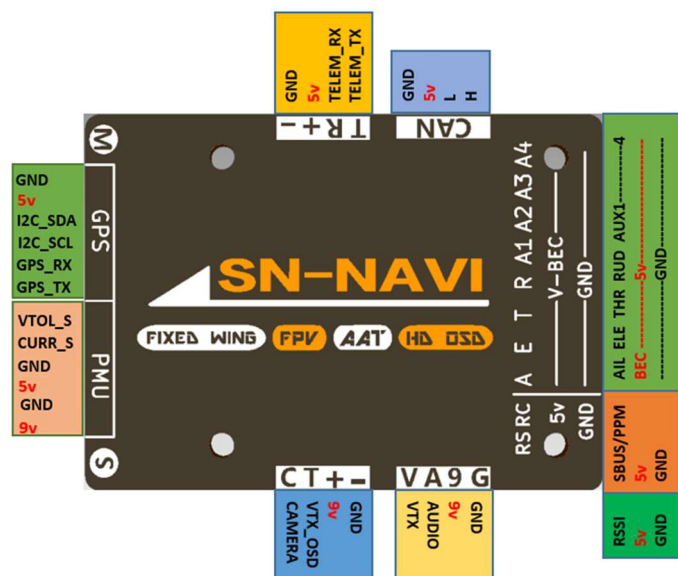
WARNING:

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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1. INTERFACE:



- ① GPS, TELEM, CAN, CAMERA, VTX, RECEIVER All powered by PMU
- ② SERVO powered by external BEC

2. 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
WAYPOINT	
VTOL	
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.

- **GEO FENCE:** When the fence is turned on, the RTH mode is triggered once the height or distance exceeds the fence radius. The way to cancel the RTH mode is to switch the mode switch once. If you do not cancel, you can dial the mode switch several times.

3. 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 SUB-MODE switch can be selected or not used when the remote controller is calibrated.

Example:

Position	Mode switch	SUB-Mode Switch
1	STAB	RTH
2	SUB-MODE	HOVER
3	ALTHOLD	MANUAL

4. INSTALLATION:

① PMU MODULE



② INSTALL DIRECTION

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

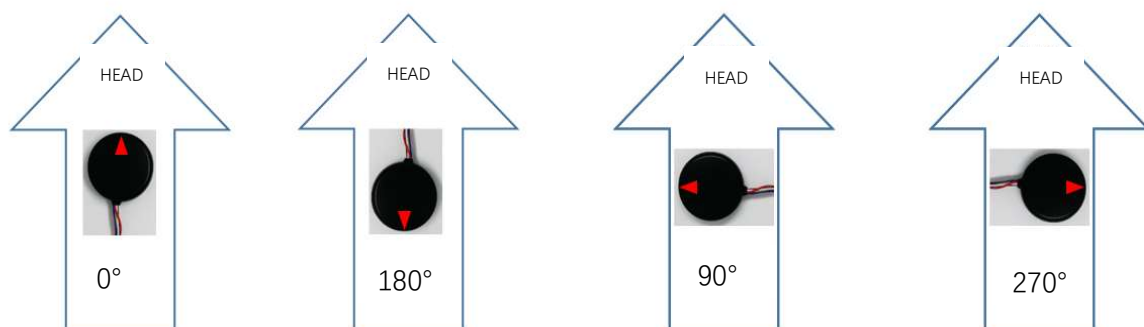
0°	Arrow point to head
180°	Arrow point to rear
90°	Arrow point to Left side of the nose
270°	Arrow point to right side of the nose



