

INSTRUMENT APPROACHS

Non Precision (VOR / VOR/DME)

Why is it referred to as “Non Precision” ?

Minimum Descent Altitude (MDA), Decision Altitude (DA), And Decision Height (DH)

Unlike Precision Approaches, Non Precision Approaches utilize an MDA as the missed approach point.

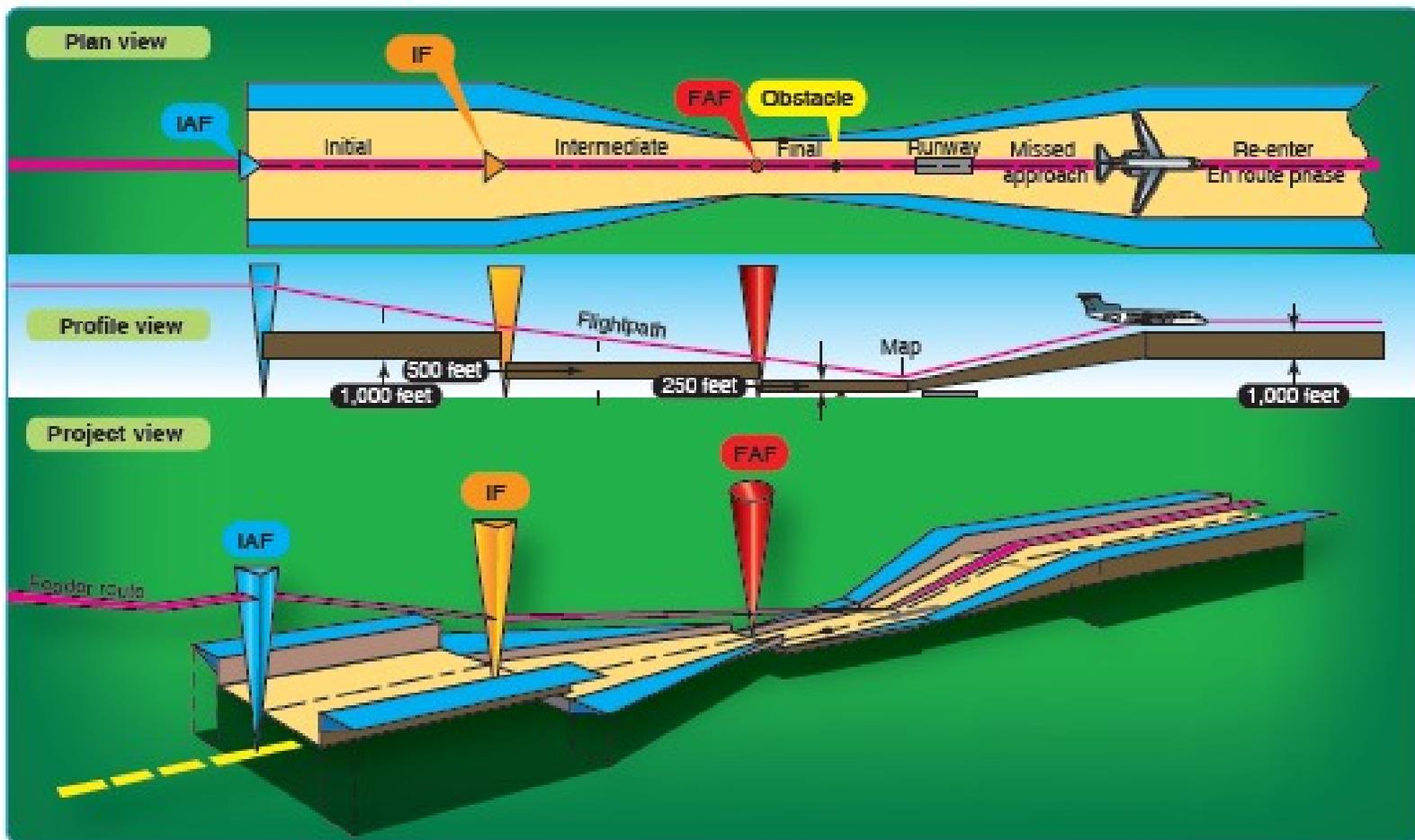
MDA—the lowest altitude, expressed in feet MSL, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure (SIAP) where no electronic glideslope is provided. **[NON PRECISION]**

DA—a specified altitude in the precision approach at which a missed approach must be initiated if the required visual reference to continue the approach has not been established. **[PRECISION]**

DH—with respect to the operation of aircraft, means the height at which a decision must be made during an ILS, MLS, or PAR IAP to either continue the approach or to execute a missed approach. **[PRECISION]**

Instrument Approach Procedure Segments

An instrument approach may be divided into as many as four approach segments: initial, intermediate, final, and missed approach. Additionally, feeder routes provide a transition from the en route structure to the IAF. The (TERPS) criteria provides obstacle clearance for each segment of an approach procedure.



