LEAD PILOTS, THE BEST OF THE BEST

Written by John W. Howland

Never again will the huge formations of bombers that darkened the skies of Europe during World War II. To those who witnessed the spectacle from the ground, the sound and sight of seemingly endless streams of aircraft was awesome. However, the smooth flow of aircraft thousands of feet overhead was anything but smooth and peaceful to the pilots jockeying throttles and horsing the control columns as they guided their heavy bombers through the skies. It was hard work and pilots had to stay continuously alert. Everything was fluid. The pilots had to anticipate changes, if they held back just a few seconds too long and dropped back out of formation, throttles were jammed forward to regain position. The four Wright Cyclone engines gobbled up fuel under these conditions, and no one relished the prospect of ditching in the frigid waters of the English Channel after a long trip to the heartland of Germany.

One of the best descriptions of the problems confronting a pilot flying formation under wartime conditions was written by my college classmate Bert Stiles and contained in his fine book, Serenade to the Big Bird. Bert dedicates one chapter to the subject he titles Formation Flying.

From Serenade to the Big Bird

By Bert Stiles

Formation Flying

“After we went on a few missions I decided if someone could figure out a simple swift way of getting a combat wing formed in the air, and on the way to the target, he could win the Legion of Merit.

Eighth air force allowed abut an hour of every mission for flubbing around, getting the groups formed into wings. Every wingman circled around looking for his element leader, while he looked for his squadron leader, and the squadron leader tried to stay in sight of the group.

After a while they sent the leaders up fifteen minutes early to find themselves, and that helped a good deal, but it didn’t cut the time any.

The Boeing B-17 is a good airplane, whether it’s made by Boeing or Douglas or Vega. It’s a pretty airplane too, in the air. With its wheels down, sitting on the ground, it is a lazy looking job, with none of the eager look of an A-20 or a B-26. But once the wheels are up, and the Fort is airborne, on the way to the land of doom, there isn’t a prettier plane in the sky.

But after you’ve admired the Fort for its beauty, and for the way it had done its job in this theater, you can stop admiring. The Flying Fortress is no fun to fly.

If you can set up the autopilot and coast along alone, a Fort is a dream girl. You could have a cocktail party in the nose and a dance in the bomb bay and it would fly on the same heading and go on and on ‘till the gas ran out.

Flying formation is something else. The more formation you fly the more you dream of fighters and Cubs and gliders, anything little that flies by the touch system, anything but a big heavy monster that has to be heaved around the sky.

I read an article in a magazine once containing this fragment: '. . . in this highly organized air war over Germany, where the heavy American bombers plug along in rigid formation like militarized geese . . .'

This is very nice, but the guy who wrote it is weak in the mind when it comes to heavy bombers and their formation. The word 'rigid' just doesn't fit anything in the sky. The sky is fluid and a formation is fluid.

The strange thing is, from any distance, a formation is always static, and always beautiful. You don't hear the pilots screaming at the co-pilots and the element leaders bitching at the squadron leaders.

'Get us out of here,' somebody will call up the lead ship. 'We're in prop wash.'

'Can you cut it down a little?'

'Can you pick it up a little? We're stalling out back here."

Bitch, bitch, bitch.

The Group leaders plead with the Wing leaders plead with the Wing leaders, and the Wing leaders weave in and out to stay in Division Formation, and the whole 8th Air Force gets there some way.

A ground-gripper would never notice a low squadron over-running lead squadron, or see a high squadron leader chop his throttles and almost pile his wing men into his trailing edges.

From the ground, or to a passenger in the air, it just looks deadly and simple and easy. And actually it's deadly if it's flown tight, and the bomb pattern is compact, and it is simple and easy if you stay on the ball and fly. You can stay in some positions with two throttles, setting the inboard engines at a constant RPM, and moving the outboards a quarter of an inch at a time. You can fly back on the tail end of an 18-ship formation and spend the whole day sliding up on your element leader, punching rudders to keep from overrunning him, and pouring it on to catch up again.

