INSTRUMENT READINGS™

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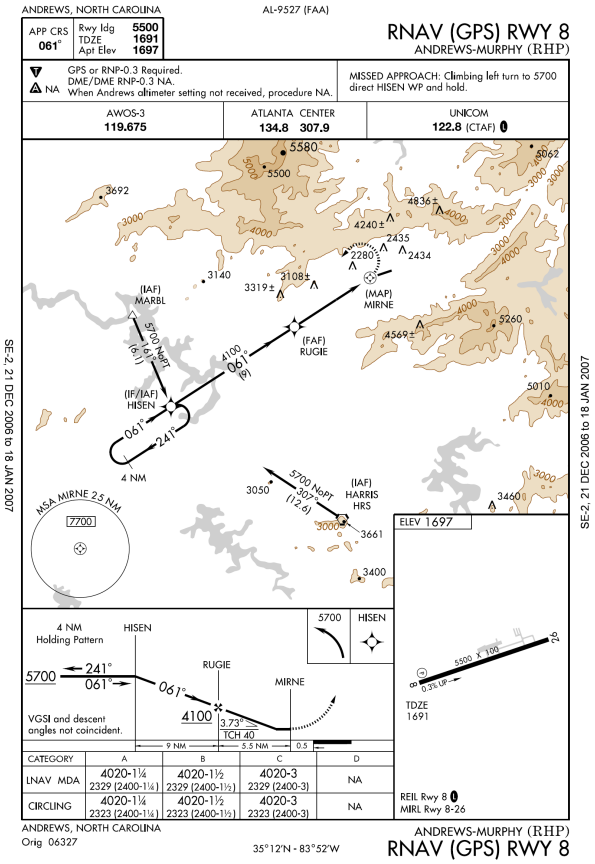
INITIATING A MISSED APPROACH BELOW MDA

So there you are, on approach, inside the FAF and below MDA. You saw the runway and began descent, but it is raining, visibility is marginal and things are murky and scuddy (technical terms). Wind is directly across the runway at 11G18 and you are crabbing down, passengers are nervous. But you are holding the CDI in the center and maintaining control. Over the runway you go into your wing-low sideslip for the crosswind landing, things are going pretty well and then whoops a big gust destabilizes you so you abort the landing. Now what do you do, go missed or go around for another landing attempt?

To provide some context, let's attach the scenario to an interesting little airport, Andrews-Murphy Airport, NC (KRHP). The instrument approach procedure (IAP) and the takeoff minima and obstacle departure procedure are shown here. This airport is nestled in a scenic valley surrounded by mountains, which are quite close on the north. A topo map can be viewed here or just go to the TopoZone website and search for Andrews, NC, or go to the airport lat/long of 3512N/08352W.



You will notice that the MDA is 2329 feet above the runway. Now remember that obstacle protection on a missed approach procedure is based on going missed at the MAP at MDA with a minimum climb gradient of 200 feet per nautical mile. No obstacle protection is assured when you go missed below MDA or past the MAP. In fact, you are not assured of obstacle protection even above MDA if the missed is initiated below MDA or after the MAP.

If you fly the published missed approach procedure from down near the runway at KRHP, you are likely to come to a bad end in the rocks north of the airport.

FAR 91.185(e)(1) tells us to immediately execute "an appropriate missed approach procedure" when

operating below MDA or DA and the required visual references for descending below MDA/DA are lost. When at or above MDA/DA, and at or before the MAP, the published missed approach procedure is "an appropriate missed approach procedure". But when below MDA/DA, or after the MAP, it is not an appropriate procedure because it does not ensure obstacle clearance. It is up to the pilot to determine how to avoid obstacles while safely transitioning onto some portion of the published procedure.

So far we have seen that flying the published miss from below MDA may not be conducive to longevity, and that it is pilot responsibility to determine a safe procedure. Before we try to come up with how to do a safe missed approach from below MDA, let us go back and address the other choice, a go-around.

The alternative to the missed was to go around for another landing attempt. If you aborted your landing at a towered field, you can just tell the tower that you want to go around the pattern for another try (or circle at circling minimums if the ceiling is below the pattern and circling minimums are below the ceiling). If you are in legal VFR and can stay that way during your planned maneuvers, just cancel IFR and land under normal VFR procedures, flying the pattern and blending in with any existing VFR traffic in accordance with instructions from the tower and as required for safe separation from other aircraft. At a nontowered field, you will not be assigned a runway or be told to land straight-in or circle to land, it is up to you to determine which runway to land on and how to maneuver to land on it. I see no regulatory impediment to executing a circle-to-land or a circuit in the traffic pattern after an aborted landing in order to make another landing attempt. Going around in visual conditions is certainly safer than trying to fly the published missed into IMC from below MDA; it also takes much less time and money. If your fuel state is low, it may be your only reasonable option. If ceiling and visibility do not allow you to fly the pattern or circle at minimums, then you have to go missed after an aborted landing.

