

Understanding the Mythical “Teardrop” Traffic Pattern Procedure - 2026

A Deadly Recipe for Midair Collisions

*Updated July 2026 to reflect progress made since
the original version was published in May 2023*



by Jim Savage

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July 2026

About the cover picture:

On June 6, 2023, the FAA issued *Advisory Circular 90-66C - Non-Towered Airport Flight Operations*. That document contains this modified illustration clarifying the flight track associated with the procedure to overfly a non-towered airport from the upwind side to the downwind side, for the purpose of making a normal 45-degree entry to the downwind leg of the traffic pattern.

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Preface

On January 29, 1986, the Space Shuttle *Challenger* broke apart 73 seconds into the flight. It was determined the mechanical issue that caused the disaster was a pair of malfunctioning O-Rings. They failed due to cold weather and we later learned engineers had test data (from as early as 1977) indicting a potentially catastrophic flaw in the O-Rings. Those warnings were ignored and the problem was never addressed or corrected.

It's now more than six years since I first became aware of “teardrop” traffic pattern entries at non-towered airports. My experience was in the Spring of 2020 when I nearly collided with a Cirrus making a high speed, descending turn into the downwind leg of the traffic pattern. I subsequently learned the Cirrus pilot was performing his version of a “teardrop” entry.

Much has been learned and documented by me about the notion of “teardrop” traffic pattern entries at non-towered airports since the Cirrus incident. What began as an initiative to understand how this mythical and extremely dangerous phenomenon had come to be, subsequently evolved into a quest to share my information with appropriate individuals within the Federal Aviation Administration (FAA). Additionally, I made a request for appropriate corrective action before a mid-air collision occurred. Over several years, that was accomplished by written communications between me and senior (level) officials within the National offices of the FAA. In the Spring of 2023, the original version of *Understanding the Mythical “Teardrop” Traffic Pattern Procedure* was assembled and published. The content of that book was a compilation of our correspondence.

Preface (continued)

The FAA listened and responded. On June 6, 2023, *Advisory Circular 90-66C, Aircraft Operations at Non-Towered Airports* was issued, a giant first step in eradicating the mythical “teardrop” traffic pattern procedure.

It has now been more than three years since *AC 90-66C* was published, yet the mythical “teardrop” phenomenon still exists amongst many pilots, flight instructors, flight schools and it even remains incorporated into a major aviation software offering. The principle of primacy in aviation training makes it clear that attitudes and perceptions initially learned are quite difficult to change. This is a classic example of that principle.

As with my initial book on the subject of “teardrop” traffic pattern entries, my intent in this updated version is to provide a complete picture of how and why we arrived at our current high-risk situation and ends with thoughts on how we can return to a much safer traffic pattern environment at non-towered airports.

The book is really two separate stories. The first covers the period from the inadvertent creation of the mythical “teardrop” traffic pattern entry in 2016 through the period just before the issuance of *AC 90-66C* on June 6, 2023. The second covers the issuance of *AC 90-66C* in 2023 through July 2026.

Preface (continued)

This update is being written in July 2026, about ten years from the time the FAA first published a controversial illustration in *Pilots Handbook of Aeronautical Knowledge* in 2016. This book, along with the earlier version, explains the origin and history of this unintended phenomenon. The original version contained a detailed history from 2016 until immediately before the issuance of *AC 90-66C* on June 9, 2023. On that date, the FAA replaced the controversial illustration with a greatly improved and far more realistic version. This updated version of ***Understanding the Mythical "Teardrop" Traffic Pattern Procedure*** includes much of the earlier history and adds information about current perspectives that have evolved since the book was published in the Spring of 2023.

This version also includes a personal perspective on where we stand today, along with thoughts on what still needs to be accomplished to finally eradicate this mythical procedure.

A Pilot's Perspective of the "Teardrop" Traffic Pattern Procedure

Twenty years ago, if you had interviewed a large group of American pilots and asked them if they knew what a "teardrop" traffic pattern entry was, it is almost certain that everyone would have responded with a definite "NO". Today, if you ask any American pilot if he/she has ever heard of a "teardrop" traffic pattern entry, there is a very good chance you will get yes for a response. A follow-up question asking if they have ever done a "teardrop" entry will also bring a lot of yes responses. The third question, asking exactly how the "teardrop" entry is performed, is the one that brings the most interesting responses. They vary from a touch of outrage that anyone would ask such a stupid question, to ones like *you just do a teardrop, any idiot knows how to do that*. The most complete answer is normally along the lines of: cross over the airport at 500 feet above pattern altitude, after flying beyond the downwind leg of the traffic pattern, turn right and descend to enter the downwind leg at midfield.

There are many variations in the response to the "how to" question, but they all have a common theme of a descending turn that resembles, in their mind, a teardrop shape. The responses shown above are not speculation, but represent actual comments I have received as I have discussed this issue with pilots in recent years.

What is most interesting about the above is there have been no new Federal Aviation Administration (FAA) *regulations* issued over the past 20 years that would account for this dramatic change in understanding. It is also interesting that in the context of Traffic Pattern Procedures, the word "teardrop" does not currently exist in any FAA printed document or regulation.

FAA's Current and Historical Guidance

The FAA provides a wealth of useful information to pilots through a variety of non-regulatory publications. Although they do not carry the weight of actual regulations, they generally reflect “best practices” and are normally accepted by pilots as required procedures. For purposes of understanding the mythical “teardrop” traffic pattern procedure, the following four publications will be analyzed. 1) *Pilots Handbook of Aeronautical Knowledge*, 2) *Airplane Flying Handbook*, 3) *Advisory Circular 90-66B, Non-Towered Airport Flight Operations (now superseded)* and 4) *Advisory Circular 90-66C, Non-Towered Flight Operations*.

Airplane Flying Handbook – 2014 Edition

To provide a baseline when pilots had never heard of a “teardrop” traffic pattern entry, a review of *Airplane Flying Handbook* FAA-H-8083-3A published in 2014, is a good place to start. Chapter 7 of that handbook covers the subject of traffic patterns. Following are three relevant paragraphs from Chapter 7 that explain traffic pattern entry procedures.

"When entering the traffic pattern at an airport without an operating control tower, inbound pilots are expected to observe other aircraft already in the pattern and to conform to the traffic pattern in use. If other aircraft are not in the pattern, then traffic indicators on the ground and wind indicators must be checked to determine which runway and traffic pattern direction should be used. Many airports have L shaped traffic pattern indicators displayed with a segmented circle adjacent to the runway. The short member of the L shows the direction in which the traffic pattern turns should be made when using the runway parallel to the long member. These indicators should be checked while at a distance well away from any pattern that might be in use, or while at a safe height well above the generally used pattern altitude.

When the proper traffic pattern direction has been determined, the pilot should then proceed to a point well clear of the pattern before descending to the pattern altitude.

When approaching an airport for landing, the traffic pattern should be entered at a 45-degree angle to the downwind leg, headed toward a point abeam of the midpoint of the runway to be used for landing. Arriving airplanes should be at the proper traffic pattern altitude before entering the pattern, and should stay clear of the traffic flow until established on the entry leg. Entries into traffic patterns while descending create specific collision hazards and should always be avoided.

The entry leg should be of sufficient length to provide a clear view of the entire traffic pattern, and to allow the pilot adequate time for planning the intended path in the pattern and the landing approach."

Key points of the above excerpts from the 2014 *Airplane Flying Handbook* are as follows:

Flying over an airport should be at an altitude that is well above the generally used pattern altitude.

After overflying the airport, the pilot should proceed to a point well clear of the pattern before descending to the pattern altitude.

After reaching pattern altitude, the traffic pattern should be entered at a 45-degree angle to the downwind leg, headed toward a point abeam of the midpoint of the runway to be used for landing.

Arriving airplanes should be at the proper traffic pattern altitude before entering the pattern.

Entries into traffic patterns while descending create specific collision hazards and should always be avoided.

The 45-degree entry leg should be of sufficient length to provide a clear view of the entire traffic pattern, and to allow the pilot adequate time for planning the intended path in the pattern and the landing approach.

The preferred traffic pattern entry is the downwind entry.

The above points were not newly introduced in the 2014 *Airplane Flying Handbook*. Although I do not know exactly when they first appeared in FAA reference material, they were definitely included in *Airplane Flying Handbook* FAA-H-8083, published nearly 30 years ago, in 1999. It should be noted that in the 1999 version, very few illustrations were used and all that were included, were black and white.

