



**TEAM AMA
Air Show Safety Program**

Updated March, 2011



CONTENTS

Team AMA Air Show Safety Program	3
FAST-TRAC Certification Program.....	4
Safety Guidelines and Guidance for Air Shows.....	7
Appendix 1a RC Aircraft Inspection Form.....	11
Appendix 1b Helicopter Inspection Form.....	12
Appendix 1c Pre-Show Site Inspection	13
Appendix 2 International Council of Air Shows RC Aircraft Operations Best Practices	14
Appendix 3: Safety Officer Air Show Notes and Lessons Learned	19
Appendix 4: FAST TRAC Example Written Test	21

TEAM AMA AIR SHOW SAFETY PROGRAM

PURPOSE:

Safety at air shows is the top priority of the Team AMA program. The Safety Program consists of several parts: the Air Show Team (AST) Program Safety Committee, the **F**light **A**ssessment **S**tandards **T**est **T**o **R**ate **A**eroflight **C**ompetency (FAST-TRAC) program and detailed guidance for show team Safety Officers as well as team members. Also included are the International Council of Air Shows (ICAS) Guidelines for the Operation of Radio Controlled Model Aircraft at Air Shows as well as ATF license information.

SAFETY COMMITTEE

The Safety Committee oversees the safety program and works to assure safe operations of teams in the Team AMA program. The committee is comprised of the Technical Coordinator who is also the Team AMA Safety Director and four at-large committee members appointed by the Team AMA Program Director. While not required, the at-large members are expected to be Safety Officers from various show teams.

Air show team members will be exposed to the scrutiny of larger numbers of spectators than many other AMA member engaged in flying activities. For this reason, professional conduct and safe flying is of utmost importance. The AMA Safety Code contains the specific safety guidance with which AMA air show teams must comply. Each team shall conduct a safety briefing before each show as well as an annual safety meeting for all members. Large full scale air shows always have AMA spectators that will be watching your show closely. They tend to judge more critical the activities at hand and have been known to turn in what they felt was a safety violation. Always make sure you work in unison with the air boss and that no risks are taken outside the envelope of a safe and entertaining show. The team Safety Officer and Manger should address, in advance, any potential safety issues with the event air boss. Any safety issues that occur must be documented and submitted to the Program Safety Director. It is best that the Team AMA Safety Director knows about any issues first before anyone else learns of any such occurrence. It would be unprofessional and Team AMA would look disorganized and unprepared if AMA, ICAS, or any authority figure brings up an issue from any team without any prior knowledge or safety investigation work done before hand by the Team AMA Safety Director.

It is essential to remember that team members represent the AMA and all other Team AMA members in the most positive manner possible. This means all participants must always set a positive and safe example. Remember that the first impression often is a lasting one; and, you only get one chance to make that good first impression.

Finally, the Safety Programs Guidelines is a living document and will be modified as additional suggestions and lesson learned are brought forward for inclusion.

FAST-TRAC Certification Program

Flight Assessment Standards Test To Rate Aeroflight Competency

The Team AMA FAST-TRAC program provides a means of enhancing the safety and professionalism of model aviation air show presentations. It is the R/C equivalent to the ACE (Aerobatic Competency Evaluation) program operated by the full scale air show community. The ACE program requires annual certification of all full scale air show pilots. The FAST-TRAC program establishes minimum competency standards for Team AMA R/C Air Show Team members. Team AMA members who fly in air shows must pass a competency test in aircraft type(s) and all members must be familiar with the program Guidelines. The FAST TRAC program will be required beginning with the 2009 season. All current members must pass the program by the end of April or end of May each year for the cold weather regions.

Term

The full FAST-TRAC certification is good for 3 years. In addition, there may be an annual written review exam when/if the safety program is updated. Except as noted above, newly added pilots must go through the FAST TRAC program before participation in AST activities. New members can undergo certification as needed. For convenience, all members of a team will be renewed at the same time. The Safety Director is responsible for keeping records of renewal dates.

Certification Process

Part 1 is a written examination available by request from the Safety Committee Chair. The written exam is required for all AST members. Ground support personnel are only required to pass the written test. The written test will be administered by the team manager in a manner similar to the way Contest Directors are certified. The manager should contact the Safety Director for a copy of the test. Once members have completed the test, answers are returned to the Safety Director for scoring. A passing score is 85%. Once the written test is passed the applicant must set up a time and place for the flight test that is convenient for both parties.

Part 2 is a flight standards test in which the applicant must demonstrate competency for the category being sought. The manager is responsible for arranging site and date when most of the pilots are available for flight exams. The goal would be to get all AST pilots qualified in one or two days and minimize the number of times a test administrator be present. Please be considerate of club rules and respect others on the flight exam day.

The flight standards tests are administered by a prominent AMA member such as a District Vice President, Associate Vice President, CD, Club Officer, etc. Team members may not administer the tests. The examiner is selected by the team manager and approved by the AST Safety Director. The Safety Director will contact the examiner to explain the exam and send him/her the materials.

The applicant must specify the category or categories for which they are seeking certification. The applicant must demonstrate good safety checks (preflight & range check) and then demonstrate safe control of the aircraft as they fly the required maneuvers for the particular category. Once the flights have been satisfactorily completed the examiner will sign off the applicant's certification sheet. The manager will then send the written test and Flight Standards test results to the Safety Committee Chair for processing. The applicant will later receive the FAST-TRAC card. The FAST TRAC and AMA cards should be available at all times while performing at any event.

Non- Flying and Ground Support Personnel

All team members who are working in a support role (i.e. non-flying) are required to take only the written test. No team member is allowed to work any show unless he/she has completed at least the written test. This requirement ensures that all members are current on the Guidelines and rules for flight operations and safety for show teams. The ground support personnel will also receive a “Ground Crew” FAST TRAC card upon passing the written exam.

