

AOSENMA CG035X

**DUAL GPS
FOLLOW-ME QUADCOPTER
6-AXIS GYRO SYSTEM**



OWNER`S MANUAL

**(“Translation” rewriting and compilation by Hendrik J Bosman
with critical inputs from Elio Bruce and other members of the
Aosemna CG035 Facebook Group)**

**Please read carefully before operating the craft. This Operating
Instruction Manual contains important safety information**

Table of Contents

(to be added later)

AOSENMA CG035 QUADCOPTER TECHNICAL DATA

Technical specifications:

Brand name: EACHINE CG035

Flight control frequency : 2.4G

Channel : 4CH

Gyro: 6 Axis

FPV control frequency: 5.8G

Motor Type: Brushless Motor 1806 2300KV

Control Distance: 300m

Remote Controller Power: 4 x 1.5V AA battery (**not included**)

Battery: 7.4V 2600mAh Lipo battery (**included**)

Charging time: 65 to 300 mins

Flying Time: 15-20mins (experience says 7 – 12 minutes)

Controller Mode: Mode 2 (default) ,can be calibrated to Mode 1

Product size (L x W x H): 33 x 33 x 13.7 cm

Package size (L x W x H): 44x 37 x 19.3 cm

Features:

With 1080P HD gimbal camera

Brushless motors provide strong power to the quadcopter
Altitude hold mode height and stationary position can be set

Headless Mode, there is no need to adjust the orientation of quadcopter craft before flying

One key to return function makes it easily to return home.

Failsafe Return to home when out of range
Orbit feature, can orbit a specified point or location
Follow me function, aircraft follows the remote controller,
Arbitrary and easy manipulation. (Up, down, left right)
Telemetry and mission planner by default.
2.4G Transmitter/ Easy Adjust Frequency
6 axis gyro system makes flight more stable and flexible
Transmitter can be switched between Mode 1 (right hand throttle) and Mode 2 (left hand throttle)

Functions:

GPS fixed point and set height,
Headless mode
One key return,
Forward/backward,
Sideward flight,
Turn left/right, Up/down
With light
FPV (if available)

Package Includes:

1 x CG035 Quadcopter
1 x Camera
1 x FPV monitor
1 x Transmitter/Remote Controller
1 x 7.4V 2600mAh Li-Po Battery
4 x Propellers (2 x CW and 2 x CCW)

1 x USB Charger

2 x Manual (Chinese and Chinglish translation)

SAFETY PRECAUTIONS

PLEASE READ AND HEED the following safety precautions.

BATTERIES

Never overcharge batteries as these may become excessively hot and explode.

Always charge in a well ventilated area

Use only designated batteries with designated balance chargers

Dispose of batteries according to the legal requirements in your country

Never put batteries in the fire

Keep out of reach of small children

Replace with correct and accepted type of batteries when damaged

QUADCOPTER

Check that all screws, bolts and wires are in good condition and properly tightened.

Check that batteries of quadcopter, gimbal (if installed), camera (if installed) and remote control are fully charged and not damaged.

OPERATION (FLYING AKA “PILOTING”)

1. Fly only in designated areas
2. Fly away from buildings and power lines
3. Fly away from people such as in a park
4. Fly away from animals
5. Fly away from water bodies and trees
6. Do not wear loose clothing as this may get entangled with turning propellers
7. Do not try to touch propellers that are turning
8. If designated areas are not available only fly in large open areas

PREAMBLE

The reason for the development of this specific manual is because of the very poor Chinese to English translation that has spawned the word Chinglish which does not provide clear instructions on the assembly or operations linked to this quadcopter.

The Chinglish manual uses words and grammar that makes it completely useless in some instances. However through much support of YouTube videos and support from the AOSENMA CG035 Facebook community this manual will fulfil most users` needs.

In actual fact the very comprehensive troubleshooting section by ***Elio Bruce*** is more complete than most other quadcopter manuals.

IMPORTANT DISCLAIMER

Although due care was taken that all instructions and safety precautions will allow the pilot (operator) to safely operate this machine the writers and/or other contributors of this manual cannot be held responsible for any injuries or death, damage to property or any other incidents resulting from the use of or activity associated with the operation of this quadcopter aircraft.

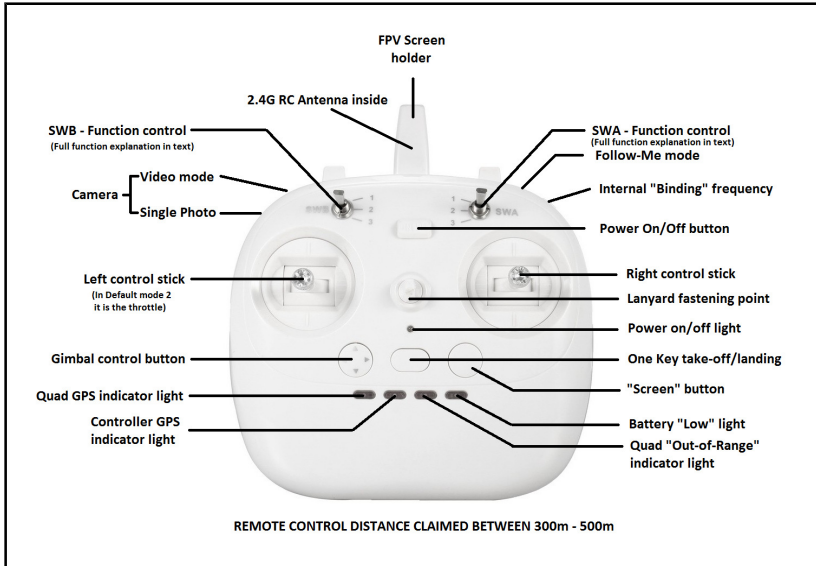
INTRODUCTION

The Aosenma CG035 Quadcopter is a toy grade quadcopter and designed for “playing” only. It is **NOT** suitable for commercial or serious hobby (such as racing) use.

The above notwithstanding it is recommended that only persons with some RC experience use it or is available to teach novice pilots the correct way to setup and operate the controls.

IDENTIFICATION OF CONTROLS, PARTS AND FUNCTIONS

Remote Controller functions (picture and annotation by Duc RED)

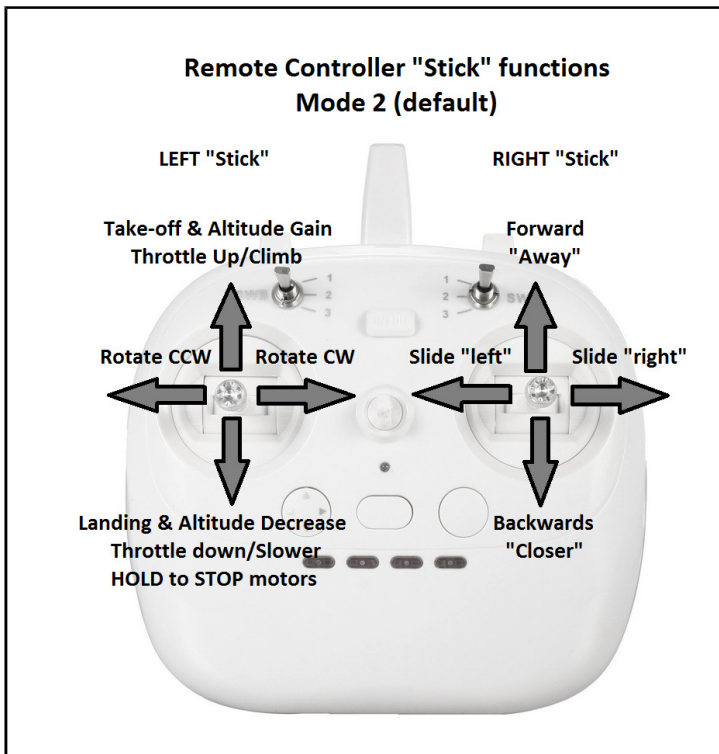


Above pictures and annotation by Duc RED

FLIGHT CONTROLS (by courtesy Elio Bruce)

For those new to the CG035 and the world of drone flight in particular there are listed below the instructions on the use of the controller as well as functional details of all the buttons and switches.