Maximum Acceptable Descent Rates

Operational experience and research have shown that a descent rate of ***greater than approximately 1,000 fpm is unacceptable*** during the final stages of an approach (below 1,000 feet AGL). This is due to a human perceptual limitation that is independent of the type of airplane or helicopter. Therefore, the operational practices and techniques must ensure that descent rates greater than 1,000 fpm are not permitted in either the instrument or visual portions of an approach and landing operation.

To verify the airplane is on an approximate three degree glidepath, use a calculation of 300 feet to 1 NM. The glidepath height above TDZE is calculated by multiplying the NM distance from the threshold by 300. For example, at 10 NM the aircraft should be 3,000 feet above the TDZE, at 5 NM the aircraft should be 1,500 feet above the TDZE, at 2 NM the aircraft should be 600 feet above the TDZE, and at 1.5 NM the aircraft should be 450 feet above the TDZE until a safe landing can be made

Transition to a Visual Approach

The transition from instrument flight to visual flight during an instrument approach can be very challenging, especially during low visibility operations. Aircrews should use caution when transitioning to a visual approach at times of shallow fog. Adequate visibility may not exist to allow flaring of the aircraft. Aircrews must always be prepared to execute a missed approach/go-around. Additionally, single-pilot operations make the transition even more challenging. Approaches with vertical guidance add to the safety of the transition to visual because the approach is already stabilized upon visually acquiring the required references for the runway. 100 to 200 feet prior to reaching the DA, DH, or MDA, most of the PM's attention should be outside of the aircraft in order to visually acquire at least one visual reference .

Single-pilot operations can be much more challenging because the pilot must continue to fly by the instruments while attempting to acquire a visual reference for the runway. While it is important for both pilots of a two-pilot aircraft to divide their attention between the instruments and visual references, it is even more critical for the single-pilot operation. The flight visibility must also be at least the visibility minimum stated on the instrument approach chart, or as required by regulations.

MISSED APPROACHES

Prior to initiating an instrument approach procedure, the pilot should assess the actions to be taken in the event of a balked (rejected) landing beyond the missed approach point or below the MDA or DA (H) considering the anticipated weather conditions and available aircraft performance. A missed approach procedure ensures obstruction clearance, but it does not necessarily consider separation from other air traffic. The pilot must consider other factors such as the aircraft's geographical location with respect to the prescribed missed approach point, direction of flight, and/ or the minimum turning altitudes in the prescribed missed approach procedure. The pilot must also consider aircraft performance, visual climb restrictions, charted obstacles, published obstacle departure procedure, takeoff visual climb requirements as expressed by nonstandard takeoff minima, other traffic expected to be in the vicinity, or other factors not specifically expressed by the approach procedures. The pilot must consider other factors such as the aircraft's geographical location with respect to the prescribed missed approach point, direction of flight, and/ or the minimum turning altitudes in the prescribed missed approach procedure. The pilot must also consider aircraft performance, visual climb restrictions, charted obstacles, published obstacle departure procedure, takeoff visual climb requirements as expressed by nonstandard takeoff minima, other traffic expected to be in the vicinity, or other factors not specifically expressed by the approach procedures.

MISSED APPROACHES

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. *The missed approach course begins at the MAP and continues until the aircraft has reached the designated fix and a holding pattern has been entered.*

A MAP 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 non-precision approach, there may be hazards when executing a missed approach below the MDA.

The published missed approach procedure provides obstacle clearance only when the missed approach is conducted on the missed approach segment from or above the missed approach point, and assumes a climb rate of 200 FPNM or higher, as published. If the aircraft initiates a missed approach at a point other than the missed approach point, from below MDA or DA (H), or on a circling approach, obstacle clearance is not provided by following the published missed approach procedure, nor is separation assured from other air traffic in the vicinity.

MISSED APPROACHES

In the event a balked (rejected) landing occurs at a position other than the published missed approach point, the pilot should contact ATC as soon as possible to obtain an amended clearance.

If unable to contact ATC for any reason, the pilot should attempt to re-intercept a published segment of the missed approach and comply with route and altitude instructions.

