U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

June 23, 2015

Exemption No. 11877
Regulatory Docket No. FAA–2015–0596

Mr. Daniel L. Kofford
President
Mr. Charles D. Daubs
CEO
Sky Vision Services, LLC
4425 Front Street
Suite 759
Shasta Lake City, CA 96019-9904

Dear Messrs. Kofford and Daubs:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated February 28, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Sky Vision Services, LLC (hereinafter petitioner or operator) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct recording videography/cinematography and/or still photographs.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

Airworthiness Certification

The UAS proposed by the petitioner is a Tarot FY690S.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112−95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*, and any associated noise certification and testing requirements of part 36, is not necessary.

The Basis for Our Decision

You have requested to use a UAS for aerial data collection[1]. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA−2014−0352), 11109 to Clayco, Inc. (*see* Docket No. FAA−2014−0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA−2014−0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA−2014−0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

Our Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, Sky Vision Services, LLC is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a)

[1] Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

In this grant of exemption, Sky Vision Services, LLC is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the Tarot FY690S when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.

2. Operations for the purpose of closed-set motion picture and television filming are not permitted.

3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.

6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.

7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the

Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS−80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.

10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.

11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.

12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.

13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal Government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.

15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or for airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.

17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.

19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.

20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least 5 minutes or with the reserve power recommended by the manufacturer if greater.

21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N−Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

24. The UA must remain clear and give way to all manned aviation operations and activities at all times.

25. The UAS may not be operated by the PIC from any moving device or vehicle.

26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
    a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
    b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

    The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.

28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS−80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.

30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
    a. Dates and times for all flights;
    b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
    c. Name and phone number of the person responsible for the on-scene operation of the UAS;
    d. Make, model, and serial or N−Number of UAS to be used;
    e. Name and certificate number of UAS PICs involved in the aerial filming;
    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
    g. Signature of exemption holder or representative; and
    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on June 30, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/
John S. Duncan
Director, Flight Standards Service

Enclosures

Application for Exemption From FAA Regulations In Order to Operate a Small Unmanned Aircraft System (sUAS) Pursuant to Section 333 of the FAA Modernization and Reform act of 2012 and Sections of 14 CFR

February 28, 2015

U.S. Department of Transportation
Docket Management System
1200 New Jersey Ave., SE
Washington, DC 20590

Dear Sir,

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 C.F.R. Part 11, application is hereby made for Sky Vision Services, LLC (SVS) for an exemption from the listed Federal Aviation Regulations (FARs) to operate a commercial sUAS for the purpose of recording videography/cinematography and/or still photographs to enhance the visual appeal and sale-ability of real estate listings in the Northern California area.

As described more fully below, the requested exemption would permit the operation of a small, unmanned and relatively inexpensive sUAS in the National Air Space (NAS) thereby complying with Congress's mandate and helping to fulfill the Secretary of Transportation's (the FAA Administrator's) responsibilities to "…establish requirements for the safe operation of such aircraft systems in the national airspace system."

Submitted by:

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Company History:

Sky Vision Services, LLC was founded in February 2014 by co-owners Daniel L. Kofford, President and Charles D. Daubs, CEO. At present there are no other owners or employees. The sUAS would be flown primarily by Mr. Daubs acting as Pilot in Command (PIC) with Mr. Kofford acting as a ground based visual observer (VO).

Owner Biography:

Mr. Kofford is a licensed Airline Transport Pilot as well as a Certified Flight Instructor, Instrument Flight Instructor, Multi Engine Instructor, and has over 30 years of flight experience operating under FAR §91, FAR §135 and FAR §121. Mr. Kofford served as the Chief Pilot and Check Airman for a FAR §135 scheduled and on-demand charter company and is currently a Captain for a regional airline carrier. In addition Mr. Kofford holds a Masters degree in Business Administration.

Mr. Daubs is a licensed, single engine, private pilot. He has been building and flying radio control models for over 30 years, including fixed wing and rotary wing aircraft. He is a member in good standing with the Academy of Model Aeronautics (AMA) and has been since 1982. Mr. Daubs attended college for several years at the University of California, Fresno and holds an AA degree.

Both Mr. Kofford and Mr. Daubs are retired law enforcement professionals with over 50 years of combined full time, law enforcement experience.

Radio Controlled Aircraft Flying Skills:

During the 30 plus years of flying radio controlled aircraft, Mr. Daubs has flown high wing entry level airplanes, shoulder wing intermediate skill level airplanes, low wing advanced skill level airplanes and high performance, semi-scale war bird airplanes. All aircraft have had a minimum of "full control functions" to include throttle, rudder, elevator and aileron control. The advanced models have had additional control of flaps and retractable landing gear. In all, Mr. Daubs has flown well over 20 different styles and models of fixed wing aircraft.

Mr. Daubs also assembled and flew a rotary wing aircraft for two years. This was a typical helicopter model; equipped with a single main rotor and tail rotor and full flight controls.

Mr Daubs has acted as a training pilot for students wishing to learn to fly radio controlled aircraft. In that capacity, Mr Daubs has assisted in the training of over 20 student pilots over the past 30 years.

Mr. Daubs composed a training manual for a local radio control model club to be used for flight training. It followed very closely the training that a private pilot would receive during his training. The manual outlined basic aircraft operation, principles of flight, traffic pattern procedures, safety and emergency procedures, take off and landing

procedures and obstacle avoidance. It also included a pre-flight checklist and pilot log. In all, during the past 30 plus years it is estimated that Mr. Daubs has well over 750 hours of PIC flying time in radio controlled aircraft. This can only be estimated as there has never been a requirement to log flight hours in radio controlled model aircraft flown as a hobby.

Aircraft Description:

The aircraft that SVS would be operating is a Tarot FY690S hexacopter with an overall diameter of approximately twenty nine (29) inches and weighing fifty three (53) ounces (gross flying weight is under twenty pounds). It is constructed primarily of two (2) carbon-fiber, centrally located, main boards and six (6) carbon-fiber booms radiating out from the central main frame. It will be powered by rechargeable batteries carried on board.

An electric motor is mounted at the outboard end of each boom driving alternating clockwise and counter-clockwise pitched propellers, for a total of six (6) units. This allows full control of yaw, pitch and roll by regulating the speed of each motor/propeller unit. The motors are controlled by individual solid state electronic speed controls, all maintained and controlled via a main controller and an Inertial Measurement Unit (IMU).

Main flight control will be provided by a state of the art, Spektrum DX-9 DSMX-9 radio control transmitter linked to an onboard receiver operating in the 2.4GHz band (this frequency is approved by the FCC for radio controlled aircraft). Also on board will be a WooKong-M Multi Rotor Autopilot System linked with a barometric pressure altimeter and G.P.S./Compass unit providing in-flight telemetry.

