



# FLIGHT-WATCH



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## LEARNING TO FLY WARBIRDS IN FORMATION

### I.

#### INTRODUCTION

Very few pilots trained in the civilian sector

master the art of formation flying. Pilots skilled in this activity typically received their training in the military. Finding an environment in which one can learn the art of formation flying, especially flying World War Two vintage aircraft, is no easy task. Fortunately, two organizations, Formation and Safety Training (FAST) and Training Squadron One of the Commemorative Air Force (TRARON) offer instructors who can train and recommend for check rides pilots who desire to obtain a formation patch. Equipped with a formation patch, the pilot may then operate his aircraft in formation at air shows (in waived airspace).

### II.

#### FORMATION TRAINING AT MITCHELL FIELD IN BESSEMER, ALABAMA

Skipper Hyle and Sid Snedeker organized a FAST/TRARON formation clinic that took place at Mitchell Field in Bessemer, Alabama (just south of Birmingham) between March 26 and March 28, 2004. Skipper is a Captain with Air Tran and flew F-16's in the Air Force. Sid was a pilot in the Marine Corps with numerous medals for valor and worked as the program manager on the Douglas A-4 Skyhawk attack aircraft. Their efforts as formation instructors were complemented by those of Major



“Sparky” (an F-16 pilot on active duty with the 422 Test Squadron based at Eglin Air Force Base), Jim Munn (a retired businessman from

California), Morris Ray, M.D. (a Memphis neurosurgeon), Rick Hosking (a veterinarian), and Tad Foran of Dallas, Texas. The good work of these instructors in directing the formation students in their activities was only made possible by flight leaders such as John Currenti (a Delta pilot and F-16 pilot in the Alabama Air National Guard), Larry Lumpkin (a United captain), and Joe Carley of Destin, Florida.

The author joined Keith Wood, Jack Van Ness, and Pete Smart of the Dixie Wing of the Commemorative Air Force for training at the FAST/TRARON clinic. Keith is a trial lawyer from Jonesboro, Georgia, and Jack is a retired Eastern captain with vast experience in propeller-driven and turbo-jet aircraft. These fellows, along with Joe Broker (a captain with Delta Airlines) are members with me in Japanese Bomber, LLC, which operates a 1943 SNJ-4 aircraft modified for the film *Tora! Tora! Tora!* that depicts and appears to resemble a Japanese Nakajima Model Number B5N2 (“Kate”) attack and torpedo bomber. Pete is an ex-Air Force pilot who retired from Delta.

Upon our arrival in the late afternoon of March 26, 2004, training was already in progress. As we arrived over the airport to enter the traffic pattern,

we had a ring-side seat to a 360 overhead break above the numbers of Runway 23. We followed the two-ship element in for landing and were greeted by other pilots and instructors who had been participating in the formation clinic.

Everyone participating in the clinic recognized the hazards of formation training, especially the neophytes with little or no prior formation experience. Because of this, at every briefing and every meeting, safety was a paramount concern. The clinic began with several hours of classroom instruction in which the various formations were reviewed, such as finger-tip strong right, finger-tip strong left, the diamond formation, echelon right, echelon left, and the in-trail formation. Signals for shifting to these formations, pitch-outs, re-joins, 360 overhead breaks, were reviewed to ensure that every pilot flying would know exactly what was expected of him or her. It was made very clear that unless every pilot knew exactly what the signals meant, nobody would fly with him or her. At the conclusion of the classroom session, written quizzes were handed out along with written materials that every pilot was instructed to read and review before the following day's flying activities.

Saturday morning at 7:15, we boarded the bus to take us to our airplanes. By 7:30 a.m. we were at the flight line ensuring that our aircraft were ready for flight. The weather was beautiful and it was inspiring to see 15 or so Warbirds assembled at the flight line being prepared for sorties. Pilots were dutifully pulling the propellers through of their round engines, checking oil and fuel levels, pumping the flaps down to the extended position, checking flight controls and a whole host of activities that Warbird pilots must observe in ensuring their aircraft are



### JAPANESE NAKAJIMA MODEL NUMBER B5N2 ("KATE")

safe for flight.

