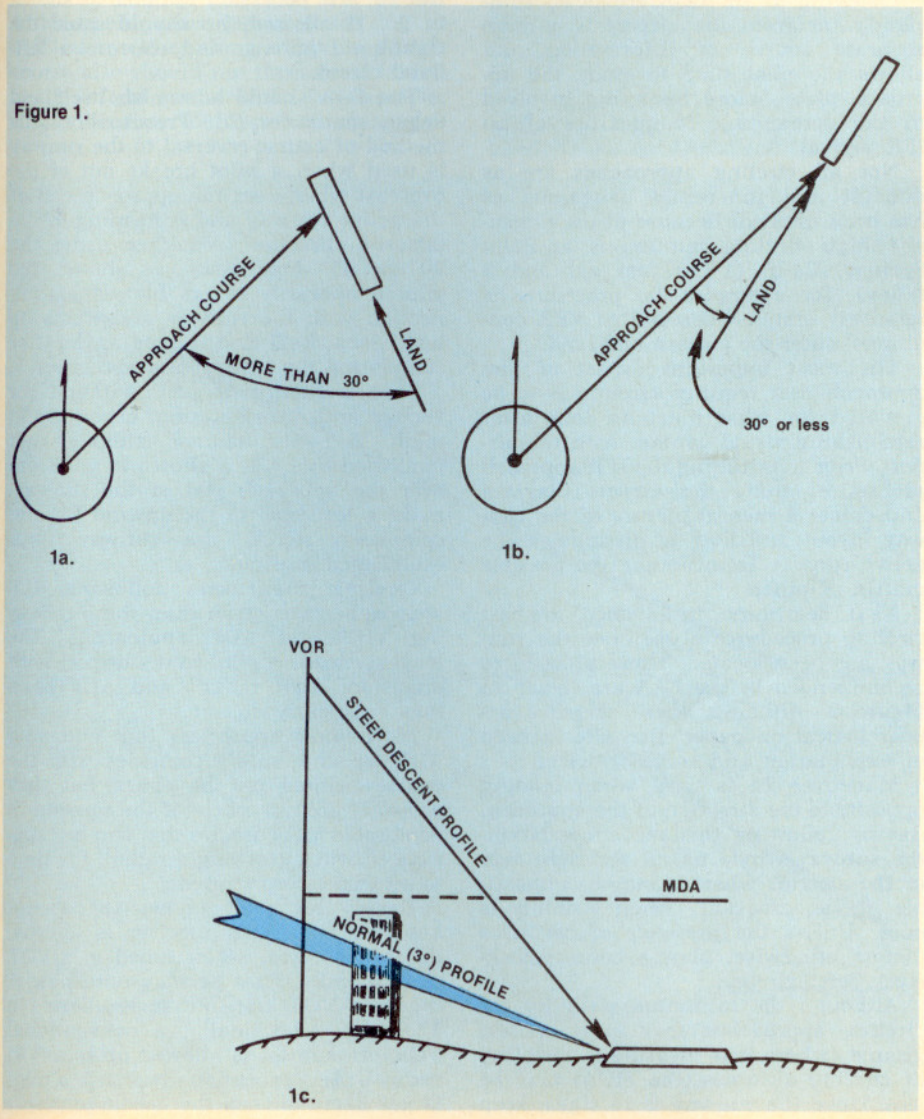
A game with a different set of rules can be a trap for the unwary

CAUTION: Circling Approaches May Be Hazardous to Your Health

by BARRY SCHIFF / AOPA 110803

■■ The circling approach is not an instrument approach. No, it's not. It is a contact approach, a maneuver used after the airport is sighted during a conventional instrument approach (ADF, VOR, ILS, etc.) in cases where the final approach course is too far off the runway heading for the pilot to make a straight-in landing.

Figure 1.



