

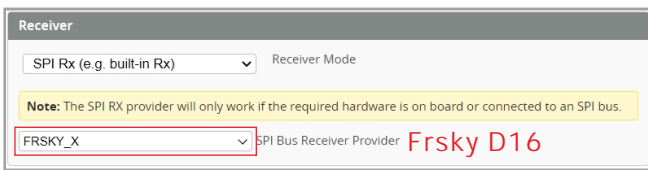
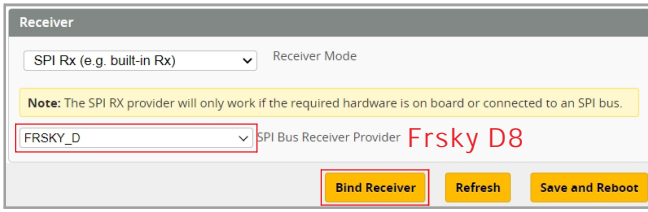
Features
X12 V1.0 PNP AIO 4-IN-1 12A 1-2S flight controller
VTX Power up to 400mw
Compatible with Serial Based receiver
NEW RS0802 KV20000 motors
Runcam Nano3 or Runcam Split3-lite with 1080P DVR
Smooth and powerful
Compatible for 1S Lipo/LIHV
Recommend 1S 450mah/550mah/650mah battery(Not include)

Specifications
Brand Name: Happymodel
Item Name: Mobula7 1S 75mm Micro FPV whoop drone
Wheelbase: 75mm
Size: 99mm*99mm*40mm
Mobula7 1S 24g Mobula7HD 1S 32g

Package Includes	Item Name	Qty
	Mobula7 1S 75mm whoop Drone Frame (Mobula7 v4 frame)	1
	Option1: X12 ELRS V1.0 flight controller built-in SPI ELRS 2.4G receiver	1
	Option2: X12 Frsky V1.0 flight controller built-in SPI Frsky 2.4G receiver	
	Option3: X12 PNP V1.0 flight controller without onboard receiver	
	Option4: X12 PNP V1.0 flight controller with External TBS Nano RX	
	RS0802 KV20000 brushless motor	4
	Gemfan 1610-2 bi-blade propellers(4cw+4ccw)	1
	Runcam Nano3 or Runcam Split3-Lite(HD version)	1
	Onboard 5.8G Openvtx 0mw-400mw VTX	1
	Series Balance Charging Board	1
	Propeller disassemble tool	1
	Extra camera canopy	1

BIND PROCEDURE

1) Connect Mobula7 1S Frsky with computer by Plug USB. Running Betaflight configurator and then move on Receiver tab then hit "Bind Receiver". The Red LED on the flight controller getting solid, it means onboard SPI Frsky receiver is in bind mode. Visit <https://bit.ly/3qW5hMa> to check bind procedure.



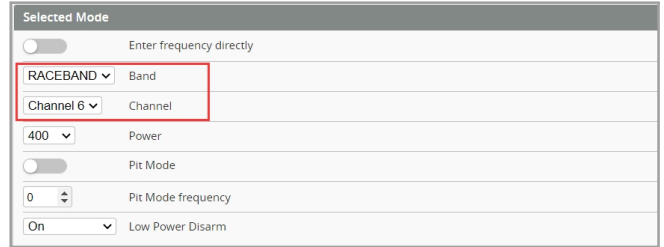
2) The default SPI Receiver provider is set to Frsky_D, that means you need to bind with your Frsky D8 radio transmitter or other radio with Frsky D8 tx module. Turn on your radio and move to model setup ,then hit BND . The bottom RED LED of the flight controller would start to blinking , it means bind successfully.

****Change Receiver provider to "FRSKY_X" for D16 radio, and Change to "REDPINE" or "SFHSS" to match REDPINE TX module or Futaba Radio.**

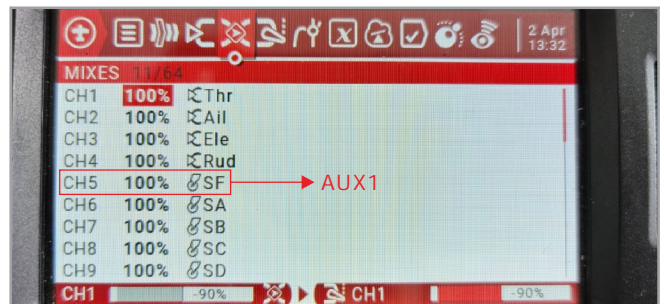
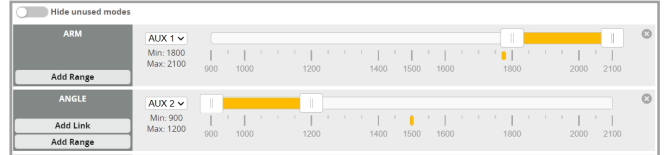


