

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
CERTIFICATE OF WAIVER

ISSUED TO

**CyPhy Works, Inc. Responsible Person: David Loh
Waiver Number: 107W-2016-00312A**

ADDRESS

**16C Electronics Avenue
Danvers, MA 01923**

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard, special, and common provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED

Night small Unmanned Aircraft System (sUAS) operations.

Tethered sUAS operations beyond the visual line of sight by the remote pilot in command (PIC), who is the manipulator of the small unmanned aircraft, in lieu of visual line of sight (VLOS).

Operations of more than one sUAS at the same time.

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

**14 CFR § 107.29 Daylight operation
14 CFR § 107.31 Visual line of sight aircraft operations
14 CFR § 107.35 Operation of multiple small unmanned aircraft
14 CFR § 107.51(c) and (d) Operating limitations for small unmanned aircraft**

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached to and become a part thereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Administrator of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

NOTE—This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

SPECIAL PROVISIONS

Special Provisions Nos. 1 to 43, inclusive, are set forth on the attached pages.

This Certificate of Waiver is effective from November 20, 2017 to November 30, 2021 and is subject to cancellation at any time upon notice by the Administrator or an authorized representative.

BY DIRECTION OF THE ADMINISTRATOR

General Aviation and Commercial Division, AFS-800

**SPECIAL PROVISIONS ISSUED TO
CyPhy Works, Inc.**

General.

This Certificate of Waiver is an amendment, which supersedes and replaces Waiver 107W-2016-00312 issued to CyPhy Works, Inc. for operations under 14 CFR 107. Waiver 107W-2016-00312 is no longer valid.

The FAA's Flight Standards Service has reviewed your application to ensure compliance with the requirements of 14 CFR § 107.200. The Administrator finds that the proposed small Unmanned Aircraft System (sUAS) operation can be conducted safely under the provisions of this Certificate of Waiver (Waiver) as listed below, because you have established adequate mitigations for risks involved with operating the sUAS in the manner you described. Adherence to the provisions of this Waiver establishes a level of safety that ensures safe operations within the national airspace system.

This Waiver may be canceled at any time by the Administrator, the person authorized to grant the Waiver, or the representative designated to monitor a specific operation. As a general rule, this Waiver may be canceled when it is no longer required, there is an abuse of its provisions, or when unforeseen safety factors develop. Failure to comply with any provision listed below is a violation of the terms of this Waiver and may serve as justification for cancellation.

List of Regulations Waived by Section and Title. The following regulations are waived:

14 CFR § 107.29, Daylight operation, is waived to allow sUAS operations during night.

14 CFR § 107.31, Visual line of sight aircraft operation, is waived to the extent necessary to allow the remote pilot in command (PIC) to operate a small unmanned aircraft (sUA) without the ability to see the unmanned aircraft throughout the entire flight. In lieu of the ability to see the unmanned aircraft throughout the entire flight, another remote pilot who holds a valid remote pilot in command certificate under part 107, subpart C, must act as a Visual Observer (VO)¹ and exercise the ability to see the sUA throughout the entire flight on behalf of the remote PIC who is directly responsible for operation of the sUAS in accordance with § 107.19.

14 CFR § 107.35, Operation of multiple small unmanned aircraft, is waived to allow a single remote PIC to operate more than one aircraft at the same time.

14 CFR § 107.51(c), Operating limitations for small unmanned aircraft, is waived to the extent necessary to allow a person who holds a remote PIC certificate under part 107, but is not performing the duties of a remote PIC throughout the entire operation, to determine the visibility as observed from the on-site control station.

¹ A visual observer is a person who is designated by the remote pilot in command to assist the remote pilot in command and the person manipulating the flight controls of the small UAS to see and avoid other air traffic or objects aloft or on the ground.

14CFR § 107.51(d), Operating limitations for small unmanned aircraft, is waived to the extent necessary to allow a person who holds a remote PIC certificate under part 107, but is not performing the duties of a remote PIC throughout the entire operation, to determine the distance of the sUA from clouds during flight.

Common Provisions. For purposes of this Waiver, Direct Participants are human beings directly participating in the operation of the sUAS. These include the remote PIC, VO, Sensor Operator, and other personnel who are designated by the remote PIC as necessary for the safe operation of the sUA.² The Responsible Person is directly responsible for safety of operations conducted under this Waiver and will ensure Direct Participants in the sUAS operation comply with all provisions of this Waiver.

