

Formation Flying, Inc.

Aviation Event Certificate of Waiver Education

Rev 0.46 4/3/2016

FAA 8900.1 RFC candidate

Objectives

1. Provide an orientation to, or review of the provisions of FAA Order 8900.1 Vol. 3 Ch. 6
2. Describe FFI cardholder privileges and limitations
3. Review additional considerations for low level maneuvering formation flight
4. Prepare for examination on the subject material

8900.1 Vol. 3 Ch. 6 and the
Aviation Event
Certificate of Waiver

What is 8900.1 Vol. 3 Ch. 6?

An FAA administrative order containing the regulations and limitations under which an Aviation Event Certificate of Waiver (CoW) may be granted, and which governs the conduct of all participants

An Aviation Event is inclusive of airshows, and several other activities for which the FAA issues CoWs

8900.1 Vol. 3 Ch. 6 provides authorization for FFI cardholders to engage in formation flight in a CoW

Aviation Event Certificate of Waiver

Definition

A CoW provides authorization to deviate from specific Federal Aircraft Regulations (FARs), such as:

- §91.111 Operating near other aircraft

- §91.119 Minimum safe altitude

- §91.121 Altimeter settings

- §91.155 Cloud clearance

- §91.303 Aerobatic flight

CoW limitations must ensure an equivalent level of safety to the waived FARs

Aviation Event Certificate of Waiver Operations

A CoW is issued with a specific start time, duration and 3-dimensional airspace, and contains standardized language from the FAA

A CoW may be customized for the venue due to densely populated or congested areas, terrain or special use airspace

Pilots must review each CoW to ensure all planned maneuvers can be safely and legally flown (for example, the CoW may prohibit formation takeoffs)

Aviation Event Certificate of Waiver

Documentation requirements

Egress/rescue documentation

Aircraft documentation

- Airworthiness, Registration, Ops Lims, W&B (AROW)
- Current annual/condition inspection
- Static and altimeter check (not required for VFR)
- Transponder check (if required for airspace)
- ELT battery

Pilot documentation

- Pilot Certificate (plastic, not a facsimile, English proficiency)
- Current Medical Certificate (not a facsimile)
- FFI card (not a facsimile)
- Date of last flight review

Aviation Event Certificate of Waiver

Required Attestations

Receipt of waiver documentation

Upon check-in, each pilot provides contact information and industry credentials, which attests that he/she has been provided with, and understands, the provisions of the CoW

Formation card and currency

The check-in form includes boxes to list formation credentials (FFI card), certify that formation currency requirements are met, and identify membership within the formation team

Authorization for FAA investigation (ramp check)

Aviation Event Certificate of Waiver

Compensation for flight activities

Commercial and 2nd class medical are required to receive compensation for aviation event flight activities

- Includes: fuel, oil, lodging, rental cars
- FAA inspectors are formally advised to investigate evidence of private pilot aviation event compensation

Experimental aircraft used for aviation event flight activity are eligible for compensation, but:

- Compensated passenger carriage is prohibited
- Uncompensated media rides are permitted at the expense of the performers, as long as not a condition of the contract

The Air Boss

Air Boss

Definition

Some Aviation Events, including airshows, require an Air Boss as a provision of CoW issuance

The Air Boss has primary responsibility for airshow operations on the active taxiways, runways and the surrounding demonstration area

The Air Boss owns the airport and airspace while an Airshow CoW is active

Air Boss

Mandatory briefing

Briefing

- The Air Boss hosts a briefing on each day of the event
- Mandatory for all participating pilots
- The formation Flight Lead or his/her delegate may act as a team representative, but the full team should attend if the briefing space permits and the Air Boss does not object
- Crash-fire-rescue (CFR) support

Lead must be prepared to provide:

- Flight's discrete (company) frequency, if used
- Type of performance start (ground or air)

