

Descent to the MDA or DH and Beyond



DESCENT TO THE MINIMUM DESCENT ALTITUDE (MDA) OR DECISION HEIGHT (DH) AND BEYOND.

FOREWORD:

A common goal for all instrument approaches is to get the pilot (and the aircraft) into a position from where a normal landing can be made, usually with visual references.

The Aeronautical Information Manual (AIM) defines MDA as "the lowest altitude, expressed in feet above mean sea level (MSL), to which descent is authorized on final approach, or during circle-to-land maneuvering, in execution of a standard instrument approach procedure (SIAP) where no electronic glide slope (GS) is provided."

The AIM defines DH as "the height at which a decision must be made during an Instrument Landing System (ILS), Microwave Landing System (MLS), or Precision Approach Radar (PAR) instrument approach to either continue the approach or to execute a missed approach."

This safety pamphlet is designed to give you some helpful hints and tips to get you safely to the MDA or DH and beyond.

Before the Flight:

- When talking to an Automated Flight Service Station or a Flight Service Station (AFSS/FSS) briefer, be sure to get all "Flight Data Center (FDC) Notice to Airmen (NOTAM)," both current in the computer and those published in the bi-weekly NOTAM's. If you are using a Direct User Access Terminal (DUAT), you must use a site specific airport identifier (3-letter) in order to get FDC NOTAM's, (warning: You may not get the ones published in the bi-weekly, Notices to Airmen). A call to Flight Service is essential.
- After obtaining a weather briefing and determining the probable landing runway, review all possible approach charts. Note any

obstructions and their relationship to the airport.

- Make a strong effort to call ahead to the destination airport to see if there are any local "Letters to Airman" that could affect your arrival.
- Make sure you have current enroute, approach, and sectional charts on board. Do not switch back and forth between National Ocean Service (NOS) and Jeppesen charts, stay with one or the other. An aircraft cockpit is no place to familiarize oneself with a chart format you are not used to. Also, have all of the approach charts for that airport readily available. Having to figure out another chart while flying the plane Instrument Meteorological Conditions (IMC) single pilot, is not exercising good judgment or planning. If the ILS GS fails, be ready to fly the localizer (LOC) approach; if both the local and GS fails, is the Automatic Direction Finder (ADF) approach using the compass locator at ILS outer marker (LOM)? If so, adjust your strategy to the Nondirectional Beacon (NDB) approach, but you will have to have all the charts readily available and your mind in gear.
- From the approach charts and Airport/Facility Directory, determine if radar is available. You may also want to know the Minimum Vectoring Altitude to determine if a visual or a contact approach may be possible.
- Determine what sources of weather reporting (ATIS, AWOS, NWS, etc.) are available at your destination.
- Determine your personal approach minimums before departing. Take into account how current and proficient you are, your experience level, and your familiarity with the aircraft and its' systems. If you are a relatively new instrument pilot, set your minimums high, possibly Visual Flight Rules (VFR), until you gain experience in the system. Also, be aware that on any given day, your personal minimums may change. You may not feel up to low approaches due to the amount of rest you've had or for other reasons.
- Assure that all Navigational Aids (NAVAID) needed (VHF Omnidirectional Range Station (VOR), ADF, etc.) are working properly in your aircraft.
- During your weather briefing, plan your escape route. Find out where the nearest present or forecast VFR weather is, just in case

you need it, such as in the event of a radio failure.

While Enroute:

- Contact the AFSS/FSS nearest your destination well in advance to determine if there are any changes in NOTAM's, locator (L), danger area (D), or FDC's that may affect your flight.
- Monitor and write down the Automatic Terminal Information Service's (ATIS), Automated Weather Observation Service (AWOS), or Automated Surface Observation Service (ASOS) recording, if available, as soon as you receive it. Be sure to verify that the ATIS hasn't changed. (Note the letter identification of the ATIS along with the time. ATIS's usually change close to the hour, so compare the time of the ATIS vs. the present time) as you get closer to your destination. If ATIS is not available, you may be able to get the needed information from the common traffic advisory frequency (CTAF). This will help determine which approach and runway is in use.
- After getting the above information, review the appropriate approach chart. If you are a two-pilot operation, have the nonflying pilot brief you on the approach. If you're operating as a single pilot, brief yourself on the approach. A sample approach briefing may be like the following:
 1. This will be a (VOR approach) to runway (23) at (Bedford) airport.
 2. Field elevation is (133) feet.
 3. The time from the Final Approach Fix (FAF) on the map will be (2:00 min.).
 4. The MDA/DH for this approach will be (680').
 5. The required rate of descent will be (500) feet per minute FPM at (120) kias.
 6. Approach notes are (ADF required. When local altimeter setting is not received, use Boston altimeter setting).
 7. The missed approach procedure is (climbing right turn to

2000 feet direct to BE LOM and hold).