Controller Stick functions (picture and annotation by Duc RED)



The 2 distinct flight modes are described later during the controller setup and calibration as having two modes and

is by default in mode 2, the differences are outlined below (***importantly!***) with the CG035 facing in the same direction you are:

In mode 1:

Right stick:

Forward = higher (throttle up).
Backwards = lower (throttle down).

Left stick:

Forward = away from you.
Backwards = closer to you.

In mode 2 (the most common and default for the cg035):

Right stick:

Forward = away from you.
Backwards = closer to you.

Left stick:

Forward = higher (throttle up).
Backwards = lower (throttle down).

IMPORTANT NOTE

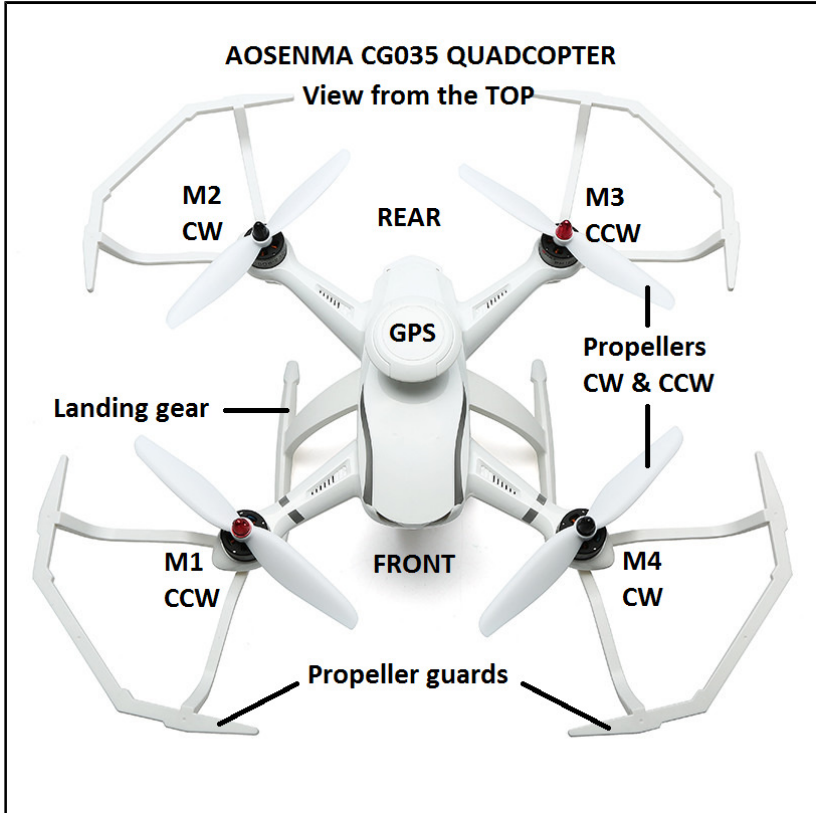
If you have the quadcopter facing towards you then sliding and forward/reverse controls are inverted in relation to you!

Sliding to the left is accomplished by pushing left on the left stick, sliding right is moving the stick right!
Moving forward is backwards and backwards is forwards!

To ***eliminate*** the above that will cause ***confusion*** to an unexperienced pilot, you can ***use Headless Mode*** as outlined further below.

QUADCOPTER IDENTIFICATION OF PARTS

Viewing the quadcopter from above. (*picture & annotation by Duc RED*)



EXTREMELY IMPORTANT NOTICE

It is extremely important to realise that the labeling of the motors on the schematic on page 4 of the Chinglish manual is **CONFUSING** because of the upside down and left to right view of the quadcopter from the bottom.

HOW TO ASSEMBLE

Unpack all parts, cables and batteries from packaging. Check all parts, cables and batteries for damage that could cause failure and subsequent damage, or personal harm to people, of the quadcopter when in operation.

The quadcopter comes with all electronics and motors pre-assembled.

Place the main section (body) of the quadcopter on a large clean work surface with the front of the machine pointing towards you.

Lay out all parts in it's relative positions around the main body. This will make it easier to assemble parts correctly.

Landing gear

Normally the landing gear is installed first, however you may specifically want to leave that till after the maiden flight, particularly if you are not a competent flyer with experience in piloting RC equipment, as the landing gear may be damaged in an uncontrolled landing.

If you want to assemble the landing gear turn the quadcopter over with the underside up. Take care to not damage the GPS unit that is now pointing towards the worksurface. Hold the landing gear in proper position and fasten with the supplied screws. Do this for both sides. Seeing that the landing gear parts are not

identical it does matter which side it is assembled. Turn the quadcopter back to the normal position and stand it on the landing gear.

Next up is the installation of the propeller guards.

Propeller guards



The above graphic is a composite with one guard installed. *(created from 2 different graphics by Duc RED)*



The propeller guards need to be assembled by pressing the thin guides into place. No screws needed.

The original kit comes with 4 identical propeller guards which means that these are all interchangeable to be installed in any of the four positions.

The quadcopter needs to be turned over with the underside in the up position in order to install the propeller guards.

To prevent the screws that hold the motors from vibrating loose and falling out just fill the plastic holder with liquid silicone. (*photo and description by courtesy Rene Peerboom*)



Another way of preventing the screws from becoming loose and falling out is by using “screw” glue such as Loctite Mild or plugging with light weight foam.

Using Loctite or silicone are not the best options as it will cause disassembly problems later.

Propellers

There are TWO sets of two propellers each. One set is designated as CW which is clockwise rotation and the other set is CCW which is counterclockwise rotation. It is important that the sets are installed on the correct motors as failure to do so may result in damage to the quadcopter and or the person operating the craft.

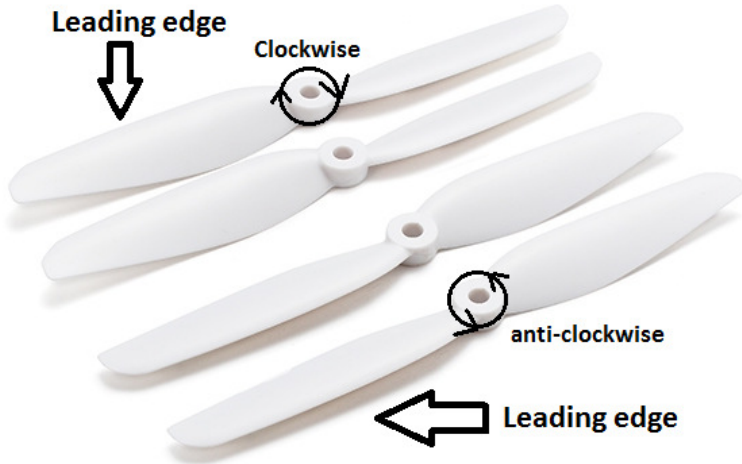
IMPORTANT NOTE – How to distinguish between CW and CCW propellers

Lay all propellers on a flat surface with the “rounded” surface up as in the following graphic. The side of the propeller that is furthest from the flat surface is called the leading edge and that is also the direction in which the blade will rotate. An alternative is to buy “self-tightening” propellers that will fit one way only.

