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# FAA SAFETY BRIEFING

## *All About* **AIR SHOWS!**



**Federal Aviation  
Administration**

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# THERE'S NO BUSINESS



## *A Behind-The-Curtain Look at Air Show Safety*

*By Tom Hoffmann*

A view of the air show control point at AirVenture 2021. This unique vantage point allows the air boss, the FAA, and event staff to observe and safely manage the event.

Who doesn't love the sights, sounds, and even smells of a good air show? A staple in this nation's culture for over 110 years, air shows have become as American as apple pie, pick-up trucks, and venti vanilla lattes. It doesn't matter if you're two or 92; airshows have a certain magical appeal to all walks of life. Even those who have never flown or been to an airport come away with a new appreciation for the wonder of flight and the vitality of aviation.

While you're busy marveling at all of the jaw-dropping performances at an air show, it's easy to overlook all the hard work and planning that goes on behind the curtain to keep these events amazingly entertaining yet extremely safe. With so many Mach-1 moving parts and pieces, it's a tall order to strike that balance. The FAA has a large role in that duty, but it's by no means a solo act. The FAA works alongside dozens of different individuals, organizations, and agencies and relies upon detailed policy and guidance materials to orchestrate a safe air show. Let's take a peek behind the "showline" to see what goes into ensuring the safety and success of these events.

### **The Leading Role**

Although air shows in the United States come in all shapes and sizes — none as large or complex as EAA's AirVenture in Oshkosh, Wisc. — safety guidelines are consistently applied and scaled appropriately for every event. The FAA's Flight Standards Service is tasked with regulatory oversight and enforcement during these and other aviation events, a responsibility it takes very seriously.

This work is carried out at the local Flight Standards District Office (FSDO) level, where a qualified safety inspector is chosen to be the Inspector in Charge (IIC)



FAA ASI and AirVenture 2021 Inspector-In-Charge Joe Saunders meeting with air show performers after a daily briefing.

for the event. The IIC is the FAA focal point for the event sponsor and performers and will liaise with other parts of the FAA as needed. Depending on the size of the event, an IIC may lead a team of inspectors to assist with compliance and surveillance duties. Within Flight Standards, there is also a team of Aviation Event Specialists assigned to each FSDO to assist the IIC with any policy concerns for a certain event. Other areas of FAA involvement during an air show may include the Air Traffic Organization, Airports, Commercial Space, and the UAS Integration Office.

### **Preshow Prep**

The multi-part process for getting an air show approved starts with a Certificate of Waiver or Authorization (CoW). If approved, it is issued to the event sponsor to allow participants to perform certain activities or maneuvers outside of the normal part 91 requirements but under conditions

# LIKE AIR SHOW BUSINESS!



that ensure an acceptable level of safety. A good example of a commonly waived regulation at an air show would be allowing performers to “zero-out” their altimeters when on the ground to more easily gauge altitude during aerobatic maneuvers (14 CFR section 91.121). Other regulations commonly waived pertain to airspeeds, minimum safe altitudes, and aerobatic flight at less than 1,500 feet above the surface. The waivers required depend on the types of operations that will be conducted at the show.