If unable to contact ATC, and in the pilot's judgment it is no longer appropriate to fly the published missed approach procedure, then consider either maintaining visual conditions (if possible) and reattempt a landing, or a circle-climb over the airport.

Should a missed approach become necessary when operating to an airport that is not served by an operating control tower, continuous contact with an air traffic facility may not be possible. In this case, the pilot should execute the appropriate go-around/missed approach procedure without delay and contact ATC when able to do so.

Visual Approach

When it is operationally beneficial, ATC may authorize pilots to conduct a visual approach to the airport in lieu of the published IAP. A pilot, or the controller, can initiate a visual approach. **A visual approach is an ATC authorization for an aircraft on an IFR flight plan to proceed visually to the airport of intended landing;** it is not an IAP. Also, there is no missed approach segment.

It is authorized when the ceiling is reported or expected to be at least 1,000 feet AGL and the visibility is at least 3 SM. Pilots must remain clear of the clouds at all times while conducting a visual approach. At an airport with a control tower, pilots may be cleared to fly a visual approach to one runway while others are conducting VFR or IFR approaches to another parallel, intersecting, or converging runway. Also, when radar service is provided, it is automatically *terminated when the controller advises pilots to change to the tower or advisory frequency*. While conducting a visual approach, the pilot is responsible for providing safe obstacle clearance.

VOR Approaches

The VOR is one of the most widely used non-precision approach types in the NAS. VOR approaches use VOR facilities both on and off the airport to establish approaches and include the use of a wide variety of equipment, such as DME and TACAN. Due to the wide variety of options included in a VOR approach, TERPS outlines design criteria for both on and off airport VOR facilities, as well as VOR approaches with and without a FAF. Despite the various configurations, all VOR approaches are non-precision approaches, require the presence of properly operating VOR equipment, and can provide **MDAs as low as 250 feet above the runway**. VOR also offers a flexible advantage in that an approach can be made toward or away from the navigational facility.

When DME is included in the title of the VOR approach, operable DME must be installed in the aircraft in order to fly the approach from the FAF. The use of DME allows for an accurate determination of position without timing, which greatly increases situational awareness throughout the approach.

GULFPORT, MISSISSIPPI

AL-576 (FAA)

VOR RWY 14 GULFPORT-BILOXI INTL (GPT)

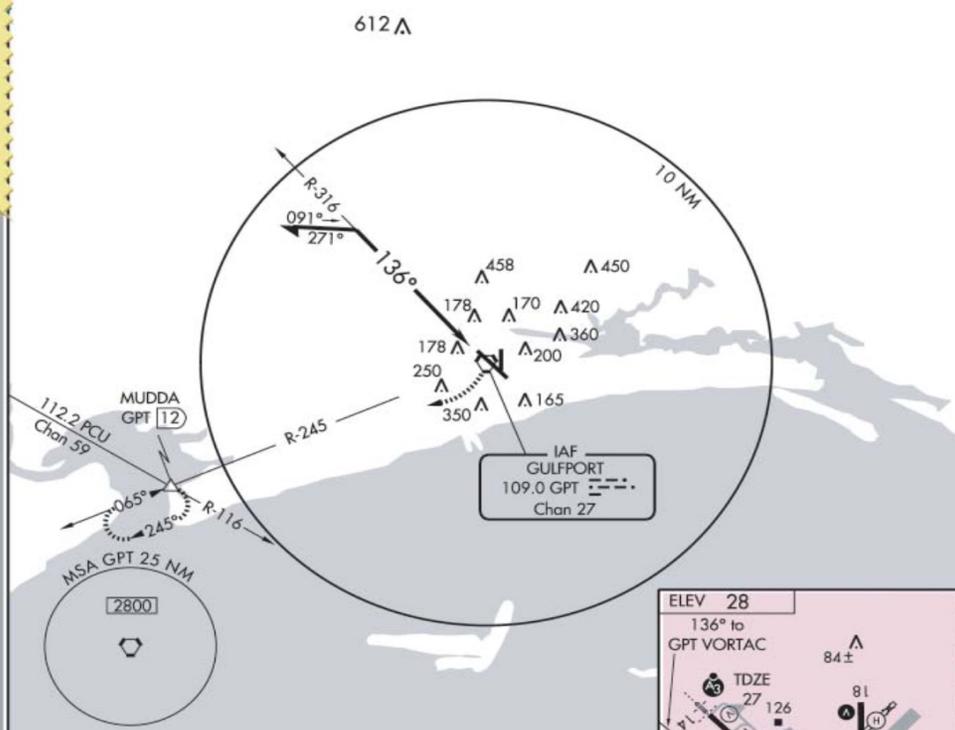
PILOT BRIEFING
AND
PROCEDURE NOTES

VORTAC GPT 109.0 Chan 27	APP CRS 136°	Rwy Idg 9002 TDZE 27 Apt Elev 28
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ASR SSALR
MISSED APPROACH: Climbing right turn to 2000 via GPT R-245 to MUDDA Int/12 DME and hold.