Most toy grade propellers are mass produced and are not balanced. *Balancing the propellers* will get rid of a lot of vibration and even some of the jello effect when filming.

In order to balance propellers properly you will need access to a propeller balancing tool such as the ODAY Tru-Spin Prop Propeller Balancer or the GOOLRC Carbon Fibre Propeller Balancer or if you are crafty enough and have some perspex materials laying around you could make your own.

**Determining the direction of rotation from studying
the position of the leading edge**



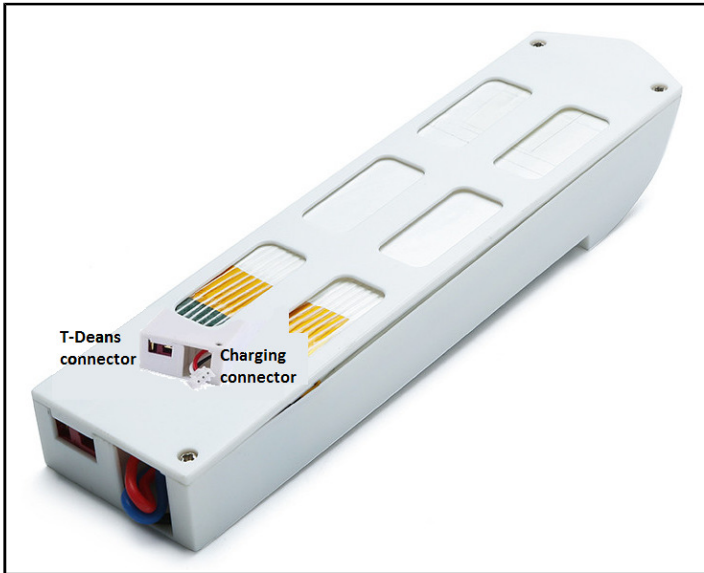
(picture and annotation by Duc RED)

Install the **CCW** propeller blades, with the silver caps, onto motors **M1 and M3** and tighten firmly by hand.

Install the **CW** propeller blades, with the black caps, onto motors **M2 and M4** and tighten firmly by hand.

NOTE: However you may specifically want to leave that till after the calibration of the quadcopter and the remote controller after testing all functions as suggested by Elio Bruce.

Battery



The above composite picture is the battery holder with the battery and all connecting wires and T-deans connectors inside. Note that the T-deans and charging wires are just an inset to try to show the connectors better.

VERY VERY IMPORTANT

NOTE ABOUT THE NEW BATTERY.

Before trying to install the battery into the quadcopter make sure that the foam that covers the T-deans connector is removed. If not done this way round the connection will most probably not be good and the quadcopter may either fail to start or fail during flight. Once the foam is removed make sure that the T-deans connector is free of glue or other substances that could have an impact on the free flow of current between the battery and the quadcopter.

CRADLE aka GIMBAL

The “gimbal” is not a true gravity gimbal as it can, in theory at least, be adjusted for angle of view which can be either up/down or left/right. **(In practice it has been found that the mechanism does not work properly, using too much power, getting hot and freezing up. This causes the quadcopter to fall out of the sky with unwanted result)**

INITIAL CALIBRATION PROCEDURE.

(by courtesy Elio Bruce with some notes by Duc Red)

It may be a good habit to calibrate the quadcopter and the remote controller before every flight session.

Remote controller

Calibration

Push both sticks to upper left corners, hold while switching controller on.

The red LED above the auto take off/land button should now flash.

Release both sticks and press the auto take off/land button once.

Move both sticks to full throw in all directions and allow it to return to centre position.

Press the auto take off/land button once again.

The LED should now be solid red.

Switch controller off.

Change Mode

The remote controller can be setup as either mode 1 (Right stick throttle) or mode 2 (Default Left stick throttle)

How to change between modes 1 and 2 (*by courtesy Elio Bruce*)

Push both sticks to upper right corners and switch on the controller.

Release sticks.

Led above auto land/take off button should flash.

Move right stick to the right to have right hand throttle (mode 1), or to the left for left hand throttle (mode 2) Led should now be solidly on.

Switch controller off.

Quadcopter (*by courtesy Elio Bruce*)

Switch controller and drone on.

Flick SWB from position 1 to position 2 four times.

The rear white LED s on the drone will come on.

On a flat level surface rotate the drone 6 times clockwise (mine seems to only need 3 rotations but the original manual says 6).

The white led should now flash intermittently.

I then point the drone nose down and rotate it again, but the manual does not call for this.

Place again on a flat level surface

The white LED's should now not be on and it will be only the red, green and blue eye lights once more.

Switch everything off.

Calibration is now complete.



Notice that the 4 status lights should be off when OK.

PRE-FLIGHT CHECK

Before a flight **ALWAYS** do a pre-flight check to insure that the quadcopter is ready to be operated safely.

1. Check that quadcopter is assembled correctly, **check for parts that may have become loose during the last flight,**
2. Check that propellers are in the correct position and will be rotating in the correct direction,
3. Ensure that ALL batteries are fully charged, in good condition and replace faulty batteries before flight,
4. Check that electronics are working properly,
5. Don't fly in strong winds as the quadcopter can only operate in light winds,
6. If you are not experienced in operating RC equipment it is recommended that you have an experienced pilot assist you until you have enough experience to operate the aerial vehicle safely.
7. Wait for GPS lock to complete before flying.

NOTES.

Radio controlled aerial vehicles can reach high speeds very quickly and will cover significant distances very rapidly. If/when control is lost the vehicle may cause damage to property or injury to people and will most certainly crash causing irreparable damage to the model.

FLYING THE Aosenma CG035 (by courtesy Elio Bruce)

Before attempting to fly the quadcopter insure that you are 100% familiar with the function of each control on both the remote controller and the quadcopter. This will insure that you are not surprised by unwanted maneuvers by the quadcopter whilst flying.

The **FIRST** and very **IMPORTANT** step is to get both the GPS from the quadcopter and the GPS from the remote controller to be locked onto the GPS Constellation.

THIS MUST BE DONE BEFORE EVERY FLIGHT !!!!

How to get GPS Lock. (by courtesy Elio Bruce)

DO NOT try to fly at all for the first few minutes of the first flight, find a nice open space, switch the controller and drone on and put them both down, take a few steps away and don't touch them. The red lights on the controller should all go off on their own, especially if you are a few paces away, if you stand too close your body can partly block the gps signal and slow down or prohibit gps lock. **HAVE PATIENCE.**

It is very helpful to use an app on your smart phone or tablet to check the availability and signal strength of the satellite constellation. In all cases go to the screen that shows the available satellites in a circle as it will give you a good idea of the distribution. (*paraph by Duc RED*)

The following Android Apps are very useful.

GPS Test by Chartcross Ltd

AndroiTS GPS Test Free by Alessandro Bonetti (*My Personal favorite Duc RED*)

GPS Data by Propane Apps

GPS Status & Toolbox by MobiWIA EclipSim

IMPORTANT NOTE (by courtesy Elio Bruce)

Be gentle with the controls on the first flight(s) to get used to the controls by doing simple manoeuvres such as short point to point take off and landings, slow banked turns etc. and try to resist the urge to go full throttle.

