

## Strato Surfer FPV Build, by Jim Anderson

Have you ever flown a plane equipped with FPV First Person View equipment? If not, and you have the opportunity, give it a try. Caution, it can and may become addictive, and so this article goes on to account for my entry into FPV flying.



So I decided on the Strix Stratosurfer was a good plane to purchase and build. This plane comes fully equipped with servos, esc, motor and accessories as a kit, or you can purchase all of the individual components. The bare bones plane was on sale, so I that is were I started. Then ordered the servos, motor, esc and accessories later. The guys at ReadyMade RC were great to deal with and offered continued support during the build. The build of the plane went will with only one problem. The main wing spar got stuck in the wing, not fully seated. I took some pictures and sent them to ReadyMade RC

for advice. They offered to replace any damaged parts as well. Fortunately, I was able to free the spar from the wing. I applied a bit of powder to the spar and it went in well. No damage occurred.



With the plane assembled, I started to think about control systems. This required much thought. Flight controller, of which there are many to choose from, I chose the SpeedyBee F405 Wing App Flight Controller. I also decided to use an ELRS receiver. So with that said, I also needed to purchase an ELRS transmitter module. Fortunately, I have a Radio Master TX16S radio with a built in 4 in 1 transmitter module and an open bay for an ELRS transmitter module. The purchase and installation of the module was a breeze. For all of this equipment, I worked with the guys from

GetFPV. The support and advice I received from these guys was top notch. Highly recommend them. Not knowing very much about the equipment I needed, I explained what I wanted to do, and they have guided me thru the purchase and have been a tremendous resource with the installation of the equipment. These two pieces were less than \$100.00, combined and the transmitter module came with 3 receivers.



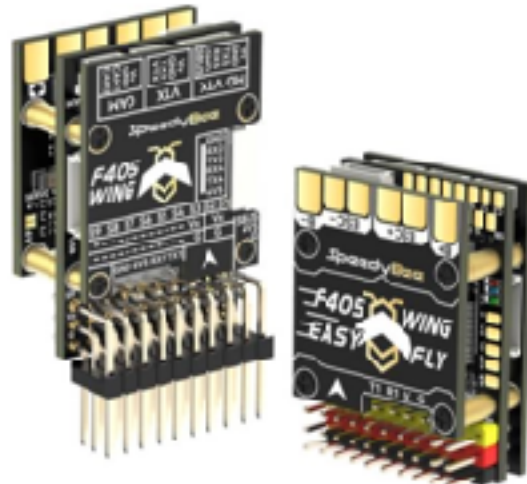
Now onto the camera, video transmitter and goggles. For this I did way too much research. There are many options to choose from. I knew I wanted Digital and not analogue, so once again I tapped into the guys at GetFPV. After much more reading, I followed their advice and purchased the Walksnail Avatar Goggles X and an Avatar HD V2 Pro Camera and VTX. Be prepared, as this is the most expensive purchase of the venture.



With all the equipment on hand, you might think the next steps is the build, or more appropriate assembly. True in part, but some of the parts and equipment I ordered needed more than just assembly. The SpeedyBee F405 Wing App, required me to become more proficient at, you guessed it, Soldering. Not my favorite job, or task. In fact I think I suck at it. So, not be out done by this already daunting task, I considered farming it out to those who know and can do, but then I thought, what a cop out. Lear how to solder correctly. Again I had to dip into the RC funds and purchase some equipment. It was time to retire the old irons I had. Again the research starts and you guessed it, there is a lot of information. So I started to watch soldering for beginners on UTube, paying attention on the process and the equipment they used. Seems that those who know and can do, have something in common. They all have good equipment. Imagine that, the right tool for the job. So off to the store, credit card in hand. With my new equipment I decided that some practice may be in order. Little to my surprise, the job was much easier than I thought it would be, and I didn't suck at it. Seems maybe I did not suck at it before, just using the wrong equipment and techniques. So off I went on the journey of soldering all of the components to the SpeedyBee Flight Controller. For this task, you need to take your time and make sure it is right. Some of the components are close together and you need to ensure you do not bridge the connections with solder. I used the assistance of a soldering helping hands with magnification and light. YeHa, all went together well.