Air Boss

Mandatory briefing

Hold

- The Air Boss will define and diagram a hold area
- If air starting, expect to orbit in the hold area

Air Boss Knock-it-Off (KIO)

- The Air Boss can call a knock-it-off at any time
- Procedures are provided in the Air Boss briefing

Air Boss Operations

Request and receive Air Boss permission to:

- Start engines
- Taxi
- Take off and land
- Begin the performance sequence

Air Boss

Emergencies

Flight Emergencies

- Lead must manage the emergency and communicate situation and intentions to the Air Boss
- As soon as practical, relay the status of any remote aircraft recovery or off-field events

Other Emergencies

- Non-participant aircraft incursion
- Comm failure
- Procedures covered in the Air Boss briefing

Airspace

Aviation Event CoW Airspace

Definitions

Aviation Event Demonstration Area

The total airspace defined by the CoW, TFR or NOTAM issued for an aviation event – a.k.a. “waivered airspace”

Flying Display Area

The airspace at an aviation event where participating aircraft have authorization to perform. This area begins at the surface and includes aerobatic boxes and showlines, but does not include ingress/egress routes

Ingress/egress routes

Routes used by performers to enter/exit the Flying Display Area

Aviation Event CoW Airspace

Definitions

Show line

A line on the surface of the ground or water intended to enhance pilot orientation during the performance. The show line provides the performer with a clear visual reference to the minimum safe distance from the crowd (commonly the runway centerline or pavement edge)

Primary Spectator Area

The main area designated by the event organizer for spectator use. Minimum altitude to overfly a primary spectator area is 1000' AGL. If a secondary spectator area exists, the minimum altitude to overfly is 500' AGL

Aviation Event CoW Airspace

Definitions

Crowd line

A physical barrier or a line marked on the ground that serves as a restraining line for designated spectator areas and provides the appropriate safety distances from the show line

Corner markers

An easily identifiable marker or landmark from the air, 500 feet or more right and left of the primary spectator area along the crowd line, to provide a 500-foot reference for proper separation

Aviation Event CoW Airspace

Definitions

Aerobatic box

The airspace within the Aviation Event Demonstration Area where participating aircraft are authorized to perform aerobatic maneuvers appropriate to their Category (CAT). This box begins at the appropriate Cat I/II/III show line

