

RPA

(Red Star Pilots Association)



FORMATION MANUAL

Version 6.0

INTRODUCTION

The Formation And Safety Team (FAST) was formed in 1993 to develop and codify standards for formation flying throughout the warbird community. Since that time, FAST has expanded to 17 signatories and includes a wide variety of aircraft including those with a military heritage as well as some formation-capable civilian aircraft.

This manual contains all the formation fundamentals including:

- Wingman procedures and techniques
- Operating procedures
- Contingency procedures
- Comm procedures and techniques, hand signals, and aircraft signals

NOMENCLATURE

Several conventions have been used throughout this manual. The terms he, she, him, her, his, hers, himself and herself are used in a generic sense and apply to all individuals, without bias or prejudice.

The terms Lead, leader, flight leader, #1, and lead pilot are used interchangeably—all these terms refer to the same individual—the pilot in command responsible for leading an individual formation.

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PREFACE

Formation flight dates back to World War I when the military began flying in formation as a means to provide mutual support in the skies over battlefields. The military continued to develop and refine formation concepts over the years and employs these concepts, in all the militaries of the world, to this day.

The principles presented in this comprehensive formation manual are derived from these same military concepts and have been adapted to the meet the needs of the civilian aviation community.

The formation concepts presented in this manual are applicable whether you are interested in flying with like-minded pilots in the local area or you want to fly in the waived airspace typically delineated at airshow venues. Regardless of your motivation, the following priorities apply:

First—Proficiency/safety

Second—Mutual support

Third—Symmetry/aerial display

STUDENTS

Formation flying is a particularly demanding skill set. You will be flying in close proximity to other aircraft, so an error can ripple through the formation, causing harm

to other pilots. The formation student needs to approach training well prepared, both mentally and physically.

Being prepared mentally encompasses knowledge of:

- Aircraft systems
- Aircraft procedures
- Your organization's standard operating procedures
- Formation signals (hand, aircraft and radio calls)
- Formation protocols, detailed in this manual

Being prepared physically means you are:

- Physically fit for flight
- Hydrated
- Rested

WING PILOT RESPONSIBILITIES

Being a good wingman means more than just hanging on Lead's wing. The wingman is part of a disciplined team, and with that comes additional responsibilities:

- Provide mutual support
- Maintain formation integrity
- Assist in mission planning, if requested
- Keep Lead in sight at all times
- Be aware of departure, enroute and arrival routing so

he/she can assume the lead, if required

- Monitor Lead for proper configuration and abnormal conditions
- Assist during abnormals or emergencies, as directed
- Monitor radio communication
- Trust and follow Lead's direction
- Wingman is responsible for separation with Lead

SAFETY EQUIPMENT

The following is a list of equipment for formation flight. Though not all items are required, the recommended equipment adds an additional layer of safety to your operation and could save your life one day.

Recommended:

- Nomex or other fire-retardant flight suit and gloves
- Parachute
- Helmet

Required (with IP on board):

- Intercom system
- Ability for instructor to transmit/receive on radio
- Dual controls

DEMO-DO

The onboard instructor will utilize the “demo-do” process—each task will be demonstrated and explained to the student, followed by repeated practice by the student, with the instructor providing constructive feedback and guidance.

PILOT IN COMMAND

The formation student pilot is the legal pilot in command and is ultimately held responsible for the condition of the aircraft and its safe operation. It may be in the best interest of all parties to execute a hold-harmless agreement to establish a no-liability relationship between the instructor and student prior to beginning flight instruction.

TRANSFER OF AIRCRAFT CONTROL

In the course of formation training, particularly in tandem-seat aircraft where the pilots cannot see one another's controls, it is imperative that positive control of the aircraft be maintained at all times.

Transfer of aircraft control, back and forth between instructor and student, must be performed in a positive, confirming manner. “The shaker is the taker” is a common, confirming technique. When aircraft control is passed from one pilot to the other, the surrendering pilot will state, over the intercom:

“You have the aircraft.”

The accepting pilot will shake the control stick or yoke and state:

“I have the aircraft.”

From this point on, the accepting pilot has full control of the aircraft.

Especially in the formation training environment, there is always the potential for a situation to deteriorate rapidly. If this should happen and the instructor recognizes the need to immediately take command of the aircraft to prevent a mid-air collision, “the shaker is the taker” protocol does not apply. The instructor will announce, in a forceful manner, “*I have the aircraft*” and the student will immediately surrender control of the aircraft.

FLIGHT LEADER RESPONSIBILITIES

Assuming the role of flight leader is a huge undertaking. In addition to being able to fly smoothly, providing a stable platform for the wingmen, Lead must monitor the wingmen, monitor the flight environment, and plan well ahead of the formation. The flight leader's responsibilities also include, but are not limited to:

- Safe conduct of flight
- Selection of wingmen
- Verification of pilots' credentials, currency and competency in type
- Mission planning
- Briefing the mission
- Debriefing the mission
- Training new formation pilots
- Endorsing Formation Proficiency Reports (FPR)
- Recommending pilots for Wing and Lead check rides

SITUATIONAL AWARENESS

Discipline and situational awareness are part and parcel of every pilot's modus operandi, but formation flight requires taking these to a higher level.

The academic definition of situational awareness is:

The continuous observation of current conditions and, along with the integration of previous knowledge, the ability to quickly form a coherent mental picture to anticipate future needs and direct future actions.

Or, in more prosaic language, “*Don't let your aircraft occupy space where your brain has not already been.*”

It is absolutely critical that every formation pilot has his “head in the game” at all times. There is little room for error and errors can propagate quickly throughout a flight of aircraft in formation.

HOW TO USE THIS MANUAL

This manual provides a comprehensive, in-depth study of fundamental formation concepts and theory.

STUDENTS

The student should begin by studying the Preface, Chapters 1 through 9, and Appendix A. This will provide the

student with a solid, basic understanding of formation structure and protocols. Once the student has completed this portion of training, he or she should coordinate with a FAST signatory to complete the ground school and then pair with a qualified formation flight instructor to begin the flying portion of training.

For the flight phase of training, the student should seek to first become proficient in 2-ship formation. Once 2-ship has been mastered, the student will progress to 4-ship formation.

FLIGHT LEADERS

Flight leaders must have a thorough knowledge of this manual and its appendices in order to play a critical role in maintaining standardization.

There are two levels of formation flight instruction. The first level of instruction is that provided by the flight leader during the post-flight debrief. The flight leader must possess the wherewithal to critique the flight in such a manner that the what, why, how aspects of the flight are thoroughly addressed. “What” means what happened in the course of each task—this requires keen observational skill. “Why” means why was the task not performed to standard—this requires keen diagnostic skills. “How” means how do you correct the observed task to standard—this requires a deep understanding of the mechanics of the maneuver and brings into play observational, diagnostic and analytical skills to meaningfully present a solution.

FLIGHT INSTRUCTORS

The second level of instruction is that provided by an on-board flight instructor. This instructor must be capable of demonstrating and teaching all the formation tasks from takeoff to landing. In addition, this instructor must possess the wisdom and experience to recognize when it is necessary to take the aircraft from the student in order to prevent an incident or accident.

To that end, the on-board flight instructor should have thorough, in-depth knowledge of this manual and its appendices.

WARNINGS, CAUTIONS AND NOTES

Throughout the manual, there are Warnings, Cautions, and Notes. These are defined and indicated in the manner designated.

WARNING

Warnings signify situations where injury or death may result

CAUTION

Cautions signify situations where aircraft or property damage may result

NOTE

Notes provide additional information useful to the understanding of the material