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

③ INSTALL GPS & COMAPSS

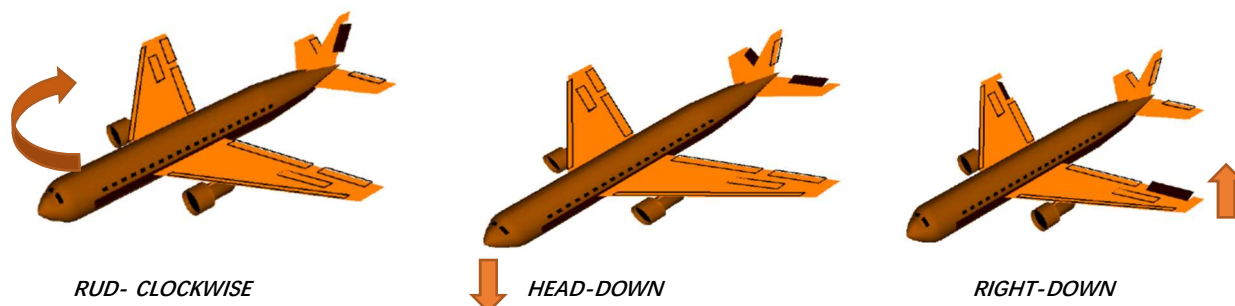
4 install direction: *<SENSOR> -> <COMPASS DIRECTION>*



④ HOW TO CONNECT SERVO

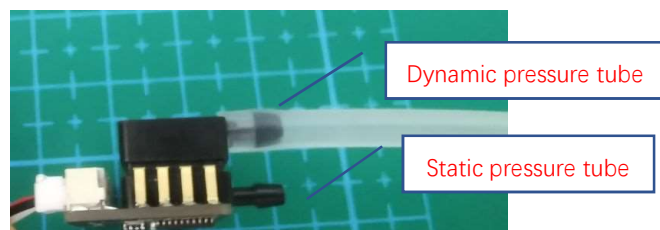
Interface \ Type	AIL	ELE	THR	RUD
Wing	SERVO 1	SERVO 2	THR	
T tail	AIL SERVO	ELE SERVO	THR	RUD SERVO
V tail	AIL SERVO	ELE SERVO1	THR	ELE SERVO2
VTOL	SERVO1	SERVO2	MOTOR1	MOTOR2

⑤ CORRECT CONTROL SURFACES MOVEMENT



⑥ CONNECT AIRSPEED

Connect airspeed to CAN interface.



Working principle: The dynamic pressure pipe is connected to the leather tow pipe and placed in front of the machine head to measure the pressure of air flow. The static pressure tube is placed inside the nacelle to measure the actual air pressure, so the actual installation should ensure that the static pressure tube cannot blow the air flow.

⑦ SMART AUDIO

Connect the VTX OSD parameter interface to **<VTX OSD>** port of the flight controller, and then enter **<6 MISC>-<VTX SMART AUDIO>/<VTX IRC TRAMP>** to set the channel and power. The power is subject to the actual display.

