



AMA[®]

ACADEMY OF MODEL AERONAUTICS

SAFETY PROGRAM

HANDBOOK

The Academy of Model Aeronautics



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WELCOME!

Founded in 1936, the AMA is the world's largest sport aviation organization, representing a membership of more than 180,000. Throughout the years, AMA established and evolved a safety program that guides modeling activities through education and voluntary compliance. As technology advances and the model community continues its growth, disciplines and interests have increased. Most model flying that takes place today is recreational rather than within a formal competition framework, and sometimes it occurs on publicly accessible sites with little or no formal control.

Creating a safe environment to protect bystanders, other model pilots, as well as surrounding property, is crucial and the responsibility of every individual participating in modeling activities. AMA highlights the most important safety aspects through its Safety Code, but the safety program encompasses many more facets. This safety handbook is a compilation of AMA documents and programs as they pertain to safe model operation. It is intended to provide a centralized location to find all pertinent safety information, and can be a valuable tool for club officers, contest directors, event managers, and others.



ACADEMY OF MODEL AERONAUTICS NATIONAL MODEL AIRCRAFT SAFETY CODE

Effective January 1, 2018

A model aircraft is a non-human-carrying device capable of sustained flight within visual line of sight (VLOS) of the pilot or spotter(s). It may not exceed limitations of this code and is intended exclusively for sport, recreation, personal, education, and/or competition. All model flights must be conducted in accordance with this safety code and related AMA guidelines, any additional rules specific to the flying site, as well as all applicable laws and regulations.

Process for Changes to the AMA Safety Program

Any change to the AMA Safety Program is done through the AMA Safety Committee and approved by the AMA Executive Council. A proposal for updating or amending any program typically starts at the membership level by submitting the proposal to the AMA Safety Director or Safety Committee Chairman. The Safety Committee will review the proposal to determine if it can be safely integrated into AMA's Safety Programming. If accepted, a final version will be submitted to the AMA Executive Council for approval and inclusion in the AMA Safety Program.



AS AN AMA MEMBER I AGREE:

- I will not fly a model aircraft in a careless or reckless manner.
- I will not interfere with and will yield the right of way to all human-carrying aircraft using AMA's See and Avoid Guidance and a spotter when appropriate.
- I will not operate any model aircraft while I am under the influence of alcohol or any drug that could adversely affect my ability to safely control the model.
- I will avoid flying directly over unprotected people, moving vehicles, and occupied structures.
- I will fly Free Flight (FF) and Control Line (CL) models in compliance with AMA's safety programming.
- I will maintain visual contact of an RC model aircraft without enhancement other than corrective lenses prescribed to me. When using an advanced flight system, such as an autopilot, or flying First-Person View (FPV), I will comply with AMA's Advanced Flight System programming.
- I will only fly models weighing more than 55 pounds, including fuel, if certified through AMA's Large Model Airplane Program.
- I will only fly a turbine-powered model aircraft in compliance with AMA's Gas Turbine Program.
- I will not fly a powered model outdoors closer than 25 feet to any individual, except for myself or my helper(s) located at the flightline, unless I am taking off and landing, or as otherwise provided in AMA's Competition Regulation.
- I will use an established safety line to separate all model aircraft operations from spectators and bystanders.

REGULATORY COMPLIANCE

Key elements of AMA's Safety Code include the requirement to see and avoid manned aircraft and maintain model aircraft operations within visual line of sight.

In addition to operating within our safety programming, AMA members should comply with any and all applicable federal, state, and local laws and regulations.

On October 5, 2018, the U.S. President signed the FAA Reauthorization Act of 2018 into law. The Exception for Limited Recreational Operations of Unmanned Aircraft established by section 349 contains eight statutory requirements that recreational and educational fliers must adhere to operate recreational UAS (model aircraft).

