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

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

July 17, 2015

Exemption No. 12079
Regulatory Docket No. FAA–2015–1232

Mr. Johnny Faber
Falcon Aerobotics, LLC
4401 East Holmes Street
Tucson, AZ 85711

Dear Mr. Faber:

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 January 9, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of Falcon Aerobotics, LLC (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial videography, cinematography, and inspections.

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 are the Bixler 2 and Bumblebee.

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, Falcon Aerobotics, 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) 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.

[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.

Conditions and Limitations

In this grant of exemption, Falcon Aerobotics, 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 Bixler 2 and Bumblebee 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 five 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 July 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

January 9, 2015
U. S. Department of Transportation
Docket Management System
1200 New Jersey Ave, SE
Washington, DC 20590

Re: Exemption Request Section 333 of the FAA Reform Act of the Federal Aviation Regulations from 14 C.F.R. 45.23(b); 14 C.F.R. Part 21; 14 C.F.R. 61.113(a)&(b); 91.7(a); 91.9(b) (2); 91.103(b); 91.109; 119.121; 91.151(a); 91.203(a)&(b); 91.405(a); 91.407(a) (1); 91.409(a) (2); 91.417(a)&(b)

Dear Sir or Madam,

I, Johnny Faber am writing pursuant to the FAA Modernization and Reform Act of 2012 and the procedures contained within 14 C.F.R. 11, to request that I, Johnny Faber, an owner and operator of small unmanned aircraft, be exempted from the Federal Aviation Regulations ("FARs") listed below so that I, Johnny Faber, may operate my small ultra lightweight unmanned aircraft system ("UAS") in commercially regulated airspace by the Federal Aviation Administration ("FAA").

As described herein I, Johnny Faber, have experience in flying hobby helicopters and planes for recreational purposes for the past eighteen (15) years. I have flown small and large remote control (RC) gas and electric aircraft models for those eighteen (15) years without incident and pledge my continued commitment to safety on all future flights.

Following exemption and approval by the FAA, I, Johnny Faber, will primarily use my hobby grade Multi-copter[1] and fixed wing[2] UAS equipped with cameras for the following applications: aerial videography/cinematography to enhance academic community awareness for individuals and companies unfamiliar with the geographical layout of the metro Tucson and surrounding areas; augmentation of real estate listing videos; and the creation of visual and topography layout videos for Search and Rescue (SAR) missions for state and local agency's, education, agricultural inspections and building and construction zone inspections.

1 Appendix A - Bixler 2 Operator Manual 2 Appendix B - Quad-Copter Operator Manual

My, Johnny Faber's, exemption request would permit the operation of ultra lightweight, unmanned (i.e. piloted by remote control) UAS's for the development of community and government use videos, permissible within property boundaries for individual homeowners and within in tightly controlled, limited airspaces predetermined in areas away from the general public, airports, heliports and vehicular traffic. Currently, similar lightweight, remote controlled UAS's are legally operated by unmonitored amateur hobbyists with no safety plan or controls in place to prevent catastrophe. With that in mind, I, Johnny Faber, have personally installed safety protocols and controls[6] to avoid and prevent public hazard, as well as any catastrophic manned aircraft hazard. Furthermore, it is my intent to assist future FAA safety protocols and regulations exclusive to lightweight UAS's for specific video and photography usage by sharing information with the FAA as I, Johnny Faber, record flight data and other pertinent information gained through permitted flight operations.

In addition, granting my, Johny Faber's, exemption request will comply with the Secretary of Transportation's (FAA Administrator's) instructions to not only integrate UAS's into the national airspace system, but to "...establish requirements for the safe operation of such aircraft systems [UAS's] in the national airspace system" under

Section 333(c) of the Reform Act specific to the use of UAS's for real estate/Realtor purposes, educational videos, Search and Rescue, land/trusts inspections, and structure inspections, to aid state and local agency's. Further I, Johnny Faber will conduct my operations in compliance with the protocols described herein or as otherwise established by the FAA.

For the reasons stated below, I, Johnny Faber respectfully request the grant of an exemption allowing me to operate ultra lightweight, remote controlled UAS's to aid academic community awareness, to benefit/stimulate attraction to the metro Tucson area and to enhance personal and public video feeds. A grant that will ultimately allow UAS's to play a more positive role in our local community by increasing employment opportunities, heightening security measures and decreasing government expenditures by reducing the need for heavier manned aircraft, containing costly, combustible fuel- a potential public hazard in and of itself.

6 Appendix F - Personal Protocols and Controls

I. Contact Information:

Johnny Faber
Falcon Aerobotics, LLC
4401 E Holmes Street
Tucson, AZ 85711
Office: (520) 323-0014
Mobile: (520) 245-3329
Email: Johnnyfaber@gmail.com

II. The Specific Sections of Title 14 of the Code of Federal Regulations From Which Johnny Faber Requests Exemption are:

14 CFR 21;
14 C.F.R. 45.23(b);
14 CFR 61.113 (a) & (b);
14 C.F.R. 91, et seq.;
14 CFR 407 (a) (1);
14 CFR 409 (a) (2); and,
14 CFR 417 (a) & (b).