While on the Approach:

- Complete as much of the landing checklist as you can before starting the approach. If you are flying a retractable gear aircraft, it is a good idea to lower the gear when you are 1/2 dot above the GS or at a GS intercept. On a non-precision approach, lower the gear at the FAF. All of the above is true, unless you are going to circle to land in a multi-engine aircraft with one engine out. Then, you should not extend the landing gear until abeam the point of intended landing on the runway of which you are landing. Having said that, be aware that this is a very dangerous maneuver, and should only be done when there is no other recourse, such as diverting to another airport with better weather or runway alignment, allowing a straight-in approach. The best rule of thumb is don't get into this situation in the first place. Consider purchasing an altitude alert indicator and or air speed bug, available from your aviation supply source, to provide a quick visual reference. Consult the Pilot Operating Handbook (POH) or Approved Flight Manual (AFM) for the aircraft for the manufacturer's recommendations.
- Think about the wind and how you will have to maneuver in it.
- If you are on an ILS and you hear that there is a large aircraft ahead of you, beware of wake turbulence. Be sure to stay exactly on the GS. Do not go below the GS! Listen to the frequency, so you are aware of other traffic.
- Call out to the flying pilot or yourself, if single pilot; 1000, 500, and 100 feet above minimums.

After the Approach:

- When you have visual contact with the runway, fly the Visual Approach Slope Indication (VASI), if it is available. If you have the aircraft established with a crosswind correction, do not immediately point the nose of the aircraft at the runway when you break out (a natural tendency). Trust your wind correction angle, it will hold you on center line until the point you would normally

straighten and lower the wing for a normal crosswind landing.

- If there is a Visual Descent Point (VDP) available (Figure 1), it will be indicated by a "v" on the profile view. This is a defined point on a straight-in, non-precision approach from which you can descend below the MDA, if you have the visual reference required by Title 14 of the Code of Federal Regulations (14 CFR) part 91, §91.175(c)(3). You may not descend below the MDA before the VDP.

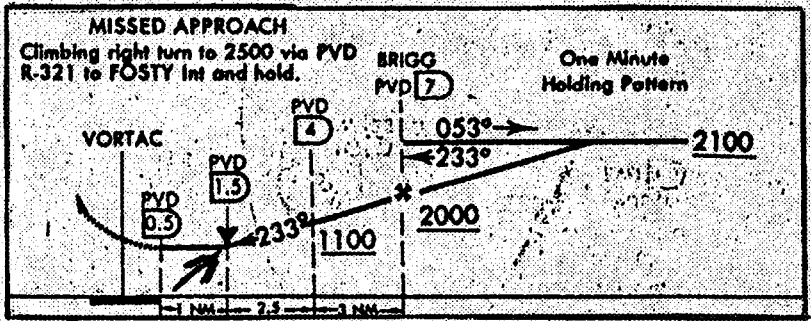


Figure 1

- If feasible, especially at a non-towered airport, please cancel your IFR flight plan whenever you can comfortably proceed to the airport under VFR conditions. This will save you time on the ground trying to find a phone booth and, if there is another aircraft awaiting departure, this will permit ATC to release the other aircraft.
- Do not deviate from the published approach procedure unless you are in VFR conditions and you have canceled your IFR flight plan with ATC.
- Remember, you can only descend below MDA or DH only if:
 1. You are continuously in a position where you can land on the intended runway using a normal rate of descent and normal maneuvers. (14 CFR part 121 and 135 operators must be able to land in the touchdown zone).
 2. The flight visibility must be at or above the visibility required to complete the approach. (It remains the pilot's decision and responsibility to determine the visibility on the approach (14 CFR part 91), part 121 and 135 operations must

have visibility reported at locations before commencing the approach.