1. The aircraft is flown strictly for recreational, or educational purposes.
2. The aircraft is operated in accordance with or within the programming of a community-based organization's set of safety guidelines that are developed in coordination with the Federal Aviation Administration.
3. The aircraft is flown within the visual line of sight of the person operating the aircraft or a visual observer co-located and in direct communication with the operator.
4. The aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft.
5. In Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport, the operator obtains prior authorization from the Administrator or designee before operating and complies with all airspace restrictions and prohibitions.
6. In Class G airspace, the aircraft is flown from the surface to not more than 400 feet above ground level and complies with all airspace restrictions and prohibitions.
7. The operator has passed an aeronautical knowledge and safety test described in subsection (g) and maintains proof of test passage to be made available to the Administrator or law enforcement upon request.
8. The aircraft is registered and marked in accordance with chapter 441 of this title and proof of registration is made available to the Administrator of designee or law enforcement upon request.

Model Operations Within Controlled Airspace

When flying in controlled airspace (Classes B, C, D, and E), all model aircraft and drone operations must be authorized by the FAA, unless operating at a fixed flying site (AMA Chartered Club field). You should use the FAA "B4 You Fly" smartphone app to determine what airspace you are in before you fly other than at an AMA Chartered Club flying field. For members flying at a fixed flying site in controlled airspace, there must be an established Letter of Agreement (LOA) with FAA air traffic control (ATC) in place which serves as an authorization. When flying in controlled airspace, outside of an AMA fixed site, operators must obtain authorization through an authorized Low Altitude Authorization and Notification Capability (LAANC) provider. LAANC is available to recreational UAS operators to quickly receive authorization to fly and can only be used for daylight operations at or below 400 feet.

For more information on LAANC

[MODELAIRCRAFT.ORG/LAANC](https://modelaircraft.org/LAANC)

On January 1, 2021, Congress also defined recreational use of UAS to include the following:

1. operated by an institution of higher education for educational or research purposes;
2. flown as part of an established Junior Reserve Officers' Training Corps (JROTC) program for education or research purposes; or
3. flown as part of an educational program that is chartered by a recognized community-based organization (as defined in subsection (h) of such section.)

BE AWARE OF NO-FLY ZONES

Do not fly near stadiums, critical infrastructure (correctional facilities, water treatment centers, utilities, etc.), large open-air events, or any time or place where model aircraft operations are prohibited.

Check for temporary flight restrictions (TFRs) in the area before you fly at

[MODELAIRCRAFT.ORG/MEDIA-RESOURCES/FAA-NOTAMS](https://modelaircraft.org/MEDIA-RESOURCES/FAA-NOTAMS)

Privacy Policy

It's important that you respect the privacy and property of others and be aware of your surroundings. What might seem like a cool flight path to you, may be a nuisance or perceived as invasion of privacy by others. Using imaging technology for aerial surveillance with a model aircraft capable of obtaining photographs and/or videos or using any types of sensors for collection, retention, or dissemination of surveillance data or information about individuals, homes, businesses, or property locations where there is a reasonable expectation of privacy is strictly prohibited by AMA, unless you have obtained written permission from the individual property owner(s) or manager(s). AMA members should educate themselves on community ordinances, guidelines, or any laws regulating the ownership and operation of a model aircraft.

NTIA UAS Privacy Best Practices Document
[NTIA.DOC.GOV/FILES/NTIA/PUBLICATIONS/VOLUNTARY_BEST_PRACTICES_FOR_UAS_PRIVACY_TRANSPARENCY_AND_ACCOUNTABILITY_0.PDF](https://www.ntia.gov/files/ntia/publications/voluntary_best_practices_for_uas_privacy_transparency_and_accountability_0.pdf)

GENERAL SAFETY PRACTICES

Adherence to AMA's safety regulations should not be viewed as an obstacle to the enjoyment of model flying, but rather as proof that model fliers are responsible and can operate safely in a community-based environment. It is to each model pilot's personal benefit to make certain that no action on his or her part will result in an unsafe situation or an accident. Before each flight, the pilot should verify the model's condition and proper function to ensure a safe and

efficient flight. A pilot should check for proper fitting and placement of parts, with special attention to the engine(s), propeller(s), and control surfaces. It is imperative that all flying sites be situated as far as practical from power lines.