III. The Extent of relief Johnny Faber Seeks and the Reason He Seeks Such Relief:

I, Johnny Faber submit this application in accordance with the Reform Act, 112 P.L. 95 §§ 331-334, seeking relief from any currently applicable FARs operating to prevent me, Johnny Faber contemplated commercial cinematic, academic and other flight operations within the national airspace system. The Reform Act in Section 332 provides for such integration of civil unmanned aircraft systems into our national airspace system as it is in the public's interest to do so. My, Johnny Faber's, ultra lightweight UAS meets the definition of "small unmanned aircraft" as defined in Section 331 and therefore the integration of my ultra light weight UAS is expressly contemplated by the Reform Act. I would like to operate my ultra lightweight UAS prior to the time period by which the Reform Act requires the FAA to promulgate rules governing such craft. Thereby, providing direct experience and valuable information for formal regulation that can be administered uniformly to all related UAS aerial video and photography. The Reform Act guides the Secretary in determining the types of UAS's that may operate safely in our national airspace system. Considerations include: The

weight, size, speed and overall capabilities of the UAS's; Whether the UAS will be operated near airports or heavily populated areas; and, Whether the UAS will be operated by line of sight. 112 P.L. 95 § 333 (a).

Each of these items reflect in favor of an exemption for me, Johnny Faber.
My UAS's utilize eight (8) or less rotating propellers
for balance, control and stability.
My UAS's are equipped with the following via video and data telemetry :
1)Altimeter
2) Attitude indicator
3) Ground Speed indicator
4) Magnetic compass
5) Heading indicator
6) Vertical speed indicator
7) Course deviation indicator
8) Radio magnetic indicator
9) GPS location
10) Fuel consumption and Fuel Left with approximate time.
11) Loiter and circle mode.
12) Auto safety or RTL (Return To Launch)
13) Auto landing technology.
Each UAS weighing less than seven (7) pounds (far below the maximum 55 pound limit);
Including camera(s) with or without gimbal (a camera stabilizer).
I, Johnny Faber consider safety as foremost with each flight. My small unmanned aircraft is designed to hover in place, circle in a specific place or loiter(figure 8 flight) via GPS and can be operated in winds up to 17.379 knots (20mph) wind. For safety, stability and fear of financial loss I will not fly in winds exceeding 13 knots (15 mph). Built in safety systems include a GPS mode that allows my UAS to hover/circle in place or land when radio controls are released.
With six (6) modes to choose from, I will fly with the modes safest to complete the videos
for aerial videography/photography and have the ability to choose the safest, most reliable and stable mode to prevent accident and hazard. When pilot communication is lost, UAS is designed slowly descend to point of takeoff and or to land at point of launch.
With an onboard flight controller - APM2.5, it has the capabilities of geofencing[4] which will prevent the craft from exceeding a set altitude or distance. No matter
what causes the craft to breach those boundaries - the craft is forced back within the boundary limits via the on board controller and will take over the craft to keep it within those set boundary lines and allow the pilot to regain control once the craft is within those boundaries.
I, Johnny Faber will not operate my UAS near airports, hospitals nor police heliports, and do not operate near areas where general public is within fifty to one hundred (50-100) yards depending on location, conditions and weather. I am constantly on alert for any manned aircraft (police/medical helicopters, etc.) and prepared to land/abort immediately to the nearest and safest ground point should a manned aircraft

approach my location or I suspect manned aircraft may
4 Appendix D - Computerized Control Boards

approach near my location. My UAS's are capable of vertical and horizontal operations, and is flown only within my line of sight, as the remote control pilot. Utilizing battery power rather than combustible

I, Johnny Faber will not operate my UAS near airports, hospitals nor police heliports, and do not operate near areas where general public is within fifty to one hundred (50-100) yards depending on location, conditions and weather. I am constantly on alert for any manned aircraft (police/medical helicopters, etc.) and prepared to land/abort immediately to the nearest and safest ground point should a manned aircraft approach my location or I suspect manned aircraft may approach near my location. My UAS's are capable of vertical and horizontal operations, and is flown only within my line of sight, as the remote control pilot. Utilizing battery power rather than combustible fuels, flights generally last between three (3) to fifteen (15) minutes, with an altitude under one hundred fifty (150) feet. Six (6)Smart Mode includes safe circle for operation, position hold, self-leveling, altitude command, GPS, return home feature, and safety control to return home or land in the event of communication interruption between RC transmitter and UAS.See Appendix A, and C -Operator Manual.

I, Johnny Faberutilize a fresh fully charged battery with each flight as a safety precaution; full flight time limit for each battery is eight (8) to twelve (30) minutes as tested. I do not operate my UAS at or below manufacture recommend minimum charge levels for operation; preferring to remain well within a safe operating range to insure adequate communication between radio control and UAS to eliminate potential for crash, loss of control or hazard. Reserve batteries are at hand with each exercise to insure replacement for sufficient safe level of operation. I do not believe in taking risk that may cause a crash, that could create hazard to the public/property/manned aircraft, and have no desire to lose an investment. I have clocked numerous practice flights in remote areas as a hobbyist simulating flights for future commercial use to gain familiarization with the characteristics of this specific UAS's performance under different temperature and weather conditions. I also practice computerized simulated flights to maintain adequate skills and response reflex time. All for the sake of safety. I, Johnny Faber, am extremely cautious when operating of my UAS/ultra light weight unmanned aircraft and will not "create a hazard to users of the national airspace system or the public." 112 P.L. 95 § 333 (b). Given the small size and weight of my UAS it falls well within Congress's contemplated safety zone when it promulgated the Reform Act and the corresponding directive to integrate UAS's into the national airspace system. Johnny Faber's UAS, used in hobby flight, has a demonstrable safety record and does not pose any threat to the general public or national security.

IV. How Johnny Faber's Request Will Benefit the Public As A Whole:

Aerial videography for geographical awareness, education, search and rescue, land management, structure inspections and for real estate marketing has been around for a long time through manned fixed wing aircraft and helicopters. For small budget companies, average homeowners and property owners the expense of such aerial videography is cost prohibitive. Only large companies and high end Realtors or luxury homeowners can afford to absorb such expense. Depriving non-luxury owners and lower budget companies from a valuable marketing tool. Manned aircraft pose a threat to the public through potential catastrophic crash that the Tucson community has experienced in the past with military aircraft and medical helicopter crashes within the city of Tucson. Each resulting in loss of life.