Guest Pilots

In the event that a “guest pilot” becomes available to a show team for a special performance, it is within the purview of the manager to grant permission for that special performance. A “guest pilot” is defined as a well qualified AMA member in good standing. It is, however, the responsibility of the manager to familiarize the guest pilot(s) with necessary safety and performance guidelines. If a “guest pilot” performs with the team for more than two shows, he must become FAST TRAC qualified before flying a 3rd show within the same year. One show may consist of multiple show days on the same weekend. This means a “guest pilot” could fly with the team several times on a weekend for up to two separate weekends without having a need for a FAST TRAC card.

Certification Categories:

1. Trainers/Park Flyers

Includes park flyers, trainers, high wing such as J-3 cubs, L5 's, with a total weight of 8 lbs or less; does not include 3D electric aircraft. Consider similar maneuvers to show capability if the wind is above normal (a safety factor) for the take off and landing left and right maneuvers.

- Applicant must demonstrate good preflight and safety checks.
- Applicant must then fly the following minimum flight maneuvers.
 - Take off from left to right direction with left turn to final landing.
 - Take off from right to left direction with right turn to final landing.
 - Perform Loop
 - Perform Roll

Note: The wind direction may prevent landing from one direction.

- If a Buddy Box is being used at any time
 - Demonstrate proper operation of Buddy Box system.
 - Must allow examiner to get plane out of shape (unusual attitude) and applicant must recover aircraft attitude to safe flight.

2. Aerobatic Aircraft

Includes all aerobatic aircraft including electric 3D aircraft

- Applicant must demonstrate good preflight and safety checks.
- Take off from left to right direction with left turn to final landing.
- Take off from right to left direction with right turn to final landing.
- Applicant must then fly the following minimum flight maneuvers:
 - Cuban 8
 - Loop
 - Roll
 - Split S
 - Knife Edge Pass in each direction
 - Stall Turn (Hammer Head)

Note: The wind direction may prevent landing from one direction.

- A show routine may be flown if it includes these maneuvers.

3. Helicopters

This category includes all electric, glow, gas and turbine powered rotary wing aircraft, single rotor, and multi rotor

- Applicant must demonstrate good preflight and safety checks.
- Turbine helicopter applicants must possess a current AMA Turbine Waiver
- Applicants must put the following maneuvers in a sequence and then demonstrate for examiner.
 - Take-off
 - Rectangular flight pattern in both left to right and right to left directions
 - Climbing and descending turns in both directions
 - Horizontal figure 8 in both directions
 - Autorotation
 - Stable, prolonged upright and inverted hover
 - Loops, pirouettes and rolls or
 - A show routine including these maneuvers.

4. Turbine Aircraft

This category is exclusive to turbine powered fixed wing aircraft.

- Applicant must possess a current AMA Turbine Waiver
- Perform the flight skills as listed in the Turbine Qualification Flight Attestation, or
- Perform a normal show routine if that routine includes the required flight waiver skills.

5. High Performance Aircraft

This category also includes warbirds, and pylon racers, novelty/special purpose aircraft, autogyros, ducted fan aircraft, tow aircraft and other aircraft that are large, fast or over 8lbs.

- Applicant must demonstrate good preflight and safety checks. Applicant must then fly the following minimum flight maneuvers.
- Take off from left to right direction with left turn to final landing.
- Take off from right to left direction with right turn to final landing.
- Must also demonstrate and maintain proper control while performing maneuvers appropriate to the aircraft type.

Note: The wind direction may prevent landing from one direction.

Safety Line Violation: If an applicant's aircraft goes behind the established safety line at any time during a flight exam, the result is automatic failure. Except for crossing the safety line, any test can be repeated once. If the applicant fails the test during the 2nd try, the testing shall halt. The pilot should practice for a second FAST TRAC flight test, which cannot be administered within 2 months of the original test.

Safety Guidelines and Guidance for Air Shows

All teams must operate by the following rules when agreeing to contract with a show host. All AMA and ICAS rules supersede the TEAM AMA Safety Guidelines. Any such conflicts shall be immediately brought to the AST Safety Director's attention.

Site Inspection

Each proposed show site must be surveyed prior to the show; it is desirable to survey the location with a frequency monitor to detect any radio interference that might be present. A local club may be asked to perform a frequency check at the airport before the event and before signing the contract. Be sure to ask how far away their club is from the airport and if they would like to assist at the show. Special arrangements can be made for local club members such as VIP parking and entrance passes.

The AMA can provide a listing of the local AMA chartered clubs, and the local hobby shop owner will probably know of any non chartered group flying in the area. If you do find a group of RC fliers within a 3 mile range, they may be willing to suspend operation at their field during the show, especially true if they are invited to attend the show as guests. Be sure to include any guests in your pilots briefing and also explain how the static display and program operates