The WooKong M autopilot system translates inputs from the Radio control transmitter through the receiver and controls the motors on the craft. With additional input from the altimeter, G.P.S. and IMU the WooKong is capable of being operated in three different modes: 1) Full control by PIC, 2) Altimeter hold and 3) Full autopilot.

In mode 1 the PIC has full control of the craft. In mode 2 the WooKong maintains altitude and allows the craft to be flown in a very stable fashion. Altitude can still be adjusted by the PIC but the flight characteristics in this mode are very smooth. In the final mode 3, the WooKong takes over full control of the craft. This mode is used in case of signal interruption or minor fault in the system. When mode 3 is engaged the craft will cease all forward, lateral and vertical flight, stabilize it's self and return to the point of origin of the flight and land autonomously. Mode 3 can also be selected by the PIC via the radio transmitter.

Additional safety features include redundant battery voltage warning devices. As part of the WooKong system a large LED panel is installed and oriented so that it is visible while the craft is in flight. This LED panel flashes different series and colors of lights to indicate different status of the electronics. Chief among them are confirmation that G.P.S. satellites have been located and fixed for navigation and a continuos readout of

the voltage level of the main flight battery. (Refer to the diagram in the Appendix) A secondary voltage monitoring and warning device is also used. This unit plugs directly into the main flight battery and supplies a digital readout of the pack voltage. When the pack voltage drops to within 25% of capacity an audible alarm sounds to warn the PIC of the low battery voltage.

There are also features available on the Spektrum Transmitter than can be used to help prevent a flight lasting past the safe voltage limit of the primary flight battery. A countdown timer can be set to a pre-determined amount fo time. When that time is reached, both an audible alarm and verbal warning will be sounded advising of such.

An under belly, centrally located, auxiliary mounting platform will be utilized for a two axis, gimbal stabilized, camera mount. Currently a GoPro camera is planned for use. The canopy of the aircraft will be clearly marked with our company name, address and contact information (following requirements already in place by the AMA).

A ground based station will be utilized primarily by the VO during all operations. An 8" LCD video screen will be used to display live video feed and telemetry information being broadcast by the sUAS. Included in the telemetry information will be the altitude, direction of flight and speed of the sUAS in “real time”. This information will be super imposed over the live video feed showing the on-board camera view.

In addition, all maintenance logs, flight logs and other required legal documents will be kept with the ground station. This will ensure that they are available for inspection should the need arise.

SVS will utilize various weather and radar applications on our iPad and smart phones prior to and during operations to assist in confirming suitable weather conditions exist to execute and maintain an operation. We will also be using a digital anemometer for current wind speed and direction readings.

Mr. Daubs assembled the airframe and installed all operating systems and controls on the Tarot FY690S used by SVS. He has test flown the aircraft for airworthiness as well as conducted more than 10 hours of practice flights to become fully familiar with the aircraft's performance, maneuverability and flight characteristics. He has conducted well over 3 take offs and landings within the past 30 days.

Flight Log and Documentation:

The Tarot FY690S is not a "buy and fly" sUAS as are many less expensive sUAS currently being used. It was designed and manufactured with the intent of the end user to build and equip it with electronics of their own choosing. As such there is no manufacturer supplied owner's manual or operating manual. SVS has developed documents specific to the equipment installed on our sUAS.

Documentation will be maintained detailing the construction and maintenance of the aircraft to include modifications, damage and repairs. A flight log will be kept to record the date, time, location, duration and other pertinent information related to each flight.

A separate log will be maintained for tracking individual battery charging and discharging information to assist in identifying when a battery has reached the end of it's useful life.

Screen shots of the flight log and copies of the maintenance log are in the Appendix.

Risk Management:

Each flight will be performed during daylight hours following established Visual Flight Rules (VFR) and conditions. There will be a minimum of two (2) persons present; one designated as the pilot in command (PIC) and the other as the visual observer (VO). The PIC and VO will be in constant verbal contact with each other during all flights. The sUAS will be flown within the visual line of sight (VLOS) of the PIC and VO. All flights will be flown at or below 400 feet above ground level (AGL) in keeping with existing established practices. No flights will be conducted within the controlled airspace of an active airport.

The subject property owner and surrounding neighbors will be advised that a sUAS operation is going to take place. This will help to ensure that no one is startled by the sight of the sUAS and will assist with crowd control. Additionally, as much as is possible, all non essential ground personnel will be kept out of the flight area for the duration of the flight.

Prior to each flight a thorough pre-flight inspection will be conducted in a manner typical with full scale aircraft, checking to be sure that the airframe and all components are in a proper and good state of repair, all subsystems are operating properly and that the radio control system is communicating with the sUAS. In the event of an in-flight loss of radio control signal between the sUAS and the transmitter, the on board central computer system has a built in "return to home" feature. That feature will stop all vertical and lateral flight, take over control of the sUAS and return it to the location the flight originated, landing it completely autonomously.

An on-board management system confirms that the computer system is operating properly and has established a good link to multiple G.P.S. satellites. A system of flashing and steady LED lights visually confirms the status with the operator. This LED is oriented so that it can be observed while the sUAS is in flight.

The sUAS will also be fitted with an on-board battery management system which will display a digital readout of the voltage of the primary flight battery. In addition the system will sound an audible warning to indicate a low voltage condition. In such event, the flight will be terminated and the sUAS will be returned to the point of origin and landed.

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Sky Vision Services, LLC (SVS) is seeking exemption from the following regulations:

14 CFR Part 21; 14 CFR §45.23 (a) & (b); 14 CFR §47 Subpart A, B and C; 14 CFR §91.119; 14 CFR §91.121; 14 CFR §91.151 (a); 14 CFR §91.203 (a) & (b); 14 CFR §91.405 (a); 14 CFR §91.407 (a) (1); 14 CFR §91.409 (a) (1) & (2); 14 CFR §91.417 (a) & (b) and a COA.

Following each annotated regulation is the explanation requesting each exemption.

- **14 CFR Part 21** - Certification Procedures for Products and Parts
  Part 21 prescribes, in pertinent part, the procedural requirements for issuing and changing design approvals, production approvals, airworthiness certificates, and airworthiness approvals.

As stated by the FAA in a prior request for exemption (ASTRAEUS AERIAL exemption #11062 and TRUDEAU #11138) exemption is not necessary from this section as it would not directly apply to the operation of a sUAS due to it's limited size, weight, operating conditions and design safety features.

