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

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

May 22, 2015

Exemption No. 11665
Regulatory Docket No. FAA–2015–0632

Mr. John Sherman
Founder
Mad Hornet Aerial Photography
172 Koloiki Lane
Bastrop, TX 78602

Dear Mr. Sherman:

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 March 9, 2015, you petitioned the Federal Aviation Administration (FAA) for an exemption. The exemption would allow the petitioner to operate an unmanned aircraft system (UAS) to conduct aerial photography and videography.

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 a Walkera Scout X4 and DJI Inspire.

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. 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, Mr. John Sherman dba Mad Hornet Aerial Photography 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.

**Conditions and Limitations**

In this grant of exemption, Mr. John Sherman dba Mad Hornet Aerial Photography 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 Walkera Scout X4 and DJI Inspire 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 May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

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

Enclosures

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March 9, 2015

U.S. Department of Transportation, Docket Operations
West Building Ground Floor, Room W12-140
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Request for exemption under Section 333 from 14 CFR Part 21, Subpart H; 14 CFR 61.113 (a) and (b); 14 CFR 91.109; 14 CFR 91.121; 14 CFR 91.151; (a); 14 CFR 91.405 (a); 14
CFR 91.407 (a)(1); 14 CFR 91.409 (a)(1); 14 CFR 91.409 (a)(2); 14 CFR 91.417 (a) and (b)

Dear Sir or Madam:

In accordance with Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act) and 14 CFR Part 11, John Sherman/Mad Hornet Aerial Photography hereby applies for an exemption from the listed Federal Aviation Regulations (FARs) to allow commercial use of its Small Unmanned Aircraft Systems (SUASs), so long as such operations are conducted within and under the conditions outlined herein or as may be established by the FAA as required by Section 333.

John Sherman/Mad Hornet Aerial Photography is requesting this exemption because - (1) existing regulations will severely hinder and burden Mad Hornet Aerial Photography (hereafter to be referred to as MHAP) (2) MHAP can provide and execute a level of PIC competence and safety that is, at the very least, equal to (or greater than in many cases) to those provided by existing guidelines, and (3) the request is in the public interest and local benefit. The FAA's authority to issue exemptions from operating rules, and the Secretary's authority granted by Section 333 of P.L. 112-95, Special Rules for Certain Unmanned Aircraft Systems, provide an opportunity to authorize certain SUAS operations in the National Airspace System (NAS) prior to implementation of the SUAS rule. This incremental step will allow MHAP/John Sherman to safely and legally enter into the NAS.

The requested exemption will permit MHAP/John Sherman to operate its SUAS under closely monitored conditions in airspace that is confined/limited (<300 meters in any direction and <100 meters altitude), predetermined and agreed upon, controlled to access and would provide safety enhancements to the already safe operations of those aircraft of similar size, weight, speed, and operating capability that have been granted entry into the NAS via the rules in Academy of Model Aeronautics (AMA) National Aircraft Safety Code.Approval of this exemption would thereby greatly enhance safety and fulfill the Secretary of Transportation's (the Secretary) responsibilities to "… establish requirements for the safe operation of such aircraft systems in the national airspace system" per Section 333 (c) of the Reform Act.

John Sherman/MHAP is requesting exemption from the following regulations:

14 CFR Part 21, Subpart H
14 CFR 61.23 (a)
14 CFR 61.113 (a) and (b)
14 CFR 91.109
14 CFR 91.121
14 CFR 91.151 (a)
14 CFR 91.405 (a)
14 CFR 91.407 (a)(1)
14 CFR 91.409 (a)(1)
14 CFR 91.409 (a)(2)
14 CFR 91.417 (a) and (b)

This exemption application is expressly submitted to fulfill Congress' goal in passing Section 333 (a) through (c) of the Reform Act. This law directs the Secretary to consider whether certain unmanned aircraft systems may operate safely in the NAS before completion of the rule-making required under Section 332 of the Reform Act. In making this determination, the Secretary is required to determine which types of UASs do not create a hazard to users of the NAS, to the public, or pose a threat to national security.

