

SN-NAVI 司南飞控

FixedWingFLightController + Pixel OSD

Verv2.2

FW 3.0+



LeFeiRC

2020/4/20

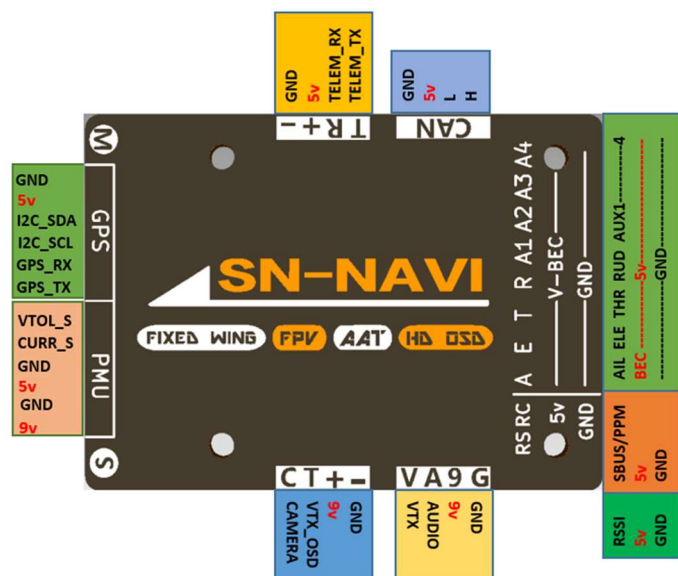
WARNING:

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.

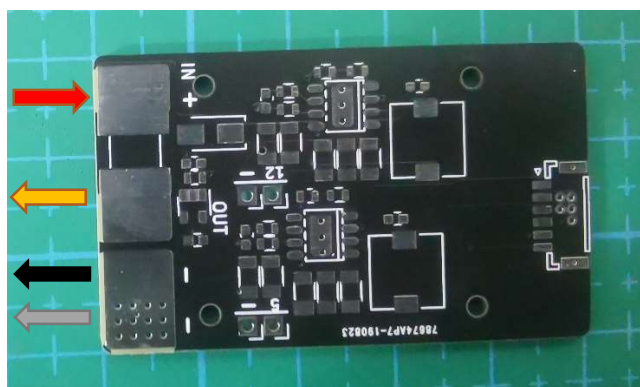
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1. INTERFACE:



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



- ➔ BATT IN
- ➔ ESC IN
- ➔ BATT GND
- ➔ ESC GND

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

- ① You need to set **< CRUISING SPEED >**, **< CIRCLE RADIUS >**, **< RTH SAFE ALTITUDE >** and **< RTH ALTITUDE >** in the RTH mode.
< RTH SAFE ALTITUDE > refers to the height that the aircraft needs to maintain when returning home; for example: The aircraft begins to return home at an altitude of 2000 meters. At this time, when the **< RTH SAFE ALTITUDE >** is set to 500m, the aircraft will

slowly descend to 500 meters and then return home ; If the *< RTH SAFE ALTITUDE >* is less than 500 meters, the aircraft will climb to a height of 500 meters first.

< RTH ALTITUDE > refers to the altitude when the plane is hovering

➤ 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:

Enter the OSD setting item *< AUTO PARAMETER >*:

< GEOFENCE DISTANCE >: The aircraft will automatically switch to the home mode when flying over this distance. Cancel the home mode by quickly dialing the mode stick; '0' means to close the radius fence limit.

< GEOFENCE ALTITUDE >: If the aircraft exceeds this altitude, the altitude will be forcibly lowered; '0' means to close the altitude limit.