ATIS 119.45	GULFPORT APP CON * 124.6 254.25	GULFPORT TOWER * 123.7 (CTAF) 0 339.8	GND CON 120.4 348.6	UNICOM 122.95
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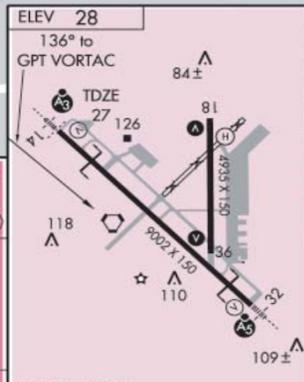
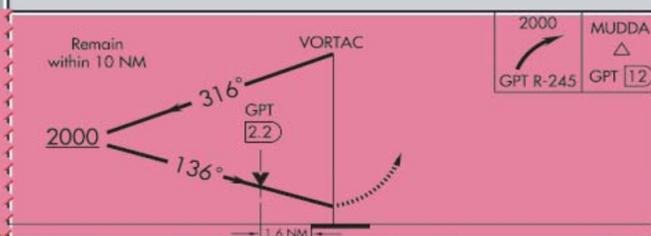
PLAN VIEW



SC-4, 06 JUL 2006 to 03 AUG 2006

SC-4, 06 JUL 2006 to 03 AUG 2006

PROFILE



AIRPORT
DIAGRAM

MINI-MUMS

CATEGORY	A	B	C	D
S-14	580/24 552 (600-1)	553 (600-1/2)	580/50 553 (600-1)	580/60 553 (600-1 1/4)
CIRCLING	580-1 552 (600-1)	660-1 632 (700-1)	660-1 1/4 632 (700-1 1/4)	660-2 632 (700-2)