The SpeedyBee Flight controller, required the most of the soldering. First the PWM pins, yes all of them need to be soldered in place. Care needs to be taken to ensure that when you begin the process, you make sure all of the pins are set in place and do not move during the soldering. As you solder one side, be sure not to allow the other side to come away from the board. To ensure this did not happen, I started with two rows in the middle, then two rows on one side, then two rows on the other side followed by the remainder of the soldering.



The GPS I used required soldering to the board as well. Not the physical GPS, but the wiring to and from the GPS. It came with relatively small wires, so I cut them close to the GPS board, and used 22 gauge wire for the extensions and shrink tube wherever there was a joint and where the wires came from thru the aircraft. Nice small unit with built in compass as a bonus.

To mount the Flight Controller in the aircraft, the Strix gives you lost of room for the install. I elected to secure the flight controller to a piece of wood, and screw the wood to the frame of the aircraft. In this manner of installation, I could remove the flight controller from the plane if needed. The flight controller provides stabilization and requires being mounted in a very secure location as close to the center of gravity as possible.



Let's talk about the video transmitter and the camera. The kit I bought, based once again on the advise of the guys at Get FPV is the Avatar HD Pro Dual Antenna Kit, which is a perfect match to the Avatar Goggles X. Each of the components, yes all four, required mounting. Now, you can buy camera mounts, but what fun would that be. When it came to the VTX, once again I chose to mount the component to a piece of wood and then mount that to the aircraft. As these components sit outside the fuselage, they need to be mounted securely. The camera required some thought to ensure I had it straight and secure and the four mounting holes lined up. Then came the antennas, of which required much thought as well. To add to the task, the mounting of these components requires routing wires to the flight controller. Must keep that in mind, and to increase the level of difficulty, the components mount to the part of the aircraft that is removable to allow access to the battery hatch. Mind that when you consider the wiring. It took some time and thought, but in the end all things worked out fine.



Pictured here are the mounting of the VTC, Camera and the GPS and compass. Also not the cool little bracket for mounting the antenna for the receiver. Just in case you can't see it, follow the arrow. Protection of wiring is and should always be a consideration when choosing a place to mount your equipment. Remember the wiring must be secure both inside and outside the airplane. Oh Ya, and free from movement that could cause damage and a disconnect that may lead to a crash.



There is a bit of particularity when it comes to the VTX and camera installations. They not only need to be secure, but also in a place where they can be free to breath and see. Nothing worse than an FPV camera install that cannot see the path of the aircraft. So I'm told. Another concern is the VTX generates a lot of heat, so it requires cooling, which is there during flight, but not always there when on the ground. Movement of air is the cooling factor and in flight, I think you get the picture. While on the ground, and after you plug in the battery and power the flight controller, the gps needs to acquire at least 6 satellites before you can arm the system and prepare for take off. This can take some time, so you want to be able to turn the power off to the VTX and the Camera. Another consideration is the Avatar VTX does not like voltage drops, ripples, or bumps. So once again, I turn to the experts and they suggest a fix.

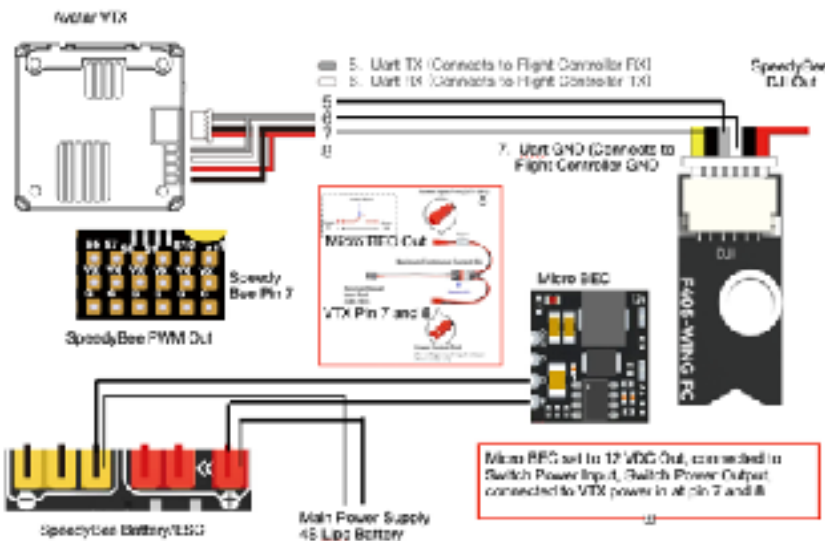


This tiny little unit, Micro BEC, battery eliminator circuit was the answer to ensure the voltage to the VTX and Camera remained constant and clean. The input to the BEC comes from the battery connection at the flight controller and the output of the BEC is routed to the VTX thru a remote controlled switch. This allows for the VTX and camera to remain off until the flight controller is ready for arming.



