Introduction

Reading a missed approach procedure is a critical step toward briefing and flying a complete instrument approach to an airport. The missed approach point is the position where the pilot must immediately climb away from the airport if the landing criteria of FAR 91.175(c) are not met. There are two challenges involved in reading the missed approach point:

a. Location

Where is the missed approach point? The profile view depicts the missed approach point as the beginning of a dashed line, as shown above. It is generally located between the final approach fix and the airport. However, only one missed approach point is depicted, and each procedure may have two or three different missed approach points. Common locations for a missed approach point include the runway threshold, the primary NAVAID for the approach, and the intersection of the glide slope with the decision altitude.

b. Identification

How does the pilot know when the aircraft has reached the missed approach point? The pilot must understand the aircraft position relative to the missed approach point while flying each instrument approach procedure. Because each procedure has a unique configuration, the indications and techniques used to identify the missed approach point may be unique as well. Common identifiers for a missed approach point include a named waypoint, a DME fix, and a time and speed table.

This study guide contains several scenarios that illustrate the most common types of instrument approach configurations. These can be used as examples for learning to read and identify the location of a missed approach point.
Scenario #1: ILS Approach

Example procedure: KDTW ILS Y RWY 4L

On an ILS, the missed approach point is that point at which the glide slope intersects the Decision Altitude (DA).

In this example, the climb to 1,100 ft is initiated upon reaching 895 ft and deciding to go missed.

In case of an early missed approach, the pilot would rely on DME or RADAR to approximate crossing the missed approach point before making the left turn.

The point depicted as (TICUD) is called a Computer Navigation Fix.

Scenario #2: LOC Approach without DME

Example procedure: KEMV LOC RWY 34

On the example LOC, the missed approach point can be identified only by flying a timed leg using a clock. The climb to 3,000 ft is initiated when the final approach time expires, and the right turn can be made at or beyond that point. In general, it is “inadvisable or impossible” to execute a normal landing from the missed approach point of a non-precision approach procedure. The missed approach point is the same for straight-in and circling approaches.
In case of an early missed approach, the pilot would maintain the approach speed and cross the missed approach point before making the right turn.

The profile for a LOC approach is essentially identical to VOR and NDB approaches. VOR and LOC approaches are relatively rare without DME, but they help to explain the following procedures that are more complex. NDB approaches usually do not have DME service.

A runway fix is sometimes depicted at the missed approach point, as in the KDET NDB RWY 15. This might serve as a quasi-DME for GPS equipped pilots.

Scenario #3: LOC Approach with DME

Example procedure: KIMT LOC/DME BC RWY 19

On the example LOC, the missed approach point is 1.5 DME from the IMT VOR/DME. The climb to 3,100 ft is initiated at or before 1.5 DME, and the left turn can be made at or beyond 1.5 DME. In general, it is “inadvisable or impossible” to execute a normal landing from the missed approach point of a non-precision approach procedure (the descent angle from 1.5 DME in this example would be 5.6 degrees). The missed approach point is the same for straight-in and circling approaches.

To use DME in identifying the missed approach point, the DME number must be published in the procedure, which is not always the case.

Not pictured in the excerpt above is the airport sketch from this procedure which states, “5.3 NM from FAF.” According to an FAA document (Control # 12-02-257) this is called the Airport Sketch Final Approach Course. It can be depicted six different ways and may or may not represent the location of a missed approach point. It is therefore incorrect, when briefing any procedure, to use the arrow in the airport sketch to identify the missed approach point.
Scenario #4: ILS or LOC Approach with DME

Example procedure: KAPN ILS or LOC RWY 1

On an ILS, the missed approach point is that point at which the glide slope intersects the Decision Altitude (DA). This is depicted by “the beginning of the dotted missed approach course line” in profile view.

