

Phase 5

Advanced Orientation and

Aerobatics

Marymoor R/C Club, Redmond, WA
AMA Charter 1610



Phase 5

Advanced Orientation

- Figure 8's
 - More aggressive this time, to remove any remaining left-right confusion
- How to *Prevent* loss of orientation, *regain* orientation, and *recover*
- Basic Aerobatics
 - Loop
 - Immelman Turn
 - Roll

Figure 8's

- Fly more aggressively than your early training.
- Use higher bank angles, 45 to 60 degrees.
- Improves your skills if the cross-over is done with the airplane pointed at you



Preventing loss of Orientation

- To remove all left-right confusion, practice figure 8's on every flight, even after you solo, until they are boring
- Always fly intentionally, with a plan, always thinking for example:
 - “I’m flying the pattern”, or “I’m flying an approach”, or “I’m getting set up to do a loop on the upwind leg of the pattern”.
 - Don’t bore random holes in the sky recovering from one mistake after another.
 - Always think ahead. Plan where you want the airplane to be in 15 seconds.
 - Flying with an intentional plan helps you recognize quickly when you might be losing orientation.

Preventing Loss of Orientation

(cont'd)

- Never fly directly overhead – can be very disorienting. Keep the plane out in front of you.
- If the plane gets behind you, turn around and calmly fly the airplane back to the right side of the flight line.
- Always remember where you were and what you were doing one second ago
- If the plane starts getting too small, don't wait – take immediate action. Waggle the wings, then to fly back closer.

Regaining Orientation

Is it coming or going? Rolled left or right?

- When the silhouette confuses you, making a roll input will help un-confuse your brain
- *Any time you realize you are not flying to your plan, or are not sure of orientation, immediately roll the wings back and forth about 30 degrees both ways*
- Then take immediate action to correct the problem

Recovery From Loss of Orientation and Extreme Attitudes

- When you are surprised by an extreme *attitude*, your objective is fix the problem with the smallest loss in *altitude*!
- Nose high: push elevator nose down to prevent the stall
- Nose low: Reduce power to avoid building too much speed, and pull out of the dive with elevator. Pulling too hard or too suddenly can cause a stall.
- High bank angle or upside down: Roll to **level the wings first**, **then** correct any dive with elevator.
 - Do not pull elevator until the wings are nearly level.
- Memorize what Pitch, Roll, and Yaw are so you and your instructor can communicate effectively.

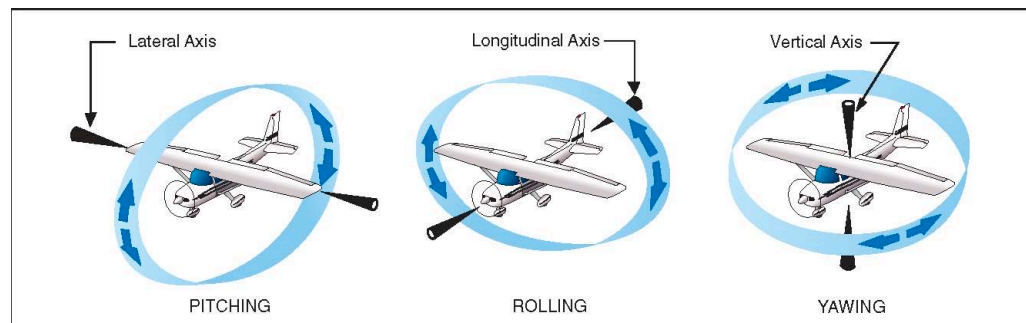


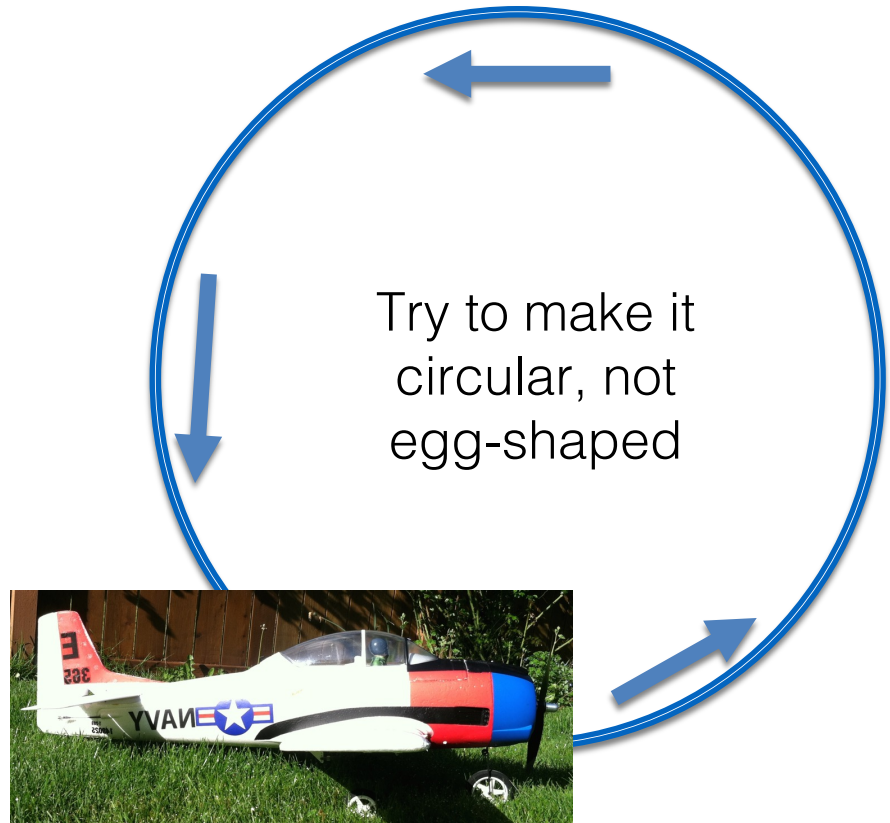
Figure 3-9. Axes of an airplane.