While the flight line was busy with pre-flight operations by the pilots, the instructors were assembled in the hangar, drawing up flight assignments on a board. The less experienced pilots would fly in two-ship elements. The element leader was an experienced formation pilot who would have a second pilot in the back seat of his aircraft to observe the formation students. The formation students would have an experienced instructor pilot in the back seat of his aircraft to talk him through the challenging art of formation flying, as well as to ensure that the student would not pose a hazard to himself or to his element leader.

While Jim Munn was making out the flight assignments, the pilots were assembled in the hangar for more briefing by Skipper Hyle. The importance of flight safety was again emphasized, as well as the protocol to be observed over the radio when operating as a two-ship element. The various flights were given code names such as Green, Red, or Blue and these flights were instructed to operate at





specific altitudes and in different geographic areas in relation to the home airport.

Although it may sound rudimentary, four of us were called upon to stand in the hangar and choreograph (walk through) the various formations while our element leader gave us the hand signals. Even the slightest mistake or error in timing was promptly brought to our attention. Every pilot had to know exactly what was expected of him or her.

Following the morning briefing, we broke up into individual briefings with our element leaders. Procedures to follow in the event of an emergency were the first items briefed. Our number one and number two radio channels were briefed. The location of our operation and altitudes were briefed. The power setting that would be employed by our flight leader were briefed. We then had time to spend with our instructor pilot to tell them about our level of experience in the aircraft and in formation flying.

During the briefing, each flight had a specified engine start time. A couple of minutes before engine start time you would turn on the master switch, listen to the airport weather (AWOS), and then turn the master switch off. About one minute before start time, you would begin pumping the wobble pump on the aircraft and then injecting about nine shots of primer into your Pratt & Whitney R1340 engine. Precisely at the time briefed by your element leader, you would



see his propeller begin to spin, and you, too, would turn on the master switch, engage the starter, and turn on the magnetos. Your engine would then roar to life with blue-gray smoke belching along the right side of your fuselage. Turning on the radio master switch and radio, your element leader would call to the flight. My first flight was "Blue" and my check-in was simply "Two." As my leader pulled forward from the flight line, I followed him in trail. We s-turned left and right. As his nose pointed right, mine pointed left, and vice versa. This choreography had a purpose. We were both clearing the taxiway in front of us while turning in opposite directions. A local film crew was on hand to capture this event as our flight taxied out for takeoff.

Because of our inexperience, initially, formation takeoffs were not attempted. Rather, we accomplished element takeoffs. We taxied out toward the hold-short line and did our engine run-ups and preflight sequencing. When my aircraft was ready for flight, I gave the thumbs-up signal to my element leader. Announcing our intentions on the Unicom frequency, my element leader took us to the active runway, where he positioned his aircraft on the downwind half of the runway. My aircraft was positioned on the upwind half of the runway. Both aircraft were canted in slightly towards the centerline of the runway to ensure that we could see all the way down the runway. Twirling his fingers above his head, my element leader signaled he was going to 2,000 rpm. I followed suit. With a head nod, my element leader was rolling down the runway. When I saw light under his wheels, I went to 36 inches of manifold pressure and 2,250 rpm and took off behind him. Since we took off on Runway 5, my element leader made a left turn toward the southwest, and I was expected to cut him off

and rejoin on his left wing. To say that formation flying is challenging for a pilot with no experience in this fine art is an understatement. It is physically

and mentally draining. The first flight consisted primarily of station-keeping, along with break-ups and rejoins. You have to learn the principles of geometry to put your aircraft where it needs to be, since your aircraft does not have sufficient power to capture an airplane a mile away. You have to learn to cut off your element leader, follow a pure intercept curve, and then adjust your pure pursuit curve with lag and lead to “come aboard” at a 45-degree bearing line abeam your leader on the inside of his turn with adequate step-down and lateral spacing to ensure that should he have an engine failure, he would depart the flight up and out and not into you.

I was fortunate to have three flights on Saturday and one flight on Sunday. With each flight, I could see the principles that had been covered thoroughly in the briefings. As you constantly practice pitch-outs and rejoins, you begin to see the picture of how to safely intercept your element leader by flying a turning radius inside his turn. A couple of times, my closure rate was too severe. We were taught never to go belly-up to our leader, but to roll out the bank, slide beneath him, and then request permission to again attempt a rejoin.

