KAKUTEFlight Controller Manual

Features:

- Recessed, sideways pin headers. Also enables soldering of all wires directly to pads without use of any pin headers.
- Dedicated Boot button for easy firmware flashing.
- Reinforced solder pads for trouble-free direct soldering.
- Extremely low profile design.
- Input voltage 7v to 42v. Power the board directly from flight pack up to 6S (on 'BAT' pad only!).
- VIN + VBAT merged A single wire to power the board will provide voltage input and Telemetry/OSD voltage data.
- Filtered voltage output output 5v 800mA (and 3.3v 150mA where applicable) to power peripherals such as GPS, RX, BLACKBOX, OSD. 5v/3.3v RX selectable.
- Cleanflight support (RACE target).
- BLHeli flashing supported by hardware
- Raceflight ready
- Betaflight ready

Specifications:

- STM32F303CCT6(256kB flash) 32-bit processor
- MPU6050 Gyro/Accelerometer
- High quality, gold plated PCB
- Micro USB connector for programming
- Dimensions: 36x36x6mm (includes USB in height)
- Mounting Holes: 30.5mm square to center of holes
- Weight: 4.2g

Package Includes:

- 1x Kakute Flight Controller
- 1x 2.54mm Pitch pin headers
- Quick Start Guide

Warranty & Return Policies :

Technical staff of our after-sales service centre will examine the returned product to identify the problem.

In the case of product failure due to defective material or manufacturer workmanship within the 60 days from the date of purchase, the product will be repaired or replaced (decided by the manufacturer) with no charge to the customer, returning shipping cost are at the expense of the customer under all circumstances.

Crash/accidental damage or overload of the on-board regulator (too many devices connected drawing too much current) will not be accepted as a warranty claim.

Returned items should include the original packaging and any accessories originally supplied. Please Contact your supplying dealer for support and warranty claims.

Board Layout:

Тор



Pin	Function
VIN+	Battery+, Input Voltage 7-42v
VIN-	Battery-
RSSI	RSSI
3V3	3.3V Output 150mA
5V	5V Output 800mA
GND	Ground
R3/SBUS,T3	UART3 RX/SBUS or other serial
	connections, UART3 TX
PPM	PPM Input
M1	PWM Output (Motor 1)
GND	Ground
Curr	Current Sensor
R2,T2	UART2 RX, TX
M5	PWM Output (Motor 5)
GND	Ground
M3	PWM Output (Motor 3)
GND	Ground
BUZ-	Buzzer+
BUZ+	Buzzer-
M4	PWM Output (Motor 4)
GND	Ground
M6	PWM Output (Motor 6)
GND	Ground
R1,T1	UART1 RX,TX
LED	Digital LED Output
M2	PWM Output (Motor 2)
GND	Ground

Bottom



Pin Function

5V output 800mA
I2C Bus
I2C Bus
Ground

Software/ Firmware / Installation guide:

Initial Setup:

- Install latest Silicon Labs CP2102 USB to UART Bridge VCP Drivers http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx
- Install and launch the Cleanflight Configurator tool https://chrome.google.com/webstore/detail/cleanflight-configurator/enacoimjcgeinfnnnpajinjgmkahmfgb
- Connect Katute to computer via USB cable.
- On the Cleanflight Configurator select the correct COM port if it is not automatically detected.
- Click Connect, and the Setup page should come into view:

CONFIGURATOR 1.2.2	GHT	L ♥ Ø	X Accel Mag		Dataflash: free 8.0MB Profile 1	Disconnect
2016-08-29 @ 08:52:30 – MultiWii API 2016-08-29 @ 08:52:30 – Flight contro 2016-08-29 @ 08:52:30 – Running firm 2016-08-29 @ 08:52:30 – Board: SRF3 2016-08-29 @ 08:52:30 – Unique devi	version received - 1.16.0 bller info, identifier: CLFL , vers nware released on: Feb 19 20 I, version: 0 ce ID received - 0x360034533	sion: 1.12.0 16 20:01:10 3570620333335				Hide Log
🗲 Setup	<u> </u>					î
🖉 Ports	Setup					N FOR 1.12.0
🔅 Configuration	Calibrate Accelerometer	Place board or frame on leve period	led surface, procee	d with calibration, ensure plat	form is not moving during c	alibration
🗇 Failsafe	Calibrate Magnetometer	Move multirator at least 260	lagraas on all avis	of rotation, you have 20 cocon	de to porform this tack	
ஃ PID Tuning	Reset Settings		aegrees on an axis	or rotation, you have so second	us to perform this task	- 1
📩 Receiver	Backup Restore	Restore settings to default				
S Modes		Backup your configuration in	case of an accider	t, CLI settings are not included	l - See 'dump' cli command	
↓ ↓ Adjustments	Heading: 90 deg			Dente 7 and a first 0 day	Info	
A Service	Pitch: -36.4 deg			Reset Z axis, offset: 0 deg	Battery voltage:	0 V
- Servos	Koli. 15.5 deg		1		Capacity drawn:	0 mAh
🖓 GPS		1	Vilion		Current draw:	0.00 A
💧 Motors		11	20		RSSI:	0.96
्रू Race Transponder		12 J	7		GPS	
🗍 LED Strip		17/			3D Fix:	
					Sats:	
Tathorad Logging					Latitude:	
Techered Logging					congroue.	
Port utilization: D: 14% U: 3% Pack	et error: 0 I2C error: 3	Cycle Time: 1001				1.2.2

