PHANTOM 4 01

BACK 02

REMOTE CONTROLLER 03

DRONE GLOSSARY

Downward Ultrasonic Obstacle Avoidance Sensor – One sensor sends out a high-frequency sound pulse and the other sensor receives the pulse. Based on the amount of time between sending the pulse and receiving the pulse, the drone calculates the height of the drone off the ground.

Drone Antennas – Inside the legs of the drone is the transmission system which relays information from the drone to the controller, and from the controller to the drone. Also, in the legs of this drone, there are two compasses which relay the drone's direction to the flight controller.

Drone Battery – These batteries are 'intelligent' meaning that there is a chip inside that regulates the charging and discharging. These batteries have over-charge protection, temperature data, charge cycle history, and communicate power output to the drone. This is to ensure the battery is safe to use repeatedly and there are no problems during flight.

Drone Camera - The drone camera works the same way a digital camera does. A lens opens at the front of the camera and light streams in. An imaging sensor captures the incoming light rays and then processes it into a digital image.

Drone Flight Controller – This is the brain of the drone. The flight controller receives input from the GPS module, compass, obstacle avoidance sensors, and the remote controller and processes it into information that is given out to the ESCs (Electronic Speed Controllers) to control the motors. An example of this is seen when a drone is hovering during windy conditions. Some older models and cheap entry level drones will just drift around because there are no sensors relaying information about the drone's location and how to correct in response to these changes. In this drone however, the drone knows its exact location from the GPS and the downward vision sensors, so even if wind is blowing the drone will stay in its exact place.

Drone Motor – Drones (quadcopters) have two clockwise and two counter clockwise motors to equalize the turning force produced by the rotating propellers. This is because of Newton's Third Law which states that for every action there is an equal and opposite reaction. So, having an equal number of motors counteracting each other provides stability through equalizing the turning force. This is why there is a tail rotor on helicopters to counteract the turning force from the single main rotor.

Drone Propellers – A drone (quadcopter) has two counter clockwise and two clockwise motors. Each propeller rotates, pushing the air down on the airfoil surface creating an area of lower pressure on top of the propeller and an area of higher pressure below it resulting in a difference of pressure thus pushing the drone up.

Electronic Speed Controller (ESC) – The ESCs are connected to the power distribution board (the battery) and the flight controller. As the ESCs receive signals from the flight controller it changes the amount of power given to each of the motors. In this drone, there are two ESC boards mounted on the battery compartment, one to control the motors on the right side and one to control the motors on the left side of the drone.

Flight LED – These lights flash various colors to show the user what direction the drone is facing. The two flashing red lights show the front of the drone and the two green flashing lights show the back of the drone.

GPS Module – The global positioning satellite module uses two different global positioning systems to pinpoint the drone's location. It uses the Russian network known as GLONASS (Globalnaya Navigazionnaya Sputnikovaya Sistema) which is comprised of 24 satellites orbiting Earth. This is used in conjunction with the United States network consisting of 31 satellites. These satellites transmit information about its location to Earth's surface. These signals travel at the speed of light and are read by the GPS module on the drone. From there, the drone calculates its geolocation based on the amount of time it took for the signals to arrive from the various satellites. These global positioning satellites give the drone the ability to understand where it is on Earth and maintain its position.

Joysticks – These translate the physical movement of the sticks into information that the controller can use to communicate with the drone. The left joystick moves the drone up and down and does pan right and pan left. The right joystick moves the drone forward and backward and does drift right and drift left.

Main Camera Board – This processes information from the imaging sensor and gimbal motors to ensure stable footage. This board also processes the camera information and writes the image to the micro SD card.

Main Remote Controller Board – This receives information from the drone about its location, altitude, and what the camera is seeing. It also takes inputs from the joysticks and sends the commands to the flight controller via the drone antennas.

Obstacle Avoidance Sensors – This drone has stereo vision sensors on the front and on the bottom. These sensors work in pairs, just like your eyes. They calculate depth by identifying which image pixels from each sensor correspond to the same point. From this, the drone can calculate the distance it is from the object in front of it as the distance between the sensors is constant. In other words, the drone solves the Pythagorean Theorem repeatedly to calculate the distance an object is from the drone.

Power Port Module – This monitors the amount of power coming from the battery and distributes it to the drone's ESCs and the fight controller.

3 Axis Gimbal – This is how drone footage is kept so still and stabilized. Motors are placed on the three different axes around the camera. When the sensors detect motion on any of these axes, the motors counteract the motion to cancel it out. This happens almost instantly as thousands of calculations are executed to move the motors to provide smooth footage.