Observation – The written narrative in the *Airplane Flying Handbook* from both the 1999 and the 2014 editions, provides clear guidance on how to safely enter the downwind leg of the traffic pattern after overflying a non-towered airport. The process involves overflying the airport at a safe altitude above the traffic pattern, flying well clear of the traffic pattern and then descending to traffic pattern altitude. The completion of the overflying and descent procedure is followed by approaching the pattern on a course of 45-degrees to the downwind leg and joining the pattern at midfield. The final step is a normal downwind entry.

There were no illustrations associated with the traffic pattern procedures in those earlier versions of the *Airplane Flying Handbook*.

Pilot's Handbook of Aeronautical Knowledge – 2016 Edition

The next FAA document for this review is *Pilot's Handbook of Aeronautical Knowledge*, published in 2016. This document is the likely origin of the "teardrop" traffic pattern notion that currently exists throughout the National Airspace System.

Following are selected narrative and illustrations from Chapter 14 - Airport Operations section of the above handbook pertaining to traffic pattern entries at non-towered airports.

"Non-towered airport traffic patterns are always entered at pattern altitude. How you enter the pattern depends upon the direction of arrival. The preferred method for entering from the downwind side of the pattern is to approach the pattern on a course 45-degrees to the downwind leg and join the pattern at midfield.

There are several ways to enter the pattern if you are coming from the upwind leg side of the airport. One method of entry from the opposite side of the pattern is to announce your intentions and cross over midfield at least 500 feet above pattern altitude (normally 1,500 feet AGL.) However, if large or turbine aircraft operate at your airport, it is best to remain 2,000 feet AGL so you are not in conflict with their traffic pattern. When well clear of the pattern - approximately 2 miles - scan carefully for traffic, descend to pattern altitude, then turn right to enter at 45-degrees to the downwind leg at midfield.

An alternate method is to enter on a midfield crosswind at pattern altitude, carefully scan for traffic, announce your intentions, and then turn downwind. This technique should not be used if the pattern is busy. Always remember to give way to aircraft on the preferred 45-degree entry and to aircraft already established on downwind.

In either case, it is vital to announce your intentions, and remember to scan outside. Before joining the downwind leg, adjust your course or speed to blend into the traffic. Adjust power on the downwind leg, or sooner, to fit into the flow of traffic."

Key points and comments pertaining to the above excerpts from the 2016 *Pilot's Handbook of Aeronautical Knowledge* are as follows:

Non-towered airport traffic patterns are always entered at pattern altitude.

The overall preferred method for entering a traffic pattern, regardless of position or direction of flight, is a downwind entry.

The preferred method for entering from the downwind side of the pattern is to approach the pattern on a course 45-degrees to the downwind leg and join the pattern at midfield.

If entering the pattern from the upwind side, two methods of entry are suggested. These two options are referred to as the Preferred Method and the Alternate Method.

Preferred Method Procedure

Announce your intentions and cross over midfield at least 500 feet above pattern altitude (normally 1,500 feet AGL).

When well clear of the pattern - approximately 2 miles - scan carefully for traffic, descend to pattern altitude. (If the downwind leg of the traffic pattern is one mile from the runway, then "well clear of the pattern" is approximately 3 miles from the runway.

The additional distance covered while descending to pattern altitude will vary. Depending on the speed of the airplane and the rate of descent, this will likely place the airplane four or more miles away from the airport.

Then turn right to enter the 45-degree entry leg that will enable you to enter the downwind leg at midfield.

The above steps are not a single maneuver but are a series of steps to accomplish two separate procedures. The first procedure is one of safely crossing over the airport and clearing the traffic pattern. The second is making a normal downwind traffic pattern entry.

Although the wording in the 2016 *Pilot's Handbook of Aeronautical Knowledge* is a bit different and more specific than what was contained in the 2014 *Airplane Flying Handbook*, the basic procedures for overflying an airport, flying well clear of the traffic pattern and executing the preferred downwind entry, are the same.

The fact the word "teardrop" does not exist in the FAA literature pertaining to airport traffic patterns and that many of the pilots trained before 2016 have no idea what is intended when they hear another pilot report they are "teardropping" or are making a "teardrop" entry does not seem to bother the pilots who are flying these mythical procedures and using that incorrect terminology.

Alternate Method Procedure

Announce your intentions.

Enter on a midfield crosswind at pattern altitude.

Carefully scan for traffic.

Then turn downwind.

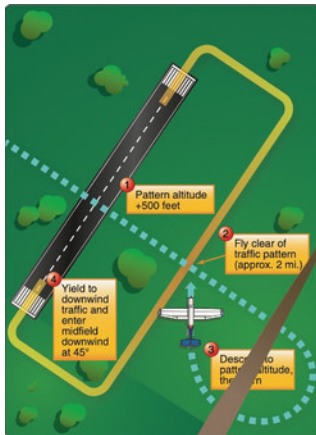
The Alternate Method Procedure is very straightforward and seems to be clearly understood by most pilots.

Significant Observation About PHAK 2016

Prior to the issuance of PHAK 2016, the earlier editions of PHAK and AFH included detailed guidance on how to overfly an airport for the purpose of observing the wind tee to determine the runway to be used for landing and then flying clear of the airport and descending and turning back to the airport for the purpose of a normal traffic pattern entry.

That guidance was written in an era before the widespread use of AWOS and ASOS. PHAK took that guidance for an outdated 20th century purpose and reused it to explain how to overfly an airport for the more relevant purpose of getting from the upwind side to the downwind side, followed by a normal traffic pattern entry. As explained in the AFH 2014 section of this book, it was the same (unnamed) process, just a different reason for using the process. The only difference was the misleading illustration that accompanied the detailed narrative.

The narrative contained in the 2016 *Pilot's Handbook of Aeronautical Knowledge* is easily understandable and both the content and format are consistent with what was published in the 2014 *Airplane Flying Handbook* and earlier FAA publications. However, the 2016 publication introduced a couple of new illustrations pertaining to the “Preferred” and “Alternate” procedure described above. These well-intentioned, but **grossly misleading** illustrations are the genesis of the mythical “teardrop” traffic pattern procedure that spread like a deadly cancer throughout the National Airspace System. Following are those illustrations.



14-2 Preferred Entry



14-3 Alternate Entry

While intended to support the actual narrative presented in the 2016 *Pilot's Handbook of Aeronautical Knowledge*, the shortcomings of the above illustrations need to be clearly understood.

Neither illustration contains sufficient information to enable a pilot to fully understand the procedure without the accompanying detailed narrative and are non-to-scale.

If we look at the runway size in both illustrations, we see the runway is 7 times as long as it is wide. Since it is intended to be a generic runway at a typical non-towered airport, for purposes of explanation, I will assume it is about 4000 feet long, or about 3/4 of a mile long. With the length being 7 times longer than the width, the calculated width would be about 570 feet. A more reasonable number for an actual airport would be about 75 or perhaps even as much as 100 feet wide. The little airplane in the picture is also “not-to-scale” with a wingspan of about 850 feet, assuming a runway length of 4000 feet. At this point, none of this is a big deal.

Focusing first on illustration 14-3 for the Alternate Midfield Entry, the next item to look at is the position of the downwind leg. While there is no prescribed distance from the runway for a downwind leg of a traffic pattern, it is generally considered to be 3/4 to 1 mile from the runway. Airplanes like a Piper Cub will probably fly a closer pattern and a Beech King Air will probably fly a wider downwind leg.

In the 14-3 illustration, the downwind leg, in relation to the runway length, is about 1/3 mile from the runway, far closer than what exists at actual airports. If the downwind leg was based on the same scale for the length of the runway, much of it would be out of the picture. For the purpose of understanding the basic procedure of the Alternate Midfield Entry, do these gross inaccuracies on metrics make a difference? Probably not. With the simple procedure being: cross the runway midfield at pattern altitude and turn left onto the downwind leg, it is still easy to understand the maneuver.