Show Site Guidelines

1. The sponsor or the show team must arrange for crowd control so that the show will be in compliance with the AMA Safety Code. A 250-foot safety line/barrier must be provided to maintain a separation between the spectators and the RC flying area. ICAS recommends that a 500-foot safety line/barrier be set up for turbine aircraft.
2. No vehicular or personnel traffic of any kind is allowed under the RC flight box during a performance. If the host requires such traffic during the show, special arrangements must be made between the Safety Officer and the air show host or Air Boss. Any such agreement should be a safe plan and preferably in writing on a copy of the AMA insurance form. The Manager/Safety Officer should never agree to any plan that he/she deems unsafe. If an unforeseen encroachment into the flight box occurs during the performance, the Safety Officer must immediately stop the performance until the matter can be resolved. No Air Boss or air show host will ever complain by a stopped performance due to a safety hazard.
3. If the show is at an airport, the airport must be closed to all air traffic during the time of your performance. If this is not possible, there must be a radio operator to alert the show team when to land and give right away to full-scale pilots. It is recommended that the Safety Officer have a NAV Flight radio tuned to the air show frequency to follow air traffic communication. It is also preferred that the Air Boss informs the AST Safety Officer of any outgoing or incoming flights ahead of time.
4. A minimum of 400 by 50 feet of level low grass or asphalt runway area is preferred. The RC flight box area should be 1000 feet cubed minimum to perform a regular show. Any smaller area is a special show which can only be done with certain small aircraft. The 250 foot safety line/barrier still applies. No parked aircraft, static displays, or airport refueling stations, etc. can be within 300 feet of this flight box area on three sides (opposite, left, and right sides of the flight box).
5. The team Manager/Safety Officer should determine if other pyrotechnics or fireworks will be used during the event. If so, consult with the Fire Marshal and manager of the pyrotechnics as the details including placement, remote control frequencies, "live" status.

6. In general, the show site should be at least 5 miles from any active or separately controlled airport and 3 miles from any RC flying site. Active on-sight frequency monitoring should be done to insure that the site is free of interference. An active flying site may be within 3 miles of the RC air show if communication and frequency control has been established with the club in advance of the show. Strict attention must be given to frequency control.
7. The Safety Officer is considered the AST Show Boss. Upon arrival, the Manager/Safety Officer must inspect the site, conduct a frequency scan, and discuss a layout for the show before a final safety commitment can be made. In most cases, an on site inspection can be performed before the show to determine the fitness of the site. A local club member can perform the inspection if the show is too far from the AST headquarters. The Safety Officer should ask the host if the layout has changed for any repeat shows. Although the Safety Officer is considered the Show Boss, he can delegate some responsibilities.
8. At least two members preferably the Manager and the Safety Officer must attend the event pilots briefing. Turbine pilots should also attend the event's pilots briefing if time allows. There should be a short team meeting to review the pilots briefing and any last safety concerns. During the pilots briefing care should be taken to assure the security of team equipment at the static display.
9. AST pilots should be prepared to land immediately and should do so if requested by anyone at the show. Typically such a request will come from the event Air Boss via the Safety Officer; however, the benefit of the doubt should be given if the person making the request is unknown. Please be considerate and polite. The Safety Officer must first understand the situation and receive permission to resume the RC show from the Air Boss.
10. There shall be no alcohol or prescription drug use with "Do Not Operate Machinery" warnings for at least 8 hours before the air show. There shall be no alcohol or tobacco use in the static display during official event hours. All AST members should use common sense and good judgment when representing the AMA at any function and also plan for proper rest if there is a show on the following day.

Static Display Area

A professional static display including a canopy and a mobile flight simulator is required for all teams. This area should be kept neat at all times. All team members must be friendly with spectators; willing to answer questions, offer assistance and advice throughout the event.

Each team must provide trash cans with outdoor plastic liners/bags at their static display. Avoid using the trash cans provided for spectators as much as possible. Secure all containers and make sure no bags leak and re-line the ones that do. Place all trash near an air show trash can before leaving the premises.

- Two fire extinguishers must be available at all times: one in the static display area and one on the flight line during the R/C performance.
- No alcohol or tobacco use is allowed in the static display area
- There should be no cursing in front of spectators
- Please leave your area cleaner than it was before you arrived.

Aircraft Inspection

Each pilot is responsible for the safe maintenance and inspection of the remote control aircraft that he will fly. Every aircraft must be checked and test flown within 30 days of each show. Each aircraft shall be inspected and certified prior to each show and witnessed by the Safety Officer. Both the pilot and Safety Officer shall

sign and date the inspection form. Inspection forms must be retained for the calendar year. The Safety Inspection form can be found in the Appendices and on the Team AMA web site.

Show Operations, Flight Line Safety and Logistics

The Program outline contain much information about show concepts; however, it is important to stress here that flight line safety is of utmost importance and is directly related to the overall safety of the air show. Our prime concern is *safety*.

Teams must strive for a professional presentation that transitions smoothly from one act to the next. To do so, a team member should orchestrate activities in the pits; i.e. there should be a pit boss. The order of acts must be prearranged and the “next” act should have his/her engine running at least two minutes before the previous act lands. Care must be taken when there are engines are running in the pits.

Each pilot *must* have a qualified spotter at all times, including engine start-up. The spotter must advise the pilot of potential dangers such as aircraft location relative to newly emerging and/or potential hazards. In addition, the spotter must be capable of assuming control of the aircraft in an emergency.

The show shall be halted if in the judgment of the Safety Officer an unsafe condition, including weather, exists. The show will not continue the show until the problem has been resolved to the satisfaction of the Safety Officer. Normally there are few issues at full scale air shows; however, good weather is necessary. The show host must understand that the team cannot perform if winds/gusts are too high or if bad weather continues. Any pilot has the option of not performing if he is uncomfortable with the conditions. The show must be revised to accommodate any such changes. “The Show Must Go On” is the attitude; however, *safety* must be the top priority.

Below are requirements for every RC air show:

1. Communication is required between the flight line safety officer and the air boss during the RC air show.
2. A team member or assistant should be designated as the frequency manager to operate any available monitoring equipment; to prevent any potential for interference; and to assure that each transmitter is turned off after each flight. He also checks the frequency with any visiting club members who bring radios to the event.
3. A fire extinguisher must be on the flight line during the show and several trash bags must be available in the unlikely event that an aircraft is damaged. Please be sure to collect all FOD. A rake or yard vac. may be useful for this purpose.
4. Any malfunctioning RC aircraft shall be landed immediately in a clear area pointing away from the spectators. Team pilots should be ready mentally prepared and reminded at each pre-show briefing of the safe area in which to land the plane.
5. As stated in the AMA Safety Code, no rocket powered projectiles may be fired from aircraft except in the case of a rocket powered aircraft that is carried a lot by another aircraft.
6. No parachute or candy drops are allowed.
7. Only essential equipment is allowed on the flight line. All items must be immediately removed after the performance. All tools used on the flight line should replaced in a tool box after use. Any debris on the flight line should be picked up before leaving after their performance.
8. No glass containers, etc. are allowed on the flight line.
9. There will be no cursing in front of spectators.