On the example LOC, the missed approach point is 1.1 DME from the APN VORTAC. The climb to 1,100 ft is initiated at or before 1.1 DME, and the left turn can be made at or beyond 1.1 DME. In general, it is “inadvisable or impossible” to execute a normal landing from the missed approach point of a non-precision approach procedure. If not equipped with DME or a GPS substitute, the missed approach point can be identified by flying a timed leg using a clock. The missed approach point is the same for straight-in and circling approaches, but is different from the ILS. The missed approach course for straight-in LOC or circling is not depicted in profile view.

A common mistake when briefing this type of procedure is to state that the missed approach point is 6.3 NM from the final approach fix, which is depicted four different ways in the profile view and airport sketch. The correct way to identify the missed approach point is by using 1.1 DME, which is 6.2 DME beyond the final approach fix. Notice they are not the same numbers.

This type of approach is named LDA if not aligned within 3° of the runway centerline. The lines of minima are named LDA/GS instead of S-ILS, and LDA instead of S-LOC. The profile is essentially identical, but LDA/GS is considered an APV type rather than a precision type.

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Scenario #5: ILS or LOC Approach without DME

Example procedure: KDET ILS or LOC RWY 15

On an ILS, the missed approach point is that point at which the glide slope intersects the Decision Altitude (DA). This is depicted by “the beginning of the dotted missed approach course line” in profile view.

In case of an early missed approach, no turns are allowed prior to reaching the CARGL NDB.

On the example LOC, the missed approach point can be identified only by flying a timed leg using a clock. The missed approach point is the same for straight-in and circling approaches, but is different from the ILS. The missed approach course for straight-in LOC or circling is not depicted in profile view.

Scenario #6: VOR Approach with Incomplete DME Information

Example procedure: KDET VOR RWY 33

On the example VOR, the missed approach point can be identified only by flying a timed leg using a clock. The climb to 3,000 ft is initiated when the final approach time expires. In general, it is “inadvisable or impossible” to execute a normal landing from the missed approach point of a non-precision approach procedure. The missed approach point is the same for straight-in and circling approaches.

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Also note this procedure requires a descent angle greater than 3 degrees.

A common mistake when briefing this type of procedure is to state that the missed approach point is 3.8 NM from the final approach fix, or 12.3 DME. The correct way to identify the missed approach point is by using the times depicted below the profile view. Notice the missed approach point DME is not depicted. In this example, DME is used only to identify the top of descent fix and the final approach fix.

_The example procedure KACB VOR RWY 2 was deleted on 8 January 2015._

**Scenario #7: VOR at the Airport**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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</thead>
<tbody>
<tr>
<td>S-1</td>
<td>1280-3½</td>
<td>595 (600-1½)</td>
<td>1280-1</td>
<td>595 (600-1½)</td>
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<td></td>
<td>595 (600-1½)</td>
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<td>1280-1½</td>
<td>595 (600-1½)</td>
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<tr>
<td>CIRCLING</td>
<td>1280-1</td>
<td>591 (600-1½)</td>
<td>1280-2</td>
<td>591 (600-2)</td>
</tr>
</tbody>
</table>

On the example VOR, the missed approach point is identified when the VOR direction flag changes to the FROM indication. The climb to 2,800 ft is initiated at or before the VOR, and the right turn can be made at or beyond the VOR.

Similarly, on an NDB approach, the ADF needle would indicate passing the NDB.
Scenario #8: RNAV without VNAV

Example procedure: KSLH RNAV (GPS) RWY 10

![Diagram showing scenario #8](image)

On an LNAV, the missed approach point is the last waypoint depicted in the profile view (RW10).

In case of an early missed approach, no turns are allowed prior to reaching the FIKAM waypoint.

LP is a slightly more precise RNAV guidance level provided by WAAS. The missed approach point is the same for LP, LNAV, and circling approaches.

Scenario #9: RNAV with VNAV

Example procedure: KADG RNAV (GPS) RWY 5

![Diagram showing scenario #9](image)

On an LPV or LNAV/VNAV, the missed approach point is that point at which the glide slope intersects the Decision Altitude (DA). In this example, there are two different DAs. The missed approach point for the “top-line” minima only is depicted by “the beginning of the dotted missed approach course line.” The missed approach course for LNAV/VNAV is not depicted in profile view.
In case of an early missed approach, no turns are allowed prior to reaching the EZHAF waypoint.