Section 333 of the Reform Act grants the Secretary authority to determine (1) if an unmanned aircraft system, as a result of its size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight (VLOS) does not create a hazard to users of the NAS or the public or pose a threat to national security, and (2) whether a certificate of waiver, certificate of authorization, or airworthiness certification under 49 USC 44704 is required for the operation of civil (non-governmental) UASs. Therefore, if the Secretary determines that such vehicles "may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft in the national airspace system".

## Mad Hornet Aerial Photography Overview

MHAP uses small UAS (quad-copters) weighing less than 6 lbs fully loaded (camera and battery). Quad-copters are small, agile UASs with the ability to hover and move in the vertical and horizontal planes simultaneously. MHAP will operate only in visual line of sight (VLOS), and only in tightly controlled and limited airspace. The UASs are capable of operating at speeds of up to 29 knots, but are routinely operated at much lower speeds, usually at a standstill for imaging. They are most frequently operated below 200 feet above ground level (AGL), and never over 400 feet AGL. MHAP's exemption request would permit a commercial operation of SUAS for aerial photography and videography in tightly controlled and limited airspace. Aerial photography and videography services will be offered to homeowners, realtors, home builders, ranchers and farmers and/or home inspectors for use in, but not limited to, real estate marketing and safer inspections of home exteriors. All operations will be conducted on private property and with the written and/or oral permission of the property owner(s), and always with privacy in mind. Operations will always be conducted in areas that are clear of all people, except the pilot in command (PIC) and the PIC's helper(s). Such operations will ensure that the SUAS will "not create a hazard to users of the national airspace system or the public".

## Our Aircraft

MHAP operates and uses the Scout X4 by Walkera (see appendix 1) and (upon approval) will be adding the Inspire by DJI. The specifications for the Scout are as follows:

Remote control: Transmitter 2.4Ghz and Video at 5.8Ghz
Support both Apple IOS and Android based devices
Waypoint mission planning / Designated flight
Hybrid, can be changed from 4 for to 8 motors
2.4G bluetooth datalink ground station (BT-2401A/B FCC / BT-2402A/B CE)
Flight time: Up to 25 minutes
Flight range: up to 1500 meter
Receiver: DEVO-RX707(CE) / RX709(FCC)
Real time flight data (telemetry) monitoring
Auto return to home (RTH)
Motors: Brushless WK-WS-34-002
ESC: WST-16AH(R/G);
Battery: 6cell 22.2V 5400mAh Li-Po
Size: 335x335x275 mm.
Rotor Blades Length: 233mm
Weight with battery: 1770g
Flying Weight: <2270g

**Our Aircraft (continued)**

The Scout X4 has multiple safety features programmed in to its APM flight control system. These features serve to minimize any risk posed by loss of control, loss of transmission signal or loss of orientation. These features include, but are not limited to:

- GPS controlled positioning allows the UAS to "know" it's location, attitude and altitude.
- RTH (return to home) when triggered, will bring the Scout back and land it autonomously in the event the PIC is unable to do so.
- FAILSAFE will return the UAS and land it autonomously should the control transmission get cut off for any reason.
- GEOFENCE allows the PIC to set a virtual "fence", or boundaries that the Scout cannot cross. By default, it is 300 meters lineal and 125 meters vertical. Crossing this boundary will automatically trigger the RTH feature.

These highly advanced capabilities will ensure that the SUASs can be safely operated and “not create a hazard to users of the national airspace system or the public.”

**Equivalent Level of Safety**

In an effort to join the FAA in its mission to provide the safest, most efficient aerospace system in the world and to minimize the risk to the NAS or to persons and property on the ground, MHAP agrees to be bound by the following limitations and conditions when conducting commercial operations under a FAA issued exemption:

A. For the purposes of ensuring SUASs will be operated within the standards that the FAA has allowed in the AMA National Model Aircraft Safety Code:

1. SUASs will not be flown:

   a. In a careless or reckless manner.

   b. At a location where SUAS activities are prohibited.

