



**FORMATION FLYING, INC (FFI)**

## **Formation Standards and Proficiency Program**

### **Program Manual**

VERSION 3

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# 1. MISSION STATEMENT

The mission of the FFI Formation Standards and Proficiency Program is to provide guidance for formation training and flying, guidance for Standard Maneuvering (non-aerobatic) formation airshow operational training and flying, a system for proficiency evaluation, and a method for monitoring qualifications and currency for operations under a Certificate of Waiver for an airshow or an Aviation Event. The program is for use by various types of aircraft, whether in a similar or dissimilar aircraft formation, as long as performance and visibility are judged sufficiently similar for safe formation flight. Explicit in the program is the use of the FFI Formation Guidelines and Standard Procedures manual, and this manual, which includes the FFI Formation Standards Evaluation Guides and Forms. Additional reference materials include, but are not limited to, the Formation Pilot's Knowledge Guide, and the FAST Formation Guideline series. The FFI Program President will approve the issuance of formation pilot credentials based on demonstrated competency and maintained currency.

# 2. OVERVIEW / HISTORY

In response to a need within the warbird community to standardize formation flying and increase safety, the "Formation And Safety Training" (FAST) National Standard Program was developed. Various warbird organizations had created and were using different procedures and signals unique to their groups. In 1993, the Warbird Operators Conference agreed to adopt a common national program for formation flying. Committee action resulted in acceptance of the T-34 Association "Formation Flight Manual" and the Darton video "Formation Flying, The Art" as common standards by five organizations within the warbird community (Canadian Harvard Aircraft Association, Confederate Air Force, EAA Warbirds of America, North American Trainer Association, and the T-34 Association). FAST was charged to develop formation standardization materials, appoint check pilots, determine evaluation and flight check administration methods, and create manuals. In 1995, the Valiant Air Command and the YAK Pilots Club joined FAST, and the Joint Liaison Formation Committee was approved to use FAST documents and manuals.

In 1997, the Federal Aviation Administration (FAA) began requiring the local Flight Standards District Offices (FSDOs) to include in their airshow waiver approvals a stipulation that anyone participating in non-aerobatic formation flight during the airshow must possess a valid industry formation training and evaluation credential acceptable to the FAA. FAST had developed appropriate credentials and the International Council of Airshows (ICAS) had a non-aerobatic formation card. However, since FAST was recognized by FAA as a warbird only organization, all the other formation flyers outside the warbird community were then excluded from participating in formation within airspace operating under a Certificate of Waiver during an airshow unless they had an ICAS non-aerobatic formation card. Then, in late 1998, ICAS terminated issuance of non-aerobatic formation cards.

Discussions between EAA, FAST and FAA in late 1997 resulted in FAST authorizing the EAA to use copyrighted FAST materials to create its own formation flying program dedicated to the EAA aircraft community. Subsequent discussions resulted in the creation of an independent organization, Formation Flying, Inc. What follows is a description of the FFI Formation Standards and Proficiency Program Manual (hereafter called "The Program") patterned after the FAST program. To enhance formation standardization across the formation community the program initially used the T-34 Association "Formation Flight Manual" in its entirety and developed type-specific supplements, such as the RV Supplement. FFI then developed the FFI Formation Guidelines and Standard Procedures. The FFI Standards and Proficiency Program Manual and the FFI Formation Guidelines and Standard Procedures are now the primary reference materials for FFI formation training, evaluation, and credential issuance. FAST Manuals remain an additional reference available to FFI Pilots. Since 2015, the FFI and FAST programs have worked together to ensure that the two programs complement each other, and continue to support each other in the development of formation best practices.

### 3. PHILOSOPHY AND POLICY

Applicants are expected to attain a high degree of formation proficiency prior to applying for evaluation within the FFI Program. Flight Leads and Check Pilots recommending pilots for entry or upgrade are expected to use discretion in their recommendations.

It is understood that individuals come into the Program from diverse backgrounds of experience and training. In addition to this manual and the FFI Formation Guidelines and Standard Procedures manual, this Program references documents, manuals, and videos from the FAST organization. They are a mixture from various military service training sources and were available as an existing national standard among warbird organizations. The Program continues that effort toward national standards.



The Flight Lead is the person in charge and is responsible for the safe conduct of the flight. He ensures flight members are current, qualified, and prepared. He ensures, through a quality briefing, that everyone knows what is expected. He leads the flight in a responsible manner that justifies the confidence his wingmen have put in him. He ensures learning through a quality and open debrief. He signs annual currency documentation for Program members.

To lead a formation, or any formation component within a large (mass) formation, during operations under a CoW for an airshow or an Aviation Event, a pilot must have a Flight Lead or Check Pilot qualification.

To lead a large formation of greater than twelve (12) aircraft flying in close formation (within 500'), during operations under a CoW for an airshow or an Aviation Event, an FFI Flight Lead or Check Pilot must meet the qualifications outlined for Large Formation Flight Lead in Section 7, and hold an FFI Flight Lead or Check Pilot card with the following endorsement: LARGE FORMATION FLIGHT LEAD.

Any mishap occurring during FFI formation flying, (training or performances), whether in or outside of CoW airspace, will be reported to the FFI President within 24 hours. Based on the circumstances, the President and the FFI Safety Officer will determine a mishap review process and may consider a Review Board of FFI Check Pilots, an investigative process, corrective action, and recommendations as required.

FFI offers reciprocity to FAST and SAC carded pilots. Any FAST/SAC carded formation pilots may fly in an FFI-led formation if accepted by the FFI leader of the flight. The FFI Flight Lead has sole authority as to flight make up when conducting training or events requiring formation cards.

A multi-organizational flight (FFI/FAST/SAC) will be briefed and led only by highly experienced Flight Leads, giving due consideration to aircraft compatibility and pilot experience.

Aerobatic formation is not addressed in this Program and will not be evaluated by FFI check pilots. FFI Check Pilots will only evaluate aircraft in non-aerobatic Standard Maneuvering formation flying.

FFI cards and authorizations are not aircraft specific. FFI pilots may exercise the privileges of their FFI cards in any aircraft they are qualified and authorized to fly.

## 4. PROGRAM PRINCIPLES

- This Program uses the FFI Formation Guidelines and Standard Procedures as a standard for thought, terminology, and procedures. The Formation Pilot's Knowledge Guide and the FAST Training Manual are additional references. It is expected that individuals wishing to participate in Program evaluations and credential issuance will have already been trained and possess a high level of competency in formation flying. They will then be evaluated IAW the criteria contained in this manual and if they meet the criteria they will be issued credentials commensurate with their abilities and knowledge.
- Formation flight is demanding and must be approached with a sense of professionalism, dedication and a safety-first attitude.
- Proper attitude and flight discipline are core values of safe formation flight.
- An FFI qualification is not to be considered a merit badge, but rather a certificate of a successful formation competency evaluation. This qualification allows Standard Maneuvering (non-aerobatic) formation operations under a CoW for an airshow or an Aviation Event.
- FFI is dedicated to the promulgation of safe formation flight. Unsafe practices negatively impact the formation community. All Program pilots are directed to take immediate corrective action through constructive criticism and positive counsel to any pilot who demonstrates unsafe formation practices.
- The criterion for evaluation and credential issuance is a thorough understanding of information contained in the FFI Formation Standards and Procedures Program Manual and the FFI Formation Guidelines and Standard Procedures. The pilot must be recommended for a check ride by a an FFI Flight Lead or Check Pilot, and demonstrate in-flight formation competency during the checkride, as well as pass an oral evaluation. Check pilots will conduct the evaluation using the FFI Formation Standards Evaluation Guides and Forms.
- A successful formation evaluation and card issuance is recognized across the FFI and FAST formation communities, as well as throughout the Airshow Industry. All pilots holding an FFI credential are expected to fly and act in a professional manner, so as to uphold the positive reputation of FFI among all industry partners.
- Check Pilots are selected by the FFI Board of Directors based on organizational needs, demonstrated leadership abilities, flying abilities, and air show experience. They should be formation pilots of the highest standards, experience, qualifications, and skill who are committed to FFI and the Program. To be selected as a Check Pilot, the applicant must meet all the Check Pilot minimum requirements listed on page 7 of this document, and be recommended to the Board of Directors by an FFI Flight Lead or Check Pilot. Once selected, the Check Pilot applicant will undergo standardization training, then receive an evaluation while he/she briefs, debriefs, and critiques a 4-ship formation flight.
- Qualified Check Pilots are expected to receive applications for evaluations and, through the check flight process, ensure wingmen and flight leads are highly qualified, with requisite formation skills, and knowledge of the FFI Formation Guidelines and Standard Procedures, the Formation Standards and Proficiency Program Manual and FAA Order 8900.1, Volume 3, Chapter 6. They will make themselves available to the formation community to give evaluations, to sign currency documentation, and to ensure knowledge of Program procedures and policy. Check pilots serve the Program on a voluntary basis. Check Pilot expense reimbursement is appropriate, i.e., travel costs, if the Check Pilot travels to the applicant's location. Check Pilots serve at the pleasure of the FFI Board of Directors, and can be removed for cause.
- Flight Leads and Check Pilots, whether operating under a CoW for an airshow or Aviation Event, or conducting a training or checking flight, are responsible to ensure that all participants have proper pilot credentials and aircraft documentation, and should ensure that all aircraft are of compatible performance characteristics. Flight Leads and Check Pilots have an absolute right to determine flight make up within the restrictions set forth in this Program manual.
- FFI pilots, regardless of qualification level, are subject to review for noncompliance. The President can and will withdraw credentials for cause.

