



FCI Emergency Maneuver Training

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TRANSFER OF SKILLS

How to Apply What You Learn at FCI to Your Aircraft

One of the most frequently asked questions from pilots considering FCI's Emergency Maneuver Training Course is, "How can training in a high-performance aerobatic aircraft like the Extra 300L benefit me when I fly my aircraft?" The pilot's concerns are valid. They are perhaps aware the Extra 300L (or similar aircraft) has a phenomenal roll rate and G capability, that it has a stick versus a yoke, and there are undoubtedly other noteworthy differences. How, then, can training in the Extra 300L possibly benefit the pilot of a Cessna or other general aviation aircraft? What about pilots of corporate or airline aircraft? Before we get to the advantages of an Emergency Maneuver Training Program in an aerobatic aircraft, I'll mention the limitations.

LIMITATIONS:

Tail Dragger: The Extra 300L is a tail dragger. Aside from take-off and landing, being a tail dragger makes no difference since it behaves like any other aircraft once airborne.

Seating Position: In the Extra 300L, you sit on the centerline of the aircraft. This presents different visual cues depending on whether you are banked to the left or to the right.

Field of View: Because of the bubble canopy, the Extra 300L affords an excellent field of view. The pilot's ability to look outside (and look for the horizon to maintain orientation) is not restricted by a cabin roof, structural supports, and other restrictions associated with most aircraft. It is therefore easier to look around and find the horizon. In other aircraft, additional field-of-view restrictions are caused by the fact that the pilot sits on the left side (and sometimes the right) of the cabin. If, for example, you are in a nose low 135-degree banked unusual attitude to the left, it would be somewhat more difficult to find the horizon to determine the shortest direction to roll upright if you were actually seated on



the left side of a typical aircraft. This is because the horizon would be visible off the right side of the aircraft, and you would have to look across the cabin and any occupant on the right side to see it. Depending on the dive angle, you may not see the horizon in the front windshield. (If referencing the instruments in IMC, this would not be a problem). This problem does not exist in the Extra 300L because of the lack of field-of-view limitations in flight.

Stick vs. Yoke: Most aircraft have a yoke. Although the principles of operation are obviously the same, the stick of the Extra 300L will feel somewhat different than a yoke. Pilots, in general, find it easy to transition to a stick.

Position of the Controls: In the Extra 300L, the throttle is on the left side, and the stick is held with the right hand. Therefore, the pilot must get used to manipulating the throttle with the left hand, and the elevator and ailerons with the right hand. The transition is straight forward, and any confusion is usually ironed out after the first couple of stall recoveries on the first flight.

Handling Characteristics: The Extra 300L is a very maneuverable aircraft. That said, it is fairly easy to fly, and has no trick's up its sleeves. The roll rate is very high. When recovering from an over-banked attitude in the Extra 300L, it is advisable to avoid large aileron deflections which can produce very high and unrealistic roll rates, which cannot be duplicated in other aircraft. Therefore, we use smooth and moderate stick deflections. Needless to say, full aileron deflection may be necessary in the aircraft that you typically fly. Many customers have concerns about the high-G capability of the Extra 300L. I'll lay that concern to rest immediately by saying that all of our instructors teach dive recoveries to the limit load factor of the aircraft that the customer typically flies. If you fly a Cessna 172, we will teach you recoveries under 3.8 G's. If you fly a Cessna Citation, we'll teach you to keep the G's to 2.5. The pitch sensitivity of the Extra 300L is not significantly different than other aircraft. On the other hand, it definitely does not have a "heavy" elevator. Usually, any over control of the Extra 300L (or any other aircraft with a stick) can be solved by holding the stick with your fingertips (much like you would fly a yoke anyway). Additionally, placing your wrist on you lap will force you to hold the stick a few inches down from the top, further preventing over-control. If you are surprised by a rapid G onset in the Extra 300 L when recovering abruptly from a dive, I can assure you that G-onset rate will be high in any aircraft at high airspeeds! (That's why we teach smooth and progressive pulls on the stick).

ADVANTAGES: Obviously, there are some limitations with utilizing an aircraft such as the Extra 300L for Emergency Maneuver Training. But what are the advantages?

We don't have a choice! The use of a structurally sound aerobatic aircraft is essential to conduct Emergency Maneuver Training to the level of thoroughness that we teach at FCI. While any aircraft can safely recover from just about any unusual attitude in the hands of a well trained pilot (that's what the training is all about!), it is neither legal nor advisable to purposefully fly a non-aerobatic aircraft in attitudes that would be considered aerobatic



maneuvering. The margin for error is slim. We must therefore use a structurally sound aerobatic aircraft.

Safe Environment: The Extra 300L in the hands of an experienced instructor provides an extremely safe environment to conduct Emergency Maneuver Training. The high structural strength of the Extra 300L combined with its very forgiving nature and the fact that there are no prohibited maneuvers makes it a very safe EMT platform. This allows the student a much larger margin for making mistakes and learning from them.