2. SUAS pilots will:

   a. Yield the right of way to all human-carrying aircraft.

   b. See and avoid all aircraft and a spotter must be used when appropriate

(Continued on next page)

c. Not fly higher than 400 feet above ground level or within three (3) miles of an airport without notifying the airport operator.

d. Not interfere with operations and traffic patterns at any airport, heliport or seaplane base except where there is a mixed use agreement.

e. Not exceed a takeoff weight of 55 pounds (including payload).

f. Ensure the aircraft is identified by affixing the owner's contact information to the outside of the SUAS.

g. Not operate SUASs while under the influence of alcohol or while using any drug that could adversely affect the PIC's ability to safely control the model.

h. Not operate SUASs carrying pyrotechnic devices that explode or burn, or any device which propels a projectile or drops any object that creates a hazard to persons or property.

3. SUASs will not be flown unless:

a. The aircraft, control system and pilot skills have successfully demonstrated all maneuvers intended or anticipated prior to the specific event.

b. An inexperienced pilot is assisted by an experienced pilot.

4. All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others.

5. A successful radio equipment ground-range check in accordance with manufacturer's recommendations will be completed before the first flight of a new or repaired model aircraft.

6. SUASs must use the radio-control frequencies currently allowed by the Federal Communications Commission (FCC).

7. SUASs will not knowingly operate within three (3) miles of any pre-existing flying site without a frequency-management agreement.

8. Excluding takeoff and landing, no SUASs may be flown outdoors closer than 25 feet to any individual, except for the PIC and the PIC's helper(s) located at the takeoff site.

9. Under no circumstances may a pilot or other person touch a SUAS in flight while it is still under power, except to divert it from striking an individual.

10. The PIC of the SUAS shall:

    a. Maintain control during the entire flight, maintaining visual contact without enhancement other than by corrective lenses prescribed for the pilot.

    b. Fly using the assistance of a camera or First-Person View (FPV) only in accordance with the procedures outlined in AMA Document #550.

    c. Fly using the assistance of autopilot or stabilization system only in accordance with the procedures outlined in AMA Document #560.

11. The flying area must be clear of all utility wires or poles and an SUAV will not be flown closer than 50 feet to any above-ground electric utility lines.

12. The flying area must be clear before the engine is started, except for PIC and the spotter.

In addition to the above rules outlined by the AMA National Model Aircraft Safety Code and in an effort to enhance the safety offered by the already safe operations mentioned above, MHAP also agrees to be bound by the following limitations and conditions:

1. Flights will be operated within VLOS of the PIC.

2. Maximum total flight time for each operational flight will be 18 minutes. Flights will be terminated at 25% battery power reserve should that occur prior to the 18 minute limit.

3. The SUAS will only operate in tightly controlled and limited airspace.

4. A briefing will be conducted in regard to the planned SUAS operations prior to each flight. It will be mandatory that all personnel who will be performing duties within the boundaries of the safety perimeter be present for this briefing.

5. The PIC and the PIC’s helper(s) will have been trained in operation of SUAS and received up-to-date information on the particular SUAS to be operated.

6. The pilot and the PIC's helper(s) will at all times be able to communicate by voice.

(Continued from page 6)

7. If the SUAS loses communications or loses its GPS signal, the SUAS will have capability to return to a pre-determined location within the security perimeter and safely land.

8. The SUAS will have the capability to abort a flight in case of unpredicted obstacles or emergencies.

9. All flights will be conducted on private property and with the written and/or oral permission of the property owner(s).

10. Flights will always be conducted in areas that are clear of all people, except for the PIC and the PIC's helper(s).

11. All flights will be conducted outdoors in visual meteorological conditions (VMC) and never during severe weather conditions.

12. Flights will not occur in weather conditions that prevent the PIC from operating within visual line-of-sight (VLOS) at all times or in weather conditions that dramatically affect the UAS's flight (e.g. high winds).

