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## OPERATIONS AT NONTOWERED AIRPORTS

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- Nontowered airports? It's a shorthand way to refer to airports not served by operating air traffic control towers, and that includes most of the airports in the United States. At present, some 12,000 airports are nontowered, compared to approximately 400 that have FAA towers.
- Millions of safe operations in all types of aircraft are conducted at nontowered airports in a variety of weather conditions. It works because pilots put safety first and use commonly known procedures.

**A word about procedure:** There are several sources of information that explain official FAA-recommended procedures at nontowered airports. CFR 91.113 cites basic right-of-way rules, and CFR 91.126 and 91.127 establish traffic-flow rules at nontowered airports. The Aeronautical Information Manual and Advisory Circular 91-66A expand on the regulations. Together, these documents define procedures for nontowered flight operations.

Regulations and procedures can't cover every conceivable situation, though, and the FAA has wisely avoided imposing rigid operating regulations at nontowered airports. What is appropriate at one airport may not work at the next. Some airports have special operating rules due to obstacles or hazards, while other rules may promote a smooth and efficient flow of traffic or keep aircraft from overflying unsympathetic airport neighbors.

The reason: When you think about it, you realize that control towers, radar controllers, right-of-way rules, and nontowered airport traffic patterns and procedures exist for only one purpose—to prevent collisions in the air and on the ground. There are other benefits to adhering to the rules, such as an orderly traffic flow, noise abatement, and defusing potential right-of-way conflicts, but traffic separation is the prime concern.

This Safety Advisor is about "rules of the road" at nontowered airports. We'll cover the following topics:

## Things you should know before you go;

- Communications;
- A trip around the traffic pattern to review procedures and techniques;
- The "C" word - courtesy; and
- Nonstandard flight operations you're likely to encounter at nontowered airports with helicopters, gliders, and parachutists.

We'll also include appendices for flight instructors and airport operators, as well as useful tips to help you fly with safety and courtesy.

## Things to Know Before You Go

### The Traffic Pattern

Safe flight operation begins with knowing the structure of a standard traffic pattern. A standard pattern is comprised of six legs to create a logical, safe flow at a nontowered airport.

- The upwind leg is a flight path parallel to the landing runway, into the wind, on the opposite side of the pattern of the downwind leg.
- The departure leg is a flight path aligned with and leading from the takeoff runway. The departure leg begins at the point the airplane leaves the ground and continues straight out or until the 90-degree turn onto the crosswind leg.
- The crosswind leg is a flight path at right angles to the landing runway off its takeoff end. It is opposite the base leg.
- The downwind leg is a flight path parallel to the landing runway in the opposite direction of landing. Because landings are made into the wind, the downwind leg is flown with the wind.
- The base leg is a flight path at right angles to the landing runway off its approach end and extending from the downwind leg to the intersection of the extended runway centerline.
- The final approach is a flight path in the direction of landing along the extended runway centerline from the base leg to the runway.

### Let's Fly!

Now that you're briefed, let's take a trip around the pattern. We'll begin in the runup area at the end of Runway 23 at Frederick, Maryland. The pre-takeoff check list is complete and the aircraft is positioned just short of the hold line, where we can see the downwind, base, and final legs. The radio is tuned to the CTAF, and we've heard traffic in the pattern.

- We scan the pattern for traffic and spot a Tampico on downwind. It looks like there'll be plenty of room, so to begin the takeoff, we:
  - Announce - "Frederick traffic, Skyhawk Four Zulu Sierra departing Runway Two-Three, remaining in the pattern-Frederick."
  - Line up - landing and anticollision lights are on. Taxi onto the runway, and without stopping, align the aircraft with the runway centerline.
  - Take off - increase to takeoff power, accelerate, and rotate to an attitude that will yield best-rate-of-climb speed.
  
- **Departure Leg**
  - Climb on the extended runway centerline to within 300 feet of traffic pattern altitude. Frederick's pattern altitude is 1,300 feet msl, so we'll continue the departure leg until our altimeter registers 1,000 feet.
  - At 1,000 feet, look to the left and right to be sure there is no traffic conflict and announce "Frederick traffic, Skyhawk Four Zulu Sierra turning crosswind Runway Two-Three Frederick."
  
- **Crosswind Leg**
- Climb to pattern altitude - 1,300 feet msl - level off, and reduce power to maintain a safe interval.
- Continue on crosswind until approximately ? mile from the extended runway centerline.
  - To help visualize this distance, you can use the runway itself. Many general aviation runways are approximately 1 mile long, so use half the runway length as a guide for the turn to downwind.
    - As you approach the turn point, scan for traffic on downwind and announce "Frederick traffic, Skyhawk Four Zulu Sierra-turning downwind Runway Two-Three Frederick."
  