Aircraft category

Cat III – 2250 lbs gross weight or less,

OR 75% power at ISA/sea level \leq 156 kts

Cat II – More than 2250 lbs gross weight,

AND 75% power at ISA/sea level greater than 156 kts

Cat I – 75% power at ISA/sea level greater than 245 kts

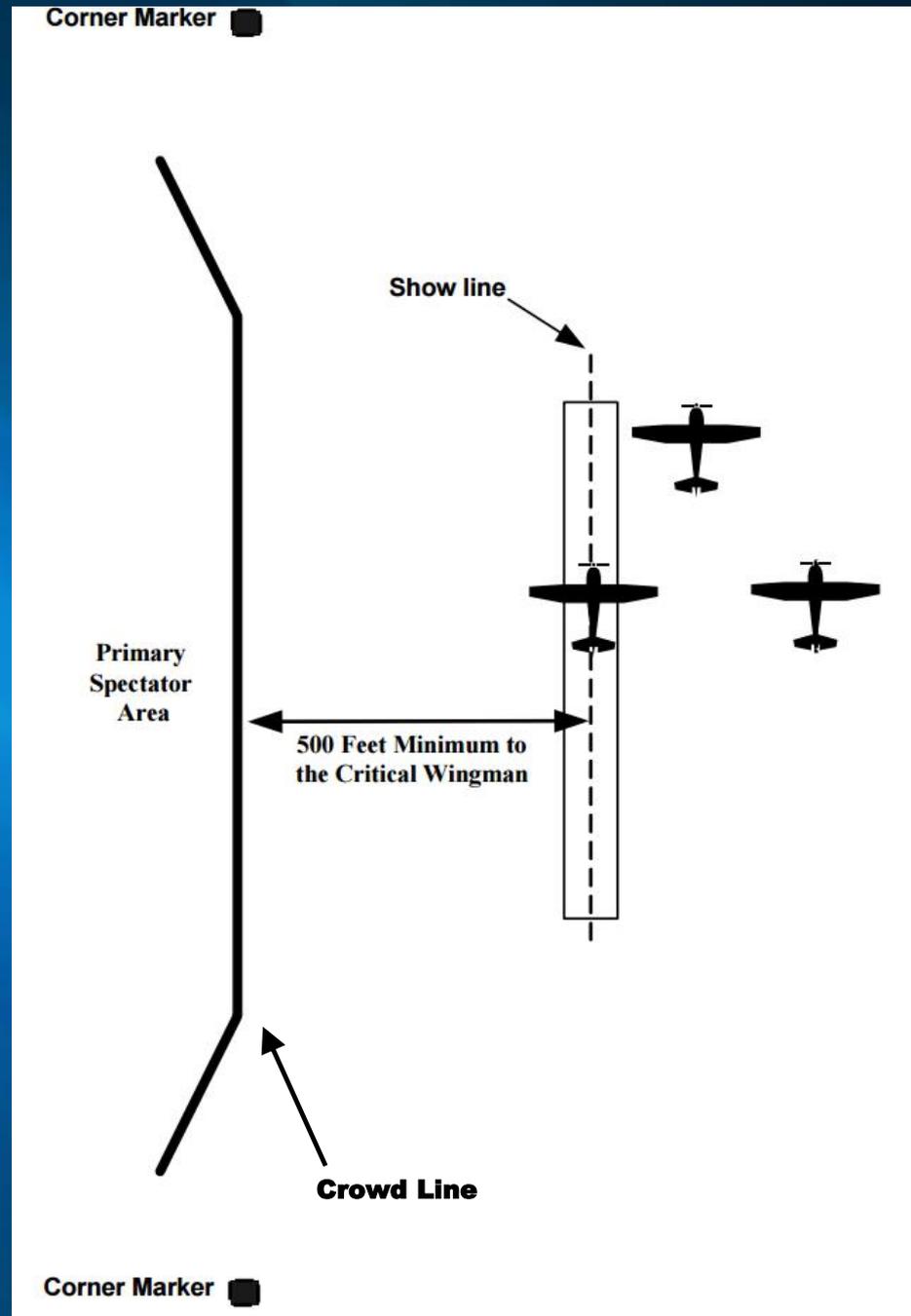
CoW Airspace

Spectator area diagram

Cat III example

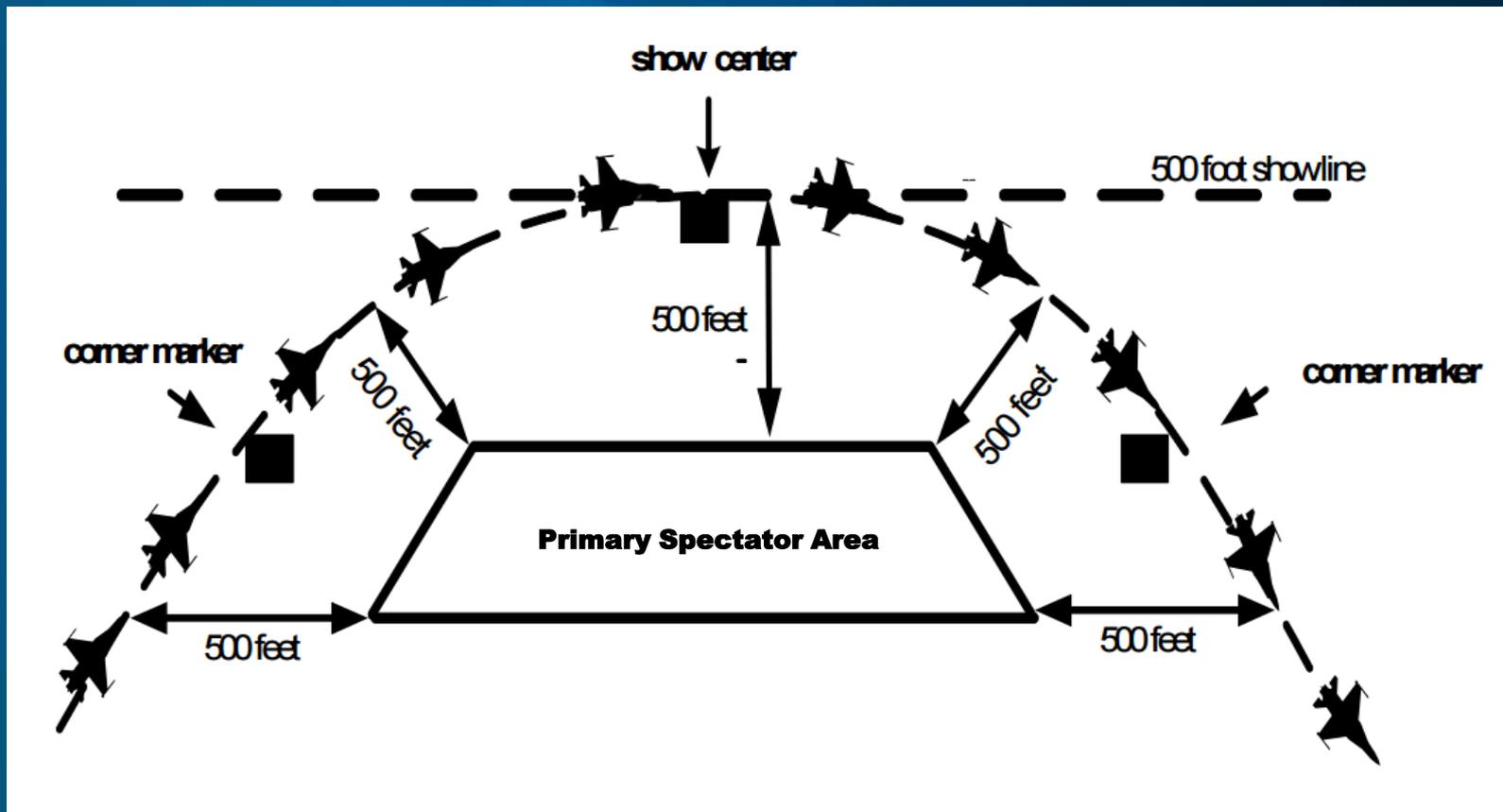
Cat III show line is normally 500 feet from the crowd line, but always check the details of the CoW