13.If an operation occurs in an area where people could inadvertently enter the area, an operational border will be established with traffic cones. If it's not feasible to use traffic cones due to interference with the photography/videography, the PIC's helper(s) will be responsible for keeping a safe perimeter around the operation.The operation will cease immediately and be rescheduled if it's impossible to establish a safe perimeter around the operation.

14. The PIC will be responsible for logging all flights to ensure the comprehensive preventative maintenance plan can be followed, as described in the "Preventative Maintenance" section below.

15. The SUAS will not be routinely operated in the proximity of any airports. In any cases where the SUAS must be operated within three (3) miles of an airport, the airport operator will be notified before the operation commences. The operation of SUASs, weighing less than 6 lbs., conducted in the strict conditions as outlined above, will provide an equivalent level of safety supporting the grant of exemptions requested herein, including exempting the applicant from the requirements of Part 21 and allowing commercial operations. These lightweight aircraft operate at slow speeds, close to the ground, and in a tightly controlled environment. As a result, they offer a much safer way to capture aerial photography and videography. Furthermore, the proposed operations represent a safety enhancement to the already safe operations that have been granted by the FAA for the establishment of the AMA National Model Aircraft Safety Code.

## Preflight Action Plan

The PIC will follow a comprehensive pre-flight checklist to ensure that the SUAS is in a condition for safe flight. This plan will be improved as needed in order to ensure all known safety precautions and/or safety precautions suggested by the manufacturer are being accounted for.

A. Pre-flight Inspection

1. Check that the remote control, Scout 4X battery(s), F12E controller, Bluetooth GCS and smartphone are all fully charged.
2. Visually inspect the LIPO batteries for signs of wear or damage. Check both battery switches for proper operation.
3. Turn the motor shafts with your fingers and verify they are smooth without excessive play or binding.
4. Verify that the rotation diagram on the propellers matches the rotation diagram on the Scout 4X arms.
5. Inspect the propeller edges for nicks or cuts.
6. Flex both side of the propellers' blades to check for hairline cracks where the blades connect in the center of the propeller.
7. Verify that the landing gear is secure (not cracked/broken/loose).
8. Verify that the retractable landing gear is functioning smoothly.
9. Verify that the Micro-SD card has been inserted and formatted.
10. Verify that the damping absorbers are not broken and/or worn.
11. Arm/Disarm motors three separate times to allow GPS to lock on the launch site.
12. Inspect the gimbal and camera for smooth operation.
13. Verify all trims and switches set at "0".
14. Verify video connection between the Scout 4X and the F12E.

15. Perform final area check for obstructions.

**B. Power Up**

1. Verify that throttle is at "0" position.

2. Power on the equipment in the following order:

   a. Power on the Scout 4X battery, check for four green lights.

   b. Power on the F12E controller, switch to SENSOR VIEW.

   c. Wait for red light to go out, indicating a successful bind between the Scout and F12E.

3. Wait for FOUR BLUE BLINKS indicating a lock with 9 satellites. (Note: The manufacturer suggests safe flight with only TWO BLUE BLINKS, or 7 satellites, but MHAP will abort any flights where fewer than 9 satellites are available).

4. Calibrate the Scout 4X compass.

5. Place the Scout 4X on open, level ground with the battery indicators facing towards the PIC.

**C. Takeoff/Launch**

1. Verify that the remote control antenna is perpendicular to the ground (pointing skyward).

2. Verify that the front of the Scout 4X is pointing into the wind.

3. Verify that the GPS light is still blinking blue and still connected to 9 or more satellites.

4. Arm/Disarm motors and check that telemetry is correct.

5. Advance throttle.

6. Take off and hover at about 6-8 feet above the takeoff point to verify that the Scout 4X has a solid GPS lock. If any abnormalities are noticed (drifting, flying in circles, etc.), land immediately and repeat the “Pre-flight Inspection” and “Power Up” sequences.