GULFPORT, MISSISSIPPI
Amdt 22 06159

30°24'N-89°04'W

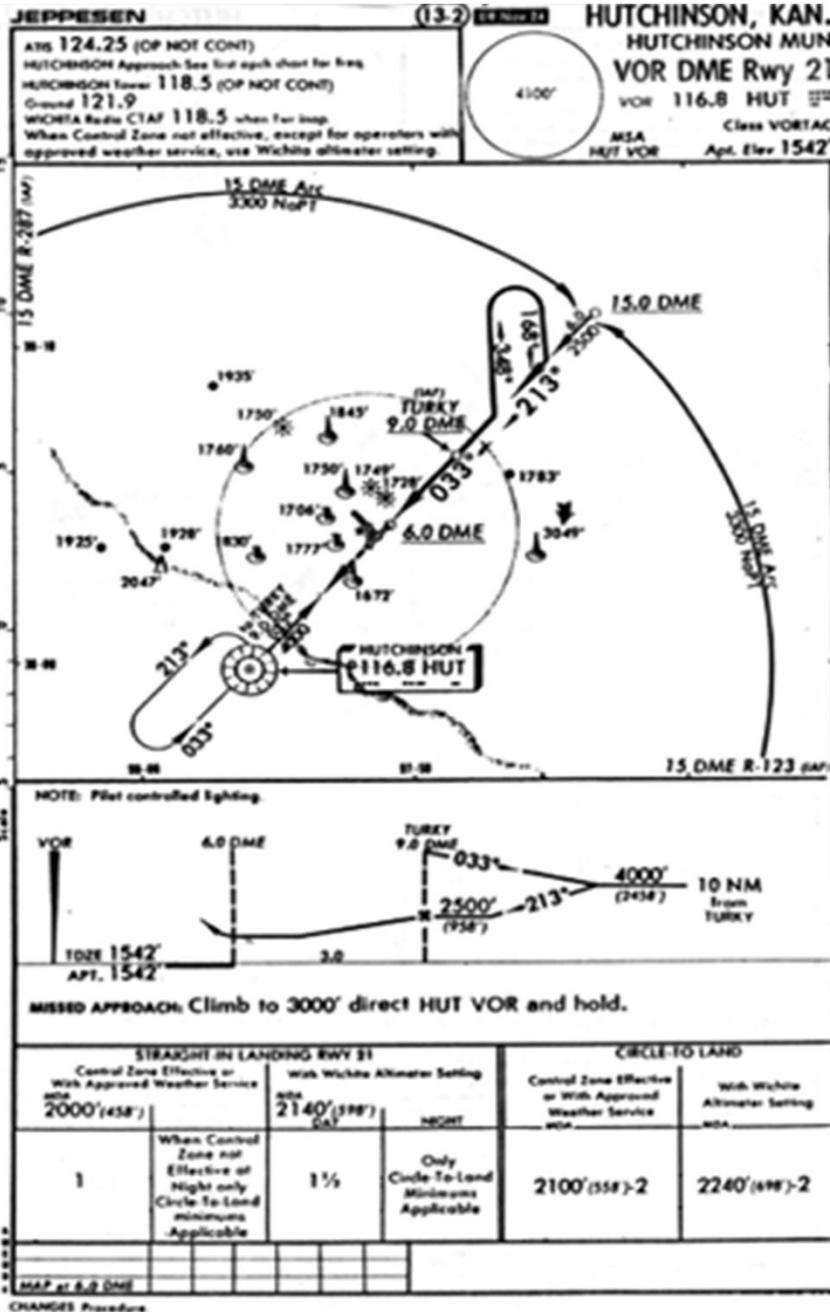
GULFPORT-BILOXI INTL (GPT)
VOR RWY 14

Knots	60	90	120	150	180
Min:Sec					

VOR and VOR/DME APPROACHES: What's the difference?

VOR/DME approaches differ from the VOR approach in that they have distance (DME) information available. Here is a VOR/DME approach plate for Hutchinson, Kansas

Notice that there is no "timing box" in the lower left corner. With distance information available, you can be much more certain of where you are on the approach. Below is a typical timing box, VOR to MAP, found on a VOR approach.