- **14 CFR §45.23 (a) & (b)** - Display of marks; general.
  (a) Each operator of an aircraft must display on that aircraft marks consisting of the Roman capital letter "N" (denoting United States registration) followed by the registration number of the aircraft. Each suffix letter used in the marks displayed must also be a Roman capital letter.

  (b) When marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.

Pertaining to 14 CFR §45.23 (a) an exemption is sought for the following reasoning. The sUAS that SVS plans to operate differs in no way from a regular radio controlled (RC) aircraft in it's manufacture, build/assembly or flight. There are no requirements for RC aircraft to be registered and marked with any registration numbers. It also appears that the requirements of the following, 14 CFR §47, subpart A, B and C are contrary to the design and manufacture of our sUAS.

Pertaining to 14 CFR §45.23 (b) , as previously ruled in (ASTRAEUS AERIAL #11062) an exemption from this section is not necessary.

- **14 CFR §47, Subpart A, B and C** - Aircraft Registration

Relief is sought under these sections as follows: Our sUAS is a kit, manufactured outside of the United States, does not have any registration, serial numbers, model number, or any identification numbers affixed to it by the manufacturer. There is nothing in place in local, state or federal government for the owner of a sUAS to have his craft examined and have any identifying serial numbers assigned or affixed to it.

In order to register any aircraft, AC form 8050-1 must be filed. That form requires the listing of the serial number of the aircraft to be registered in addition to other requirements that cannot be meet. Without any such serial number the requirement to have the sUAS registered appears to be unobtainable.

- **14 CFR §91.119** - Minimum safe altitudes: General.
  Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

  c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

SVS is requesting exemption from 14 CFR §91.119 (c). Our intention is to fly our sUAS above and around real property taking aerial video to be used to enhance real estate listings. The altitude such operations would be conducted would not exceed 400' AGL.

The owner's of the real property and structures we would be flying above and around would have prior notice and have given prior authorization for our operations. All persons present at the time of the operation would be notified of the impending operation and cautioned to either leave the immediate area or to remain inside until the operation is finished (excluding those persons actively involved in the operation).

As indicated in our earlier statement, every effort would be made to keep unauthorized persons out of the immediate area and at least 500' away. In the event that the 500' zone was violated, the operation would cease immediately and the sUAS landed. Given the limited size, weight, operating conditions as set forth herein and the design safety features of our sUAS the equivalent level of safety will be achieved during all operations. Compared to flight operations of fixed wing aircraft or rotary wing aircraft

carrying a pilot and or crew, the potential danger is far less in the same circumstances than with our sUAS.

- **14 CFR §91.121** - Altimeter settings.
  (a) Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating—
  (1) Below 18,000 feet MSL, to—

The sUAS that SVS will be operating is equipped with a barometric altimeter and a G.P.S. antenna/compass. Information from these two sources is fed directly into the on-board flight controller for use during flight. This information is also relayed, via real time video feed, to the ground station for both the PIC and VO to monitor during the flight operation. Thus a constant confirmation of the sUAS altitude will be readily available at all times.

Although this is not typical of the equipment required in fix wing aircraft an equivalent level of safety will be achieved by the PIC and VO at all times. Therefore, SVS is requesting exemption from14CFR §91.121.

- **14 CFR §91.151 (a)** - Fuel requirements for flight in VFR conditions.
  (a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed—

  (1) During the day, to fly after that for at least 30 minutes; or
  (2) At night, to fly after that for at least 45 minutes.

  (b) No person may begin a flight in a rotorcraft under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 20 minutes.

Regarding relief from 14 CFR §91.151 (a). Our sUAS carries no fuel. Instead it is battery powered. As explained earlier within this document, our sUAS is equipped with a dual system of alerting the PIC and VO of a low voltage condition in the main flight battery. Namely, a digital readout and audible sounding alarm will alert the PIC and VO when the on board battery voltage reaches 25% or less capacity. A second visual warning device, the LED, will flash a warning indicating the same condition has been reached.

In the event either of the two visual warnings or audible warning is detected, the operation will be terminated and the sUAS returned to land immediately. Given the restrictive operating area that these operations would be carried out, the 25% battery level affords more than sufficient time to safely return and land the sUAS.

Given that similar exemptions have been granted under similar conditions (exemptions ASTRAEUS #11062 and TRUDEAU #11138) an exemption to these regulations is sought.

- **14 CFR §91.203 (a) & (b)** - Civil aircraft: Certifications required.
  (a) Except as provided in §91.715, no person may operate a civil aircraft unless it has within it the following:

  (1) An appropriate and current airworthiness certificate. Each U.S. airworthiness certificate used to comply with this subparagraph (except a special flight permit, a copy of the applicable operations specifications issued under §21.197© of this chapter, appropriate sections of the air carrier manual required by parts 121 and 135 of this chapter containing that portion of the operations specifications issued under §21.197©, or an authorization under §91.611) must have on it the registration number assigned to the aircraft under part 47 of this chapter. However, the airworthiness certificate need not have on it an assigned special identification number before 10 days after that number is first affixed to the aircraft. A revised airworthiness certificate having on it an assigned special identification number, that has been affixed to an aircraft, may only be obtained upon application to an FAA Flight Standards district office.

  (2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft registration Application as provided for in §47.31©, or a registration certification issued under the laws of a foreign country.

  (b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

The sUAS operated by SVS weighs less than 20 pounds and is operated without an on-board pilot and as such there is no provision for carrying the required documents as outlined under this regulation.

An equivalent level of safety will be achieved by keeping these or similar documents at

the ground station during any operations. They will be readily available for inspection by any so authorized official requesting to inspect them.

In keeping with other exemptions (ASTRAEUS #11062 and TRUDEAU #11138) SVS is requesting exemption from 14 CFR §91.203 (a) & (b).

- **14 CFR §91.405 (a)** - Maintenance required.
  Each owner or operator of an aircraft—

  (a) Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, except as provided in paragraph (c) of this section, have discrepancies repaired as prescribed in part 43 of this chapter;

- **14 CFR §91.407 (a) (1)** - Operation after maintenance, preventive maintenance, rebuilding, or alteration.
  (a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless—

  (1) It has been approved for return to service by a person authorized under §43.7 of this chapter;

- **14 CFR §91.409 (a) (1) & (2)** - Inspections.
  (a) Except as provided in paragraph c) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—

  (1) An annual inspection in accordance with part 43 of this chapter and has been approved for return to service by a person authorized by §43.7 of this chapter; or

  (2) An inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

- **14 CFR §91.417 (a) & (b)** - Maintenance records.
  (a) Except for work performed in accordance with §§91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

  (1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

(I) A description (or reference to data acceptable to the Administrator) of the work performed; and

(ii) The date of completion of the work performed; and

(iii) The signature, and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

(I) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by §43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

(b) The owner or operator shall retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under §43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

Regarding 14 CFR §91.405 (a); 14 CFR §91.407 (a) (1); 14 CFR §91.409 (a) (1) (2) and 14 CFR §91.417 (a) & (b); an exemption is sought from these sections. The manufacturer of our sUAS does not offer any documentation regarding regular maintenance schedules and suggested maintenance. As such it is the responsibility of SVS to create and use a similar maintenance log.