However before installing the FC and configuring Cleanflight we recommend you always flash to the latest available firmware (See next Page)

Firmware installation:

- Click Disconnect if you're still connected
- Select Firmware Flasher
- Ensure the 'No reboot Sequence' option is off
- Enable 'Full chip erase'
- Enable & Set 'Manual baud rate' to 256000 or alternatively 115200 if 256000 fails
- From the 'Choose Firmware / Board' drop down menu ensure you select the latest firmware for the 'SPRACINGF3' target, for example '1.13.0 SPRACINGF3 2016-6-6 22:20 (stable)' as below:
- Click on 'Load Firmware [Online]' and after a few seconds the latest release info release notes will appear

CONFIGURATOR 1.2.2	GHT	COM4 115200 Auto-Connect	Connect
2016-08-29 @ 09:01:58 Unique devic 2016-08-29 @ 09:02:01 Serial port si 2016-08-29 @ 09:02:33 Serial port si 2016-08-29 @ 09:02:37 Serial port si 2016-08-29 @ 09:03:31 Detected: CC	ce ID received - 0x3600345333570b20333335 uccessfully closed uccessfully opened with ID: 18 uccessfully closed DM4 - triggering flash on connect		Hide Log
<i>CF</i> Welcome			^
Documentation & Support	1.13.0 SPRACINGF3 2016-6-6 22:20 (stable)	Available online firmware releases - Select the correct firmware appropriate	for your board.
💮 Firmware Flasher	No reboot sequence	Enable if you powered your FC while the bootloader pins are jumpered or ha button pressed.	ive your FC's BOOT
	Full chip erase	Wipes all configuration data currently stored on the board.	
	Manual baud rate 256000 V	Manual selection of baud rate for boards that don't support the default spee bluetooth. Note: Not used when flashing via USB DFU	rd or for flashing via
	Show unstable releases	Show Release-Candidates and Development Releases.	
		Release info	
	Target: SPRACINGF3 Name/Version: 1.13.0 Binary: cleanflight_SPRACINGF3.hex Date: 2016-66 22:20 State: Release notes: Thanks to anyone who's ever helped out a fellow of coding - keep up the good work!	leanflight user - without you all the developers would be stuck answering	questions instead of
	There have been MASSIVE amounts of code cleans	ups in this release, we really put the clean in cleanflight with this release.	· · · ·
		Flash Firmware Load Firmware [Online]	Load Firmware [Local]
Port utilization: D: 0% U: 0% Packet	t error: 0 I2C error: 0 Cycle Time: 0		1.2.2

• Click on 'Flash Firmware' and the flashing process will begin:

Recovery / Lost communication
 If you have lost communication with your board follow these steps to restore communication: Power off Enable 'No reboot sequence', enable 'Full chip erase'. Jumper the BOOT pins or hold BOOT button. Power on (activity LED will NOT flash if done correctly). Install all STM32 drivers and Zadig if required (see USB FlashIng section of cleanflight manual). Close configurator, Close all running chrome instances, Close all Chrome apps, Restart Configurator. Release BOOT button if your FC has one. Flash with correct firmware (using manual baud rate if specified in your FC's manual). Power off. Remove BOOT jumper. Power on (activity LED should flash). Connect normally.
Hashing
Flash Firmware Load Firmware [Online] Load Firmware [Local]

DO NOT UNPLUG THE USB PORT WHILE FLASHING, WAIT UNTIL YOU SEE 'Programming: SUCCESSFUL' displayed:

Hardware Installation:

For ease of installation we recommend you apply solder to all required headers and twist + tin all cables prior to soldering the wires to the PCB:



When using soldered connections in high vibe environments using some form of wiring support is recommended near the solder joint to prevent fatigue:



Wiring Diagrams:

The following two diagrams are recommended for a typical FPV 'X' quadcopter. Be sure to take note of the front 'A' arrow for correct board orientation

Wiring diagram with SBUS & OSD connected:



Wiring diagram with FrSKY S.Port Telemetry, SBUS & OSD connected

Note: A DPST switch is required when using UART 1 with OSD as UART1 is shared with the USB port as both cannot be used concurrently.