1. The Responsible Person listed on the Waiver is responsible for the safe conduct of the operations. Prior to conducting operations that are the subject of this Waiver, the Responsible Person:
 - a) Must ensure the remote PIC and VO are informed of the terms and provisions of this Waiver and the strict observance of the terms and provisions herein,
 - b) Must ensure the remote PIC and VO are informed and familiar with part 107 regulations not waived, and
 - c) The Responsible Person must keep a log of the communications that establish compliance with subparagraphs (a) and (b) of this paragraph. This log must be presented for inspection upon request by the Administrator or an authorized representative;
2. This Waiver must not be combined with any other waiver(s), authorization(s), or exemption(s) without specific authorization;
3. Operations conducted in accordance with this waiver must continue to comply with 14 CFR § 107.41, which limits operations to Class G airspace and outside the lateral boundaries of the surface area of Class E airspace designated for an airport;
4. The FAA has the authority to cancel or delay any or all flight operations in order to maintain safety or to ensure compliance with the terms of this Waiver;
5. The Responsible Person listed on this Waiver must maintain a current list of sUA by registration number(s) used in the Responsible Person's operations. This list must be presented for inspection upon request by the Administrator or an authorized representative;
6. The Responsible Person listed on this Waiver must maintain a current list of pilots by name and remote pilot certificate number used in the Responsible Person's operations. This list must be presented for inspection upon request by the Administrator or an authorized representative;

² For purposes of this Waiver, the FAA considers anyone who is not a Direct Participant to be a "Nonparticipant."

7. A copy of this Waiver must be available during the sUAS operations that are the subject of this Waiver;
8. The Responsible Person must ensure a remote PIC who holds a valid remote PIC certificate under part 107, subpart C, is designated at all times during any operation that will occur in accordance with this Waiver. See § 107.19 for a description of the responsibilities and duties of the remote PIC. The Responsible Person must have a procedure for positive, unequivocal designation of the person who is acting as the remote PIC. This procedure must include a three-step positive transfer of controls. Upon such transfer, the responsibilities and duties of the remote PIC under § 107.19 will transfer, accordingly.

Special Common Provisions. Compliance with these provisions is required during any operation that proceeds pursuant to this waiver:

9. As described in the waiver application, all operations conducted under this waiver must use at least one VO per sUA.
10. All operations subject to this waiver are limited to 200 feet Above Ground Level (AGL) or the top of any obstacle or structure if the sUA is operated within 250 feet of the obstacle or structure (whichever is higher).
11. As described in the waiver application, all sUA operations conducted that conducted in accordance with this Waiver must comply with the manufacturer User Manual, including recommendations and limitations;
12. If operating at over 150 feet AGL, the Responsible Person must file a Notice to Airmen (NOTAM) at least 24 hours prior to conducting operations that are the subject of this Waiver. The NOTAM must include location, altitude, and/or operating area, time and nature of the activity, and number of sUA that will be flying in the operating area in accordance with this waiver.

§ 107.29 Night sUAS Operations Special Provisions. sUAS operations may be conducted at night as defined in 14 CFR § 1.1, provided:

13. As described in the Waiver application, the remote PIC and VO must be trained to recognize and overcome visual illusions caused by darkness, and understand physiological conditions which may degrade night vision prior to conducting operations that are the subject of this Waiver. This training must be documented and must be presented for inspection upon request from the Administrator or an authorized representative;
14. The area of operation must be sufficiently illuminated to allow both the remote PIC and VO to identify people or obstacles on the ground, or the remote PIC and VO must conduct a daytime site assessment prior to conducting operations that are subject of this Waiver, noting any hazards or obstructions.
15. The sUA must be equipped with lighted anti-collision lighting visible from a distance of no less than 3 statute miles. The remote PIC may reduce the intensity of, but may not extinguish, the anti-collision lighting if he or she determines that doing so would be in the interest of safety;

16. When the sUA is operated on a tether, the tether must be lighted so as to give a visual warning equal to that required for obstructions to air navigation in the FAA publication AC70/7460-1L Obstruction Marking and Lighting.

§ 107.31 Visual Line of Sight Operations Special Provisions. sUAS operations may be conducted by remote PIC, without the ability to see the unmanned aircraft throughout the entire flight, provided:

