

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](#)

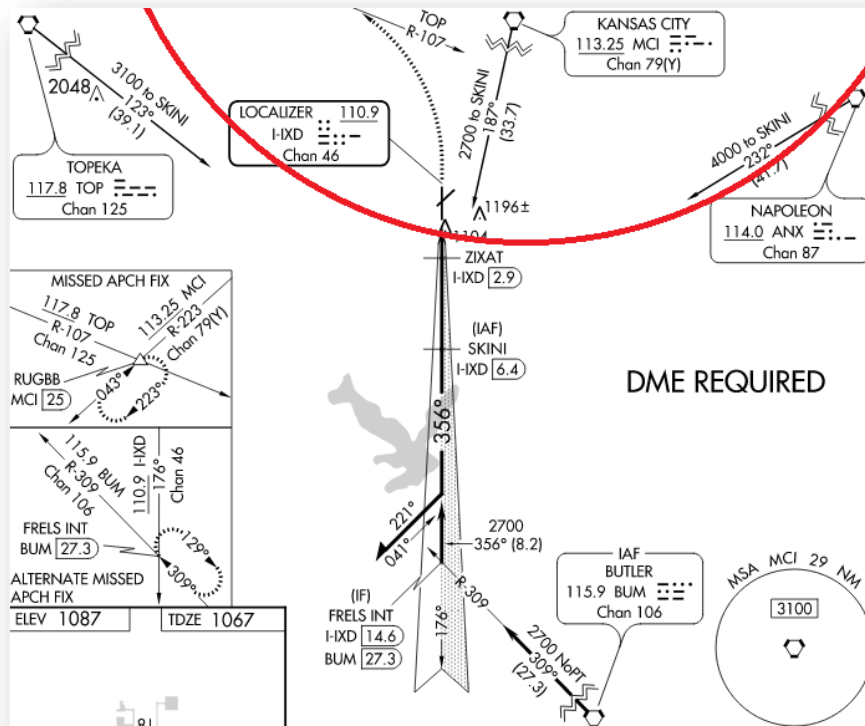


Figure 1: KIXD ILS or LOC RWY 36

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.

MSA Center for Non-RNAV Procedures

Example 2:

- [KCBE, LOC/DME RWY 23](#)