7. Verify that the Scout 4X holds a steady position while yawing 360 degrees.

8. Verify that the Scout 4X responds appropriately to all controls – yaw left/right, pitch forward/backward, roll left/right, and throttle up/down.

**Preventative Maintenance**

A comprehensive preventative maintenance plan will be followed in order to ensure the SUAS's software is up-to-date, the batteries are in good health, and the aircraft itself is always ready for safe flight. (MHAP follows suggested maintenance in attached Walkera Scout manual - See appendix 1)

**Pilot in Command (PIC) Qualifications**

The PIC does not hold an airman certificate or medical certification. Since the SUAS is similar in size, weight, speed and operating capability as those currently allowed to be flown for hobby/recreation, holding the PIC to those same set of standards will allow for an equivalent level of safety.

The PIC has over 20 years experience in piloting RC/UAS craft, and has been an instructor to many students, a few of which were pilots. Because the PIC is not actually in the aircraft, quick reflexes, manual dexterity and computer knowledge is more important to safely piloting the UAS than an airman certificate.

It cannot be assumed that a commercial pilot, approved to operate a helicopter or fixed wing aircraft, has the skill or ability to safely operate an unmanned aerial vehicle,operating at 400 feet AGL or lower, within strictly controlled pre-approved airspace. Since there are no standards for either private or commercial SUAS pilot certificates, knowledge of airspace regulations and dexterity in the control and operation of the SUAS acquired from actual operation of the aircraft will be the most important factors in establishing an equivalent level of safety. With that in mind, MHAP proposes that its PIC be required to do the following prior to the first commercial operation **(Note- These are mostly the same requirements proposed by Singer's Creations in their successful request for exemption. MHAP believes that these requirements are an excellent start to ensure the PIC is qualified to operate safely** ):

1. Perform 20 flights or log 20 hours of flight time (the greater of the two) with the Scout.

2. Successfully learn and demonstrate all flight maneuvers in the Scout 4X manual.

3. Study and be familiar with all sections of the “Scout 4X users manual”.

4. Study and be familiar with all sections of the “Devo F12E manual".

5. Study, be familiar with, and demonstrate (where possible) the “Always be Prepared for the Worst” scenarios.

**Public Interest**

Granting this exemption would benefit the public as a whole. SUASs offer a strong equivalent level of safety, a reduction in environmental impacts, and are free from the harmful emissions associated with the manned aircraft that are currently used for aerial photography and videography. Due to the size of the SUAS and the tightly controlled and limited airspace in which the SUAS will operate, approval of this application presents no risk to the public. Furthermore, the public will be able to legally acquire aerial photography and videography to help in, but not limited to, advertising homes for sale, advertising uninhabited home lots, use of photos and video as an aid when researching homes for sale on the market, or safely accessing high and/or awkward areas of a home’s exterior to assess damage that needs to be repaired.

**Privacy**

Since the areas being photographed or filmed will be on private property, accessed only after given written and/or oral consent by the property owner(s), and clear of all people, except for the PIC and the PIC's helper(s), approval of this application presents no risk to the public privacy. In addition, MHAP will honor all requests for "no-fly zone".

**National Security**

Due to the size of the SUAS and the tightly controlled and limited airspace in which the SUAS will operate, approval of this application presents no risk to national security.

**Requested Exemptions**

John Sherman/MHAP requests exemption from the following regulations since it’s not possible to fully comply with them, and attempting to follow them for the purposes of operating a SUAS would be a burden:

(Continued on next page)

**Airworthiness Certificates**
**14 CFR Part 21, Subpart H**
Subpart H establishes the procedural requirements for the issuance of airworthiness certificates as required by FAR 91.203 (a) (1). Given the size and limited operating area associated with the aircraft to be utilized by Singer's Creations, an exemption from Part 21 Subpart H meets the requirements of an equivalent level of safety under Part 11 and Section 333 of the Reform Act. The Federal Aviation Act (49 USC 44701 (f)) and Section 333 of the Reform Act both authorize the FAA to exempt aircraft from the requirement for an airworthiness certificate, upon consideration of the size, weight, speed, operational capability, and proximity to airports and populated areas of the particular SUAS. In all cases, an analysis of these criteria demonstrates that the SUAS operated without an airworthiness certificate, in the restricted environment and under the conditions proposed, will be at least as safe,or safer, than a conventional aircraft operating with an airworthiness certificate without the restrictions and conditions proposed.