3. You have at least one of the following in sight:

- a. The approach light system, except that you may not descend lower than 100 feet above the touch-down zone elevation, unless the red terminating bars or the red side row bars are clearly visible.
- b. The runway threshold.
- c. The threshold markings.
- d. The threshold lights.
- e. The runway end identifier lights (REIL).
- f. The VASI.
- g. The touchdown zone or touchdown zone markings.
- h. The touchdown zone lights.
- i. The runway or runway markings.
- j. The runway lights.

- Following is a rule of thumb to estimate "flight visibility" when coming out of the clouds on an approach that has an approach lighting system. Every approach lighting system has a "decision bar" located 1000 feet from the runway threshold (see Figure 2). These lights (or bar) are perpendicular to the approach lighting system. Another 1000 foot key is that if there are sequenced flashers or "rabbit" in the system, they stop at the decision bar. If you are at the middle marker and cannot see the runway threshold look for the decision bar. You see the decision bar. For example, let's say the middle marker (MM) is six tenths (.6) of a nautical mile (NM) from the threshold. This translates into approximately 3650 feet ($.6 \times 6080$) from the threshold. Then subtract the 1000 feet from the threshold to the decision bar. This leaves 2650 feet or just under 1/2 mile. Therefore, if the visibility minimum for this approach is 1/2 mile, you have it. Conversely, if the MM is five

tenths of a mile from the threshold and you see the decision bar, visibility is approximately 2000 feet ($6080 \times .5 = 3040 - 1000 = 2040$, is approximately $1/3$ of a NM). On this approach if the visibility minimum is $1/2$ mile, you do not have minimums. Be advised, though, that having the visibility at Decision Altitude (DA) is no guarantee that it won't change.

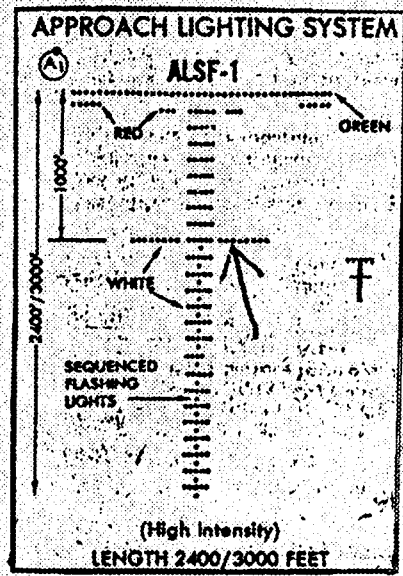


Figure 2
(Approach
Lighting
System)

Note: The arrow points to the decision bar. Also note the 1000 feet between the decision bar and the threshold.

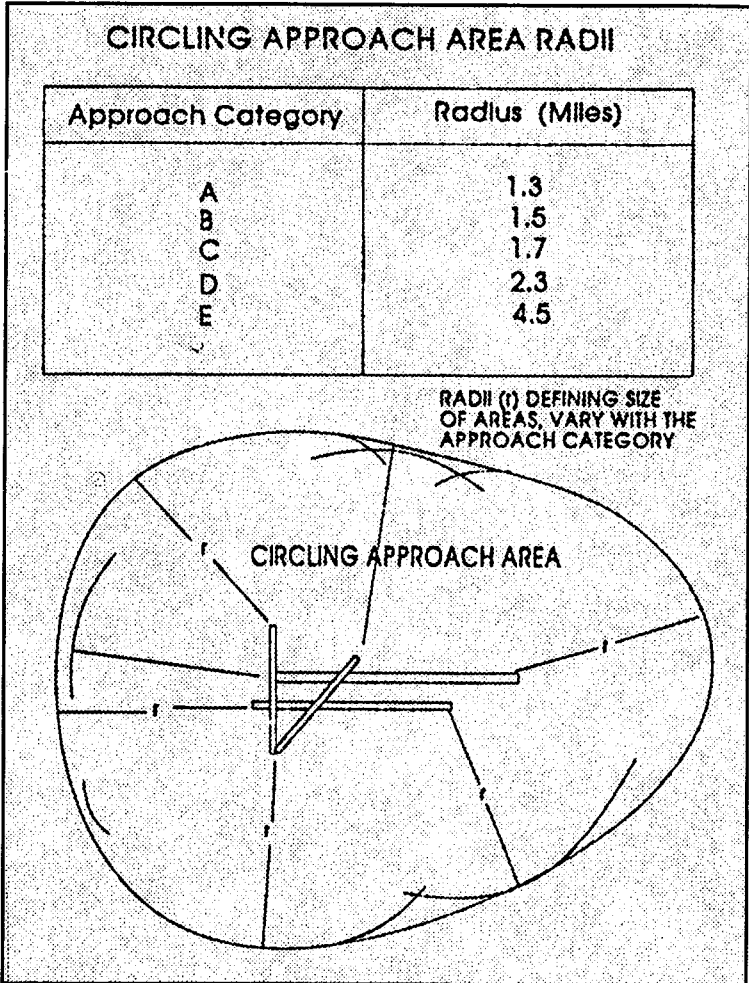
- So far, we've discussed mainly straight-in approaches. Now let's discuss circling approaches. A circling maneuver is initiated by the pilot, with ATC approval, to position the aircraft for landing on a runway when a straight-in landing from an instrument approach cannot be done. You must have visual contact with the airport before doing this. Remember, complete as much of the landing checklist as possible before circling. If you are a two-pilot opera-