## 5. DEFINITIONS - FAA Order 8900.1, Volume 3, Chapter 6

FAA Order 8900.1, Volume 3, Chapter 6 is the primary document which defines all limits, conditions and restrictions for an Aviation Event. The following definitions will add amplification and clarity to Section 6 FFI CARD AUTHORIZATION.

- Aviation Event - Airshows, aerobatic competitions, closed course air races, cross-country air races, parachute demonstration jumps, balloon meets, flyovers, and fly-ins conducted before an invited assembly of persons, for which the FAA issues a Certificate of Waiver or Authorization (CoW/A).
- Aviation Event Demonstration Area - The total airspace (lateral and vertical limits) identified by the CoW/A, temporary flight restriction (), or the Notice to Airmen (NOTAM) issued for an aviation event (sometimes referred to as the waived airspace).
- Flying Display Area - The airspace at an aviation event where participating aircraft, UAS, and rockets have authorization to perform under a CoW/A. This area begins at the surface and includes the racecourse area, aerobatic boxes, and show lines but does not include ingress/egress routes.
- Formation Flight - 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 of the referenced aircraft.
- Formation Separation - aircraft separate into solo flight or multiple formations (e.g. bomb-burst, 8-ship to two 4-ships, 4-ship to two 2-ships, etc).
- Formation Configuration/Position Change - aircraft maintain formation while maneuvering to a new formation configuration (e.g. Fingertip to Diamond) via the movement or repositioning of one or more aircraft within the flight (e.g. aircraft #4 moves from outside right wing to slot).

NOTE: Formation Separation in the flying display area and Formation Configuration / Position Change is authorized during Formation Dynamic Maneuvering. Formation Configuration / Position Change is authorized during Formation Standard Maneuvering.

- In-Trail - A solo aircraft or aircraft in formation that are flown solely with reference to another solo aircraft or formation and are more than 500 feet from the referenced aircraft or formation. (e.g. during a parade overflight, a flyby, or a racetrack pattern of flybys).
- Standard Maneuvering-Formation - Non-aerobatic maneuvering in the Flying Display Area based on the following limitations: maneuvering pitch angle up to 45 degrees and bank angle up to 60 degrees and the formation does not separate inside the Flying Display Area, except for formation or position changes, missing-man formation, or to break for landing or fly-by. Pitchouts to Extended Trail maneuvering flybys, that do not include crossing or opposing maneuvers, are authorized.
- Standard Maneuvering-Solo - includes non-abrupt maneuvering and flybys in solo flight. The pitch and bank limitations are when aircraft pitch attitude is less than or equal to 60 degrees above or below the horizon and/or the bank angle is less than or equal to 75 degrees in reference to the horizon.

## 6. FFI CARD AUTHORIZATION

**FFI AUTHORIZATION** - An FFI card authorizes a pilot to participate in Standard Maneuvering (non-aerobatic) flybys or a series of flybys, performed by one or more aircraft, before an invited assembly of persons at an aviation event while a Certificate of Waiver (CoW) is in effect.

In a formation flight, Standard Maneuvering includes non-abrupt maneuvering, flybys, formation configuration/position changes, and missing-man formation, and the flight may not separate inside the flying display area, except to break for landing or flyby. The pitch and bank limitations are when the aircraft pitch attitude is less than or equal to 45 degrees above or below the horizon and/or the bank angle is less than or equal to 60 degrees in reference to the horizon.

Pilots holding an FFI card are authorized to:

- Maneuver in the flying display area to the pitch angle, angle of bank, and altitude limitations of FAA Order 8900.1, Volume 3, Chapter 6.
- Fly Standard Maneuvering (non-aerobatic) maneuvers by a single aircraft, by multiple aircraft, or aircraft in formation with an energy vector directed towards the primary spectator area provided the aircraft remains beyond the appropriate show line for the aircraft category (i.e., 500 feet for Category III).
- Fly Standard Maneuvering (non-aerobatic) formation maneuvers (e.g. flyby) that may direct momentary, but not sustained energy toward the primary spectator area, except during any formation separations, formation configuration/position changes, or rejoins.
- Momentarily project energy toward the primary or secondary spectator areas during flybys as long as the formation is stable.
- Perform reversal turns both inside the Flying Display Area and outside the Flying Display Area.
- Perform Formation Configuration/Position Changes during flybys or reversal turns, as long as the Formation Configuration/Position Change is complete, and the formation is stable, prior to the energy vector being momentarily projected at the spectator areas.
- Perform flybys of multiple aircraft in trail or multiple formations in trail in the Flying Display Area. A formation may execute a pitchout to Extended Trail maneuvering in the Flying Display area that does not include crossing or opposing passes.
- A formation may separate into separate formations while outside the Flying Display Area, and may perform separate flybys, or flybys in trail, within the Flying Display Area, but may not execute maneuvers authorized under Dynamic Maneuvering.
- Perform pitch-outs or pitch-ups to land, or to conduct fly-bys in trail.
- Perform Missing Man Flybys.

The following restrictions apply:

- Pilots conducting Standard Maneuvering formation must comply with 8900.1, Vol 3 Chapter 6, Section 1, Part 3-145 D.1) a) through D.1 h).
- With the exception of a pitchout or pitch-up for landing or to conduct flybys in trail that do not include crossing or opposing passes, or a Missing Man Flyby, pilots may not perform Formation Separations while inside the Flying Display Area.
- Dynamic Maneuvering operations, for instance, maneuvers that separate aircraft from the formation while in the Flying Display Area, or that include solo or formation crossing or opposing passes, or “bomb-bursts” are NOT authorized.
- To lead a formation, or any formation component within a large (mass) formation, during operations under a CoW for an airshow or Aviation Event, a pilot must have a Flight Lead or Check Pilot qualification.
- In order to lead a large formation of greater than twelve (12) aircraft, an FFI Flight Lead or Check Pilot must have an approved Large Formation Flight Lead Qualification form on file with FFI.

## **7. PILOT QUALIFICATION REQUIREMENTS**

To be eligible for an FFI formation qualification, a pilot must fulfill the requirements below. These are the MINIMUM requirements. Airmanship, discipline, attitude, motor reflexes, situational awareness, and appropriate aggressiveness are the determining factors of a good formation pilot.

The Program comprises three levels: Wingman, Flight Lead, and Check Pilot. A Large Formation Flight Lead designation is also available to Flight Leads and Check Pilots. Check Pilot staffing will be determined by organizational needs, and is subject to review by the FFI President. Individual minimum requirements as listed below may be waived by the President upon request.

### **Wingman Minimum Qualifications**

- Private pilot
- 100 hours total time
- 20 hours formation time
- Current medical
- Ten (10) flights in a 4-ship formation
- Recommendation by a FFI Flight Lead or Check Pilot
- Pass a Wingman formation flight evaluation as #2 and #4 in a 4-ship formation
- Pass an oral evaluation demonstrating knowledge of FFI formation standard procedures as well as knowledge of rules and restrictions required to operate within the Air Show environment

### **Flight Lead Minimum Qualifications**

- Private pilot
- 300 hours total time
- 40 hours formation time
- Current medical
- One year as a qualified Wingman
- Twenty (20) flights in a 4-ship formation, ten (10) as a Flight Lead
- Recommended by a FFI Flight Lead or Check Pilot
- Pass Flight Lead evaluation leading a 4-ship formation
- Pass an oral evaluation demonstrating knowledge of FFI formation standard procedures as well as knowledge of rules and restrictions required to operate within the Air Show environment

### **Check Pilot Minimum Qualifications**

- Private pilot
- 1000 hours total time
- 100 hours formation time
- Current medical
- One year as a Flight Lead
- Flight Lead for twenty (20) 4-ship formations
- Recommended by 2 Flight Leads or Check Pilots
- Commitment to serve the formation community
- Agreement to abide by Program policies and procedures
- Complete an FFI Check Pilot Training and Standardization Program
- Pass a Check Pilot evaluation briefing and critiquing a 4-ship formation while demonstrating knowledge of FFI formation standard procedures as well as knowledge of rules and restrictions required to operate within the Air Show environment
- Demonstrate knowledge in completing all forms

## **Large Formation Flight Lead Designation - Minimum Qualifications**

- One year as a Flight Lead
- Recommended by a Flight Lead or Check Pilot
- Documented experience leading a formation of greater than twelve (12) aircraft
- Large Formation Lead Qualification Form (found in FFI Evaluations, Addendum A) submitted, approved by the FFI Board of Directors, and on file with FFI.

## **8. EVALUATIONS**

All evaluations will be administered in a 4-ship, referencing the FFI Evaluation Supplement.

Note: See FFI Evaluation Supplement for all required forms.

If an applicant for an evaluation does not meet minimum pilot qualification requirements, the FFI President may consider a partial waiver. The waiver must be granted prior to conducting the evaluation in question.

In all evaluations, the Check Pilot may ride with the applicant, or may choose to fly in another aircraft, or as a chase.