3. SWITCH FLGHT 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:

PMU MODULE



INSTALL DIRECTION OF FC

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

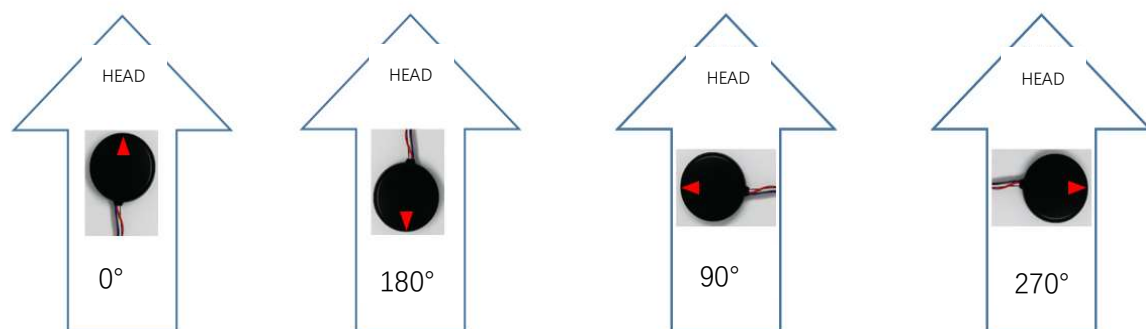
0°	Arrow point to head
180°	Arrow point to rear
90°	Arrow point to Left side of the nose
270°	Arrow point to right side of the nose



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

INSTALL GPS & COMAPSS

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



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

① Direction setting of servo

Step 1:

Enter **<REMOTE CONTROLLE>** and configure the maximum, minimum and intermediate values .

How to judge the direction of the RC channel direction ?

Method 1: Connect to the SN_GCS, then switch to the remote control interface and check whether the corresponding virtual joystick moves correctly.

Method 2: Set the value of **<OSD>-> <SHOW RC CHANNEL>** to 'ON', then check the direction.

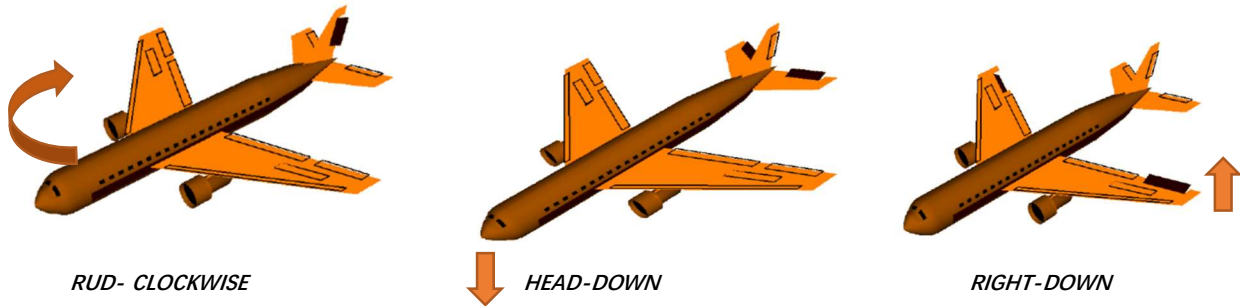
Step 2: Enter **<SERVO>-> <SERVO DIRECTION>** to set the direction of servo feedback correction. For mixing control, please note that when the correct direction cannot be set, you can exchange the mixing servo jack to configure the direction again..

② AUX port configuration

In addition to mapping the control channels and remote control channels on the AUX port, you can also configure the execution speed of the AUX port servo in **<SERVO>**.

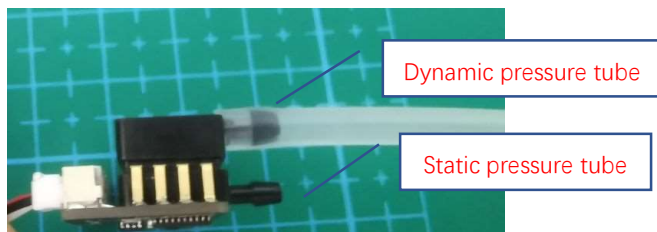
How to configure the throttle differential: Just configure one of the AUX ports such as AUX1 as the **<THR>** function, the flight control will differentially control the throttle channel and the AUX1 channel; Note that the differential control map is the direction stick, please Confirm that the direction of the throttle differential is correct, and set the differential amount in **<SERVO>-> <THRROTLE DIFF>**. The greater the differential amount, the faster the flight turns, but it is easier to stall.

CORRECT CONTROL SURFACES MOVEMENT



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.