STEP-BY-STEP 1st Flight Procedure (by Duc RED)

1. Do **thorough** pre-flight check as indicated before,
2. Switch on the remote controller using the power button,
3. Switch on the quadcopter by inserting the battery fully,
4. Do pre-flight calibration of both quadcopter and remote controller,
5. While both quadcopter and remote controller are on, place on the ground about 3 meters apart and stand away to facilitate a good GPS fix,
6. Check the 4 status lights on the lower part of the remote controller, these should all be off,
7. There are 3 ways to start the quadcopter's motors.

8. A. Push both controller sticks towards you and “inwards”, B. Push both controller sticks towards you and “outwards”
- 9.
10. With the quadcopter in idle and in GPS Mode (SWB - 2) mode press the “ONE Key take-off/landing” button 3X in quick succession,
11. The quadcopter should now take-off and hover at a height of about 2 - 2.5 meters from the ground,
12. Press the “ONE Key take-off/landing” button again 3X in quick succession and the quadcopter should land by itself,
13. *CONGRATULATIONS YOU HAVE JUST COMPLETED YOUR FIRST SUCCESSFUL FLIGHT WITH YOUR AOSENMA CG035 QUADCOPTER!!*

One of the main reasons why people buy the Aosenma CG035 Quadcopter is because of the very unique features at a very good price. Two of these are the **Follow Me Mode** and **Orbit Mode**.

FOLLOW-ME Mode

In the ***follow-me*** mode the quadcopter will ***follow the remote controller*** and not the person *per se*.

For the follow-me mode to be working the following settings need to be set on the remote controller.

First of all get the quadcopter into flight to the height (elevation) that you want it to follow you.

SWA = 3 Headless mode

SWB = 2 GPS mode

Then Press the “Follow-Me Mode Button on SWC on the top right of the remote controller once.



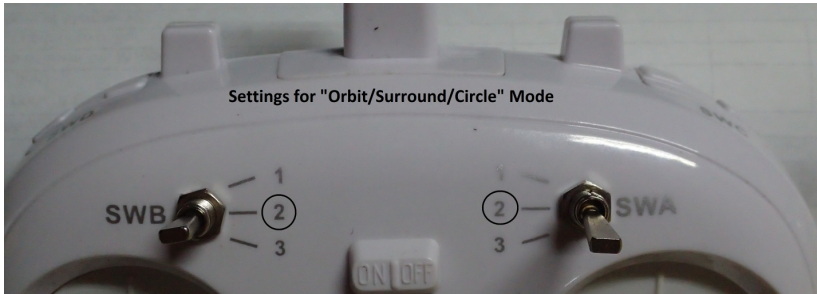
Once that is done you may try to engage “altitude hold” mode by changing the position of SWA = 1 Altitude hold.

ORBIT Mode

Orbit mode which is also called “surround point” is where the quadcopter will fly in a circle around the point it was at it when the “orbit/surround” mode was switched on.

First of all get the quadcopter into flight to the height (elevation) that you want it to orbit or fly in a circle. Set the switches on the remote controller as follows;

SWA 2 = Orbit/Surround/Circle mode
SWB 2 = GPS Mode



Doing Photography or Videography.

Regardless of which mode the quadcopter is operated if it has a FPV camera system the pilot can take either photo`s or video`s.



Just make 100% sure that the camera and FPV batteries are fully charged and that the camera is turned **ON**.

AOSENMA GROUND STATION SOFTWARE (by *courtesy Jim Buxton*)

The software can be downloaded from the following link.

http://www.drone-maniac.com/wp-content/uploads/2016/12/Aosenma_vast_gcs.zip

ATTENTION & WARNING

If used incorrectly the process WILL “brick” your quadcopter.

The ground station software is provided by Hohem. ONLY use to tune PID`s, RTH, set maximum altitude and set the voltage alarm threshold for emergency landing.

DO NOT USE TO WORK ON FIRMWARE!

In order to use this software with the best results it is **CRITICAL** that the quadcopter be set on a flat surface and be **PERFECTLY LEVEL**. To achieve that the most practical is to use a proper and true spirit level. The levels one find as Apps must be used with care as there are many factors such as side buttons and covers etc that will have an influence on accuracy of the work surface.

The following account is *courteously provided by Jim Buxton*. Thank you Jim.

Thought I would share my most recent experience with the CG035 "Ground Station Software" and how it resolved an issue with my CG035, and how this experience may be of some benefit to some members here.

I have opened and used the software 5 or 6 times in the past 2 weeks, mainly just to modify the perimeters relative to the "Fly Function" tab. However, curiosity soon had me checking out the "Status" tab and its' corresponding "Accelerometer" and "Gyro" data fields, and "Initialization" buttons. That's where the problem started, and that's where the problem was resolved. Having read all the information on the "software", that I could find, I decided to "mess with the buttons" in an effort to figure out how all this was designed to work, and see if there was any more stability to be had from my CG035. Besides, I figured this was an opportunity to extend, and feed the "addiction." So placed my 035 on the small 18"x18" 4 legged wooden table as usual. Remembering that it needs to be on a level surface, I figured my table must be level, it is resting on the carpet which is installed over the cement foundation slab so of-course it's level. I opened up the program one more time, powered up the transmitter and CG035, then connected to the computer. Off to the "Status" tab I go. Pointed her do north. Although I never changed any of the numerical values, I pushed the "Gyro" and "Accelerometer" buttons a few times and watched as the computer graphic of my 035 changed orientation. I continued to work the "Accelerometer" and "Gyro" buttons until the graphic of my 035 looked the same as before I did anything. Then, I could not resist... and I pushed the "Apply" button. Didn't

see any visual changes in the graphic of my 035, so I decided to bail out. I disconnected from the computer, powered off the 035, turned off the transmitter and closed the program. To the back yard I go for a brief low level confirmation flight. Manual take off was a little "squirrly", but not bad, hover still good, but as I took a few short laps around the yard I could see that "forward" elevator input now also produced some small, but very noticeable "right" aileron input as well. In other words she would not fly straight away, but forward and right. Humm, well I had been noticing a bit of "play" around center developing in my right stick so I did the stick re-cal both in the software and manually. No change. Bummer, it used to fly straight! Damm that software I thought! Rethinking the entire process, I decided to check my small wooden table to be sure it was indeed level. Well it was "almost" level, but not "perfectly" level.

So I shimmed the legs individually until it was indeed ***PERFECTLY LEVEL***. A quick trip back to the software to re-visit the "Accelerometer" and "Gyro" buttons showed my 035 graphic to be noticeably "goofy". I then worked the "Accelerometer" button until the graphic of my 035 looked level and straight. I then pushed the "Gyro" button, then the "Apply" button, and I'm out of there, following the same closeout procedure described above. Another back yard flight and problem solved!!! Perfect auto takeoff, rock stable hover, and she flies straight!!! Moral of the story, "almost" level or "close" to level was NOT close enough in my case! This leads me to believe the surface you put the 035 on needs to be "perfectly" level to get a good result in the "Status" tab. A long story

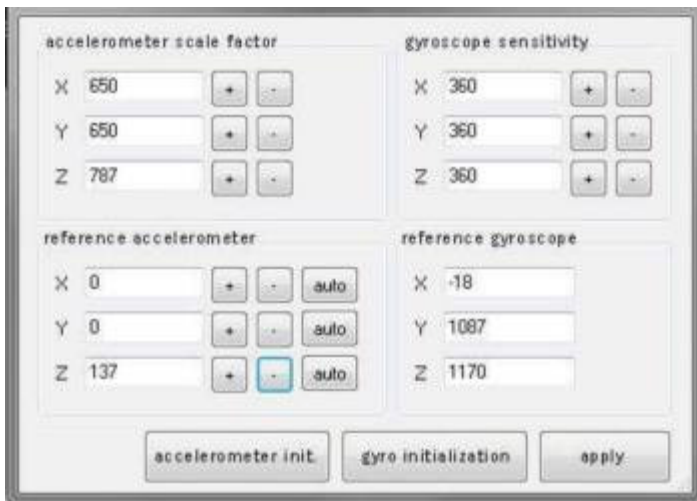
for such an obvious solution I know. But for me, it required curiosity and the "hobby addiction factor" to realize what should have been obvious to me in the beginning. I hope this can be of some benefit to others.