Illustration 14-2 for the Preferred Entry – Midfield Crossing, is a far different situation. ***If drawn to scale, a majority of the flight track would be out of the picture.*** The actual procedure has the airplane flying 4 or more miles beyond the runway before turning back to enter the 45-degree entry to the downwind leg of the pattern. As drawn, the flight track is grossly distorted. Unfortunately, many pilots fail to see or understand that distortion. What they see in the picture is a descending turn that ends at the midpoint of the downwind leg. To many, it looks like a “teardrop” and has increasingly been referred to as a “teardrop” entry in position reports at non-towered airports.

Adding to the confusion, is the fact the illustrations for both the Preferred Entry and the Alternate Midfield Entry are always shown together. There is a natural tendency to assume these are comparable pictures. The runway length and width are identical in both illustrations, the airplane size is the same in both illustrations, the downwind leg placement is the same in both illustrations, therefore the scale of the flight track is presumed to be the same. If you turn to downwind for the Alternate Midfield Entry at 3/4 to 1 mile beyond the runway, the illustration for the Preferred Entry creates the impression you should begin a descending turn about two miles from the runway and not four or more miles from the runway as the detailed written narrative specifies.

In addition to the shortcomings already mentioned, there is a significant problem with the abbreviated labels and where those labels are placed within the illustrations. For example, in the illustration for the Preferred Entry, label 3 states “descend to pattern altitude then turn.”

While the actual procedure would have the airplane descend while traveling away from the airport, the label placement suggests it occurs when the airplane is approaching the airport. Without the benefit of the full detailed procedure contained in *Pilot's Handbook of Aeronautical Knowledge*, the not-to-scale illustrations provide insufficient information to fully understand and properly execute the procedure for the Preferred Entry.

Observation – The written narrative in the *Pilot's Handbook of Aeronautical Knowledge* provides clear guidance on how to safely overfly an airport and enter the downwind leg of the traffic pattern when approaching from the upwind side of the airport. The process involves overflying the airport at a safe altitude above the traffic pattern, flying well clear of the traffic pattern and then descending to traffic pattern altitude. The completion of the crossing and descent procedure is followed by approaching the pattern on a course of 45-degrees to the downwind leg and joining the pattern at midfield. The final parts of the above process are a normal downwind entry.

The guidance provided in the illustration is inconsistent with the published narrative. It dangerously distorts the flight path that it is trying to depict. If viewed without reviewing and thoroughly understanding that narrative, it creates the impression the proper procedure is a descending turn directly into the downwind leg of the traffic pattern, a maneuver that many are now inappropriately characterizing as a “teardrop” entry.

Finally, the publishing of illustration 14-2 in PHAK in 2016 probably marks the date of the unintentional creation of the mythical "teardrop" traffic pattern entry concept. If the illustration had never been created, pilots would have relied on the written narrative for guidance on how to overfly an airport for the purpose of making a normal 45 degree downwind entry.

Advisory Circular 90-66B, Non-Towered Airport Flight Operations (2018)

The next item for review is the Advisory Circular issued in 2018. It contains far less information than either the *Airplane Flying Handbook* or the *Pilot's Handbook of Aeronautical Knowledge*. This is a problem when it comes to understanding the preferred method to enter the traffic pattern when approaching the airport from the upwind side of the airport.

Following are selected items from the Traffic Pattern Entry section of the above Advisory Circular that pertain to traffic pattern entries at non-towered airports.

11.3 Traffic Pattern Entry. Arriving aircraft should be at traffic pattern altitude and allow for sufficient time to view the entire traffic pattern before entering. Entries into traffic patterns while descending may create collision hazards and should be avoided. Entry to the downwind leg should be at a 45-degree angle abeam the midpoint of the runway to be used for landing. The pilot may use discretion to choose an alternate type of entry, especially when intending to cross over midfield, based upon the traffic and communication at the time of arrival.

Note - Aircraft should always enter the pattern at pattern altitude, especially when flying over midfield and entering the downwind directly. A midfield crossing alternate pattern entry should not be used when the pattern is congested. Descending into the traffic pattern can be dangerous, as one aircraft could descend on top of another aircraft already in the pattern. All similar types of aircraft, including those entering on the 45-degree angle to downwind, should be at the same pattern altitude so that it is easier to visually acquire any traffic in the pattern."

Observation – The Advisory Circular provides a few pieces of general traffic pattern information that is the same or similar to what is included in both the *Pilot's Handbook of Aeronautical Knowledge* and the *Airplane Flying Handbook*. Noteworthy items include:

Arriving aircraft should be at traffic pattern altitude and allow for sufficient time to view the entire traffic pattern before entering.

Entries into traffic patterns while descending may create collision hazards and should be avoided.

Entry to the downwind leg should be at a 45-degree angle abeam the midpoint of the runway to be used for landing.

All similar types of aircraft, including those entering on the 45-degree angle to downwind, should be at the same pattern altitude so that it is easier to visually acquire any traffic in the pattern.

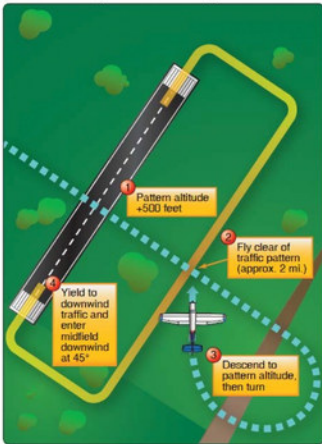
The most significant observation is that the Advisory Circular *does not* provide the detailed narrative regarding the specifics of how to properly execute the “Preferred Entry When Crossing Midfield” procedure.

Instead of including that essential information, the Advisory Circular simply includes the notation **(From PHAK)**. While that undoubtedly refers to the most recent edition of the *Pilot's Handbook of Aeronautical Knowledge*, that may not be obvious to all pilots reading the Advisory Circular. Even if one understands what **PHAK** is, the likelihood of having that book on hand while reading this particular Advisory Circular is remote.

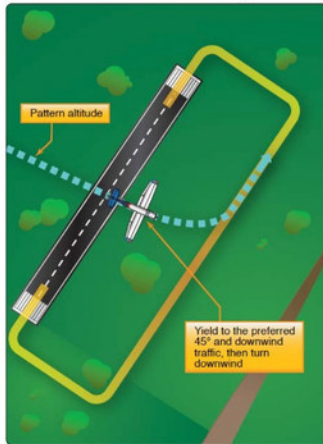
The shortcomings of the following illustrations are identical to what was presented in the previous section of this book covering the 2016 PHAK. Armed with just the new *AC 90-66B* and absent readily available specific guidance on how to properly execute the "Preferred Entry", pilots began "flying the picture." And since the flight path in the picture resembled a familiar IFR holding pattern entry procedure, some inappropriately began referring to it as a "teardrop entry".

Figure 1. Preferred and Alternate Entry When Crossing Midfield (From the PHAK)

Preferred Entry When Crossing Over Midfield



Alternate Midfield Entry



While the Preferred and Alternate illustrations originated with PHAK 2016, they were little noticed until the issuance of *AC 90-66B*.

Airplane Flying Handbook – 2021 Edition

The next FAA document for this review is *Airplane Flying Handbook*, published in 2021. Chapter 8, Airport Traffic Patterns, is similar in content to what is shown in Chapter 14 of the 2016 edition of *Pilot's Handbook of Aeronautical Knowledge*. Because the content is similar, but not identical in wording, the following items may seem a bit repetitious. They are being repeated, however, to show the exact wording of the final FAA reference publication, prior to changing the troublesome illustrations with the issuance of AC 90-66C in June, 2023.

"Non-towered airports traffic patterns are always entered at pattern altitude. How a pilot enters the pattern depends upon the direction of arrival. The preferred method for entering from the downwind leg side of the pattern is to approach the pattern on a course 45-degrees to the downwind leg and join the pattern at midfield.

There are several ways to enter the pattern if the arrival occurs on the upwind leg side of the airport. One method of entry from the opposite side of the pattern is to announce intentions and cross over midfield at least 500 feet above pattern altitude (normally 1,500 feet AGL). However, if large or turbine aircraft operate at the airport, it is best to remain 2,000 feet AGL so as not to conflict with their traffic pattern. When well clear of the pattern - approximately 2 miles - the pilot should scan carefully for traffic, descend to pattern altitude, then turn right to enter at 45-degrees to the downwind leg at midfield. An alternate method is to enter on a midfield crosswind at pattern altitude, carefully scan for traffic, announce intentions, and then turn downwind. This technique should not be used if the pattern is busy.