On an LNAV, the missed approach point is the last waypoint depicted in the profile view (RW05). In this example, it is difficult to distinguish between the missed approach point and the visual descent point (VDP). A pilot would initiate the climb to 3,000 ft between the VDP and RW05. Since no turns are allowed and by definition it is impossible to make a normal landing beyond the VDP, there is no reason to wait for RW05.

The missed approach point is the same for LNAV and circling approaches, but is different from the LPV and LNAV/VNAV. In other words, the example procedure has three different missed approach points. The missed approach course for LNAV is not depicted in profile view.

**Scenario #10: LOC/VOR Approach**

This is a technicality mentioned in the FAA handbooks. A missed approach point might be defined by a cross-radial from a second NAVAID, and identified during the approach using a second receiver. However, this is extremely rare and I have yet to find any example of this in a non-military procedure. Cross radials are more commonly used to identify a final approach fix. Reference KNFW ILS or LOC RWY 17.

**Scenario #11: LOC/DME with RNAV Substitution**

Example procedure: KORK LOC/DME RWY 5

LOC/DME procedures rarely include timed legs or a named fix or intersection to identify the missed approach point. On the example LOC, the missed approach point may be identified only by using DME. Because general aviation aircraft are increasingly dependent on GPS distance information and may not have DME transceivers, the pilot must determine whether the avionics are “suitable” for this procedure. This includes procedures titled “ILS or LOC/DME” which are

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relatively common. RNAV substitution for the DME is allowed per AC 90-108 to “determine aircraft position relative to or distance from a … DME fix.” Notice it also says, “Pilots must extract waypoints, NAVAIDs, and fixes by name.”

The attached photo of a GNS 430 receiver shows that the I-ORK facility can be identified by name when manually entered as IORK. The small blue square symbol next to the cursor indicates this is a DME facility. Note the DME antenna is located beyond and offset from the final approach path for this procedure. GNS 430 is capable of displaying the distance to this facility, but it will not load the 1 DME fix via the procedures menu for non-overlay approach information. As described in AIM 1-1-18(n)(11), “a DME fix will not be in the waypoint sequence on the GPS receiver unless there is a published name assigned to it.”

Scenario #12: ASR Approach

RADAR identification of the missed approach point is provided for ASR approach procedures. However, the location of the missed approach point is not published. Air Traffic Control uses the following phrase to specify the location:

“Missed approach point is (distance) miles from the runway.”

During the approach, ATC uses this phrase to identify the point:

“Over missed approach point. If runway not in sight, execute missed approach.”

Scenario #13: PAR Approach

On a PAR procedure, the missed approach point is the intersection of the PAR glide path and a published decision altitude. The terms Decision Altitude (DA) and Decision Height (DH) have the same meaning in this case, and both are MSL altitudes. RADAR identification of the missed approach point is provided using the following phrase:

“At decision height.”
Scenario #14: Unusual Approaches

Example procedure: KSPS ILS or LOC/DME RWY 15C

Can you fly this ILS profile? Are you sure? Take a close look at it. What do all those symbols mean? If the glideslope is out of service, how will you identify the missed approach point? Maybe you are equipped for this, but maybe not!

This study guide does not describe all real world situations. There are exotic procedures involving mountainous terrain, restricted airspace, Cat II & III, SDF, IGS, RNP, PRM, and many others. It is always the pilot’s responsibility to understand the procedure before attempting it.

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DME or RADAR required. Simultaneous approach authorized with Rwy 3R. Procedure NA when glideslope not available.