As described earlier, SVS will utilize a maintenance and repair log that will fully document any maintenance, upgrades or repairs performed on their sUAS. Additionally a flight log will be used to fully document every flight conducted by the sUAS outlining at a minimum the date, time, location, duration and any other pertinent information of said flight. It will be the responsibility of the PIC to ensure the sUAS is flight worthy prior to any operation by conducting a pre-flight check as outlined in the Pre Flight Check List developed by SVS.

By following these restrictions an equivalent level of safety will be achieved in ensuring that the sUAS is maintained in an airworthy condition and is checked to be fully operational prior to any flight.

- **Certificate of Waiver or Authorization (COA) -** The COA will require the operator to request a Notice to Airman (NOTAM), which is the mechanism for alerting other users of the NAS to the UAS activities being conducted.

An exemption is being sought from obtaining a COA based on the following information and belief. The sUAS that SVS would be operating is no larger than the vast majority of radio controlled (RC) aircraft currently being flown as a hobby by thousands of people across the United States. RC aircraft are similar to sUAS in that they are unmanned and are operated remotely via radio transmitted signals.

Under agreement between the FAA pursuant to Advisory Circular 91-57, Model Aircraft Operating Standards, and the AMA safety guidelines for operating RC aircraft, it is agreed that RC aircraft would not be flown above 400' AGL, would weigh less than 55 pounds and would not be flown in any controlled airspace or interfere with the flight path of any full scale aircraft. SVS has proposed the same restrictions apply to it's sUAS.

Full scale aircraft operating in the NAS are prohibited from flying below 500' AGL except under certain conditions such as takeoff and landing or after obtaining an exemption (14 CFR §91.119 (b)). This alone creates a 100' safety zone in altitude between legally operating full scale aircraft and legally operating RC aircraft or sUAS.

There is no requirement for any RC aircraft or pilot of such aircraft to obtain a COA nor to file a NOTAM prior to any flight. Requiring such would overwhelm the ATC system with such notices, thus rendering them less effective by shear numbers.

Operating a sUAS as SVS is proposing would not differ in any substantial manner from operating any other RC aircraft, other than it's use for commercial purposes. The fact that the operator is being compensated for flying the sUAS has no impact on the physical presence of the sUAS in the NAS or how it is safely operated. A more practical solution would be to place a requirement on the operator of a sUAS to check for NOTAMs involving full scale aircraft operating in the area prior to any sUAS operations. This is something that SVS would be more than willing to do and abide by.

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Pursuant to 14 CFR Part 11, the following summary is provided for publication in the Federal Registry if needed.

Sky Vision Services, LLC (SVS) is seeking exemption from the following regulations:

14 CFR Part 21; 14 CFR §45.23 (a) & (b); 14 CFR §47 Subpart A, B and C; 14 CFR §91.119; 14 CFR §91.121; 14 CFR §91.151 (a); 14 CFR §91.203 (a) & (b); 14 CFR §91.405 (a); 14 CFR §91.407 (a) (1); 14 CFR §91.409 (a) (1) & (2); 14 CFR §91.417 (a) & (b) and a COA.

Granting these exemptions would permit SVS to operate a sUAS weighing less than 20 pounds for the primary purpose of recording aerial videography/cinematography and/or still pictures for the purpose of enhancing real estate listings of property and/or homes for sale.

The operation of said sUAS conducted within the strict conditions set forth would provide an equivalent level of safety supporting the grant of exemptions sought. Additionally by granting an exemption from Part 21 would allow the operations outlined to be conducted for commercial purposes.

Due to the limited size, weight, operating conditions and design safety features of the sUAS result in a safer operation than those of fulls scale aircraft being operated for the same purpose.

Public Benefits:

Shasta County has been a hub for growth and recreation in California for many past decades. The diverse natural resources of the area have been a large factor in attracting people to the north state. In the mid to late 1980's, the city of Redding (the largest city in Shasta County) had a population of approximately 50,000 people and covered approximately fifty square miles. Today, Redding's population has grown to nearly 100,000 people and encompasses over sixty five square miles.

With both Lake Shasta and Wiskeytown Lake offering water sports activities and abundant fishing and the surrounding forested mountains offering camping, hunting and outdoor recreation, the north state is growing rapidly. With this growth comes the need for more development in both the business sector and residential housing. With the recent upturn in the economy the Redding area is beginning to enjoy more growth again.

Traditionally more expensive fixed wing and rotary wing aircraft have been the only option for aerial surveying and photography. This method is inherently dangerous for not only the pilots and crews of the aircraft but the general public in the unfortunate event of a failure resulting in a crash by the aircraft in use. The biggest danger is in the fuel used by these aircraft. The fuel is highly combustible and often results in setting off uncontrolled fires at the scene of a crash.

The use of a battery powered sUAS puts no crew in danger (it is unmanned) and poses no immediate fire danger in the case of a crash (it is battery powered). Due to the relatively small size of the sUAS the possibility of collateral damage to structures or the public in the event of a crash is also greatly reduced, if not eliminated. The cost to operate and maintain a sUAS is only pennies on the dollar compared to full size aircraft.

The granting of this exemption would afford local realty companies a more affordable and safer alternative to acquire aerial videography/cinematography or still photography to help enhance real estate listings and advertising in order to assist sales. This would benefit the community as a whole by helping to increase home sales, increase spending in the local economy and generate increased tax revenue at the local, state and federal level. The exemption would also aid the general public in acquiring a better knowledge of the geographical layout of the surrounding area and the accessibility of the area's recreational diversity thus ameliorating the service industry it supports. Another ancillary benefit would be an increase in the general public's knowledge and understanding of integrating the use of sUAS into every day life in keeping with the intent of the Reform Act.