- **Downwind Leg**
  - Establish the downwind track and begin the pre-landing check list. Perform most of the landing configuration tasks while on this leg.

- Retractable-gear-airplane pilots should confirm gear down and locked before passing midfield on downwind.
  - All pilots should be especially vigilant, scanning and listening for traffic entering the pattern on downwind leg. This could occur anywhere on downwind but will usually happen at midfield.
  - Select a touchdown spot on the runway, and as we pass that spot, begin the descent for landing by:
    - Reducing power to maintain approach speed.
    - Set approach flaps.
  - Continue on downwind and plan the turn to base so as to achieve a 1/2-3/4-mile final approach leg.
    - Suggestion-turn base when the aircraft is 45 degrees to the approach end of the runway.
  - Approaching the turn point, we'll scan for conflicting traffic and announce "Frederick traffic, Skyhawk Four Zulu Sierra turning base leg Runway Two-Three Frederick."
- **Base Leg**
- This leg is flown perpendicular to the runway centerline, but if there is any wind, the airplane will be crabbed toward the runway.
    - If dealing with a left crosswind, we'll have to lead the turn to final approach.
    - Right crosswinds will delay the turn to final.
  - Be especially careful to scan and listen for traffic on base or final. Once turned toward the runway, we won't be able to see behind the aircraft.
  - We'll continue configuration tasks by setting flaps.
  - Approaching the turn point, we announce "Frederick Traffic, Skyhawk Four Zulu Sierra turning final, full stop Runway Two-Three Frederick."
- **Final Approach**
- On final, check configuration one more time and set landing flaps.

- There is a tendency for pilots to "lock on" to the touchdown zone. It's imperative to continue scanning and listening for traffic as we slide down final.
- Maintain alignment, flare, and wait for that soul-satisfying squeak that says we've made another great landing.
- Conscious of following traffic, don't dwell on success. Expeditiously taxi to the nearest turnoff and clear the runway for the next arrival.

### Safety Tip

*Announcements made just before "turning the corners" give other pilots in the pattern a definite place to look for traffic. Banking airplanes are easier for other aircraft at the same altitude to spot. High-wing aircraft should always pick up a wing and look before turning.*

### One Size Doesn't Fit All

Although pattern nomenclature doesn't change, just about everything else can. Pilots should consult the Airport/Facility Directory (AFD) published by the FAA, AOPA's Airport Directory, and other pilot information sources for pattern information on specific airports. Airport management has the final say on many pattern parameters. Here are a few of them:

- All turns are made to the left unless otherwise specified.
  - Occasionally a right-hand traffic pattern will be established for terrain clearance or to avoid overflight of noise-sensitive areas.
  - It's not unusual to find a single runway served by a left-hand pattern when landing in one direction and a right-hand pattern when landing in the opposite direction.
- Landing aircraft have the right of way over aircraft on the ground.
- The speed of your aircraft determines the size of the traffic pattern.
  - The AOPA Air Safety Foundation (ASF) recommends that fixed-gear, single-engine airplanes fly downwind legs about 1/2 mile from the runway.
  - ASF recommends that pilots maneuver so as to be established on final approach 1/2-3/4 mile from the end of the runway.
    - Many single-engine airplanes fly at 70 to 80 knots during pattern operations, but it's not unusual for high-performance singles and multiengine airplanes to fly the pattern at 120 knots or more. Obviously the faster aircraft will fly larger patterns.

- Many antique airplanes and some helicopters fly considerably slower than 70 knots. You'll often see these aircraft flying downwind legs closer than 1/2 mile from the runway.
- No matter what size pattern your aircraft requires, you should follow traffic ahead of you in the pattern. This means that faster aircraft may need to extend downwind slightly to allow sufficient clearance from slower traffic.
- Bank angles should not exceed 30 degrees in the pattern.
  - Flying a pattern of the size recommended above will require banks of approximately 30 degrees.
- The recommended pattern altitude for piston single-engine aircraft is generally 1,000 feet agl - there may be local exceptions.
- The recommended pattern altitude for twins, turboprops, and jets is generally 1,500 feet agl - there may be local exceptions.

