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

- Communications
- Traffic pattern procedures and techniques
- The "C" word - courtesy
- Nonstandard flight operations you're likely to encounter at non-towered airports with helicopters, gliders, and parachutists

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 non-towered 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 (extended centerline of runway to within 300 feet of traffic pattern altitude).
- 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.

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.
Some general guidelines include: 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 over-flight 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 ½ mile from the runway. ASF recommends that pilots maneuver so as to be established on final approach ½ - ¾ 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 non-towered airports are shown in magenta. The basic difference between operating at a towered 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 non-towered 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
Listen before you speak. Your transmission can block another pilot’s transmission. Plus, you gain valuable information from listening to other pilots’ communications.

Safety Tip
All aircraft should monitor the CTAF when operating in the vicinity of non-towered airports. Too many pilots wrap up their initial position announcement with: “Traffic in the area, please advise.” Don’t be one of them. According to the AIM, it is not a recognized self-announce position and/or intention phrase and should not be used under any condition.

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. Non-towered 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, non-towered 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. Non-towered 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.

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, CAP) and the last three alpha-numericics of the aircraft N number. State your intentions, and end by repeating the name of the airport; i.e., "Kerrville traffic,
CAP 4294 entering downwind Runway One-Two, Kerrville.” 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 non-towered 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.

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.

**Safety Tip**

ASF recommends using instrument approach charts, if they are available for the airports you are using.

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

**Collision Avoidance**

At non-towered 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 non-towered 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 non-towered airport. Put it on your takeoff and descent checklists—it is the mark of a professional.*

**Safety Tip**

CAP uses 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.

**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 glide path.
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 go, announce your intention on final. "Kerrville traffic, CAP4294 turning final for touch and go [or full stop] Runway one-Two Kerrville." This allows pilots behind to gauge how long you are likely to be on the runway.

Departing the Airport
When departing a non-towered airport, monitor and communicate on the CTAF from engine start until you're 10 miles from the airport.

Safety Tip
Avoid the practice of taking position on the runway and holding ("line up and wait") at non-towered airports to wait for other traffic to clear. There may be a delay, and you are in an extremely vulnerable position with no way of seeing traffic behind you.

It's helpful to other pilots if you state what your intentions are after takeoff. For example: "Kerrville traffic, CAP4294 departing Runway One-Two, to the south, Kerrville" 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. "Kerrville traffic, CAP4294 departing the pattern Runway One-Two, right turn southbound, Kerrville."

Noise Note: Use the full length of the runway and climb at Vy to gain altitude as quickly as possible, unless an obstacle dictates the use of Vx. 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
Non-towered 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.
- AC 90-66 A describes the preferred entry from the "opposite" side of the pattern. Cross over at least 1000 feet above pattern altitude. When well clear of the pattern-approximately 2 miles-descent to pattern altitude and enter at 45 degrees to the downwind leg. Because large and turbine aircraft fly 1,500-foot-agl patterns, crossing only 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.
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. "Kerrville traffic, CAP4294 is midfield on downwind Runway One-Two, Kerrville."

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 non-towered 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. "Kerrville traffic, CAP4294 is three-mile final Runway One-Two, Kerrville." 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. ("Kerrville traffic, CAP4294 is extending downwind Runway One-Two for the departing aircraft, Kerrville.")

It's Instrumental
Instrument approaches present special challenges at non-towered airports. Pilots practicing instrument approaches frequently make straight-in approaches to the approach end of the active runway, the departure end, or even to a crossing runway. It all depends on which runway or runways at the airport are served by instrument approaches. This is a potentially confusing situation to VFR pilots flying a standard traffic pattern to the active runway. Add to this mix an unfamiliar IFR vocabulary heard over the CTAF-terms like "procedure turn outbound," "outer marker inbound," or "Dyer inbound," and you have the ingredients for a traffic conflict.

Safety Tip
We should exercise particular vigilance during VFR conditions, when it is easy to get distracted by the "approach" activities. Your primary responsibility is to see and avoid.

A situation that poses special risks is when a non-towered airport is blanketed by a broken or overcast cloud ceiling or visibility is reduced-due to haze, for example-yet VFR conditions exist below the cloud layer. In that case, it's possible for a pilot flying an actual IFR approach in the clouds to break out below the ceiling and suddenly encounter a VFR pilot turning base for a practice touch and go. It helps if both pilots are diligent in communicating on the CTAF, but even that doesn't guarantee against a conflict on the final approach, because they can't see each other until the IFR aircraft has descended below the cloud layer.

Safety Tip
If possible, monitor the IFR approach frequency simultaneously with the CTAF. It can provide valuable warning as to when an IFR inbound is about to pop out of the clouds.

Under reduced visibility (but still VFR) and nearly calm conditions, many IFR pilots will opt for a straight-in approach, which may conflict with local VFR traffic. Recognize that the VFR pilot may have a greater level of situational awareness, a more maneuverable aircraft, and possibly a lower fatigue level, because he or she hasn't been flying in the clouds for several hours.
If you know where the missed approach holding fixes are and how instrument traffic navigates to those fixes, you'll know where IFR pilots are headed when they announce on the CTAF they are executing a practice missed approach. You also can calculate how long it will take an IFR aircraft to fly from an instrument approach fix to the runway. The pilot of a high-performance single, who reports crossing a fix 5 miles from the runway, will take a little more than 3 minutes to cover the distance to the runway at 90 knots. A 120-knot twin will take about 2 and 1/2 minutes. If you hear a pilot in a single report "procedure turn inbound," add about a minute to the inbound time.

**Safety Tip**
*If there is heavy VFR traffic and you're approaching to other than the active runway, break off the approach before a conflict develops and enter normal traffic. Announce your intentions on the CTAF.*

**Serving Two Masters**
Instrument pilots approaching non-towered airports will usually be in radio contact with an air traffic control facility until they are quite close to landing. Many instrument approach procedures have reporting points where pilots must communicate with ATC. At the point the instrument flight breaks out of the clouds and the pilot sees the airport, ATC will generally approve switching to the CTAF for traffic announcements. In good weather, you may hear instrument pilots reporting approach waypoints and fixes on the CTAF: "Kerrville traffic, CAP4294, Diyer, inbound GPS 30 approach, Kerrville."

**Common Courtesy**
It helps to keep in mind that traffic procedures at non-towered airports are advisory in nature, not regulatory. There frequently is more than one way to fly a safe pattern, final approach, and landing.

- Taking other pilots to task because they don't exactly follow your interpretation of the local procedures is asking for trouble, especially if you lecture the miscreant, using the CTAF as your bully pulpit. If you feel the need to discuss a situation, do it on the ground-politely.
- Use the courtesy and respect you expect from others. There can be honest differences of opinion, and we should be far more courteous to one another than most automobile drivers.
- Give the other pilot the benefit of the doubt to compensate for the time when you are the one who may have made an inadvertent error.

**Safety Tip**
*Think like an air traffic controller when you fly. Controllers try to maintain an orderly, efficient flow of traffic, meaning you'll slow down or extend to accommodate the traffic ahead or alter your normal pattern slightly to conform to the traffic situation.*