

## Unmanned Aircraft Operation Utilizing First-Person View

### 1. Definition of terms

Please refer to Page 3, which contains an alphabetical listing of the definitions of the terms that are used in this document.

### 2. FPV operations, requirements, and limitations

- a) AMA FPV novice pilots must first be capable of flying their FPV sUAS without utilizing FPV.
- b) AMA FPV novice pilots undergoing training with an experienced AMA FPV pilot should use a buddy-box system if practicing at a low altitude (below 100 feet) or practice at a safer, higher altitude when no buddy-box system is an option.
- c) AMA FPV pilots should perform preflight inspections of their FPV sUAS video, electronic control, power, and mechanical systems before each flight.
- d) All FPV flights require an AMA FPV pilot to have an AMA FPV spotter next to him or her maintaining VLOS with the FPV sUAS throughout its flight.
- e) The AMA FPV pilot must brief the AMA FPV spotter on the FPV spotter's duties, communications, and hand-over control procedures before FPV flight.
- f) The AMA FPV spotter must communicate with the AMA FPV pilot to ensure that the FPV sUAS remains within VLOS, warning the FPV pilot of approaching aircraft, and when avoidance techniques are necessary.
- g) During an FPV flight, the FPV spotter must be prepared to acquire the transmitter/control from the FPV pilot and assume VLOS control of the sUAS at any time safe operation of the flight is in question.
- h) If an FPV pilot experiences a safety issue that does not appear to be a brief glitch, he or she must abandon FPV mode and fly VLOS.
- i) FPV pilots must perform an RC test flight without FPV by conventional VLOS after installing a new FPV system and/or after any changes or repairs to essential flight systems.
- j) sUAS *exceeding* 55 pounds cannot use an FPV system for FPV flying.
- k) FPV pilots can control the flight path of FPV sUAS with a standard gimbal RC transmitter or a smartphone, tablet, smartwatch, laptop, or proprietary controller with AP mission software using RF telemetry modules for the control link.
- l) sUAS must operate on frequencies approved by the FCC for wireless video, radio control, and ground station telemetry systems. Some systems, because of power output or Amateur Band frequencies, will require FCC licensing (AMA document #580 & #590).

### General rules for sUAS operations

- a) AMA sUAS flights must be conducted in accordance with the AMA National Model Aircraft Safety Code, AMA supplemental rule documents, flying site specific rules, FAA regulations, and any laws relating to sUAS operations (AMA document #105).
- b) AMA pilots must fly their sUAS strictly for hobby/recreational use.
- c) AMA pilots, when flying sUAS either manually or utilizing FPV, stabilization, or autopilot systems for automated flight, must at all times maintain the sUAS within VLOS.
- d) AMA pilots must provide prior notification of their intent to fly an sUAS to an airport operator and/or air traffic control tower when they will be flying within 5 miles of an airport.
- e) sUAS must not be flown in a careless or reckless manner or at locations where sUAS activities are prohibited, or in close proximity to crowds of people at outdoor sporting events, music festivals, political gatherings, firework displays, or beaches (see section 3b).
- f) All AMA pilots shall avoid flying sUAS directly over unprotected people, animals, vessels, vehicles, or structures so as not to endanger the life and property of others who are not directly involved in the sUAS activity.
- g) All sUAS flights must yield right-of-way to man or other unmanned aircraft.
- h) All AMA pilots or their spotters must monitor the airspace surrounding sUAS while in flight. If aircraft, people, or property become endangered, pilots must maneuver the UAS to avoid a collision (AMA document #540-D).

### 3. Range, separation, altitude, weight, and speed

- a) **Range**—flight range of sUAS is limited to VLOS of the AMA pilot/operator.
- b) **Separation**— AMA pilots should maintain the flight path of their sUAS at safe minimum separation distances from pilots, helpers, spectators, vehicles, and structures as follows:
- 4.4 lbs. or less and Park Pilot model aircraft not exceeding 2.0 lbs. should maintain a minimum separation of 10 ft. from pilots/helpers, 25 ft. from spectators, and 50 ft. from vehicles/structures.
  - over 4.4 lbs. should maintain a minimum separation of 25 ft. from pilots/helpers, 60 ft. from spectators, and 80 ft. from vehicles or structures.
- c) **Altitude**—Maximum altitude of sUAS is limited to 400 ft. above ground level (AGL) when within 5 miles of an airport.
- d) **Weight**—sUAS are limited to a maximum flying weight of 55 pounds, unless in compliance with AMA’s Large Model Airplane UAS program (AMA document #520-A).
- e) **Speed**—sUAS aircraft utilizing an onboard autopilot system for automated flight are limited to a maximum speed of 100 mph.

AMA, unless expressed written permission is obtained from the individual property owner(s) or manager(s).