A pilot applying to become a Check Pilot will monitor the brief and debrief, then critique a 4-ship formation flight. The applicant will normally fly the chase position, fill out all forms, demonstrating thorough knowledge of all Program requirements. The President or another Check Pilot administering the evaluation may fly with the applicant or fly in his own aircraft, wherever he believes it most advantageous.

## **9. CURRENCY**

Formation flight is an art that deteriorates without practice. Thus, there is a requirement for currency in formation flight to be qualified for annual re-issuance of formation credentials.

### **Wingman Currency**

A Wingman must fly as a Wingman in a 4-ship formation or larger, a minimum of four (4) times a year to maintain the validity of their FFI card and remain qualified. It is the Wingman's responsibility to log, track, document, and present the Annual Activity Report to an FFI Flight Lead or Check pilot. A Flight Lead or Check Pilot must sign and submit the Annual Activity Report to the President on that Wingman attesting to the fact that he/she has flown the minimum number of required flights, is in compliance with FFI policies, and meets the FFI standards of performance. Failure to provide documentation for a two (2) year period will require a review and competency evaluation flight with a Check Pilot.

FAA Order 8900.1, Volume 3, Chapter 6 requires that each Wingman within a formation be able to show evidence of having practiced at least once in the past 45 days, to operate under a CoW for an airshow or Aviation Event.

NOTE: Initial currency may not be attained during a rehearsal or performance in airspace under a CoW. It must be achieved via practice sessions prior to operating in a CoW. Maintaining continued currency during an airshow season may be accomplished via practices, or via rehearsals and/or performances in a CoW.

## ***FFI Airshow Currency Recommendations - Wingmen***

FFI recommends that all Wingmen within a performance meet the following currency recommendations:

For maneuvering performances that include multiple flybys with reversal turns inside and/or outside the Flying Display Area:

- have flown in at least three (3) formation practices, rehearsals or performances in the same formation performance, within the last 45 days
- have flown at least one (1) of the three (3) recommended formation practices, rehearsals or performances in the same formation performance, within the last 15 days

For Single-pass flybys and flybys flown as part of a basic racetrack pattern :

- have flown in at least one (1) formation practice, rehearsal or performance in the same formation performance, within the last 45 days

For Large (Mass) Formations of greater than 12 aircraft:

- have flown in at least one (1) formation practice, rehearsal or performance in the same formation performance, within the last 45 days

## **Flight Lead Currency**

A Flight Lead must brief and fly as Flight Lead in a 4-ship or larger formation a minimum of four (4) times a year to maintain the validity of their FFI card and remain qualified. He/she will submit an Annual Activity Report reviewed by another Flight Lead or Check Pilot. The reviewing Flight Lead or Check Pilot must sign and submit the Annual Activity Report to the President attesting to the fact that the Flight Lead has flown the minimum number of required flights, is in compliance with FFI policies, and meets the FFI standards of performance. Failure to provide documentation for a two (2) year period will require a review and competency evaluation flight with a Check Pilot.

FAA Order 8900.1, Volume 3, Chapter 6 requires that each Flight Lead within a formation be able to show evidence of having practiced at least once in the past 45 days, to operate under a CoW for an airshow or Aviation Event.

NOTE: Initial currency may not be attained during a rehearsal or performance in airspace under a CoW. It must be achieved via practice sessions prior to operating in a CoW. Maintaining continued currency during an airshow season may be accomplished via practices, or via rehearsals and/or performances in a CoW.

## ***FFI Airshow Currency Recommendations - Flight Lead***

FFI recommends that a Flight Lead of a performance meet the following currency recommendations:

For maneuvering performances that include multiple flybys with reversal turns inside and/or outside the Flying Display Area:

- have flown in at least three (3) formation practices, rehearsals or performances in the same formation performance, within the last 45 days
- have flown at least one (1) of the three (3) recommended formation practices, rehearsals or performances in the same formation performance, within the last 15 days

For Single-pass flybys and flybys flown as part of a basic racetrack pattern:

- have flown in at least one (1) formation practice, rehearsal or performance in the same formation performance, within the last 45 days

For Large (Mass) Formations of greater than 12 aircraft:

- have flown in at least one (1) formation practice, rehearsal or performance in the same formation performance, within the last 45 days

NOTE: Leading a formation incorporated into a larger formation counts towards Large Formation Lead **and** normal Flight Lead currency.

## **Check Pilot Currency**

Check pilots have the same flight currency requirements as a Flight Lead. Additionally, Check Pilots will submit a yearly report showing check flight activity as part of their Annual Activity Report.

## **Large Formation Currency**

Each pilot participating in a Large (Mass) formation during operations under a CoW for an airshow or Aviation Event must satisfy the above currency requirements by flying in a practice or rehearsal in the formation configuration to be performed, and in the same role (Lead or Wingman). For this currency requirement, a Large Formation is a formation greater than twelve (12) aircraft that is composed of multiple 4-ship (or other size) elements, flown in close formation together. For a performance or flyby that is flown as separate formations in trail (500' or more), pilots must meet the currency requirements stated above only in the formation in which they fly.

## **Practice Session Rules**

A practice session is defined as flying a dedicated event with a planned series of maneuvers. Up to, but no more than three (3) practice sessions may be accomplished in one flight, with the exception of a large (mass) formation.

For the purposes of currency for a large (mass) formation, a practice session is defined as being an entire flight from engine start-up to shut-down. Therefore, only one practice session may be accomplished in a single flight.

# 10. PRACTICAL TEST STANDARDS AND EVALUATION GUIDELINES

## Foreword

In conjunction with the FFI Formation Guidelines and Standard Procedures, this evaluation guide will be used by Wingman, Flight Lead and Check Pilot applicants, to understand the standards by which they will be judged during their evaluation, and by Check Pilots as a guide in conducting the evaluation.

Practical Test Standards have been developed for each task area that is to be evaluated during an evaluation check flight. Each task in the several phases of a formation mission is given three levels of accomplishment: Qualified, Conditionally Qualified, and Unqualified. Each task accomplishment level is described to give the Check Pilot guidelines to determine the applicant's level of competency and to grade accordingly. There is suitable latitude in each guideline to leave the Check Pilot grading discretion. Any Unqualified grade will result in an overall Unqualified for the evaluation, requiring further training before another evaluation. A task graded Conditionally Qualified indicates an area requiring training for the applicant but does not necessarily dictate an Unqualified for the mission. Several tasks graded Conditionally Qualified may, in the judgment of the Check Pilot, dictate an overall Unqualified. Airshow quality is the measure of merit.

## Check Pilot Options

Some maneuvers may not be appropriate for certain aircraft. The following maneuvers are optional and may be excluded at the Check Pilot's discretion.

- Formation Takeoffs and Landings. NOTE: If Formation Takeoffs and Landings are excluded from the evaluation, due to environmental constraints, the FFI card will contain a limitation stating "No Formation Takeoffs or Landings", until the applicant can safely demonstrate those maneuvers to a Check Pilot.
- In the case of Biplanes, Lazy 8s in diamond, close trail, and extended trail need not be demonstrated.
- Airborne configuration changes, except where necessary for takeoff and landing
- Type aircraft specific maneuvers / signals, if the evaluation is conducted with dissimilar aircraft.

## Dissimilar Aircraft

Dissimilar aircraft may be used as long as the performance and visibility are judged by the Check Pilot to be sufficiently similar for safe formation flight. The differences in flight characteristics will be specifically briefed.

## Evaluation Grading Guidelines

### Qualified

Applicant demonstrates thorough, comprehensive knowledge, and performs all required maneuvers without prompting or counsel. Applicant flies aircraft smoothly and coordinated, without exceeding aircraft or engine limits. All maneuvers required are performed with precision and a degree of finesse. The successful and safe outcome of any maneuver is never in doubt.

### Conditionally Qualified

Applicant demonstrates adequate knowledge and performs maneuvers required. Performance of maneuvers is within allowable tolerances but improvement in smoothness and precise aircraft control is recommended. Applicant safely applies principles of formation flight. Additional training and practice are required to reach the QUALIFIED level.

### Unqualified

Applicant's knowledge and performance of maneuvers is not adequate. Applicant's planning is deficient and aircraft control is rough. Occasionally some aircraft or engine limits are exceeded. Applicant's demonstrated capacity does not meet minimum standards for issuance of formation pilot credentials.

## ***PRACTICAL TEST STANDARDS - WINGMAN - ORAL PHASE***

### ***Objective #1***

***To demonstrate knowledge and understanding of all hand and aircraft signals.***

Run-up	Climb
Frequency changes	Descent
Number signals	Fuel state
Head nod	Inflight emergency/HEFOE
Wingman cross	Can't hear
Element cross	Can't transmit
Breakup and rejoin	Lead change
Gear and flap cycling	Stack up
Power addition and reduction	Stack down
Level off	Stop squawk
Beacon/Strobe On/Off	Fingertip to route
Fingertip to echelon	Echelon to fingertip
Fingertip to diamond	Diamond to fingertip
Fingertip to trail	Trail to fingertip

**Qualified:** Applicant knows all hand and aircraft signals and when they are used.

**Conditionally Qualified:** Applicant knows most of the signals with some prompting. Description of signals does not exhibit full understanding without discussion.

**Unqualified:** Applicant does not know hand or aircraft signals without prompting or open book reference. Applicant confuses or inverts meaning of two or more signals.