The following paragraph is a reply from Jim Buxton to a question about using a phone app for leveling.

It may be better to just use an old fashioned bubble level like I did. Good luck with your system, but please remember, the process I described may or may not work for you, and may damage your CG035, as a few owners have "**Bricked**" their CG035 by using this software. In any event please let us know how you are doing with it.

Best regard Jim

This graphic was provided by Davide Rocciuto



TROUBLESHOOTING (by courtesy Elio Bruce)

This section assumes you have at least a passing familiarity with electronics, though I have tried to simplify things wherever possible to open the process to as many as possible.

OK. Time for some fun and games.

Let`s start with something simple.

LIST OF TOOLS YOU WILL NEED.

Screwdriver set, long reach, thin precision type.

Multimeter, (and for convenience a cell meter) preferably with audible continuity test.

Soldering iron, (lower powered electronics or variable temperature type) solder, soldering sponge.

Desoldering tool.

Snips.

Needle nose pliers.

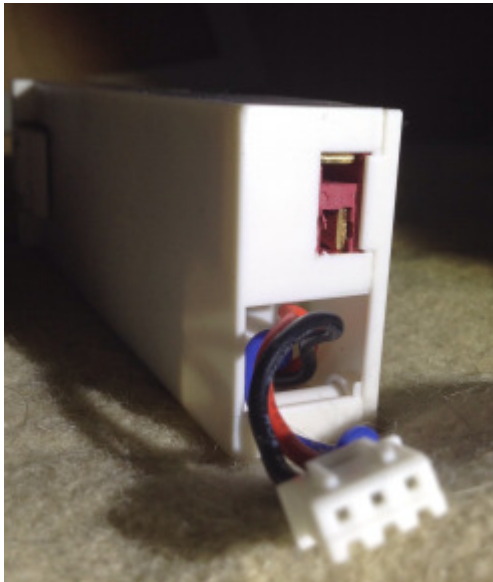
Cordless drill or drill of some sort with variable speed control (you`ll find out in a bit).

DEAD ON ARRIVAL

You have inserted the battery into the quad and nothing happens, no lights, no noise. This is known as CDOA or Completely Dead On Arrival.

A few things can cause this issue.

Best case scenario is that you have forgotten to remove the protective foam pad over the Deans T connector. If this is the case then simply remove the pad to make it look as shown.



However, if you have forced it in then there then you may need to clean the contacts of the battery

and inside the quad to ensure a good connection. There may be pieces of the pad or residue of glue that needs removed. Try using tweezers to remove the debris and lightly scratch the surfaces to take them back to bare metal.

Another option is the LiPo battery has failed, either by physical damage or through being drained far past normal levels. Generally speaking this is fatal for the battery and it will need replaced.



Test this with a cell meter as shown or a multimeter set to the 0-20 Volts DC range, (all measurements from here on out will be done using this range and setting unless otherwise stated) measured across the Deans T connector. The stock battery is a 2 cell (2s) 7.4 Volt with an alleged 3200mAh capacity, though in practice it is usually nearer 2800mAh or less. A functioning and fully charged battery is around 8.4V, 4.2V per cell (each cell should have near identical voltages). If it is dramatically low, like 5V total across the T connector then it is a good indication that the battery may be dead and needs replacement, though it may be recoverable with a good

quality balance charger. A cell meter as shown above offers the information in a simpler way, just connect it to the balance charging port and it shows the voltage of each cell and the total of all cells

.

Another possibility is

...

..

THE CHARGER

Could have failed and is only charging one cell or not at all. Measure the output of the balance ports on the charger while it is switched on. Be careful not to short out the contacts with the meters probes while doing this.



The voltage on a correctly functioning stock charger (with no load) is measured as 4.8Volts across each cell. Pin 3 is ground (or – terminal, furthest right). Pin 2 is cell 1, pin 1 is cell 2. So if you put the negative probe of the multimeter on the negative pin of the charger and the positive probe of the meter on pin 2, you get a reading of 4.8V. Now move the positive probe to pin 1 and this gives you a cumulative value of 9.6V, 4.8V per cell, if you move the negative probe to pin 2 this shows you the value for cell 2, which again should be 4.8V. If you do not get quite near these values, the charger is probably broken and will need to be replaced

If the battery and charger check out as ok then the issue is within the drone, look inside the battery bay and if you can see a damaged Deans T connector then that is probably the issue.

If looking inside the battery bay you see nothing untoward then you may wish to open the chassis of the quad for further inspection.

Another possibility is the red and/or black power wires are not soldered correctly onto the main board, or at the back of the T plug, check this for faults too. If everything is ok it should look as pictured here.



If none of these are the issue then the quad is more than likely dead and will need a new main flight board. Major surgery involved.

Constant beeping from the controller. Low voltage indication. The right most led on the controller is flashing and the quad refuses to move. In this situation the lights may flash on the quad for a time and even the start up tones may sound though it goes no further.

Again a couple of potential issues here. The battery or charger may be damaged and not charging correctly, though still have enough charge to partly power the quad giving rise to the above condition. Test the battery and charger as outlined in the above DOA section.

Another possibility is a faulty voltage sensor within the quad or even the voltage reading not being transmitted correctly back to the controller. Unfortunately if it is either of these it is likely to be a fault in the main board and the only solution I know of is replacing the whole board.

Though unlikely another possibility is a fault in the controller in it's communication with the quad. As a last resort you could attempt to re-bind the quad and controller as outlined further on.

GPS failure/out of range warning



Also the third light on the controller is flashing. This indicates the controller thinks the quad has had GPS failure (out of range warning), due to not receiving any GPS data. Check the quad and make sure there is a green light on under the GPS dome of the quad, if not then this is a known and common fault.

There are a couple of possibilities for this problem, faulty wiring leading to the gps unit or a faulty gps unit it's self are the most probable causes.

Test all the wiring going to the gps pod for continuity and a good solid solder connection.

