

Control Modes

Important: Check all props and motors to ensure they are tight prior to every flight.

Remember it is important to have the throttle at 50% (mid-point) before switching modes to AVOID SUDDEN DROPS in ALTITUDE

Stabilize Mode

Stabilize mode is APM:Copter's most used manual flight mode.

Overview

- Pilot's roll and pitch input control the lean angle of the copter. When the pilot releases the roll and pitch sticks the vehicle automatically levels itself.
- Pilot will need to regularly input roll and pitch commands to keep the vehicle in place as it is pushed around by the wind.
- Pilot's yaw input controls the rate of change of the heading. When the pilot releases the yaw stick the vehicle will maintain it's current heading.
- Pilot's throttle input controls the average motor speed meaning that constant adjustment of the throttle is required to maintain altitude. If the pilot puts the throttle completely down the motors will go to their minimum rate (MOT_SPIN_ARMED) and if the vehicle is flying it will lose attitude control and tumble.
- The throttle sent to the motors is automatically adjusted based on the tilt angle of the vehicle (i.e. increased as the vehicle tilts over more) to reduce the compensation the pilot must do as the vehicle's attitude changes.
- In AC3.0.1 and earlier versions the copter can only be armed in Stabilize or ACRO.

Warning: it is very important to master flying in stabilize before moving on to other flight modes and it is highly recommended that the pilot is always able to easily and rapidly switch back to stabilize mode from other flight modes in case of unexpected or undesirable flight behavior.

PosHold Mode

The PosHold flight mode (previously known as “Hybrid”) is a new mode for AC3.2. It is similar to Loiter in that the vehicle maintains a constant location, heading, and altitude but is generally more popular because the pilot stick inputs directly control the vehicle’s lean angle providing a more “natural” feel.

Overview

When switched on, PosHold mode will automatically attempts to maintain the current location, heading and altitude. Good GPS position, low magnetic interference on the compass and low vibrations are all important in achieving good loiter performance.

Controls

The pilot can control the copter’s location horizontally and vertically with the control sticks.

Horizontal location can be adjusted with the the Roll and Pitch control sticks with the default maximum lean angle being 45 degrees (angle can be adjusted with the ANGLE_MAX parameter). When the pilot releases the sticks the copter will lean back to bring the vehicle to a stop.

Altitude can be controlled with the Throttle control stick just as in AltHold mode

The heading can be set with the Yaw control stick

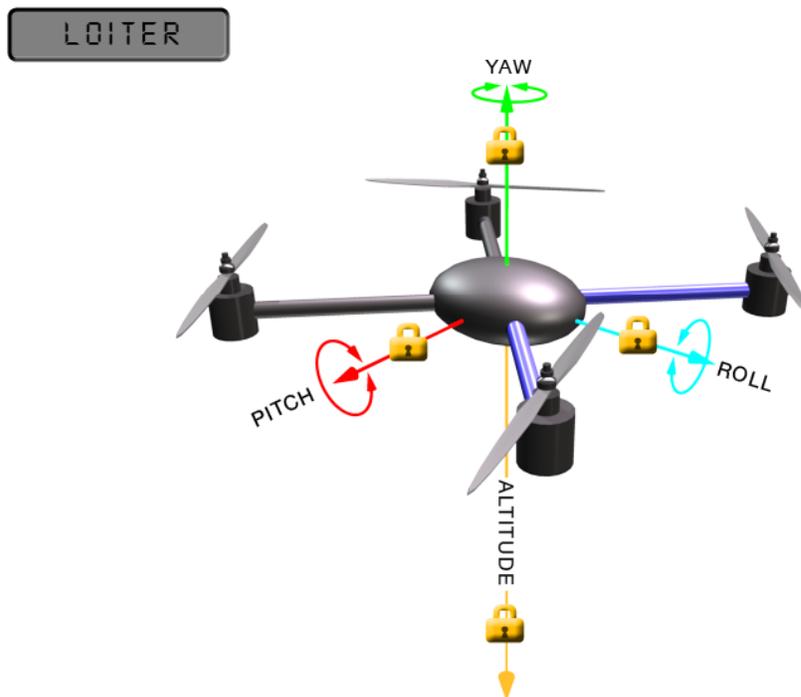
You may arm in PosHold mode but only once the GPS has 3D lock and the HDOP has dropped to 2.0 or lower.

Loiter Mode

In loiter mode, the copter maintains a consistent location, heading, and altitude. This page describes what to expect when using loiter mode and provides tips for flying and tuning.

Overview

When switched on, loiter mode automatically attempts to maintain the current location, heading and altitude. Good GPS position, **low magnetic interference on the compass** and **low vibrations** are all important in achieving good loiter performance.



Controls

The pilot can control the copter's location horizontally and vertically with the control sticks.

- Horizontal location can be adjusted with the the Roll and Pitch control

sticks with the default maximum horizontal speed being 5m/s (see Tuning section below on how to adjust this). When the pilot releases the sticks the copter will slow to a stop.

- Altitude can be controlled with the Throttle control stick just as in [AltHold mode](#)
- The heading can be set with the Yaw control stick

In AC3.1 (and above) you may arm in Loiter mode but only once the GPS has 3D lock and the HDOP has dropped to 2.0 or lower. On a Pixhawk the LED will become green ([more details on LED patterns here](#)).

Drift Mode

This page provides tips for flying in Drift Mode and methods for tuning your copter to fly optimally in Drift Mode.