A formation depends on its leaders. Good squadron leaders. Good squadron leaders and good element leaders make formation flying easy. Bad ones make it hell.

From the day you start out in the B-17's they tell you that formation flying is the secret to coming back every time. The Luftwaffe is always looking for a mangy outfit that is strung out halfway across Germany.

When the Luftwaffe lies low for a few days, the formations begin to loosen up and string out and take it easy, then one day the 190's come moaning down out of the clouds and the whole low squadron blows up and the high squadron piles into the lead squadron, and three or four ships out of a whole group come home. After that some pretty fair formation is flown for a while.

It is always work, and nine hours of it on a Berlin trip knocks you flat, and if you have to drag out of the sack at two in the morning for another nine hours of the same thing, you feel like going over the hill with no forwarding address."

Any pilot struggled to keep his bomber in one of these huge formations knows that Bert's words ring true, for they have, "Been there." "Done that."

The gross weight of a B-17 with 2750 gallons of fuel aboard was 58,000 lbs. With a bomb load of 10,000 lbs and several boxes of ammunition, the gross weight easily approached 70,000 pounds. We must realize that there was no such thing as hydraulic support to operate the controls. The pilot normally moved ailerons, elevators and rudders with his muscles. On long distance flights the pilot could set up the AFCE (Automatic Flight Control Equipment) and, as Bert Stiles says, "You could have

a cocktail party in the nose and dance in the bomb bay and it would fly on and on 'till the gas ran out." However, flying formation was an entirely different matter. It was constant attention and pure muscle power of the pilot that guided the aircraft in formation flight. And it takes a lot of muscle power to horse a 70,000 lb airplane through the skies.

About two months into our tour of duty we were flying in formation as a line crew. We were showering in the "ablution room" at Ridgewell. When I noticed that Jim Tyson's left biceps seemed swollen completely out of proportion with his right arm. "What's wrong with your right arm?" I asked.

"Nothing", replied Jim. "My left arm gets a good workout horsing that B-17 through *the* skies while my right arm just loafs as it adjusts the throttles."

During practice flights over England after we were moved to the Pathfinder Force, I would sometimes take over the controls from the co-pilot and practice timed-turns with Jim Tyson. I wasn't completely unfamiliar with piloting since I completed a course in 42-43, and possessed a valid private pilot's license. However, I was ½ inch too short to meet pilot requirements for the Army Air Corps so I opted to become a celestial navigator. At any rate, I practiced by timing turns of ½ and 1 needle width on the turn and bank indicator. Jim and I were trying to develop a standard turn rate to be used when guiding a Wing formation of 54 bombers. I could not compete with Jim's expertise as a pilot. However, by working together on the same problem we each gained insight to the problems and complexities associated with establishing the ideal turning rate for a Combat Wing formation. Jim Tyson finally decided the best standard turning rate for a Wing Formation of 54 planes was a ¼ needle width on his turn and bank indicator.

This required 4 minutes to swing through 180 degrees or 2 minutes through 90 degrees. Turning a Wing Formation of 54 planes created all kinds of problems. Turn too sharp and those on the outside couldn't keep up. They were screaming into their microphones, "Slow it down! Slow it down! We can't keep up with you!" At the same time, those on the inside of the turn were slowed down to the point they were ready to stall-out. They were screaming, "Speed it up, we're about to stall out down here." Jim Tyson found that the ¼ needle width turn was just about right. His next problem was to keep unnecessary turns to a minimum. This was a problem for the navigator.

One of the toughest jobs confronting me from the navigator's table was to lead a formation of 54 bombers over a checkpoint, on course, at altitude and exactly on time. I talked to many navigators on this subject; but always receive the same answer and exactly on time. I talked to many navigators on this subject; but always receive the same answer. "Just allow plenty of time and jog left or right to kill time while you are heading for the check point." Such a procedure is fine if you are flying a single plane or in a small flight of planes. But jogging, and turning, or slowing down and speeding up were bad news for the 54 ship Combat Wing formations we were leading. Turns had to be slow and gentle. No! Jogging and unnecessary turns were not the answer.