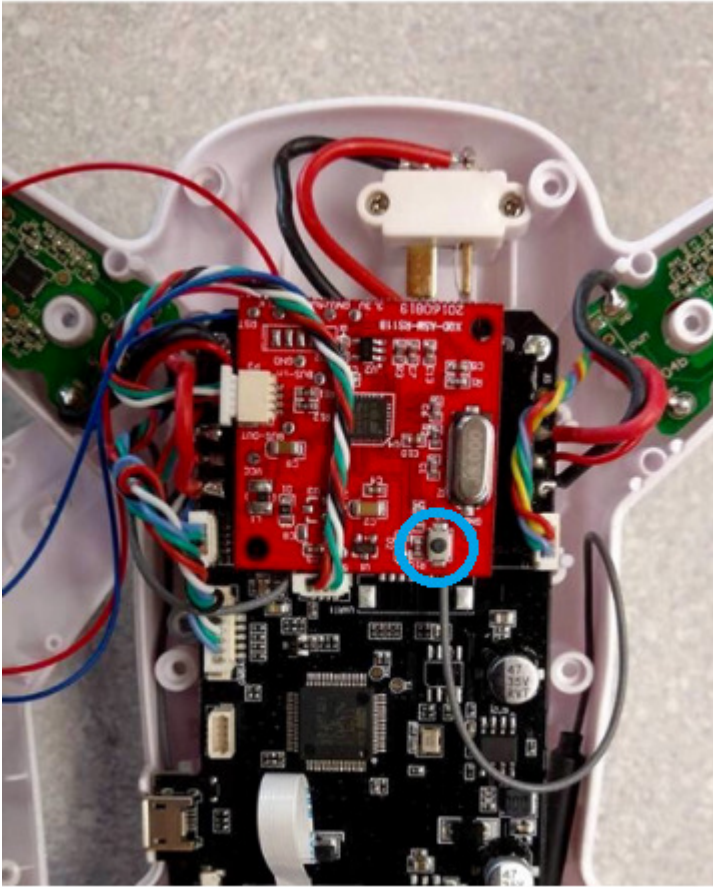
Back out with the multimeter, this time set for audible continuity test. If you do not have this on your meter then set it to resistance. All continuity readings should read as 0 Ohms resistance. Test from one end of the wire to the other with the GPS unit disconnected from the quad. If the wires and solder joints all check out as ok then the GPS unit will need replaced as further fault finding on it is near impossible at home.

Controller has become unbound from the quadcopter

An all too common problem, this is annoying as hell to fix because it is so simple yet complicated at the same time. You will know if this is an issue as the quad will accept no input from the controller at all and the red LED above the auto-take off button will be flashing.

To fix this you need to disassemble the chassis by taking

out all 22(!) screws and removing the props in order to access the bind button on the quadcopter.



The procedure to bind is as follows:



Hold the bind button(circled in blue, above) down while inserting the battery on the drone, the led next to the button will now flash. Release the button. Next hold down the internal frequency aka bind button (circled in blue, across) on the controller then switching it on. The led next to the bind button inside the drone is now solid red, as will be the red led above the auto take off/landing button. Simple. Job done and ready to fly, once you reassemble, screw all 22 screws back in and put the props back on that is. (Note that controller is turned upside down.

Motor is not turning, or is erratic

Again, a few options here and several test options:
Calibration needed, Faulty wiring, faulty Electronic Speed Controller, faulty motor or faulty main flight board.

The flight board is the least probable cause of the problem unless all motors are affected. Thankfully. Remember to label or take a picture of all the positions of each wire and component you remove, this will help during reassembly! If you feel confident of a solution or have spare parts to hand then feel free to read on but skip ahead to sixth or even seventh test.

First test

At this time check the motor to see if it is loose or rattles, it may be missing a screw or two or they may just be loose. Try turning the motor by hand and listen for any noise, they should be virtually silent, if there is noise this could indicate a mechanical failure or foreign object inside the motor which has probably caused damage (you can try removing the foreign object if possible and running the motor again to see if this helps).

Try recalibrating the controller and quad gyros before looking for another source of the failure, simply because it the easiest and least invasive solution, though not the most likely one, unfortunately. In all probability though you may need to replace the motor or Electronic Speed Controller..

Second test

Next would be opening the chassis and carrying out an inspection of the wiring to the ESC and motor to see if there is a break there. A broken wire or intermittent connection can lead to false or incomplete signals to the ESC or motor giving erratic control and flight. Have a look at the esc for signs of burning or bubbling of the components which may indicate overheating.

If the wiring and ESC looks good then the problem probably lies within the esc or even motor. There is no really simple home test for these parts other than to swap them with a known good one to see if this solves the issue. However if you feel able to then there are further tests to see what has failed.

Third test



You can desolder the motor from the ESC and test each phase (wire windings inside the motor) in turn to see if they have a short to the stator (the bit of the motor that the wires come out of which stays stationary when on the quad) to determine if there is a short circuit. There should **never** be one. If a motor spins freely at all then it will probably be good, a brushless motor is usually a remarkably robust piece of technology but it is still prone to poor workmanship, abuse and overloading, so it is still worth testing.

Fourth test

To proceed further you need to remove the motor from the chassis (4 screws holding it in underneath). Then unscrew the screws holding in the Electronic Speed Controller, the little circuit board in the picture above. Once this is done you need to desolder the motor from the esc if not already done, completely removing it from the quad.

Take the motor and put the screw end (rotor shaft) in the chuck of the drill and while holding the end of the motor that the wires come out of so that it should stay stationary, run it up to speed for a couple of minutes making sure the wires do not connect to each other, isolate with a little white electrical tape and labelling them

A, B, C. What you are looking for here are two things, sound and heat, the motor should be more or less silent, just a gentle whirring noise or whistle with virtually no heat as it is not under load. If there is either of these it's usually a mechanically dead motor and needs replaced.

Fifth test

While still on the drill, again spin it up to full speed then use your multimeter on the (highest range first if not an autoranging meter then work your way down the ranges until you see a reading) VAC setting, test the voltage output across each phase in turn. To do this keep the three wires isolated from each other labeled A, B, C. Connect the meter to the bare wires of A and B. Take note of the AC voltage. Then repeat this test on wires labeled B and C then wires labeled A and C. All three readings should be pretty much the same, providing your drill is running at the same speed on all tests. If not, then dead motor. Needs replaced.

Sixth test, no multimeter (optional)

If you do not have access to a multimeter (I strongly suggest buying one) then you can try swapping out the motor for the diagonally opposite one. E.g. Clockwise for clockwise motor to see if this works. This means

desoldering and soldering the **good** motor back where the suspected bad one was. This way if you have to buy and fit a new motor you do not have to do this process twice. Spin the motors up to idle and see if there is any change.

CRITICAL - Please note:

Every time you desolder from a PCB (Printed Circuit Board) you run the risk of delaminating or lifting the copper circuit, this should only be attempted a limited number of times as it will, eventually, destroy the board, also this has to be done using the like-for-like motors as they are designed to run in one direction only.

Seventh test.

So the more probable cause is with the ESC, this is a much more fragile part.

Unfortunately there is no real home test for this other than a visual inspection for charring caused by overload (just compare it to a known good one, it should be identical) checking for poor solder joints or just swapping it out, it is just that complicated. If you want to do this test you can swap it out with the diagonally positioned motor and working ESC assembly to see if it will function with another set in this position.

If this does not isolate the issue then this would determine that the main flight board is the problem meaning it will need replaced. Not very expensive, all things considered, but a long, tedious and involved process.

Note:

Be careful if you need to order a replacement esc or motor (so far there seem to be two distinct versions of the esc and motor) as they should all match ratings and values otherwise there can be balancing and other issues when you install a new but unmatched one.

Camera/Gimbal/FPV Transmitter unit



Ok, is this actually worth mentioning?

Right.... I suppose a few words of warning...?

It is a diabolical contrivance and should be sentenced to death by fire. The tiny servo's almost universally fail after a few flights, they never stay where they are pointed, the video quality is middling at best, especially as it is claimed to be 1080p and there are charging issues where the internal battery fails or has a poor connection.

It needs re designed from the ground up to be even half way capable.