Gnd speed-Kts	70	90	100	120	140	160
VOR to MAP	7:22	5:44	5:10	4:18	3:41	3:14

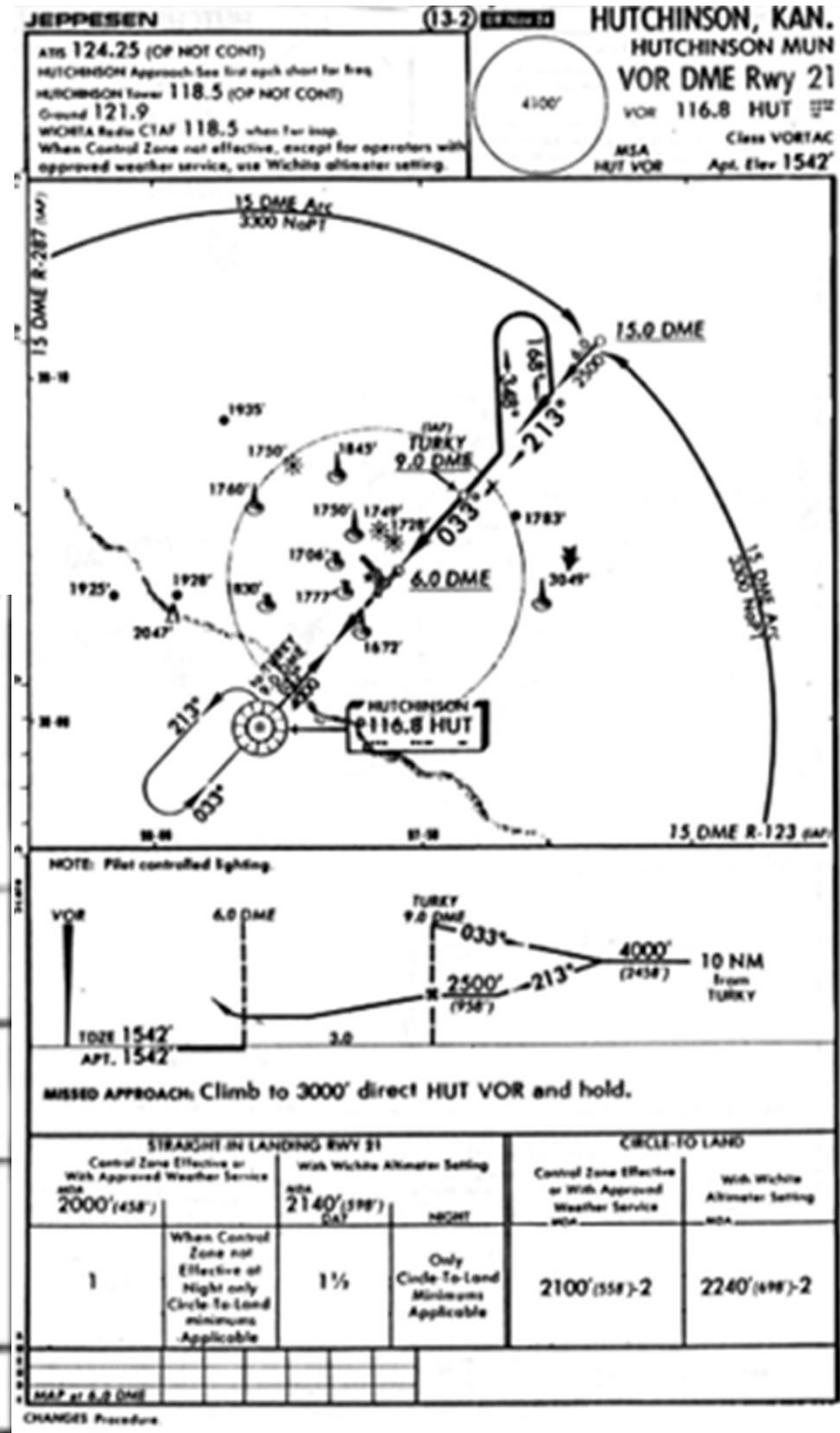
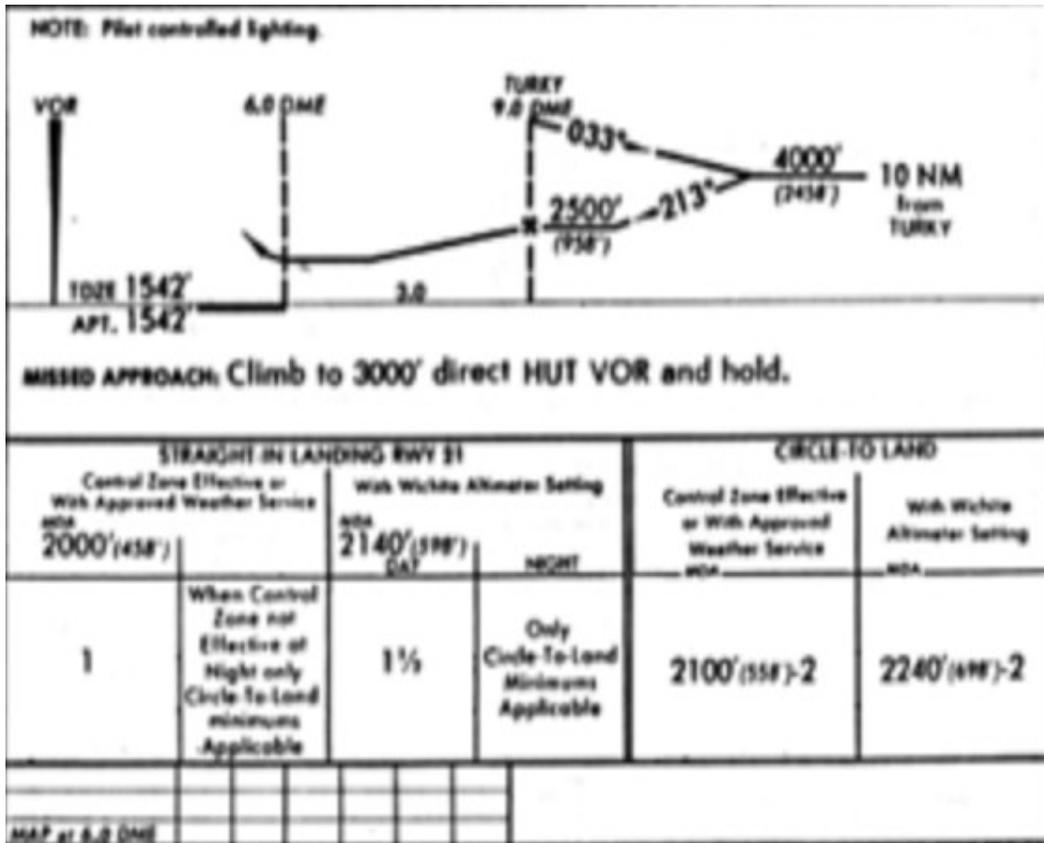
VOR/DME Approaches

The VOR is one of the most widely used *non-precision approach* types in the NAS. VOR approaches use VOR facilities both on and off the airport to establish approaches and include the use of a wide variety of equipment, such as DME and TACAN. Due to the wide variety of options included in a VOR approach, TERPS (**Terminal Instrument Procedures**) outlines design criteria for both on and off airport VOR facilities, as well as VOR approaches with and without a FAF. Despite the various configurations, all VOR approaches are non-precision approaches, require the presence of properly operating VOR equipment, and can provide MDAs as low as 250 feet above the runway. VOR also offers a flexible advantage in that an approach can be made toward or away from the navigational facility.