**Medical certificates**
**14 CFR 61.23 (a)**
This regulation requires pilots of manned aircraft to hold a medical certificate. Since risks associated with the operation of the proposed SUAS are so diminished from the level of risk associated with any manned aircraft; the SUAS is of a size, weight, speed, and operational capabilities which makes it much safer than any manned aircraft; since operations will occur in tightly controlled and limited airspace; and considering that all operations will be on private property that is clear of all people, obtaining and maintaining a medical certificate would not improve the safety of the operation. In the very rare case of a mishap, the SUAS being flown will pose significantly less of a threat than manned helicopters and fixed wing aircraft because the SUASs are a fraction of the size, a fraction of the weight, will be flown at a fraction of the speed, carry no flammable fuel, and carry no crew or passengers.

**Private pilot privileges and limitations: Pilot in command**
**14 CFR 61.113 (a) and (b)**
These regulations limit private pilots to non-commercial operations. Because the SUAS will not carry a pilot or passengers; due to the SUAS's size, weight, speed, and operational capabilities; and since operations will occur in tightly controlled and limited airspace, the proposed operations can achieve the equivalent level of safety of current operations that currently require a commercial pilot's license. Furthermore, since there are no standards for either private or commercial SUAS pilot certificates, knowledge of airspace regulations and dexterity in the control and operation of the SUAS acquired from actual operation of the aircraft will be the most important factors in establishing an equivalent level of safety. It cannot be assumed that a commercial pilot, approved to operate a manned helicopter or fixed wing aircraft, has the skill or ability to safely operate an unmanned aerial vehicle, operating at 400 feet AGL or lower, within strictly controlled pre-approved airspace.

**Flight instruction**
**14 CFR 91.109**
This regulation provides that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls. SUASs and remotely piloted aircraft, by their design do not have fully functional dual controls. Flight control is accomplished through the use of a control box that communicates with the aircraft via radio communications. The FAA has approved exemptions for flight training without fully functional dual controls for a number of aircraft and for flight instruction in experimental aircraft. The equivalent level of safety provided by the fact that neither a pilot nor passengers will be carried in the aircraft and by the size and speed of the aircraft.

**Altimeter settings**
**14 CFR 91.121**
This regulation requires each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "…to the elevation of the departure airport or an appropriate altimeter setting available before departure." As the SUAS may not have a barometric altimeter, but instead a GPS altitude read out, an exemption may be needed. An equivalent level of safety will be achieved by the operator by confirming the altitude of the launch site shown on the GPS altitude indicator before flight.

**Fuel Requirements for Flight in VFR Conditions**
**14 CFR 91.151 (a**)
This regulation prohibits an individual from beginning "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."
The battery powering the SUAS provides approximately <25 minutes of powered flight. That would make it impossible to meet the 30 minute reserve requirement. Given the limitations on the SUAS's proposed flight area and the location of its proposed operations within a predetermined area, a longer time frame for flight in daylight or night VFR conditions is reasonable. An equivalent level of safety can be achieved by limiting flights to <25 minutes or 25% of battery power (whichever occurs first). This restriction would be more than adequate to return the SUAS to its planned landing zone from anywhere in its limited operating area.