Appendix

- Tarot FY690S Airframe
- Basic airframe under construction
- Dimensions and 2 Axis Gimbal Mount with Camera
- The WooKong M Multi Rotor Control System
- Schematic of WooKong Components
- LED Status Chart
- LED Flight Status Chart
- Single Flight Log
- Total Flights Log
- Total Flight Time on sUAS Log
- Battery Use Log
- Pilots License Scans
- Maintenance Log
- Pre Flight Check List

Tarot FY690S multi-rotor sUAS airframe

Basic airframe under construction with motors installed on the booms

Typical dimensions, overall gross weight, as flown by SVS

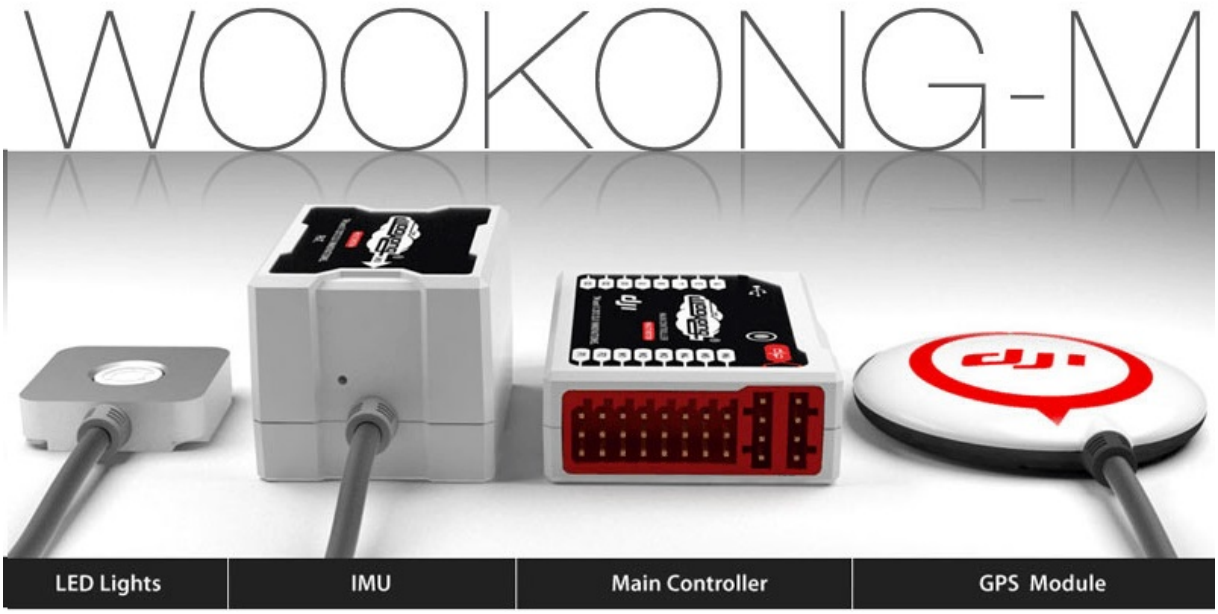
10 Minutes of hovering with GoPro Hero 3

We used 3S 5000mah battery pack, carrying Brushless Gimbal and GoPro 3, flew for 10 minutes, all-up-weight is about 3000g

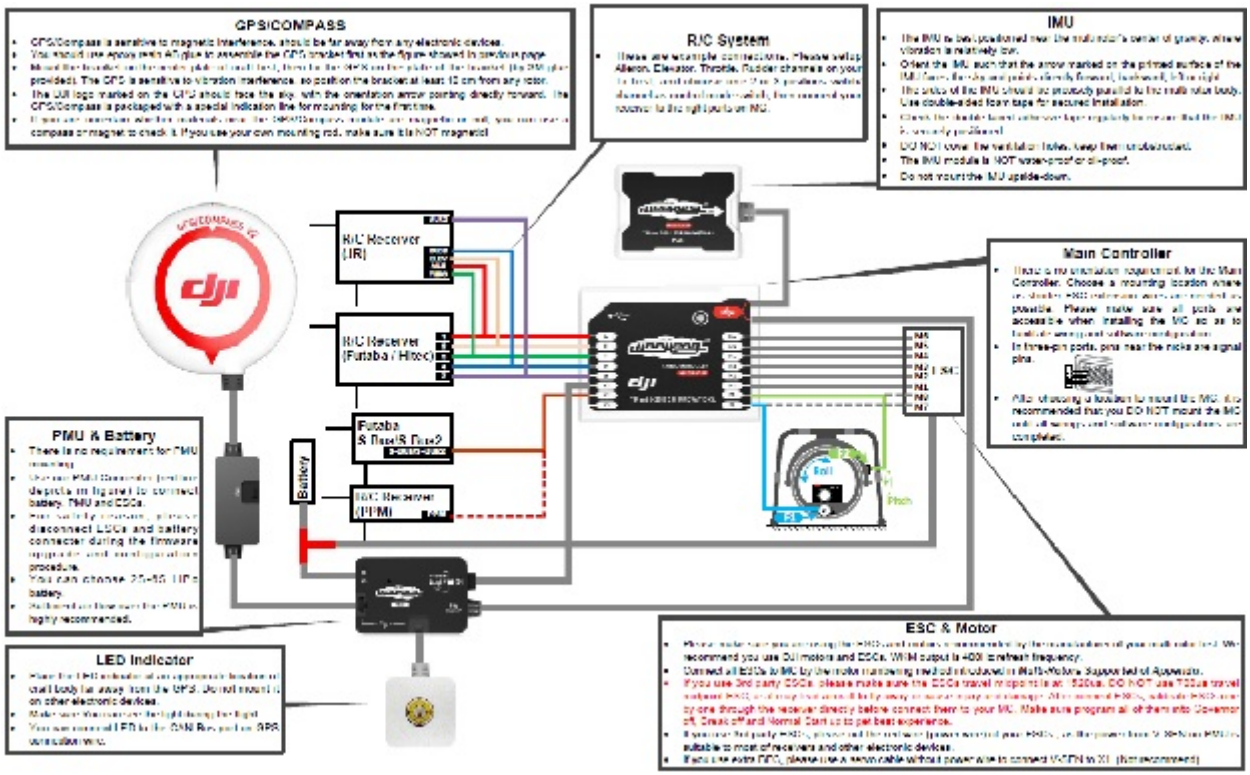
Tarot 2 Axis, Gimbal Stabilized Camera Mount

Shown with GoPro Camera installed - mounts under the airframe

The WooKong M Multi Rotor Control System main components



Schematic of installation of WooKong Components



LED Status Chart

Flight States

	Manual Mode	Atti. Mode	GPS Atti. Mode	IOC	Tx Signal Lost
GPS satellites < 5	●●●	●●●○	●●●●	●●●○	●●●●
GPS satellites < 6	●●	●●○	●●●	●●○	●●●
GPS satellites < 7	●	●○	●●	●○	●●
Attitude & GPS good		○	●	○	●
Attitude status fair	○○	○○○	○○●	○○○	○○●
Attitude status bad	○○○	○○○○	○○○●	○○○○	○○○●
IMU data Lost	○○○○	○○○○	○○○○	○○○○	○○○○

- Sparking indications of ●, ●, ● are: **Single spark**, all the sticks return to center, multi rotor hovering; **Double spark**, stick(s) not at center, speed command is not zero.)
- ● Fast blinking: Record forward direction or home point successfully.