Why is it advantageous to use the preferred 45-degree entry? If it is not possible to enter the pattern due to conflicting traffic, the pilot on a 45-degree entry can continue to turn away from the downwind, fly a safe distance away, and return for another attempt to join on the 45-degree entry - all while scanning for traffic.

Before joining the downwind leg, adjust course or speed to fit the traffic. Once fitting into the flow of traffic, adjust power on the downwind leg to avoid flying too fast or too slow."

Key points and comments pertaining to the above excerpts from the 2021 *Airplane Flying Handbook* are as follows:

Non-towered airport traffic patterns are always entered at pattern altitude.

The overall preferred method for entering a traffic pattern, regardless of position or direction of flight, is a downwind entry.

The preferred method for entering from the downwind side of the pattern is to approach the pattern on a course 45-degrees to the downwind leg and join the pattern at midfield.

If entering the pattern from the upwind side, two methods of entry are suggested.

A Preferred Method and an Alternate Method. It is advantageous to use the preferred 45-degree entry.

If it is not possible to enter the pattern due to conflicting traffic, the pilot on a 45-degree entry can continue to turn away from the downwind, fly a safe distance away, and return for another attempt to join on the 45-degree entry - all while scanning for traffic.

The illustrations for the two midfield crossing procedures in the 2021 handbook are the same as what was included in earlier FAA reference documents. The only difference is they have been combined into a single image rather than two separate images.

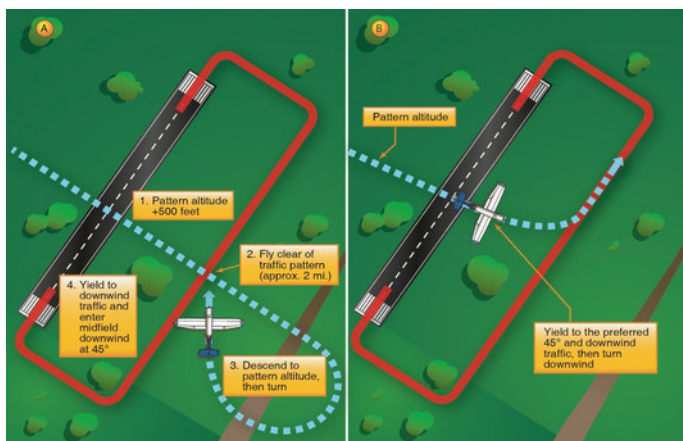


Figure 8-3. Preferred entry from upwind leg side of airport (A). Alternate midfield entry from upwind leg side of airport (B).

Rather than repeating comments about the troublesome aspects of the illustrations, please refer to the information already presented in the section pertaining to the 2016 edition of *Pilot's Handbook of Aeronautical Knowledge* - (pages 12 - 19).

Personal Assessment - January 2023

We have tens of thousands of pilots trained over the past six years who are absolutely convinced the proper way to enter the downwind leg of the traffic pattern when approaching the airport from the upwind side of the airport is to perform a "teardrop" entry. The fact they are essentially "flying the picture" and are disregarding many of the safety concepts associated with traffic pattern operations, seems to be of little or no concern to them.

We have flight schools, independent instructors, YouTube videos and even flight training applications that have embraced the notion of a descending turn into the downwind leg of the traffic pattern as a safe and rational means of entering the traffic pattern. The use of the word "teardrop" that doesn't exist in FAA literature applicable to traffic patterns, is a natural to them as downwind, base or final.

It hasn't happened yet, but a midair collision caused by a "teardrop" entry or confusion caused by use of that term in a traffic pattern position report is inevitable.

Essential Elements of Current FAA Regulations and Reference Documents Pertaining to Non-Towered Airport Operations, issued before June, 2023.

There is not now, nor has there ever been, an FAA sanctioned traffic pattern procedure for non-towered airports called a “teardrop” entry.

In the context of airport traffic patterns, the word “teardrop” does not currently appear in any FAA regulations or reference materials.

The overall preferred method for entering a traffic pattern, regardless of position or direction of flight, is the downwind entry.

Confusing language should never be used in a position report. Since “teardrop” is not a recognized traffic pattern word or procedure, it is, by definition, confusing language. In addition, “teardrop entry” is an IFR holding pattern entry concept that has nothing to do with traffic patterns. As indicated in *AC 90-66B*, IFR terminology in a VFR environment is, by definition, confusing.

The traffic pattern should be entered at a 45-degree angle to the downwind leg, headed toward a point abeam of the midpoint of the runway to be used for landing.

Non-towered airport traffic patterns are always entered at pattern altitude.

The 45-degree entry leg should be of sufficient length to provide a clear view of the entire traffic pattern and to allow the pilot adequate time for planning the intended path in the pattern and the landing approach.

If it is not possible to enter the pattern due to conflicting traffic, the pilot on a 45-degree entry can continue to turn away from the downwind, fly a safe distance away and return for another attempt to join on the 45-degree entry - all while scanning for traffic.

When overflying a non-towered airport to view a windsock or tetrahedron or for repositioning the airplane from the upwind side of the airport to the downwind side for the purpose of entering the traffic pattern, the overflight should be at least 500 feet above pattern altitude, normally 1,500 feet AGL.

Additional guidance is provided when the purpose of the airport crossing is to enable the pilot to enter the 45-degree entry leg for a downwind entry. When well clear of the pattern – approximately 2 miles – scan carefully for traffic, descend to traffic pattern altitude, then turn right to enter the 45-degree entry leg that will enable you to make a normal downwind entry. The word then has been emphasized since it is often overlooked or read as the word and. The above language needs to be read very carefully. It should also be noted that the following language is from the written narrative of current editions of *Pilot's Handbook of Aeronautical Knowledge* and *Airplane Flying Handbook*. Well clear of the pattern (approximately 2 miles) doesn't mean 2 miles beyond the runway. The downwind leg is part of the traffic pattern and depending of the aircraft being flown, is typically about 1 mile from the runway. Therefore, the descent begins approximately 3 miles beyond the runway or 2 miles beyond the downwind leg. The crossing altitude and the rate of descent will determine how much additional distance the airplane will cover before it reaches pattern altitude.

A 120 mph aircraft descending 500 feet, at a rate of 500 feet per minute, will cover an additional two miles before turning. A 90 mph aircraft making a descent of 500 feet, at a rapid rate of 1000 feet per minute, will travel an additional $\frac{3}{4}$ of a mile. Since 500 feet above pattern altitude is the minimum crossing altitude, aircraft crossing at an altitude higher than the minimum will cover an even greater distance during the descent.

The above calculations show there is not a specific distance that works for all of the many airplanes that might use this procedure. It does, however, show that the turn to intercept the 45-degree entry leg will likely be 4 or more miles beyond the runway.

Widespread Usage of the Mythical “Teardrop” Terminology and Procedure

Although the word “teardrop” in the context of traffic pattern procedures, is nonexistent in current FAA literature, it is frequently heard in traffic pattern position reports at non-towered airports. Those reports contain phrases such as “teardropping into the pattern” at XXXX airport to, “entering the teardrop” for runway XX at XXXX airport. I have even heard someone reporting they were making a “left teardrop” to runway XX, when in fact, they were executing the mid-field crosswind entry at pattern altitude. To most pilots, those words and phrases create more confusion than clarification. From a personal perspective, if I am in the vicinity of an airport and hear a position report that includes the word “teardrop”, I fly away from the area until that individual has either landed or moved away from the area.

Since there are no specifications for a “teardrop” entry or for “teardropping”, the ensuing procedures vary considerably from pilot to pilot. They generally have the common characteristic of a descending turn that ends at the midpoint of the downwind leg. They also incorporate practices that existing FAA reference documents say we should avoid such as: (1) using unclear (made up) terminology, (2) entering the traffic pattern while descending, (3) continuing turning until the point of entering the downwind leg at midfield (i.e. not flying a 45-degree entry leg), (4) flying a 45-degree entry leg that is of insufficient length to provide a clear view of the entire traffic pattern, and (5) beginning a descent to pattern altitude prior to being well clear of the traffic pattern.

The “teardrop” entry is particularly concerning when the airplane executing the descending right turn is a low wing airplane, thus blocking the pilot’s view of any other airplanes in the pattern.