ARM/DISARM THE MOTOR

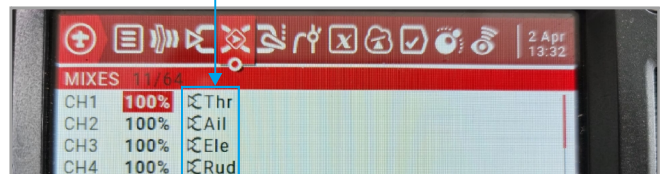
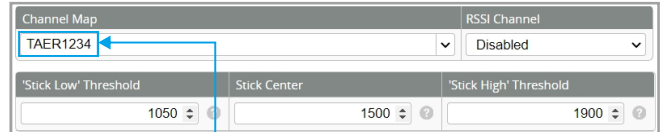
- 1) Turn on your radio transmitter and connect the battery to the Mobula7 1S Frsky. Then place Mobula7 1S Frsky horizontally on the ground.
- 2) Prepare your goggles, and match the channel with the VTX_table



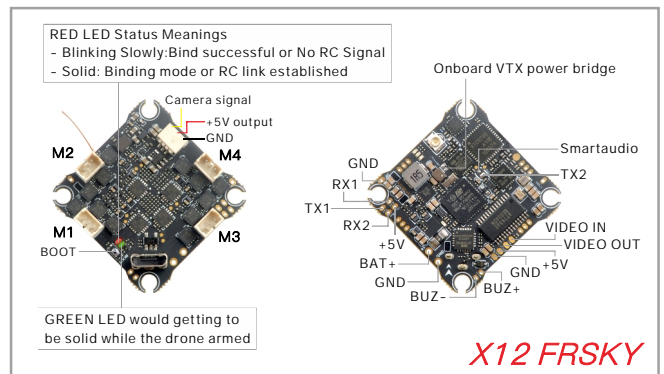
3) The default ARM/DISARM switch was set to "AUX1", usually it's Channel5 of your radio. You can customized a switch for AUX1(Channel5). Then Toggle Aux1 switch to arm the motors, the LED at the bottom Green of the flight controller would get solid once armed, happy flying.



4) Please make sure the MIXES of your radio settings is match the Channel Map of betaflight settings, otherwise it won't be able to armed. The default channel map is "TAER1234", you can also set it to "AETR1234" if necessary.



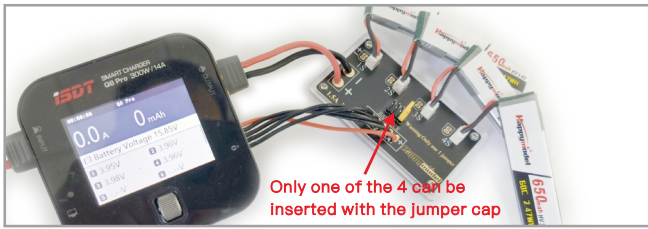
FLIGHT CONTROLLER CONNECTION DIAGRAM



Identifier	Configuration/MSP	Serial Rx	Telemetry Output	Sensor Input	Peripherals
USB VCP	115200	Disabled	Disabled / AUTO	Disabled / AUTO	Disabled / AUTO
UART1	115200	Enabled	Disabled / AUTO	Disabled / AUTO	Disabled / AUTO
UART2	115200	Disabled	Disabled / AUTO	Disabled / AUTO	VTX (TBS Smt) / AUTO

- *RX1/TX1/+5V/GND pads could be used for External Serial Based RX like ELRS Receiver, TBS Tracer or CRSF Nano RX
- *Only Enabled Serial RX for UART1 when use external Serial Based RX and choose correct receiver provider based on your receiver description.

1S PARALLEL CHARGING BOARD CONNECTION DIAGRAM



Note: If you charge 4 batteries at the same time, please insert the jumper cap into the position of number "4"; if you charge 3 batteries at the same time, please insert the jumper cap into the position of number "3", and so on. If charging multiple batteries, try to avoid the voltage difference between the batteries being too large.

DEFAULT PID AND FILTER SETTINGS

Note: The value marked red color is for Mobula7HD 1S version

	Proportional	Integral	D Max	Derivative	Feedforward
Basic/Acro					
ROLL	130 123	127 143	86 80	86 80	217 226
PITCH	122 116	120 135	83 77	83 77	203 212
YAW	130 123	127 143	0 0	0 0	217 226

Mode:	RPY	Low	Default	High
Damping: D Gains	1.85	2		
Tracking: P & I Gains	1.9	2		
Stick Response: FF Gains	1.3	1.25		
Dynamic Damping: D Max	0	0		
Drift - Wobble: I Gains	0.65	0.55		
Pitch Damping: Pitch:Roll D	0.85	0.85		
Pitch Tracking: Pitch:Roll P, I & FF	0.9	0.9		
Master Multiplier:	1.45	1.45		