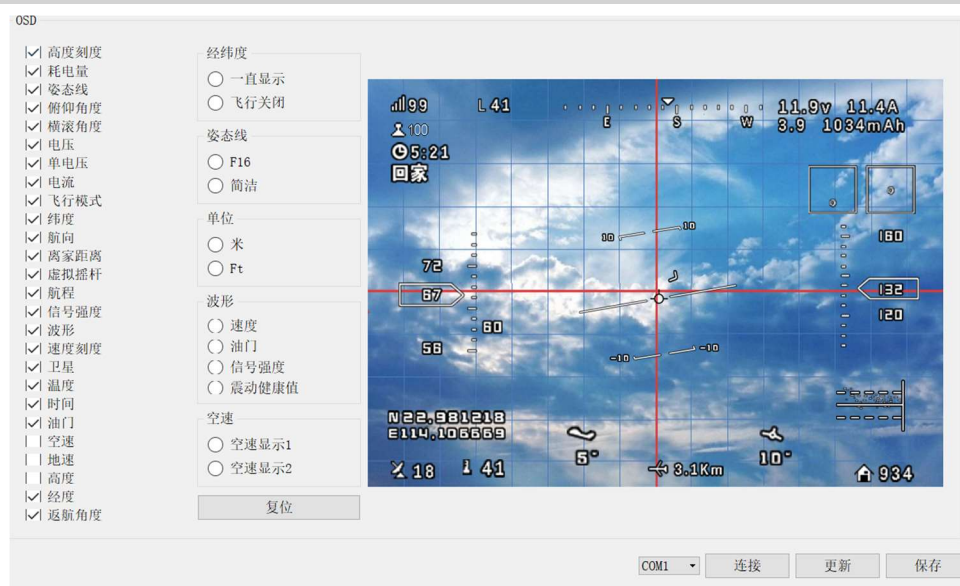
⑧ TELEMETRY PORT

- . As mavlink telemetry: **<6 MISC>-<2 TELEM PORT FUNC>-<MAVLNK>**
- . As friend plain communication: **<6 MISC>-<2 TELEM PORT FUNC>-<PLAIN>**

⑨ AUDIO ALARM

You can choose to turn off or turn on the audible prompt at **<6 MISC>-<3 AUDIO ALARM>**

5 . OSD:



- ① All icons can be moved or turned off.
- ② Click the Update button to get the device information of the flight controller; click the Save button to save the set information to the flight control; the reset button restores the icon to the default settings.



6 . REMOTE CONTROLLER:

➤ CALIBRATE RC

Make sure the 5th 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 SUB-Mode switch, flip mode switch enter next step	Detect SUB-Mode switch

➤ ENTER RC CALIBRATE <BASE FUNCTION> - <CALI RC>

- ① When you cant 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, dont change RC Channel offset

➤ FAIL SAFE

- ① PPM receiver FC can't recognize whether the RC is out of control, need to be set in advance.
- ② 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

➤ 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.

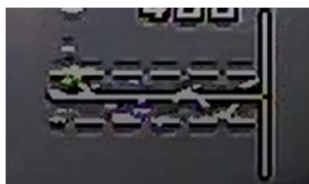
➤ RSSI

- ① Support independent RSSI and RSSI signal channels in SBUS or PPM signals; can be selected by OSD menu.
- ② 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.
- ③ FC does not return to home based on the RSSI signal value.
- ④ 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.

8 . PRE FLIGHT CHECKLIST:

➤ 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 **<SENSOR>-<CALI LEVEL>**

- ① Ensure that the aircraft is level and static during horizontal calibration.
- ② Horizontal calibration is required after changing the mounting direction.
- ③ If you have not calibrated for a long time or the temperature difference has changed too much, you need to recalibrate.

➤ SENSITIVITY 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.
- ③ Adjustment Steps:
 Step1: set **<FEED FORWARD GAIN>**, normally reduce feed forward gain to 45
 Step2: set the **<AIL BASE GAIN> -<ELE BASE GAIN> -<RUD BASE GAIN>**. You can fly by default, then increase or decrease the sensitivity according to the state of flight.
- ④ Speed PID Factor
PRINCIPLE: the faster the speed, the smaller the rudder surface sensitivity should be. The greater the value, the greater the speed involved in PID control.
EXAMPLE: when speed of the aircraft is very fast, the aircraft begins to shake; then you can increase **<ADVANCE FUNC>-<STAB GAIN>-<SPEED PID FACTOR>**value.

➤ ARM & DISARM

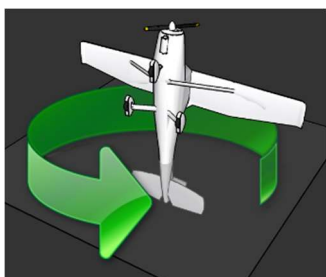
Satellites	<=6	>6
GPS connect	DISARM	ARM
GPS disconnect	ARM	ARM

➤ CALIBRATE COMPASS **<SENSOR> - <CALI COMPASS>**

Step1:



Step2: after this step, please wait until OSD indicate done.



