

# **FFI Formation Guidelines and Standard Procedures**

## **LongEZ/Varieze Supplement, Version 2**

### **08/15/2018**

This document highlights formation flight references for LongEZ and Varieze aircraft. In conjunction with the “*FFI Formation Guidelines and Standard Procedures*”, this Supplement establishes the **LongEZ/ Varieze Standard**. Other variants of Rutan canards can use these guidelines as fundamentals, and specifics for those variants may be added to this supplement. All procedures contained in this document should be briefed.

Since each Rutan aircraft construction is unique, Flight Leads should evaluate the characteristics (such as different engines) of aircraft in the formation and brief alternate procedures and airspeeds if required.

#### **Startup and Taxi:**

Parking: EZ's park with their nose wheels retracted for several reasons, the most important being that without a pilot in the aircraft the EZ is tail heavy and will tip over backwards.



Hand-propping: Some EZ's (mostly Variezes) don't have starters. Lead should set an engine start time to accommodate those in the flight that need to hand prop. A good scenario is for all pilots to be manned up and wait for the hand-propping aircraft to start, then after that pilot is in his/her cockpit, everyone else starts.

When hand-propping a hot engine, it often takes two people: one propping, and one at the engine controls in the cockpit. One of the flight's non-hand propping pilots may assist.

Taxi and Speed Brakes: EZ's are pushers and therefore FOD sensitive. Formation taxi increases risk of FOD, so if it is installed, taxiing with the speed brake extended is standard procedure.

The signal for the Lead to know the flight is ready for radio check in prior to taxi is to extend the speed brake. Aircraft without a speed brake will use a thumbs up. With everyone's speed brakes extended or thumbs up, Lead will check in the flight.

To minimize risk of FOD damage, staggered taxi is preferred. The signal to move from staggered into trail taxi is to cycle the elevator. Keep in mind the location and size of the elevators may make the signal difficult to see. It is advisable for Lead to back up the cycling signal with a radio call.



Canopies: Typically EZ's taxi with canopies open. Consideration should be given to taxiing with canopies closed in high wind conditions or cold temperatures.

Takeoff Readiness: Once established in position for run-up, wingmen should complete all pre-takeoff checks except the canopy closed (if it is open). The signal for run-up complete and ready to close canopies is to retract the speed brake.

Once the Lead sees all speed brakes retracted, and if canopies are open, Lead will signal them closed by grasping the canopy with his/her left arm. Lead will then wait until all wingmen are observed grasping their canopies. When ready, Lead will give an exaggerated head nod, and all canopies should close in unison. If the flight is unable to get a good visual on the Lead, then Lead should grasp his/her canopy with the left arm and state over the radio, "EZ Flight, canopies... now." On "now" the flight should close their canopies in unison.

When all canopies are closed, Lead will wait for the thumbs up to be passed from the back to the front of the formation. This indicates each wingman has made a visual check of the adjacent aircraft, including speed brakes and canopies, and is ready for takeoff. When Lead gets a thumbs up from #2, all aircraft are ready for takeoff.



### **Takeoff:**

EZ's take off like a jet. They accelerate down the runway, rotate enough to lift off the nose wheel, and continue to accelerate until the main wing lifts the aircraft off the runway. There is seldom a "rotation" that takes the EZ airborne.

Element Takeoff: For elements of matched horsepower (HP), Lead will give the Wingman 100 RPM or as needed. Brief RPM for aircraft of differing HP.

Rotation Speed: Nose wheel off at 60-70 KIAS, Main wheels off at 70-80 KIAS

Nose wheel retraction: EZ's have a variety of retraction mechanisms. Some are electric and some are hand crank. Brief nose wheel retractions with the flight.