## **Objective #2**

**To explain the basic concepts of formation flight and demonstrate a full understanding of the mechanics and safety factors for the following:**

- Standard fingertip, echelon, trail, diamond, and enroute formations
- Cross-unders, rejoins, configuration changes
- Breakup and rejoin, turn cutoff, energy management
- Fingertip, echelon, trail, and enroute turns, and terminal maneuvering
- Lead changes, emergency signals and HEFOE system
- 360° overhead patterns, breaks, intervals, formation landings, go-arounds
- Taxi procedures
- Radio discipline, check-in, frequency changes, traffic calls
- Emergency abort on takeoff
- In-flight emergency procedures

**Qualified:** Applicant understands and is able to discuss the mechanics and dynamics of different formations and is able to describe methods of aircraft control and proper wingman and leader techniques on all formations. Applicant understands flight discipline and each flight member's responsibility to flight integrity.

**Conditionally Qualified:** Applicant understands the mechanics of different maneuvers but needs prompting to understand the safety and dynamics. Applicant does not exhibit full knowledge of methods of aircraft control and techniques to maintain or change position. Applicant understands flight discipline and Wingman responsibility to flight integrity.

**Unqualified:** Applicant is unable to describe basic formation flight mechanics and concepts without prompting. Applicant is unable to describe formation flight dynamics and does not exhibit knowledge of basic safety of each formation or change.

## **Objective #3**

**To demonstrate knowledge and understanding of operations under a Certificate of Waiver for an Air Show or Aviation Event, to include the following:**

- Aircraft and pilot documentation requirements
- Applicable rules and restrictions contained in FAA Order 8900.1, Volume 3, Chapter 6
- Weather requirements and considerations
- Certificate of Waiver specifics to include the flying display area, show center, corner markers, the crowd line, the Category I, II, III show lines, and the concept and implication of waived regulations
- Air boss communications - normal and emergency
- Abnormal and Emergency procedures

**Qualified:** Applicant understands and is able to discuss rules and restrictions as they pertain to operations under CoW for an airshow or Aviation Event as they apply to Standard Maneuvering (non-aerobatic) formation flight.

**Conditionally Qualified:** Applicant has a general knowledge of rules and restrictions as they pertain to operations under a CoW for an airshow or Aviation Event as they apply to Standard Maneuvering (non-aerobatic) formation flight but is able to locate the required items within FAA Order 8900.1, Volume 3, Chapter 6 with little or no prompting.

**Unqualified:** Applicant is unable to discuss rules and restrictions as they pertain to operations under a CoW for an airshow or Aviation Event as they apply to Standard Maneuvering (non-aerobatic) formation flight.

## **PRACTICAL TEST STANDARDS - WINGMAN - FLIGHT PHASE**

### **Objective #4**

**To conduct ground operations to include start time, start, taxi, and response to signals.**

**Qualified:** Applicant properly conducts preflight and is strapped in and ready at start time. Applicant concentrates on the leader and complies with start, radio check-in, and taxi procedures. Applicant falls into proper position behind leader and maintains position.

**Conditionally Qualified:** Applicant properly conducts preflight and is strapped in and ready at start time. Applicant does not concentrate on leader and delays start or misses signals, but checks in properly. Applicant falls into proper position behind the leader but varies position occasionally through inappropriate use of power or brakes.

**Unqualified:** Applicant is not prepared at start time. Applicant does not concentrate on leader, does not start on time, and misses signals and radio check in. Applicant taxi position is incorrect through inattention or inappropriate use of power or brakes.

### **Objective #5**

**To properly exercise radio discipline, check in, and frequency changes.**

**Qualified:** Applicant has recorded all briefed frequencies in proper order and anticipates radio calls from lead. Applicant responds crisply with flight position number on all commands. Applicant checks on and off all assigned frequencies and changes are made expeditiously so as to not disrupt sequential check in. If NORDO, applicant effectively signals condition and recognizes numerical signals.

**Conditionally Qualified:** Applicant is aware of all briefed frequencies and responds to radio check ins but is occasionally out of order or uses incorrect terminology. Applicant is slow to change frequency and occasionally misses check in. Applicant needs prompting to use or understand NORDO signals.

**Unqualified:** Applicant is aware of briefed frequencies but uses them out of order. Applicant misses several frequency changes or checks ins and is slow to change frequencies. Applicant does not respond to NORDO signals from leader and misunderstands numeric signals. General radio discipline and awareness is lacking.

### **Objective #6**

**To conduct run-up, check list and standard procedures.**

**Qualified:** Applicant taxis into run-up area in proper sequence and aligned properly with no wingtip overlap. Applicant complies with lead run-up signal and performs run-up and pre-takeoff checks in timely and accurate manner. Applicant passes thumbs up signal in proper sequence to lead.

**Conditionally Qualified:** Applicant taxis into run-up area in proper sequence but not aligned with the flight. Applicant complies with lead run-up signal and performs run-up and pre-takeoff checks in a rushed but accurate manner. Applicant neglects to pass the thumbs up or neglects to check with other flight members before passing it.

**Unqualified:** Applicant taxis into run-up area misaligned and with wingtip overlap and/or angular mismatch. Applicant does not concentrate and misses lead run-up signal. Applicant performs run-up and pre-takeoff checks inaccurately. Applicant fails to pass thumbs up or fails to check with other flight members before passing it.

## **Objective #7**

### ***To execute formation takeoff and power management.***

**Qualified:** Applicant, using proper spacing, taxis into correct wing position as briefed for formation takeoff. Applicant holds brakes, acknowledges run-up signal, checks instruments, and concentrates on leader. At leader's head nod, applicant releases brakes, smoothly adds power and maintains during takeoff roll. Maintaining position, applicant is smooth on power and pitch adjustments and rotates for liftoff with lead. After liftoff, applicant maintains position throughout acceleration, power reduction and climb initiation, smoothly crossing under to other wing if directed.

**Conditionally Qualified:** Applicant, using proper spacing, taxis into correct wing position as briefed for formation takeoff. Applicant holds brakes, acknowledges run-up signal, checks instruments, and concentrates on leader. At leader's head nod, applicant releases brakes and adds power, but is slightly sucked or slightly overruns lead. Applicant corrects position, but is not consistently smooth, resulting in slightly mismatched liftoff and pitch angle. Corrections are prompt but slightly over controlled, including cross under, if directed.

**Unqualified:** Applicant taxis into an incorrect position for formation takeoff. Applicant holds brakes, acknowledges run-up signal, checks instruments, and but fails to concentrate on leader. At head nod, applicant is late releasing brakes and adding power, resulting in excessive sucked position. Applicant does not ask for power and excessive power does not correct position. Liftoff is not matched with lead and over controlling is evident, including the cross under, if directed. Element joinup is delayed waiting for applicant to settle in.

## **Objective #8**

### ***To execute climbout, level off, enroute procedures, and radio calls.***

**Qualified:** Applicant exhibits precise aircraft control with little to no relative motion. During climbing turns and level off applicant's flight control and power movements are smooth and anticipated, assuring proper formation position. Response to lead fishtail and wingrock aircraft signals draws a smooth and responsive movement into enroute position and return to fingertip. Applicant remains alert while maintaining concentration and discipline. Applicant responds crisply and sequentially on radio channel changes and check-ins.

**Conditionally Qualified:** Applicant exhibits reasonable aircraft control. During climbing turns and level off applicant's flight control and power movements allow him to maintain position but are not smooth or well anticipated. Response to lead fishtail and wingrock signals draws a delayed and somewhat erratic movement into enroute and fingertip positions. Applicant remains alert while maintaining concentration and discipline. Applicant responds to radio channel changes and check-ins, but does not always maintain the sequential flow.

**Unqualified:** Applicant maintains a poor level of concentration resulting in rough aircraft control. During climbing turns and level off applicant's flight control and power movements are erratic and not well anticipated, resulting in much relative movement in pitch, bank, and fore/aft position. Response to lead fishtail and wingrock signals draws erratic movement to incorrect and inconsistent positions. Applicant does not concentrate and discipline is lacking. Radio channel changes and check-ins are missed and out of sequence.

## **Objective #9**

### ***To execute crossunders.***

**Qualified:** Applicant responds to hand and aircraft signals in a timely and accurate manner. Use of flight controls and power results in a smooth and expeditious crossunders with proper drop back, nose/tail clearance, and push up on other side.

**Conditionally Qualified:** Applicant responds to hand and aircraft signals in a timely and accurate manner. Use of flight controls and power results in smooth crossunders with proper drop back and fore/aft clearance, but push up power is not anticipated and slow on other side.

**Unqualified:** Applicant is slow or fails to respond to hand and aircraft signals. Use of flight controls and power results in an erratic and inconsistent cross under with too fast a drop back, too little or too much fore/aft clearance, and too little or too slow push up resulting in a delayed sucked position.

## **Objective #10**

### ***To execute pitchouts and rejoins.***

**Qualified:** Applicant acknowledges pitchout signal, maintains wings level, then breaks at the proper interval with a crisp and level pitchout, rolling out directly behind lead. Upon receiving rejoin signal, applicant smoothly adds power and banks to establish and maintain proper rejoin line on a level plane with lead. Power is reduced appropriately and closure into fingertip position is smoothly executed. If an overshoot occurs, it is executed properly and smoothly, as long as other rejoins are executed properly.