17. All sUA operated that are subject to this waiver remain affixed to a tether throughout the entire operation, as described in the waiver application;
18. Operations subject to this Waiver are prohibited from being conducted within 5 miles of any airport, heliport, or seaplane base, unless the sUA is operated on a tether, below the top of any structure, and within 250 feet of the structure, and the sUA does not obscure any required obstruction marking or lighting;
19. The area surrounding each tether's anchor point on the ground must be restricted to prohibit access by non-participants. This area must be a radius of 150% of the sUA altitude measured in feet AGL for altitudes of 100 feet or less, 125% of the sUA altitude measured in feet AGL for altitudes between 101 feet AGL and 200 feet AGL, and 115% of the sUA altitude measured in feet AGL for altitudes 201 feet and greater AGL;
20. At all times, at least one person who holds a remote pilot in command certificate under part 107, subpart C, must maintain VLOS of each sUA in order to (1) know each unmanned aircraft's location, (2) determine each unmanned aircraft's attitude, altitude, and direction of flight, (3) observe the airspace for other air traffic or hazards, and (4) determine that each unmanned aircraft does not endanger the life or property of another. The remote pilot who is responsible for maintaining VLOS of the aircraft involved in the operations must maintain effective communication with the remote pilot in command who is manipulating the flight controls of the sUAS and coordinate with the remote pilot in command to fulfill the duties listed at (1) – (4) of this paragraph;
21. Prior to conducting operations under this Waiver, the remote PIC must establish continuous full-duplex hands-free audio communications with the VO. The full-duplex audio communications must occur over an independent transmission and reception system, and not be dependent on the ground station method of data transmission and reception;
22. Prior to operations under this Waiver, all persons who will act as remote PIC, participate in the operation as a part 107 certificated airman, or act as a VO in furtherance of the operation must participate in a safety briefing that addresses at minimum, the following items:
 - a) Designated positions and responsibilities/Crew Resource Management,
 - b) Flight operating area,
 - c) Designated launch and recovery area,
 - d) Verification of geo-fence boundaries,
 - e) Normal procedures,
 - f) Abnormal procedures, and
 - g) Emergency procedures;
23. The remote PIC and the remote pilot who fulfills the duties of a VO must have access to a real-time display of sUA altitude, sUA position, and sUA direction of flight information. This information must be available at all times to the remote PIC and remote pilot who is acting as the VO;

24. Replicate requirements of 107.7 here. VO must produce these records.
25. The Responsible Person listed on this Waiver must ensure each remote PIC is trained in a manner consistent with how the sUAS will be operated under this Waiver. All training and demonstration for any remote PIC and VO must be documented and made available upon request by the Administrator or an authorized representative. Training operations may only be conducted under the standard requirements of part 107 (without waiver). The training must include:
 - a) sUA limitations,
 - b) sUA programming,
 - c) sUA operational procedures,
 - d) Abnormal and contingency procedures,
 - e) Evasive and emergency procedures,
 - f) Crew Resource Management,
 - g) sUA flight training, and
 - h) A demonstration of sUA ground and flight skills;
26. Communication between the remote PIC and remote pilot acting as VO must allow for the remote PIC to maneuver the sUA with sufficient time to fulfill the existing requirements of part 107 that the FAA does not waive, which include:
 - a) Giving way to all other aircraft,
 - b) Reacting to any unforeseen operational or mechanical failure without creating a hazard to other people, other aircraft, or property in the event of a loss of control of the sUA for any reason, and
 - c) Maneuvering each sUA whenever necessary to maintain compliance with this Waiver and unwaived provisions of part 107;
27. Operations conducted subject to this waiver must cease immediately if, at any time:
 - a) Safety of human beings or property on the ground or in the air is in jeopardy;
 - b) There is a failure to comply with the provisions of this Waiver;
 - c) Full-duplex communications cannot be maintained;
 - d) There is a loss of sUA onsite control link;
 - e) There is a failure of sUA offsite ground control station communication link;
 - f) A non-participating vehicle, aircraft, or person enters the restricted access operating area;
 - g) There is a loss of sUA GPS signal; or
 - h) There is degraded sUA GPS location information;
28. All persons participating in the sUAS operations that proceed in accordance with this waiver, as well as each sUA tether point(s) must be physically located within the United States;
29. Each sUA must have pre-programmed and available contingency and emergency profiles. The sUA ground station displays must audibly and visually alert all remote pilots involved in the operation of any degradation in sUA that may cause it to not comply with any requirement of this Waiver or with any provision of part 107;