**LOC/DME** I-ALA 111.75 (Y)

**S-ILS** 4L

**RADAR REQUIRED**

**ATIS** 133.675

**DETOUR APP CON** 124.05 363.2 (WEST)

**METRO TOWER** 135.0 317.725 (WEST)

**GND CON** 121.8 (NW) 119.45 (NE)

**CLNC DEL** 120.65

**MISSDE APPROACH:** Climb to 1100 then climbing left turn to 3000 on heading 320° and SVM VORTAC R-130 to SVM VORTAC and hold.
LOC RWY 34

EMPORIA-GREENSVILLE RGNL (EMV)

AWOS-3 124.175
WASHINGTON CENTER 132.025 269.4
UNICOM 123.0 (CTAF)

When local altimeter setting not received, use Ahoskie altimeter setting and increase all MDA 80 feet.

MISSED APPROACH: Climb to 600 then climbing right turn to 3000 direct ELQ NDB and hold, continue climb-in-hold to 3000.

ADF REQUIRED

CATEGORY
A
B
C
D
S-34
720-1
598 (600-1)
NA
CIRCLING
720-1
594 (600-1)
NA
S-34
460-1
338 (400-1)
NA
CIRCLING
580-1
454 (500-1)
NA

NE-3, 03 APR 2014 to 01 MAY 2014
Circling NA northeast of Rwys 19 and 31. DME from IMT VOR/DME.
Simultaneous reception of I-IMT and IMT DME required. Helicopter visibility reduction below 1 SM NA. Rwy 19 Straight-in and Circling and Circling to Rwy 31 NA at night.

MIssed Approach:
Climb to 3100 then left turn direct IMT VOR/DME and hold.
**ILS or LOC RWY 15**

**COLEMAN A. YOUNG MUNI (DET)**

- **ATIS** 124.875
- **DETOIT APP CON** 126.85 363.2
- **DETOIT CITY TOWER** 121.3 257.8
- **GND CON** 121.85

**ADF REQUIRED**

**LOCALIZER 111.3**

- **I-DET**
- **DE**
- **IT**

**338 DE**

**LOCALIZER 111.3**

**338 DE**

**WINDSOR 113.8 YGG**

**CARGL 230 VQ**

**YQG 8.5**

**ALT**

**GND CON 121.85**

**MISSED APPROACH**: Climb to 3000 direct CARGL NDB/YGG 8.5 DME and hold, continue climb-in-hold.

- **MADDS LOM/INT**
- **338 DE**

**ATIS** 124.875

**DETOIT APP CON** 126.85 363.2

**DETOIT CITY TOWER** 121.3 257.8

- **GND CON** 121.85

**ER**: 14317

**LOCATION**: DETROIT, MICHIGAN

**EC-1, 11 DEC 2014 to 08 JAN 2015**

**Amdt 10A**: 16OCT14

**EC-1, 11 DEC 2014 to 08 JAN 2015**

**DETROIT, MICHIGAN**

**Amdt 10A**: 16OCT14

**DETROIT, APT ELEV 626**

**TDZE 624**

**MIRL RWY 7-25**

**HIRL RWY 15-33**

**REIL RWSY 15 and 33**

**FAR to MAP 5.7 NM**

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<td>554 (600-1)</td>
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**FAF to MAP 5.7 NM**

<table>
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<tr>
<th>Knots</th>
<th>60</th>
<th>90</th>
<th>120</th>
<th>150</th>
<th>180</th>
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<tr>
<td>Min:Sec</td>
<td>5:42</td>
<td>3:48</td>
<td>2:51</td>
<td>2:17</td>
<td>1:54</td>
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</tbody>
</table>

**42°25'N-83°01'W**
Visibility reduction by helicopters NA. When local altimeter setting not received, use Detroit Metro Wayne County altimeter setting and increase all MDA 60 feet and increase Cat C and D visibility 1/2 mile.

MISSED APPROACH: Climb to 3000 via YQG VOR/DME R-326 to DELOW INT and hold, continue climb-in-hold to 3000.

NoPT for arrival on YQG VOR/DME airway radials 040 CW 101.

