AERONAUTICAL CHARTING MEETING
Instrument Procedures Group
Meeting 22-01 – April 25-26, 2022

RECOMMENDATION DOCUMENT

FAA Control # 22-01-368

Subject: MSA Center for Non-RNAV Procedures

Background/Discussion:

The FAA Order 8260.3E includes the following guidance for the creation of the MSA area:

> **2-3-2. Minimum Safe Altitude (MSA).** Establish an MSA for all approach procedures, graphic obstacle departure procedures (ODPs), and standard instrument departures (SIDs) within a 25-NM radius of a specified point for use during emergency situations (see Figure 2-3-1).
>
> …
>
> b. Area.
>
> (1) Non-RNAV procedures. Center the MSA on the omni-directional facility upon which the procedure is based. When the distance from the facility to the airport exceeds 25 NM, extend the radius to include the airport landing surfaces up to a maximum distance of 30 NM. When the procedure does not use an omnidirectional facility (for example, an ILS or vector SID), use the primary omnidirectional facility in the area. If a graphic OPD or SID utilizes more than one omni-directional facility, use the facility nearest the airport. If no omni-directional NAVAID is located within 30 NM of the airport landing surfaces, then center the MSA on the airport reference point (ARP). Establish a common area (no sectors) around the facility or ARP. If necessary to offer relief from obstacles, sector divisions may be established for an MSA based on a facility. Sectors must not be less than 90 degrees in spread.
>
> (2) RNAV procedures. For RNAV straight-in approach procedures, establish a common safe altitude within the specified radius of the runway threshold (preferred) or the MAP waypoint (WP); for RNAV circling and RNAV departure procedures use the airport waypoint (APT WP).

These rules outline a different hierarchy for choosing the MSA center fix for non-RNAV procedures versus RNAV procedures:

#	Non-RNAV MSA Center
1	Omni-directional facility upon which the procedure is based
2	Omni-directional facility in the area; within 30NM of the airport landing surfaces
3	Airport reference point (ARP)

Table 1: MSA Center Hierarchy for Non-RNAV Procedures

MSA Center for Non-RNAV Procedures

#	RNAV MSA Center
1	Runway threshold
2	Missed approach point (MAP)
3	Airport reference point (ARP)

Table 2: MSA Center Hierarchy for RNAV Procedures

The RNAV rules are always picking a fix close to the procedure's airport, whereas as the non-RNAV procedure's MSA center can be up to 30 NM from the procedure's airport.

Also, choosing a good omni-directional facility for use as a MSA center that is close to the procedure's airport will only get more difficult as more VORs are shutdown as part of the FAA's VOR MOR program.

Example 1:

- KIXD, ILS or LOC RWY 36

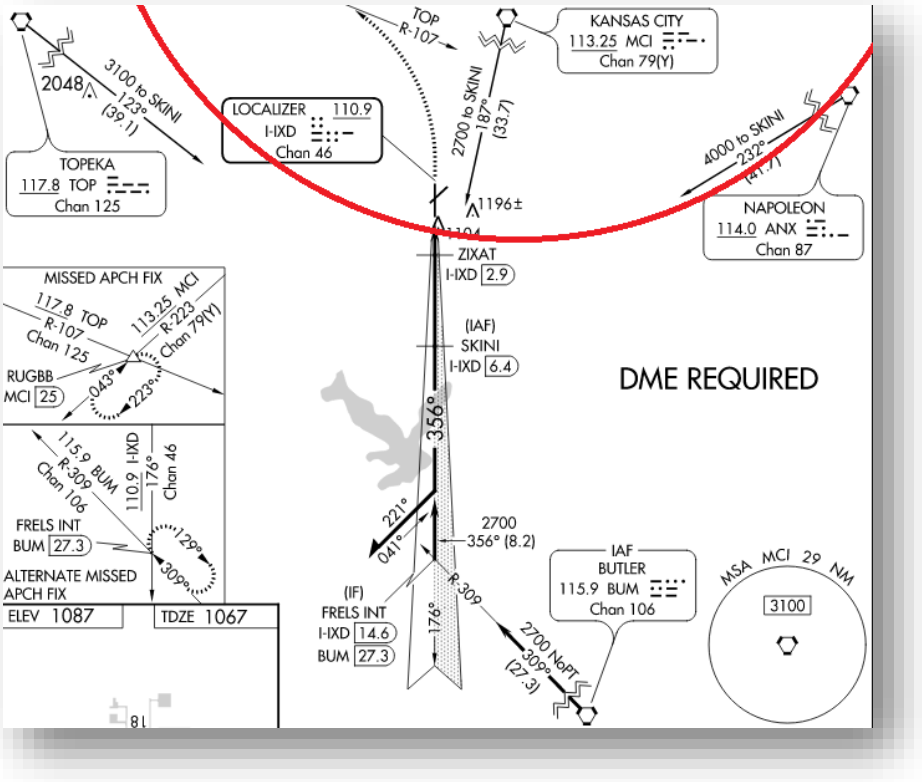

Figure 1: KIXD ILS or LOC RWY 36

The KIXD ILS or LOC RWY 36 approach's MSA is centered on the MCI VORTAC which is 28.2 NM to the northeast of the KIXD airport. What this means is that the 29 NM radius of the MSA, shown in the image as a red circle, only protects arrivals from the northeast. The MSA does not protect any parts of the final approach or arrivals from the south, east or west.