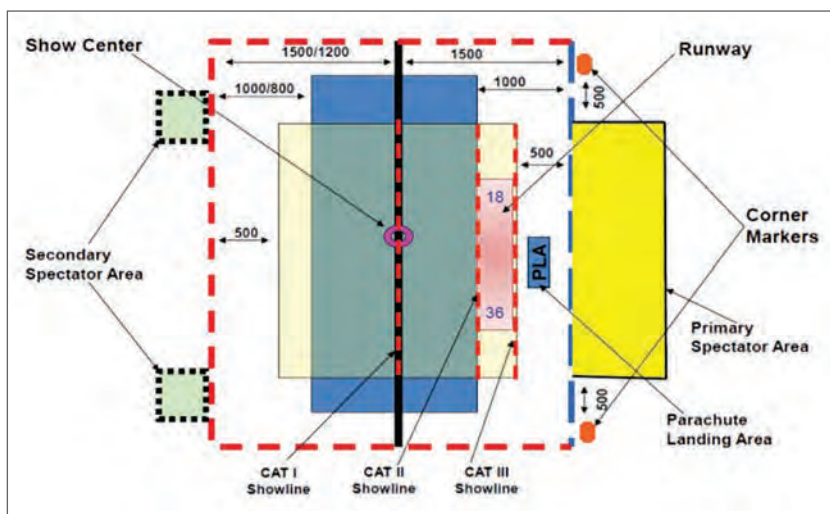
The CoW process is accomplished via two forms, FAA Form 7711-1 and 7711-2. The latter is what an air show sponsor or organizer uses to apply for the CoW. The former is the actual certificate issued by the FAA with any special provisions the agency determines necessary to carry out the event safely. In addition to capturing the event details (date, location, regulations waived, the scope of planned operations, etc.), the CoW process also allows the IIC and the event sponsor to thoroughly evaluate risks and hash out any necessary mitigations. For example, as part of their review, an IIC will want to see if the event has sufficient fire-fighting and rescue capabilities or if the waived maneuvers can be performed safely. More on that later.

One side note on getting a CoW issued: if the air show is held at an airport certificated under part 139, the FAA’s regional airports division must first review and approve a ground operations plan. The plan must address the part 139-related requirements impacted by the airshow and be approved by an airport safety certification inspector. Among the key areas of consideration for the

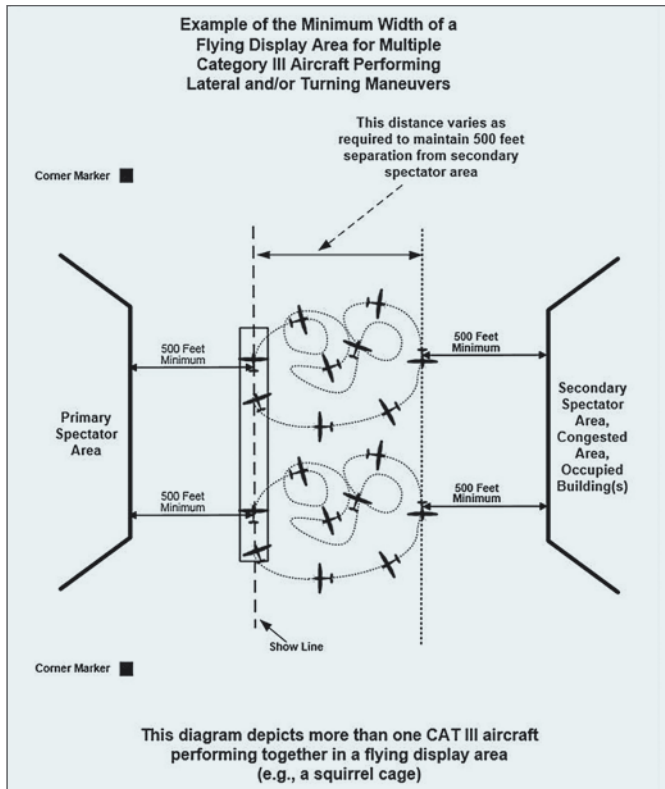
ground operations plan are runway and taxiway closures, the impact on nav aids, and safety precautions for any pyrotechnic devices. It’s also not uncommon to see an airport district office lend their expertise during the planning stages at some larger or complex air shows located at a non-part 139 airport. For more details and resources on coordinating a ground operations plan for an air show, see [faa.gov/airports/airport\\_safety/airshows](http://faa.gov/airports/airport_safety/airshows).

## Drawing the Line, Literally

With a new air show or an IIC unfamiliar with the location, an onsite visit with the event sponsor is necessary to get a first-hand look at the grounds and validate certain aspects of the operations plan. Armed with a laser measuring device, the IIC will verify the location and distances



Air show fly zones relative to airspace, including the CAT I, II, and III showlines.