Basic Cleanflight Setup:

Once the FC is installed, <u>**REMOVE ALL PROPELLERS</u>**, power up your quadcopter, bind your receiver & connect to Cleanflight - the Setup page will come into view</u>

Accelerometer Calibration:

- Place the quadcopter on a flat, level surface
- On the Setup page, click the 'Calibrate Accelerometer' button & wait until process is completed
- Pick the quad up and point it at your monitor. Click the 'Reset Z axis' button and ensure the 3d model mimics any movement of the quad you make (this ensures board orientation is correct)

Serial Port Configuration A (Only for those using a Serial Rx and optional OSD):

- Select the 'Ports' Tab.
- If you're using an SBUS or Spektrum based Serial receiver you must enable 'Serial Rx' on UART 3
- If you plan to use a Minim OSD (not covered in this guide), you must also enable 'MSP' on UART2
- Click 'Save and Reboot'

🗲 Setup	^ Ports					DOUMENTATION FOR 3 0.0
😰 Ports						
Configuration	Note: not a	all combinations are valid. When	n the flight controller firmware detect ial port upless you know what you ar	s this the serial port configuration v e doing. You may have to reflash an	will be reset.	ation if you do
	10000		an por carriess you know what you ar	e doing. Tou may have to remain an	in crube your conligan	adon'n you do.
	Identifier	Data	Logging	Telemetry	RX	GPS
📩 Receiver	UART1	● MSP 115200 ▼	Blackbox 115200 V	Disabled v AUTO v	Serial RX	57600 •
🖀 Modes	UART2	● MSP 115200 ▼	Blackbox 115200 V	Disabled V AUTO V	Serial RX	57600 ¥
↓ ‡ Adjustments	UART3	MSP 115200 V	Blackbox 115200 V	Disabled • AUTO •	Serial RX	57600 •

Serial Port Configuration B (for FrSKY S.port Telemetry + SBUS and optional OSD):

<u>Note</u>: On this board, UART1 MSP is shared with the USB port to connect to the GUI for configuration. As such only UART 2 or 3 can be used for S.port + SBUS. OSD can still be connected via UART1 as it uses the MSP protocol but a DPST Switch is required to isolate the OSD when using the USB port as they cannot be used concurrently.

- Select the 'Ports' Tab
- On UART 2 under Telemetry select 'SmartPort' & 'Auto'
- On UART 3 Enable 'Serial Rx'
- Click on Save and Reboot
- Select the 'Configuration' Tab
- Scroll down to the 'Other Features' Box and enable 'TELEMETRY'
- Click on Save and Reboot
- On your Taranis's Telemetry page select 'Discover new sensors' and all the new telemetry info will appear.

🖌 Setup	Ports					CUMENTATION FOR 3.0.0
😰 Ports	10113					
Configuration	Note: not a	all combinations are valid. When	n the flight controller firmware detects	s this the serial port configuration v doing. You may have to reflash an	vill be reset. d erase your configura	tion if you do
👽 Failsafe	Note: Do N		an port anness you know an at you are	onig. Too may have to remain an	a crase your comigare	alor in you do.
ஃ PID Tuning	Identifier	Data	Logging	Telemetry	RX	GPS
📩 Receiver	UART1	● MSP 115200 ▼	Blackbox 115200 V	Disabled v AUTO v	Serial RX	57600 •
	UART2	MSP 115200 ▼	Blackbox 115200 V	SmartPort • AUTO •	Serial RX	57600 •
∔ ‡ Adjustments	UART3	MSP 115200 V	Blackbox 115200 V	Disabled • AUTO •	Serial RX	57600 •

IMPORTIANT: DO NOT DISABLE MSP on UART 1! DOING SO WILL DISABLE USB COMMUNICATION AND REQUIRE THE BOARD TO BE REFLASHED BY JUMPERING THE BOOTLOADER PINS (not covered in this guide).