The circling approach is not an easy—or a particularly safe—approach. An inherently hazardous procedure, it involves making steep turns about a point while slow flying under a less-than-400-foot overcast with one-mile visibility. The procedure is not easy even under optimum conditions, but when attempted on a turbulent, showery night, the circling approach demands highly disciplined, sharply honed skills.

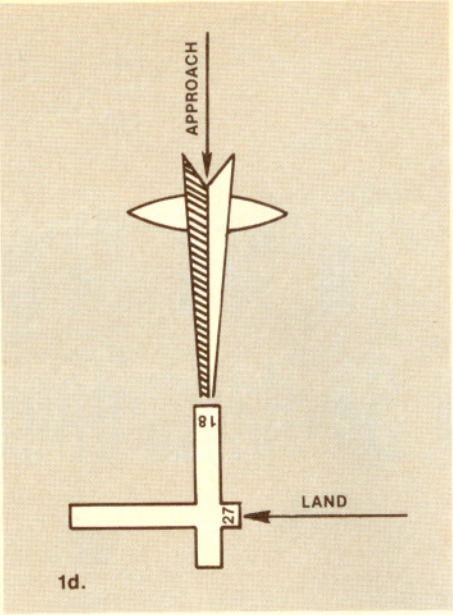
This maneuver is uniquely different because it cannot be practiced in a simulator. Although the mechanics of a circling approach may be practiced in VFR conditions, this drill bears little similarity to reality. In fact, practicing could even add to the danger of an actual circling approach because an inexperienced pilot could be misled into believing that the maneuver is easier than it really is.

Several major U.S. air carriers recognize the hazards of circling approaches and have revised their policy manuals to prohibit line pilots from executing the maneuver in less than VFR conditions. There's a message in this that applies indirectly to general aviation pilots who are allowed to perform circling approaches when the weather is considerably less than VFR.

Most commonly, circling is required because the final approach course (to or from a radio facility) makes more than a 30° angle with the runway in use (Figure 1a). This is typical of most VOR approaches and explains why corresponding approach plates contain only "circling minimums."

When the final approach course makes an angle of 30° or less with the active runway (Figure 1b), "straight-in" minimums are published.

"If the final phase of an IFR approach requires an abnormally steep descent (because of obstacles on final), FAA publishes only circling minimums even though the procedure would otherwise qualify as a straight-in approach (Figure 1c). This does not mean that a pilot



1d.

must circle to land. If the runway is sighted sufficiently early in the approach and the pilot feels it is safe to do so, he has the option to either land straight-in or circle to land.

Most approaches that require circling (such as Figure 1a) are obvious. A pilot can determine from a glance at the approach plate that a circling maneuver is required. What often traps the unsuspecting pilot is the situation shown in Figure 1d—an ILS approach to Runway 18 at a time when Runway 27 is the active runway.

When preparing for an ILS, a pilot is preoccupied with setting up the radios, reducing airspeed and establishing the aircraft in an approach configuration. He expects to be cleared for an approach to Runway 18 but may not be prepared for the words that follow: "...circle to land Runway 27."

The pilot is suddenly thrust into a new game with a different set of rules. He must shift from a relatively low decision height (DH) to a higher minimum descent altitude (MDA). Also, he must determine the allowed flight time to the missed approach point and figure out which circling method to use.

If circling at this particular airport is an unusual experience for the pilot, he might consider requesting clearance to a holding pattern where he will have ample time to become familiar with what must be done. An unprepared pilot circling at minimums is a candidate for a catastrophe.

It's logical to ask why a pilot might be required to circle and land on a runway other than that served by the ILS (or other approach facility). There are several reasons. Sufficiently strong, adverse winds might warrant the use of another runway, or the ILS runway might be closed because of construction or blocked by a disabled aircraft. A preflight analysis of weather forecasts and NOTAMs often indicates when a pilot might be a candidate for a circling approach and its associated higher minimums and hazards.