What have we learned? (as of Spring 2023)

After reviewing and analyzing historical and current FAA publications, gathering and analyzing information about current practices and beliefs, looking at training curriculum used by different flight and ground schools, and talking with current active pilots, much has been learned. In no particular order, here is a listing of what is now known about “teardrop” traffic pattern procedures.

Over the past 20+ years, there have been no regulatory changes pertaining to traffic pattern procedures at non-towered airports.

In 2016, the FAA made some changes to the section of the 2016 version of *Pilot’s Handbook of Aeronautical Knowledge* (**PHAK**) that pertains to Airport Operations at non-towered airports. None of the fundamental traffic pattern principles were changed from earlier FAA reference books.

The revised **PHAK** provided additional clarity around the best procedure for overflying an airport to then make a normal 45-degree entry to the midpoint of the downwind leg of the traffic pattern. An alternate traffic pattern entry procedure was also included in the revised book.

Along with the additional clarity provided in narrative form for the traffic pattern entry procedures, the **PHAK** added two new colorful “not-to-scale” illustrations. Although not realized at the time of publication, one of those illustrations would eventually become problematic.

Although not-to-scale, the drawing for the alternate midfield entry represented a reasonable portrayal of the actual procedure, as detailed in the written narrative of the **PHAK**.

The illustration for the preferred midfield crossing was drawn in a similar manner, but the scale that was necessary for the flight track to fit into the overall dimensions of the illustration was incongruent with the actual written procedures.

While there are notations on the misleading illustration for the preferred midfield crossing that are intended to provide clarification, the brevity and placement of those notations fails.

From the time the 2016 **PHAK** was published until the issuance of *Advisory Circular 90-66B, Non-Towered Airport Flight Operations* in 2018, the two midfield crossing procedures and the related illustrations drew little notice from pilots. After *AC 90-66B* was issued everything changed, and not for the better.

Unlike the 2016 **PHAK** that contained both the detailed specifications for the Preferred and Alternate midfield crossing procedures, the newly issued Advisory Circular only contained the not-to-scale illustrations. As mentioned above, the illustration for the alternate midfield entry represented a reasonable portrayal of the actual procedure while the illustration for the preferred midfield crossing bore no resemblance to the actual written procedures.

In the absence of clear written procedures, pilots looked at the illustration for the preferred midfield crossing and saw a “teardrop.” With that mistaken revelation, a new descending turn procedure that commenced soon after crossing the downwind leg of the traffic pattern and ended at the midpoint of the downwind leg, was conceived. And for a name, what could be more appropriate than “teardrop entry?” Presto, the myth had originated!

Recommendations Made to the FAA to Resolve the Mythical “Teardrop” Traffic Pattern Problem

Immediately update *Advisory Circular 90-66B*.

Boldly state in that document – *There is not now, nor has there ever been an FAA traffic pattern procedure called the “Teardrop Entry.”*

Include the detailed steps for overflying a non-towered airport and then executing a normal 45-degree downwind entry. The language already exists in both the *Pilot’s Handbook of Aeronautical Knowledge* and *Airplane Flying Handbook*. These steps should leave no room for interpretation.

Remove or completely revise the confusing not-to-scale drawings that are in the current version of *AC 90-66B*. If a new illustration is to be used, it is critical that any depicted flight track be representative of what the actual flight track would look like if the detailed steps were flown correctly.

Where possible, have organizations like AOPA and EAA publicize the revised aspects of the updated Advisory Circular.

Where possible, have training organizations like Boldmethod, Gleim, Sporty’s and others update their training products to assure consistency with the updated guidance.

Where possible, notify popular applications like ForeFlight and Garmin Pilot of the new guidance.

A Note About Examples From the Original Version of This Book That Have Been Omitted From this Version

When the original version of this book was written in 2023, to assist the reader in understanding the magnitude of the “teardrop” phenomena that existed at that time, I included a number of actual examples of instructional information that promoted the use of a “teardrop” traffic pattern entry, based on various interpretations of how to “fly the picture” in the flawed illustration. These included magazine articles, online presentations, actual flight school training materials and instructional material associated with a well known aviation flight planning program.

Since all of those items had been produced prior to the FAA issuing a revised and much clearer illustration on June 6, 2023, with the publication of *AC 90-66C*, they are not included in this updated version. The focus on the remainder of this book is both the current situation and the future, not the past.

Sometimes the FAA Listens and Takes Action

Over a period of 2-1/2 years, multiple letters were written, asking the FAA to take several actions to once and for all, eliminate all notions of the mythical "teardrop" traffic pattern entry at non-towered airports, throughout the National Airspace System. After growing frustrated by the lack of any clear actions by the FAA to address my concerns, I took the content of what I had shared with the FAA in those letters and turned it into the original version of this book. I wanted a permanent record of our correspondence for when the inevitable midair collision occurred. A copy of the book and a letter, again urging the FAA to take action, was sent on May 23, 2023.

One very specific request was to immediately update *Advisory Circular 90-66B*, the document I considered to be the principle driver of the "teardrop" phenomenon.

A second request was to remove or revise the confusing not-to-scale drawings that are in the current version of *AC 90-66B* (and other FAA reference books). If a new illustration is to be used, I believed it was critical that any depicted flight track be representative of what the actual flight track would look like if the detailed steps were flown correctly.

The book sent to the FAA also contained a plea for prompt action, as shown below.

"We have a clear choice. We can do something now and prevent a "teardrop entry" from ever causing a midair collision. Or we can do nothing, wait for the inevitable and let the National Transportation Safety Board (NTSB) deal with the issue."

The FAA's response to that letter is on the following page.

FAA Response to my May 23, 2023 Letter

"Thank you for your May 23, 2023 letter regarding the depiction of "Teardrop" traffic pattern entry in the Federal Aviation Administration's publications. I asked our Flight Technologies and Procedures Division to review your letter and book. I'm happy to report the following:

- Advisory Circular (AC) 90-66B was revised to 90-66C to include an updated picture depicting traffic pattern entry which more accurately refers the actual path to be flown by adjusting the scale of the picture. AC 90-66C was published on 6/6/23.
- Pilots Handbook of Aeronautical Knowledge (PHAK) is currently under revision to align the picture depicting traffic pattern entry with the picture currently available in AC 90-66C. This will be reflected in the next version of the PHAK with publication anticipated within the next few months."

The above response was received in mid-June 2023, nearly three years after I sent the first of many letters to the National Offices of FAA. The second part of the response was particularly exciting since the PHAK is normally updated on an infrequent basis.

Advisory Circular 90-66C, Non-Towered Airport Flight Operations (2023)

This newest revision was released on June 6, 2023 and was the first and probably the most useful step in eliminating the mythical and highly controversial "teardrop" traffic pattern entry at non-towered airports that many pilots had incorrectly adopted as a normal means of pattern entry.

Like the earlier version of this *Advisory Circular* and the current versions of *Pilots Handbook of Aeronautical Knowledge* and the *Airplane Flying Handbook*, it contains the standard and non-controversial aspects of traffic pattern procedures that are generally well understood by pilots. An example is section 11.3 in the new AC.

11.3 Traffic Pattern Entry. Arriving aircraft should be at traffic pattern altitude and allow for sufficient time to view the entire traffic pattern before entering. Entries into traffic patterns while descending may create collision hazards and should be avoided. Entry to the downwind leg should be at a 45-degree angle abeam the midpoint of the runway to be used for landing. Aircraft should always enter the pattern at pattern altitude, especially when flying over midfield and entering the downwind directly."

Another example is section 10.3 pertaining to use of confusing language.

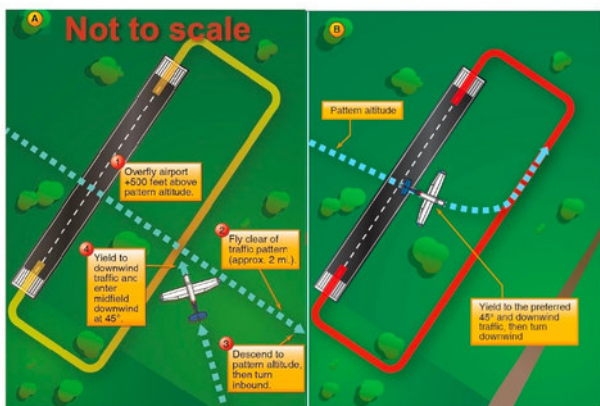
10.3 Avoid Confusing Language. Avoid confusing language that could attribute to the risk of a midair collision."

