Controls

Arming

When armed, the aircraft is ready to fly and the motors will spin when throttle is applied. The motors will
spin at a slow speed when armed (this feature may be disabled by setting MOTOR_STOP, but for safety reasons,
that is not recommended).

By default, arming and disarming is done using stick positions. (NOTE: this feature is disabled when using a
switch to arm.)

Some conditions will disable arming. In this case the Warning LED on the board will flash a certain number of times, indicating what the condition is:

Reason for disabled Arming	LED Flashes
CLI is active in the configurator	2
Failsafe mode is active	3
The aircraft has landed in failsafe mode	3
Maximum arming angle is exceeded	4
Calibration is active	5
The system is overloaded	6

Stick Positions

The three stick positions are:

Position	Approx. Channel Input
LOW	1000
CENTER	1500
HIGH	2000

The stick positions are combined to activate different functions:

Function	Throttle	Yaw	Pitch	Roll
ARM	LOW	HIGH	CENTER	CENTER
DISARM	LOW	LOW	CENTER	CENTER
Profile 1	LOW	LOW	CENTER	LOW
Profile 2	LOW	LOW	HIGH	CENTER
Profile 3	LOW	LOW	CENTER	HIGH
Calibrate Gyro	LOW	LOW	LOW	CENTER
Calibrate Acc	HIGH	LOW	LOW	CENTER
Calibrate Mag/Compass	HIGH	HIGH	LOW	CENTER
Inflight calibration controls	LOW	LOW	HIGH	HIGH
Trim Acc Left	HIGH	CENTER	CENTER	LOW

Trim Acc Right	HIGH	CENTER	CENTER	HIGH
Trim Acc Forwards	HIGH	CENTER	HIGH	CENTER
Trim Acc Backwards	HIGH	CENTER	LOW	CENTER
Disable LCD Page Cycling	LOW	CENTER	HIGH	LOW
Enable LCD Page Cycling	LOW	CENTER	HIGH	HIGH
Save setting	LOW	LOW	LOW	HIGH

Mode 2 Stick Functions

Arm	↘ •	In-flight Calibration Controls	↙ ↗
Disarm	↙ •	Trim Acc Left	↑ ←
Profile 1	↙ ←	Trim Acc Right	↑ →
Profile 2	↙ ↑	Trim Acc Forwards	↑ ↑
Profile 3	↙ →	Trim Acc Backwards	↑ ↓
Calibrate Gyro	↙ ↓	Disable LCD Page Cycling	↓ ↘
Calibrate Acc	↘ ↓	Enable LCD Page Cycling	↓ ↗
Calibrate Compass	↗ ↓	Save Setting	↙ ↘

History

Intial stick commands, came from MultiWII but the original code no-longer has direct links.

The original documents as listed below can be found here
https://code.google.com/archive/p/multiwii/source/default/source

- `svn/branches/Hamburger/MultiWii-StickConfiguration-23_v0-5772156649.pdf`
- `multiwii/branches/Hamburger/MultiWii-StickConfiguration-23_v0-5772156649.odp`

Yaw control

While arming/disarming with sticks, your yaw stick will be moving to extreme values. In order to prevent your craft
from trying to yaw during arming/disarming while on the ground, your yaw input will not cause the craft to yaw when the
throttle is LOW (i.e. below the `min_check` setting).

For tricopters, you may want to retain the ability to yaw while on the ground, so that you can verify that your tail
servo is working correctly before takeoff. You can do this by setting `tri_unarmed_servo` to `ON` on the CLI (this is the
default). If you are having issues with your tail rotor contacting the ground during arm/disarm, you can set this to
`0` instead. Check this table to decide which setting will suit you:

```
<table>
<tr>
<th colspan="5">Is yaw control of the tricopter allowed?</th>
</tr>
<tr>
<th></th><th colspan="2">Disarmed</th><th colspan="2">Armed</th>
</tr>
<tr>
<th></th><th>Throttle low</th><th>Throttle normal</th><th>Throttle low</th>
<th>Throttle normal</th>
</tr>
<tr>
<td rowspan="2">tri_unarmed_servo = OFF</td><td>No</td><td>No</td><td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td><td>No</td><td>No</td><td>Yes</td>
</tr>
<tr>
<td rowspan="2">tri_unarmed_servo = ON</td><td>Yes</td><td>Yes</td><td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td>
</tr>
</table>
```

Throttle settings and their interaction

min_command -
With motor stop enabled this is the command sent to the esc's when the throttle is below min_check or disarmed. With motor stop disabled, this is the command sent only when the copter is disarmed. This must be set well below motors spinning for safety.

min_check -
With switch arming mode is in use, lowering your throttle below min_check will result in motors spinning at min_throttle. When using the default stick arming, lowering your throttle below min_check will result in motors spinning at min_throttle and yaw being disabled so that you may arm/disarm. With motor stop enabled, lowering your throttle below min_check will also result in motors off and the esc's being sent min_command. Min_check must be set to a level that is 100% reliably met by the throttle throw. A setting too low may result in a dangerous condition where the copter can't be disarmed. It is ok to set this below min_throttle because the FC will automaticly scale the output to the esc's

min_throttle -
Typically set to just above reliable spin up of all motors. Sometimes this is set slightly higher for prop stall prevention during advanced maneuvers or sometimes considerably higher to produce a desired result. When armed with motor stop off, your motors will spin at this command so keep that in mind from a safety stand point.

max_check -
Throttle positions above this level will send max_command to the esc's.

`max_throttle` -
This is the max command to the esc's from the flight controller.

In depth videos explaining these terms are available from Joshua Bardwell here:

https://www.youtube.com/watch?v=WFU3VewGbbA

https://www.youtube.com/watch?v=YNRl0OTKRGA

Deadband

If yaw, roll or pitch sticks do not reliably return to centre or the radio has a lot of jitter around the centrepoint, deadband can be applied. The whole deadband value is applied *either side* of the center point rather than half the value above and half the value below. The deadband value will have an effect on stick endpoint values as the axis value will be reduced by the amount of deadband applied.

deadband -
Applied to roll, pitch.

yaw_deadband
Only applied to yaw.