Don't attempt to retrieve a model from electric power lines. Contact the local power company. Identify each model aircraft flown outdoors with the name and address or AMA number of the owner. This can be placed inside on an easy to access panel or marked on the outside of the model. If your aircraft weighs .55 pounds or more, you should also attach your FAA registration number to the outside of the aircraft. Current FAA regulations require all model aircraft owners to register with the FAA through Drone Zone.

FAA DRONE ZONE

[FAADRONEZONE.FAA.GOV/#/](https://www.faa.gov/uas/dronezone)

This is not necessary for indoor flying. Before you participate at an AMA sanctioned event, air show, or a model demonstration, you should test your model aircraft and control systems by successfully performing all intended or anticipated maneuvers before the event. If you are an inexperienced pilot, it is important that you obtain the assistance of an experienced pilot for these specific events.

Your model aircraft must not carry any incendiary or explosive devices that creates hostile fire or weaponizes the aircraft. Air Show Teams (AST) s are authorized to use devices and practices as defined with the Team AMA Program document.



Devices that propel hazardous projectiles are prohibited. Dropping any object creating a hazard to persons or property are prohibited. Free Flight fuses or other devices that burn, producing smoke, and are securely attached to the model aircraft during the flight are acceptable. Rocket motors, up to a G-series size, may be used for propulsion, as long as they use solid propellants and remain attached to your model during the flight. Launching a rocket or any other missile from a model aircraft is prohibited.

AMA members interested in model rocketry should abide by the National Model Rocketry (NAR) Safety Code. When appropriate or required by AMA safety guidelines and/or AMA Competition Regulations, helmets must be worn and fastened. Helmets must be OSHA, DOT, ANSI, SNELL, or NOCSAE approved or comply with comparable standards.

Spotters/Visual Observers

The duties of a spotter are critical, requiring absolute attention and concentration on the flight being observed. The use of electronic devices or participating in conversations is discouraged during the course of the flight! The task of a spotter is to assist the RC pilot by watching for and keeping him/her aware of any aircraft or obstacle or hazard that may create an airspace conflict so that evasive action can be taken to maintain safe separation as required by AMA's See and Avoid policy. The use of a spotter is highly recommended when at a flying site where aircraft are seen in or near the airspace on a regular basis. A spotter is required when flying using First-Person View (FPV) with goggles. In addition to the above, the spotter must also assist the pilot in keeping the model in Visual Line of Site (VLOS) at all times ... that is, the aircraft must be kept in view of the spotter without using binoculars or any other vision enhancement device.

WEATHER

Current weather conditions are always a consideration whenever you plan to fly model aircraft. Temperature,

precipitation, clouds/visibility, and wind conditions should be factored in your plans to fly.

Temperature:

Cold weather can make a day at the field miserable. Extremely cold conditions can be dangerous and even fatal if exposed for too long. Be sure to check the temperature before leaving for the flying site. Keep in mind that many electronics can start to fail in very cold temperatures. If flying RC models, check your operation manual for your radio equipment to know the temperature limits your equipment has.

Precipitation:

Rain can really spoil your day at the field. It can also present significant dangers as well. Water can get inside the transmitter, can cause shorts in the circuitry, and ultimately cause it to fail. During rain and other forms of precipitation, it's best not to fly at all and remain sheltered until the rain stops. But, if you must fly, ensure that your transmitter is protected from water intrusion. Snow can melt and get into your transmitter as well. Losing control of your model because of a radio malfunction endangers everyone.

Clouds/Visibility:

Although overcast conditions are fine to fly in, it's important to be aware of how low or close clouds are. You must remain well clear of all clouds and never fly between cloud layers, keeping your aircraft in clear view and within visual line of sight at all times. Having a model enter clouds or fog violates the visual line of site requirement, as well as potentially leading to a flyaway, a crash, or a possible collision with other objects on the ground or in the air. It's a good practice to check local weather conditions via your local TV or internet weather. If you find low ceilings or reduced visibility due to fog, haze, or smoke, you should not fly until weather conditions improve.