1 Appendix A - Bixler 2 Operator Manual 2 Appendix B - Quad-Copter Operator Manual 3 Appendix C - Transmitter Controller Manual

Each with combustible fuel that exploded and burned on impact. Police helicopters have

made emergency hard landings within city limits. My, Johnny Faber's, UAS poses no such threat since size and lack of combustible fuel alleviates any potential threat to the public. Congress has already proclaimed that it is in the public's interest to integrate commercially flown UAS's into the national airspace system, hence the passing of the Reform Act. Granting my, Johnny Faber's, exemption request furthers the public interest through academic/visual awareness of the geographical benefits in and around the metro Tucson area. My ultra light weight UAS is battery powered and creates no emissions that can harm the environment. The consequence of my ultra light weight UAS crashing is far less than a full size helicopter or fixed wing aircraft; which are heavy, contain combustible fuel and can cause catastrophic devastation to the public. The public's interest is furthered by minimizing ecological and crash threat by permitting aerial video/photo capture through my battery operated ultra lightweight UAS's.

Permitting me, Johnny Faber to immediately fly within national air space furthers economic growth. Granting my exemption request substantially furthers the economic impact for the metro Tucson and surrounding community for companies looking to relocate or build around the Tucson metro area as well as individuals looking to relocate for career advancement through academic and geographical awareness. Both of which serve as a stimulus to the community.

V. Reasons Why Johnny Faber's Exemption Will Not Adversely Affect Safety Or How The Exemption Will Provide a Level of Safety At Least Equal To Existing Rule:

My, Johnny Faber's, exemption will not adversely affect safety. Quite the contrary, for the reasons stated permitting me, Johnny Faberto log more flight time in FAA controlled airspace, with communication with the FAA, will allow me to contribute to the innovation and implementation of new and novel, as of yet undiscovered safety protocols for Realtors, land and structured owners. For development in cooperation with the FAA.

In addition I, Johnny Fabersubmit the following representations of enhancements to current aerial videography and photography:

My UAS's weigh less than seven (7) pounds complete with a small ultra-light weight high quality GoPro 3+ Black camera; Mobius camera or similar;

I only operate my UAS below 200 feet (well within the 400 foot permissible ceiling set by the FAA Modernization and Reform Act of 2012);

My UAS only operate for 3-15 minutes per flight;

I land my UAS prior to manufacturer recommended minimum level of battery power;

I pilot my UAS through remote control only by line of sight; and have live video feed for a secondary pilot to monitor video recording;

My UAS's have a GPS controlled main frame- a flight safety feature whereby it hovers or circles and then lands at the GPS takeoff point if communication with the remote control pilot is lost;

I actively record and analyze flight data through the APM main frame and other sources of information to constantly update and enhance safety protocols;

I only operate in reasonably safe environment that are strictly controlled, are away from power lines, elevated lights, airports and actively populated areas;

I conduct extensive preflight inspections and protocol, during which safety carries primary importance;

I always obtain all necessary permissions prior to operation; and,
I have procedures in place to abort flights in the event of safety breaches or potential danger.

My, Johnny Faber's, safety protocols provide a level of safety equal to or exceeding existing rules. It is important to note that absent the integration of commercial UAS into our national airspace system, helicopters are the primary means of aerial video and photography for community awareness real estate, structured inspections, land management and search and rescue While the safety record of such helicopters is remarkably astounding, there has been local incident involving loss of life as well as extensive property damage; it is far safer to operate a battery powered ultra lightweight UAS. First, the potential loss of life is diminished because UAS's carry no people on board and I only operates my UAS in specific areas away from mass populations. Second, there is no fuel on board a UAS and thus the potential for fire or explosions is greatly diminished. Third, the small size and extreme maneuverability of my UAS allow me to remotely pilot away from and avoid hazards quickly and safely. Lastly, given its small size and weight, even when close enough to capture amazing images, my UAS need not be so close to the objects they are focused on
through the technology and use of post editing software allowing pan and zoom.

Accordingly, my UAS has been experimentally operated for familiarization/competency and will continue to operate at and above current safety levels.
VI. A Summary The FAA May Publish in the Federal Register:
A. 14 C.F.R. 21 and 14 C.F.R. 91: Airworthiness Certificates, Manuals and The Like.
14 C.F.R. 21, Subpart H, entitled Airworthiness Certificates, sets forth requirements for procurement of necessary airworthiness certificates in relation to FAR §91.203(a)(1). The size, weight and enclosed operational area of my, Johnny Faber's, UAS permits exemption from Part 21 because my UAS meets (and exceeds) an equivalent level of safety pursuant to Section 333 of the Reform Act.
The FAA is authorized to exempt aircraft from the airworthiness certificate requirement under both the Act (49 U.S.C. § 44701 (f)) and Section 333 of the Reform Act. Both pieces of legislation permit the FAA to exempt UAS's from the airworthiness certificate requirement in consideration of the weight, size, speed, maneuverability and proximity to areas such as airports and dense populations. My, Johnny Faber's, current and projected UAS's meet or exceed each of the elements.
14 C.F.R. 91.7(a) prohibits the operation of an aircraft without an airworthiness certificate. As no such certificate will be applicable in the form contemplated by the FARs, this Regulation is inapplicable.
14 C.F.R. § 91.9 (b) (2) requires an aircraft flight manual in the aircraft. As there are no on board pilots or passengers, and given the size of the UAS's, this Regulation is inapplicable. An equivalent level of safety will be achieved by maintaining a safety/flight manual delineating areas of where safety can be defined.
The FAA has previously issued exemptions to this regulation in Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 10700 and 32827.
14 C.F.R. § 91.121 regarding altimeter settings is inapplicable insofar as my UAS utilizes electronic global positioning systems with a barometric sensor or controled GPS "geofencing"
14 C.F.R. § 91.203 (a) and (b) provides for the carrying of civil aircraft certifications and registrations. They are inapplicable for the same reasons described above. The equivalent

level of safety will be achieved by maintaining any such required certifications and registrations by me, Johnny Faber.