Example of flying display area for multiple CAT III aircraft.

of the showline, crowd line, and race course if applicable. For example, the IIC will check if the minimum horizontal distance required by policy exists between the showline and spectators. This depends on the type and speed of the aircraft used. The minimum distance ranges from 500 feet for category three aircraft (less than 156 knots) to 1,500 feet for category one aircraft (more than 245 knots). An event waiver will not be considered if these distances cannot be met. Note that a category one or two aircraft may still use the 500-foot showline distance provided they fly non-aerobically and parallel to the spectator areas.

The IIC will also visit secondary spectator areas, which could be outside the airport, and decide if any type of crowd control or road closures are needed to protect the public. The same may apply to homes or buildings under the aerobatic maneuver area (aerobatic box). In some cases, it may be necessary to close or evacuate these areas during the performance. This is all part of the security plan discussed next.

### There's A Plan for That

An important element of air show planning (and CoW approval) involves reviewing emergency preparedness and security at the event. The event organizer must present to the FAA an Emergency Response Plan (ERP) that establishes procedures (who does what and how) for any emergency that could affect performers, essential personnel, and spectators. The ERP must be risk-based, scaled to

the scope and complexity of the event, and coordinated with local emergency response officials. The Incident Action Plan (IAP) that outlines the tactical deployment of resources for specific incidents is a required companion document to the ERP.

There is also a required Security Plan that shows how areas outside the designated spectator area(s), especially under the aerobatic box, are secure and, if needed, kept clear of non-participants. The Security Plan will need to account for how this is accomplished. It requires diagrams, descriptions, and sufficient staffing to ensure the plan's integrity and ability to handle a breach effectively.

As the waiver approval process requires, these plans are all put to the test prior to the event via scenario-based tabletop exercises and an on-site emergency drill. "The practice drills are important to ensure that the emergency response — equipment and personnel — can rapidly react and reach a downed aircraft anywhere in the sterile aerobatic box," says FAA aviation safety inspector and former AirVenture IIC Joe Saunders. "They also help identify if equipment has to be moved or if more equipment is needed in order to respond." He adds that additional response resources could include boats, ATVs, fire trucks, and possibly helicopters. It goes without saying that effective and well-executed emergency plans can go a long way to improving safety for performers and spectators alike.

## Effective and well-executed emergency plans can go a long way to improving air show safety for performers and spectators alike.

### There's a Tool for That

Luckily for Joe and other IICs out there, the FAA has developed some excellent tools to assist both the IICs and the event organizers with emergency planning and other critical risk assessment processes. Of note is AvERT, the Aviation Event Risk Tool, which is listed on the FAA's National Aviation Events Program page at [faa.gov/about/initiatives/airshow](http://faa.gov/about/initiatives/airshow). AvERT reflects the concepts of safety risk management and provides a structured approach toward identifying site-specific hazards and addressing the risks they pose at an airshow event. It covers everything from bird strikes to hail storms to a rocket launch mishap and provides an effective way to assess risk acceptability and develop management strategies.

The CoW process for an aviation event is also laid out in exceptional detail in FAA Order 8900.1, Volume 3, Chapter 6 ([bit.ly/8900V3C6](http://bit.ly/8900V3C6)), complete with flowcharts, checklists, diagrams, and sample forms. It's a great resource for both the IIC and the event organizers to ensure everything is covered. The order outlines many of the additional efforts

required for an IIC not yet mentioned, like verifying the event NOTAM and coordinating the use of controlled airspace with the local ATC facility. This establishes the procedures for transitioning the airspace from ATC to the air boss during the air show. The air boss, besides having the coolest title in aviation, is delegated authority to control air show operations. You can find more about air traffic's role in air shows by reading the article "Thinking Outside and Inside the Box" in this issue.