Flybys are performed to Cat III limits



Aviation Event CoW Airspace

Banana pass diagram

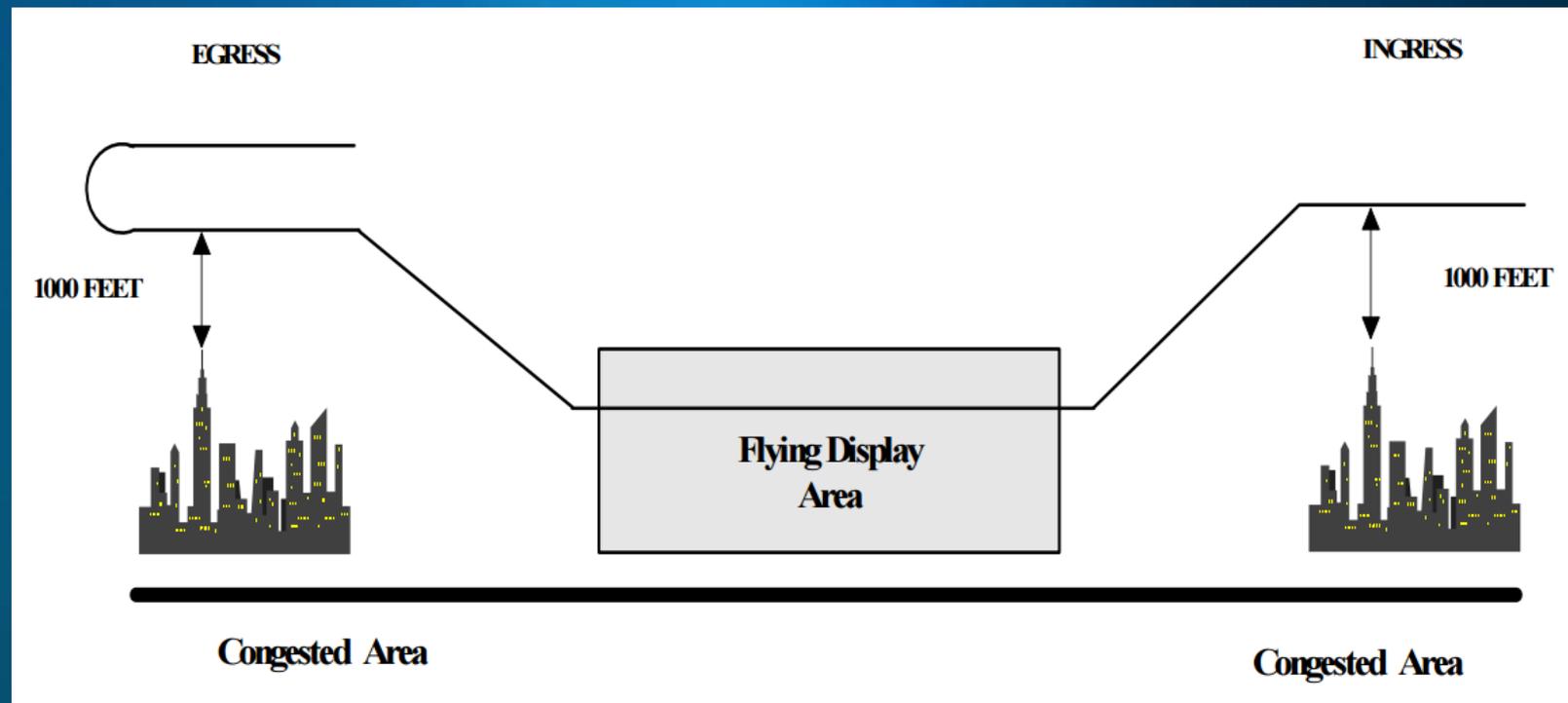


A minimum of 500 feet must be maintained from all spectator areas

Aviation Event CoW Airspace

Congested airspace diagram

Congested areas may require the use of ingress/egress routes. If applicable, expect a briefing from the Air Boss or IIC to initiate a climb to at least 1000' AGL during egress



Formation Flight in an Aviation Event CoW

Formation Flight in a CoW

Definitions

Formation

When two or more aircraft, under the command of a flight leader, are flown solely with reference to another aircraft and are within 500 feet that aircraft. Air racing and simulated dogfighting are not considered formation flight

Formation configuration/position change

When aircraft maintain formation while maneuvering to a new formation configuration (e.g. fingertip to diamond) via movement or repositioning of aircraft within the flight

Formation separation

When aircraft separate into solo flight or multiple formations

Formation Flight in a CoW

Definitions

In-trail

A solo aircraft or formation flown solely with reference to another solo aircraft or formation greater than 500 feet away

Flyby

A pass or a series of passes, performed by one or more aircraft within the Flying Display Area

Critical aircraft

That aircraft closest to the Primary Spectator Area in a formation flight

FFI Large (Mass) Formation

A formation of greater than twelve (12) aircraft flying in formation (within 500') in CoW/TFR airspace