Getting Comfortable with Aerobatics

- Critical to being able to recognize, and then calmly recover from loss of orientation without “freezing up” or panicking.

Loop

- Fly straight with wings level and plenty of speed and power
- Pitch up smoothly and apply full power
- At the top of the loop, pull power back to idle so you don't get too fast coming down
- Continue pitching smoothly
- Add the power back in at the bottom

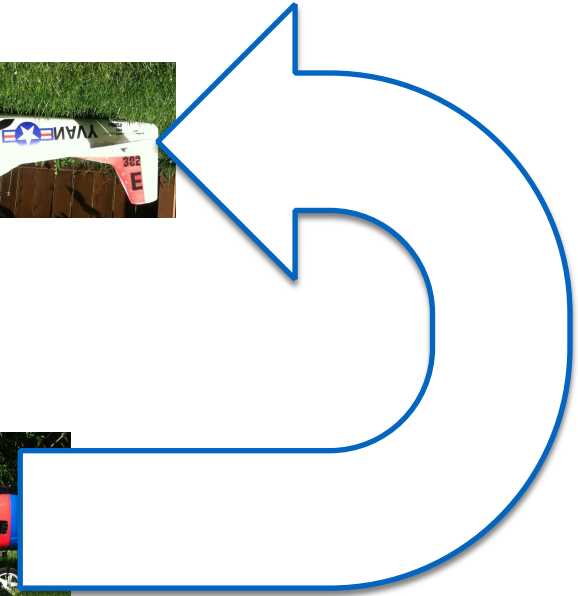


Immelman* Turn

½ Roll
Upright



- Enter just like the loop
- At the top of the loop, neutralize elevator.
- Then do ½ roll upright



* Named for Max Immelman, German WWI ace

Half Cuban Eight

Learn to roll first when recovering from a dive

- Just like the Immelman, but,
- Neutralize elevator a bit later - on a straight 45° down line
- Roll upright
- Pull out of the dive



Pull up



Roll Upright



Phase 5

Barrel Roll



Level Flight



- Nose up
- Then, Neutralize Elevator



- Full Aileron
- Roll all the way around



- As you gain confidence, push some down elevator when the plane is inverted
- Using more down elevator when inverted will allow using less initial pitch up
- Eventually, your *Barrel Roll* will turn into an axial *Slow Roll*

Flying in Gusty Weather

- Gust means that the wind speed and/or direction change rapidly
- Wind is usually stronger higher up
- Gusts may be stronger nearer the ground where the wind whips around obstacles
- Try not to fight every gust too hard. It is possible that the next gust will put the plane back in the direction you want.
- If your trainer has artificial stabilization like Spektrum's SAFE, with modes like "Beginner", "Intermediate", and "Advanced", choose the Intermediate mode. The airplane will fight some of the gusts for you.

Recovery from mishaps

- Mental – don't worry everyone does it! You will learn, and fly again.
- Repair – You can fix almost anything if you are determined, and ask for help and advice.
- Ask your instructor to teach you dead stick (power lost) landings
- If your airplane goes down:
 - Put your throttle to idle immediately to avoid damage to the ESC, or to an engine.
 - Other pilots at the field are likely to see where it went down. Get someone to go with you. The tall grass and vegetation make finding the plane difficult. Wear long pants. There are nettles out there!
 - Take your transmitter with you so you can wiggle the controls and make a little noise. At Marymoor, putting a beeper in your plane is a really good idea.

Notes for Instructors

Teach techniques to:

- *Prevent* loss of orientation
 - Flying with a plan
 - No left-right confusion. High proficiency with aggressive figure 8's
- *Regain* orientation
 - Left-right roll to re-orient the brain.
 - Acting immediately
- *Recover* from extreme attitudes
 - Help student be comfortable with basic aerobatics

Disclaimers

MAR/C provides advice. After you gain solo flight privileges, *only you* are responsible for your model aircraft readiness, your actions, and abilities

Any instructions provided by the manufacturers of equipment such as but not limited to aircraft, radio controls, batteries, motors or engines and anything installed in your airplane have precedence over any advice provided by instructors, this document, or the mar-c website..

Flying and teaching techniques vary widely in our hobby, and vary from one instructor to another.

The goal of this document is to encourage some standardization and provide a practical minimum amount of knowledge.

Version Information

Version	Author	Date	Description
1.5	Brian Kelly	April 2017	Aligned Flight Training Syllabus with new flight log. Misc corrections and refinements
1.6	Brian Kelly	4/19/2017	Misc edits, repaired links, to prepare for website update
1.7	Brian Kelly	4/26/2017	Corrections and misc edits
1.8	Brian Kelly	9/28/2017	Updated Proficiency Check and misc edits
2.0	Brian Kelly	Nov 2018	Broken into separate standalone chapters for quicker access on the website.
3.0	Brian Kelly	April 2023	Updated to reflect club-owned fleet of electric training planes and miscellaneous improvements