### The Magnificent Men and Women and Their Flying Machines

What's an air show without pilots performing acts of derring-do in their majestic, spectacular, and sometimes outlandish aerial steeds? Probably one you'll want to skip! To help put the "show" in air show requires due diligence on the part of the performers, the organizers, and the FAA.

Before each air show, the IIC, with help from other ASIs, will perform a check of each performer and aircraft scheduled to participate. They'll verify the validity of airman certificates and necessary type ratings, medical certificates, formation flying cards, and/or statements of aerobatic competency (if required). Inspectors also review the participating aircraft's paperwork (e.g., registration, airworthiness certificate, operating limitations, weight and balance, last condition/annual inspection). As part of the security plan, performers must also demonstrate and document emergency extraction procedures for their aircraft. This step is to alert emergency personnel of any special requirements like an ejection system or any onboard hazardous materials.



Photo by Brian O'Brien

Aerobatic pilot Vicky Benzing greets her fans after an air show performance.

For aerobatic and air race pilot Vicky Benzing, preparation for an air show begins months in advance. This includes assembling a special binder with all her required pilot credentials and documents verifying that her aircraft is safe and legal. An airshow performer is also required to practice their performance within 45 days of the airshow. "That is not usually an issue for me," explains Vicky, "since I practice regularly and will have practiced the week of an upcoming show." In fact, Vicky practices her routine so often that she rarely has to

think much about the mechanics of her flying. "That frees me up to focus on monitoring airspeeds, critical altitude gates, and maintaining my position in the aerobatic box."

Beyond keeping her airplane and her flying skills in the best condition, Vicky also works hard to keep herself in top shape too. "I try to be in the best health possible," she says. "I lift weights regularly to help my g-tolerance and make sure I'm well hydrated and get plenty of sleep before a show."

### It's Show Time

If the IIC finds all parts of the waiver application process satisfactory, the air show is a go! But the work doesn't stop there. The FAA will continue to work with the organizer as needed and provide onsite surveillance of the event. That includes conducting any necessary ramp checks of performance aircraft and attending various meetings and briefings, none more important than the daily performer briefing. "The daily briefings are vital to ensure everyone involved in the airshow understands their role and the terms of the CoW," says Joe. "It is the place to de-conflict and resolve any confusion."

During the air show, the IIC will usually monitor the performances from what's called the control point, a designated area where the air boss directs operations. That's followed by a debrief with the FSDO and responsible parties to review what went well and what areas need improvement. "To be an effective IIC at any air show, it is vital to know the guidance, be agile to the events happening around you, and exhibit professionalism," says Joe. He recalls his time as an IIC for AirVenture as an honor and a privilege. "I was humbled and awed by everyone's willingness to pull in the same direction to have a safe outcome. It is truly a collaborative effort."

Vicky couldn't agree more, adding that the inspectors chosen to work the air shows are some of the FAA's most friendly and helpful people. "We are all in this together to make the air shows safe and entertaining."

Going forward, the FAA recognizes the air show and aviation event industry is evolving rapidly with a constant stream of innovative technologies. To match that innovation, the FAA continues to develop new processes and procedures to ensure safety remains consistent at any event. "Safety is a continuous improvement," says Joe, "and it's constantly evolving as new risks are identified." That's a wrap! ▶

#### LEARN MORE

Air Show Calendar  
[airshows.aero/Page/AirShowsCalendar](https://airshows.aero/Page/AirShowsCalendar)

FAA National Aviation Event page  
[faa.gov/about/initiatives/airshow](https://faa.gov/about/initiatives/airshow)

# Thinking Outside and Inside the Box

*How Coordination and Teamwork are  
Critical to the Flow of an Air Show*

*By James Williams*



A Mobile Operating and Communications Workstation (MOOCOW) is a mobile tower setup that allows controllers to get closer to the action at AirVenture.

Air shows were a staple of my childhood. Our local U.S. Air Force base would put on its open house complete with a major air show every May. It was an air show all-star game, with many of the most renowned civilian performers and demonstrations of all the latest military aircraft capped off with a stunning display by either the U.S. Air Force Thunderbirds or U.S. Navy Blue Angels.