TELEMETRY PORT

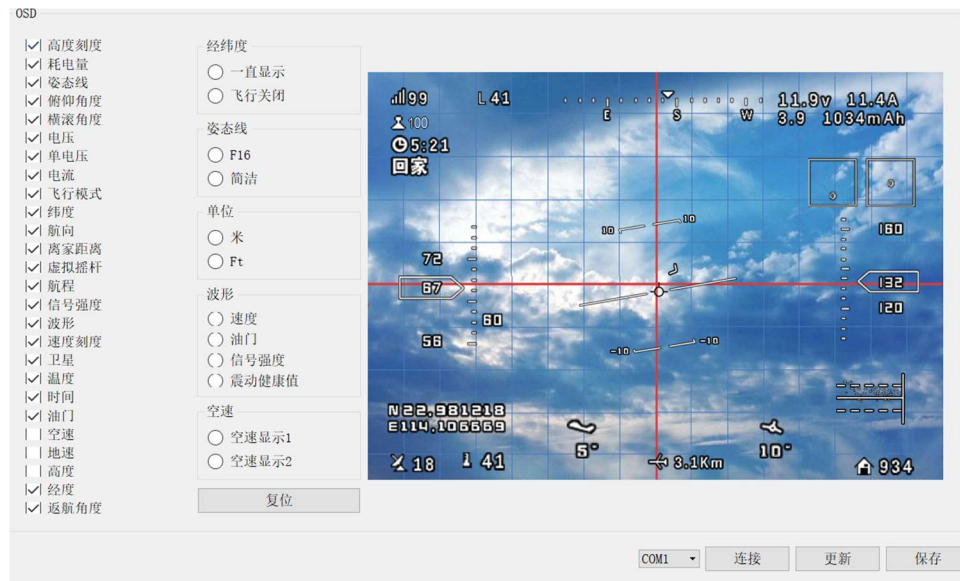
- ① Connect FC to SN_GCS
- ② Connect FC to mavlink GCS, like QGround, MissionPlanner

DJI MSP

Connect 'VTX_OSD' port to 'RX' port of DJI air unit.

Baud: 115200

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 <REMOTE CONTROL>

< MAX CHANNEL VALUE>: Select this setting item, then move the throttle stick to the highest level. After the data is updated, exit the selected state.

< MID CHANNEL VALUE>: Select this setting item, then move the throttle stick to the middle. After the data is updated, exit the selected state.

< MIN CHANNEL VALUE>: Select the setting item, then move the throttle stick to the minimum. After the data is updated, exit the selected state.

***When performing this process, please remove the motor propeller to prevent unnecessary damage caused by sudden rotation.**

➤ 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>** -> **<FAILE SAFE 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 down ^①
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

- 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 , **<REMOTE CONTROLLE>-<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 **<BASE FUNCTION>-<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 PID speed 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.

⑤ Altitude hold gain **<ADVANCE FUNC>**-**<STAB GAIN>**-**<ALT HOLD GAIN>**

IN RTH, ALT-HOLD, WAY-POINT mode, if aircraft action like this in the pitch direction:



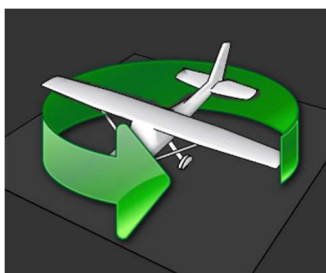
please decrease alt-hold gain.

➤ ARM & DISARM

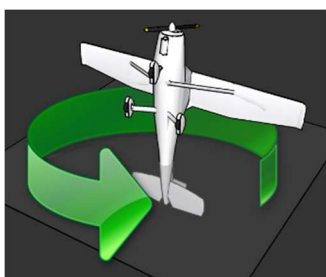
Satellites	<=6	>6
GPS connect	DISARM	ARM
GPS disconnect	ARM	ARM

➤ 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:
 - Way1: push throttle stick away from the zero position, give plain a speed until motor start.
 - Way2: 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?

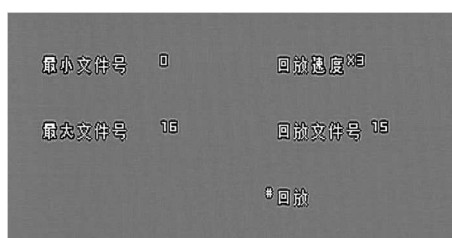
- ① The fixed wing can obtain the flight direction through GPS under normal speed, so as to ensure that the aircraft can return home safely; but when the wind is blowing in the wind, the direction of the GPS guidance will be wrong due to the excessively low ground speed. The aircraft stops spinning back 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.



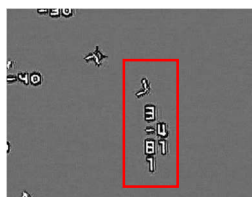
Select the item to be executed by move the mode switch, and select the specific file and playback speed by using the up and down joysticks.

➤ 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 ang 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