tion, the flying pilot should brief the non-flying pilot, before circling, on the direction to be flown after getting visual contact with the airport, the missed approach procedure and as much else as possible. Use no more than a 30 degree angle of bank in turns while maneuvering and stay at or above (no more than 50 feet) the MDA while circling. Remember, you cannot descend from the MDA until you are in a position from which you can descend to the runway using normal maneuvers and a normal descent rate. Be very careful, you will be circling well below pattern altitude. The airport must remain in view of the flying pilot at all times. After doing the straight-in portion of the approach, you may find it helpful to turn 30 degrees to the runway, if you are landing on the opposite end, then fly a parallel downwind until in proper base turn position. At any point, if you lose visual contact with the airport, you must execute a missed approach. Make a climbing turn towards the landing runway until you are established on the missed approach course. Remember, you must execute the published missed approach procedure for the approach you used to get to the circling point, unless ATC gave you alternate instructions. Tell ATC what your intentions are, i.e., to hold or to execute another approach.

- Remember, circling approach-protected airspace is affected by the approach category you are in. (See Figures 3 and 4)
- Plan your approach to arrive at the MDA prior to reaching the missed approach point.
- Remember, when being vectored for an approach, always know your position relative to the initial/final approach fix. Sometimes ATC may be very busy, and you may get a late turn which might require a steeper bank than you would like. You are the pilot-in-command (PIC), and if things don't feel right, ask for vectors for another approach. If you cannot do what ATC asks you, tell them. If you accept their instructions, you will be expected to comply.

MANEUVERING TABLE					
Approach Category	A	B	C	D	E
Speed (Knots)	0-90	91-120	121-140	141-165	Abv 165

Figure 3



(Maneuvering Table)

Figure 4

Circling Approach Area Radii

- Before the flight, you may wish to refresh your memory on lost communication procedures.
- Use the profile view when established on the approach. This will give you the best reference information.
- The Regulations require air carrier pilots to be familiar with the destination before departing. Should any less be expected of a general aviation pilot?
- Here's another tip: Make sure, before starting the approach, you have your radios set up for the missed approach procedure.
- Since the closer you get to the airport, the narrower the course is, any course deviation will cause the needle to move farther as you get closer. Make corrections smaller as you get closer.
- You may wish to leave the power setting alone, unless you have a 10 knot or larger airspeed change.
- For more detailed information on this topic, please refer to 14 Code of Federal Regulations, Part 91.175 Takeoff and landing under IFR as well as Section 4., Arrival Procedures, of the Aeronautical Information Manual.

This is a Back
to Basics,
Aviation Safety
Program Product.



Federal Aviation Administration
Aviation Safety Program (AFS-810)
800 Independence Avenue S.W.
Washington, D.C. 20591

Contact your local FAA Flight Standards District
Office's Safety Program Manager for more safety
information.



U.S. Department of Transportation
Federal Aviation Administration
Washington, D.C.