Listening to an ATIS broadcast sufficiently far from the airport is a more accurate source of information and allows the pilot time to study the approach plate before becoming involved in the demanding complexities of an IFR arrival.

Not all circling approaches are as difficult and inherently dangerous as has been implied. Because of the unusually high circling minimums at Palm Springs, Calif. (1,712 feet agl and 3 miles), for example, the procedure is relatively simple—descend to VFR conditions, enter the pattern and land.

The most important aspect of any approach that requires circling is to be prepared for what must be done after establishing visual contact with the airport. Prior to initiating the IFR approach procedure, study the airport diagram and create a mental picture of the runway layout and how to distinguish the active runway from among the possible matrix of others.

Next, determine, in advance, the best circling procedure to use once the runway has been located. Those procedures recommended by the FAA are shown in Figure 2. Although these sketches appear logical on paper, they are in need of explanation and some criticism.

Maneuver 2a is used when landing opposite to the direction of the approach. But by following this recommendation, the runway winds up on the right side of the aircraft where it may be impossible to see, especially when visibility is poor. Unless the presence of obstacles dictate otherwise, plan a counterclockwise (left) circle.

Although the minimum visibility for circling approaches may exist on the ground (where it is measured), visibility at circling altitudes (the MDA) may be less. Once the runway is in sight, keep it in sight with the tenacity of a hungry cougar stalking its prey. Losing visual contact with the airport is a good excuse for an expeditious missed approach, although this is not mandatory.

While left-hand circles are strongly recommended, don't ignore notations on the chart that might dictate otherwise. A comment such as, "NA East of RWY 18-36" in the Circle-To-Land Minimums section of the approach plate is often overlooked and warns that circling must be confined west of this particular runway because of obstacles on the other side.

Figure 2b is used when on an approach course that intercepts the runway centerline at less than a 90° angle *and* when the airport is sighted sufficiently far away so as to allow a simple turn onto base leg.

There are times, however, when a pilot does not sight the runway until almost above it. Since he is too high to use 2b, it is necessary to circle as shown in 2c. If allowed, he should avoid the right-hand pattern and execute a left-hand circuit.

The FAA should admonish itself and delete maneuver 2d. Presumably, this method of course-reversal to the runway is used when a pilot breaks out of the overcast when over the approach end of the active runway and is heading in the opposite direction. Whether using the 90° or 45° breakaway, as shown, the pilot temporarily severs his visual connection with the runway and trusts (to luck?) that he'll find it once again after completing the turnaround maneuver.

This technique is an invitation for vertigo and disorientation, especially at night. A better method, although not published by FAA, is shown in 2e. From over the approach end of the runway, make a left turn to the upwind leg and completely circle the runway until established on final.

Circling maneuvers following ILS approaches are easier than those following VOR and ADF approaches. The localizer leads a pilot to the airport with precision. VOR radials and ADF bearings frequently do not.

Most pilots appreciate that outbound ADF tracking rarely coincides with the course printed on the chart, but they probably are not aware of the sometimes deplorable inaccuracies that can be experienced when tracking a radial. It's time to set this record straight.

Every IFR pilot knows (or should know) that a VOR receiver is allowed up to a 4° error when tuned to a VOT (test signal). What he may not know is that the VOT transmitter is allowed a 1° error. Additionally, a conventional VOR transmitter is allowed up to a 2.5° error. Unless exceptionally sharp, a pilot is not likely to keep the needle precisely

centered throughout an approach. A quarter-scale needle deflection is an acceptable deviation and represents another 2½° error. And if this were not enough, a recent FAA study reveals that nondigital omni-bearing selectors are frequently up to 2° in error.

If all these potential errors were to accumulate in the same direction and conspire against an unsuspecting pilot, his aircraft could be 12° off course at any given point during a VOR approach. Curiously, FAA protects a pilot from enroute obstacles only when within 4½° of the published course.