**Maintenance Inspections**
**14 CFR 91.405 (a); 14 CFR 91.407 (a)(1); 14 CFR 91.409 (a)(1); 14 CFR 91.409 (a)(2); 14 CFR 91.417 (a) and (b)**
These regulations require that an aircraft operator or owner "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

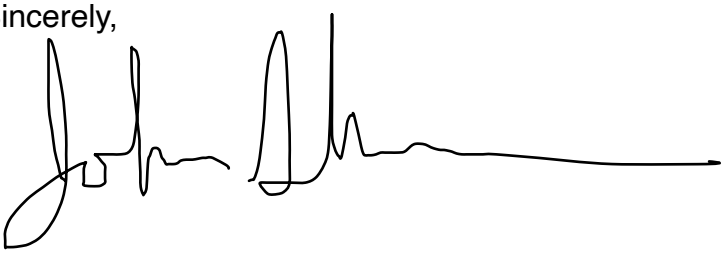
repaired as prescribed in part 43 of this chapter...," and others shall inspect or maintain the aircraft in compliance with Part 43. Given that these sections and Part 43 apply only to aircraft with an airworthiness certificate, these sections will not apply. Maintenance will be accomplished by the operator pursuant to the aforementioned Scout 4X user manual and guide. An equivalent level of safety will be achieved because these small SUASs are very limited in size, will carry a small payload, and operate only in restricted areas for limited periods of time. If mechanical issues arise, the SUAS can land immediately and will be operating from no higher than 400 feet AGL. As outlined in the aforementioned Pre-flight Action Plan, the operator will ensure that the SUAS is in working order prior to initiating flight and perform maintenance as required. Moreover, the operator is the person most familiar with the aircraft and best suited to maintain the aircraft in an airworthy condition to provide the equivalent level of safety.

**In accordance with 14 CFR Part 11, the following summary is provided for publication in the Federal Register:**
**The applicant seeks an exemption from the following rules: 14 CFR Part 21, Subpart H; 14 CFR 61.113 (a) and (b); 14 CFR 91.109; 14 CFR 91.121; 14 CFR 91.151; (a); 14 CFR 91.405 (a); 14 CFR 91.407 (a)(1); 14 CFR 91.409 (a)(1); 14 CFR 91.409 (a)(2); 14 CFR 91.417 (a) and (b) to commercially operate small unmanned aircraft systems (55 lbs. or less) in order to safely and legally capture aerial photography and videography for use by homeowners, realtors, home builders, home contractors, and/or home inspectors.**

The operation of SUASs conducted in the strict conditions outlined above, will provide an equivalent and/or greater level of safety supporting the grant of the exemptions requested herein, including exempting the applicant from the requirements of Part 21 and allowing commercial operations. These lightweight aircraft operate at slow speeds, close to the ground, and in a sterile environment, and as a result, are far safer than existing operations conducted with helicopters operating in close proximity to the ground, people, or other buildings in the vicinity. Given the small size of the SUASs involved, the slow speed at which they must be operated in order to capture photos and videos, and the restricted environment within which they will operate, the Scout 4X demonstrates that it can be operated within an equivalent level of safety in which Congress envisioned that the FAA must, by exemption, allow commercial operations of SUASs to commence immediately. Also, due to the size of the SUASs and the restricted areas in which the relevant SUASs will operate, approval of this application presents no threat to national security. Given the clear direction in Section 333 of the Reform Act, the authority contained in the Federal Aviation Act, the strong equivalent level of safety surrounding the proposed operations, the significant public benefit – including enhanced safety, reduction in environmental impacts, no emissions, ability to legally obtain aerial photography and videography services – the grant of the requested exemptions is in

the public interest. Accordingly, MHAP respectfully requests that the FAA grant the requested exemption without delay. Satisfaction of the criteria provided in Section 333 of the Reform Act – size, weight, speed, operating capability, proximity to airports and populated areas, operation within the visual line of sight, public safety, and national security – provide more than adequate justification to grant MHAP the requested exemption, allowing for commercial operations as described herewith.

Sincerely,



John Sherman
Founder, Mad Hornet Aerial Photography

**Attachments**
Appendix 1 - Walkera Scout 4X quick start guide and systems Flowchart (for F12E)
Appendix 2 - Walkera Scout 4X quick start guide and systems flowchart (for GCS)