Pyrotechnics

Only members of TEAM AMA are allowed to use pyrotechnics in model air shows.

Pyrotechnics are an effective and spectacular addition to any show. However extreme caution and care should be used to prevent injury to a show team member or spectators. The following guidelines have been established for the proper use and supervision of such devices.

A designated member of the team should obtain an appropriate ATF permit or license to purchase, manufacture and use pyrotechnic devices. (The permit/license became a federal requirement as of May 24, 2003). The particular permit or license type can be determined by the requirements of the individual AST, in consultation with a local or regional Bureau of Alcohol, Tobacco, Firearms, and Explosives office. It is likely that ATF will recommend a Type 19 Manufacturer of Theatrical Flash Powder License, a Type 33 user of high explosives permit or a Type 34 user of low explosives permit. Pyrodex, a modern smokeless gun powder, can be purchased at most sporting goods stores that sell muzzle loading supplies. This material does not require a license to use. ATF regulations can be found at www.atf.gov. Show teams are advised that ATF permits or licenses do not eliminate the need to clear any pyrotechnic use with local fire authorities. It is the responsibility of Manager and/or Safety Officers to inform the show host and fire marshal in writing of any the special effects.

AMA air show teams shall comply with General Rule 9 of the Official AMA Safety Code with the following exceptions:

- A fire extinguisher *shall be available* on the flight line at all times.
- Solid fuel smoke generators such as the Superior brand smoke writer cartridge are permitted if firmly attached and shielded from the aircraft.
- In addition, in those communities where the use of such devices is not banned or where permission for their use has been obtained, ground-based explosive charges using not more than one quarter pound of black powder (or equivalent) may be used subject to the following restrictions:
 - a. A team member must be licensed by the AFT
 - b. The team must contact local law enforcement and/fire marshal regarding the use of pyrotechnic devices. All applicable State and local laws must be followed.
 - c. Charges must be electrically fired using two switches in series.
 - d. Charges may not be located closer than 50 feet from the flight line.
 - e. Charges must be fired from a "thick wall" rolled *steel* pipe mortar having sufficient inside diameter to allow a loose fit of the charge and designed to direct the blast upward and to prevent the throwing of stones or debris.

Appendix 1a TEAM AMA RC AIRCRAFT INSPECTION FORM

(February, 2009)

Event: _____ **Date:** _____

Team _____ **Name** _____

Aircraft: _____ **Engine:** _____

Owner/Pilot: _____

Address: _____

City: _____ **State:** _____ **Zip:** _____

AIRWORTHINESS REVIEW: The ultimate responsibility for the safety and airworthiness of this aircraft rests solely with the owner and/or pilot. All items listed must be certified by the owner and/or pilot for the aircraft to be airworthy for flight at this event.

GENERAL APPEARANCE - (check for damage, warps, loose covering, etc.)	
PROPELLER - secure (check for cracks, damage)	
ENGINE/MUFFLER - securely attached	
KILL SWITCH – except glow engines. Can I kill the engine with the radio?	
WING - attachments secure, struts and for bipes	
AILERON/FLAP - hinges secure	
AILERON/FLAP - push rods and control link keepers	
ELEVATOR - hinges secure	
ELEVATOR - push rods and control link keepers	
RUDDER – hinges secure	
RUDDER - push rods and control link keepers	
FLYING WIRES - secure	
CANOPY - secure	
HATCHES OR COVERS - secure	
WHEELS AND LANDING GEAR - secure	
BATTERIES FULLY CHARGED	
RANGE TEST PERFORMED	
DO I HAVE PROPER SAFETY EQUIPMENT?	

I certify that, as the Owner/Pilot, I have reviewed the described aircraft and said aircraft meets AMA safety guidelines.

OWNER/PILOT CHECKLIST

CHECKED THIS DAY

√

Owner / Pilot

Date

Safety Officer

AMA Number _____

Appendix 1b TEAM AMA RC HELICOPTER INSPECTION FORM

(February, 2009)

Event: _____ Date: _____

Team Name _____ Team No. _____

Aircraft: _____ Engine: _____

Owner/Pilot: _____

Address: _____

City: _____ State: _____ Zip: _____

AIRWORTHINESS REVIEW: The ultimate responsibility for the safety and airworthiness of this aircraft rests solely with the owner and/or pilot. All items listed must be certified by the owner and/or pilot for the aircraft to be airworthy for flight at this event.