B. 14 C.F.R. § 45.23: Marking of The Aircraft.

Applicable Codes of Federal Regulation require aircraft to be marked according to certain specifications. My UAS are, by definition, unmanned. They therefore do not have a cabin, cockpit or pilot station on which to mark certain words or phrases. Further, two-inch lettering is difficult to place on such small aircraft with dimensions smaller that minimal lettering requirement. Regardless, I will mark its UASs in the largest possible lettering by placing the word “EXPERIMENTAL” on its fuselage as required by 14 C.F.R. §45.29 (f) so that I the pilot, or anyone assisting me as a spotter with the UAV will see the markings. The FAA has previously issued exemptions to this regulation through Exemptions Nos. 8738, 10167, 10167A and 10700.

C. 14 C.F.R. § 61.113: Private Pilot Privileges and Limitations: PIC.

Pursuant to 14 C.F.R. §§ 61.113 (a) & (b), private pilots are limited to non-commercial operations. I, Johnny Fabercan achieve an equivalent level of safety as achieved by current Regulations because my UAS does not carry any pilots or passengers. Further, while helpful, a pilot license will not ensure remote control piloting skills. The risks attended to the operation of my UAS is far less than the risk levels inherent in the commercial activities outlined in 14 C.F.R. § 61, et seq. Thus, allowing me, Douglas Trudeau, to operate my UAS meet and exceed current safety levels in relation to 14 C.F.R. §61.113 (a) & (b).

D. 14 C.F.R. 91.119: Minimum Safe Altitudes.

14 C.F.R. § 91.119 prescribes safe altitudes for the operation of civil aircraft. It allows helicopters to be operated at lower altitudes in certain conditions. My UAS will never operate at an altitude greater than 200 AGL; safely below the standard of 400 AGL. I, Johnny Faberwill however operate my UAS in safe areas away from public and traffic, providing a level of safety at least equivalent to or below those in relation to minimum safe altitudes. Given the size, weight, maneuverability and speed of my UAS, an equivalent or higher level of safety will be achieved.

E. 14 C.F.R. 91.405 (a); 407 (a) (1); 409 (a) (2); 417(a) & (b): Maintenance Inspections.

10 Appendix E - Safety/Flight Manual

The above-cited Regulations require, amongst other things, aircraft owners and operators to “have [the] 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. . . .”These Regulations only apply to aircraft with an airworthiness certificate. They will not, therefore, apply to my, Johnny Faber’s, UAS. However, as a safety precaution I inspect my UAS before and after each

flight.

A Summary The FAA May Publish in the Federal Register: A. 14 C.F.R. 21 and 14 C.F.R. 91: Airworthiness Certificates, Manuals and The Like. 14 C.F.R. 21, Subpart H, entitled Airworthiness Certificates, sets forth requirements for procurement of necessary airworthiness certificates in relation to FAR § 91.203(a)(1). The size, weight and enclosed operational area of my UAS permits exemption from Part 21 because my, Johnny Faber’s, UAS meets an equivalent level of safety pursuant to Section 333 of the Reform Act. The FAA is authorized to exempt aircraft from the airworthiness certificate requirement under both the Act (49 U.S.C. § 44701 (f)) and Section 333 of the Reform Act. Both pieces of legislation permit the FAA to exempt UAS's from the airworthiness certificate requirement in consideration of the weight, size, speed, maneuverability and proximity to areas such as airports and dense populations. My

UAS meets or exceeds each of the elements. 14 C.F.R. 91.7(a) prohibits the operation of an aircraft without an airworthiness certificate. As no such certificate will be applicable in the form contemplated by the FARs, this Regulation is inapplicable. 14 C.F.R. § 91.9 (b) (2) requires an aircraft flight manual in the aircraft. As there are no pilots or passengers, and given the size of the UAS's, this Regulation is inapplicable. An equivalent level of safety will be achieved by maintaining a manual. The FAA has previously issued exemptions to this regulation in Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, maintenance program that involves regular software updates and curative measures for any damaged hardware. Therefore, an equivalent level of safety will be achieved.
In summary, Johnny Faber seeks an exemption from the following Regulations:14 C.F.R. 21, subpart H; 14 C.F.R. 45.23(b); 14 C.F.R. §§ 61.113 (a) & (b); 14 C.F.R. §91.7 (a); 14 C.F.R. § 91.9 (b)(2); 14 C.F.R. § 91.103(b); 14 C.F.R. § 91.109; 14 C.F.R. §91.119; 14 C.F.R. § 91.121; 14 C.F.R. § 91.151(a); 14 C.F.R. §§ 91.203(a) and (b); 14 C.F.R. § 91.405 (a); 14 C.F.R. § 91.407 (a)(1); 14 C.F.R. § 91.409 (a)(2); 14 C.F.R. § 91.409 (a) (2); and, 14 C.F.R. §§ 91.417 (a) & (b)
to commercially operate my, Johnny Faber's, small unmanned vehicle/lightweight unmanned aircraft vehicle in community awareness, education, structural inspection land management, search and rescue and real estate operations, and to develop economic platforms for the aforementioned to enhance the experience of those seeking to relocate, rebuild in the metro Tucson area.