Wind:

Depending on the size and type of aircraft, the wind can be a deciding factor for whether you should fly. Fly in an environment that meets your aircraft's capabilities.

In conclusion, always be aware of the weather. Conditions can change and often change quickly; you should continually monitor and assess the weather conditions. Understand the limitations of your model and equipment to ensure safe and enjoyable operations.

WEATHER

MODEL.AIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/512.PDF

MODEL AIRCRAFT OPERATIONS IN CONTROLLED AIRSPACE

Model aircraft operations within controlled airspace must be conducted in accordance with the requirements and limitations provided by Air Traffic Control through the Low Altitude Authorization and Notification Capability (LAANC) system. Or...

Model aircraft operations at established flying sites within controlled airspace must be conducted in accordance with the Letter of Agreement (LOA) established with the local air traffic control facility. Modelers must comply with any additional weather considerations, limitations, or criteria referenced in the agreement.

PROPELLERS

- Cracked, nicked, or unbalanced propellers or rotor blades should be replaced and not reused!
- Stay clear of the propeller arc while starting or running any engine or motor.
- Do not stop engines by throwing rags or other objects in the propeller.

- Painting tips of propellers a bright color helps you to better see the propeller arc during rotation.
- Check the propeller and spinner for tightness before each operation.
- Learn about and check for the proper grain patterns in wooden propellers to ensure strength in high rpm operation.
- Exercise extreme caution adjusting needle valve settings on engines. Most adjustments should be performed from behind the model, thus avoiding reaching around a spinning propeller.

BATTERIES

Lithium batteries have become extremely popular for powering control and power systems in models because of their high-energy density compared with earlier battery technologies. With high energy comes increased risk in use. The principle risk is fire, which can result from improper charging, crash damage, or shorting the batteries. All Lithium battery vendors warn customers of this danger and recommend extreme caution in their use. However, many fires have resulted from the misuse of Lithium Polymer (LiPo) batteries, leading to the loss of models and automobiles. Other property, such as homes, garages, and workshops, have also burned. A Lithium battery fire burns explosively at several thousand degrees and is an excellent initiator for ancillary fires. Fire is caused by contact between Lithium and oxygen in the air. It needs no other source of ignition or fuel to start. The following is recommended for Lithium batteries to preclude ancillary fires:



- Store and charge in a fireproof container—never in your model.
- Charge in a protected area that is devoid of combustibles.
- In the event of damage from crashes, etc., carefully move the battery pack to a safe place for at least a half hour to observe. Physically damaged cells can erupt into flames. After sufficient time to ensure safety, the cells should be discarded in accordance with the instructions that come with the batteries. Never attempt to charge a cell with physical damage, regardless of how slight.
- Always use chargers designed for the specific purpose; it's preferable to have a fixed setting for your particular pack. Many fires occur while using selectable/adjustable chargers that are improperly set. Never attempt to charge Lithium cells with a charger that is not specifically designed for Lithium cells! Never use chargers that are specifically designed for NiCd batteries.
- It is strongly recommended that you use charging systems that monitor, control, and balance the charge state of each cell in the pack. Unbalanced cells can lead to disaster if the system permits a single cell in the

pack to be overcharged. This means that the charging system must provide charge cessation as each cell reaches the proper voltage. If the batteries show any sign of swelling, discontinue charging and move them to a safe place—outside. They could erupt into flames.

- Never plug in a battery and leave it to charge unattended; serious fires have resulted from this practice.
- Do not attempt to make your own battery packs from individual cells. Use only professionally packaged and labeled units that contain safer charging features.