OWNER/PILOT CHECKLIST	CHECKED TO DAY	√
GENERAL APPEARANCE - (check for damage, cracked frames, loose tail boom, cracked canopy, etc.)		
ROTOR BLADES, Main and Tail - check for cracks, delamination damage, Blade bolts adjusted to correct tension?		
ENGINE/MUFFLER or TUNED PIPE, DRIVE LINE - securely attached, centrifugal clutch dragging? Autorotation clutch smooth and disengaging properly? Main shaft bent?		
KILL SWITCH – Can I kill the engine with the radio?		
ROTOR HEAD – attachment bolt secure, check ball links & pushrods for wear/damage		
MAIN BLADE HOLDERS – check radial & thrust bearings are smooth, blade bolt not bent and tightened correctly.		
FLYBAR (if present) – Flybar bent? Flybar paddles tight? Linkage arms tight?		
SWASHPLATE & MIXER ASSEMBLY – Ball links loose or worn? Lube main shaft & uniball. Balls on swash or mixer worn or loose?		
SERVOS - push rods and ball links worn, loose or tight? Bellcrank mount tight and bellcrank pivots correctly? Servo wires not worn & clear of moving parts?		
TAILBOOM – Correctly seated and tightly mounted to frames? Tail fins tight? Boom braces tight?		
TAIL PITCH CHANGE – Servo tight & wires not worn or rubbing? Servo arm, link & pushrod properly connected? Pushrod guides tight & aligned? Tail rotor bellcrank & pushrod properly connected? Bellcrank bolted to tail rotor gearbox?		
Tail Rotor Gearbox – Securely attached to tailboom? Gearbox contain grease? Bearings smooth? Torque Tube/Drive Wire connection secure or drive belt tensioned properly? Pitch change mechanism smooth & tight? Lube output shaft & pitch change unit. Tail rotor blade holders secure, not cracked? Check radial & thrust bearings for roughness or freeplay (wobble). Check tail blade mounting bolts.		
RADIO EQUIPMENT – Receiver & Gyro Control Box (if present) securely mounted? Gyro sensor properly mounted with vibration dampening double sided tape? Batteries securely attached? All connectors fully seated & restrained from fouling moving parts?		
CANOPY – Securely attached		
LANDING STRUTS & SKIDS or WHEELS – Struts securely mounted to frame? Struts and Skids not cracked, damaged, or worn through (some wear on skids is normal)		
BATTERIES FULLY CHARGED		
RANGE TEST PERFORMED		
DO I HAVE PROPER SAFETY EQUIPMENT?		

I certify that, as the Owner/Pilot, I have reviewed the described aircraft and said aircraft meets AMA safety guidelines.

Owner / Pilot _____ Date _____

Safety Officer _____

AMA Number _____

Appendix 1C
PRE-SHOW SITE INSPECTION
ACADEMY OF MODEL AERONAUTICS
TEAM AMA AIRSHOWS PROGRAM

Team name:

Date:

Show sponsor:

Show date(s) and time(s)

Contact Information:

Will additional insured certificate(s) be needed? (Recommended for all events.)

LOCATION

Are there other RC Clubs within 3miles? IF so what arrangements have been made to address potential frequency conflicts?
(Note: Irrelevant if all are pilots using 2.4 GHZ systems.)

Are all failsafe features programmed in show pilot radios?

Scan area for potential RFI

Runway surface and condition:

Prevailing wind direction:

Are there obstructions such as buildings, power lines, roads, full-scale aircraft, cars or other obstacles in the area?

Where are the no-fly zones? (Never fly over buildings, cars, aircraft or people)

Where is there a safe "ditch" area in case of emergency? (Never attempt to land a malfunctioning aircraft near the crowd.)

What are the arrangements for crowd control and spectator safety? Will safety barriers be present?

Is electricity available?

Sketch of the flying area with major features of the site:

Appendix 2
International Council of Air Shows
Remote Control Aircraft Operations Best Practices

1. Overview of operations of Remote Control (RC) Aircraft at aviation events

2. Disclaimer:

ICAS Best Practices are developed to establish a baseline from which air show operations should be conducted. They are presented here as a written summary of conventional wisdom and common practices among experienced professionals within the air show community. They are not intended to be the sole source of guidance for these operations nor do they supplant the training, instruction, mentoring, licensing or certification, as appropriate, for the operation being conducted. ICAS strongly recommends that they be used as one part of a multi-faceted training, education and operations program.

3. Terms and Definitions:

- 3.1. RC Aircraft: A model aircraft capable of navigating the airspace and flown by hobbyists within visual line of sight under direct control from the pilot using radio signals for the remote control of a model aircraft.
- 3.2. TEAM AMA: AMA sanctioned RC air show teams that are experienced with full scale aviation events.
- 3.3. Safety Officer: A member of the model group who is responsible for safe operations of the RC air show.
- 3.4. Spotter: A member of the model group who assists the pilot during his flight by continually apprising the pilot of the position of his aircraft and the surrounding conditions.
- 3.5. RC Flight line: The area from which RC flight operations, including take offs and landings are conducted

4. Requirements

4.1. Regulatory Requirements

- 4.1.1. Academy of Model Aeronautics (AMA): ICAS recognizes the Academy of Model Aeronautics (5161 East Memorial Drive, Muncie, Indiana 47302, Phone: 1-800-435-9262, Website: www.modelaircraft.org) as the sanctioning body for the radio-controlled model aircraft community and refers all technical or licensing questions to them.
- 4.1.2. All operators of R/C aircraft at air shows shall operate within relevant portions of the current Academy of Model Aeronautics (AMA) Safety Code, AMA Safety Regulations For Model Aircraft Powered By Gas Turbines, and/or the AMA Experimental Radio Control Aircraft Program Requirements.

4.2 Training Requirements

- 4.2.1 ICAS recommends that RC pilots have passed a flight certification test in specific aircraft types to be flown such as the Team AMA FAST-TRAC certification process.

5. Currency/Recency/Experience

- 5.1. All pilots should have demonstrated experience in performing at large events such as major contests, multiple participant events or other events where significant numbers of spectators are present.
- 5.2. All pilots should maintain a record of flight certification in type and be recertified every three (3) years. Team AMA FAST-TRAC cards are good for a three (3) year period.
- 5.3. Turbine powered aircraft: All pilots operating turbine powered aircraft shall maintain current AMA turbine waivers.

6. Documentation

- 6.1. All pilots shall produce evidence of experience and/or flight certification on request.
- 6.2. Pilots operating turbine powered aircraft shall produce evidence of turbine waivers on request.