The scale of the event was because the base (Joint Base Andrews), home of Air Force One, is located beside the national capital. But as I grew up, I visited other air shows and eventually made it to Sun 'n Fun as a volunteer and pilot. Later, I joined the FAA and began attending these events professionally. From this angle, you can see that these gatherings are not just an incredible show, but an impressive fete of logistics, teamwork, and careful risk mitigation.

## Getting into the Box

Not all air shows are the same, but fly-in conventions like Sun 'n Fun and AirVenture have added marquee acts like

the aforementioned U.S. military display teams to attract a broader audience. These large fly-ins have a significant challenge: how do you get thousands of GA aircraft into an airport that may only handle a dozen or so at a time in everyday operations?

**At aviation events, teamwork is critical to allow for a safe, fun experience for everyone involved.**

It starts with teamwork. “The greatest challenge is the logistics required to ensure all the necessary coordination has taken place between all parties involved,” explains Jay McKinty, an Air Traffic Controller joining the team headed to AirVenture this summer. During this year’s Sun 'n Fun, the FAA temporarily assigned 62 controllers from more than 39 different facilities. This additional workforce allows for not just controllers in the tower as usual but also controllers staged near the active runways and in outposts along the



Remotely positioned air traffic controllers help guide the flow of aircraft into the show.



approaches to help sequence the additional traffic. This tactic is used at events like AirVenture and Sun 'n Fun, where they take advantage of NOTAMs for special arrival procedures.

For Sun 'n Fun, a fire tower located several miles north-east of the field gives controllers excellent visibility of the approaches. But in most cases, no such happy coincidences of geography exist, and the remote locations don't enjoy such an advantageous perch. It requires a lot of coordination and communication.

Aiding in that effort is an additional set of FAA employees required to provide the proper support to controllers both on the field and in remote locations. The Air Traffic Organization's (ATO) Technical Operations (Tech Ops) group is tasked with ensuring all the proper equipment is in place and working properly to handle the massive increase in traffic. This includes everything from radios to lighted signage and even generator capacity to support all those systems where power isn't readily available. The technicians' focus then turns to keeping all those systems running properly throughout the event.

### Defining the Boundary

The FAA's first priority at any air show is audience protection. We'll cover more on this and the waiver process in the article "There's No Business Like Air Show Business" in this issue. In general, audience safety is accomplished by restricting access to portions of the airspace around the airport to ensure there is a sufficient safety margin. This area is usually referred to as the aerobatic box.



(Left and right image) The communication between airshow organizers, air bosses, IICs, ATC, and performers is constant throughout an event and critical to a safe experience.

The area directly within and adjacent to the box should be clear of non-participants. Meeting this requirement can include actually evacuating homes and businesses near the airport. Of course, things can change during an event.

"In my experience, last-minute changes usually revolve around weather and the need to balance the desire to have the performance while ensuring the safety of all involved (spectators, performers, employees, etc.)," McKinty says.

"The best part of any air show is seeing all the people excited by aviation. The impact that airshows have on our industry can't be quantified. Whether it's a young person dreaming about learning to fly a fighter jet, an 'old-timer' rehashing glory days as a crop duster, and everything in-between, air shows spark something in all of us.

"I think one thing the public doesn't understand is what takes place during the air show demonstrations," says McKinty. "I don't think the public differentiates between what air traffic control does pre-and post-demonstration and what the Air Boss does during the actual demonstration. The two are separate entities but equally dependent upon each other."

### Meet the Boss

Once it's showtime, the regular air traffic controllers hand off immediate responsibility for the box to the air boss. "The easiest way to describe the air boss is that he/she is similar to the conductor of a large orchestra," explains Jim Tucciarone, an experienced air boss. He is the Chairman of the International Council of Air Shows (ICAS) Air Boss Recognition Program Review Committee and an instructor for air boss training. "Just as a musician has their music, every pilot has their routine. Everyone has practiced and memorized the program. The air boss pulls together all of the pieces of the airshow like the conductor does with an orchestra."