When DME is included in the title of the VOR approach, operable DME must be installed in the aircraft in order to fly the approach from the FAF. The use of DME allows for an accurate determination of position without timing, which greatly increases situational awareness throughout the approach. *THERE IS NO TIMING BOX ON THE VOR-DME APPROACH PLATE.* We are relying on DME distances to indicate our position on the approach.

The criteria for an arc final approach segment associated with a VOR/DME approach is based on the arc being beyond 7 NM and no farther than 30 NM from the VOR and depends on the angle of convergence between the runway centerline and the tangent of the arc. Obstacle clearance in the primary area, which is considered the area 4 NM on either side of the arc centerline, is guaranteed by at least 500 feet.

VOR DME BASED ON DME DISTANCE



ALEXANDRIA, LOUISIANA

AL-13 (FAA)

VOR/DME RWY 32
ALEXANDRIA INTL (AEX)

VORTAC AEX 116.1 Chan 108	APP CRS 327°	Rwy Idg TDZE Apt Elev	9352 89 89
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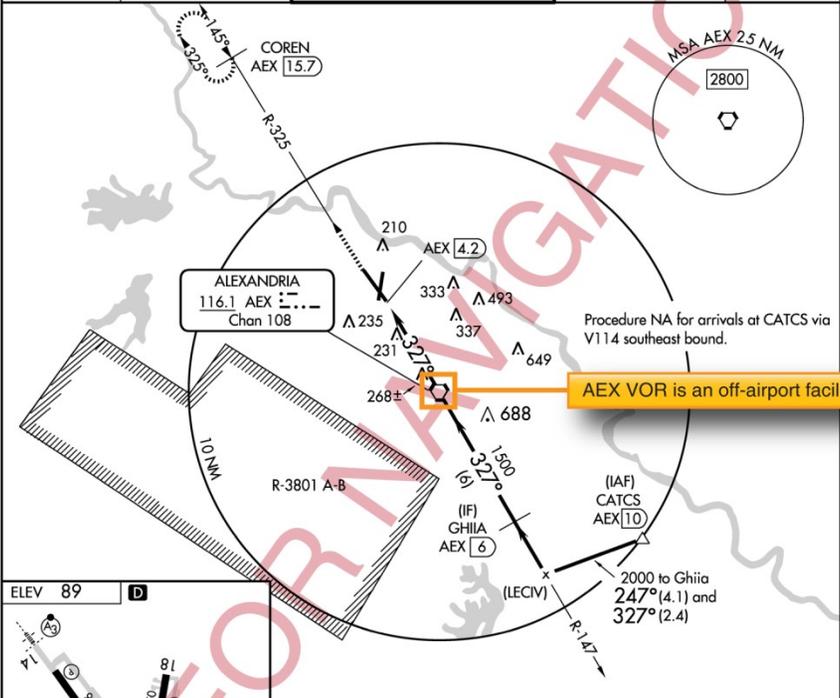
▼ Radar required when R-3801 A-B in use.

MISSED APPROACH: Climb to 3000 via AEX R-325 to COREN/AEX 15.7 DME and hold.

ASOS 123.975	POLK APP CON 125.4 302.2	ALEXANDRIA TOWER 127.35 (CTAF) 269.2	GND CON 121.9 372.0	CLNC DEL 121.9
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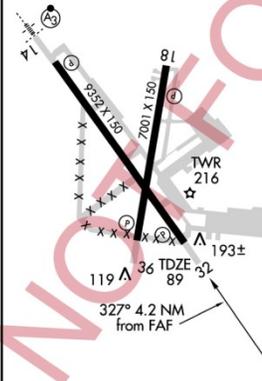
SC-4, 16 DEC 2010 to 13 JAN 2011