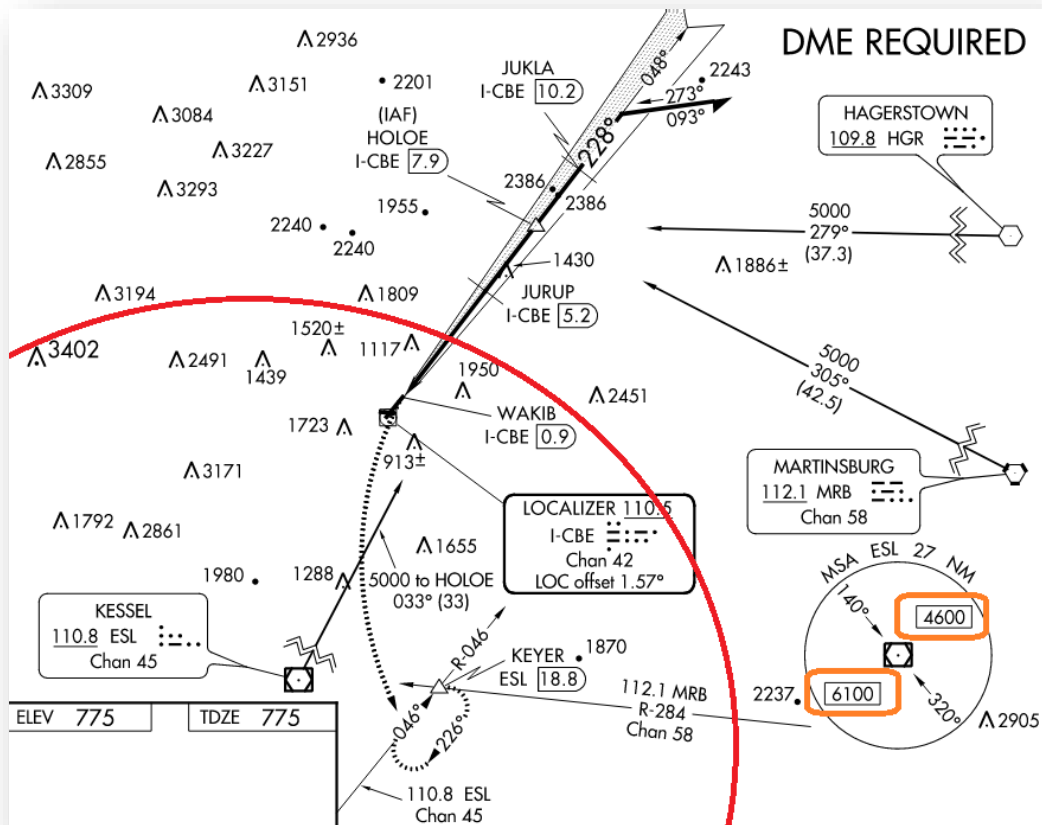


Figure 2: KCBE LOC/DME RWY 23

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.

MSA Center for Non-RNAV Procedures



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



Figure 4: KCBE 30NM Radius on Garmin GTN

MSA Center for Non-RNAV Procedures

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

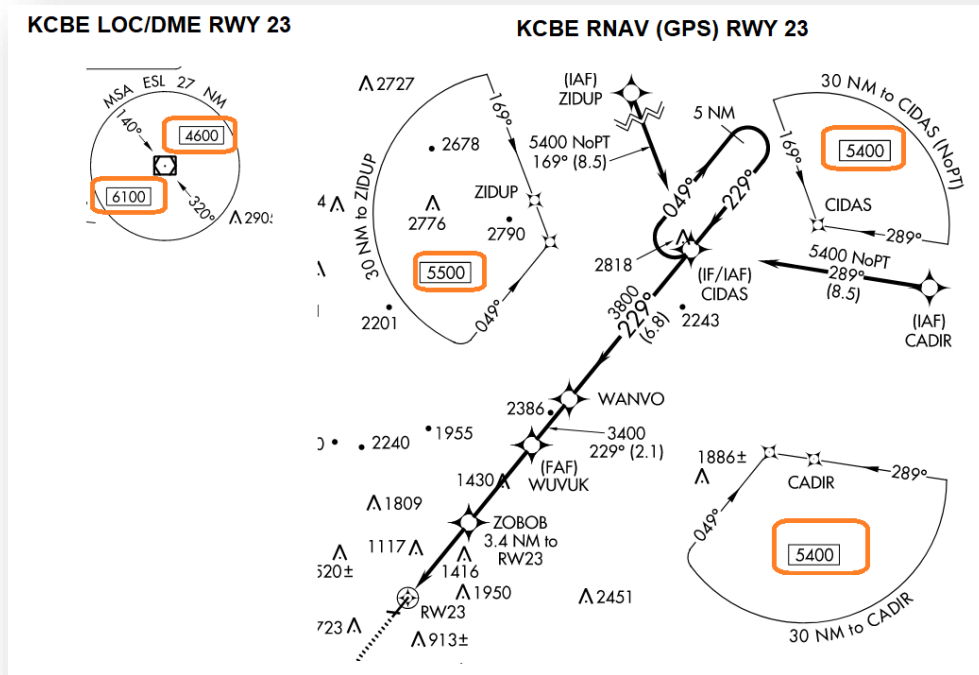


Figure 5: KCBE L23 MSA vs R23 TAA

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

MSA Center for Non-RNAV Procedures

Example 3:

- [KOLV, ILS or LOC RWY 18](#)