FREE FLIGHT

The starting area must be carefully chosen. Considerations include wind strength and direction, relative position of buildings, runways, vehicle parking, spectator areas, and the place where models are expected to land after a normal flight, according to the wind. Outdoor Free Flight models should be flown in an area that is clear of obstacles, persons, and other property that could be damaged by the model. Free Flight models must be launched at least 100 feet downwind from spectators and automobile parking and the launch area must be clear of all individuals



except mechanics, officials, and other fliers. Free Flight models should only be launched when the launch area and downwind airspace are clear of manned aircraft.

Use an effective device to extinguish any fuse on the model aircraft after the fuse has completed its function.

CONTROL LINE

Before flying, inspect and pull-test your complete control system, including the safety thong where applicable. The pull test will be in accordance with the current Competition Regulations for the applicable model aircraft category. Model aircraft that don't fit a specific category will use the Control Line Precision Aerobatics pull-test requirements. The flying area must be clear of all utility wires or poles. Nonessential participants and spectators must be out of the flying area before any engine is started. Model aircraft will not be flown closer than 50 feet to any above-ground electric utility lines.

RADIO CONTROL

Complete a successful radio equipment ground-range check (in accordance with manufacturer's recommendations) before the first flight of a new or repaired model aircraft.

Establish a safety line(s) behind which all spectators and bystanders must remain and in front of which all flying takes place. Intentional flying behind the safety line is prohibited.

Air shows and flight demonstrations must have a straight safety line. Any other flying activities would be able to establish a straight or a curved line.

Only personnel associated with flying the model aircraft are allowed at or in front of the safety line. Spectators must have a designated area away from the line.

No pilot or other person should touch an outdoor model in flight, while still under power, except to divert it from striking an individual.

Night flying requires a lighting system that provides the pilot with a clear view of the model's attitude and orientation at all times. Hand-held illumination systems by themselves are inadequate for night flying operations and must be supplemented with other lighting systems.

SEE AND AVOID GUIDANCE

As model aircraft pilots, we share the National Airspace System (NAS) with man-carrying aircraft and other FAA-managed aeronautical operations. It is imperative that we yield the right of way and maintain a separation between our operations and theirs. This document provides guidance for all outdoor modeling operations, to ensure that we do not create a hazard for our full-scale counterparts:

See and Avoid Guidance

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/540-D.PDF](https://modelaircraft.org/system/files/documents/540-d.pdf)

GUIDANCE FOR FPV OPERATION

First-Person View (FPV) refers to the operation of a Radio Control model aircraft using an onboard camera's cockpit view to orient and control the aircraft. If you are involved in FPV operation, curious, or just want to learn more, please take a moment and review AMA's guidance for FPV operations:



FPV Operation

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/550.PDF](https://modelaircraft.org/system/files/documents/550.pdf)

FPV Operation for Indoor Flying

[MODELAIRCRAFT.ORG/SITES/DEFAULT/FILES/FPVINDOOR.PDF](https://modelaircraft.org/sites/default/files/fpvindoor.pdf)

FPV Racing Recommendations

[MODELAIRCRAFT.ORG/FILES/160616FPVDRONERACINGRECOMMENDATION.PDF](https://modelaircraft.org/files/160616fpvdrone racing recommendation.pdf)

System Licensing Guidance

[MODELAIRCRAFT.ORG/SITES/DEFAULT/FILES/FPVFCF.PDF](https://modelaircraft.org/sites/default/files/fpvfcc.pdf)

GUIDANCE FOR ADVANCED FLIGHT SYSTEMS

(Failsafe, Stabilization, and Autopilot)

Models using advanced flight systems allowing for automated or flight are permitted by AMA, provided the pilot remains in direct control and flies within visual line of sight. In such operations, a modeler must be able to override the automated and programmed features at all times.