Overview

- Drift Mode allows the user to fly a multi-copter as if it were a plane with built in automatic coordinated turns.
- The user has direct control of Yaw and Pitch, but Roll is controlled by the autopilot. This allows the copter to be controlled very intuitively with a single control stick if using a Mode 2 transmitter
- The user has completely manual control over the throttle as in [Stabilize mode](#).
- **Drift Mode is available as of release 3.1 of the APM:Copter firmware.**

How Drift Mode works:

- You “fly” the MultiCopter with the right stick (on Mode 2 controllers) controls Pitch and Yaw.
- You use the left stick primarily for altitude control but not for yaw directly.
- When you push the right stick forward or back the copter will pitch (and accelerate) in the appropriate direction.
- When you push the right stick towards one side or the other the right or to the left the copter will turn in the direction specified.
- The copter will also bank at the same time so as to make a coordinated turn in that direction.
- When turning with the right stick yaw is automatically applied and sufficient roll is added to cancel the copters velocity in the roll axis.
- This allows you to maintain a coordinated (non-skidding) turn.
- Letting go of the sticks effectively turns on a speed brake in the Pitch axis that slows the copter to a stop over a two second period.
- A copter in Drift Mode with the right stick in the center will loosely hold horizontal position (It will slowly drift in the wind.)
- Pilot’s throttle input controls the average motor speed meaning that constant adjustment of the throttle is required to maintain altitude. If the pilot puts the throttle completely down the motors will go to their minimum rate (MOT_SPIN_ARMED) and if the vehicle is flying it

- will lose attitude control and tumble.
- Drift Mode relies on your GPS for control.
 - If you lose your GPS signal in flight while in Drift Mode, your copter will either land or enter altitude hold based on your failsafe_gps_enabled setting.
 - You should also be prepared to switch back to Stabilize Mode for manual recovery if necessary.

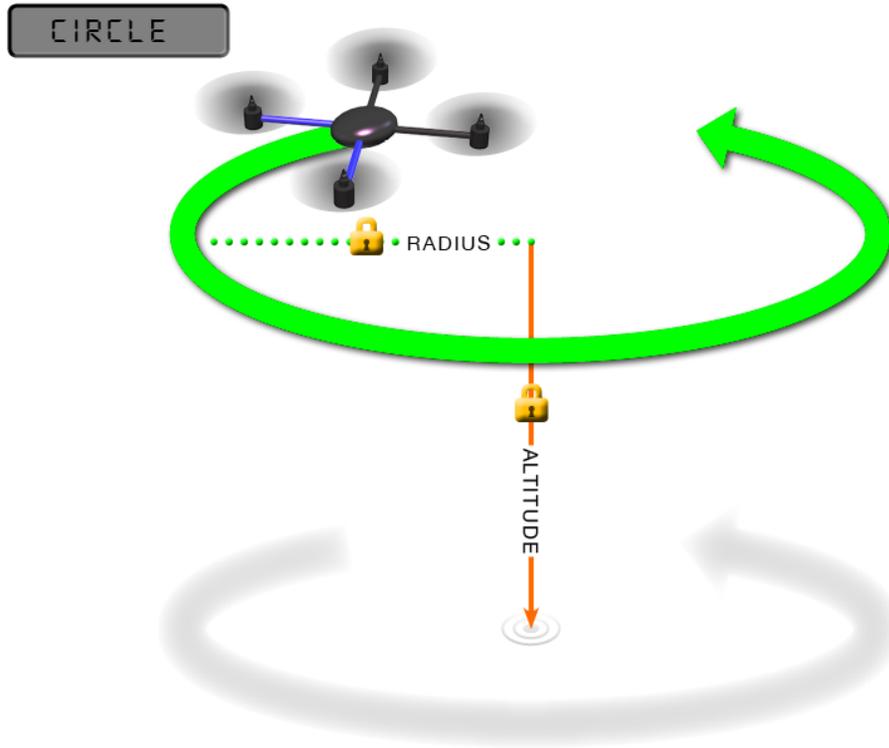
Whats it Useful For:

- FPV flyers who are looking for a dynamic, plane like flight as well as loiter-like position hold.
- New flyers who want to try a more intuitive and easy to learn flight mode.
- Anybody who would like to try an easy to fly and easy to learn and very fun mode.

Photographers and especially videographers who want a smoother and more coordinated filming result.

Circle Mode

When circle mode is engaged the vehicle will begin flying in a circle with the nose of the vehicle pointed towards the center.



The radius of the circle can be controlled by modifying the `CIRCLE_RADIUS` parameter (default is 30m).

NB: The units are centimeters in AC 3.2. ***Mission Planner will report the units as cm for both versions of the code.

Setting the `CIRCLE_RADIUS` to zero will cause the copter to simply stay in place and slowly rotate (useful for panorama shots).

The pilot does not have any control over the roll and pitch but can change the altitude with the throttle stick as in PosHold or Loiter mode.

The pilot can control the yaw of the copter, the autopilot will not retake control of the yaw until circle mode is re-engaged.

Radio Transmitter Flight Mode Switches

Switch A (SW B in UP Pos, SW B in DN Pos)

STAB, DRIFT

POS HOLD, CIRLCE

LOITER, RTL

When switching modes, ensure you have sufficient altitude before switching since the craft may experience a drop in altitude due to the change in modes and stability control loops have adjusted to mode changes.