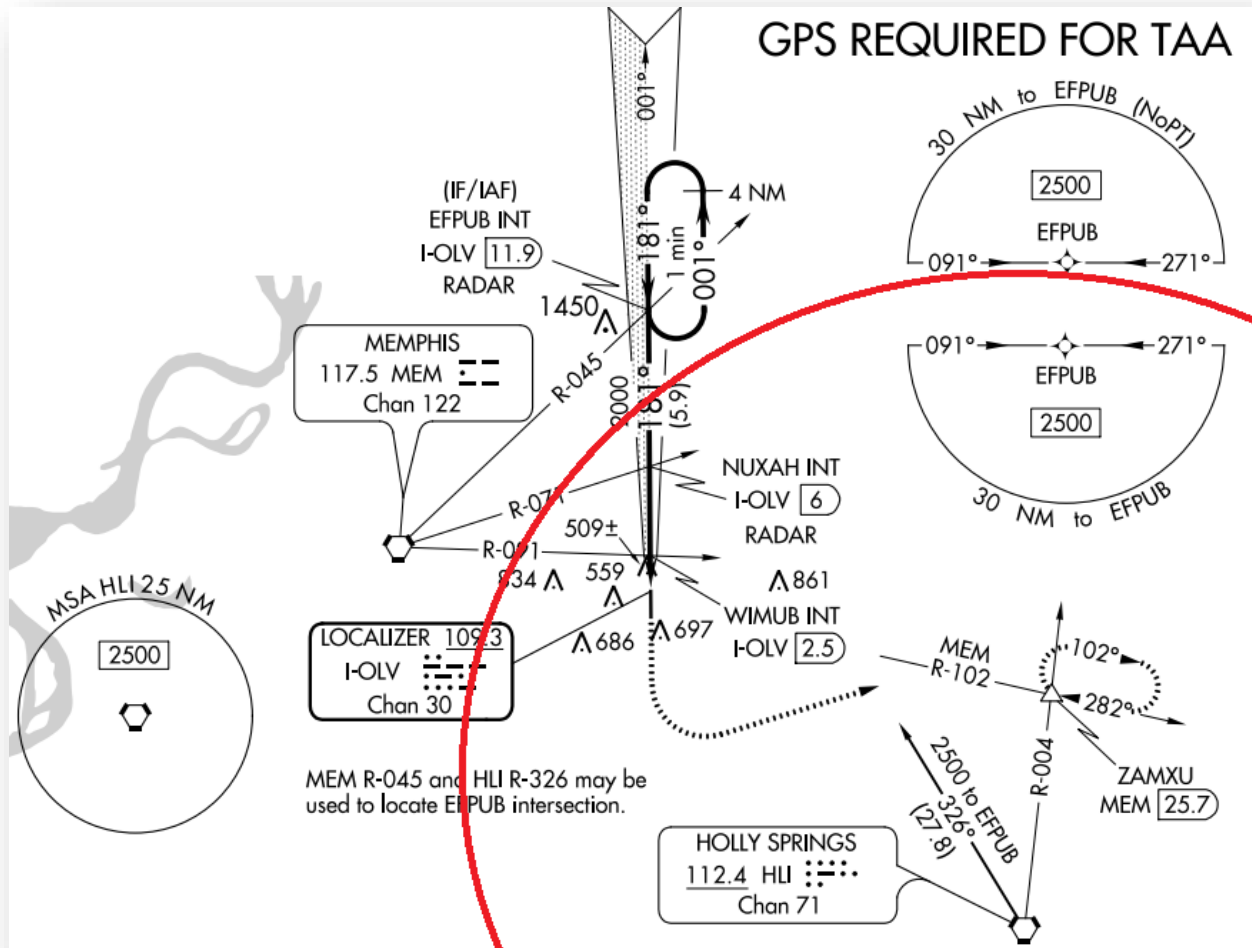


Figure 7: KCBF LOC/DME RWY 23

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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Date: 3/3/2022