**Conditionally Qualified:** Applicant acknowledges pitchout signal, leans slightly into turn but breaks at the proper interval with a crisp and nearly level pitchout, rolling out directly behind lead. Upon receiving rejoin signal, applicant adds power and banks to establish rejoin line, but wanders between slightly sucked and slightly acute on a nearly level plane with lead. Power is reduced appropriately and closure to fingertip is smoothly executed.

**Unqualified:** Applicant fails to acknowledge pitchout signal, leans into the turn and breaks at improper interval with a crisp pitchout but drops significantly in the pitchout plane. Upon receiving rejoin signal, applicant adds too much/too little power, banks but never establishes a consistent rejoin line, going very acute/sucked, and drops too low in the plane with lead. Power, pitch, and bank are erratic in the closure to fingertip resulting in unstable, unsafe, or multiple overshoots.

## **Objective #11**

### ***To execute echelon turns.***

**Qualified:** Applicant conducts echelon turn with same roll rate as lead and anticipates power and pitch inputs to maintain a smooth and level position.

**Conditionally Qualified:** Applicant conducts echelon turn with same roll rate as lead and pitch is anticipated to maintain level position, but power is not anticipated, resulting in a sucked position.

**Unqualified:** Echelon turn is conducted with a different roll rate than lead. Power and pitch changes are not anticipated, resulting in a sucked and erratic aircraft position during turn.

## **Objective #12**

### ***To conduct Lazy 8s in fingertip, trail, extended trail, and diamond formations.***

**Qualified:** Applicant maintains precise and smooth position during Lazy 8s in all formations, demonstrating an understanding of the acceleration/deceleration effects of maneuvering. Power is anticipated, smooth, and well within limits. Flight controls are blended smoothly with anticipation to maintain a steady position. Applicant remains attentive for formation change signals or calls. Applicant recognizes the signal or responds to the call and smoothly conducts the movement in the proper sequence.

**Conditionally Qualified:** Applicant maintains a relatively stable position during Lazy 8s in all formations but has a tendency to not anticipate power requirements causing some fore and aft movement. Flight controls are blended smoothly but he has a tendency to overlap on the inside of turns and go wide on outside. Applicant remains attentive for formation change signals or calls. Applicant recognizes the signal or responds to the call and conducts the movement in sequence but is slightly jumpy on the controls.

**Unqualified:** Applicant is unable to maintain a steady formation position while maneuvering during Lazy 8s. Power is not anticipated causing fall back and surge ahead as airspeed and Gs vary. Flight controls are handled roughly causing oscillations and overlap. Applicant is not attentive and signals or calls need to be repeated. Applicant's position changes are rough and out of sequence.

## **Objective #13**

### ***To conduct descent, traffic pattern entry, and landing.***

**Qualified:** Applicant's response to lead fishtail and wingrock aircraft signals draws a smooth and responsive movement into enroute position and return to fingertip. While in route formation, applicant maintains proper position while assisting in clearing the flight for traffic. Applicant replies crisply in sequence to frequency changes and check-ins. Response to signal for echelon formation and change of position is correct and smooth with proper power and flight control management. Applicant maintains smooth and precise position on initial approach, acknowledges the pitchout signal, and breaks crisply at proper interval. After a level pitchout, applicant rolls out behind the lead at briefed airspeed, aircraft is configured correctly, and spacing is maintained on downwind and base. Applicant touches down in the zone and maintains correct side of runway, making calls as appropriate.

During formation approach and landing, applicant flies a smooth and precise position and stacks level on final approach, configuring smoothly upon lead's signal. On short final, applicant continues smoothly flying wing position, aligns on his side of runway, flares and touches down with lead. Applicant decelerates so as to gain separation from lead.

**Conditionally Qualified:** Applicant's response to fishtail and wingrock signals draws a delayed and somewhat erratic movement into enroute position and return to fingertip. While in route formation, applicant's position wanders somewhat while assisting to clear the flight. Applicant replies crisply but somewhat out of cadence to frequency changes and check-ins. Response to signal for echelon formation is correct, but change of position is somewhat jerky but with good power management. Applicant maintains position but is somewhat erratic in pitch on initial approach, acknowledges pitchout signal, and leans slightly prior to breaking crisply at proper interval. After a nearly level pitchout, applicant rolls out behind lead at briefed airspeed, aircraft is configured correctly, but spacing is expanded/reduced somewhat on base leg. Applicant touches down in the zone and maintains correct side of runway, making calls as appropriate.

During formation approach and landing, applicant flies a precise position until final approach where he remains stacked low until halfway down final or corrected by lead. Configuration change is smoothly done on lead's signal, but spacing is not maintained. On short final, applicant aligns on his side of runway, but does not maintain precise position, causing flare and touchdown to be not matched with lead. Applicant temporarily moves acute on lead before decelerating to gain separation from lead

**Unqualified:** Applicant's response to fishtail and wingrock signals draws erratic movement to incorrect and inconsistent positions. While in route formation, applicant's position wanders excessively and no attempt is made to assist in clearing. Applicant misses frequency change calls and check-ins. Response to signal for echelon formation is delayed and the change is erratic with poor power management. Applicant is erratic in pitch, bank and power on initial approach, does not acknowledge pitchout signal, and leans significantly prior to breaking at an improper interval. Applicant varies his altitude considerably during the pitchout and rolls out on downwind wide of lead at higher than briefed airspeed. Applicant configures correctly but does not attain or maintain proper spacing on downwind or base. Applicant lands long and does not maintain correct side of runway.

During formation approach and landing, applicant wanders excessively in pitch, bank, and power on final and during configuration change. Corrected by lead, applicant still does not maintain a level stack. On short final, applicant aligns with his side of runway, and ceases maintaining position, flaring and landing separately from lead. Applicant passes lead on runway and/or brakes excessively to gain separation.

#### **Objective #14**

##### ***To execute runway clearing, taxi back, shutdown, and debriefing.***

**Qualified:** Applicant clears the runway at appropriate speed, forms on the leader and configures as the leader. During taxi to parking, applicant maintains briefed spacing on taxiway and ramp. Engine shutdown is on signal or as briefed and applicant properly secures his aircraft. During debriefing, applicant is attentive and accepts constructive criticism with maturity and objectivity, learning how to improve for the next formation flight.

**Conditionally Qualified:** Applicant clears the runway at appropriate speed and forms on the leader, but is late configuring. During taxi to parking, applicant occasionally varies from briefed spacing on taxiway and ramp. Engine shutdown is on signal or as briefed and applicant properly secures his aircraft. During debriefing, applicant is attentive and accepts constructive criticism with maturity and objectivity.

**Unqualified:** Applicant clears the runway with excessive speed, misaligns with lead, and does not configure as the leader. During taxi to parking, applicant does not maintain consistent spacing as briefed on taxiway and ramp. Applicant shuts down on his own without regard to lead's signal and aircraft is not properly secured. During debriefing, applicant does not accept constructive criticism, makes excuses, and exhibits immaturity.

## Flight Lead Selection and Evaluation Philosophy

The Flight Lead is responsible for the safe conduct of all formation flight under his/her control. He/she is responsible for approving all members in the flight. This implies the Flight Lead is familiar with the experience level, currencies, and credentials of each member with respect to the mission to be accomplished.

In a training environment, Flight Leads should assess the state of proficiency of Wingman and Flight Lead candidates, and forward recommendations for evaluations, when appropriate, to Check Pilots. Flight Leads are responsible for signing Wingman and Flight Lead Annual Activity Reports attesting to the fact that the pilot has flown the minimum number of required flights, is in compliance with FFI policies, and meets the FFI standards of performance. Flight Leads should identify members needing additional training and provide it where necessary, even to the point of recommending recertification under this program.

Leadership ability is the most important quality to be evaluated as a Flight Lead applicant. The applicant must demonstrate not only that he/she has the pilot skills and is in charge, but also that flight members can be confident and comfortable in following maneuvers and instructions. Flight leadership implies above average knowledge of aircraft and performance limitations, airspace and ATC environment, operations under a CoW for an airshow or Aviation Event, wingmen and their limitations, formation procedures, operational techniques, and signals, as well as excellent situational awareness.

### ***PRACTICAL TEST STANDARDS - FLIGHT LEAD - ORAL PHASE***

The oral phase shall be accomplished for all Flight Lead candidates even though it was accomplished as part of their Wingman evaluation. This is to ensure absolute standardization of all signals, procedures, and maneuvers among all Flight Leads. In addition, the applicant shall have complete knowledge and understanding of all Flight Lead responsibilities.

#### ***Objective #1***

***To demonstrate knowledge and understanding of all hand and aircraft signals.***

Run-up	Climb
Frequency changes	Descent
Number signals	Fuel state
Head nod	Inflight emergency/HEFOE
Wingman cross	Can't hear
Element cross	Can't transmit
Breakup and rejoin	Lead change
Gear and flap cycling	Stack up
Power addition and reduction	Stack down
Level off	Stop squawk
Beacon/Strobe On/Off	Fingertip to route
Fingertip to echelon	Echelon to fingertip
Fingertip to diamond	Diamond to fingertip
Fingertip to trail	Trail to fingertip

**Qualified:** Applicant knows all hand and aircraft signals and when they are used.

**Conditionally Qualified:** Applicant knows most of the signals with some prompting. Description of signals does not exhibit full understanding without discussion.