There's more to this than chastising FAA and reviewing potential VOR-bearing errors. An error of several degrees can result in being considerably off course. Since most circling approaches are associated with VOR approaches, it is distressingly obvious that a pilot could execute a VOR approach with superhuman precision, establish ground contact and, because of restricted visibility, sail past the airport without being close enough to see it.

Pilots tracking along a final approach course also should not limit their search to the left of the aircraft, for example, simply because the approach plate says

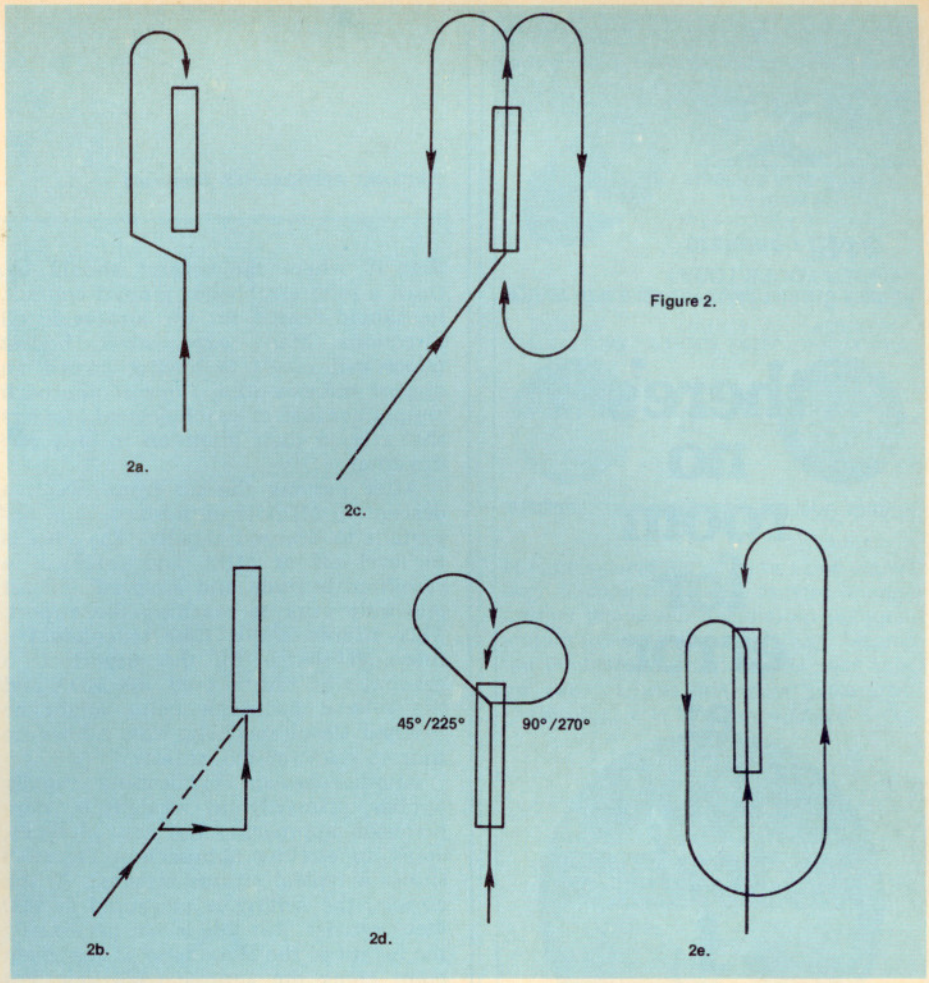


Figure 2.