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Initial Meeting 22-01: Joshua Fenwick, Garmin, briefed the item from the RD ([slide](#)). As more VORs are decommissioned, we are seeing more MSAs moving away from the airport centers, and they are not overlying the entire approach area. Joshua displayed examples from his RD, showing non-RNAV procedure MSA centers can be up to 30 NM from the procedure airport by Order 8260.3 criteria, whereas RNAV procedures are typically centered on the runway threshold associated with the approach. Since the rest of the world uses the airport ARP to center MSAs, Garmin suggests using the ARP if no suitable NAVAID is near the airport. Dan Wacker, FAA Flight Procedures and Airspace Group (FPAG), explained the background of the MSA criteria. The MSA was never intended to aid pilot descent on the approach, since they operate at en route altitudes until the approach IAF or the MVA if ATC is vectoring the aircraft. The MSA is provided for emergency use, so if the pilot has an emergency while on the approach, they have a safe altitude to climb to. Dan said it has been this way for years and feels pilots understand it is based on the procedure and not the airport. Dan said the FAA has looked at changing the MSA center to the ARP like Garmin suggests, with only one per airport and possibly allowing sectorization. Dan added this is not considered a high priority, and would likely be a day-forward change, though that could take several years to fully accomplish. Dan said on the specific example shown, the TAA was not added because of the MSA location, but because they were added on hybrid procedures for RNAV to the ILS. Mike Stromberg, Independent Pilots Association (IPA)/UPS, said the MSA should overlie the entire procedure area in case of an emergency, if that is the intent of the MSA. UPS has tailored charts depicting the MSAs. Dan restated the MSAs are not built to cover the entire procedure path, but only for a safe altitude within 25 NM of the NAVAID. Rich Boll, NBAA, said the MSA is used for other types of procedures, including departures, and asked if a localizer could be used. Jeff Rawdon, FPAG, advised it could not, since criteria requires an omni-directional facility. Rich thinks the MSA should be moved to the ARP. Dan added if there is no NAVAID within 30 NM of the airport current criteria allows the MSA to be centered on the ARP which was a criteria change due to the VOR MON project. John Barry, FAA Aircraft Certification, said maybe ESAs could be used instead of MSAs. Most of the participants felt moving the MSA to the ARP would benefit the pilots. Joshua said this is being done worldwide, so we should look at ICAO procedures and definitions. Jeff said this will go to the ACM Recommendation Review Group for discussion.

Action: This item will be reviewed by the ACM Recommendation Review Group to determine any action and that outcome will be provided at ACM 22-02.

Status: Item open.

Meeting 22-02: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the item from the RD ([slide](#)). The ACM Recommendation Review Group (ARRG) reviewed the issue and decided this should not be work for the Agency to take on since criteria is already in place to provide the FPT the option of using the airport reference point (ARP) on conventional procedures for the MSA center. Valerie Watson, FAA Charting Products Integration Team (AJV-A250), asked how a non-RNAV equipped aircraft would determine the ARP, and Jeff pointed out the pilot should have a situational awareness of their relation to the airport. Joshua Fenwick, Garmin, referenced Table 1 from the RD – their proposals for non-RNAV MSA center

locations – and thinks hierarchal option #2 (an omni-directional facility within 30 NM of the landing surfaces) should be removed. Mike Stromberg, Independent Pilots Association (IPA)/UPS, suggested reordering options #2 & #3 (ARP) in Table 1. Dan Wacker, FPAG, advised the MSA issue had been discussed previously and there was a previous ACM item to remove the MSA to rely on OROCA usage. Michael said if there was only one MSA per airport it should be the ARP. Dan concurred, adding this will be a future effort since he has not seen a safety case on this. Joshua added the OROCA is not on the approach charts and necessitating a pilot reference between charts before beginning the approach procedure could be a safety concern. The ICAO standard is to use the center of the airport. Joshua feels this is a safety issue, and the VOR MON project makes the need greater. Garmin does like the idea of only one MSA per airport. Dan explained with other scheduling priorities for work this may not be considered until 2027. Based on the discussion, Jeff suggested leaving the issue open at this time. Jeff will bring this discussion back to the ARRG for additional consideration.