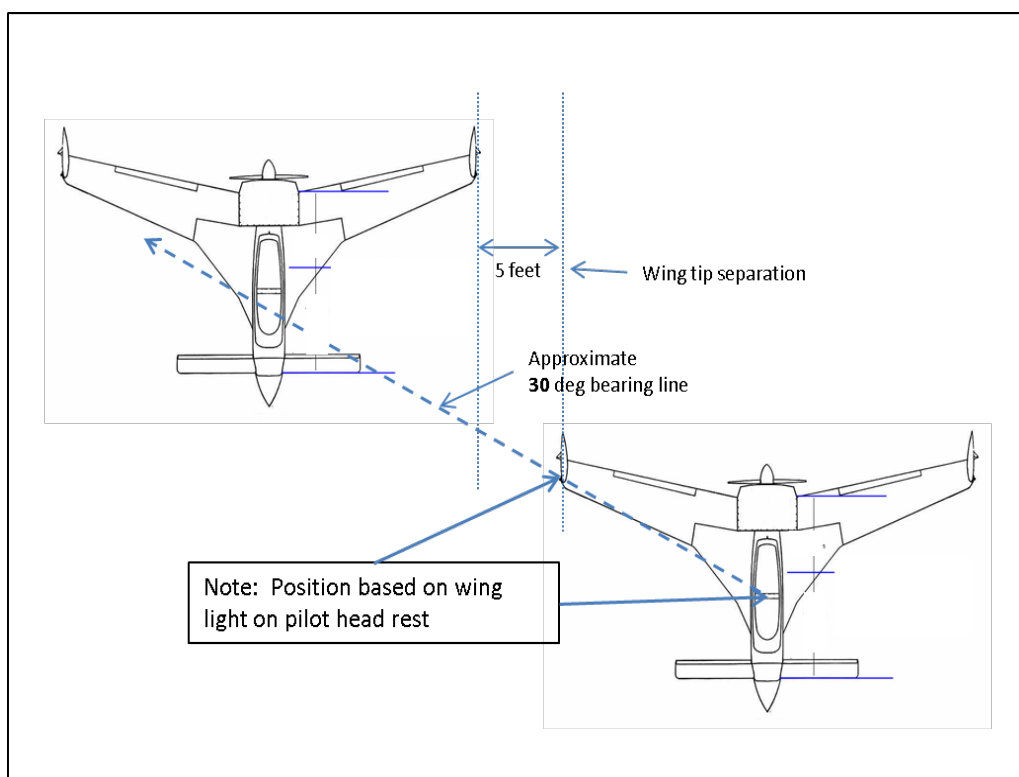
Climb-out: 110 KIAS and 500 FPM until all aircraft have rejoined.

Rejoins: Lead will use 20-25 degrees of bank for all turning rejoins.

## LongEZ Fingertip References:

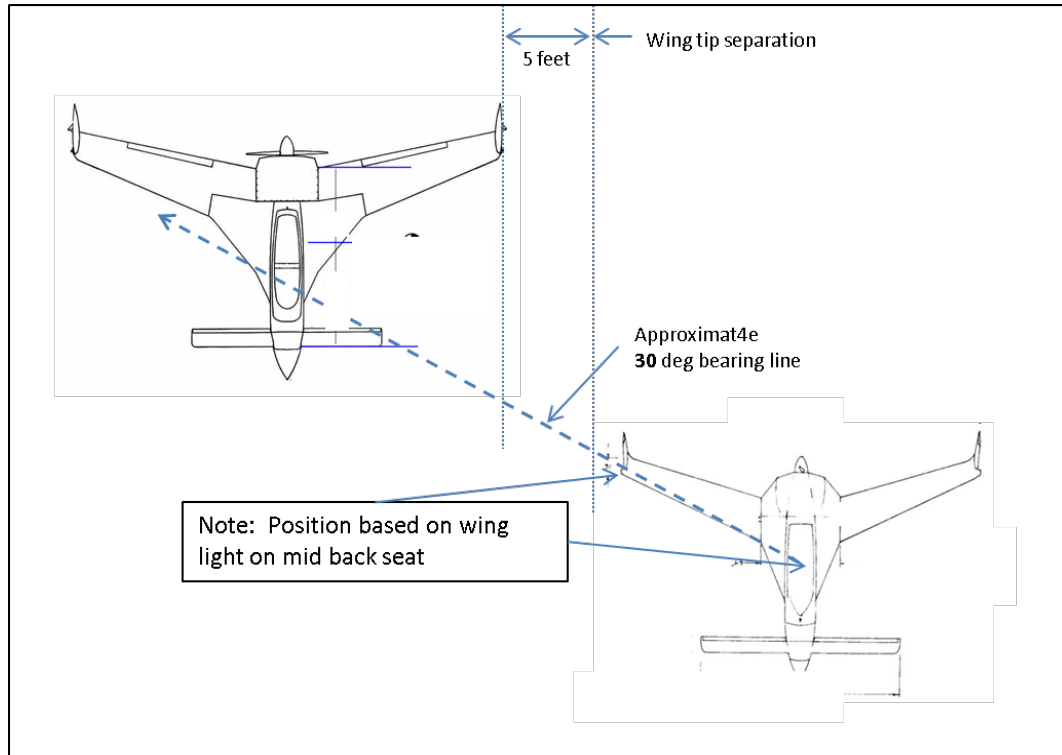
The following diagram highlights the correct position for a LongEZ fingertip position.

Note: Some aircraft may have different configuration that should be noted to establish proper stationkeeping.



1. Step down: Keep the wheel pants/tires even.
2. Bearing line: Align wingtip light with pilot's headrest
3. Spacing: Approx 5 ft between winglets.

## Varieze Fingertip References:



1. Step down: Keep the wheel pants/tires even
2. Bearing line: Lead's wing light on mid back seat
3. Spacing: Approx 5 ft between winglets.

## Reference Speeds, Angles and Other Procedures:

Cruise Speed: 130-150 KIAS

Maximum Speed: 150 KIAS

Pitchout Bank Angle: 45 Degrees

Lazy Eight Maneuvering: (Fingertip / Diamond / Close Trail) Lead should work the formation up to 30 degrees of bank and +20 degrees of pitch.

Extended Trail Entry: From Echelon formation only, using a normal pitchout with 2 second spacing and 45 degrees of bank. Lead will not continue the turn, but will roll out after 180 degrees to wait for the "4's In" call. With visual on all preceding aircraft and appropriate spacing, 4 may call "In" prior to rolling out in trail.

Extended Trail Maneuvering: Lead should work the formation up to 45 degrees of bank and +30 degrees of pitch. To prevent Wingman overspeed, Lead should avoid excessive nose low maneuvering and adhere to the 150 KIAS limit.

Close Trail Spacing: One plane length between aircraft, with adequate stack down in case of engine failure of the preceding aircraft.



Dissimilar aircraft formation: Other types of aircraft (RV's, T-34's, etc.) utilize a 45 degree bearing line. When formation flight may occur with other types of aircraft, or the symmetry of the formation will require a different bearing line, flying behind the winglet may be required. This will be briefed by the Flight Lead.



## **Landing:**

Speeds: Downwind – 100 KIAS

Extend speed brake and landing gear abeam the touchdown point or where Lead does. Wingmen should extend gear and speed brake at the same place as Lead

Base – 90 KIAS

Final – 80 KIAS

Touchdown: Land on the mains and hold the nose wheel off until slow, as the canard will keep the nose up. This helps with nose wheel shimmy issues.

Roll to the end: Getting on brakes early often results in hot brakes. Due to tight wheel pants, small brakes and tires, landing rollouts tend to be long.

Single-ship landings: Standard as with other aircraft but crossing onto the cold side with the nose up must be done with caution. Visibility over the nose is limited.

Formation landings: Standard as with other aircraft. Brief holding the nose off and timing setting the nose down together.

## **Taxi and Shutdown:**

Taxi: The flight should taxi in with speed brakes extended for uniformity and FOD protection.

Shutdown: Speed brakes retracted in the parking spots on Lead's command.

Open canopies to configure as Lead, or at Lead's radio command.

Shutdown as a flight using standard hand signal and head nod for execution.

If possible, pilots should lower noses together.

END