Receiver Configuration:

- Select the 'Configuration' tab
- Scroll down to the 'Receiver Mode' box and select your applicable type (RX_SERIAL or RX_PPM)
- If using a serial receiver, In the 'Serial receiver Provider' box you must select the appropriate receiver type
- Click 'Save and Reboot'
- Select the 'Receiver' tab
- Verify your RC Transmitter stick inputs are controlling the associated Roll/Pitch/Yaw/Throttle bars and in the correct direction (sticks left / down = lower number, up / right = higher number), If your inputs are controlling the wrong channel, change the channel map to suit for example, to swap Roll/Yaw, AETR1234 becomes RETA1234. (R=Rudder or Yaw, E = Elevator or Pitch, T= Throttle and A = Aileron or Roll)
- Use the subtrim on your RC Tx to ensure Roll/Pitch/Yaw channels are exactly 1500 when sticks are centred & 1000/2000 at maximum deflection.

Receiver Mode		Channel Map	RSSI Channel
RX_PPM	PPM RX input	AETR 1234	▼ Disabled ▼
RX_SERIAL	Serial-based receiver (SPEKSAT, SBUS, SUMD)	Roll	15 <mark>00</mark>
RX_PARALLEL_PW	M PWM RX input (one wire per channel)	Yaw	1500
RX_MSP	MSP RX input (control via MSP port)	Throttle	885
Carial Danairan Drawi	id	AUX 1 AUX 2	1500 1500
Serial Receiver Provi	laer	AUX 3	15 <mark>00</mark>
Note: Remember to co a Serial Receiver Provid	nfigure a Serial Port (via Ports tab) and choose ler when using RX_SERIAL feature.	AUX 4	<mark>15</mark> 00
SPEKTRUM1024 SPEKTRUM2048 SBUS SUMD SUMH XBUS_MODE_B XBUS_MODE_B_RJ IBUS	01		

If you can't quite get your Pitch/Roll/Yaw inputs exactly 1500 after adjusting sub trims, we recommend adding some deadband equal to the amount of error in your sticks (2-4 is usually required with a Taranis + XSR)



Motor Setup:

- Select the 'Configuration' tab
- IF your ESC's support it, enable 'ONESHOT125' in the 'ESC/Motor features' box
- Select the 'Motors' Page
- <u>REMOVE ALL PROPELLERS</u>
- Connect the battery if it isn't already
- Enable Motor Test Mode
- Click on the 'Master' slider once
- Using the Arrow keys on your keyboard, use the up/down arrow to slowly increase the master slider until all motors start rotating consistently.
- Add 10 to this value to get the value for 'Min Throttle' (for example in the picture below, all motors started rotating at 1045, were consistent at 1050 hence my Min Throttle would be 1060)



If all motors don't start rotating within 5 units of each other than an ESC calibration is necessary – refer to your ESC's manual.

- Select the 'Configuration' tab
- In the 'ESC/Motor Features box' Enter the Min Throttle value you just worked out
- Set Max Throttle to 2000
- Click on Save and Reboot.

or Features		
MOTOR_STOP	Don't spin the motors when armed	
ONESHOT125	ONESHOT ESC support	0
Disarm motors reg AUX channel)	gardless of throttle value (When arming	via
Minimum Throttle		
Middle Throttle [R	C inputs center value]	
Maximum Throttle	2	
Minimum Comma	nd	
	MOTOR_STOP ONESHOT125 Disarm motors reg AUX channel) Minimum Throttle Middle Throttle [R Maximum Throttle Minimum Comma	MOTOR_STOP Don't spin the motors when armed ONESHOT125 ONESHOT ESC support Disarm motors regardless of throttle value (When arming AUX channel) Minimum Throttle Middle Throttle [RC inputs center value] Maximum Throttle Minimum Command

Flight Mode Setup:

- Select the 'Modes' tab
- Click on 'Add Range' on both 'ARM' and ANGLE' modes
- Assign a switch on your radio to output on channel 5 (AUX 1 in CF)
- Now when you move the switch you assigned the small green bar under the slider should also move.
- Set the switch to the position where you want the quad to be armed and then drag the slider to cover the small green bar.
- Repeat this process for Angle on channel 6 (AUX 2)
- Click on Save and Reboot

ARM	AUX 1 🔻									
Add Range	Min: 1300 Max: 1700	 900	1000	1200	1	400 150	0 1600	1800	2000	 2100
ANGLE	AUX 2 🔻						Curre	nt calue recieved	from Rc Rece	iver 😣

Congratulations you are now ready to fly!