Currently, the aforementioned aerial videography/photography relies primarily on the use of larger aircraft running on combustible fuel. Posing potential risk to the public. Granting my, Johnny Faber's, request for exemption will reduce current risk levels and thereby enhance safety. My UAS craft do not contain potentially explosive fuel, is smaller, lighter and more maneuverable than conventional video and photographic aircraft with much less flight time.

Further, I operate at lower altitudes and in controlled airspace eliminating potential public risk flying to and from established airfields. I, Johnny Faberhave been informally analyzing and recording flight information and will compile safety protocols and the implementation of a flightoperations manual for usage that exceeds currently accepted means and methods for safe flight. Formal collection of information shared with the FAA will enhance the FAA's internal efforts to establish protocols for complying with the FAA Modernization and Reform Act of 2012.
There are no personnel on board myJohnny Faber's, UAS and therefore the likelihood of death or serious bodily injury is
significantly diminished. My, Johnny Faber's, operation of my UAS, weighing less than seven (7) pounds and travelling at lower speeds within limited areas will provide an equivalent level of safety as that achieved under current FARs. Accordingly I, Johny Faber, respectfully request that the FAA grant my exemption request and am willing to cooperate in sharing information to benefit the FAA, safety of manned aircraft, and the general public at large.

Respectfully submitted,
Johnny Faber
Falcon Aerobotics LLC
4401 E Holmes Street,Tucson, AZ 85711

Appendix A

Bixler 2 Operator Manual

CONTENTS

3DR Plane

1 Audio/video (AV) cable
2 AV receiver power cable
3 AV receiver antenna
4 AV receiver
5 AV transmitter battery (air)
6 AV receiver battery (ground)
7 Telemetry module (ground)
8 Telemetry antenna (ground)
9 Propeller
10 Servo horn screws
11 Ailerons Y cable
12 Micro-USB cable
13 USB extension cable
14 Wing screws
15 Main battery
16 Adhesive Velcro squares
1 Telemetry (air)
2 Power module
3 AV transmitter
4 Camera
5 GPS module
6 Air speed sensor
7 AV transmitter power connector
8 On-screen display board
9 APM
10 Input connectors

Bixler Assembly Manual

Please refer to the assembly manual included with your plane to install main wings, stabilizers, and other parts of the plane's frame. Use the Y-cable to connect the aileron cables from the left and right wings.

WIRING APM OUTPUTS

Connect the servo and electronic speed controller (ESC) wires to APM's outputs pins in the order indicated below. Connect the white wire to the S pin (top row), the red wire to the + pin (center row), and the black wire to the - pin (bottom row).

Elevator
Ailerons
Throttle
Rudder

Connect the wires from the APM inputs to the signal pins on your RC receiver. The wires are labeled with the channel they should connect to.

Connect the black wire to a ground pin on the receiver, and connect the red wire to a power (five volts) pin on the receiver.

CONNECT RC RECEIVER

APM inputs wires

Connect inputs wires to RC receiver

Servo cables are labelled by type.
Connect them to APM's output pins as shown.

Your plane is now fully assembled. For software downloads and flying instructions, please visit plane.ardupilot.com. Happy flying!

POWER WIRING

Connect the power module's yellow XT60 connectors to the motor and main battery connectors. Connect the AV transmitter battery to the

red connector on the transmitter.
AV transmitter battery
Main battery
Motor power
connector
Power module and
transmitter power connector

BALANCING THE PLANE

Your plane's center of gravity should
be 71 mm from the leading edge.
Please balance the plane
at this point before flying,
and move the main battery
as necessary to achieve the correct center of gravity,

MOUNT TELEMETRY AIR MODULE

Use the adhesive Velcro squares to mount
the telemetry radio air module to the side
of the fuselage where it has a clear view
of the sky.
Mission Planner is free, open-source software providing multiplatform configuration and full-featured waypoint mission scripting for autonomous vehicles.
To install Mission Planner on your ground station computer (Windows only), visit ardupilot.com/downloads, select Mission Planner, and select sort by date (short link: goo.gl/Si5grC). Select the most recent (top) MissionPlanner - MSI (Microsoft installer package).

INSTALL SOFTWARE

After selecting the most recent MSI, read
the safety information and select Download:

Open the downloaded file to run the Mission Planner Setup Wizard.
Select the option to proceed if prompted with a security warning.
Mission Planner
Setup Wizard will
automatically install
the correct device
drivers.
Device Driver Installation Wizard
Mission Planner Downloads Screen

Mission Planner (6) « Downloads

Sort by: Title | Hits |
■■ MissionPlanner - ZIP - 1.2.62
■■ MissionPlanner - MSI - 1.2.62
■■ MissionPlanner - ZIP - 1.2.60
■■ MissionPlanner - MSI - 1.2.60
■■ MissionPlanner - ZIP - 1.2.61
■■ MissionPlanner - MSI - 1.2.61
Sort by date.
Select top MSI to
download most
recent version.
Mission Planner Setup Wizard
Mission Planner: Flight Data Screen
Launch Mission

Planner to explore the capabilities of your autonomous vehicle!
Mission Planner will notify you when an update is available; please always run the most current version of Mission Planner.

CALIBRATE RADIO CONTROL

Mission Planner's RC calibration utility teaches APM to work with your RC transmitter.
For more information on using Mission Planner or troubleshooting your installation, please visit planner.ardupilot.com.
Open Mission Planner. Connect APM to your computer using the provided micro-USB cable. Windows will automatically install the correct drivers for APM. In Mission Planner, select the COM port for Arduino Mega, set the Baud rate to 115200, and select Connect.
Turn on your transmitter, and ensure it is set to airplane mode (not helicopter mode). In Mission Planner, navigate to Initial Setup, Mandatory Hardware, and Radio Calibration. Select Calibrate Radio.
Move the transmitter's sticks and mode switches to all available positions until the red bars are set at the extremes for each control.
Select Click when Done to complete RC calibration.
APM USB port
Connect APM to Mission Planner:
1 Select Arduino Mega.
2 Select 115200.
3 Select Connect.