## Communication

VFR charts depict towered airports in blue, and nontowered airports are shown in magenta. The basic difference between operating at a tower-controlled airport and one without an operating control tower is the difference between instructions and advisories. Tower controllers issue taxi, departure, and arrival instructions for pilots to follow on specific air traffic control frequencies. At nontowered airports, you will hear advisories on a common traffic advisory frequency (CTAF), but the responsibility for collision avoidance, sequencing, and knowing the local procedures lies solely with the pilot.

## Safety Tip

*All aircraft should monitor the CTAF when operating in the vicinity of nontowered airports.*

The CTAF may be found on sectional charts, in the Airport Facility Directory, AOPA's Airport Directory, instrument approach charts, or other airport directories. Frequencies do change, so use current references.

Nontowered airports without a flight service station (FSS) generally will have a unicom frequency. These usually are staffed by fixed-base operation (FBO) employees who provide airport information. The unicom is usually the CTAF.

*Note: Unicom operators are not required to communicate with pilots, and if they do, there are no standards for the information conveyed.*

- Some airports have part-time control towers. When the tower is closed, usually at night, nontowered operating procedures apply. The tower frequency usually becomes the CTAF when the tower is closed.
- Other airports have part-time FSSs that advise pilots of the winds, weather, and known traffic. Usually the FSS advisory frequency will become the CTAF when the FSS is closed.

Nontowered communication is not always easy, though, especially in metropolitan areas where there never seem to be enough frequencies to go around. It's not unusual for several airports within radio range to share the same CTAF. The result is an aeronautical party line traveling at more than 100 knots. Let's take a look at some basic communication precepts:

### **Safety Tip:**

*The CTAF should be used for two reasons only:*

- *Collision Avoidance*
- *Airport Advisory*

Listening to a busy CTAF for only a few minutes will reveal too many long-winded conversationalists. Don't use this vital collision-avoidance resource for aircraft or lunch date scheduling, formation flying, saying hello to old friends on the ground, discussing sports scores, or expressing your displeasure at the guy who just pulled out on the runway while you were on short final.

- **Be Specific**
  - When you transmit, begin by stating the name of the airport, followed by the model of your aircraft (Skyhawk, Cherokee, Bonanza) and the last three alphanumeric of the aircraft N number. State your intentions, and end by repeating the name of the airport; i.e., "Frederick traffic, Warrior Five-Four Charlie entering downwind Runway Two-Three, Frederick."
  - It's common practice for pilots of homebuilt and other aircraft certificated in the Experimental category to identify their airplanes as "Experimental." There is a tremendous performance differential between a Lancair and a Baby Ace. Likewise, an RV4 silhouette is altogether different from an Acro Sport. In order to aid identification and predict performance, ASF recommends that all traffic-pattern announcements include the aircraft type.
- **Be Brief**
  - It's more important for pilots to know what kind of airplane you're flying than to know your complete call sign. Knowing the model

of airplane will help other pilots plan their pattern flight relative to you. The abbreviated version of your call sign takes up less of that valuable party line time, and it's easier for other pilots to remember your call sign if they need to request an update on your position.

- To prevent confusion, use your full call sign whenever you hear another aircraft with a call sign similar to yours.

### **Automated Weather Information**

Some nontowered airports are served by AWOS (Automated Weather Observing System) or ASOS (Automated Surface Observing System). Pilots should monitor these systems, if available, before takeoff and 20 to 30 miles out when approaching the airport to land. AWOS/ASOS frequencies are shown on sectional charts. Obtaining airport information this way will decrease congestion on the CTAF and allow more time for those all-important traffic announcements.

At airports without automated information, you'll need to contact unicom for information: "Wings Unicom, Conquest Three-Nine Alpha, ten miles south, landing, airport advisory please."

### **Be Prepared**

Familiarity breeds comfort and confidence. If you're not familiar with communication frequencies, pattern altitudes and procedures, or any other item at your departure or destination airport, look them up.

Noise Note: Ask an instructor or FBO at your departure airport about special procedures such as noise-abatement departure routes or local protocols. You can telephone your destination field for the same information. One inconsiderate act, even inadvertently, can undo months of good will by concerned pilots.

Carry current charts for the airport, and become familiar with the location of the airport with respect to landmarks and airspace. If it's your first flight to the airport, learn the orientation of the runways and the communications frequency. This will avoid a scramble to find information as you approach the airport. The airlines route-check their crews into every airport, simply because airport familiarization is so important.

## Safety Tip

*ASF recommends using instrument approach charts, if they are available for the airports you are using. With these useful charts, you'll:*

- Have a runway/taxiway diagram and CTAF;
- Know where to expect inbound IFR aircraft;
- Know what ATC frequencies they will be monitoring; and
- Know the location of significant obstacles.