Formation Flight in a CoW

Definitions

Standard Maneuvering (Formation)

Includes non-abrupt maneuvering, flybys, formation configuration/position changes, and missing-man formations, with pitch angle up to 45° and bank angle up to 60° , and with no formation separation within the Flying Display Area except to break for landing or flybys

Dynamic Maneuvering (Formation)

Includes formation separation, formation configuration/position changes, rejoins, crossing maneuvers, and opposing maneuvers, with pitch angle up to 60° and bank angle up to 75°

Formation Flight in a CoW

Prerequisites

Approved formation credential

- FFI, FAST, or SAC card with a formation endorsement
- The pilot acting as Flight Lead must possess a Lead card
- The Flight Lead of an FFI Large (Mass) Formation must have a Large Formation endorsement on his/her FFI Lead card
- FFI honors reciprocity with FAST and SAC cardholders, subject to the Flight Lead's discretion

Flight Lead's performance flight brief is mandatory

Flight Lead must identify all flight members to the IIC (FAA safety inspector in charge of the event)

Formation Flight in a CoW

FFI cards and Part 91 formation flying

FFI cards **only** provide authorization for formation flight within a CoW or TFR that specifically requires a formation credential

Possession of an FFI card grants no additional privileges for a standard, unwaivered Part 91 flight. **Do not use an FFI card to skirt Part 91 rules outside of a CoW!**

Any limitations imposed by a CoW have no impact on unwaivered Part 91 formation flying activities

Formation flight (including Missing Man flyovers) under unwaivered Part 91 does not require an FFI card

FFI Card Authorization

Permitted activities

Formation flight within an Aviation Event Demonstration Area, and formation Standard Maneuvering within the Flying Display Area at or above 250' AGL, including:

- 45° pitch, 60° bank in formation
- Formation takeoffs and landings
- Formation configuration/ position changes
- Flybys **in-trail** of multiple aircraft or multiple formations
- Pitchout/pitchup within the Flying Display Area **only to land, or perform subsequent flybys in-trail**
- Momentary energy projection toward spectator areas during fly-bys
- Maneuvers with energy vector toward the Primary Spectator Area (providing that the aircraft remain beyond the appropriate show line for the aircraft category)
- Reversal turns inside or outside the Flying Display Area
- Missing Man flyovers

FFI Card Authorization

Prohibited activities

Prohibited formation flight activities include:

- Separating aircraft from the formation within the Flying Display Area (except for a Missing Man formation, to break for landing or to conduct flybys **in-trail**, or for safety of flight/emergencies)
- Multiple formations simultaneously occupying the Flying Display Area that are not conducting flybys **in-trail**
- Rejoins, bomb bursts, opposing and crossing passes
- Carriage of passengers, other than required crew, during a performance flight
- Formation training, checkrides or currency flights (within CoW airspace)

Formation Flight in a CoW

Maneuvering limits summary

Formation card types

- FFI
- FAST
- SAC with Formation Dynamic Maneuvering endorsement
- SAC with Formation Aerobatic endorsement

	FFI/FAST	SAC + FDM	SAC + FA
Pitch	45°	60°	Unlimited
Bank	60°	75°	Unlimited
Dynamic	No	Yes	Yes

Formation Flight in a CoW

Limits when FFI/SAC cardholders perform together

FFI cardholders may not participate in a performance:

- Where SAC cardholders execute aerobatic maneuvers
- Where SAC cardholders execute dynamic maneuvering

Any formation that includes FFI cardholders:

- May not fly below the Standard Maneuvering minimum altitude (250' AGL), even if participating SAC formation authorized cardholders have a lower altitude limit
- Is limited to Standard Maneuvering for the entirety of the performance