SC-4, 16 DEC 2010 to 13 JAN 2011



AEX VOR is an off-airport facility

ELEV 89 **D**



REIL Rwy 18, 32 and 36
HIRL Rwy 18-36 and 14-32

3000	VGS and descent angles not coincident.			
AEX R-325	COREN AEX 15.7	GHIA AEX 6	(LE CIV)	CATCS AEX 10
AEX 4.2	AEX 3	VORTAC	FAF	
327°	327°	327°	247°	2000
1500	2000	2000	2000	Procedure Turn NA
1.2	3 NM	6 NM	2.4 NM	4.1 NM
CATEGORY	A	B	C	D
S-32	520/50	431 (500-1)	520/60 431 (500-1½)	520-1½ 431 (500-1½)
CIRCLING	540-1 451 (500-1)	560-1 471 (500-1)	560-1½ 471 (500-1½)	640-2 551 (600-2)

ALEXANDRIA, LOUISIANA
Amdt 1A 08325

31°20'N-92°33'W

ALEXANDRIA INTL (AEX)
VOR/DME RWY 32

VOR Approaches

OFF-AIRPORT VOR FACILITIES: VOR is NOT located on the airport but nearby.

Preparing for the Approach

- Conduct a chart review to familiarize yourself with procedures.
- Check the associated airport diagram for each procedure.
- Monitor ASOS for surface weather conditions.

Clearance Example: “Skyhawk 1234, expect VOR Runway 30 approach, Contact Tower on xxx”

Descending Prior to the IAF

- Determine the required descent rate from your enroute segment. Descent rates are typically 500 fpm but it depends on your MEA which could require a greater rate of descent.

Outbound on the Procedure Turn

- Keep track of your time. You must remain within 10 NM of the VOR, as required by the procedure. Enter the procedure turn after flying outbound from the VOR for 2 minutes. As you begin the turn, set the OBS to the inbound course and fly for one minute.

Inbound to the FAF

- Complete your landing checklist
- Watch for the VOR needle to center on the course, reset your stopwatch, and begin your final approach.

Final Approach Segment

- Watch your groundspeed as you approach the MAP only 0.1 NM from the runway threshold
- You will need adjust your heading due to the VOR being off the airport when airport in sight.

Missed Approach

- If you are at the MDA and cannot see the runway, you must execute a missed approach.
- You must have at least a textual missed approach procedure specifying an exact procedure for entering a holding pattern upon reaching the VOR.

VOR/DME Approaches

OFF-AIRPORT VOR FACILITIES: VOR is NOT located on the airport but nearby.

Procedure with DME.

Having DME onboard allows you to use the DME arc procedure, which lines you up on the final approach course more directly than when you perform the procedure turn. Use of DME also enables you to accurately determine your position throughout the approach without timing.

ON-AIRPORT VOR FACILITIES: VOR is located on the airport.

When an approach procedure uses an on-airport facility, no final approach fix (FAF) is designated, unless DME or another means is available for identifying such a fix. However, a FAF is designated and identifies the beginning of the final approach segment. This point is where the aircraft is established inbound after completing the procedure turn. The FAF serves as the FAF.

Without DME, for obstacle clearance, usually you overfly the VOR at a safe altitude, proceeding outbound, and turn around and track back toward the airport/VOR as you descend to the MDA.

Preparing for the VOR Approach

- Conduct a chart review to familiarize yourself with procedures
- Check the associated airport diagram for each procedure.
- Monitor ASOS for surface weather conditions.

Clearance Example: “Skyhawk 1234, cleared for VOR Runway 4 Approach to xxx, maintain 2,500 until outbound from xx VOR. Report procedure turn inbound to the tower on xxxx”

Descending Prior to the IAF

- Once clearance is received begin a descent to the altitude assigned by ATC, and continue tracking the VOR.

Outbound on the procedure turn (Same as VOR only approach)

Inbound to the airport

- Intercept the inbound course to the VOR and track inbound at the MDA.
- Progressive Stepdown fixes are used on a VOR/DME approach. These are DME distances from the runway allowing you to descend to the next fix.
- Your missed approach point is where the TO/FROM indicator changes from TO to FROM, directly over the airport.
- Since a circling MDA is the same as the straight-in MDA, you can circle as needed to land.
- When circling, position yourself on a normal base or final with a clear view of the approach end of the runway generally is sufficient to descend below the MDA and land.

Missed Approach

- If you can't see the runway at the MAP or you lose sight of it while circling to land-immediately execute a missed approach.

VOR Approach Summary Checklist will be combined at the end of the next unit on NDB Approaches

See Jewel Box for 27 page on sample VOR DME Approaches and variances from VOR only approaches
Filename: VOR DME Approaches.pdf