Example 2:

- KCBE, LOC/DME RWY 23

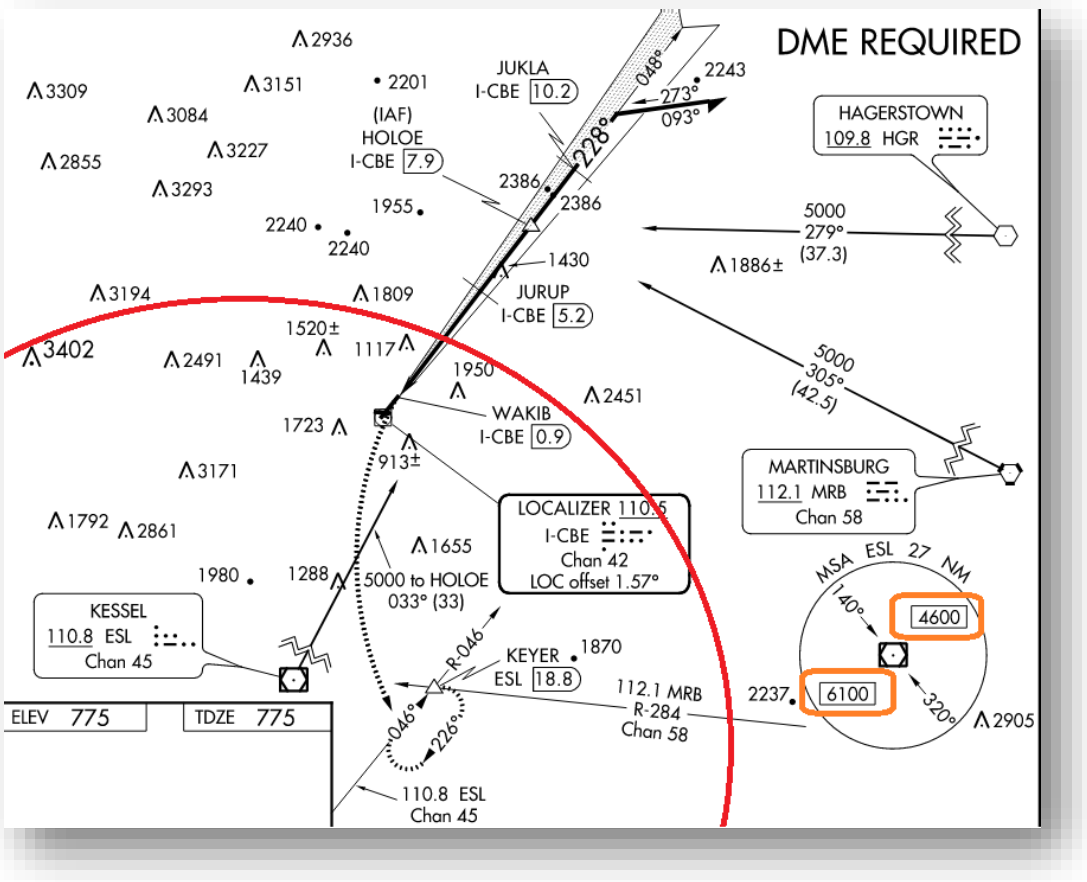

Figure 2: KCBE LOC/DME RWY 23

The KCBE LOC/DME RWY 23 approach's MSA is centered on the ESL VOR-DME which is 25.7 NM to the southwest of the KCBE airport. What this means is that the 27 NM radius of the MSA, shown in the image as a red circle, only protects the arrivals from the southwest. The MSA does not protect most of the final approach or arrivals from the north, east or west.

What stands out in this example is the terrain and obstacles in the KCBE area. The 25-NM radius around the ESL VOR-DME versus around the KCBE would get a different set of obstacles and terrain.

Figure 3: ESL VOR-DME 30NM Radius on Garmin GTN

Figure 4: KCBE 30NM Radius on Garmin GTN

This is highlighted when you compare the LOC/DME RWY 23's MSA values versus the RNAV (GPS) RWY 23's TAA values.