Although there is sometimes a tendency to view Advisory Circulars, such as AC 90-66C, as standalone reference material, that is not the FAA's intent with regard to these documents. Throughout the circular, there are many references to both the PHAK and AFH as sources for additional clarifying information.

AC 90-66C introduced a new and greatly improved illustration that covers both the preferred and alternate procedure for entering the traffic pattern at a non-towered airport when approaching from the upwind side of the airport.

Alternate method to the 45 degree to the downwind leg. Preferred entry from upwind leg side of airport (A). Alternate midfield entry from upwind leg side of airport (B). Refer to the [Airplane Flying Handbook](#), Chapter 7.

Note: Aircraft should always enter the pattern at pattern altitude, especially when flying over midfield and entering the downwind directly.



The most notable change is the portrayal of the flight track on the "A" side of the picture. While the detailed procedure has always required the crossing airplane to fly 4 or 5 miles beyond the airport before reaching pattern altitude, and **then** turning back to the airport for a 45-degree entry to the downwind leg, the earlier illustration compressed the flight track to fit into the allotted dimensions of the picture.

A second noteworthy change is the reference to the *Airplane Flying Handbook*, the source of the detailed steps associated with this procedure. In the past, this would have required the reader to actually seek out a copy of that handbook. The former portrayal of reference material has been replaced by a hyper link.

Pilot's Handbook of Aeronautical Knowledge – 2023 Edition

The letter I received from the National Office of the FAA in June 2023 indicated the updated version of PHAK was scheduled to be released in about three months. Much to my surprise, the actual release date was mid July.

The new version of PHAK, referred to by the FAA as FAA-H-8083-25B, contained all of the detailed guidance regarding the process of overflying an airport from the upwind side to the downwind side, for the purpose of entering the traffic pattern that had been included in all FAA reference documents since PHAK 2016 was published. Following is the exact wording from PHAK 2023.

"Non-towered airport traffic patterns are always entered at pattern altitude. How you enter the pattern depends upon the direction of arrival. The preferred method for entering from downwind side of the pattern is to approach the pattern on a course 45 degrees to the downwind leg and join the pattern at midfield.

There are several ways to enter the pattern if you're coming from the upwind leg side of the airport. One method of entry from the opposite side of the pattern is to announce your intentions and cross over midfield at least 500 feet above pattern altitude (normally 1,500 feet AGL.) However, if large or turbine aircraft operate at your airport, it is best to remain 2,000 feet AGL so you are not in conflict with their traffic pattern.

When well clear of the pattern—approximately 2 miles – scan carefully for traffic, descend to pattern altitude, then turn right to enter at 45° to the downwind leg at midfield. *[Figure 14-2]*

An alternate method is to enter on a midfield crosswind at pattern altitude, carefully scan for traffic, announce your intentions, and then turn downwind. *[Figure 14-3]* This technique should not be used if the pattern is busy. Always remember to give way to aircraft on the preferred 45° entry and to aircraft already established on downwind."

As was the case with all previous FAA written guidance on this subject, the detailed steps to be taken regarding the process of overflying an airport from the upwind side to the downwind side, for the purpose of entering the traffic pattern, are clear and unambiguous.

While the guidance is clear and unambiguous, that doesn't mean this is a precision maneuver that will produce an identical flight path for all aircraft that use this guidance. The crossing altitude is 500 feet or more above pattern altitude, not a precise number. If an airport has a pattern altitude of 2250 feet, one airplane may choose to cross the airport at 2750 feet, while another may choose 3000 feet. The next step requires flying well beyond the airport pattern (2 miles). The distance of the downwind leg of a traffic pattern from the runway is not defined. It varies based on the performance characteristics of the different airplanes. The placement of the downwind leg for a slow, two seat trainer, will be much closer to the runway than the downwind leg for a twin engine turboprop. In a similar fashion, speeds and descent rates of different types of aircraft will also vary significantly. While the guidance is the same, and considering the many variables among different airplanes, the ultimate flight path will not be identical for all airplanes. The guidance will, however, provide a safe process for all aircraft to safely overfly an airport for the purpose of making a normal traffic pattern entry.

Oops, the wrong illustration made it into PHAK 2023!

When the FAA committed, in a letter, to changing what had been determined to be the root cause of the Mythical Teardrop Traffic Pattern Entry phenomenon, the following two specific actions were detailed.

"Advisory Circular (AC) 90-66B was revised to 90-66C to include an updated picture depicting traffic pattern entry which more accurately refers the actual path to be flown by adjusting the scale of the picture. AC 90-66C was published on 6/6/23.

2. Pilots Handbook of Aeronautical Knowledge (PHAK) is currently under revision to align the picture depicting traffic pattern entry with the picture currently available in AC 90-66C. This will be reflected in the next version of the PHAK with publication anticipated within the next few months."

Item 1, as explained elsewhere in this book, happened and was positively welcomed by many.

Regarding Item 2, the illustration that made it into PHAK 2023 was neither the troublesome one that was in earlier versions of AC 90-66B, PHAK 2016 and AFH 2021, nor was it the newly created illustration that had just been introduced in AC 90-66C, less than a month earlier.

What actually made it into PHAK 2023
vs what should have been included.

The incorrect illustration used
in PHAK 2023

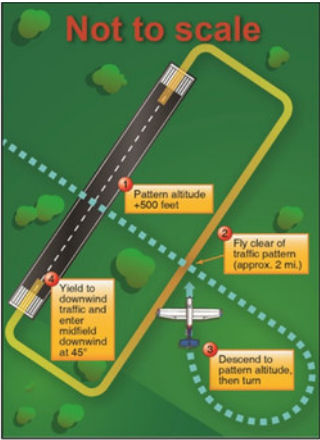


Figure 14-2. Preferred Entry-Crossing Midfield.

The correct illustration that should have
been used in PHAK 2023



What really happened and what happens next after the PHAK 2023 illustration debacle?

Immediately after discovering the illustration that made it into PHAK 2023 was different (in a bad way) from what had just been released in *AC 90-66C*, and was different from what I had been assured was going to be used, I again contacted the Assistant Administrator for Safety that I had been corresponding with over the past three years. In September, I received the following, less than forthright, response.

"Thank you for your August 30, 2023 letter regarding the depiction of "Teardrop" traffic pattern entry in the Federal Aviation Administration's (FAA) publications.

At the time of your request, the publication cycle for the July 2023 update of the FAA's Pilots Handbook of Aeronautical Knowledge (PHAK) was nearing its end. As noted, we have included the update for the next revision cycle. The anticipated publication date for the next regularly scheduled update to the PHAK is June 2024. This update will include the revised depiction of the traffic pattern entry to be consistent with the current depiction in Advisory Circular 90-66C, Non-Towered Airport Flight Operations."

While the above response provided some reassurance the "correct" illustration would make its way into PHAK in the not to distant future, the revision and reissuance of any of the FAA handbooks has never occurred within a year of publication. The typical time frame is normally five or more years.

The official FAA identifier for PHAK 2023 is FAA-H-8083-25C. The final letter in the identifier is the key in identifying the document. The next one to be issued, at an unknown future date, will be FAA-H-8083-25D. The process of assembling a new version actually begins at the moment the current version is finalized/published.

Since the intended updated version of illustration 14-2 did not make it into version FAA-H-8083-25C, it now resides with the "in process" files for FAA-H-8083-25D. After the next PHAK is issued and the correct figure 14-2 is used, the illustrations in both AC 90-66C and the PHAK will once again be the same.

When FAA-H-8083-25D will actually be issued remains an open question. The correct illustration didn't make it into PHAK 2023, as originally promised and FAA-H-8083-25D wasn't published in June 2024, as promised. It also wasn't published in 2025 or thus far in 2026. At the time this is being written, FAA-H-8083-25D is currently scheduled to be published in June 2027, which is still a relatively short span for publication of different versions of PHAK.

In spite of the missed opportunity involving the publication of PHAK in 2023, there is one positive aspect to the situation. Illustration 14-2 is not a stand-alone item in the handbook, but accompanies the detailed guidance that is unambiguous.

What is the status of the mythical "teardrop" traffic pattern procedure in July 2026?