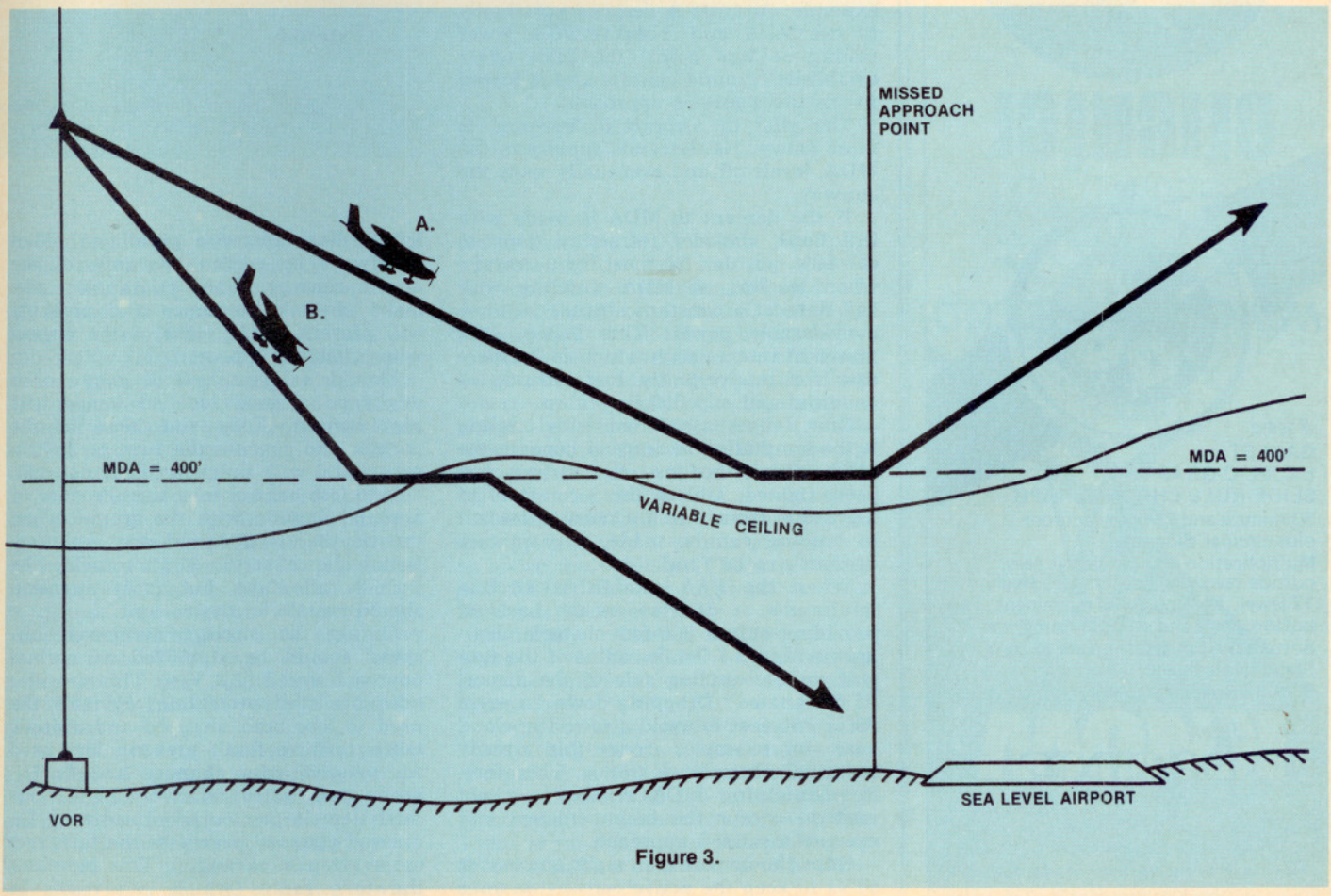


Figure 3.

that is where the airport should be. Once a pilot establishes ground contact, he should search for the airport in all directions. Many experienced, honest pilots will admit to having passed an airport and executing a missed approach simply because of psychological blinders that riveted their attention in only one direction.

After passing the fix from which a descent to MDA is authorized, it is important to descend rapidly. The idea is to level off at MDA and establish a stabilized attitude and airspeed at least one mile prior to reaching the airport. This affords ample time to conduct a thorough search for the airport. If a gradual sink rate is used, the MDA and the missed approach point might be reached simultaneously. This allows no time to scan for the runway.