We practiced cross-unders, which means transitioning from the left wing of your leader to the right wing of your leader by reducing power, then reapplying power, dropping aft and below, and then transition behind your leader, bringing the throttle forward, and accelerating to the opposite side of your leader. If you failed to drop down adequately during the cross-under, you would meet your element leader’s prop wash, and your aircraft would roll in the turbulence. If your element leader porpoised, it meant you were to go into the in-trail position, and you flew behind and below your leader and followed him through a series of turns. Keeping position

on your leader’s tail required constant changes in power so as not to overtake your leader and not fall too far behind. The site picture was to put your element leader’s horizontal stabilizer at the top of the canopy bow. Again, adequate step-down was maintained to ensure that in the event your element leader had an engine failure, he would fly above and over you and not back and into you.

Since the airport traffic pattern had standard left-hand turns, as we approached the airport, your element leader would wag his wings, signal a rejoin, and put you on his right wing. He would spin his index finger over his head and hold up five fingers to indicate a five-second break. You would arrive over the runway numbers on the right wing of your element leader. He would then pitch out to the left to join the downwind leg toward the airport and after five seconds, you would pitch out behind him. Aircraft

would put their landing gear down abeam the runway numbers and were expected to maintain traffic pattern altitude until turning the base leg. You would lose altitude in the base leg and the final leg and were briefed to land halfway down the runway where your element leader landed on the downwind side of the runway and you landed on the upwind side of the runway. As soon as you had your aircraft slowed down to ensure control, you would call to your leader “Two’s cold.” This was to signal to your element leader that it was safe for him to leave his side of the runway to cross your side of the runway to get to the taxiway.

After each sortie, there was a thorough debriefing. The instructors would debrief the element leader first and then debrief the new formation pilot. Sometimes the instructors were vocal and colorful both in and out of the cockpit as they



attempted to impart to the student the importance of putting the airplane precisely where it had to be. Portions of the debrief could be less than complimentary to the aspiring formation pilot. The



first comment about the conclusion of each flight was to review the fact that there was no compromise in safety. The second thing was to point out that the student did nothing that was not anticipated. Specifically, this was stated in the form of “there was no breach of the rules of engagement.” The instructors would call this ROE violations. After ensuring there were no safety violations and no ROE violations, the instructor would give the student a critique of his performance. After beating up on the student, the instructor would then give reassuring comments such as even though the student’s performance fell way below the standard of the bearer of a formation patch, the instructor did see that the student “got” some of the sight pictures that had been the subject of the lectures and the pre-flight briefing.

After briefing, flying, and post-briefing for three flights on Saturday, I was ready to go to bed Saturday evening! Because some of the flight leaders could not stay for the entire clinic, there were fewer airplanes on Sunday morning. However, a number of flights still got off on Sunday. My instructors were Rick Hosking, Jim Munn, Skipper Hyle and Sid Snedecker. My flight leaders were Joe Carley, Larry Lumpkin, and John Currenti. Everyone participating in these flights conducted him-or-herself as a professional aviator.

### III.

#### CONCLUSION

Flying in formation is a challenging endeavor. Warbirds were historically operated in formation by military pilots. These old airplanes serve to remind us of our aviation heritage. The impact of these aircraft when operated in for-

mation is more meaningful to spectators at air shows and aerial exhibitions as opposed to single-ship operations.

If you as a pilot aspire to operate your Warbird in a formation flight at an air show, you must obtain your formation card either as a wingman or a flight leader. During the clinic, two pilots (both former military) obtained their wingman patches. One was Stan Bloyer, a former Navy pilot from Fort Walton Beach, Florida. The other was fellow Dixie Wing member Pete Smart. Mitchell Field in Bessmer, Alabama, was filled with the sights and sounds of a military training base for three days in March of this year. This formation clinic was the first of what is anticipated to become an annual event. Next year, the sights and sounds of a bygone era will once again come alive at the FAST/TRARON Clinic.

Happy landings,

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