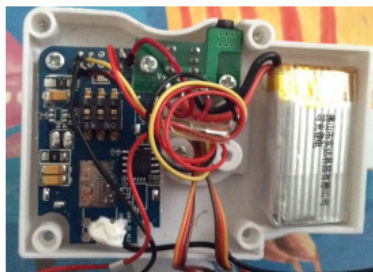
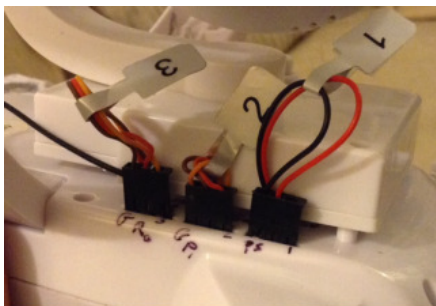
If it breaks down enough to make it unusable, remove it and replace with another system such as an action cam and mount if you want fairly good quality video recording (as shown above) and even with a connected FPV transmitter if you want or just replace with an all in one type of FPV camera/transmitter which can run from the gimbal power out.

If there are no lights on the camera/transmitter (usually one red and one blue) this usually indicates the battery has either failed or is not charging correctly via the USB charger which should output 5.2V when plugged into a suitable power supply. If not, this needs replaced with a

lipo usb charger, **not** just a straight through power supply from a usb cable as it needs a dedicated charger to sense the voltage in the battery in order to cut off supply to it.

You could then use this opportunity to replace the internal battery, if desired, with an external single cell one that you can remove to charge and wire on a JST or connector (or one of choice) to power up the camera and it's transmitter. Longer life if higher capacity as the one inside is only 250mAh and it would probably be a bit more reliable!

If it is still partially working (normally because of a melted servo) just disable the pitch and/or roll functions by pulling out plug 2 and 3 respectively from the quad and use it simply as a FPV camera.



FPV MONITOR

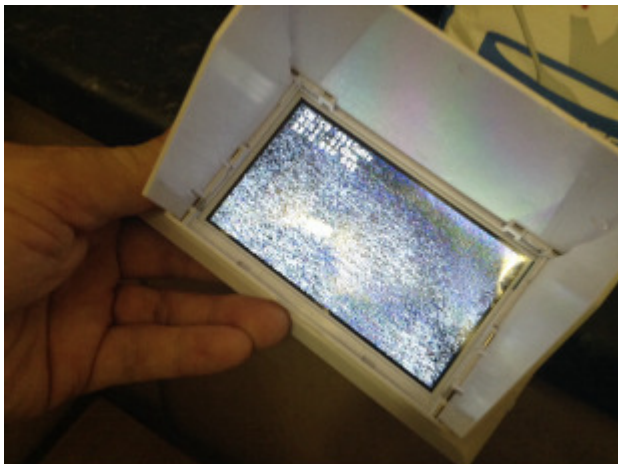
Not switching on.

As with the camera this may be indicative of a failed USB charger, test it with your meter, it should output around 5.2V when plugged into a suitable USB power supply. If not, this needs replaced with a lipo charger, **not** just a straight through power supply from a USB cable as it needs a dedicated charger to sense the voltage in the battery in order to cut off supply to it.

Everything is internal from here so opening the monitor is a must. Fortunately there are only 4 screws holding the back on. Inside you will find the small LiPo battery as well as access to everything else for that matter.

Again, test the voltage of battery, if not approximately 4.2 Volts when fully charged then it has probably failed and may need replaced.

Weak or 'snowy' picture at close (10meter or so) range



Usually indicative of a faulty antenna, SMA connector or transmitter.

An internally broken antenna can be annoying as it is essentially unfixable, having to buy a new one is the only realistic solution, however a couple of basic tests can usually determine where the fault lies.

Remove the antenna and see if this affects the reception, if not then this means it is on the receiver end, continuity test across the middle pin and outer ring where it screws onto the monitor. If there is a short here, the antenna is faulty and should be replaced.



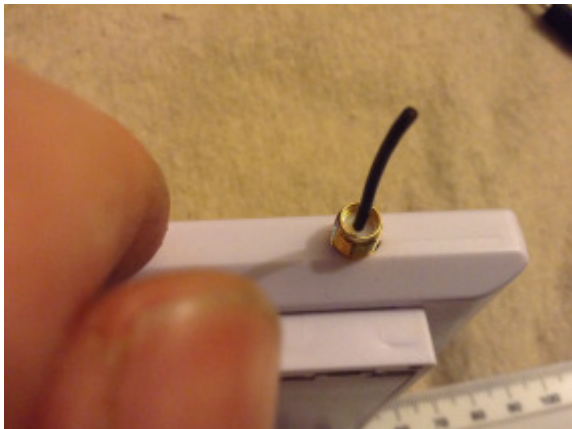
However a further test can confirm if it is the antenna or if the monitor has an internal issue with it's SMA socket. Simple if you have a spare antenna, swap it out and if it fixes the issue, problem solved. However if you do not then do as below.

Cut a short length (approx. 28mm) of thin wire as shown and strip back about 2mm to expose the metal core.



Congratulations, you have just made a very basic 5.8GHz antenna.

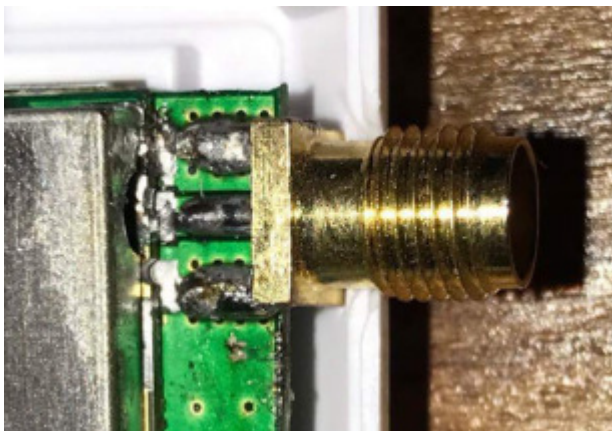
Insert it onto the hole being careful not contact the outer ground connection.

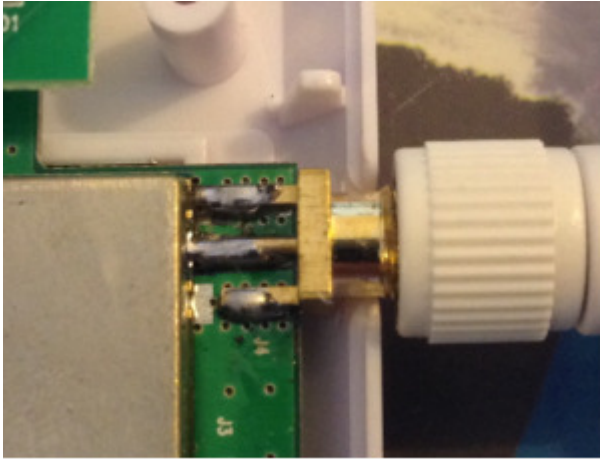


Re test the range, and if there is a marked improvement it confirms the antenna was the issue and needs replaced.

If these tests show no improvement in signal then it will be an internal issue of the monitor or camera/transmitter. Again simple if you have another fpv system/spares as you can test parts against each other for comparison. If you do not then it is more difficult to be sure.

Remove the back plate of the monitor and visually inspect the solder joints at the SMA connector (circled in red), there may be a short between two pins or a joint that is dry.





If not then the problem may be so deep it might not be worthwhile fixing, however you can try replacing the SMA socket or even just try re flowing the solder joints on the pins to see if that will fix it.