The control of the switch plugs into the flight controller PWM output configured to turn on and off when activated by a two or three position switch on the radio. The power into the switch comes from the BEC and the output goes to the VTX power input. So how much did this cost you ask, each piece is \$8.99. So for less than 20.00, you have the option of turning on and off your VTX and camera. Considering the alternative, burning out the VTX due to excess heat build up could cost you hundreds for a replacement.

There is one more connection we need to discuss, the communication from the VTX to the flight controller. The flight controller is capable of analogue and digital video communications and comes with a plug and play UART port for ease of connection. Of course if you wish, you can solder these connection to the board too. I chose to use the plugs supplied. At the flight controller, there is a 6 pin connection for digital video and at the VTX, there is a 4 pin connection. So how does that work you ask. Pretty easily. At the VTX, you have already used two of the 4 connection for the DC power, which leaves the Serial communications pair. These two wires go from the VTX to the flight controller as shown in the picture below.



This diagram shows all of the connection I made, but I want to point out the pin 5 and 6 of the VTX to the Flight Controller Port. So, what is UART. U = Universal A = Asynchronous R = Receiver T = Transmitter Which in simple terms means, serial communication using two wires and a ground. The ground keeps the two components at the same potential, by providing a common bond.

So that is it, for the connections. I cannot say this enough, be sure to always think about the wiring path and security. The VTX, Camera and antennas are mounted on the battery hatch cover which needs to be removed to install the battery. You must take care to ensure the wiring cannot be damaged when the cover is removed and installed.

What is a UART Pot. Here is a closer look at t.

UART stands for **Universal Asynchronous Receiver-Transmitter**, a hardware protocol that allows devices to communicate by exchanging serial data:

- **How it works**  
UART sends data by breaking it into individual bits and transmitting them one by one. The receiving device then reassembles the bits into bytes.
- **Communication modes**  
UART can operate in simplex, half-duplex, or full-duplex modes:
  - Simplex: Data is sent in one direction only.
  - Half-duplex: Each device can speak, but only one at a time.
  - Full-duplex: Both devices can transmit simultaneously.
- **Transmission**  
UART uses a packet mode of transmission, which includes a start bit, data frame, parity bit, and stop bits.
- **Data rate**  
The data rate at which the transmitter and receiver operate is called the baud rate. Common baud rates for UART are 115200 or 9600 bits/s.
- **Use cases**  
UART is commonly used in embedded systems, microcontrollers, and computers. It's also used by Arduino boards to communicate with a computer.
- **Advantages**  
UART is simple, low-cost, and easy to implement. It's still widely used for lower-speed and lower-throughput applications.

Now with all that done, you need to power up the goggles, power up the aircraft, power up the VTX and link the Goggles and the VTX. This process is relatively simple and presented no challenges. Follow the manufacturer data provided and you can't go wrong. Although the equipment is new, I found the firmware a version behind the most recent, so I followed the directions to download and flash the firmware to the goggles and the VTX. Seamless and simple process.

I am extremely please with the choice to follow the advice of the GetFPV guys and wait for the Avatar Goggles x and the HD Pro Kit to be available. It took some time, but it was well worth the wait. The video is amazing, so far, and that is limited to the testing I have done in my garage and living room. Really excited to get it to the field. First two flights are in, maiden went very well, love the auto launch feature. Goggle and camera performed very well as expected. The video is amazing. If you get a chance to try this type of flying, I highly recommend it.

I am going to end this article here. But, you guessed it, To Be Continued. Next we will talk about the flight controller, set up and INAV configuration and programming. More fun to be had. Cheers for now, Jim