Another reason to descend rapidly applies primarily to straight-in, non-precision approaches but can, at times, apply to circling approaches. Figure 3 shows a typical stratus overcast. At the airport, the ceiling is measured as 400 feet overcast. But this is not necessarily the height of the cloud base at any given point along the approach corridor. For example, Aircraft A descends gradually to the MDA and, because of a lower ceiling at this point, the pilot never establishes ground contact and is forced to execute a missed approach.

The pilot in Aircraft B, however, is more savvy. He descends rapidly to the MDA, levels off and eventually spots the runway.

If the descent to MDA is made with full flaps, consider retracting them to the 50% position (in most light aircraft) when leveling at MDA. Circling with full flaps at a constant altitude requires considerable power. This leaves little power in reserve with which to compensate for inadvertently lost altitude or to initiate an expeditious pullup.

One danger associated with circling is the temptation to descend beneath the MDA simply because the airport has been sighted. Unless the aircraft is in a position from which a normal descent to landing can be made, a premature descent can be fatal.

When the FAA establishes circling minimums, it does so on the basis of providing only a 300-foot-obstacle clearance within a 1.7-mile radius of the runway on the circling side of the airport (if designated). Dropping down an extra 50 or 100 feet to avoid a lowering cloud base, for example, erodes this already marginal obstacle clearance. Therefore, if maintaining MDA results in cloud reentry, accept the inconvenience and execute a missed approach.

Once the airport is in sight, maneuver so as to keep the active runway on your left (unless otherwise prohibited). Plan to always be within one mile of the active runway. This guarantees adequate obstacle clearance and probably will prevent losing sight of the airport when visibility is poor.

Should a large turn be required, it might be a good idea to temporarily play ostrich. Keep you head in the cockpit and execute the turn on instruments and with precision. It is not difficult to lose control in a turn because of a visual fixation with the ground when the weather is 400 and one. An occasional glance at the airport during the turn is all right, but most attention should remain in the cockpit.

During the circling maneuver, airspeed should be stabilized at normal approach speed (1.3 Vso). This provides adequate stall protection, obviates the need to lose both airspeed and altitude when turning final, prevents the need for massive trim changes and finally, keeps turn rates relatively high. This final item is particularly important. Increased airspeed decreases the turn rate (at a given bank angle). This increases the turn radius which can result in