A note for those beginners/intermediates interested in the Controller, Monitor and CG035 antenna mods:

The stock antenna is pointing straight out inside the controller which is slightly the wrong orientation during normal use for the greatest range, the antenna in the controller is quite poor, essentially just a bare piece of wire for the signal to come out of. To increase the range somewhat you can replace it first with a decent antenna, one designed for 2.4ghz. If you wish to start modding

your transmitter I would suggest you start by fitting an external SMA socket which means you can screw onto it a whole raft of different commercially available third party antennas offering a wide range of claimed dB 'boosts'. There are so many antenna mods you can do to improve range that if you research it there's practically no limit to them, hell you can even fit a wifi booster to it to increase the (wattage) output of the controller if you were so inclined.

A 'simplified' bit of the theory behind antenna types and dB gain.

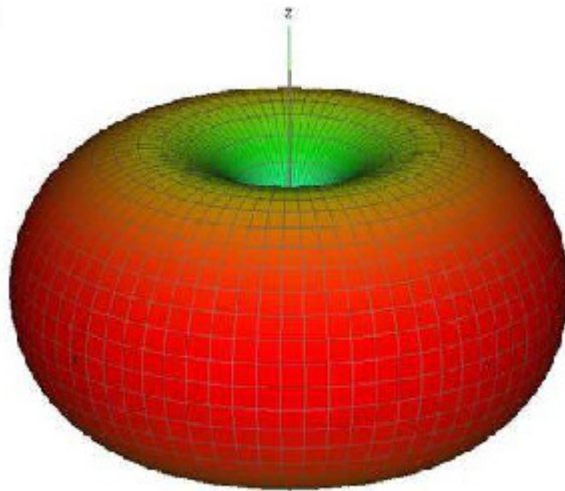
Antenna design depends on what they are to be used for. They are generally 'tuned' to a broader frequency range than needed, for economic and practical reasons. For instance while we say this is a 2.4GHz control system it is not exactly 2.4GHz, it could be 2.35 or 2.45GHZ depending on what channel you are using and so if it is calibrated to one end of the spectrum and you change channel it would mean a somewhat reduced range. Focusing in on a specific frequency also requires more precise engineering, driving up cost.

Then we have signal 'pattern'.

To liken the transmission from your controller to a light source is a simple way of describing it.

Think of your controller as a bulb producing a source of light and the antenna as a reflector and lens. Think of using the same power supply and the same 'bulb' giving out the same amount of light but projecting it in a different way.....

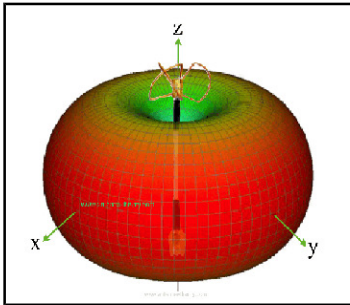
The standard antenna produces a slightly squashed dome shaped transmission, sending the signal everywhere more or less equally, including into the ground, somewhat like a naked light bulb pointing down would produce light. Good for use nearby and particularly if you fly at a very variable height and direction.



from www.antenna-theory.com

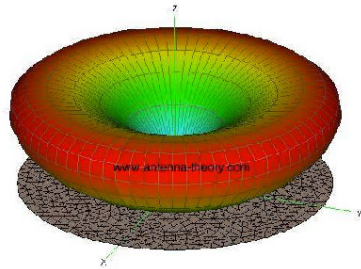
“Normal” antenna radiation pattern.

A cloverleaf or mushroom type antenna projects out and up giving a more 'doughnut' shaped transmission, like a lantern. Good for all around flight but some height is sacrificed, particularly directly above you.



Cloverleaf

vs



Mushroom

Cloverleaf vs Mushroom antenna radiation pattern.

A flat panel (patch or patch array) antenna projects everything almost all in one general direction like a floodlight. Good for long distance flight, in one specific direction, more commonly used with 'diversity' receivers often paired with a mushroom antenna.

If we were to use a dish shaped antenna (like a satellite dish) it would be a highly focused pattern like a spotlight and using one of these could increase gain by over 50dB

in extreme cases. Almost entirely useless for flight control unless used with a ground station that can track your flight, only really used in fixed wing extreme range cases such as military UAV's.

So, each of these can be 'seen' progressively further away by the receiver.

The same can be said of the receiving antenna on the quad itself. If it 'looks' for a signal in a limited area, its field of view being narrower means it can see the signal from further away. Much like a fisheye lens, a naked eye, binoculars and telescope depending on antenna type. However if it turns away from the source of the transmission with a high gain antenna it would be completely uncontrolled or 'blind' using a dish or patch antenna to receive with. Normally the best used is stick, cloverleaf or mushroom type.

For instance the probes which NASA sent out, like voyager, have no more power output than a regular walkie talkie radio but because of the precision of the sending and receiving 'antennas' (more like a laser beam than a spotlight) it can be received from literally millions of miles away. Of course it helps that there is comparatively little interference to swamp out the signal in space but you get the idea.

If you need a graphic of this just google 'antenna transmission pattern' and that should show you what I mean.

The claimed decibel (dB) increase of commercially available antennas rely on this principle and by having a precise calibration of the antenna to the correct frequency range and modifying the 'pattern' or focus of the transmission to give an increase in range.

In order to make your own antenna perfectly matched for optimum range you would need to know the frequency range (bandwidth) in use and a good knowledge of antenna theory.

Unfortunately there's a really simple way of determining the signal bandwidth used by the controller..

I say unfortunately.

It's called a spectrum analyser. Or an oscilloscope that can go up to 2.4GHz.

You hook the controller up to one and measure the maximum and minimum frequency the transmitter uses, that gives the precise frequency range that you calibrate to the middle of.

There is a way to hack a pc usb tv stick to open the frequencies up to perform a similar function to this as well, but I've only ever done it once. Even then it was not

precisely calibrated making the reading suspect at best, useless at worst.

The current stock antenna used is a 'naked lightbulb' type, probably poorly calibrated, but ok for toy grade use. You can open the controller up and replace it with another better manufactured antenna. Even if this is still a 'naked bulb' type antenna it should be better than the stock one. It means you can use this mod to extend range, even giving is a sort of quasi 'spotlight' antenna if you wanted to, but this means you have to point it in the right direction **all the time**, it becomes less useful the closer you are, for instance if you do a high speed pass in front of yourself and don't turn the antenna to face the quad all the way along, despite being quite close, you could quite easily loose signal. Or, using the bulb analogy again, try pointing a spotlight at a bird flying by and see how difficult it is to keep it in the light. You want to tailor the antenna for your specific needs.

SYNOPSIS

If you are wanting to extend range then I would stick with regular good named brand, antennas for the controller, the fpv monitor and the quadcopter if you want reliability and consistency. They may not be calibrated to your

specific channel's frequency range but it should be close enough to give good results.

The next step up could be getting a hobby grade transmitter that you can programme for the CG035 frequencies and codes, but I personally don't know if anyone has been able to do that.....yet, and a diversity receiver for FPV.

However If you want to experiment with it then thats cool too, but expect it to be a long process with a lot of trial and error. It will certainly be an education.

Have fun!

Elio Bruce.

AOSENMA CG035 Facebook Group

Notes & Tips

How to disable the gimbal

There are cases where the gimbal worked erratically or none at all. In these cases it may be necessary to disable the gimbal but not the camera. Unplug cables 2 and 3 of the gimbal from the quadcopter, leave 1 plugged in and you can still start and stop video recording and take photo`s. That is how I have set mine up and it seems to take a far more stable image.