The specific automated functions allowed for this type of model operation are listed in this guidance document:

Failsafe, Stabilization, and Autopilot Systems

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/560.PDF](https://modelaircraft.org/system/files/documents/560.pdf)

GAS TURBINE PROGRAM

The operation of gas turbine engines in model aircraft requires the modeler to prove competency

in the operation, care, and maintenance of model turbines and the model aircraft flown with them. AMA has established a program for these operations, which includes the requirement for pilots to have a turbine waiver issued by AMA prior to any solo operation. You can find all of the applicable information for this program at:

AMA Gas Turbine Program

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/510-A.PDF](https://modelaircraft.org/system/files/documents/510-a.pdf)

RC PULSE JET ENGINES

RC Pulse Jet operations require special considerations because of the risk of fire, extreme noise, and high thrust. Considerations and requirements are outlined in the following program document.

RC Pulse Jet Engines

[MODELAIRCRAFT.ORG/SITES/DEFAULT/FILES/510-Q.PDF](https://modelaircraft.org/sites/default/files/510-q.pdf)

LARGE MODEL AIRPLANE PROGRAM

AMA requires that model airplanes weighing more than 55 pounds must be built, inspected, and operated in compliance with the rules set forth in AMA's Large Model Airplane program (LMA). This program details specific requirements for the design, construction, and operation of model airplanes



weighing up to 125 pounds. Compliance with the LMA program is required by Federal Law since 2018.

LMA Program

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/520-A.PDF](https://modelaircraft.org/system/files/documents/520-A.PDF)

RC COMBAT

Radio Control Combat (RC Combat) models are flown with streamers trailing behind them that are cut by other models in combat. For powered RC models, these operations use a variable setback distance based on the internal combustion engine displacement (or the electric equivalent) used on the model. Specific safety guidelines for these operations are available here:

RC Combat

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/525.PDF](https://modelaircraft.org/system/files/documents/525.PDF)

RC RACING

A Radio Control racing event is one in which model aircraft compete on a prescribed course with the objective of determining a winner by being the first to cross the finish line or to post the fastest time to complete the race. AMA's safety standards for the various types of radio control racing are listed below:

General RC Racing

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/530.PDF](https://modelaircraft.org/system/files/documents/530.PDF)

Giant Scale Racing

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/515.PDF](https://modelaircraft.org/system/files/documents/515.PDF)

Sport Pylon Racing

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/540-B.PDF](https://modelaircraft.org/system/files/documents/540-B.PDF)

FPV Racing Recommendations

[MODELAIRCRAFT.ORG/SYSTEM/FILES/DOCUMENTS/540-E.PDF](https://modelaircraft.org/system/files/documents/540-E.PDF)

FLYING SITE LAYOUT RECOMMENDATIONS

Every flying site situation is different and there is no one-size-fits-all approach when it comes to layout and set up. Each location has different values, as well as challenges, and modelers and chartered clubs have differing individual needs. Although there is no one-size-fits-all to designing and establishing a flying site, some modeling operations

do have specific parameters for safe operation, e.g.: gas turbine-powered models typically require a lengthy runway with a hard or smooth surface and sufficient airspace in which to maneuver. You should carefully evaluate the proposed flying site to determine what modeling operations can and cannot be accommodated at any given location. You should also consider the environment surrounding the proposed site. Flying sites near residential areas often encounter problems relating to sound and/or overflight of private property. At such areas it might be advisable to curtail operations during early morning hours, to restrict the size of aircraft flown, or to limit aircraft to electric propulsion only. Flying sites near or on an airport may require a LOA with the FAA ATC Facility that controls the airspace for that airport. It is important to identify the class of airspace where the flying site is to be located and obtain authorization from the FAA if it will be in controlled airspace (e.g., Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport). AMA's flying site recommendations are for a typical, multiuse flying site designed to accommodate most aeromodeling operations, and are helpful if you are designing a new flying site. They can also assist you if you are encountering changes in the dynamic of your club (e.g. more active pilots, new technology, and increased interest in diverse modeling disciplines) and need to reevaluate your current layout.

Flying Site Layout Recommendations

[MODELAIRCRAFT.ORG/SITES/DEFAULT/FILES/DOCUMENTS/SUGGESTED FLYING SITE SPECIFICATIONS.PDF](https://modelaircraft.org/sites/default/files/documents/suggested_flying_site_specifications.pdf)



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