1 Select Hardware.
2 Select Mandatory Hardware.
3 Select Radio Calibration.
4 Select Calibrate Radio.
5 Move transmitter sticks and switches to all positions.
6 Select Click when Done.

To learn about utilizing your plane's autonomous flight modes, designing missions, troubleshooting, multicopter safety, and more, please visit plane.ardupilot.com.
Mission Planner: Radio Calibration Screen

Appendix B

Quad-Copter Operator Manual

使用前请仔细阅读此说明书。
Read the manual carefully before usin. g it
550mm
展开状态：
参数特点 F e a t h u r s：
折叠状态：
305mm
191mm
571mm
158mm
空机重量（： g
起飞重量（A l l W e i g h t）：1200g
建议飞行载重量（P a y l o a d C a p a b i l i t y）：200~ 500g
最大安全起飞重量（）：1700g
电池要求 （ Cell Chemistry)：11. 1V 3S 2200uma/h~5500uma/h
Li_poly 电池放电能力（Instant Discharge Capacity)>20C
飞行时间（ Flight Time)：> 10分钟
轴距（ wheelbase)：550mm
整机高度 （ height)：306mm
折叠后长度（L ength Of After F o l d)：784mm
折叠后高度（H e i g h t Of After F o l d)：100mm
桨Propeller：1038*2pcs，1038P*2pcs
3512无刷电机（B r u s h l e s s M o t o r）：
重量（W e i g h t）：75g
KV：930rpm/ V
空载电流（N o _ l o a d C u r r e n t）：0. 7A/11.1V
无刷电子调速器 （B r u s h l e s s E S C）：20A * 4pcs
Empty Frame Weight) 450
M a x i m u m G r o s s T a k e - O f f W e i g h t
兼容所有模型遥控器和接收机，建议使用6通道以上的遥控器和接收机。
可折叠设计，方便携带和运输。
C o m p a t i b l e w i t h a l l t h e R C d e v i c e s , w e r e c o m m e n d y o u t o u s e R C d e v i c e w i t h 6 c h a n n e l s o r m o r e f o r e x p a n s i o n . - 1- - 5-

B e f o r e F l i g h t :

DISCLAIMER OF LIABILITY

1.Using the company products within the limits permitted by local laws and regulations. the company is not responsible for any illegal activities.
2.The Bumblebee is an aeromodelling product only. Please strictly follow the aeromodelling safe function rules, the company does not hold responsible for any control over its operation or usage.
3.Model aircraft are not toys! Fly under professional guidance and strictly follow instruction rules in this document. the company is not responsible for consequences caused by improper install, wrong setting or operation.

SAFETY CAUTIONS

1. Familiarize yourself with fly environment and any obstacles. Identify any potential hazards such as power lines, cars, people, etc.
2.Do not fly the aircraft when fatigued, drunk or your mental state has been compromised which may cause an accident.
3.Stay away from wet areas. Do not fly in the rain or wet environments which can cause device failure and probably lead to danger. Do not fly at night or in windy conditions.

5. Do not fly alone during your preliminary flights. If you need help, please enlist the aid of an experienced pilot before flying for the first time.
6. Prepare rescue tools such as cell phones or other communication devices which should you need to call for help.
7. Please fly under safe take-off weight, do not overload the aircraft which can lead to danger.
8. Ensure all the equipment operates correctly before flight and that there is no transmitter interference or conflicts.
9. Do not touch any moving or powered parts. Do not try to catch the quadcopter which has rotating motors or blades for example. Keep loose clothing away from moving parts as they may get caught and could cause physical harm.
10. Always throttle down to minimum before fly.
11. Remove the propellers when testing the remote device or motors operation. Attach the propellers after you have tested that everything is working good to prevent an accident.
12. Assemble the aircraft with accessories the company provides. the company is not responsible for any consequence resulted from assembly with other accessories or modifications.
4. Stay away from any fire resulting in damage of the electronic parts or others such as the flight battery.

INSPECTIONS BEFORE FLIGHT

PLEASE PAY ATTENTION TO THE AGING AND WORN PARTS, AND FLY WHEN THEY ALL WORK WELL. PLEASE DO CHECK EVERY ASSEMBLY CAREFULLY BEFORE FLIGHT, especially lapses in these parts will easily cause DANGER.
1. Check that the propellers are secured properly.
2. Check that the receiver is receiving a stable signal.
3. Check that the battery is secured tightly and the battery is fully charged.
4. Check that the receiver is attached correctly.
5. Check the antenna is assembled tightly enough.
6. Check that the brushless motor and brushless ESC are secured to the airframe.

Before flight, please assemble receiver or connect ESC to FC as the company factory defaults, if not, please DO CHECK the operations of Remote Control channels and consistence of motor reactions.

FLIGHT CONTROL INSTRUCTION

1. Start: Set the throttle stick to the lowest then turn on the transmitter. Connect the flight battery then slowly apply the throttle until all motors begin to run.
2. Stop: Move the throttle stick to the minimum. All motors should stop to work in about one second. First cut off the Bumblebee then the RC powers off.
3. Any emergency occurs when taking off or landing, please move the throttle stick to the lowest position immediately to keep safe.
4. Flight control to the front, back, left and right is similar to the traditional RC helicopters but each motion is controlled by a separate channel. Do not use any channel mixing in your RC transmitter such as v-tail or swashplate mixing etc.