If you cannot afford a set of approach charts, consider acquiring an airport information guide or make a sketch of the airport diagram and other pertinent information.

## Collision Avoidance

At nontowered fields, it's possible that pilots in no-radio aircraft are shooting landings, IFR students and their instructors are practicing instrument approaches, helicopter pilots are perfecting their autorotation skills, or sailplanes are floating overhead. Not all pilots in the area are announcing their positions and intentions on the CTAF, or even looking out the window!

Midair collisions are the primary hazard associated with flying at nontowered airports. Most midair collisions occur in clear weather within 5 miles of an airport and below 3,000 feet, which is where aircraft congregate. Most collisions occur on the downwind leg or on final approach, generally with a faster aircraft overtaking a slower one.

## Safety Tip

*Use landing lights within 10 miles of a nontowered airport. Put it on your takeoff and descent checklists-it is the mark of a professional.*

## Safety Tip

*The airlines use a "sterile cockpit" concept to minimize distractions. Conversation is restricted to operationally pertinent topics. Brief your passengers or copilot that, within 10 miles of the airport, either inbound or outbound, they should not disturb you other than to point out traffic or significant aircraft-related items. It is not a time to answer general questions about the aircraft or sightseeing.*

Takeoff and landing are the busiest times. There are many distractions-configuring the aircraft, checklists, setting equipment, and communicating-

but this is precisely the time to be looking outside. Preset everything that can be done on the ground-navigation/communication frequencies, programming GPS and loran receivers, chart positioning, etc. Inbound, have the cockpit and your mind clear of distractions. Know the airport layout and have the frequencies set so most of your attention may be directed outside.

### Managing Your Focus of Attention

Pattern flying requires pilots to focus their attention in several areas at once, and when pilots concentrate on landing, they sometimes neglect collision-avoidance tasks with disastrous results.

Items to consider:

- Sequence
  - Where is your place in the pattern?
  - Who are you following?
  - Are you faster or slower than the traffic ahead?
- Airplane configuration
  - Is the airplane set up for landing?
    - Flaps
    - Propeller
    - Power
    - Gear
- Track
  - Are you following a ground track that conforms to the traffic pattern, and will it put you in a position to land?
- Landing
  - Are you aligned with the landing runway?
  - Is the final approach clear?
  - Is the landing area clear?
  - Have you double-checked airplane configuration?

### Safety Tip

*Manage your attention all the way to the hangar. Final approach is the place where pilots narrow their focus to concentrate on landing. They "lock on" to the touchdown zone and stop scanning for traffic. This may be why most midair collisions occur on final approach to nontowered airports. Concentrating too much on landing may also contribute to landing with the gear up.*

## Safety Tip

*An aircraft on a collision course will have no apparent movement relative to you, and the target will "blossom" just a few seconds before impact. Survivors of midair collisions frequently have no recollection of seeing the other aircraft. It is easy to lose a target in the ground clutter-be at pattern altitude before entering the pattern.*

Collisions also occur on the ground, both on taxiways and runways. This is a problem at dusk, night, or during periods of low visibility. In calm or nearly calm wind conditions, be especially cautious. Another pilot may choose a different runway from the one you have selected. If the runway has a blind intersection or you cannot see the opposite end, be prepared. Remember that not everyone is on the CTAF.

## Pattern Notes

- If an aircraft is ahead of you in the pattern, start your turn to base when you are abeam the other aircraft. On final, use the approach slope guidance system (VASI, PAPI, etc.), if installed, to fly the proper glidepath.
- On short final, check that no other aircraft are in takeoff position. If you have to abort the landing because another aircraft is taking off, fly parallel to the right of the runway (left traffic) to keep the traffic in sight. Maintain a safe distance from the other aircraft, and rejoin the pattern when it's safe.
- If practicing touch and goes, announce your intention on final. "Culpeper traffic, Warrior Eight-Nine Uniform turning final for touch and go [or full stop] Runway Four Culpeper." This allows pilots behind to gauge how long you are likely to be on the runway.
- If you fly a retractable, make it a habit to double- and triple-check the gear-down selector and indicator before crossing the airport boundary on the final approach.

## Departing the Airport

When departing a nontowered airport, monitor and communicate on the CTAF from engine start until you're 10 miles from the airport, so you'll be aware of other traffic that could conflict with your route. The exception is if you need to switch frequencies after departure to talk to ATC or an FSS specialist.