### 4. Recommendations and information

- a) AMA FPV novice pilots should consider using a cockpit-view flight simulator to become accustomed to FPV flight.
- b) AMA FPV pilots should consider using a programmable autopilot for their FPV sUAS to provide a return to launch (RTL) or failsafe landing feature in the event of a loss of control, video signal, or VLOS.
- c) When purchasing FPV operational systems, always try to select quality equipment from reputable dealers, ensure for compatibility with other onboard systems, and install components according to manufacturers’ instructions.

### 5. Privacy protection safeguards

- a) **Laws: Federal, State, and Local**—AMA members must be aware of and observe any laws regulating the ownership and operation of sUAS.
- b) **Cameras/sensors**—the use of imaging technology for aerial surveillance with radio-controlled sUAS capable of obtaining high-resolution photographs and/or video, or using any types of sensors for the collection, retention, or dissemination of surveillance data or information on individuals, homes, businesses, or property at locations where there is a reasonable expectation of privacy is strictly prohibited by the

## Definitions of terms

### A

#### **AMA FPV novice pilot**

An AMA member learning to fly FPV with an experienced AMA RC pilot providing flight instruction and serving as an FPV spotter.

#### **AMA pilot/operator**

An AMA member who is capable of manually operating an RC transmitter to control a sUAS flight path within its safe intended flight envelope without losing control or having a collision.

#### **AMA FPV pilot/operator**

An AMA pilot who is capable of maintaining stable flight of an FPV sUAS within its intended flight envelope while flying by FPV without losing control or having a collision.

#### **AMA FPV spotter/observer**

An experienced AMA RC pilot who has been briefed by the AMA FPV pilot on the tasks, responsibilities, and procedures involved in being a spotter, is capable and mature enough to perform the duties, and is able to assume conventional VLOS control of the FPV sUAS.

#### **Automated Flights**

Use an autopilot system to control the flight path of a sUAS. The level of automation/autonomy does not totally remove the AMA pilot from control capability since the pilot has VLOS of the sUAS and can activate and deactivate the automation.

#### **Autopilot systems**

Used to stabilize and control the flight path of a sUAS without assistance from a pilot. The autopilot system incorporates a microcontroller, inertial measurement unit, GPS receiver, and an altitude sensor. A laptop with mission software allows the pilot to program and save navigable waypoints to the autopilot system's memory for automated flight.

### B

#### **Buddy-box system**

A flight-training system that has one transmitter operating as the master controller, while a second transmitter is linked/slaved to it, allowing dual control of a sUAS. The operator of the master transmitter allows one or the other transmitter to control the sUAS. Although this system is commonly used for training novice fliers, it is also useful in situations where an experienced pilot may have an increased likelihood of needing a second pilot's assistance in maintaining control of the sUAS. It might also be helpful in assisting pilots with physical limitations, flying in congested environments, during times of reduced visibility, or anytime during FPV flight when a timely transfer of control might be beneficial.

### E

#### **Essential flight systems**

Any systems or components necessary to maintain stable flight within a model aircraft's flight envelope. (This includes primary RC systems and any stabilization or gyros required to maintain stability and heading in certain types of sUAS that would be uncontrollable/unstable without their use.)

### F

#### **First-Person View**

Refers to the operation of a radio controlled (RC) sUAS using an onboard camera's cockpit view to orient and control the aircraft.

#### **Flight envelope**

The range of airspeeds, attitudes, and flight maneuvers that an sUAS can safely perform/operate for its intended use.

#### **FPV aircraft**

An RC sUAS equipped with a video transmitter to send real-time video images from an onboard camera to a ground-based receiver for display on a pilot's video monitor/goggles. (FPV sUAS types include: fixed-wing, rotary-wing, and multirotor platforms.)

### M

#### **Model Aircraft, small Unmanned Aircraft Systems (sUAS), Unmanned Aerial Vehicles (UAV), Remotely Piloted Aircraft, Multirotors (MR), and Drones**

Remotely controlled and/or autopilot controlled unmanned aircraft capable of sustained flight in the atmosphere. The small sUAS have a maximum weight of 55 pounds and micro mUAS 4.4 pounds.

#### **Multirotor**

A remote-controlled model aircraft whose lift is derived from the aerodynamic forces acting on one or more powered rotors turning about vertical axes and includes tricopters, quadcopters, hexacopters, octocopters, etc.

### N

#### **Nonessential flight systems**

Any systems or components that are not necessary to maintain stable flight within the sUAS flight envelope. This includes autopilot or stabilization systems that can be activated and deactivated in flight by the pilot without affecting stable flight.

### P

#### **Park Pilot aircraft**

A remote-controlled mUAS limited to 2 pounds in weight, speeds of less than 60 mph, and designed for park flying in small urban area locations.

### R

#### **RC test flight**

Requires an AMA pilot to manually operate an RC transmitter to control a sUAS flight path and determine if the sUAS is capable of maintaining stable flight within its safe intended flight envelope.

### V

#### **Visual line of sight (VLOS)**

Distance at which the pilot/operator is capable of maintaining visual contact with the sUAS and determine its orientation and altitude without enhancements other than corrective lenses.