

**AERONAUTICAL CHARTING FORUM**  
**Charting Group**  
**Meeting 15-02 – October 28 - 29, 2015**

**RECOMMENDATION DOCUMENT**

**FAA Control # ACF-CG RD 15-02-298**

**Subject: Charting GLS DMax (Service Volume)**

**Background/Discussion:**

GLS ground stations have varying service volumes based on installation and siting. Because ATC can expect a pilot to join the final approach course (FAC) out past the service volume, pilots must use LNAV and VNAV to fly the procedure until inside the service volume. Afterwards, the APP mode should be used to complete the approach. Without charting DMax pilots have no reasonable way to know whether they need to use LNAV or APP to join the FAC nor do they have a reasonable way to know when to abandon the approach (if satellite coverage does not support the approach) until they reach the FAF.

**Recommendations:**

Chart DMax either in the profile or plan view or both.

**Comments:**

**Submitted by:** Ron Renk  
**Organization:** United Airlines  
**Phone:** 281-553-6573  
**E-mail:** ron.renk@united.com  
**Date:** 10-2-15

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**MEETING 15-02**

Ron Renk, United Airlines, [briefed the issue](#). Ron first described to the audience the process of how a GLS approach is flown at Houston. Ron stated that United has flown over 3,000 GLS approaches and an unanticipated issue has surfaced. ATC can expect a pilot to join the final approach course (FAC) outside the service volume of the GLS ground station. Beyond the scope of the GLS signal, pilots must use LNAV/VNAV to fly the procedure. Once within the service volume of the GLS signal, they can use the Approach (APP) mode to complete the approach. Since pilots don't know the service volume limit, they have no way to know if they should use LNAV or APP mode to join the FAC. Ron recommends that the GLS service volume limit, or DMax, be charted on GLS procedures.

Catherine Graham, AFS-470, stated that the GLS service volume is sourced on the airport detail sheet that is used by the procedure designer. She stated that it is documented as a distance

from the antenna. Ron said that it would need to be converted to a distance from threshold for charting.

Ron proposed a couple of ideas on how the service volume could be provided to pilots on the charts. His first idea was to provide a feather-like representation (like a localizer) that would go out as far as the service volume for a given approach. His second idea was to add an arc at the point along the FAC at the service volume limit.

Discussion continued regarding different depiction ideas for showing the DMax limit. Suggestions included showing it as a note, or as a line or symbol across the FAC. The preference seemed to be indicate the DMax limit as a note.

Brad Rush, AJV-54, suggested the establishment of a waypoint on the FAC at or just inside the DMax limit. The point would include an indicator of (DMax) with the waypoint name. This point would be indicated for charting on the Form 8260-3 to support charting and database coding. There was consensus of support for this suggestion. The audience agreed both that the GLS service volume should be depicted on the charts and that establishment of a labeled waypoint on the planview would be a clear method to show it.

Valerie Watson, AJV-553, agreed to create prototype charts for the next ACF for the depiction of a waypoint located at the service volume limit (or just inside) accompanied by text indicating "(DMax)". Catherine said that she would work on determining the correct DMax fix placement and coordinate with Tom Schneider on changes that would be necessary in FAA Order 8260.19.

#### **STATUS: OPEN**

**ACTION:** Valerie Watson, AJV-553, to develop prototypes for the depiction of a DMax waypoint on GLS procedures for consideration at next ACF.

**ACTION:** Catherine Graham, AFS-470, and Tom Schneider, AFS-420, to work on FAA Order 8260.19 revisions to support establishment of a DMax waypoint on GLS procedures.

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#### **MEETING 16-01**

Valerie Watson, FAA/AJV-553, reviewed the issue and [showed a prototype](#) approach chart depicting the identification of DMax. There was ACF consensus in support of the chart depiction.

Tom Schneider, FAA/AFS-420, [showed the language](#) that he has drafted for FAA Order 8260.19H. This language received support and Tom will move to finalize it.

Tony Lawson, FAA/AJV-5441, asked if DMax is documented in the AirNav database and asked how a procedure specialist will know where the antenna is located on the airport. Catherine Graham, FAA/AFS-470, confirmed that the DMax information is reported on the Airport Datasheet that can be pulled from AirNav.

#### **STATUS: OPEN**

**ACTION:** Valerie Watson, FAA/AJV-553, to draft an IACC Requirement Document for charting of DMax on IAPs.

**ACTION:** Tom Schneider, FAA/AFS-420, to proceed with ACF-supported draft FAA Order 8260.19 language to support procedure documentation for DMax publication.

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## **MEETING 16-02**

Valerie Watson, FAA/AJV-553 reviewed the topic. She stated that the IACC Requirement Document (RD 769) written in accordance with ACF 16-01 consensus, was submitted for coordination, but was placed on hold by request of AFS-400.

Tom Schneider, FAA/AFS-420, stated that AFS-400 has devised a [counter proposal](#). He said that rather than specifying a "(DMAX)" point on the procedure source document and the chart, Flight Standards would prefer to revise the GLS design criteria so that the Intermediate Fix (IF) is always located within the service volume area of the GLS signal. If the IF is always located within the service volume, there would be no need to depict the DMax location. He presented the revision to Draft Order 8260.58A supporting this counter proposal.