From a personal perspective, I have the opportunity to observe actual traffic pattern radio transmissions at non-towered airports on a frequent basis. I typically fly 3 or 4 times each week and most flights involve non-towered airports. Airports that I normally operate from use either 123.0 or 123.05 radio frequencies. As such, I almost always am listening to radio transmissions on one of those two frequencies. Those two frequencies each cover about a half dozen airports that are in range of my radio receiver.

Prior to the issuance of *AC 90-66C*, I would seldom make a flight where I didn't hear one or more radio transmissions that contained the word "teardrop" or some variation of that word such as "teardropping".

As indicated above, I currently fly 3 or 4 times each week and I continue to monitor the 123.0 or 123.05 radio frequencies. I still hear radio transmissions that contain the word "teardrop" but they are far less common than they were a few short years ago. I can go for days and sometimes more than a week without hearing a single "teardrop" transmission. While that represents a significant improvement, it clearly indicates there are still pilots who are using techniques and terminology that are inconsistent with written FAA guidance.

While the above is anecdotal in nature, it is an observation by someone who has been actively involved with this subject for the past six years.

The next few segments of this book provide a context for understanding the current traffic pattern situation and the opportunities for enhanced safety at non-towered airports.

FAA Reference Material

There are currently three major FAA reference documents containing information pertaining to Operations at Non-Towered Airports. First is *Airplane Flying Handbook*, (Chapter 8 – Airport Traffic Patterns). The most current edition was published in 2021. The second is *Pilot's Handbook of Aeronautical Knowledge*, (Chapter 14 – Airport Operations). The most current edition was published in 2023. The third is *Advisory Circular 90-66C – Non-Towered Airport Flight Operations*, published in June 2023.

The two handbooks provide very detailed information that enables pilots to fully understand the specifics of the concept or the procedure being presented. The detailed narrative is frequently accompanied by illustrations intended to emphasize some aspect of the concept or procedure. They are intended to supplement the detailed procedures, and not function as a substitute. These illustrations take many forms: photographs, charts, and colorful drawings. The drawings are almost always “not-to-scale”, “not to be used for navigation purposes” and have captions that provide only some of the detailed procedures or limitations that are fully explained in the written narrative. When presented in the two handbooks, the illustrations are always accompanied by the explanatory written narrative.

For perspective, the 2023 edition of *Pilot's Handbook of Aeronautical Knowledge* is more than 500 pages in length and includes 496 illustrations.

While FAA “Handbooks” are lengthy and cover a wide range of topics, individual Advisory Circulars are quite limited in scope. *AC 90-66C*, published in June, 2023 covers just the topic of Non-Towered Airport Flight Operations. Advisory Circulars are unlike the “Handbooks” in another, sometimes misunderstood, way. Rather than going into great detail explaining a specific procedure, the AC will provide a reference to the Handbook containing the detailed procedure. While *AC 90-66B*, published in 2018, included an illustration from PHAK 2016, it did not include the detailed procedures that were essential for understanding that illustration. However, it did include a reference to that material.

When *AC 90-66C – Non-Towered Airport Operations* was published in 2023, and superseded *AC 90-66B*, two noteworthy changes were made. First and foremost, the “airport crossing, followed by pattern entry” illustrations were modified to include a “Not-to-scale” notation and a revised flight path depiction to minimize confusion caused by the earlier version. The second change was the addition of a hyper link that would take the reader (assuming they were using an electronic version of the AC) to the actual source material in the appropriate handbook.

After considering the above, it is clear the current FAA written guidance provides comprehensive information on how to safely reposition an airplane from the upwind side of an airport to the downwind side, for the purpose of making a normal traffic pattern entry. This has been accomplished by using existing safe practices and without the creation of new (named) procedure.

Position Reporting at Non-Towered Airports – A Critical Safety Element

There are nearly 900,000 licensed pilots in the USA, operating in big cities and remote outposts, throughout the National Airspace System. By the very nature of air travel, these pilots operate in many different locations. As such, it is critical that flight procedures and communications terminology be consistent, regardless of where the pilot is flying on any given day.

To achieve that consistency, two foundational elements are essential. The first is a single gatekeeper that has the sole authority to create, modify and name a flight procedure. Without question, that authority is held by the FAA and not individual pilots, flight instructors, flight schools, training material developers/suppliers and aviation software marketers. The second foundational element is that all pilots, from students to instructors to Airline Transport Pilots, only use clear terminology that **actually exists** in current FAA regulations and advisory documents.

The fact that a pilot was taught a particular aviation term or has been using it for years, or thinks that it is more descriptive of what their intentions are, or is something that exists in third party training materials or is part of an aviation software package they subscribe to, is probably meaningless to many, if not most of the other 900,000 pilots if it does not exist in approved FAA literature.

The sole reason for giving a position report in the vicinity of non-towered airports, is for other pilots in the area to fully understand where you are (position and altitude) and what your intentions are. Using terminology or procedures that are not documented in written FAA guidance makes a position report meaningless and very likely confusing to most pilots who hear it.

Although the word “teardrop” does not now, nor has it ever existed in the context of traffic pattern procedures in written FAA guidance, it is appropriate to explain why that specific term cannot and should not ever be used in a traffic pattern position report.

Let’s start with the legitimate “teardrop entry” procedure used to enter an IFR holding pattern. For student and VFR pilots, it’s likely a concept they have never heard of. But for IFR trained pilots, it represents one of three ways to enter a holding pattern. The other two methods are the “direct entry” and the “parallel entry”. The appropriate procedure to use is determined by the direction the airplane is coming from when it arrives at the entry point. The entry point is a clearly defined navigation aid such as a VOR or an airway intersection. Use of the “teardrop” entry is limited to a 70 degree segment based on arrival direction, whereas a “parallel” entry has a 110 degree arrival segment and “direct” has a 180 degree arrival segment. Other strictly defined parameters include altitude, holding leg length and direction of turns.

The specificity of the elements of the procedure makes it both a unique procedure and a unique term in the field of aviation. In other fields, the word teardrop may have different or even some generic meanings, but in aviation, it has a very specific meaning. It is, in fact, a “term or art” or alternatively a “word of art”. As such, in the field of aviation, it can only be used in the specific context of a holding pattern entry. So even if the FAA ever decided to create a new (named) traffic pattern procedure, or any other flight procedure, it would be inappropriate for them to use the term “teardrop.”

Why doesn't the FAA simply name the procedure?

Most VFR guidance provided by the FAA does not result in named procedures. The objective of the FAA published guidance is to get an airplane from the upwind side of an airport to the downwind side for the purpose of making a landing at that airport. Two methods are specified – a preferred and an alternate - to be used when the airport isn't congested.

Starting with the easier of the two is the alternate method. It is extremely straightforward and is simply a “crosswind entry at midfield” that is flown at pattern altitude, with a turn to the downwind leg after the crossing is complete.

The preferred method is a bit more complex, with numerous variables that will affect the ultimate flight path. In its most basic form, it is a crossing/overflight maneuver (including a descent and course reversal) followed by a normal 45-degree entry to the downwind leg of the pattern. For the first part of the process, it is a routine crossing over the airport and is similar to what occurs during cross country flights when you overfly non-towered airports. Following FAA recommendations, when approaching the airport at an altitude of 500 or more feet above pattern altitude, announce your position and intentions. ie. Smallville Airport, Cessna 12345, three miles North of the airport. I'll be overflying the airport, North to South at 3000 feet. When well clear of the airport and after descending to pattern altitude and turning back to the airport, in accordance with the specific FAA guidance, you are then in a position to announce and enter a normal 45-degree entry for the downwind leg of the traffic pattern.

What are the variables that affect the ultimate flight path? The crossing altitude is the first variable and it affects everything that follows. The guidance says to cross the runway at 500 or more feet above pattern altitude for most airplanes and 1000 or more above pattern altitude for airports that have jets using that airport. But those are minimum altitudes and crossing airplanes can and do use altitudes that are sometimes higher than those minimums.

The second variable is the downwind leg placement in relation to the runway. The guidance says fly well clear of the pattern, 2 miles (which is 2 miles beyond the downwind leg). The problem is the downwind leg is not a defined item. For some airplanes, an appropriate downwind placement is one half mile from the runway and for large/fast aircraft, it may be more than a mile. The FAA has not defined the downwind leg distance. Even if the downwind leg was a defined distance, there is still the issue of knowing precisely when you are two miles beyond the downwind leg. Unlike the IFR world of navigation where everything is defined by specific navigation aids or precise times, this VFR crossing procedure is far from being precise.