Regarding converting the approach to a circle-to-land after an aborted landing attempt, if you were descending on the final approach course and were below circling minimum altitude when you called the abort, you now have to get back up to circling minimums while maintaining safe obstacle clearance. This will include climbing while flying over the runway, and continuing the climb in visual conditions to the circling altitude while visually avoiding obstacles in minimum visibility. Also remember that you have to stay within the required distance from the runway at circling altitude. At KRHP, circling MDA is 2300 ft above the runway, requiring quite a climb and definitely a plan. In fact, I don't see how a circling approach is even possible at KRHP. At a descent rate of 1000 fpm, a two-minute descent from MDA would be required, which at 90 kts would be 3 nm from the runway for beginning that descent. That is outside the maximum allowable distance from the runway for a circling approach. In general, I think that trying to convert an aborted landing below MDA to a circle-to-land approach is too complex and too dangerous. If you can't convert to VFR and fly the pattern, go missed. Now back to how to do that.

So flying the published miss from below MDA in our scenario is neither safe nor desirable, but going around looks OK. That should be enough on the scenario of an aborted landing. There are other scenarios that can cause you to need to go missed, like the rain showers got so intense that the visibility dropped below minimums. This brings us back to how can you safely go missed from below MDA.

Let me clarify that I am making a distinction between an aborted landing, which might arise from any of the reasons that would apply in VFR flight, such as an animal or vehicle on the runway or dissatisfaction with the setup for landing, and a missed approach, which would be necessitated by losing the required visibility to comply with the requirements for operating below MDA/DA. The aborted landing may can be recovered by going around for another try while operating in VFR conditions, whereas losing the required visibility or required visual references will require aborting the approach and landing procedure and executing appropriate maneuvers to become established on the missed approach procedure while maintaining safe obstacle clearance.

Looking for guidance from the FAA, we find that the Instrument Procedures Handbook has the following to say:

> *"Once descent below the DA, DH, or MDA is begun, a missed approach must be executed if the required visibility is lost or the runway environment is no longer visible, unless the loss of sight of the runway is a result of normal banking of the aircraft during a circling approach. A missed approach procedure is also required upon the execution of a rejected landing for any reason, such as men and equipment or animals on the runway, or if the approach becomes unstabilized and a normal landing cannot be performed. After the MAP in the visual segment of a nonprecision approach there may be hazards when executing a missed approach below the MDA. Any missed approach after a DA, DH, or MAP below the DA, DH, or MDA involves additional risk until established on the published missed approach procedure course and altitude."*

Unfortunately, the IPH stops there and provides no guidance on what kind of procedure one should use when going missed below MDA/DA; it just says "a missed approach procedure." The published missed approach procedure does not assure obstacle clearance when initiated from below MDA/DA or from after the MAP, so our question remains unanswered.

Note that the IPH differs from my conclusion that one may execute a go-around if conditions are VFR. But I know of no regulatory basis for its statement that a missed approach is required after a rejected landing.

The FAA publishes departure procedures to help us depart an airport safely from the surface (See *Instrument Readings™ Nos. 2-5).* If a procedure will provide obstacle clearance when departing from the surface, it clearly will provide obstacle clearance when initiating the procedure from above the surface. So the obvious answer appears to be to fly the Obstacle Departure Procedure (ODP) rather than the Missed Approach Procedure when initiating the missed from below MDA. But what a can of worms that opens!

Looking further for FAA guidance, Section 5-4-21(g) of the AIM addresses the issue somewhat:

> ***"g.*** *Missed approach obstacle clearance is predicated on beginning the missed approach procedure at the Missed Approach Point (MAP) from MDA or DA and then climbing 200 feet/NM or greater. Initiating a go-around after passing the published MAP may result in total loss of obstacle clearance. To compensate for the possibility of reduced obstacle clearance during a go-around, a pilot should apply procedures used in takeoff planning.*

Pilots should refer to airport obstacle and departure data prior to initiating an instrument approach procedure. Such information may be found in the "TAKE-OFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES" section of the U.S. TERMINAL PROCEDURES publication. "

The AIM's use of the term "go-around" seems to refer to a missed approach rather than an aborted landing, although there is no clear context from which to infer the intended meaning. The AIM doesn't come right out and say to fly an ODP, but it clearly does instruct the pilot to "refer" to the takeoff minimums and departure procedures when it becomes necessary to execute a missed approach from below MDA/DA. So we will continue to try to figure out how to refer to them and devise a safe procedure.