START TO FLY

Power ON/OFF Operations: Before plugging in the quad you have to turn on the RC and set the throttle stick to the lowest position. When powering off, you have to cut off the aircraft first then the RC powers off. Disorder in the on and off procedure will cause an accident.
1. Place the aircraft on the ground. Put the throttle stick to the lowest position then turn on the transmitter.
2. Connect the battery to the ESC board.
3. Start the Quad by applying power slowly with the throttle stick. When all the motors rotate at a slow speed you can move the stick to check the X650 Value actions according to your operation.
4. If you can not calibrate the tilt on one side during your flight, please connect Bumblebee to the PC and use the company configuration software to do the calibration.

BeforeFlight:

机身臂安装 FrameArmassembly:

Screw M2.5*24
机身管固定座
ArmMount
杯头内六角螺丝
ScrewM2.5*22
M2.5防松螺母
LockNut M.25
碳 管
Carbontube
垫片
Washer
M2.5防松螺母LockNut
电调线
wire of ESC
电调线
wire of ESC

安装M 2 . 5 * 2 4的螺丝时，请注意避开里面的电调线，
以免碰伤电调线致使电调损坏。
– 8–
Identify the parts carefully
before installing
机身下板
Fuselage Lowerr Plate
杯头内六角螺丝
SocketScrewM2.5*10
杯头内六角螺丝
SocketScrew
M2.5*10
M2.5防松螺母
LockNut
M2.5防松螺母
LockNut
M2. 5防松螺母
Lock Nut
半圆
SocketScrewM2.5*6
头内六角螺丝
半圆
SocketScrewM2.5*6
头内六角螺丝
半圆
SocketScrewM2.5*6
头内六角螺丝
半圆
SocketScrewM2.5*6
杯头内六角螺丝头内六角螺丝
SocketScrew
M2.5*10
支撑管卡扣
Thesupport
pipebuckle
起落架固定块-左
Landing Gear Fixed block-left
起落架固定块-右
Landing Gear
Fixed block-right
机身装配 MainFrameAssesbly（1）：
机身上板
FuselageupperPlate
机身下板
Fuselage Lower Plate
安装前请仔细辨认
– 9–
起落架固定块-左
Landing Gear Fixed block-left
注意安装方向
Noticeface.
起落架固定块-右
Landing Gear Fixed block-right
机身装配 MainFrameAssesbly（2）：
– 10–
半圆
SocketScrewM2.5*6
头内六角螺丝
杯头内六角螺丝
SocketScrewM3*28
半圆
SocketScrewM2.5*6
头内六角螺丝
杯头内六角螺丝
SocketScrewM3*28
机身上板
FuselageUpperPlate
直形卡扣
Straightbuckle

弧形卡扣
Curvedbuckle
弧形卡扣
Curvedbuckle
尼龙垫片
Nylon washer
尼龙垫片
Nylon washer
尼龙垫片
Nylon washer
半圆
SocketScrewM2.5*6
头内六角螺丝半圆
SocketScrewM2.5*6
头内六角螺丝
自锁螺母
Locker Nut

起落架安装 Landing gear Assem:bly

③
⑤
⑥ ⑦
①
②
①
④
③
⑤
⑥
⑦
⑦
④
④

① 起落架
② 起落架连接柱
③ 圆头十字自攻螺丝
④ 支撑管
Landing Gear Connector
Supporting Tube
Landing Gear
Screw PA 2.5×10
⑤
⑥
⑦
硅胶套
碳管胶塞
杯头内六角轴套螺丝
Plugs
Silicon gel- Slipcover
Screw M3×12

1. 先将单边起落架向侧面分开 First please separate landing gear to another side
2. 把电池板组件卡在另一边的支撑杆上 Fixing component of the battery board on another support rod
3. 分开的起落架复位 Resetting the separated landing gear frame
4. 电池板组件另一边卡扣卡在另一支撑杆上 Fixing another component of the battery board on another support rod

扎带
用扎带固定在电池板上
ribbon tied
fixing upon the battery
board with a ribbon tied
电池battery
电池板组件Battery Assembly：
BatteryB oard
电池板
半圆头内六角螺丝
Screw M2.5*12
半圆头内六角螺丝

Screw M2．5*12
M 2 ． 5防松螺母
L o c k N u t
电池板卡扣
B a t t e r y b u c k l e

电池板组件安装 Battery Mounting Assembly：

起落架横管安装The installation of landing gear cross tube：
硅胶套
silicon gel- Slipcover
起落架横管
landing gear cross tube
硅胶套
silicon gel- Slipcover
2
1
3

桨的安装 Propeller Installation：

S T 1 0 3 8
正桨2 p c s
S T 1 0 3 8 P
反桨2 p c s
螺旋桨有正反之分，安装前请仔细辨认！
M1、M3相同，M2、M4相同。
There are difference of pros and cons in the propeller, please identify it carefully before installation ! M1、M3 is the same, M2、M4 is the same too.
桨 Propeller
桨夹 Propeller Locker
无刷电机
Brushless Motor
螺旋桨必须贴紧电机，以保证四个螺旋桨的
高度一致性。
Close to motor to make
sure 4 blades in the same height.
Motor Blade
用螺丝刀穿过桨夹上的孔来拧紧桨夹。
We recommend you use the driver to poke through the hole on the locker for better tighten in case of any loose of the screw during your flight.
桨夹必须拧紧，以免飞行时脱桨造成危险。建议螺丝刀
Screw Driver
M2
M3 M4
M1

Fornt

无桨通电测试 P o w e r - o n T e s t w i t h o u t P r o p e l l e r s：

电路安装完成后，请勿安装螺旋桨，进行Bumblebee无桨通电测试。
1 将遥控器油门收到最小后打开遥控器开关。
2 Bumblebee接通电源。
3 轻推油门。
4 观察四个电机启动是否顺畅，旋转方向是否正确。
a) 如果电机没有启动或启动不畅，则将油门收到最小，断开Bumblebee的电源，检查电路和电机后重新测试，直到正常。
b) 如果旋转方向不正确，则将油门收到最小，断开Bumblebee电源，对调任意两条电机线，直到电机旋转方向都正确。
5 推动各操纵杆，观察电机的转速是否有变化。
6 测试完成，将油门收到最小，断开Bumblebee的电源。
After electronic parts installation, DO N OT install the propellers and follow in steps.
1 Lowest the RC throttle then turn on the transmitter.
2 Power on Bumblebee.