30. Prior to operations conducted under this Waiver, the Responsible Person must develop, and the Responsible Person must ensure, the developed operations manual that the responsible person provided to the Administrator with the waiver application is made available to the Administrator. As described in the Waiver application, the Responsible Person must ensure all operations conducted under this Waiver follow the procedures as outlined in the operations manual. If a discrepancy exists between the provisions in this Waiver and the procedures outlined in the operations manual, the provisions of this Waiver take precedence and must be followed.
31. The operations manual developed by the Responsible Person must continue to contain at least the following items:
 - a) Operator name, address, and telephone number;
 - b) Method of distribution and revision;
 - c) Certificate of Waiver. The operations manual must include a copy of the current Waiver(s);
 - d) Aircraft description and limitations list by aircraft type and model;
 - e) Method to ensure safety of non-participating persons and aircraft;
 - f) Safety briefing of Direct Participants;
 - g) Direct Participants Minimum Requirements. In accordance with this Waiver, the Responsible Person must specify the minimum requirements for all Direct Participants in the operations manual, and the method used by the Direct Participants to meet those minimum requirements;
 - h) Method of communications;
 - i) Normal operating procedures;
 - j) Abnormal operating procedures;
 - k) Emergency procedures;
 - l) Crew Resource Management;
 - m) Risk management; and
 - n) Accident Notification. The operations manual must contain procedures for notification and reporting of accidents in accordance with this Waiver;
32. The Responsible Person must ensure that a copy of the current operations manual, including a copy of this Waiver, is available to all remote PIC's involved with the operation, during sUAS operations that are the subject of this Waiver;
33. The Responsible Person may update or revise the operations manual. The Responsible Person must ensure tracking of manual revisions, all manuals used or referenced for operations conducted under this Waiver are updated, and revised manuals are submitted to the Administrator. If the Responsible Person or Administrator determines that any update or revision would affect the ability to comply with any provision of this Waiver or the basis for which the FAA granted this Waiver, then the Responsible Person must apply for an amendment to this Waiver;

34. The Responsible Person must maintain each sUAS and its components in accordance with manufacturer's instructions and recommendations, as provided with the waiver application. sUA maintenance includes scheduled and unscheduled overhaul, repair, inspection, modification, replacement, and system software upgrades of the sUAS and its components necessary for flight. A log of all maintenance performed must be kept for each aircraft operated under this waiver, and available to the remote PIC to review prior to conducting operations that are the subject of this waiver. Each sUA maintenance log must be presented to the Administrator when requested. These procedures must be added to the CyPhy Works, Inc. operations manual;
35. Any sUAS that has undergone maintenance must undergo a functional test flight prior to conducting operations under this Waiver. A log entry must be made for each functional test flight. The log entry must contain at minimum the:
 - a) Calendar date,
 - b) sUA registration number,
 - c) Remote PIC who performed the functional test flight,
 - d) Duration of the flight, and
 - e) the result of the functional flight test;
36. The Responsible Person must establish and maintain a Safety Management System (SMS) appropriate for the size, scope, and complexity of the waived operation. Guidance on establishing and maintaining an SMS is available in FAA Advisory Circular 120-92B. This program must be made available upon request by the Administrator.
37. Flight operations recordkeeping requirements. Records shall be retained for a period of 90 days after the expiration date of the Waiver. The Responsible Person shall keep at its principal business office or at other places approved by the Administrator, and provide the Administrator on a monthly basis by email to 9-AFS-820-Part107Reports@faa.gov, the following:
 - a) For each sUA flight conducted under the terms of this waiver—
 - i. Registration number of the sUA,
 - ii. Make and model of the sUA,
 - iii. Name and certificate number of the remote PIC,
 - iv. Name and certificate number of the onsite part 107 certificated airman (VO),
 - v. Location of the remote PIC during the sUA flight,
 - vi. Location of the sUA, and
 - vii. Duration of the sUA operation;
 - b) sUA equipment malfunctions. Reportable sUA equipment malfunctions include, but are not limited to, the following:
 - i. Onboard flight control system,
 - ii. Any portion of the navigation system to include GPS functionality,
 - iii. Power plant malfunction or failure,
 - iv. Battery malfunction or failure,
 - v. Electrical power system malfunction or failure,
 - vi. Control station malfunction or failure, and
 - vii. Broken tether connection;

§ 107.35 Operation of Multiple sUAS Special Provisions. sUAS Operations with multiple sUA may be conducted, provided:

38. The remote PIC must ensure that any individual system failure does not interfere with the operation of other sUA or cause incidents, accidents, or loss of control involving other aircraft in the operation, in the manner described in the waiver application;
39. Prior to conducting operations under this Waiver, the remote PIC must ensure each sUA, its tether and associated flight control system, as described in the Waiver application, operate properly and remain stationary, in predetermined, defined areas or “cones” of operation;
40. Multiple sUA operations may only occur in areas in which access is restricted to people who are directly participating in the operation.³
41. An individual system failure must not interfere with the operation of any other sUA or cause incidents, accidents, or loss of control involving any other sUA that are subject to this Waiver;
42. As described in the waiver application, a remote PIC is prohibited from operating more than four sUA simultaneously;

§ 107.51(c) and (d) Operating limitations for small unmanned aircraft Special Provisions.

43. For operations subject to this waiver, the sUA tether point on the ground must be used as the measurement point for the purposes of measuring the visibility distance listed in § 107.51(c).

³ The prohibition of 14 CFR § 107.39 continues to apply to all operations conducted under this Waiver. Section 107.39 prohibits operation over any human being unless that human being is directly participating in the operation or is located under a covered structure or inside a stationary vehicle that can provide reasonable protection.