## Safety Tip

*Remember to scan for traffic while talking on the radio.*

It's helpful to other pilots if you state what your intentions are after takeoff. For example: "Frederick traffic, Bonanza One-Three-Charlie departing Runway Two-Three, to the west, Frederick" or "remaining in the pattern," as the case may be.

After takeoff, climb on the extended runway centerline to within 300 feet of pattern altitude. At this point, you can continue straight ahead or make a 45-degree turn to the left (to the right if the airport has a right-hand pattern).

If you will be departing to the right, wait until you are at least at pattern altitude plus 500 feet before making a right turn, and be sure to advise on the CTAF. "Westco traffic, Arrow Four-Seven Romeo departing the pattern Runway One-Eight, right turn eastbound, Westco."

*Noise Note:* Use the full length of the runway and climb at  $V_y$  to gain altitude as quickly as possible, unless an obstacle dictates the use of  $V_x$ . Upon reaching pattern altitude, reduce to climb power, or less if remaining in the pattern. This will help to decrease your noise footprint.

## Safety Tip

*The higher the angle of climb, the less visibility you'll have over the nose. Clear the area ahead by lowering the nose occasionally and/or turning slightly side-to-side as you climb.*

## Coming home

Nontowered airport traffic patterns are always entered at pattern altitude. How you enter the pattern depends upon the direction you're coming from.

- 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're coming from the upwind side of the airport.

- AC 90-66 A describes the preferred entry from the "opposite" side of the pattern. Cross over at least 500 feet above pattern altitude

(normally 1,500 feet). When well clear of the pattern—approximately 2 miles—descend to pattern altitude and enter at 45 degrees to the downwind leg.

- Because large and turbine aircraft fly 1,500-foot-agl patterns, crossing 500 feet above the single-engine pattern altitude might place you in conflict with traffic. If large or turbine aircraft are operating into your airport, 2,000 feet agl is a safer crossing altitude.
- An alternate method is to enter upwind at pattern altitude and turn crosswind between midfield and the departure end of runway. Give way to aircraft on the preferred 45-degree entry and to aircraft on downwind.

Aircraft using the alternate entry should yield to aircraft using the preferred entry and to aircraft on downwind. In either case, it's 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. "Winfield traffic, Centurion Nine-Nine Yankee is midfield crosswind Runway One-Eight, Winfield."

### **Safety and Courtesy Tip**

*Slower aircraft should fly a tighter traffic pattern. Practice until you are comfortable making up to banks for base and final. Too close leads to a potential overshoot or a stall from an oversteep turn. Too wide leads to a greater noise footprint and a strung-out final.*

Adjust power on the downwind leg, or sooner, to fit into the flow of traffic. Avoid flying too fast or too slow. Speeds recommended by the airplane manufacturer should be used. They will generally fall between 70 to 80 knots (80 to 92 mph) for fixed-gear singles, and 80 to 90 knots (92 to 103 mph) for high-performance retractables.

### **Nobody's Home**

How do you find the active runway when there are no aircraft in the pattern and no one answers on the CTAF? Overfly the airport at least 500 feet above the traffic pattern, and look for a windsock, wind tee, or tetrahedron. Then fly clear of the pattern, descend to the traffic pattern altitude, and enter the downwind leg as described previously.

## Going Straight

Occasionally you might be inbound to a nontowered airport on a heading that will allow a straight-in approach. Though permissible, a straight-in approach should only be used when you are certain there will be no conflict. Straight-ins should yield to other aircraft in the pattern. If another aircraft is ahead of you on base and the spacing will not be sufficient, go around by altering course to the right (on a standard left pattern), enter the upwind leg, and turn crosswind when it's safe.

When straight-in, announce your position on a 3-mile final and on a 1-mile final. Use landing lights and strobes. "Dodge City traffic, Twin Cessna Three-Eight Gulf is three-mile [one-mile] final Runway Three-One, Dodge City." Non-radio aircraft should avoid straight-in approaches.

## Safety Tip

*Air carrier aircraft and many larger aircraft seem to make more straight-in approaches than light singles. In many cases, they cannot fly a pattern much slower than 120 knots, which is faster than the cruise speed of most trainers. They may not see you, and although there may be cases where they should yield right of way, they sometimes don't. Pursue the discussion on the ground, not on the radio.*

## Courtesy Tip

*If there are several aircraft waiting to take off, announce that you are extending downwind to let traffic depart. ("Findlay traffic, Katana Five-Four Foxtrot is extending downwind Runway Two-One to allow departures, Findlay.")*