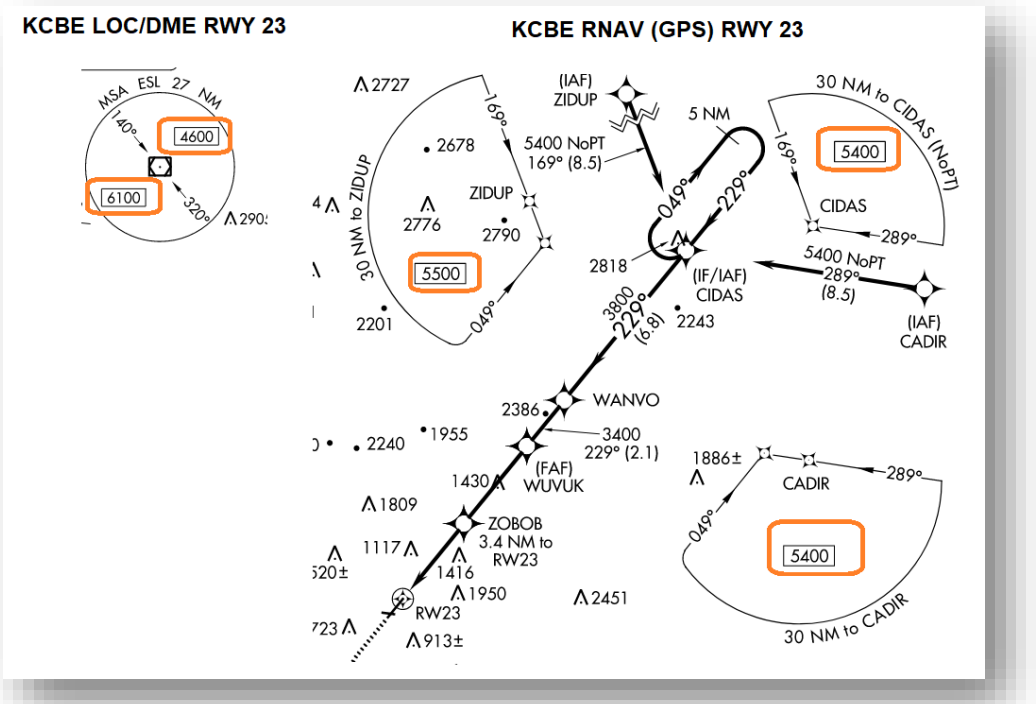

Figure 5: KCBE L23 MSA vs R23 TAA

So, how would the pilot know the safe IFR off-route altitudes to get to the KCBE LOC/DME RWY 23 procedure not covered by the MSA? They would have to look at the IFR Enroute L-23 chart:

Figure 6: ESL VOR/DME Radius vs KCBE Radius on L-23

Example 3:

- KOLV, ILS or LOC RWY 18

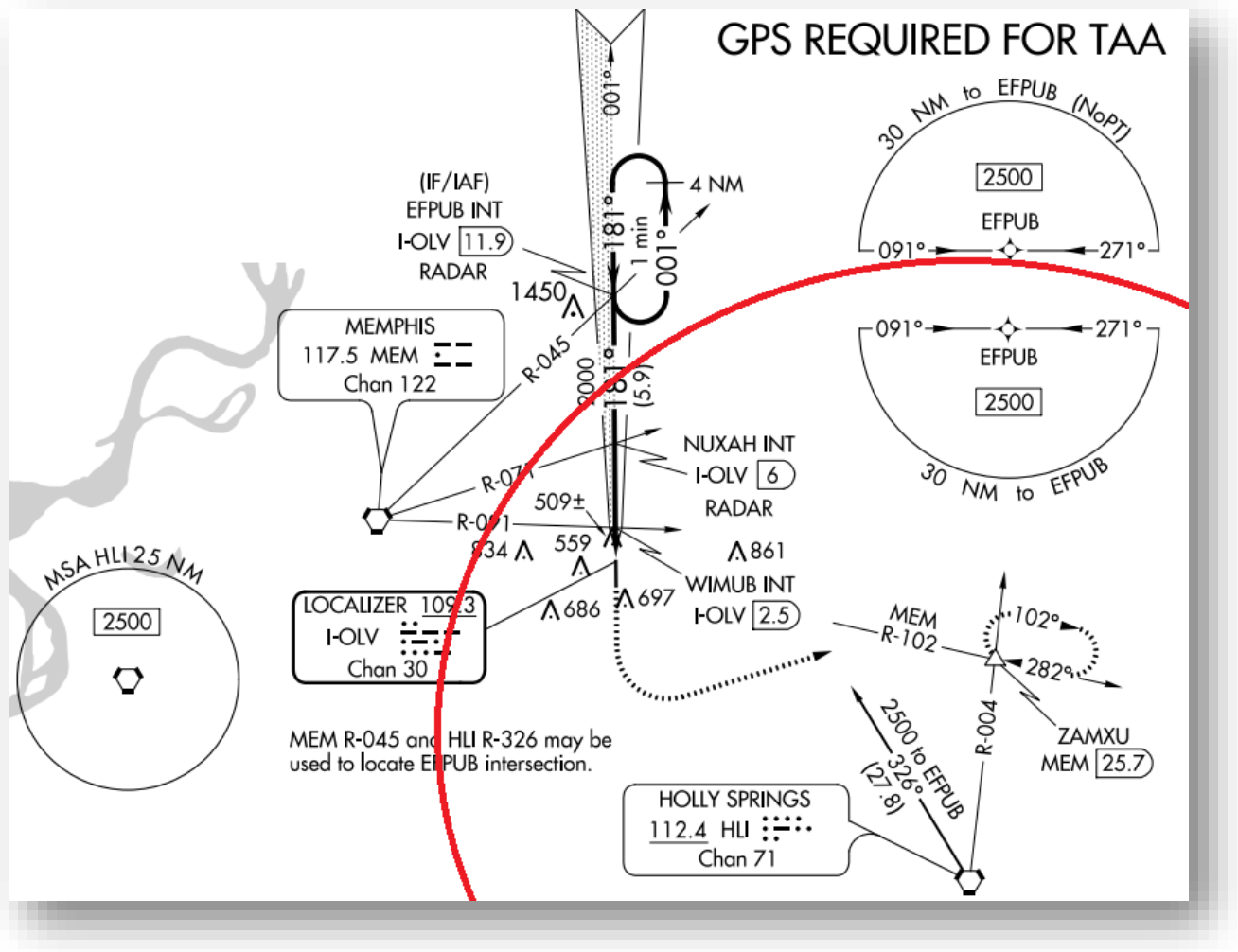

Figure 7: KCBE LOC/DME RWY 23

The KOLV ILS or LOC RWY 18 has a MSA and a TAA! The approach's MSA is centered on the HLI VORTAC which is 19 NM to the southeast of the KOLV airport and the TAA is centered on the EFPUB INT. The 25 NM radius of the MSA, shown in the image as a red circle, protects the arrivals from the southeast. The TAA would be needed for the rest of the arrivals but according to the plan-view note would require GPS equipment: "GPS REQUIRED FOR TAA".

Recommendations:

Garmin would like to see the procedure design requirements for choosing an MSA center for non-RNAV procedures be amended to pick a location that is close to the airport reference point (ARP). Ideally, the majority of the non-RNAV procedures would use the ARP unless there is VOR/NDB very near the airport.

MSA Center for Non-RNAV Procedures

One option is to modify the 8260.3E to always use the airport reference point for conventional procedures not based on an omni-directional facility.

(1) Non-RNAV procedures. Center the MSA on the omni-directional facility upon which the procedure is based. When the distance from the facility to the airport exceeds 25 NM, extend the radius to include the airport landing surfaces up to a maximum distance of 30 NM. When the procedure does not use an omnidirectional facility (for example, an ILS or vector SID), then center the MSA on the airport reference point (ARP). If a graphic OPD or SID utilizes more than one omni-directional facility, use the facility nearest the airport. If no omni-directional NAVAID is located within 30 NM of the airport landing surfaces, then center the MSA on the airport reference point (ARP). Establish a common area (no sectors) around the facility or ARP. If necessary to offer relief from obstacles, sector divisions may be established for an MSA based on a facility. Sectors must not be less than 90 degrees in spread.

Another option is to reduce the distance from between the omni-directional facility and the ARP.

(1) Non-RNAV procedures. Center the MSA on the omni-directional facility upon which the procedure is based. When the distance from the facility to the airport exceeds 25 NM, extend the radius to include the airport landing surfaces up to a maximum distance of 30 NM. When the procedure does not use an omnidirectional facility (for example, an ILS or vector SID), use the primary omnidirectional facility in the area. If a graphic OPD or SID utilizes more than one omni-directional facility, use the facility nearest the airport. If no omni-directional NAVAID is located within 10 NM of the airport landing surfaces, then center the MSA on the airport reference point (ARP). Establish a common area (no sectors) around the facility or ARP. If necessary to offer relief from obstacles, sector divisions may be established for an MSA based on a facility. Sectors must not be less than 90 degrees in spread.

Benefits of using the ARP as the MSA center for most procedures:

- The final approach of the approach would be covered by the MSA
- One place to look for the safe IFR off-route altitude to navigate to the procedure's airport without having to cross reference the IFR enroute charts
- Hopefully reduce the need for more procedures to have a MSA & TAA on the same chart
- Reduce the possibility of an incident caused by a pilot not understanding how far away the MSA center is from the airport, and thinking they are safe to descend in an area not covered by the MSA area.

Comments:

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