7. RC Flight line Operations

- 7.1. RC pilots shall not use alcohol or prescription drugs that have “Do Not Operate Machinery” warnings for at least 8 hours before the air show.
- 7.2. Communications with Air Boss: Two-way communications shall be maintained between the event air boss and the RC air boss throughout the R/C demonstration.
- 7.3. No vehicle or personnel traffic of any kind is allowed under the RC flight box during a performance. If the host requires such traffic during the show, special arrangements must be made between the Safety Officer and the air show host and/or Air Boss. Any such agreement should be well conceived and preferably in writing. Manager/Safety Officer should never agree to any plan that he/she deems unsafe. If an unforeseen encroachment into the flight box occurs during the performance, the Safety Officer must immediately stop the performance until the matter can be resolved.
- 7.4. Spotter: Each pilot *must* have a qualified spotter at all times, including engine start-up. The spotter must advise the pilot of potential dangers such as aircraft location relative to newly emerging and/or potential hazards. In addition, the spotter must be capable of assuming control of the aircraft in an emergency.
- 7.5. RC aircraft shall give right of way to full-scale aircraft. RC pilots must be prepared to land immediately if requested by anyone associated with the show. Typically such a request will come from the event Air Boss; however, the benefit of the doubt should be given if the person making the request is unknown.
- 7.6. All propeller driven aircraft shall be started with the tail of the aircraft pointed toward the crowd.
- 7.7. Turbine powered aircraft shall be started in areas with a sufficient safety buffer and pointing such that the exhaust is not pointing toward the crowd.
- 7.8. Any testing of smoke systems must be done such that smoke is not directed at the crowd.
- 7.9. All take-offs, landings and flight maneuvers such as “high performance turns that direct the energy of the aircraft toward the crowd are prohibited.
- 7.10. At no time shall any RC aircraft be operated behind the safety line or over spectators, vehicles or buildings.
- 7.11. Actions such as touching the tail of an aircraft on the ground or touching any part of an aircraft while in flight are prohibited.
- 7.12. Dropping of candy or parachutes is prohibited.
- 7.13. Any malfunctioning RC aircraft shall be landed immediately in a clear area pointing away from the spectators. Pilots should be prepared and reminded at each pre-show briefing of the safe area in which to land the plane.
- 7.14. Only personnel directly involved in the model air show shall be permitted on the RC flight line.
- 7.15. At least one fire extinguisher shall be available on the RC flight line during the RC demonstration.
- 7.16. Only essential support equipment is allowed on the RC flight line and must be immediately removed after the performance. Any tools used on the RC flight line should be replaced in a tool box after use. Several trash bags should be available to collect and any debris after the performance.
- 7.17. Smoking is prohibited on the RC flight line.

8. Professional Pyrotechnics Displays

- 8.1. If a professional pyrotechnics display is planned the RC safety officer shall coordinate with the pyrotechnicians(s) relative to any concerns on use of radio frequencies.
- 8.2. If the display is located within the RC aerobatic box, the RC safety officer and the operators of all RC aircraft shall be advised to avoid the “hot” area and to not fly near or over any personnel

working in the area.

- 8.3. In the event that an RC aircraft lands in the hot area, the pilot must be accompanied by a member of the pyrotechnics team.

9. Pyrotechnics as part of the RC demonstration

Pyrotechnics are an effective and spectacular addition to any show. However extreme caution and care should be used to prevent injury to modelers or spectators. The following guidelines have been established for the proper use and supervision of such devices.

- 9.1. Only Team AMA members are permitted to use pyrotechnic devices under the AMA Safety Code. Team members are referred to the guidance in the Team AMA Safety Program.
- 9.2. Additional guidance can be obtained from the ICAS Pyrotechnics Best Practices document.

10. Exceptions/Waivers

- 10.1. What may be waived - None
- 10.2. Reasons for Exceptions/Waivers – N/A
- 10.3. Procedures for requesting a Exception/Waiver – N/A
- 10.4. Reviewing/Recommending entity – N/A
- 10.5. Approval authority – N/A
- 10.6. Issuing entity – N/A

11. Insurance

- 11.1. RC pilots shall provide evidence of personal liability insurance in the amount of at least \$1,000,000¹ US and meet the following conditions:
 - 11.1.1. Any exclusion for aircraft must be modified to include RC aircraft
 - 11.1.2. Coverage cannot exclude models that weigh less than 55 pounds with fuel
 - 11.1.3. Coverage territory must include the United States of America (including its territories and possessions) and Puerto Rico
 - 11.1.4. AMA members may satisfy this requirement through insurance provided through membership in the Academy of Model Aeronautics.
- 11.2. Participants must provide a Certificate of Insurance for each air show event and include the following:
 - 11.2.1. Name show sponsor(s), show site owner(s) (if different), and any other entities as required by the show contract as an Additional Insured.
 - 11.2.2. Coverage is to be provided on a Primary / Noncontributory basis
 - 11.2.3. Coverage is to include a Waiver of Subrogation in favor of all Additional Insureds as required above in section 11.2.1.

12. Equipment

- 12.1. All radio equipment shall be FCC approved narrow band 72 MHz, Ham narrow band or 2.4 GHz spectrum band systems. Radios using other frequencies are not permitted by the FCC.
- 12.2. All radios should have the fail safe function enabled and set to the following conditions:
 - 12.2.1. Throttle closed or idle cut off
 - 12.2.2. Flaps down (if applicable)
 - 12.2.3. Speed brakes deployed (if applicable)
 - 12.2.4. The remaining controls should be in the last position held
- 12.3. Aircraft Inspection: Each model must be checked and test flown within 30 days before each show. Each model shall be checked and certified prior to each show and the pilot shall sign a flight safety declaration of aircraft inspection form. Under no circumstance may an untested aircraft be flown in an air show.

¹ AMA members have \$2,500,000 in liability coverage as part of annual membership.

