

VERSION 1.0



Safety Guidance for Manned Aircraft Pilots Operating in the Presence of Drones

PREFACE

Drones, or Unmanned Aircraft Systems—UAS—create substantive (if not profound) new capabilities, opportunities, and benefits. But as drones become more common, manned aircraft operators face new challenges. The FAA asserts that drones “are inherently different from manned aircraft” and “create situations not common to manned flight.”

Current safety initiatives advancing aircraft integration focus almost exclusively on drone operators using education, regulation, and (more recently) enforcement. Promising technologies may provide effective manned/unmanned aircraft interoperability in the near future, but these nascent efforts do not fully address the risks to manned aircraft created by drones.

This brochure responds to the need for drone avoidance safety guidance for manned aircraft pilots. Effective guidance is critical, because the essential visual flight rules (VFR) safety mechanism—“see-and-avoid”—is largely inadequate with regard to the small drones that create the greatest risk of collision with manned aircraft.

We offer the following guidance to fill the void.

INTRODUCTION

The following safety guidance is designed for pilots who may experience unexpected, increasingly frequent encounters with unmanned aircraft

operations. Not *all* these provisions apply to *all* flight operations. The guidance is general in nature. The guidance assumes that pilot awareness and response are particularly important where drone safety technologies and rules may not yet be developed fully or implemented effectively. Pilots are encouraged to review and selectively integrate these recommendations into their operations.

Users are urged to customize this brochure to suit their needs. Resources, including a supporting technical paper and a poster can be found at: secureav.com/drones.

The guidance is organized in five sections, presented by phase-of-flight. The provisions within each section are not presented in any order of importance.

1. GENERAL EDUCATION AND PREPARATION

Pilots should:

- a. recognize that most drone operators are not certificated pilots and may not understand or adhere to aviation operations and safety requirements;
- b. recognize that most small drones operate without systems that provide a level of safety equivalent to manned aircraft in terms of collision avoidance capability and reliability;
- c. become familiar with drone regulations, and to distinguish the flight profiles, characteristics, and operations of manned aircraft from those of drones;
- d. recognize that drones may be operated in unexpected or unauthorized ways, including at night, in instrument meteorological conditions (IMC), in controlled or uncontrolled airspace, at unauthorized altitudes, and beyond visual line-of-sight (BVLOS) of the operator, possibly impeding effective collision avoidance;
- e. consider that many drone operators are preoccupied with maneuvering for photography or other applications, which may compromise situational awareness;
- f. anticipate that some (larger, typically public) drones may require “chase aircraft” while in controlled airspace—possibly making departure and arrival procedures, traffic pattern altitudes, and handling non-standard;
- g. review and understand the limitations of even the most effective visual scanning techniques; and

- h. train to respond to possible collisions and other emergencies arising from conflict between manned aircraft and drones.

2. PREFLIGHT OPERATIONS

Pilots should:

- a. review diverse information sources, including: Notices to Airmen (NOTAMs), Temporary Flight Restrictions (TFRs), Chart Supplements U.S., online flight planning resources, airport and airport/pilot association resources, charted UAS procedures, and Flight Service;
- b. recognize that information supporting the separation of manned from unmanned flight operations is neither readily available nor standardized, and may change frequently; pilots should monitor those changes accordingly;
- c. when indicated, query Flight Service, airport operators, and ATC regarding drone operations in the airport environment prior to taxi-out;
- d. consider that airport personnel or ATC may acquiesce to drone activity in the airport environment without notice to pilots;
- e. where practicable, identify and monitor drone site activity, including *lost link loiter points* along their planned route;
- f. recognize that most commercial drones are permitted to operate as close as 2 NM from airports without a published instrument flight procedure or an operating control tower;
- g. know that some drone operations may occur within 5 SM of airports; and
- h. give attention to aeronautical chart symbology for drones (“UA” for unmanned aircraft activity), identify charted drone operations affecting planned flights, and plan for ample separation.