**Unqualified:** Applicant does not know hand or aircraft signals without prompting or open book reference. Applicant confuses or inverts meaning of two or more signals.

## **Objective #2**

**To explain the basic concepts of formation flight and demonstrate a full understanding of the mechanics and safety factors for the following:**

- Standard fingertip, echelon, trail, diamond, and enroute formations
- Cross-unders, rejoins, configuration changes
- Breakup and rejoin, turn cutoff, energy management
- Fingertip, echelon, trail, and enroute turns, and terminal maneuvering
- Lead changes, emergency signals and HEFOE system
- 360° overhead patterns, breaks, intervals, formation landings, go-arounds
- Taxi procedures
- Radio discipline, check-in, frequency changes, traffic calls
- Emergency abort on takeoff
- In-flight emergency procedures

**Qualified:** Applicant understands and is able to discuss the mechanics and dynamics of different formations and is able to describe methods of aircraft control and proper Wingman and leader techniques on all formations. Applicant understands flight discipline and each flight member's responsibility to flight integrity.

**Conditionally Qualified:** Applicant understands the mechanics of different maneuvers but needs prompting to understand the safety and dynamics. Applicant does not exhibit full knowledge of methods of aircraft control and techniques to maintain or change position. Applicant understands flight discipline and Wingman responsibility to flight integrity.

**Unqualified:** Applicant is unable to describe basic formation flight mechanics and concepts without prompting. Applicant is unable to describe formation flight dynamics and does not exhibit knowledge of basic safety of each formation or change.

## **Objective #3**

**To demonstrate knowledge and understanding of operations under a Certificate of Waiver for an Air Show or Aviation Event, to include the following:**

- Aircraft and pilot documentation requirements
- Applicable rules and restrictions contained in FAA Order 8900.1, Volume 3, Chapter 6
- Weather requirements and considerations
- Certificate of Waiver specifics to include the flying display area, show center, corner markers, the crowd line, the Category I, II, III show lines, and the concept and implication of waived regulations
- Air boss communications - normal and emergency
- Abnormal and Emergency procedures

**Qualified:** Applicant understands and is able to discuss rules and restrictions as they pertain to operations under CoW for an airshow or Aviation Event as they apply to Standard Maneuvering (non-aerobatic) formation flight.

**Conditionally Qualified:** Applicant has a general knowledge of rules and restrictions as they pertain to operations under a CoW for an airshow or Aviation Event as they apply to Standard Maneuvering (non-aerobatic) formation flight but is able to locate the required items within FAA Order 8900.1, Volume 3, Chapter 6 with little or no prompting.

**Unqualified:** Applicant is unable to discuss rules and restrictions as they pertain to operations under a CoW for an airshow or Aviation Event as they apply to Standard Maneuvering (non-aerobatic) formation flight.

#### **Objective #4**

***To demonstrate knowledge and understanding of Air Boss communications, both normal and emergency, while operating under a CoW for an airshow or Aviation Event***

**Qualified:** Applicant understands normal procedures, Air Boss frequency usage, the use of a discrete frequency, and Flight Lead responsibilities to communicate with, and to keep the Air Boss informed during abnormal or emergency situations.

**Conditionally Qualified:** Applicant has a general knowledge of Flight Lead communication responsibilities with the Air Boss both in normal and abnormal / emergency situations.

**Unqualified:** Applicant is unable to discuss Air Boss communication responsibilities in either normal and abnormal / emergency situations.

### ***PRACTICAL TEST STANDARDS - FLIGHT LEAD - BRIEFING PHASE***

#### **Objective #5**

***To organize and brief a four-ship flight including all elements of the FFI Formation Guidelines and Standard Procedures Manual plus formation takeoffs and landings and overhead patterns.***

**Qualified:** Applicant properly plans the flight with an orderly and efficient sequence of maneuvers which take into account local conditions and traffic. Applicant takes into account the qualifications and abilities of wingmen and checks credentials. The briefing is well organized, concise, and clear, and the applicant is clearly the leader and in charge. All formation briefing elements are covered and emergency procedures are briefed. All flight members understand the mission.

**Conditionally Qualified:** Applicant properly plans the flight but the sequence of maneuvers is not the most efficient, resulting in wasted time between maneuvers. Several formation briefing items are omitted. Flight position assignments are not consistent with wingmen abilities. The briefing leaves some unanswered questions and doubt in the minds of wingmen. Obvious leadership but short of inspiring total confidence.

**Unqualified:** Applicant lacks planning an organization in the structure of the sequence of maneuvers. Applicant does not take in consideration local conditions and traffic. Applicant does not take into consideration the qualifications and abilities of wingmen. The briefing is not concise and clear and leaves unanswered questions. The tone and content of the briefing does not suggest strong leadership and applicant is not clearly in charge. Numerous formation briefing items are omitted and emergency procedures are not discussed. Briefing elements, procedures, and signals are not standardized.

## **PRACTICAL TEST STANDARDS - FLIGHT LEAD - FLIGHT PHASE**

### **Objective #6**

**To conduct ground operations including start time, start, marshal, taxi, run-up, radio communications, and standard signals and procedures.**

**Qualified:** Applicant preflights aircraft, straps in, obtains airport information, and is ready to start engines at time briefed. Radio check in precise and communications established with all flight members. Delays or problems are handled and through radio and hand signals, applicant is in command. Applicant taxis at appropriate speed using appropriate procedures and complies with ATC procedures. Applicant appropriately positions flight in run-up area. Hand signals precisely executed and acknowledged. Sufficient time allowed for flight run-ups.

**Conditionally Qualified:** Applicant rushes preflight, strap in, or receipt of airport info, but ready to start on time. Radio check in not precise and missed check in not caught. Applicant indecisive dealing with problems and not in charge of problems. Taxi speed inconsistent requiring Wingman to use excessive power or brakes. Misses radio call. Applicant inappropriately positions flight in run-up area. Hand signals correct but imprecise. Run-up rushed.

**Unqualified:** Applicant performs unsafe preflight and not ready to start on time. Radio check in non-standard and taxis without positive radio contact. Applicant not decisive in dealing with problems and led by events or consensus. Taxi speed varies excessively or inappropriate for conditions. Misses critical radio calls causing problems. Positioning in the run-up area disregards wingmen. Hand signals incorrect or not visible to all and acknowledgements disregarded. Rushes run-up to point wingmen checks are incomplete.

### **Objective #7**

**To conduct formation takeoff, element joinup after takeoff, and enroute procedures.**

**Qualified:** Applicant ensures flight is ready for takeoff and on frequency. Radio communications are clear and concise and all instructions or standard procedures complied with. Correctly aligns flight on the runway and uses correct signals for engine runup and brake release. Flight Lead positions himself in takeoff position so as to visually clear the runway, and does not roll until the runway ahead is clear or the previous section (element or flight) has or is about to liftoff with no standing or aborting aircraft on the runway. Smooth and appropriate power, directional control, and rotation result in precise liftoff. Establishes power and attitude for climb smoothly and appropriately. Applicant begins turn for element joinup smoothly, correctly positions Wingman, and maintains constant bank and airspeed while element joins to outside of turn. Climbout procedures, power, and frequency changes are correctly executed with appropriate formation changes.

**Conditionally Qualified:** Applicant ensures flight is ready for takeoff and on frequency. Procedures are complied with but an occasional radio call may be unclear or missed. Correctly aligns flight on the runway but signals may not be totally clear or visible and applicant does not monitor acknowledgement. Flight Lead positions himself in takeoff position so as to visually clear the runway, and does not roll until the runway ahead is clear or the previous section (element or flight) has or is about to liftoff with no standing or aborting aircraft on the runway. Runup and brake release is correct but power advance is too fast or slow. Directional control is acceptable but rotation too fast or slow not allowing Wingman to easily match the rotation. Climb power and attitude control causes Wingman to work harder than necessary. Applicant smoothly begins the turn for joinup and correctly positions the Wingman, but attitude, bank or speed during the turn causes element go acute or be too shallow, preventing an expeditious and smooth rejoin. Climbout procedures, power, and formation / frequency changes executed with only minor deviations.

**Unqualified:** Applicant rushes wingmen and all are not on proper frequency. Radio communications are not clear and concise, doubt exists as to intentions, and radio calls are missed. Instructions or standard procedures are not complied with. Runway alignment is non-standard or wingmen are crowded and engine runup and brake release signals incorrect. Flight Lead does not position himself so as to visually clear the runway, and he rolls before the runway ahead is clear, the previous section (element or flight) is about to lift off, or with standing or aborting aircraft on the runway. Applicant uses inappropriate power setting, wandering directional control, or abrupt liftoff causing Wingman difficulty in formation takeoff. Climb power and attitude inconsistent and abrupt. Turn for joinup is abrupt and Wingman not positioned correctly. Airspeed, bank, and climb angle during joinup inconsistent causing element excessive maneuvering. Applicant not situationally aware causing departure deviations or traffic conflicts, and insensitive to Wingman requirements during climbout. Formation and frequency changes inappropriate.