- 12.4. Range Check: Each day all aircraft shall have completed a successful range check before flight.
- 12.5. Frequency Scanner: A scanner capable of discerning the 72 MHz and Ham bands shall be in use during the model air show.
- 12.6. Fire Extinguisher: At least one fire extinguisher shall be available on the flight line and in the static display area at all times.
- 12.7. Trash receptacles shall be present in the static display area.

13. Location

- 13.1. In general, the show site should be at least 3 miles from any RC flying site. Active on-sight frequency monitoring should be done to insure that the site is free of interference. An active RC flying site may be within 3 miles of the RC air show if communication and frequency control has been established with the club in advance of the show. Strict attention must be given to frequency control.
- 13.2. Ideally the RC air show would occur at “show center” or other suitable location to allow maximum spectator enjoyment.
- 13.3. Crowd Control: The sponsor or the RC group must arrange for crowd control so that the show will be in compliance with the AMA Safety Code. A 100 foot safety line/ or barrier must be provided to maintain a separation between the spectators and the RC runway. The flight box must be at least 250 ft from the safety barrier.
- 13.4. Runway and Aerobatic Box: A minimum of 500 by 50 feet of level low grass or asphalt runway area is preferred. The RC flight box area should be 1000 feet cubed minimum to perform a regular show. A smaller area can only be used with certain small aircraft.
- 13.5. No parked aircraft, static displays, or airport refueling stations, etc. should be within 300 feet of this flight box area on three sides (opposite, left, and right sides of the flight box).

14. Personnel

- 14.1. Manager or Coordinator
- 14.2. Safety Officer/Model Air show Airboss
- 14.3. RC Pilots
- 14.4. Spotters
- 14.5. Ground Support Crew

15. Weather Requirements

- 15.1. Model aircraft can fly under most weather condition except high winds and steady rain. Decisions as to the acceptability of weather conditions are at the discretion of the team manager or safety officer.

16. Emergencies/Contingencies

- 16.1. The show shall be halted if in the judgment of the Manager or RC Safety Officer an unsafe condition, including weather, exists. The show can not continue until the problem has been resolved to the satisfaction of the Safety Officer.

17. Briefings

- 17.1. All pilots in the model air show shall attend all safety briefings.
- 17.2. The manger and safety officer should review all safety considerations with all team members prior to each show. This briefing must include a discussion of the need to direct any malfunctioning aircraft away for the crowd and all aircraft.

18. Links to useful documents

- 18.1. [AMA Safety Code](#)
- 18.2. [TEAM AMA Safety Program](#)

- 18.3. [AMA Safety Regulations For Model Aircraft Powered By Gas Turbines](#)
- 18.4. [AMA Experimental Radio Control Aircraft Program Requirements](#)
- 18.5. Briefing Outline N/A

Appendix 3: Safety Officer Air Show Notes and Lessons Learned

Note: All AST's are required to have at least one Safety Officer on the team and at each show. It is preferred to have two or three reliable Safety Officers. The Pilot and Safety Officer are responsible for the Pre-Flight Check. Make sure the Safety Officer is a witness and checks off the following.

These rules are crucial in setting your team apart from a regular R/C pilot performing in front of crowds. Study these rules and know what to do in case of an emergency without any hesitation.

- Show the Safety Officer your FAST TRAC card, AMA card, and Jet Waiver (if applicable) at each show (we're suppose to have them on us). The manager should give the Safety Officer a copy of the Event's AMA additional insured certificate. This certificate is required for all events.
- The Safety Officer needs to ask the local Clubs and the team's Membership Manager if the nearest local club is at least 5 miles away from the airport. A special arrangement needs to be made if the nearest club field is less than 5 miles away. A local club should be 3 to 5 miles away from the air show event.
- Verify that the safety officer checks your channel on the frequency analyzer both during the safety checks and during the show.
- Make sure the Safety Officer has control of the other radios/frequencies if another RC club is present at the show. It's best to ask them to leave the radios at home, have them pull the crystals, or put the radios safely away in the off position.
- Make sure the Simulator Trailer radio does not have a crystal.
- The Safety Officer should always have a list of the team (and other clubs present) frequencies and make sure there are no duplicates. Store the frequencies the pilots normally use on the safety list, have duplicates watch each other, have them check the frequency on the analyzer, and make sure all radios being used in the show are checked. Do not bring out another radio after the checks without going through the Safety Officer. If you see someone handling a radio, report it to the Safety Officer.
- All aircraft over 25 pounds requires a two receiver system.
- Check hinges (Wings, Elevators, and Rudder).
- Check all battery level(s) with load. Document.
- Check all clevises, servo screws, and push rods.
- Canopy on correct.
- Wheels secure.
- Receiver, batteries, and fuel tank secure.
- Fuel tank half full. (Don't want a full tank if throttle gets stuck).
- Engine and prop secure.
- Obtain clearance from Ground Safety Officer before starting engine.
- Start your engine facing away from the crowd. Make sure no one is in line with the prop.
- Engine check. With the engine running perform the following:
 1. Verify that your channel is clear on the analyzer during the engine check and during the show.
 2. Check for correct control surface movement and direction.
 3. Do a range check with engine running if there were any prior changes. A test flight should be done before the next show in the event of any aircraft changes. The Safety Officer should ask if there were any changes since the last show.
- Know your spotter and where you are on the line up before show start.
- Set up the flight line neatly and professionally. Do not have tool boxes, equipment, etc. sitting all over the place. Keep all tools in the tool box when not in use. Remove all tools and equipment from the flight line back to your area once your show is over. Insure that nothing is left on the taxi way or run way.
- The Safety Officer must get clearance from the Air Boss or Team Communicator via the Air Boss before starting the show.
- Obtain clearance from Ground Safety Officer before starting engine.