9. FLIGHT & CONTROL

➤ AUTO TAKEOFF:

- ① AltHold mode: Push the throttle to enough power and the aircraft will automatically climb to a height of 20m.
- ② RTH mode:
 - 2.1 **<TAKE OFF SPEED >** more than zero, push throttle stick away from the zero position, give plain a speed until motor start.
 - 2.2 **<TAKE OFF SPEED>** equal zero, push throttle stick away from the zero position, shake the aircraft, until motor start.
 Aircraft will auto climb at 30m.

➤ SPEED CONTROL

- ① Disconnect Airspeed

Speed is controlled by the ground speed, cruising speed set in *<ADVANCE FUNCTION>-<CURISE SPEED>*.

② Connect Airspeed

Speed is determined by airspeed, Preventing the wind from flying in the head, causing the ground speed to be too small, please set *<MINIMUM GROUND SPEED>*.

➤ COMPASS

Why compass?

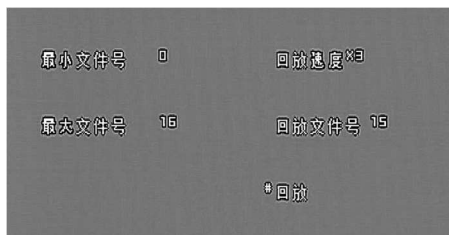
- ① The fixed wing can obtain the flight direction through GPS under normal speed, so as to ensure that the aircraft can return home safely; but when the wind is blowing in the wind, the direction of the GPS guidance will be wrong due to the excessively low ground speed. The aircraft stops spinning back and forth; this is the situation in which the compass can participate in the control, stabilize the flight direction of the aircraft.
- ② The flight control adopts an external compass installation to prevent electromagnetic interference inside the cabin.
- ③ The flight control adopts the algorithm jointly controlled by the compass and the GPS. When the GPS indicates the direction is valid, the GPS direction is adopted. When the GPS ground speed is too low, the compass direction is adopted to ensure the safety of the aircraft.

➤ FLIGHT LOG

The FC detects that the data is recorded after the aircraft takes off, and can enter the data playback interface through the OSD after landing.。

The files are recorded in the order of records. The larger the file ID number, the closer the time is to the most recent flight. The flight record data includes geographic location, speed, altitude, attitude, battery voltage, current, and flight mode.

The flight control can be connected to the computer by digital transmission before playback. The ground station begins to display the flight path status when starting playback.



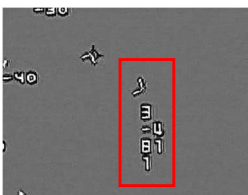
Select the item to be executed by move the mode switch, and select the specific file and playback speed by using the up and down joysticks.

➤ MULTI-AIRCRAFT DISPLAY

STEP1: *<MISC>-<SYSTEM ID>* set your plain ID.。

STEP2: *<MISC>-<TELEM PORT FUC>-<PLNAE>*。

STEP3: Check if OSD has display ID



The position of the friend aircraft in the red box, from the top to the next is the ID number, height, distance, speed

* the ID number must start from 1 and cannot be skipped.

10 . OSD

➤ ACTION

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

11. FIRMWARE UPGRADE

STEP1: Download upgrade software and drivers and install: install "CP210x USB to UART Bridge" driver.

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

www.lefeirc.com

STEP2:

- ① Connect via blue-tooth
- ② Connect via USB
- ③ Select correct com ID

***Do not connect USB and telemetry at the same time, Otherwise it may cause the upgrade to fail.**

STEP3:

➤ Upgrade IMU

Step1: Select "IMU"

Step2: load firmware and flash, please ensure that FC is running normally.

*** If upgrade failure , please restart FC and GCS, then try it again.**

➤ Upgrade SN_NAVI

/*****way 1 *****/

Step1: Select "SN_NAVI"

Step2: load firmware and flash, please ensure that FC is running normally.

/*****way 2, if way1 failure you should use way2 *****/

Step1: power off FC at first

Step2: Select "SN_NAVI"

Step3: load firmware and flash,

Step4: Before the end of the countdown, power on FC