Formation Standard Maneuvering

Energy vector management

Energy vector management requirements

- Formation changes during flyby reversal turns must be completed prior to the energy vector passing through the Primary Spectator Area
- Non-aerobatic maneuvers with energy vector toward the Primary Spectator Area are permitted, provided the aircraft remain beyond the appropriate show line for the aircraft category

Examples of affected maneuvers

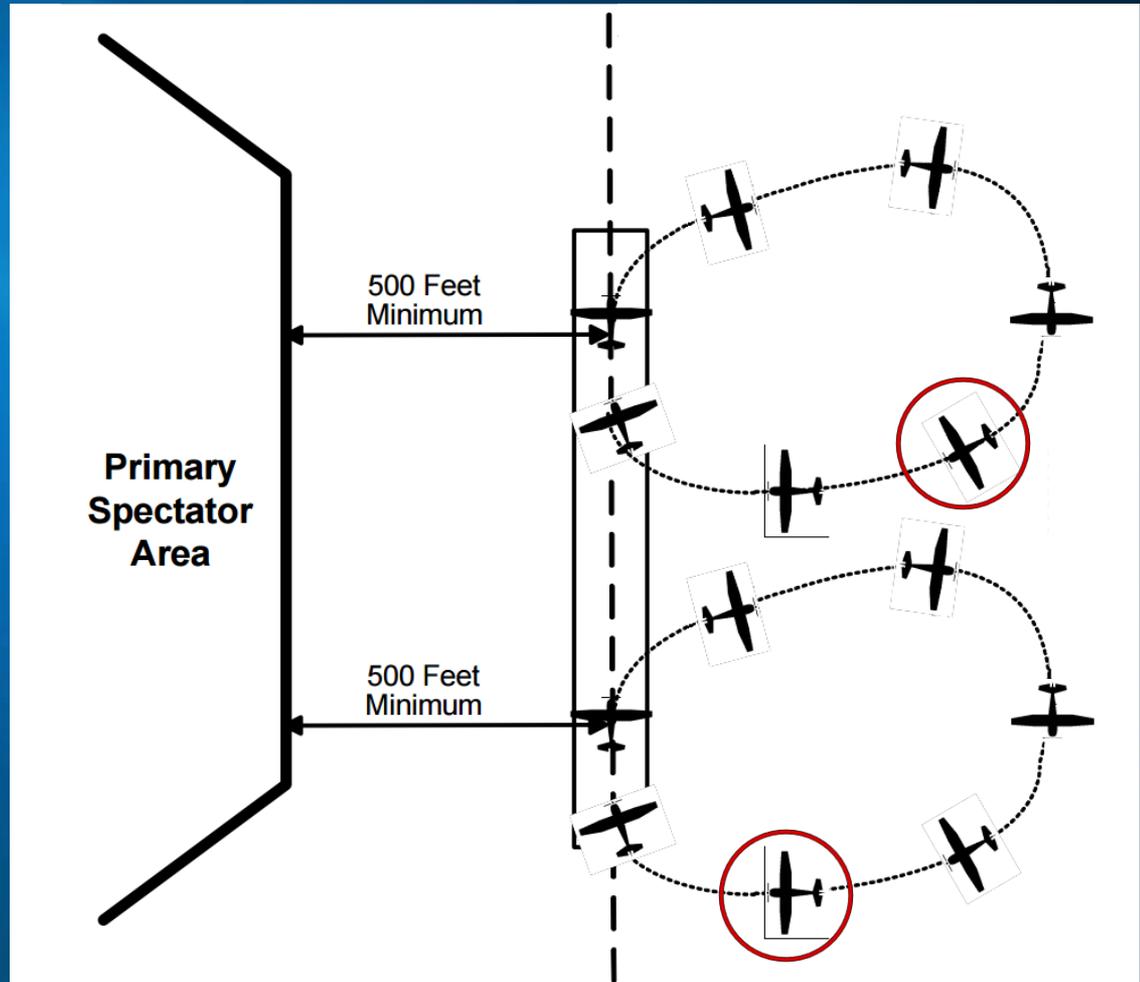
- Reversal turns in the Flying Display Area
- Formation changes in the Flying Display Area
- Reverse banana passes
- 360s