In general, the safe procedure is to use the ODP, or the initial part of it, to safely get up out of the weeds and rocks, and then transition onto the published missed approach procedure. If there is no ODP, then you will use the standard diverse departure, which is to cross the departure end of the runway at 35 feet AGL or higher and continue to climb at 200 fpnm or greater to 400 feet AGL, at which point you can turn in any direction to join the missed approach procedure, while continuing the climb.

But wait: you weren't cleared to fly an ODP, you were cleared to fly the missed approach procedure. In the first installment of *Instrument Readings*™, we discussed making sure your clearance is compatible with what you intend to fly. Doesn't the same issue arise here, you ask, when I (and the AIM) am advocating flying something other than the missed approach that you were cleared for? Yes and no. No, because you intend to fly the published miss if you go missed at or above MDA and before or at the MAP. Yes, or maybe, because you may have to go missed below MDA. In that event, you have no clearance that applies, or rather no defined way to transition onto your cleared procedure, and you are on your own. Let's explore further by way of example at KRHP.

At KRHP, the missed approach procedure is a climbing left turn to 5700, direct HISEN, which is the Missed Approach Holding Waypoint (MAHWP). The ODP has you climb to 4900 over the airport, then at least 200 fpnm to 7000, but part of that climb is south to HRS VORTAC. The ODP and the missed approach procedure take you to different locations, which is in general true; it is necessary to transition at some point from the ODP to the missed approach procedure, once obstacle clearance is assured.

ANDREWS, NC

ANDREWS-MURPHY

TAKE-OFF MINIMUMS: **Rwys 8, 26,** max. 180 KIAS 3400-2, max. 210 KIAS 3400-2½, max. 250 KIAS 3400-3.

DEPARTURE PROCEDURE: **Rwys 8, 26,** procedure NA at night. Remain within 3 NM of Andrews-Murphy Airport while climbing in visual conditions to cross airport westbound at or above 4900. Then climb to 7000 via heading 251° and HARRIS (HRS) VORTAC R-356 to HRS VORTAC before proceeding on course.

A good way to do this would be to use the ODP's circle climb to 4900 over the airport, and then transition to the missed approach procedure by flying direct HISEN on a direct path between the airport and HISEN, using the GPS missed approach guidance. Sequence to the missed approach on the GPS when crossing the airport the last time. This is basically flying the approach path backward. In the upper part of that circle climb, you may not be visual, but you can maintain your distance from the airport by using the GPS distance readout. Do not sequence to the missed approach until completion of the circle climb, and the GPS will continue showing distance from the missed approach waypoint (MAWP). If you are flying 100 knots or so, you shouldn't have

any trouble staying within 1 mile of the airport. Just watch what the wind is doing to you. It's like turns around a point, you just can't see the point. But the GPS tells you what you need to know.

Note that the ODP has different minima from the IAP. If you want to be prepared to use the ODP, or portion thereof, as an escape maneuver if you have to go missed below MDA, you will have to use the greater of the two minima for your criteria to fly the approach. Close and careful examination of the specific procedures to be used may allow that criteria to be relaxed.

All these issues cannot be figured out in real time. In preflight planning, you ought to analyze the approach and know what you will do if you have to go missed below MDA or if you have to abort a landing below MDA. The issue is magnified in mountainous terrain, and with a high MDA, but in reality exists always, even for a 400 AGL MDA. A high MDA can result from some obstacle on the approach path, but frequently is driven by the missed approach segment.

Always keep in mind that you are completely on your own for obstacle clearance below MDA. There is no Federal aid down there! And you are also on your own above MDA if you initiate the missed approach below MDA or after the MAP.

In every case when you begin a descent below MDA/DA or begin a missed approach from below MDA/DA or after the MAP, you are on your own for obstacle clearance. In every case of a missed approach from below MDA/DA or after the MAP, it is up to you to devise a procedure to maintain obstacle clearance while transitioning onto some portion of the published missed approach procedure. This is clearly recognized by both the IPH and the AIM. It has been my purpose in this article to emphasize this point, and to stimulate you to think about it, and to encourage you to consider it in preflight planning.

If you have to go missed after the MAP or below MDA/DA, you may consider that you now have an emergency, since you are not cleared for any procedure or flight path that will ensure your obstacle clearance. When the FAA puts the responsibility for obstacle clearance on you and provides you no way to accomplish it, they have to accept that you will exercise your Pilot In Command authority and do whatever you have to do to ensure a safe outcome of the flight. Do you need to inform ATC that you have an emergency and tell them what you plan to do? You should inform ATC of your missed approach and your intentions when able, as always. If you get any static for doing something they are not expecting, and/or receive instructions you consider unsafe, then you should state your emergency. It documents that you were exercising your emergency authority. Worry about the FAA and paperwork later. First, survive.

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