### **Objective #8**

***To conduct general airmanship and flight lead control techniques, including smooth and deliberate flight control manipulation, constant roll rates into and out of turns, as well as climbs, descents, power management, formation changes, and configuration changes.***

**Qualified:** Applicant is obviously in charge. The sequence of maneuvers is as briefed, logical, and consistent with power and airspace limits. Situational awareness is maintained at all times. No unsafe condition is allowed to develop. Applicant constantly scans for traffic, flies with smooth and constant rate control inputs, and considers the wingmen states of proficiency. Applicant keeps power changes to a minimum and smooth, allowing a comfortable power margin. No maneuver causes wingmen to meet or exceed operational limitations. Hand or aircraft signals are standard, clearly given, and acknowledgements noted. Radio procedures are standard, wingmen are always on the correct frequency and checked in properly. Formation or frequency changes are properly signaled or called with sufficient time or space allowed for wingmen.

**Conditionally Qualified:** Applicant in charge but may show some indecision. Maneuvers are as briefed, but not in the most logical sequence. Situational awareness is good, but a better choice of altitudes or airspace would have been better for the formation. No unsafe situation is allowed to develop. A good lookout is maintained but some traffic is missed. Wingman proficiency level is occasionally overlooked. Control inputs provide constant rate maneuvers but could be initiated more smoothly. Power changes are smooth but sometimes do not give wingmen an advantage. No maneuver causes wingmen to exceed operational limitations. Hand or aircraft signals are standard, but may be rushed, not always visible to all, or acknowledgement not always checked. Radio procedures are standard but some may be unclear requiring repeat. Better planning would aid in maneuver execution, pace, or formation change.

**Unqualified:** Applicant not always in charge, allows events to dictate the course of the flight, exhibits indecisiveness, and fosters doubt among wingmen. Sequence of maneuvers not as briefed, not logical, and poorly planned allowing dead space. Altitude and airspace not well utilized. Situational awareness not maintained and airspace or traffic conflicts and unsafe conditions develop. Applicant ignores the proficiency level of wingmen and does not notice them out of position. Control inputs are abrupt and maneuver rates not constant. Power control leaves no margin for wingmen and maneuvers cause wingmen to meet or exceed operational limits. Wingmen have difficulty maintaining position. Hand or aircraft signals are non-standard and not visible, causing confusion among wingmen. Radio procedures are non-standard or unclear causing wingmen to be confused or off frequency. A general lack of planning causes non-standard formation changes and wingmen poorly positioned.

## **Objective #9**

***To conduct smooth lead training maneuvers: Lazy 8s in various formations, in-trail, break-ups and rejoins.***

**Qualified:** The flight is conducted as briefed. Applicant correctly signals flight into all formations, waits until #4 calls in for trail, and conducts maneuvers appropriate for each type formation. Applicant selects and holds a comfortable power setting allowing ample power margin for the flight. Changes in pitch and roll are precise and smooth at constant rates appropriate for the flight's level of experience. No aircraft or engine limits are exceeded. Pitchouts and rejoins are signaled correctly and rejoin is held constant at appropriate angle and airspeed. Situational awareness is maintained at all times and applicant constantly scans for traffic. Sun angles are always considered and minimized. No unsafe condition is allowed to develop.

**Conditionally Qualified:** The flight is generally conducted as briefed with some deviations. Applicant correctly signals flight into all formations, waits until #4 calls in for trail, and conducts maneuvers appropriate for each type formation. Planning, timing, positioning, and execution of maneuvers, though acceptable, could be improved with better use of altitude, airspeed, and airspace. Power settings allow a less than desirable power margin. Pitch and roll inputs are smooth but rates are not constant making it difficult for wingmen to maintain position. Signals are sometimes not visible to all causing some confusion. Pitchout and rejoins are signaled correctly but rejoin bank angle and/or airspeed not constant causing wingmen some problems. Situational awareness is maintained and applicant is alert for traffic. Sun angles pose visibility problems occasionally. No unsafe conditions are allowed to develop.

**Unqualified:** The flight is not conducted as briefed. Maneuvers selected are inappropriate for the formation flown and the wingmen's ability. The planning, timing, positioning, and execution of maneuvers is unsatisfactory and airspace, airspeed and altitude are not used well, causing time wasted. Power settings and control cause wingmen to abuse their engines. Control inputs are abrupt, rapid, and inconsistent and do not consider proficiency level of wingmen, who must make large power and control inputs to stay in position. Signals are incorrect or not visible. Rejoin pitch and bank angles are inconsistent making wingmen unable to execute a smooth, safe, and timely rejoin. Situational awareness is poor and applicant is not alert for other traffic. Sun angles are disregarded. Unsafe conditions may arise. A lack of leadership, discipline, and understanding of flight dynamics is evident.

## **Objective #10**

***To conduct flight entry into an airport traffic pattern, including compliance with instructions and maneuvering the flight for a 360° overhead pattern and a formation landing.***

**Qualified:** Situational awareness is high and planning for the descent and approach is clear. Radio communications and field advisories are accomplished, and any changes to the briefed arrival are passed to the flight. Adequate time and distance are allowed for formation position changes, frequency changes, and descent checks. Maneuvering is held to a minimum and executed to avoid traffic conflicts and conform to local procedures. Signals are correct and timely.

**360° overhead** - Arrival onto initial is well planned with appropriate radio call and the flight is put into echelon with sufficient time to allow members to stabilize prior to the pitch. Pitchout signal is given clearly with appropriate interval indication for the conditions. The pitchout is executed at the right place considering traffic and is aggressive yet smooth, resulting in an appropriate downwind position at an appropriate airspeed. Downwind airspeed is maintained as briefed, base turn is initiated at appropriate place with correct radio call, and airspeed and altitude in base turn and on final is appropriate. Landing is made in the touchdown zone and the correct side of the runway is maintained until clearing or called across. Lead marshals his flight and taxies to parking at an appropriate speed with correct radio calls.

**Formation landing** - Lead effectively splits the flight into two-ships. Lead positions the flight on sufficiently long final approach and stabilizes pitch and airspeed, places the Wingman on the upwind side in ample time, and maintains smooth power with an ample margin. Lead ensures Wingman is in proper position and correctly signals configuration changes. Lead provides a stable platform with smooth pitch and power, touches down in the zone, maintains power briefly allowing Wingman to fall back, and maintains his side of the runway with good directional control and moderate braking. Lead marshals his element for taxi to parking.

**Conditionally Qualified:** Situational awareness is evident and planning for the descent and approach is adequate. Radio communications and field advisories are accomplished and any changes to the briefed arrival are passed to the flight. Approach is somewhat rushed and more time could have been allowed for formation changes, frequency changes, and descent checks. Some excess maneuvering is required that better planning and alertness for traffic might have eliminated. Signals are correct but some may not be visible to all, producing some confusion.

**360° overhead** - Arrival onto initial requires some unnecessary maneuvering, radio call is correct, and initial is too short, requiring the change to echelon and pitchout signal to be rushed. The pitchout is delayed because of the rush, is aggressive and smooth but the airspeed on downwind is other than briefed. Base turn is delayed, causing a large pattern and altitude/airspeed control causes variations. Landing is in touchdown zone and correct side of runway is maintained until clearing or called across. Lead marshals his flight and taxis to parking with correct calls but varying speed.

**Formation landing** - Lead splits the flight into two elements with some excess maneuvering. Lead positions the element on a too short final, which rushes stabilization and positioning of Wingman on upwind side, and causes power and pitch fluctuations. Lead allows Wingman to stack low too long before correcting and rushes signal for configuration changes. Lead is stable in pitch but makes too many power adjustments, lands in the zone on his side but with too little power, causing Wingman to not fallback easily. Lead maintains good directional control but brakes too aggressively causing Wingman overrun. Lead marshals his element for taxi to parking.

**Unqualified:** Situational awareness and planning for descent and approach are lacking. Radio communications and field advisories are not timely or not accomplished and changes to the briefed arrival are not passed to the flight, allowing confusion to be evident. Insufficient time and distance are allowed for formation changes, frequency changes, and descent checks, and the flight is rushed. Excessive maneuvering results from poor planning and traffic deconfliction. Signals are non-standard and not clearly given.

**360° overhead** - Arrival onto initial is poorly planned requiring excessive maneuvering and perhaps a turn into the echelon, lead is not smooth in pitch or power, radio calls are incomplete or absent, and pitchout/interval signal is rushed or not visible. Pitchout is too early or late for the conditions, Altitude is lost or gained in the break, and airspeed on downwind is other than briefed. Base turn is delayed causing a large pattern and airspeed/altitude vary considerably causing difficulty for flight to follow. Landing is not in touchdown zone, lead does not maintain his side of the runway, and braking is too aggressive causing flight to close too fast. Lead does not marshal the flight after clearing the runway.

**Formation landing** - Lead splits the flight into two elements with some confusion after excessive maneuvering and inattention for local traffic. Lead positions the element on too short a final with significant power and pitch variations, does not place Wingman on upwind side, and the approach is rushed, as are the configuration changes. Lead does not notice or correct the Wingman's too low, too far back position. Leads control and power inputs are excessive. Lead flares abruptly and chops power, causing Wingman to overtake, and lands out of the touchdown zone. Lead crowds the centerline and uses excessive braking. Lead does not marshal his element before taxiing to parking.

**Objective #11**

***To properly debrief a four-ship formation flight.***

**Qualified:** The applicant conducts the flight debriefing in a timely and constructive manner in a location that is free from distractions. The flight is debriefed in a concise and logical manner from start to finish. Non-standard events and unsafe actions are emphasized. Mistakes are explained and corrective actions suggested, including remedial training or decertification. The debriefing is a learning experience with all questions answered, opinions heard, and conflicts resolved.