Formation Standard Maneuvering

Energy vector management

Cat III flyby example

Note circled locations where formation changes must be complete and stable



Formation Standard Maneuvering

Low level considerations

Obstacle clearance

- Buildings, light poles, antennas and other structures must be safely cleared by the critical aircraft

Ground rush

- **New low-level pilot:** ground rush can cause spatial disorientation and loss of situational awareness
- **Experienced pilot:** use of ground rush effects to estimate altitude may risk excessively low flight, especially if transitioning from faster aircraft
- **Use altimeter and ground markers to cross-check altitude**

Formation Standard Maneuvering

Low level considerations

Wind correction

- Maneuvering flight trajectory can be significantly impacted
- Extra caution for “on-crowd” wind vector into spectator area
- Reversal turns must be corrected for wind so that the duration of the energy vector on the spectator area is properly minimized
- **Do not overshoot the show line**

Wingman performance

- A wingman suddenly unable to maintain station or who becomes disoriented may be a safety hazard
- Monitor wingman position frequently
- Maintain critical wingman safety clearance
- **KIO, or increase ground and show line clearance if necessary**

Currency Requirements

Formation Practice

Definition and purpose

FFI formation practice is a dedicated flight where a planned sequence of formation maneuvers are flown

- Practice must occur outside of the CoW environment
- Practice is required to attain or maintain currency
- Up to three (3) practices may be accomplished within a single flight, except—
- For a Large (Mass) Formation, a practice is defined from engine start-up to shut-down. Therefore, only one Large Formation practice may be accomplished in a single flight

Formation Performance

Definitions

Airshow performance

- An airshow performance is a planned sequence of formation maneuvers flown within a CoW
- All participating pilots must be current prior to flying the airshow performance

Airshow rehearsal

- A formation airshow performance, flown within a CoW, on a day the airshow is not open to the general public
- All participating pilots must be current prior to flying the rehearsal performance

Currency, Part I

FFI card validity

FFI cards are issued for 12 months

FFI cardholders maintain card validity by:

- Flying at least four 4-ship training missions, practices or performances in the prior 12 months (Leads must brief and fly as Lead)
- Certifying the flights and flight dates to the FFI Administrator by submitting an Annual Activity Report

Failure to submit an Annual Activity Report will result in denial of card issuance. **After 24 months, a new initial checkride will be required**

Currency, Part II

FAA Aviation Event CoW currency minimums

Per FAA Order 8900.1, Vol. 3, Ch. 6:

To be considered current to exercise the privileges of an FFI card in an Aviation Event CoW, the cardholder must have flown, within the previous 45 days, at least one practice, rehearsal or performance of the routine to be performed

Currency may not be attained via performance or rehearsal within an Aviation Event CoW

Performances and rehearsals do count towards the continued maintenance of currency

Currency, Part IIIa

FFI currency recommendations

Flybys/racetracks

FAA minimum currency (one practice, rehearsal or performance in the previous 45 days)

Maneuvering performances

Three (3) formation practices of the routine to be performed, with one in the previous 15 days

Large (Mass) formations of greater than 12 aircraft

Two (2) formation practices of the formation to be performed within the previous 45 days

Currency, Part IIIb

FFI currency Lead considerations

Flybys/racetracks or Maneuvering performances

- Flight Lead currency must be obtained by flying as Lead

Large (Mass) Formations of greater than 12 aircraft

- A Flight Lead of a Large (Mass) Formation must have a Large Formation endorsement
- Leading a formation incorporated into a larger formation counts toward both Large Formation Flight Lead, and regular Lead currency

A Flight Lead may fly as Wingman as long as he/she meets Wingman currency requirements

Questions and Answers