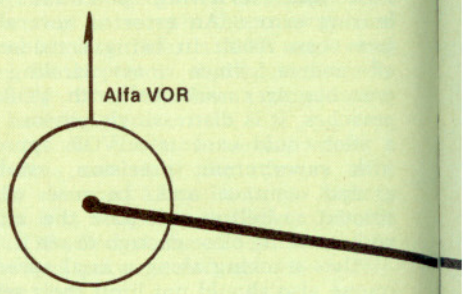
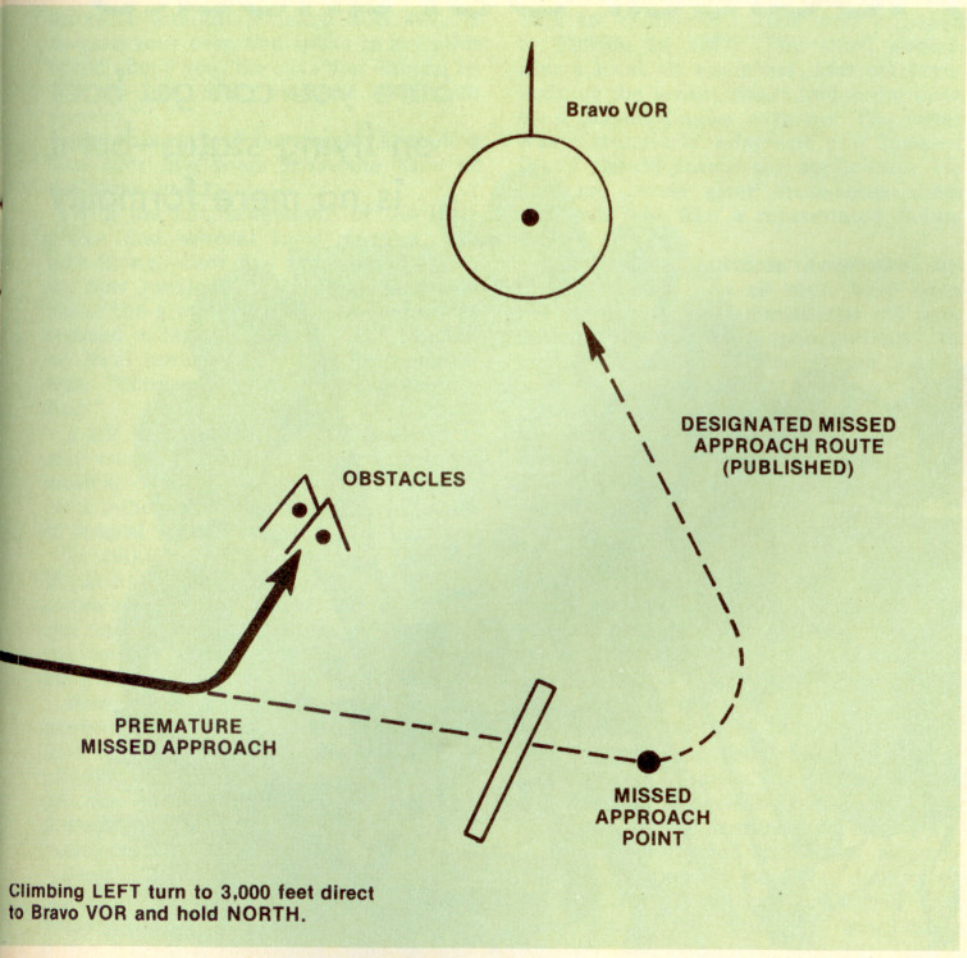


Figure 4.

Pullup Instructions:



excessively wide patterns and loss of visual contact with the airport.

Another area demanding extreme care is the missed approach. It is of paramount importance that a pilot be thoroughly familiar with the pullup procedure prior to beginning an approach. If it is necessary to consult an approach plate after inadvertently entering clouds at less than 400 feet agl, you are in serious trouble.

Since the need for a missed approach can occur at any point while circling, confusion often arises as to the method of initiating the pullup. Simply stated, turn toward the runway (even though it cannot be seen) and intercept the missed approach procedure when over the airport. This can require some imagination and again stresses the need to be familiar with the pullup procedure.

A final word of caution. The pullup procedure (Figure 4) guarantees terrain clearance only when it is initiated at the designated missed approach point (MAP). Executing a premature pullup sacrifices this protection. So, if you're engulfed in cloud and tracking toward the airport at MDA when the tower advises that the field has just gone to zero-zero, do not abandon the approach. A climb may be initiated, but avoid turning until the MAP has been reached.

The "sidestep maneuver" is often confused with the circling approach. These procedures are related but, like brothers, should be treated individually. A sidestep maneuver follows an IFR approach to one of two parallel runways less than 1,200 feet apart. A pilot is allowed to "sidestep" and land on the other parallel runway, *provided* it is in sight when at or above the published "Minimum Sidestep MDA" and the appropriate clearance has been received.

Generally, sidestep minimums are higher than those for straight-in approaches and less than those for circling approaches.

Any pilot who considers making his first circling approach when the weather is reported as 400 and one should either hire an experienced pro to ride shotgun or cancel his planned flirtation with fate. There is no doubt that the circling approach can be a hazard to your health—respect it accordingly. □