Skills Are Transferable: While saying that all airplanes fly the same is a gross oversimplification, it is true on a very fundamental level. All aircraft roll, pitch and yaw about the center-of-gravity, and most are controlled using ailerons or spoilers (or similar devices), elevator (or stabilator), and rudder. All respond similarly to power inputs as well. Aircraft handling characteristics do vary widely, but an airplane is essentially an airplane! At FCI, we teach skills that are applicable across an extremely wide spectrum of fixed-wing aircraft. For instance, if using the ‘Power, Push, Roll’ technique for an over-banked unusual attitude, the act of manipulating the throttle to adjust power works whether you must use your left or right hand. Pushing on the elevator control to move the elevator to a more favorable position applies whether you happen to be pushing a stick or a yoke. And rolling is intuitively obvious again, whether you must turn the yoke, or shove the stick to the side. Regardless of the subtle differences in how you get the controls to move, the procedures do not change in the fundamental sense. Still, it is beneficial, when attending an Emergency Maneuver Training Course, such as the one we have at FCI, to give some thought to the differences between the Extra 300L and your aircraft. If there is specific guidance in the Pilot’s Operating Handbook for the airplane that you typically fly that would suggest a modification of procedure (the use of in-spin aileron during a spin recovery for example), then you should do so accordingly, and we will teach you to do that.

Other Transferable Skills: Many of the advantages of completing an Emergency Maneuver Training Course are non-aircraft specific. In other words, they are directly transferable to any aircraft that you might fly.

Knowledge: A good EMT course will vastly expand your awareness of how an airplane really flies. It offers a different perspective on the basic aerodynamics you may have already learned. Knowledge of the performance envelope of an aircraft, dynamics of turning flight, and of the aerodynamics of stalls and spins, etc., is essential regardless of the airplane you fly.

Situational Awareness: A solid EMT program expands your awareness of what is going on around you. Skills aside, just having the opportunity to see a spin or inverted nose low unusual attitude will reduce the chances that you might panic should you find yourself in such an attitude or flight regime in your aircraft. Even performing a loop will allow you to note that pitch angle and angle-of-attack are not the same.



Orientation: An EMT course will teach you to maintain orientation. In other words, it will allow you to quickly ascertain your spatial relationship with the horizon. Always knowing whether you are nose high or nose low, right side up or upside down, is very important in making a timely and correct recovery from any attitude.

The Ability to Make Decisions in a High Pressure Environment: Normal flight regimes experienced during, say, a cross-country flight in your aircraft, afford you the luxury of extra time to make a decision. If the weather is bad at the destination airport, you normally have ample time to consider different courses of action. However, recovering from unusual attitudes does not allow ample time. A decision must be made expeditiously. And even though your instructor will ensure that maneuvers are performed at very safe altitudes, you know the aircraft is structurally capable, and the instructor experienced, you can't help but get a rush of adrenaline when nose low, near inverted with a windshield full of ground, and accelerating rapidly! The same sensations will occur in your aircraft! It is important to learn to think clearly, make quick decisions, and react quickly in such a high pressure environment.

Kinesthetic Feel: Developing a feel for what different G-forces feel like, and for G-onset rate (how quickly those forces build up, in a dive recovery) is critical in ensuring that you keep your aircraft within its structural limits. Also, developing a feel for when an airplane is not coordinated (when practicing skidded and slipping flight) is important, because recognition of such a condition in your airplane will allow you to get back to coordinated flight.

Overcoming Spatial Disorientation: The first time you recover from an accelerated spin, you will notice that although your eyes see the horizon, and they tell you that you are not spinning any longer, your inner ear is telling you the opposite! Practicing unusual attitude recoveries allows you to learn to trust your eyes ("visual dominance") and not your vestibular cues ("vestibular suppression"). This takes practice.

Tying it All Together: To summarize, practicing unusual attitude recoveries during an EMT course allows you to correlate control inputs, visual cues (what the aircraft is doing in relation to the horizon), vestibular sensations (inner ear), kinesthetic sensations ("Seat-of-the pants" feel), and aural cues (wind rush, engine sounds). This environment cannot be duplicated in a simulator.

We know there are some limitations in conducting an Emergency Maneuver Training program, in a high-performance aircraft like the Extra 300L. There are control and handling differences between the Extra 300L and the aircraft you currently fly, which must be considered. But the advantages outweigh the limitations, and the skills apply to just about any airplane you could fly. In addition, there are plenty of non-aircraft related advantages in completing an Emergency Maneuver Training Program. Some of the non-aerobic exercises conducted in the Extra 300L can be conducted in the aircraft that you typically fly. (It is always advisable to go up with an instructor if you are not comfortable performing these maneuvers on your own). Such training is valuable to any



pilot. For corporate and airline pilots, simulator training is essential. But Emergency Maneuver Training is an essential compliment to such simulator training.

Hopefully, I answered some of the questions you might have about the differences between the Extra 300L and your aircraft, and of how skills taught at FCI are transferable to your aircraft. Just being armed with knowledge of these differences will make you better prepared to maximize the benefit of EMT training.



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