More Filtering | Default Filtering | Less Filtering

Gyro Filter Multiplier: 0

D Term Filter Multiplier: 1

Profile independent Filter Settings: OFF

Profile dependent Filter Settings: ON

Gyro Lowpass Filters: DYNAMIC Mode, 300 Min Cutoff Frequency (Hz), 550 Max Cutoff Frequency (Hz), PT1 Filter Type

Gyro Notch Filters: Gyro Notch Filter 1, Gyro Notch Filter 2

Dynamic Notch Filter: Dynamic Notch Filter, 3 Notch Count, 300 Q factor, 150 Min Frequency (Hz), 600 Max Frequency (Hz)

D Term Lowpass Filters: DYNAMIC Mode, 75 Min Cutoff Frequency (Hz), 150 Max Cutoff Frequency (Hz), 5 Dynamic Curve Expo, PT1 Filter Type

D Term Notch Filter: D Term Notch Filter

Yaw Lowpass Filter: Yaw Lowpass Filter

BOARD AND SENSOR ALIGNMENT AND FREQUENCY SETTINGS

Board and Sensor Alignment

Roll Degrees: 0 | Pitch Degrees: 0 | Yaw Degrees: 0

First: GYRO/ACCEL | CW 90° | First GYRO

Default: MAG Alignment

8.00 kHz Gyro update frequency

2.00 kHz PID loop frequency *Recommend 2.00kHz for a better and stable experience.*

MOTORS AND ESC SETTINGS

Mixer: Quad X

PROP OUT :Mount 1610 propeller on #1 and #4 motors, Mount 1610R propeller on #2 and #3 motors

Motor direction is reversed

ESC/Motor Features: DSHOT300 ESC/Motor protocol

MOTOR_STOP: Don't spin the motors when armed

ESC_SENSOR: Use KISS/BLHeli_32 ESC telemetry over a separate wire

Bidirectional DShot (requires supported ESC firmware)

10 Motor Idle (% static)

VOLTAGE AND CURRENTS METER SETTINGS

Voltage Meter

Battery: 0.6 V

Scale: 110

Divider Value: 10

Multiplier Value: 1

Amperage Meter

Battery: 0.00 A

Scale [1/10th mA/A]: 470

Offset [mA]: 0

"FLIP OVER AFTER CRASH" PROCEDURE

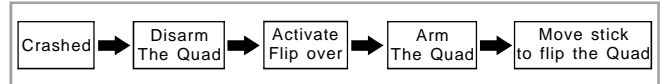
Set one channel of your radio transmitter to activate the Flip over function in the Mode tab of Betaflight configurator.

The default Switch for Activate "Flip" is AUX3(Channel7)

FLIP OVER AFTER CRASH: AUX 3

Min: 1800 | Max: 2100

Add Link | Add Range



VTX BANDS AND CHANNELS SETUP

Frequency and channel frequency table:

FR	CH	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
BOSCAM_A	5865M	5845M	5825M	5805M	5785M	5765M	5745M	5725M	
BOSCAM_B	5733M	5752M	5771M	5790M	5809M	5828M	5847M	5866M	
BOSCAM_E	5705M	5685M	5665M	5645M	5885M	5905M	5925M	5945M	
FATSHARK	5740M	5760M	5780M	5800M	5820M	5840M	5860M	5880M	
RACEBAND	5658M	5695M	5732M	5769M	5806M	5843M	5880M	5917M	
LOWRACE	5333M	5373M	5413M	5453M	5493M	5533M	5573M	5613M	

There are 2 ways to switch the vtx channels:



1. Plug USB to Mobula 7 1S Frsky then we should Go to Betaflight CLI type the command
Set vtx_band=5
Set vtx_channel=4
save
This command will change the vtx channel to 5769
2. Disarm the Mobula 7 1S Frsky and then move the stick of the transmitter THR MID YAW LEFT PITCH UP to enter OSD Menu Enter to Features then enter to VTX SA to set VTX Band and channel

FLIGHT CONTROLLER FIRMWARE UPDATE

1. Install latest STM32 Virtual COM Port Driver <http://www.st.com/web/en/catalog/tools/PF257938>
2. Install STM BOOTLOAD Driver (STM Device in DFU MODE)
3. Open Betaflight configurator and choose firmware target "CRAZYBEEF4FR", then select the firmware version.
4. There are 2 ways to get in DFU Mode: 1). solder the boot pad and then plug USB to computer 2). loading betaflight firmware and hit "flash", then it will getting into DFU Mode automatically.
5. Open Zadig tools to replace the drivers from STM32 Bootloader to WINUSB Driver.
6. Reconnect the flight controller to the computer after replace driver done , and open Betaflight Configurator, loading firmware and flash.

Zadig Device: Options Help

STM32 BOOTLOADER

Driver: STTLu30 (v3.0.4.0) | WinUSB (v6.1.7600.16385)

USB ID: 0483 DF11

WCID: X

Replace Driver

8 devices found.



Firmware and diff download