Compass Calibration

Begin horizontal calibration	▬▬▬▬▬▬▬▬▬▬
Begin vertical calibration	▬▬▬▬▬▬▬▬▬▬
Calibration finished	▬▬▬▬▬▬▬▬▬▬
Calibration or others error	●●●●●●●●●●●●●●●●●●●●●●

Low Voltage Warning

First lever protection	●●●●●●●●●●●●●●●●●●●●●●
Second lever protection	●●●●●●●●●●●●●●●●●●●●●●

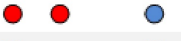
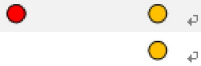
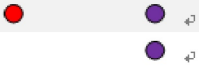
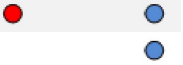
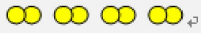
MC LED

MC is functioning well.	▬▬▬▬▬▬▬▬▬▬
Boot loader mode, MC is waiting for firmware upgrading.	▬▬▬▬▬▬▬▬▬▬
Firmware upgrading is finish. MC is waiting for reboot.	●●●●●●●●●●●●
Error occurs during firmware upgrading, MC reboot is required	▬▬▬▬ or ●●●●●●

PMU LED

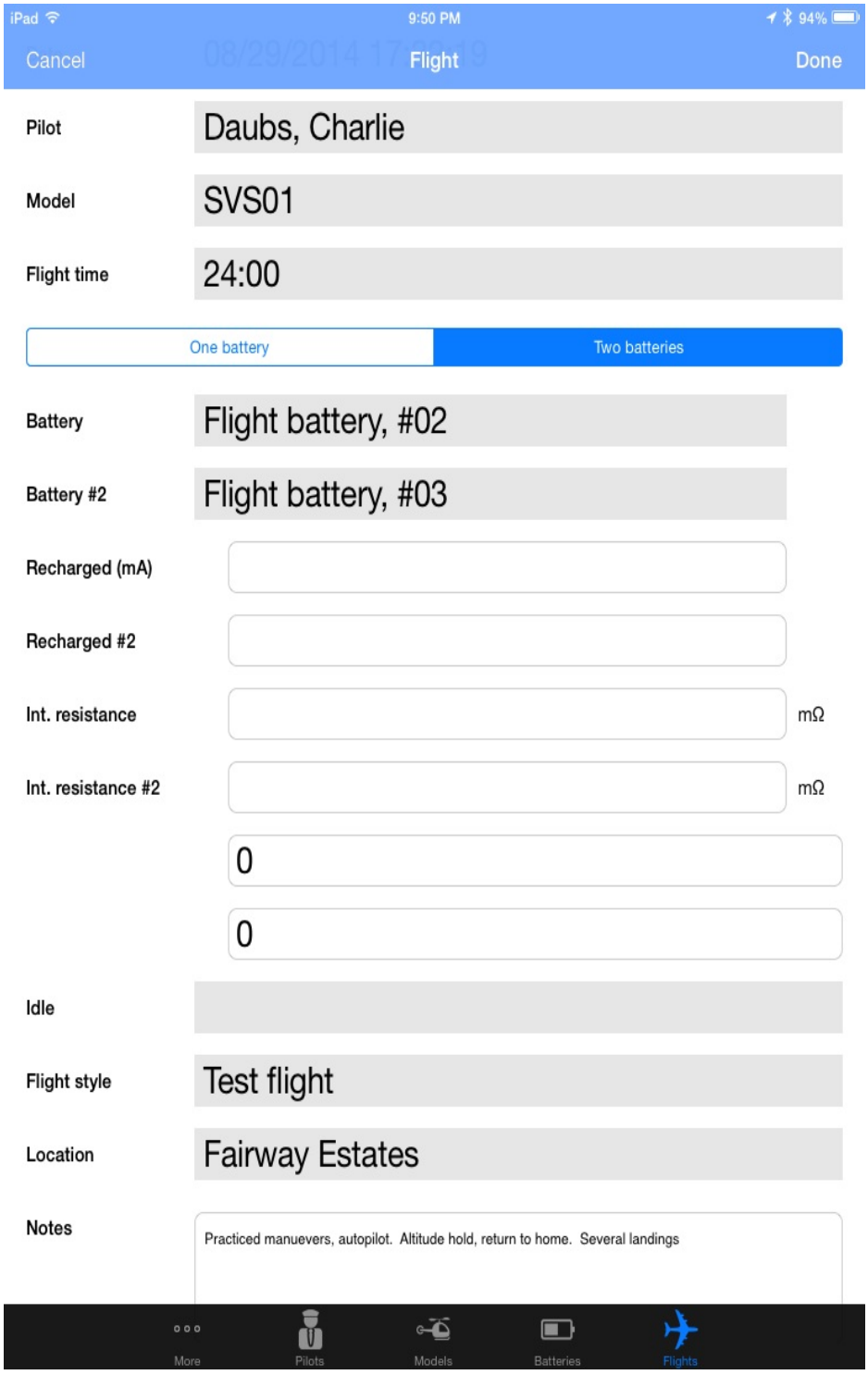
PMU connection is correct.	▬▬▬▬▬▬▬▬▬▬
Connection between PMU and battery is wrong (polarity error).	▬▬▬▬▬▬▬▬▬▬