One Minute Holding Pattern

VGS and descent angles not coincident (VGS Angle 3.00/TCH 49).

FAF to MAP 3.8 NM

Knots 60 90 120 150 180
Min:Sec 3:48 2:32 1:54 1:31 1:16

DETOUR, MICHIGAN

AMDT 28 12MAR09

COLEMAN A. YOUNG MUNI (DET)

VOR RWY 33

EC-1, 08 JAN 2015 to 05 FEB 2015
When local altimeter setting not received, use Pellston altimeter setting and increase all MDA 60 feet, increase LP and LNAV Cat C visibility ½ mile.

When VGS1 inop, Straight-in/Circling Rwy 10 procedure NA at night. DME/DME RNP-0.3 NA. Visibility reduction by helicopters NA.

**MISSING APPROACH:** Climb to 2600 direct FIKAM and hold.

<table>
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<td>1100-1</td>
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<td>1100-1 1/2</td>
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<tr>
<td>CIRCLING</td>
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<td>500 (500-1)</td>
<td>1140-1 1/2</td>
<td>NA</td>
</tr>
</tbody>
</table>

NoPT for arrivals at JATRA via V78 southeast bound.

Procedure NA for arrivals on PLN VORTAC airway radials 219 CW 023.

EC-1, 14 NOV 2013 to 12 DEC 2013

EC-1, 14 NOV 2013 to 12 DEC 2013
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -16°C (4°F) or above 47°C (116°F). DME/DME RNP -0.3 NA. When local altimeter setting not received, use Ann Arbor Muni altimeter setting and increase all DAs 66 feet and all MDAs 80 feet, and increase LPV all Cats, LNAV Cat D and Circling Cat C visibility ¼ mile. Baro-VNAV and VDP NA when using Ann Arbor Muni altimeter setting.

MISSED APPROACH: Climb to 3000 direct EZHAF and hold.

Procedure NA for arrivals at CRUXX via V11 northeast bound.

Procedure NA for arrivals at PIONS via V11 and V98 southwest bound, V6 northwest bound.

### Holding Pattern

- **HAGVI**: 1.7 NM to RW05
- **SECRU**: 1.2 NM to RW05
- **IF/IAF** OBIHI

** CATEGORY **

<table>
<thead>
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<td>1300-1/4</td>
<td>321 (400-11/4)</td>
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</tbody>
</table>
LOC/DME RWY 5
NORTH LITTLE ROCK MUNI (ORK)

Use Bill and Hillary Clinton National/Adams Field altimeter setting, if not received use Searcy altimeter setting and increase all MDAs 60 feet. Circling NA for Cat C north of Rwy 5-23 when R-2403B active. Visibility reduction by helicopters NA.

MISSED APPROACH: Climb to 1700 then climbing left turn to 4000 on LIT VORTAC R-352 to OCAPU/25 DME and hold.

Use I-ORK DME when on the localizer course.

REIL Rwys 5, 17, and 23
MIIRL Rwys 5-23 and 17-35

Apt Elev 541

CATEGORY | A | B | C | D
---|---|---|---|---
S-LOC 5 | 980-1 439 (500-1) | 980-1 4 439 (500-1 4) | NA | NA
CIRCLING | 1040-1 495 (500-1) | 1040-1 1/2 495 (500-1 1/2) | NA | NA

Orig-A 123220

34° 50' N-92° 15' W
ILS or LOC/DME RWY 15C

WICHITA FALLS/MUNI (KSPT)

** When ALS inop, increase CAT AB vis to 1 mile,
CAT CDE vis to ½ mile.

† Circling not authorized W of Rwy 15R-33L.

CAUTION: Do not confuse parallel
taxway with Rwy 15R-33L.

DME REQUIRED
EMERG SAFE ALT 100 NM 4600

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<thead>
<tr>
<th>CATEGORY</th>
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<th>B</th>
<th>C</th>
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<td>200</td>
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WICHITA FALLS, TEXAS 33°59'N-98°30'W

Amdt 8 09JAN14