Assuming you really are two miles from the undefined downwind leg, you have three variables, other than winds, that will determine how far your descent to pattern altitude will take you. If you crossed the runway at exactly 500 feet above pattern altitude, that is the minimum you will need to descend. However, if you crossed at more than 500 feet or possibly 1000 feet or more above pattern altitude, you have a much greater descent facing you. That brings you to the next variable - - what will your descent rate be, and the final variable of what speed you will be traveling. With the number of variables, the distance covered on the way to pattern altitude could be as little as 1-1/2 to 4 or more miles.

Based on the above understanding, the airport crossing and descent guidance does not result in a precise flight path that will be identical for all aircraft using the guidance. Because this is a VFR procedure, the guidance also does not assure the flight path will remain clear of nearby airport traffic patterns, restricted airspace or obstructions. There are approximately 4500 non-towered public use airports in the USA, which creates many situations that will require some degree of pilot judgment. A named procedure would imply a degree of precision that doesn't exist.

What is the role of flight instructors, flight schools and non-FAA businesses that provide aviation training, course materials and automated flight planning software?

With nearly 900,000 licensed pilots operating throughout the National Airspace System, the most critical element is consistency, regardless of where in the system the flight occurs. The two fundamental building blocks of the system are terminology and procedures. To achieve consistency in the creation or modification of those two elements, requires a single point of origin. Without question, that responsible party is the FAA. There also needs to be a formal means of communicating information about the creation or modification of procedures and terminology. That again, is the responsibility of the FAA and is accomplished through the issuance of formal documents such as AIM, PHAK, AFH, and Advisory Circulars.

The role of flight instructors, flight schools and non-FAA businesses that provide aviation training materials and automated flight planning software is to convey terminology and procedures, as they exist in published FAA materials. Teaching or using terminology or procedures that are inconsistent with written FAA guidance, removes the keystone of consistency that is essential for common understanding, by all pilots, regardless of where they are operating in the National Airspace System.

If you really believe you have a better/safer procedure or believe that a particular “name” for a procedure needs to be modified or adopted to improve safety or understandability, there is a way to do that - - - convince the FAA that such a change needs to be made. Keep in mind the necessity for consistency throughout the National Airspace System, which makes it a National and not a local matter.

A Cautionary Note About the Electronic Portrayal of VFR Guidance Information

There is a significant difference between actual IFR procedures and VFR guidance information. An instrument approach procedure provides very specific guidance that has been developed for a specific approach at a specific airport. It has been designed and tested to assure it is a safe procedure, devoid of obstructions and restrictions. When flown as an IFR procedure, it can be assumed to be a safe procedure.

VFR guidance is generic in that it applies to all public use airports and is not customized or tested to assure it is devoid of obstructions and restrictions at each of the public use airports throughout the National Airspace System. Pilot involvement in the actual flight process is essential and required. As pointed out on page 40 of this book, the preferred procedure for overflying an airport from the upwind side to the downwind side, for the purpose of making a normal 45-degree traffic pattern entry, has many variables the pilot must deal with.

When using flight planning software programs that are linked to actual IFR approach plates, it is possible to have an accurate and complete picture of the anticipated flight path displayed. **If VFR flight planning software programs are used for VFR arrival purposes, it is essential to understand their limitations.** Unless all of the variables (altitude, speed, descent rate, your definition of how far the downwind leg is from the runway, and the specific point you would like to enter the 45-degree entry point) are items you can input into the program, the output you will get will be generic and will be the same, regardless of what airport you arrive at. You cannot assume a generic output will be devoid of obstructions and restrictions.

While there is a significant difference between the IFR procedure and the VFR guidance for a specific runway at a specific airport, the two distinctly different items may be portrayed in the same or in a similar manner on a portable display.

In circumstances where software providers for VFR flight planning purposes have a menu item for “selecting an approach” at your destination airport, the line between IFR and VFR becomes even more blurred. What began as VFR guidance from the FAA on how to get from the upwind side of the airport to the downwind side, for the purpose of making a routine 45-degree traffic pattern entry, now has the appearance of an approved approach procedure.

Conclusion

When the original version of this book was published in 2023, the objective was to get the FAA to fix a problem that had originated with a new, and very misleading, illustration that first appeared in *Pilot's Handbook of Aeronautical Knowledge* in 2016. It was little noticed at the time because it was accompanied by detailed narrative explaining exactly how to accomplish the task of repositioning an airplane from the upwind side of the airport to the downwind side, for the purpose of landing at that airport. That changed in 2018 when *Advisory Circular 90-66B* was published. It included the same misleading illustration, but without the detailed narrative.

Although never intended by the FAA to do so, it spontaneously erupted into a “new” traffic pattern entry procedure, that quickly started being referred to as a “teardrop entry.” In the absence of detailed procedures associated with the illustration not being included in the AC, the actual procedures being flown varied rather dramatically from pilot to pilot, based on their interpretation of an illustration that was never intended to be used for navigation purposes.

After three years of extensive effort encouraging the National Offices of the FAA to fix the root cause of this “mythical teardrop traffic pattern entry” procedure, they revised the troublesome illustration and rescinded *AC 90-66B*, replacing it with *AC 90-66C* in June 2023. In the new AC, they also provided a hyper link to enable the reader (assuming they were viewing it as an electronic version) to jump to the detailed procedure. They also committed to use the updated version in future FAA handbooks, with the revised illustration now scheduled to be used for the first time when PHAK is next reissued (currently scheduled for June 2027).

Conclusion (continued)

The root cause of this unintended phenomenon has been fixed and usage of a steep descending turn into the downwind leg, while announcing a “teardrop” entry has decreased; but problems still remain. This updated version of ***Understanding the Mythical “Teardrop” Traffic Pattern Procedure*** provides a history, from the first publication of the troublesome illustration to the current time. It also provides some insights regarding who and why the FAA is the true gatekeeper for creating, modifying and naming aviation procedures.

There are many high-quality pilot training manuals being produced today by a variety of well-known vendors. More often than not, flight schools use these commercially available training materials in lieu of the actual FAA reference documents. While it is essential the detailed procedures and terminology be consistent between what the vendors have produced and what is contained in the FAA reference documents, there are current examples that still incorrectly portray the “mythical teardrop traffic pattern entry” as a legitimate procedure.

There are also many highly competent flight instructors that learned to fly in the period after *AC 90-66B* was issued in 2018. As such, there is a reasonable chance some were taught the “mythical teardrop traffic pattern entry” by their instructors. Regardless of what they were taught and regardless of what third party training materials they may use for instructional purposes, it is their responsibility to teach their students the material that currently exists in FAA guidance.

Conclusion (continued)

I'll end this book with a plea for all pilots to periodically review FAA guidance documents to assure your current understanding of flight procedures and terminology is consistent with the latest versions of those documents. Although the wheels of progress within the FAA sometimes move slowly, changes in regulations and guidance do occur. I would also urge caution when using non-FAA reference material and software until you are confident it is consistent with FAA written documentation. As a whole, flight instructors and flight schools know a lot about all things aviation and pilot training materials provided by vendors are generally excellent. The incredible aviation software that you have loaded onto your i Pad has revolutionized flight planning. However, there are times when what you are told or what you read in a training document or what you see on your flight planning software may be different than what is included in official FAA publications. Remember, the FAA is the one official source of guidance for procedures and terminology for **ALL** of the 900,000 pilots that use the National Airspace System. Without them functioning in that capacity, the National Airspace System would be in chaos.

Bibliography/Reference Documents

Airplane Flying Handbook - 1999

Airplane Flying Handbook - 2014

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Advisory Circular 90-66B - 2018

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Advisory Circular 90-66C - 2023

Pilot's Handbook of Aeronautical Knowledge - 2023

*Formal written responses received from the National
Offices of FAA.*

September 1, 2022

July 23, 2023

September 27, 2023

August 27, 2024

June 12, 2026

***There is not now, nor has there ever been,
an FAA published document pertaining to
non-towered airport operations that contains
the words "teardrop" or "teardrop entry"***