I pondered this problem many hours making sketched and dozens of calculations. Nothing seemed to fit until one evening while I was sitting on my bed. Like the answer to many perplexing problems, the answer was instantaneous, clear, and oh-so-obvious. If you want to fly over a checkpoint. You should fly away from it. I explained the theory to Jim Tyson and he agreed it was a workable approach toward resolving our problem.

Jim and I worked out the details of the departure procedure during practice flights in the air. It took about four minutes and a circle 10 miles in diameter to turn Combat Wing formation 180 degrees. This was our standard turn or ¼ needle width on Jim's turn and bank indicator. If we wanted to fly over a checkpoint on a course of 90 degrees at exactly 0929 hours in the morning, I flew a reciprocal heading

of 270 degrees. Then, I made certain I passed 10 miles right of the checkpoint at least 4 minutes prior to the scheduled departure.

To illustrate, let's say our departure point was Bassingbourn. I flew 10 miles abreast of Bassingbourn on a heading of 270 degrees (west) at 0900 hours, twenty minutes before departure time. Since 4 minutes would be used for turning, we had 16 minutes to divide between flying west (270 deg) and east (90 deg). Under no wind conditions we flew another 8 minutes east. With practice, and making time allowance for wind, we got so we could hit our departure time within a few seconds.

Another problem confronting the lead crew was to establish wind at altitude conditions. This was the responsibility of the DR navigator. The information was needed by the bombardier and Mickey H2X radar operator to calculate the accurate ground speed needed for the bomb drop. I was well aware of the double drift methods taught in navigation school. This required taking a reading with the drift meter. Then a right turn of 45 deg was made and a third drift reading taken. Then, the three drift readings were entered into the E6B hand-held computer and wind direction and speed plotted. However, if I had tried such a procedure while Jim Tyson was leading 54 ships in a Wing formation, I would probably have been shot on the spot. Drift readings in the cloudy skies of England were out of the question so I turned to my GEE box to find the answer.

The GEE box was a cathode ray tube that sat on my navigator's table. It measured the difference in the time of arrival of two radio pulses transmitted from a Master station and retransmitted form a slave station usually about 70 miles apart. The difference in time of arrival of these two signals was measured in microseconds (millionths of a second) by the cathode ray tube and placed the aircraft on a hyperbolic curve or line of position (LOP) associated with the stations. A second set of GEE stationed provided our location on a second LOP. Our actual position was the point at which two LOP's intersected. Gee was accurate to about 25 feet at sea level. Time required to obtain a fix was about fifteen seconds.

I took advantage of Jim Tyson's steadiness as a lead pilot and developed what we called a SIX-MINUTE WIND. When I was ready to get a wind at altitude, I was informed Jim that we were starting the Six Minute Wind. At that point, Jim locked-on on to course, speed and altitude. No changes were made for the six-minute period. I started with GEE fix and then ran air plot on my GEE chart (Mercator projection with GEE lines) and determined my no-wind position at the end of six minutes. At the end of the six-minute period I took another GEE fix. Wind direction was established by the Weems plotter and distance between the two six minute points multiplied by 10 to determine wind speed in MPH. GEE signals were jammed as we flew into Germany and other procedures had to be used including pilotage and H2X radar fixes. However, by the time we reached the coast of Holland we usually had a good idea of wind at altitude conditions. Best of all we didn't have to break up the Wing formation or cause havoc with unnecessary turns to obtain the data.

Lead pilots were a special breed. They made life easier for all the other pilots in the formation. And their superb flying made life easier for their navigators as well. They were steady and solid as a rock even under heavy fire. There were no "hot-shot-Charlies" among this elite group of pilots. Turns were slow, precise and always the same. When they took up a heading given by the navigator, the compass needle became glued to that course. They were the best of the best and I salute them for a difficult job, very well done.

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