**Conditionally Qualified:** Lead conducts the debriefing in a timely manner but allows distractions to intrude. The flight is debriefed in a concise manner from start to finish, but some non-standard events are missed. All unsafe actions are debriefed. Mistakes are explained but corrective actions or training are not dealt with. The debriefing is a learning experience but some issues are unresolved.

**Unqualified:** The debriefing is not conducted in a timely manner with numerous distractions allowed to intrude. Location is not conducive to a quality debriefing. Some flight members are late or absent and applicant does not have everyone's attention. The flight is not debriefed in an orderly manner. Non-standard events are glossed over and unsafe actions not addressed. Lacking in leadership skills, applicant does not deal with mistakes nor corrective actions. Flight members do not profit from the debriefing, questions remain, and conflicts are left unresolved.

## 11. DOCUMENTATION

- To request an evaluation for an FFI Wingman or Flight Lead qualification, an applicant completes the header information on the appropriate Formation Evaluation Form. The Hold Harmless statement on the back of the evaluation form must also be signed by the applicant and witnessed by another individual. The applicant will then present the form to a Flight Lead or Check Pilot for their recommendation.
- The Flight Lead or Check Pilot, if he believes the applicant is qualified, completes the recommendation section of the form and contacts a Check Pilot to schedule the evaluation. If an applicant does not meet specific requirements as outlined in Section 7 of this manual, but the recommending Flight Lead feels the applicant is qualified for the evaluation, a waiver of specific requirements may be granted by the FFI President. That waiver must be requested and approved prior to the scheduling of the evaluation.

NOTE: If a Check Pilot recommends an applicant, he **cannot** also conduct the evaluation.

**FFI Wingman Evaluation Form**

IMPORTANT: RELEASE/HOLD HARMLESS MUST BE PRINTED ON REVERSE SIDE AND MUST BE SIGNED BEFORE FLIGHT

Applicant Name (as appears on Pilot Certificate) \_\_\_\_\_ Date \_\_\_\_\_  
 Address \_\_\_\_\_ Email \_\_\_\_\_  
 \_\_\_\_\_ Primary phone \_\_\_\_\_  
 Pilot Certificate Type \_\_\_\_\_ No \_\_\_\_\_ Medical Class \_\_\_\_\_ Date \_\_\_\_\_  
 Total flight time (100 hrs min) \_\_\_\_\_ Total formation time (20 hrs min) \_\_\_\_\_ 4-ship flights (10 min) \_\_\_\_\_  
 A/C Type \_\_\_\_\_ Emergency Contact \_\_\_\_\_ Phone \_\_\_\_\_

RECOMMENDATION: I have observed the above pilot in \_\_\_\_\_ formation flights, find him/her qualified, and recommend him/her for an FFI Wingman evaluation.  
 Recommending Flight Lead Name \_\_\_\_\_ FFI # \_\_\_\_\_  
 Recommending Flight Lead Signature \_\_\_\_\_ Date \_\_\_\_\_

EVALUATION PRACTICAL TEST STANDARDS (To be filled out by Check Pilot)

		QUAL	COND QUAL	UNQUAL			QUAL	COND QUAL	UNQUAL
1 Signals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		8 Climbout / Route	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Formation knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		9 Cross Unders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Air Show knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		10 Pitchout and Rejoins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Ground Operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		11 Echelon turns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Communications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		12 Lazy 8 Maneuvering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Run-up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		13 Pattern / Landing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Formation Takeoff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		14 Taxi / Debriefing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SUMMARY OF FLIGHT EVALUATION

QUALIFIED  Comments: \_\_\_\_\_  
 CONDITIONALLY QUALIFIED   
 UNQUALIFIED

Recommendation for further training: \_\_\_\_\_

Check Pilot Name (print) \_\_\_\_\_ FFI # \_\_\_\_\_  
 Check Pilot Signature \_\_\_\_\_ Date \_\_\_\_\_

- The Check Pilot who will conduct the evaluation reviews the form for accuracy, and insures that all qualification requirements have been met.
- The Check Pilot performs the evaluation using FFI Evaluation Supplement.
- If the evaluation is successful, the Check Pilot signs the form, makes a copy for his files, and sends the completed original to the President.
- If the check is unsuccessful, the Check Pilot declines to sign and files or returns the form.
- Upon successful completion, the President, or his designated representative, will review and send the applicant his Program credentials.
- FFI Annual Activity Reports will be submitted annually by all card holders to an FFI Flight Lead or Check Pilot for review, and then submitted to the President or his designated representative for re-issuance of the FFI credential.

## 12. EVALUATION / QUALIFICATION FORMS and REPORTS

- Evaluation / qualification forms and reports, (Wingman, Flight Lead, Check Pilot, Large Formation Flight Lead, and Annual Activity Report), the current FFI fee schedule, and the address to which to submit them, are all found in the FFI Evaluation Supplement.

**NOTE: Each Formation Evaluation form must be accompanied by a signed and witnessed Hold Harmless Statement. The Hold Harmless MUST be printed on the SAME PIECE OF PAPER. (Hold Harmless on the back side).**

## 2017-18 Summary of Changes

### TABLE OF CONTENTS:

- Re-ordered and re-titled sections, as required

### Section 1 MISSION STATEMENT:

- Added Standard Maneuvering and Certificate of Waiver verbiage to the Mission Statement.
- Added Formation Pilot's Knowledge Guide to the list of additional reference material.

### Section 2 OVERVIEW / HISTORY:

- Added additional historical data, including post-2015 FFI/FAST cooperative efforts.

### Section 3 PHILOSOPHY AND POLICY:

- Corrected the title of the FFI Formation Guidelines and Procedures Manual.
- Added clarifying verbiage in the Flight Lead description.
- Added a definition of, and parameters for, Large Formation Flight Leads.
- Clarified the process for accident reporting and follow-up.
- Added verbiage about FFI and FAST card reciprocity.
- Added verbiage clarifying that the FFI Program Manual concerns non-aerobatic, Standard Maneuvering formation flying.
- Added verbiage clarifying that FFI card qualifications are not aircraft-specific.

### Section 4 PROGRAM PRINCIPLES:

- Updated several bullets in this section in terms of evaluation/check ride principles.
- Added clarifying verbiage regarding Check Pilot selection criterion.
- Added FAA Order 8900.1, Volume 3, Chapter 6 to knowledge requirements for evaluations.
- Added verbiage clarifying Flight Lead and Check Pilot responsibilities and authority as the team leader, when operating in a CoW.
- Added verbiage clarifying that FFI card-holders are subject to performance review for non-compliance.

### Section 5 DEFINITIONS - FAA Order 8900.1, Volume 3, Chapter 6:

- Added new section with definitions found in the 2018 FAA Order 8900.1, Volume 3, Chapter 6

### Section 6 FFI CARD AUTHORIZATION:

- Added new section that outlines FFI Card Authorizations under the 2018 FAA Order 8900.1, Volume 3, Chapter 6

#### Section 7 PILOT QUALIFICATION REQUIREMENTS:

- Added Airshow Environment oral evaluation requirement to Wingman Minimum Qualifications.
- Added Airshow Environment oral evaluation requirement to Flight Lead Minimum Qualifications.
- Added completion of a Check Pilot Standardization Program and Airshow Environment knowledge demonstration requirements to Check Pilot Minimum Qualifications.
- Added Large Formation Flight Lead Minimum Qualifications.

#### Section 8 EVALUATIONS:

- Added verbiage that all evaluations will be conducted with reference to the FFI Evaluation Addendum.
- Clarified Check Pilot chase aircraft options.
- Clarified the basic requirements for a Check Pilot check ride.

#### Section 9 CURRENCY:

- Updated minimum currency requirements for Wingmen, for operations in a CoW, to match the 2018 FAA Order 8900.1, Volume 3, Chapter 6.
- Added FFI Airshow Currency Recommendations for Wingmen.
- Updated minimum currency requirements for Flight Leads, for operations in a CoW, to match the 2018 FAA Order 8900.1, Volume 3, Chapter 6.
- Added FFI Airshow Currency Recommendations for Flight Leads.
- Added Large Formation Currency requirements..
- Added Practice Session Rules definitions.

#### Section 10 PRACTICAL TEST STANDARDS AND EVALUATION GUIDELINES:

- Re-titled Section to incorporate Practical Test Standards (PTS) nomenclature.
- Added new Objective #3 to Wingman PTS, covering CoW and Air Show operations knowledge.
- Separated crossunders, pitchouts and rejoins, and echelon turns into separate Wingman PTS Objectives, numbers 9, 10, and 11, and updated verbiage in #11.
- Updated Flight Lead Selection and Evaluation Philosophy verbiage.
- Added new Objective #3 to Flight Lead PTS, covering CoW and Air Show operations knowledge.
- Added new Objective #4 to Flight Lead PTS, covering knowledge of normal and emergency Air Boss communications.

#### Section 11 DOCUMENTATION

- Added new section to clarify documentation requirements for FFI evaluations and annual currency reporting.

#### Section 12 EVALUATION / QUALIFICATION FORMS and REPORTS:

- Updated section with reference to the FFI Evaluation Addendum as the source for all required forms.