- Start engine(s) before next act lands. Dead time is bad even if it is 5 seconds.
- Extend your antenna (if applicable).
- Get clearance for take offs and landings from spotter and Ground Safety Officer. Make sure Safety officer is in contact with the Air Boss and that he gives us the initial clearance.
- Take off, land, and fly in front of you and 250 feet (minimum) in front of crowd line. Jets are required to be 500 feet in front of crowd line during the performance.
- Have spotter watch for other airborne planes and ahead of you (opposite your aircraft). Make sure he is not watching your show.
- If anyone from the event show comes to you with issues, do what he ask immediately... .without question. Report to the Safety Officer what happened and investigate before resuming the show. Do not leave flight line until instructed or told that the RC show is over.
- Make sure you have a clear path for take off and landing. Check take off and landing strip for hazards before show. Know where to land/go in an emergency. Have a place for a hold pattern if landing is not permitted.
- Know wind direction, take off, and landing procedures for each show/airport setup.
- Do not fly over your head, the crowd, other static aircraft, or toward the crowd. You can only turn toward the crowd line side at the ends of the crowd at show left and show right.
- Land your aircraft immediately if the Safety Officer asks you too or if you experience a radio hit. Let the Safety Officer know that you received a hit.
- If the radio hits are severe, point the aircraft away from the crowd when possible. You can try and land the aircraft, but only pointing away from you and the crowd.
- Do not taxi your aircraft back pointing toward the crowd.
- After flight, shut off the engine and all batteries.
- Be ready for show substitutions by checking batteries and fuel.
- Make sure the line up includes a substitution request routine before or after your part of the show. Go over the line up with the pilots before the show and any substitution routines.
- Our team requires AMA air show insurance and that you follow FAST TRAC, AMA, and ICAS rules. The Safety Officer should know them better than anyone.
- Do not lay any fuel cans near anything dangerous (i.e. wiring such as sound system, extension cords, etc., generator, exhaust).
- Be professional at all times and think! Watch your language and appearance. No two day old beards. Uniform shirts should be worn at all times and stay tucked in (You never know when the media is taking pictures or video). Do not use tobacco products on the ramp, flight line, or in front of the spectators. We represent AMA when in uniform or when someone knows you are an AMA Air Show Team member. Keep tools and aircraft lined up neatly on the flight line, drink plenty of fluids, and do not leave anything on the taxiway or runway after the show.

The Safety Officer may delegate any of these job tasks. Each pilot is ultimately responsible for his/her own aircraft. The Safety Officer is responsible for overseeing that the above rules are met. The Safety Officer's job is so important that everyone needs to respect and help support the position. Substitute (2nd or 3rd) Safety Officers need to be trained before and during shows. It's too important a job just to say you're the Safety Officer today.

Appendix 4: FAST TRAC Example Written Test

1. Who is responsible for the Pre-Flight Check?
 - a. The Pilot.
 - b. The Safety Officer.
 - c. The Pilot and Safety Officer.

2. How far away from the air show must a local club field be?
 - a. From 1 to 3 miles.
 - b. From 3 to 5 miles.
 - c. From 5 to 7 miles.

3. What must be done during the safety checks after a radio, receiver, servos, any electronics have been worked on or changed, etc
 - a. Tell the Safety Officer.
 - b. Test-fly the aircraft before the show.
 - c. Test-Fly before the show and do a distance check with the engine running.

4. What should your spotter be watching for?
 - a. Your aircraft and make sure nothing gets close.
 - b. Other aircraft and ahead of your aircraft. c. Your aircraft and Safety Officer for instructions.

5. What should you do if anyone from the show comes to you and asks you to land?
 - a. Land immediately and do not resume show until the Safety Officer says it's okay.
 - b. Land as soon as you can and find out what is going on.
 - c. Have the person get behind you where it is safe and ask him to talk to your Safety Officer.

6. Who should you get clearance with before starting your show?
 - a. Safety Officer and Air Show Boss.
 - b. Safety Officer and Spotter.
 - c. Safety Officer and Manager.

7. How far in front of the crowd line must you fly your aircraft if it is a gas powered prop plane that is over 25 pounds?
 - a. 150 Feet.
 - b. 250 Feet.
 - c. 500 Feet.

8. How should you not fly?
 - a. Outside of your 1000 foot cube performance area.
 - b. Touching the rudder or any part of the aircraft. c. Near any static displays or toward the crowd.

9. What should you do if you experience a radio hit?
 - a. Land it as soon as you have control.
 - b. Land it as soon as you can and as far away from the crowd as you safely as you can. c. Land it immediately pointing the aircraft away from the crowd if and when you have control of the aircraft.

10. What should you do with your tools during the show?

- a. Bring only the tools you need.
 - b. Tools must be in a tool box (not loose) and lined up neatly.
 - c. Lined up neatly and search grounds, not to leave anything on the taxi-way or run-way after the show.
11. What aircraft requires two receivers?
- a. Any aircraft over 25 pounds.
 - b. All big aircraft and jets.
 - c. All aircraft over 25 pounds and all jets.
12. Is a fail safe radio required?
- a. Yes.
 - b. No.
 - c. Yes, starting in 2009.
13. What mode must a fail safe radio be in?
- a. Last position.
 - b. Default mode.
 - c. Last position except throttle down.
14. What type of Frequency Analyzer should we use during the show?
- a. Any good Analyzer that covers our frequency.
 - b. Hobby Analyzer from Horizon Hobby.
 - c. Hobby Analyzer designed for our Hobby.
15. What should we think about when talking to the media?
- a. Promote the hobby by telling how fun it is.
 - b. Promote the hobby by explaining how easy, safe, and inexpensive it can be.
 - c. Promote your sponsors. Never forget to mention them by name while promoting the hobby at the same time.