LED Flight Status Chart

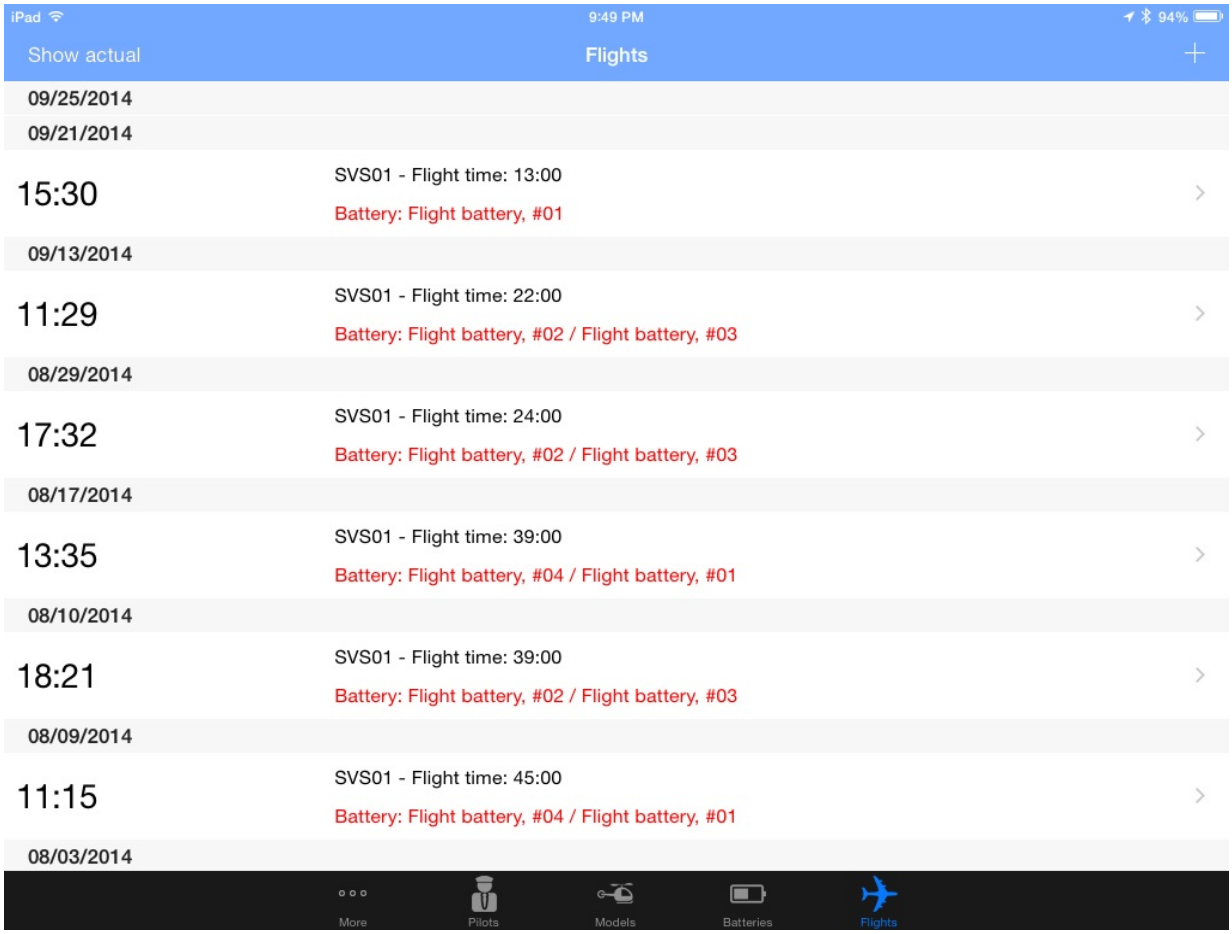
Flight States	Manual Mode	Atti. Mode	GPS Atti. Mode	Tx Signal Lost
GPS satellites found <5				
GPS satellites found <6				
GPS satellites found <7				
Attitude & GPS good				
Attitude status fair				
Attitude status bad				
IMU lost, check IMU connection.				
<3.5V low voltage, replace battery!				
<4.4V low voltage, replace battery!				

Notices: Here the sparking indication of ● & ● could be: **Single spark**, all the sticks return to center, helicopter hovering; **Double spark**, stick(s) not at center, speed command is not zero.

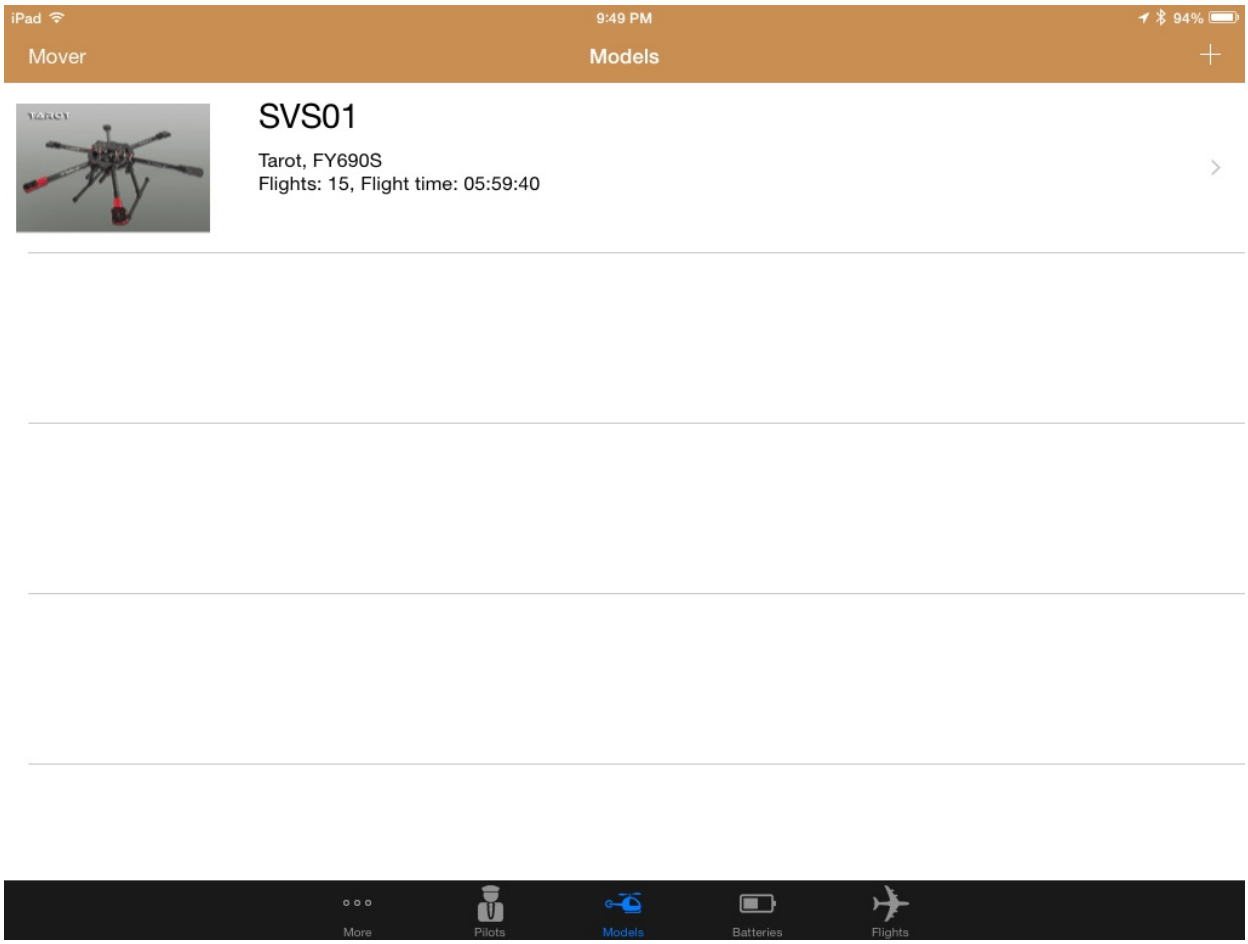
Representative Copy of “Single Flight” Log Entry