Tucciarone elaborated, "The air boss usually writes and choreographs the schedule for the show ... that is their sheet music. When the Boss is ready for the B-25, he/she clears him into the aerobatic box." He notes that the B-25 is ready and has taxied because he has read the schedule and knows when they will be queued. The air boss uses a headset and mic like a conductor uses a baton.

"I was fortunate enough to work as a guest controller at Oshkosh for the fly-in for ten years. I met some amazing people and performers," Tucciarone explains when asked how he got into working as an air boss. "After moving to a staff support position at Oshkosh, coordinating between the control tower and the rooftop controller (air boss) on the field, I found it fascinating, and I wanted in," says Tucciarone. After one of his fellow controllers asked him to





form an air boss company, Tucciarone did his first show in Gary, Ind., in the late 80s. “After a while, I became dormant until another Boss called and got me back in during 2002. I have been around the country (and Costa Rica and the Bahamas) doing shows ever since.

“Most spectators are under the impression that the planes are given a sequence and just take off when it’s their turn. There is so much more that goes into show prep,” Tucciarone explains. “We have jets followed by quiet acts, parachute jumpers taking off during other acts, air starts, ground starts, no jumpers with any props turning, over water coordination, acts departing a remote airport, pilots flying more than once during the day, weather forecast and weather/wind minimums.” He added that the “the daily air boss briefing covers all safety information concerning the show, followed by a review of the entire day’s act by act, minute by minute, including sequences and on the spot changes.” All these tasks aim to provide a smooth, well-run, safe, and entertaining air show.

### Find and Fix

An old proverb credited to Prussian commander Helmuth von Moltke says: “No plan survives first contact with the enemy.” As we’ve seen, this applies to both the air show itself and the air traffic flow into and out of it. The best-laid plans sometimes need adjustments.

I once had the opportunity to watch this adjustment process at the Reno Air Races. Upon arrival, one of the military jet teams was slightly outside the approved boundary of the aerobatic box for one maneuver. To resolve this issue,



A meeting with an air boss, IIC, and military display team to work through potential issues with the show.



Air show performer briefing.

## The FAA’s first priority at any air show is audience protection.

representatives from the team, the organizers, and the FAA all sat down to look at options to protect the public and allow the show to go on. After some discussion, a few slight adjustments were made, and things were back on track.

While this meeting was meant to deal with a specific issue, there are standard briefings each day where all participants can work through any problems they may have encountered on the previous day. No matter how perfect a plan may seem, reality often finds a flaw. So having a process to adapt to and overcome challenges is key to a successful and safe event.



Photo of the Sun 'n Fun accident mentioned below.

### Oops Happens

No human endeavor is perfect. So it stands to reason that when bringing potentially thousands of aircraft into a small airport, something might go wrong. I’ve been on hand for a few of those situations. You can read one of those stories about the time when a tornado hit a fly-in in the article “Teamwork at Its Best” in our July/August 2011 issue.

On another occasion, we shadowed some air traffic controllers working a Sun 'n Fun show. During an arrival period one morning, we spotted a light twin airplane on approach with its gear not completely down. Moments later, the plane touched down, settled onto the two extended wheels and a wingtip, and slid down the runway, eventually exiting off the side of the runway. Within seconds the EMS crews arrived, followed by members of the ATC and aviation safety inspector (ASI) teams. Luckily the occupants were largely unscathed. Attention quickly turned from the initial response to aid the pilot to documentation and recovery of the airport. The ASIs handled the situation in very short order. Meantime, controllers were working to reopen the runway.

For sure, aviation events (both fly-in and general air shows) are team efforts between performers, organizers, ATC, ASIs, local communities, and all those attending. Teamwork is critical to allow for a safe, fun experience for everyone involved. >

James Williams is *FAA Safety Briefing's* associate editor and photo editor. He is also a pilot and ground instructor.