3. IN-FLIGHT OPERATIONS

Pilots should:

- a. increase their awareness of drone hazards where incursions are most likely:
 - ❑ during flight below 500' AGL;
 - ❑ during climb-outs and descents on terminal segments of flight;
 - ❑ while flying faster, lower—where see-and-avoid margins are reduced by the increased speed;

- ❑ near areas of high public interest—such as fires, festivals, parades, attractions, parks, and popular photographic and vista points;
- b. query ATC and/or Flight Service regarding drone operations in the airport environment;
- c. recognize the risks of drone *fly-away* (loss of command and control, “C2”), and *lost link* (pre-programmed procedure upon loss of C2);
- d. use available aircraft lighting to increase your visibility to drone operators;
- e. when in a climb, consider a cruise climb which maximizes visibility;
- f. listen attentively, including on 121.5 MHz, for radio reports of drone sightings/activities, make periodic transmissions, and answer inquiries concerning drone operations;
- g. recognize that many private airports and heliports are not accurately charted (on a current FAA Form 5010 – *Airport Master Record*), if at all;
- h. for rotorcraft operations, exercise heightened vigilance when landing at off-airport locations. Conduct a high recon around the intended landing site to provide visual and aural warning to drone operators nearby;
- i. when flying rotorcraft at low altitudes, keep airspeeds at or near the best autorotation speed; flying higher may improve safety margins;
- j. recognize that risk of collision is exacerbated by distractions during high-workload phases of flight;
- k. if aggressive maneuvers are necessary to avoid collision, consider the acute vulnerability that can result (to windshields, jet intakes, or rotor systems);
- l. anticipate that fires, public gatherings, points-of-interest, and newsworthy events are likely to attract drone operations; avoid operating in their vicinity;
- m. consider that nonstandard lighting may indicate that the aircraft is a drone;
- n. maintain greater separation from drones than might otherwise appear necessary; be prepared for the unknown;
- o. fly predictably so drone operators can better avoid you;
- p. recognize the potential for drone collision even beyond congested areas;
- q. make in-flight reports (a PIREP) of all unsafe drone sightings or incidents; and
- r. identify and preserve material evidence of drone incidents and rogue drones.

4. POST-FLIGHT OPERATIONS

Pilots should:

- a. understand that reporting hazardous drone operations and near-miss incidents will not only assist in education and possible enforcement actions against errant drone operators, but will help build the database required to promote the safe integration of manned and unmanned aircraft operations; and
- b. become familiar with and file (or request that ATC file) applicable reports, including: Near Mid-Air Collision (NMAC), and the Aviation Safety Reporting System (ASRS) General Form.

5. AVIATION COMMUNITY

Pilots should:

- a. communicate to all stakeholders the risks arising from drone operations;
- b. directly engage ATC and airport management regarding drone operations and safety;
- c. avoid the assumption that airport and tower personnel:
 - ❑ are fully apprised of local drone activity and hazards;
 - ❑ understand and exercise the scope of their authority regarding drone safety oversight;
 - ❑ have operational procedures in place to document and manage drone activity effectively;
 - ❑ respond to operator notifications of planned flight proximate to airports in a manner consistent with safety of flight;
 - ❑ file and communicate appropriate drone safety reports and notifications to all relevant parties;
- d. engage and inform local governments near airports of relevant safety risks, and urge their active engagement in advancing flight safety;
- e. serve as a drone safety resource to local airports and airport/pilot associations;
- f. serve as ambassadors to the local drone community, recognizing that many drone operators are unfamiliar with manned aircraft operations and safety; invite drone operators to relevant safety meetings and seminars; and
- g. in the absence of Federal preemption, consider engaging local government to

address exigent safety hazards near airports and heliports by measured (exclusively ground-based, and *strictly not airspace*) zoning and land use action.

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The Permanent Editorial Board (PEB) provides editorial oversight and stewardship of the initiative. See PEB at: secureav.com/PEB.pdf.

NOTICE

This publication may be used as a resource for safety content development, although it is recommended that this be supported by independent research on the suitability of its provisions for specific or local applications and situations. It is not intended to provide legal advice and must not be relied upon as such. Please send suggestions, edits, errata, questions, and comments to: PEB@secureav.com.

RESOURCES

- ❑ A supporting annotated technical paper addressing issues raised in this brochure in greater depth can be found at: secureav.com/drones. A corresponding safety awareness poster is also available at that site.
- ❑ The Aviators Model Code of Conduct (AMCC) Initiative has developed voluntary safety guidance, including model codes of conduct for: aviation maintenance technicians, aviators, flight instructors, glider aviators, helicopter pilots, light sport aviators, seaplane pilots, and student pilots. Available at: secureav.com.
- ❑ Further information about flight safety and drones is available at: faa.gov/uas.