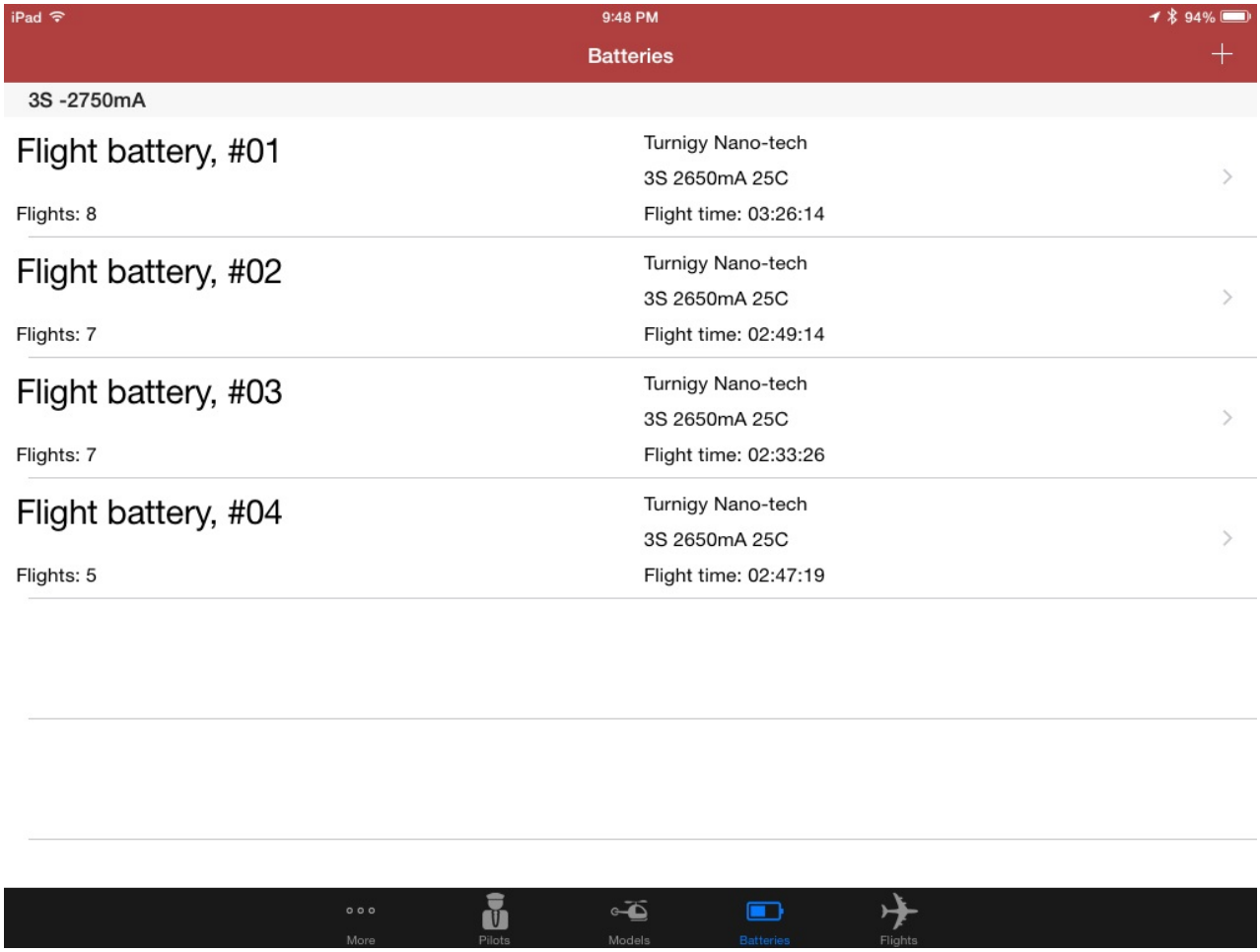
Representative Copy of “Total Flights” Log Entry



Representative Copy of “Total Flight Time” on sUAS Flight Log Entry



Representative Copy of “Battery Log” Log Entry



Scans of Pilots Licenses/AMA Membership

Daniel Kofford

Charlie Daubs

Maintenance Log

This log is to used to document all builds, upgrades, repairs and maintenance performed on the sUAS used by SVS, the **Tarot FY690S.**

DATE	BUILD, UPGRADE, REPAIR, MAINTENANCE DONE
Feb. 2014	Purchase of major components begins, Tarot FY690S
March 2014	Continued purchase of components
April 2014	Build of Tarot FY690S begins
May 2014 May 2014	Main air frame completed Installation of electronics begins
June 2014	Build Complete
06/13/14	First Test Flight was successful!
06/14/14	Changed Flight Batteries to higher capacity
06/21/14	Second Test Flight successful!
09/20/14	Installed On-Board Camera Mount, 2 Axis Gimbal w/GoPro Camera
09/23/14 09/27-28/14	Installed Video Equipment On-Board Maintenance Done – All screws checked, all equipment checked for solid mounting, all electrical connections checked, CG checked and confirmed, propellers checked for damage and balanced, motor bearings oiled
11/29-30/14	Maintenance Done – All screws checked, all equipment checked for solid mounting, all electrical connections checked, CG checked and confirmed, propellers checked for damage and balanced, motor bearings oiled
11/30/14	New propellers installed
01/13/15 01/29/15 02/27/15	Retractable landing gear installed, CG checked Maintenance Done – All screws checked, all equipment checked for solid mounting, all electrical connections checked, CG checked and confirmed, propellers checked for damage and balanced, motor bearings oiled Second receiver installed for control of camera and retractable landing gear

sUAS Flight Check List

- ■ Primary Flight Batteries Charged
- ■ Radio Control Transmitter/Receiver Batteries Charged
- ■ Base Station Video Receiver Batteries Charged
- ■ Components of sUAS Installed Properly, Secured
- ■ Components of sUAS Are Wired Properly
- ■ Activate Transmitter/Receiver – Confirm Radio Connection
- ■ Activate sUAS – Confirm:

1. G.P.S. Satellite Connection
2. No Errors in LED Display
3. Primary Flight Battery Voltage
4. Video Link Established
5. Camera Gimbal Control Established
6. Motors Operate Properly

- ■ Area Clear for Take Off