Action: The ARRG will reconsider the possibility of work on this issue and the outcome of that discussion will be briefed at ACM 23-01.

Status: Item open

Meeting 23-01: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the summary, actions, and status from the [slide](#). This issue was addressed again by the ACM Recommendation Review Group (ARRG) based on input from ACM 22-02. The ARRG decided this issue should be addressed, but it has not yet been addressed due to higher priority work.

Actions: FPAG will continue to work on possible solutions for this issue.

Status: Item open

Meeting 23-02: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed from the [slide](#).

Dan Wacker, FPAG, briefed from a [slide](#) presentation and would like feedback on a proposal to change non-sectorized MSAs from a graphic depiction to text identifying the MSA center and minimum altitude. PJ Gonzalez, Jacobs, thinks the current MSA depiction would be it is easier to identify on the chart, especially in an emergency. Krystal Kime, FAA Aeronautical Information Services Terminal Charting, says replacing the graphic depiction with text would take less plan view space, but feels a standardized location would need to be identified.

Joshua Fenwick, Garmin, said this issue was not in the original RD and stressed that the RD was focused on procedures that weren't fully encompassed by MSAs with a center point far from the procedure. Garmin requests the airport reference point (ARP) to be used as the MSA center for non-RNAV procedures when a NAVAID is not near the airport. Dan said this is already allowed in criteria and the decision for the MSA center to be used is made in the design process. Dan said

for the last five years the effort has been to switch to using ARP with all procedures at an airport using the same MSA. Joshua said full implementation of that proposal should satisfy the issue.

Michael Stromberg, Independent Pilots Association (IPA)/UPS, discussed the broad distance covered by an approach and agreed that using the ARP would be advantageous, especially with VOR MON. Michael also voiced support for retaining the graphic MSA depiction in all cases. Pat Mulqueen, FAA Instrument Flight Procedures Group (AJV-400), thinks the criteria could be simplified to use the NAVAID when located on the airport, and use the ARP otherwise.

Dan advised the issue is being worked within the Departure Working Group.

Actions: FPAG will continue to work on possible solutions for this issue.

Status: Item open

Meeting 24-01: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed from the [slide](#). Proposed criteria is being evaluated by FPAG, but resolution will come after higher priority work already scheduled.

Jeff explained that this issue would be moved to action pending status since work on possible criteria changes will come behind higher priority work already scheduled, and any updates will be briefed at later meetings.

Status: Moved to action pending status

Meeting 24-02: No new activity, item not briefed.

Status: Remains in action pending status

Meeting 25-02: Rune Duke, FAA Flight Procedures and Airspace Group (FPAG), briefed from a [slide](#). Planned directives changes are being identified but must be scheduled for order revisions. Scheduling is expected in 2027.

Action: FPAG to provide update on planned directive changes and schedule for any order revisions.

Status: This item will remain in Action Pending.

Meeting 26-01: Rune Duke, FAA Flight Procedures and Airspace Group (FPAG), briefed from a [slide](#). Planned directives changes are being identified but must be scheduled for order revisions. Scheduling is expected in 2027. There is no change in status from what was briefed at previous IPG.

Action: FPAG to provide update on planned directive changes and schedule for any order revisions.

Status: This item will remain in Action Pending.

Meeting 26-02: Rune Duke, FAA Flight Procedures and Airspace Group (FPAG), briefed from a [slide](#). Planned directives changes are being identified but must be scheduled for order revisions. Scheduling is expected in 2027. There is no change in status from what was briefed at previous IPG.

Action: FPAG to provide update on planned directive changes and schedule for any order revisions.

Status: This item will remain in Action Pending.