3 Apply the throttle slowly.
4 Note if four motors rotate sm oothly
a)If motor does not r otate or not sm oothly enough, please throttle down to the lowest t hen unplug Bumblebee . Check on electronic circuit and motors to retest until it works fine.
b)If not in the right direction, olwer the throttle to m inim um and power off Bumblebee. Swap any motor wire of three connecting to the holes until i t works in the right way.
5 Poke all control sticks to observe motor rotation speed changes or not.
6 Throttle back to lowest and power off Bumblebee.

折叠方式 F o l d i n g M e t h o d :
支臂的折叠 F o l d i n g A r m:
1. 先取下电池板组件
First pletake of component as battery board
2. 沿箭头方向将起落架拉平
Along the arrow direction to e v e n t h e l a n d i n g g e a r o u t
3. 起落架和支臂折叠后
A f t e r f o l d i n g o f l a n d i n g g e a r a n d r o t o r w i n g s
起落架的折叠 The folding of landing gear：
571mm
305mm 158mm
电池板组件191mm
b a t t e r y b o a r d
c o m p o n e n t

Appendix C
Transmitter Control Manual

Appendix D
Computerized Control Board

Appendix F

Personal Protocols and Controls

Protocols and Controls
Johnny Faber, Falcon aerobotics llc, Tucson Arizona Page 1
Safety for public on the ground as well as manned aircraft above is an essential and utmost consideration for aerial videos and photography. As such, safety protocols and controls must be implemented through pre-flight preparation and during flight.
Pre-Flight Protocol:
Check batteries with voltage meter to insure fully charged and ready for use.
Inspect batteries for damage or leakage that may affect proper operation.
Inspect propellers for cracks, chips or damage that may cause sudden loss of propulsion or unmanageable/uncontrolled flight.
Check all GPS and Telemetry connections prior to flight
Check weather forecasts for wind advisory or other conditions that my impact flight.
Consult Sky Vector aeronautical Charts (Skyvector.com)for airport vicinity and flight paths of possible air traffic.

- Contact respective airport to advise of estimated flight time, estimated flight duration, estimated elevation of flight, and any other pertinent information.

Inspect flight area for

- vicinity of public safety helipads/heliports
- vicinity of medical helipads/heliports
- vicinity of light poles
- vicinity or utility wires
- vicinity of trees
- flocks of birds that may cause interference and potential flight impact
- vicinity of any elevated obstructions that may pose potential flight hazard
- vicinity of roadways with moderate to heavy traffic that can be distracted
- public gatherings that may attract viewers
- optional point of control for best visual site of UAS while in flight
- Emergency landing areas

Takeoff and landing

- inspect area for best and safest point of takeoff and landing
- if in a subdivision or area that is within 150 feet of a residential street, post warning sign(s)/stand(s) "Attention Aerial Photography In Progress - Remain Back 150 Feet "

Flight Protocol:
takeoff and land from same location (have alternate landing areas in case of emergencies)
remain alert to birds, sound or aircraft, curious public, and approaching vehicles
do not allow anyone to engage in conversation or distract the remote control pilot
restrict flight to minimal elevation sufficient to acquire desired results
remained prepared for emergency landing at all times
pay attention to flight time – warning meter for low voltage.

- set voltage meter alarm for low voltage and flight timer as a safety alert

land UAS and shut down propulsion immediately following landing – priority of disconnecting batteries
Post flight:
a) disconnect battery to prevent accidental activation of propulsion system
b) secure UAS in a safe location
c) remove all warning signs from public access areas
Emergency or Suspected Hazard:
Immediate land UAS at safest and closet ground location in the event

- manned aircraft is heard or seen in vicinity of flight
- there is a public gathering within established safety boundary wanting to observe flight
- pilot is being distracted from focusing on flight and safety
- sudden change in weather (wind bursts)
- sudden increase in vehicular traffic in vicinity of flight
- birds enter into proximity of flight
- any sudden unsafe event that can cause collision, distraction or interruption of control

Safety for public on the ground as well as manned aircraft above is an essential and utmost consideration for aerial videos and photography.
Maintaining a record of safe flight for FAA request and for determining future UAS safety protocols is imperative.
Date:_____ Location: _____
pre-flight Inspection:

- Yes
- No

Comment: _____
Elements
Weather Good Fair Poor Comment :
Visibility Good Fair Poor Comment :
Wind Speed ___mph ___Gusts/MPH ___avg/MPH Comment :
Proximity to airport: _____ (see attached map pinpointing approximate location of flight)
Airport notified

- Yes
- No Date:_____ Time: _____

Phone Number: _____ Contact Name: _____
Nearest major intersection: _____
Proximity to medium traffic road: _____
Proximity to heavily traveled roadway road: _____
Proximity to congested population: _____
Approx. Takeoff Time : GMT:
Approx. Landing Time: GMT:
Estimated Elevation Ground level: sea level:
Safety Concerns:
Additional Comments: