



# Flying the 2024 Glider Sportsman Sequence

BY JARED R.S. BACHMAN, 2ND LT., USAF, IAC 440685

## Introduction and Disclaimer

**THIS ARTICLE PROVIDES GENERAL INFORMATION** and techniques for flying the International Aerobatic Club's 2024 Sportsman Known Glider sequence. It is not intended to replace an aerobatic CFI or your pilot's operating handbook (POH).

There are a few concepts that impact the sequence overall that I will cover before discussing individual figures. These concepts involve entering the box and figure exit lines.

## Box Entry

Unlike powered pilots, the aerobatic glider pilot is constantly losing altitude and should plan their box entry accordingly to best present to the judges. *IAC Rule Book*, Section 29.3.1, states that judges must consider "control of distance and altitude for best viewing angle" in their presentation scores. Additionally, Rule 27.15.1 states, "For each figure that cannot be properly graded because of viewing angle or distance, deduct 2 points."

Judges grade any line or looping segment relative to the horizon and the glider's flight path. If a judge cannot keep both the horizon and the aircraft's flight path in sight simultaneously, they cannot accurately grade the figure, resulting in a point deduction on the figure and overall presentation.

For example, if a pilot performs a loop orientated too close on the Y-axis to the judges, the judges are required to look up at a higher angle, lose sight of the horizon, and are unable to accurately judge the roundness of the loop.

Therefore, glider pilots should generally begin in the back third of the aerobatic box and work toward the judges as they descend to maintain a constant and comfortable viewing angle, as depicted by the green line in Illustration 1. It is better to err on the side of flying farther back in the box (yellow line)

than directly over the judges (red line) for presentation purposes.

Plan on entering the box in between the center and far edge of the box (away from the judges) to maintain the ideal viewing angle. If winds are pushing you toward the judges, start on the edge of the Y-axis to compensate. If winds are pushing you away from the judges, begin your sequence on the center box marker.

The Sportsman sequence includes two figures where the pilot turns onto the Y-axis. Strategies for these turns will be

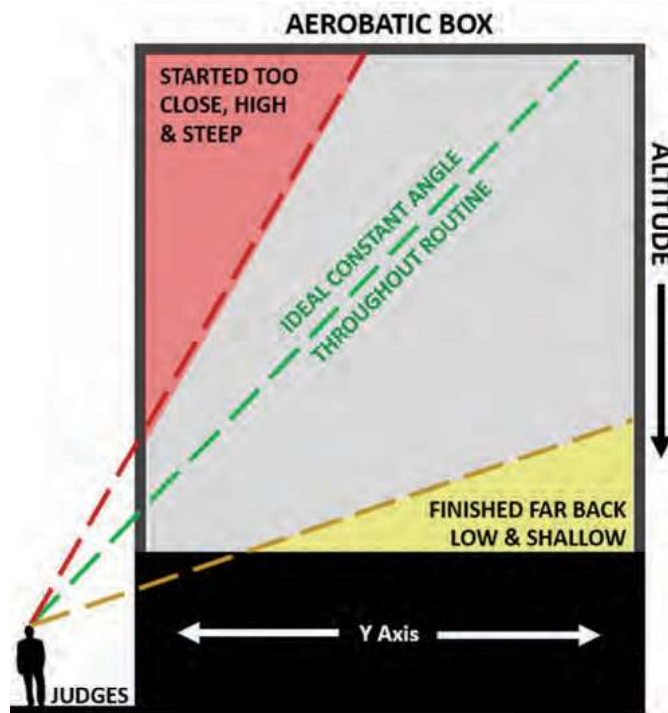


Illustration 1 - Angle to fly for judges' best view is indicated by the green line.

discussed later. Y-axis figures will generally be flown to keep the glider on the ideal viewing angle.

### Figure Exit Lines

Aerobatic figures can be categorized into “fast” or “slow” entries and exits. For example, a competition spin requires a slow velocity at entry. Ideally, the figure before the spin should exit slowly. If the previous figure exits with a fast velocity (e.g., a loop), the pilot should plan on exiting on a slight upline to decrease airspeed and set up for the next maneuver.

Remember, Rule 34.19.2.1 states, “In Glider flights, the lines marking the entry into and exit from a maneuver can be at any reasonable angle and need not be the same, provided the angles do not violate the basic form of the figure.” This allows glider pilots to finish maneuvers on ascending or descending lines to ensure proper velocity for the succeeding figure.

Though figures can exit on reasonable lines, the line connecting figures must be constant. A pitch change in between figures will result in a point deduction. When chair flying your sequence, plan and practice figure exit lines — they are critical to safely and successfully flying any glider sequence!

### Figure 1: The Loop

A loop can be divided into four 90-degree sections. (See Illustration 2.) The entry velocity and initial  $g$ -loading applied defines the shape of the first section, which the following sections should replicate. Airspeed and kinetic energy decrease as the glider climbs, which often causes glider loops to be tall and oval-shaped, with quadrant four ending significantly lower than quadrant one. Entering the loop at a high airspeed with high initial  $g$ -loading keeps the loop smaller, which makes mistakes less noticeable while preserving energy. For example, the DG-1000 POH specifies entering loops between 97-108 knots indicated airspeed (KIAS) and 4 $g$ . Experienced DG-1000 competitors target 120 knots indicated airspeed and a 4.5 $g$  entry in calm wind conditions. This step keeps the loop tighter and generally rounder while still flying within aircraft limits.

Less experienced pilots tend to roll to the right while pulling back on the control stick due to the natural path of movement of the right arm. This tendency is highlighted while flying loops. If the loop’s exit heading is left of the entry heading, right aileron was inadvertently applied at some point during the figure.

Just like a turn-around-a-point, a loop should be wind-corrected.  $G$ -loading should be highest when downwind due to the faster groundspeed and vice versa. In this sequence, the loop enters into the wind. Modifying  $g$ -loading

by  $\pm 0.5g$  is a good starting point — decrease  $g$ -loading by 0.5 $g$  on the initial pull in a headwind and increase by 0.5 $g$  on the pull between sections three and four to compensate for the tailwind. Remember,  $g$ -loading will naturally decrease as the aircraft enters section two. Do not attempt to maintain a constant  $g$ -loading to keep the loop round — the natural decrease in  $g$ ’s and airspeed will already ensure it.

Start this figure centered on the X-axis in front of the judges and toward the rear of the box as appropriate for any crosswinds. Exit the loop on a slight downline. Figure 2 has a “fast” entry.

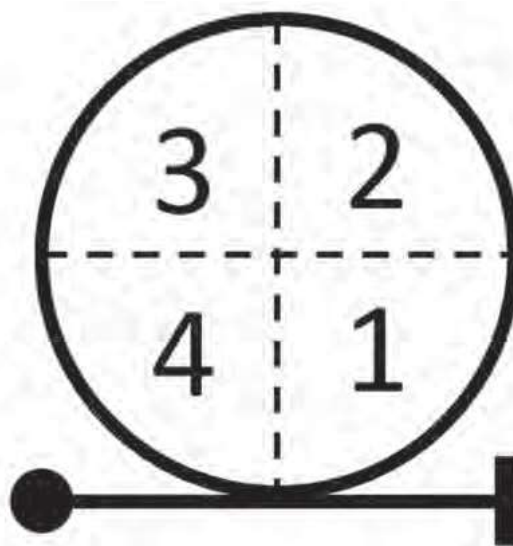


Illustration 2 - Four quarters in a loop.

### Figure 2: The Half-Cuban

This figure can be divided into two parts: the looping portion and the 30-degree downline. The techniques for the looping portion of this figure mirror Figure 1. While transitioning from the loop to the 30-degree downline, the glider’s airspeed should be slow enough to allow the pilot to set a discernible line before and after the roll without overspeeding the glider on the downline. Reducing the  $g$ -load during the initial pull of the looping portion by as much as 0.5 $g$  - 1 $g$  will allow the glider to enter the downline at a slower airspeed. (See Illustration 3.) Omitting a line before/after the roll results in a sizable point deduction and is much easier for a judge to spot than a slightly out-of-line loop.

On the 30-degree downline, the half-roll must be centered on the line. Since the glider is increasing in airspeed throughout the duration of the line, the time spent on the 30-degree downline before and after the roll must differ to keep the length of each segment of the line the same. A good rule of

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thumb for gliders is a 2-to-1 time ratio between the slower and faster portion of the line.

Proper aileron and rudder coordination is critical during the rolling portion of any figure. For example, if using left aileron during the half-roll, the pilot should apply right rudder for the first half of the roll (inverted to knife edge), followed by left rudder for the remainder of the roll.

Plan on exiting the figure “fast,” pulling to a slight downline in preparation for Figure 3.

Figure 4, the 1-¼ spin, is a Y-axis maneuver and requires a decision on which way to spin. While exiting Figure 2, the pilot has an excellent view of the box and should consider which way to exit the spin on the Y-axis to best keep the glider on the ideal viewing angle.

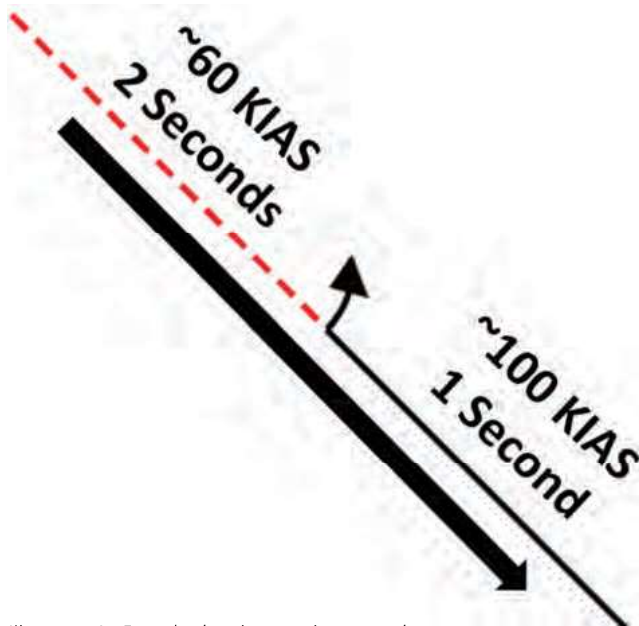


Illustration 3 - Enter the downline at a slower speed.

### Figure 3: The Immelmann

Gliders are generally at a slow airspeed at the top of a loop. However, Figure 3 requires a higher airspeed at the top of the looping portion in order to have enough energy to accomplish the half-roll. It is a challenging figure, especially in slow-rolling gliders. To further add to the difficulty, the following figure requires a slow entry, meaning that Figure 3 should ideally exit on a shallow upline.

To maintain sufficient energy after the looping portion, begin the loop with a higher entry airspeed and maintain a constant g-load. Continue applying back-stick pressure throughout the looping portion to maintain the desired g-load. Plan on exiting the looping portion on a shallow inverted upline (approximately 10 degrees to 15 degrees).

Once a slight upline is achieved, neutralize the control stick and then begin your roll. If the pilot rolls with any inadvertent “up” elevator applied, the glider will change heading during the roll. Be sure to remain coordinated throughout the roll using techniques described in Figure 2.

### Figure 4: The 1-¼ Competition Spin

Begin the spin past the center box marker on the upwind side of the box. There may be a long line connecting Figure 3 and Figure 4 — this is a perfect opportunity to confirm which way to spin. This figure is the first in the sequence to exit on the Y-axis. Use this opportunity to compensate for any crosswind effects and to maintain an optimal presentation angle as previously discussed. The direction of the spin chosen in Figure 4 decides the direction to roll in Figure 5. If spinning to the right, the pilot must roll to the left during Figure 5. A helpful technique is to verbalize it (“spinning right, rolling left” or vice versa) to maintain situational awareness.

During the entry of the figure, the aircraft must simultaneously move around all three axes: the nose pitches toward the ground, the glider yaws, and the wing will drop/roll. Pulling back abruptly to force the glider to stall prematurely or kicking the rudder to force a premature yaw will result in a point deduction.

Each glider’s spin characteristics differ. Practice when to begin applying anti-spin inputs so that the spin terminates on the desired heading. Before entering the spin, pick a visual reference point to prompt initiating spin recovery, usually 90 degrees to 120 degrees prior to the spin exit.

After the spin is terminated, the maneuver is still not over. Rule 28.24.8 directs that the glider must establish a vertical downline after the spin. This can be accomplished in two ways: blending spin recovery inputs to exit on a vertical downline or pitching to a vertical downline after recovering the spin separately. Pull to level on a slight downline — the next maneuver has a “fast” entry.

### Figure 5: The Quarter Cloverleaf on an Upline

Before beginning this figure, consider how far the glider should continue flying on the Y-axis to best compensate for any crosswind effects and to maintain the ideal presentation angle.

This figure has two components: a simultaneous half-roll and half-loop up, followed by a simple half-loop down to exit on the X-axis. Remember, the glider must exit this maneuver



going the proper direction on the X-axis. Think back to what was verbalized during the spin (“spinning right, rolling left”). Before beginning the maneuver, find a visual reference point 90 degrees off — you should see this point halfway through the maneuver while inverted.

Begin applying rolling and looping control inputs together. The aircraft’s roll and pitch change must be simultaneous per IAC grading criteria. When the glider is inverted, the heading should have changed 90 degrees from the initial entry and you should see your reference point. Simply neutralize rolling inputs while maintaining back-stick to fly a half-loop down. The next maneuver has a “fast” entry; exit on a slight downline in preparation.

### Figure 6: The Laydown Humpty

This one is a reversing figure and should not be started until the glider is downwind of the center box marker. This figure can be divided into three sections: a 30-degree upline with a half-roll to inverted, a half-loop, and a 30-degree downline.

Pull to a 30-degree upline, neutralize controls, and begin the roll (after an appropriate pause), being sure to remain coordinated throughout. If flying a glider with a slower roll

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rate, it is possible to run out of energy during/immediately after the half-roll. In competition, maximum safe airspeed should be established prior to setting the upline. A firm initial pull will preserve kinetic energy.

The half-roll on the upline must be centered. Because the glider is flying fastest before the half-roll, plan on pausing longer after the half-roll to keep the roll centered on the upline. (See Illustration 4.)

Setting the 30-degree downline can be difficult. It is helpful to look over the shoulder while pulling to ensure the looping section stops on the 30-degree downline. Use a sighting device, canopy rail, or the leading edge of the wing relative to the horizon to terminate the half-loop accurately. Set the downline and prepare for the competition turn.

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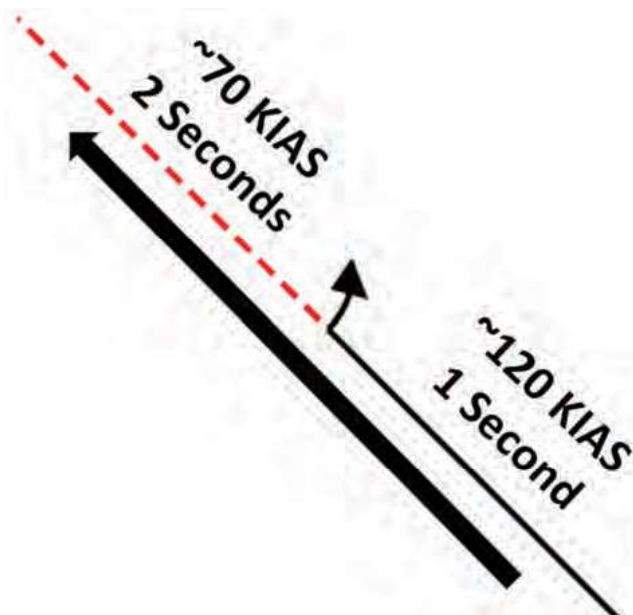


Illustration 4 - Pause longer after the half-roll to keep the roll centered.

### Figure 7: The Competition Turn

It is the final opportunity to shift the glider on the Y-axis to maintain the ideal viewing angle. This maneuver also positions the glider on the X-axis for Figure 8, the full roll. Slower-rolling gliders should place the turn as far upwind as possible to ensure that Figure 8 downwind remains in the box.

Competition turns generally enter and exit at similar airspeeds. Therefore, ensure that you enter the turn at the appropriate pitch picture that Figure 8's full roll requires. For gliders, maintaining a steeper angle of bank (70 degrees to 85 degrees) mitigates any climbing tendencies with the application of back-stick and helps to maintain airspeed.

Competition turns are divided into three sections: establishing a bank of 60 degrees to 90 degrees, changing heading, and rolling back to wings level while maintaining the final heading. These three sections must be distinct; changing heading while still rolling into the turn will result in a point deduction for a "blended entry." Roll to the desired angle of bank, neutralize the stick, apply back-stick to initiate the heading change, neutralize the stick to stop the heading change, and roll to wings level.

The *g*-loading applied during the heading change is generally between 1.5*g* and 3*g*. A higher *g*-load will decrease the turn's ground track and can be used to optimally position the aircraft in relation to the Y-axis.

### Figure 8: The Aileron Roll

The aileron roll is the final maneuver in the sequence and will make a big impression on your overall presentation score. From the judge's perspective, the glider should roll at a constant rate without barreling or pitching. Ideally, the aircraft will be halfway through the roll while directly in front of the judges — begin rolling accordingly if able.

Newer aerobatic pilots tend to relax aileron inputs during full rolls. A helpful technique is to use both hands on the control stick to ensure that aileron input is not accidentally reduced. Stay coordinated throughout the roll. Refer to the concepts reviewed in Figure 2.

Unlike powered aircraft, gliders can descend during aileron rolls on a consistent and reasonable angle. If the glider's pitch is not ideal when exiting the competition turn, it is better to fix it before beginning the aileron roll at a slight point deduction. Do not enter the aileron roll on too steep of a downline; doing so could result in an overspeed.

### Concluding Thoughts

This article is not airframe specific. The aerobatic glider community has a broad spectrum of airframe capabilities. A DG-1000 and MDM-1 Fox handle differently yet commonly compete in the Sportsman category. Therefore, my intent is to provide general techniques for flying this sequence, *not* procedures applicable to your aircraft. Specific entry procedures including airspeed and *g*-loading should come from your POH and respect any applicable airframe and personal limitations.

Always fly in accordance with your and your glider's personal limits. Never be afraid to wag out if you lose situational awareness or aren't positioned for the next figure. The penalty for doing so is negligible compared to flying a poor or incorrect figure. Fly safe! **IACG**

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**Second Lt. Jared R.S. Bachman** is the evaluation liaison officer for the 94th Flying Training Squadron at the United States Air Force Academy in Colorado Springs, Colorado. He has been a member of the U.S. Air Force Aerobatic Glider Team since 2020. He started in Sportsman and advanced through Intermediate to the Advanced category. At the end of 2022, he transitioned to flying Sportsman Power in a Pitts Special S-1E.