Mike Cipriano, United Airlines, was in attendance representing Ron Renk, United Airlines, original proponent of this issue. Mike commented that in some cases, the IF could be as close as 7 nautical miles from the runway and that does not give the pilot sufficient time to switch to approach mode. He also pointed out that a user could be well within the service volume of the GLS when being radar vectored and not be aware of it. Several pilots voiced this same concern. Tony Lawson, FAA/AJV-542, said that from a procedure design standpoint, it may not always be possible to design a procedure so that the IF is within the Service Volume of the GLS.

Although there was agreement from the majority of the ACF audience that it would be preferable to simply identify the DMax point on the chart, as per the original proposal and the consensus of the ACF 16-01 audience, representatives from AFS-470 did not agree.

Because the original proponent, Ron Renk, was not in attendance, and because AFS-470's counter proposal did not receive the support of the audience, no decision was made. Representatives from AFS-470 will connect with Ron and this issue will be discussed again at the next ACF before any decisions will be made.

## **STATUS: OPEN**

**ACTION:** FAA/AFS-470 will arrange to discuss the counter proposal with Ron Renk, United Airlines, and report back at the next ACF.

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## **MEETING 17-01**

Meeting was cancelled.

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**MEETING 17-02**

Valerie Watson, FAA/AJV-553, reviewed the issue and the request supported by the ACF to designate the first fix along the final approach course extended within the service volume of the GLS signal with a [“\(DMAX\)” annotation](#), allowing the user to know when he can switch to approach mode. Joel Dickenson, FAA/AFS-470, reported that since the last ACF, AFS-470 had made a counter decision to resolve this issue by adding the service volume for the GLS to the Chart Supplement airport entry. He [showed the entry](#) that had been published for Houston in the Chart Supplement.

Ron Renk, United Airlines, responded to Joel’s proposed solution stating that it does not meet the intent of his original request. Ron said that pilots don’t have the Chart Supplement with them in the cockpit. He also emphasized that more GLS airports are coming online, so the problems pilots are experiencing are going to spread. He reiterated that pilots would like to see a clear graphic indication on the planview of the approach chart.

Michael Stromberg, UPS, echoed Ron’s comments, emphasizing that the service volume needs to be where the pilots can find the information easily. Lev Prichard, APA, expressed his full support of the original charting solution. Gary McMullen, Southwest Airlines, agreed and stated the he also supports the original “(DMAX)” charting solution.

Dale Courtney, FAA/AJW-292, commented that there are technical changes going on that will make GLS act more like an ILS. Joel echoed that and stated that AFS-420 wants GLS to be like ILS in that they both have a standard service volume (SSV) and that pilots can be taught that standard. He would prefer not to teach new symbology that only exists at a few locations and that may only be necessary temporarily. Michael Stromberg disagreed with that and stated that it is not easy to look at the chart and know where that point is even if you know what the SSV is. A pilot would have to manually add up the distances on the chart to determine if he was within signal coverage.

Valerie stated that, based on the strong support from the pilot audience for the charting solution, she would like to move forward with the original proposal to chart “(DMAX)”. She indicated that if and when a better solution is found, that solution could be pursued. She asked for a show of hands for those still in support of the charting solution. The following pilots indicated support:

Rich Boll	NBAA	Ron Renk	UAL
Lev Prichard	APA	Michael Stromberg	UPS
Christopher Collins	Delta Air Lines	John Collins	GA/Foreflight
Gary McMullen	Southwest Airlines	Chris Neidhardt	Southwest Airlines
Gerry O’Sullivan	ALPA Safety	John Schmitz	Delta Air Lines
Charles Wade	Delta Air Lines	Brian Townsend	American Airlines
Steve Woodbury	Flight Safety Int’l	Chris Zimmerman	UPS
Ethan Quastler	Southwest Airlines		

John Bordy, FAA/AFS-420, suggested that he and Joel take the sentiments of the ACF pilot audience to their management to continue to try to find a workable solution. Joel agreed and

stated that he would continue the discussion offline with those in the audience with specific concerns.

**STATUS: OPEN**

**ACTION:** John Bordy, FAA/AFS-420, and Joel Dickenson, FAA/AFS-470, will take the ACF pilot consensus to their management to continue to try to find a workable solution.

**ACTION:** Joel Dickenson, FAA/AFS-470, will continue to work with the proponent and others invested in this issue to address their concerns.

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**MEETING 18-01**

Joel Dickenson, FAA/AFS-470, reviewed the issue and provided an update on developments since the last meeting. Joel reported that there has been a change in the use of the term DMAX and that it no longer refers to the service volume of the GLS. As a result, the proposed charting solution of using a fix at the service volume limit with the label (DMAX) is no longer appropriate. He is now working to find another charting solution to depict the extent of the service volume.

He suggested the use of a localizer fan symbol that extends to the service volume limit. Valerie Watson, FAA/AJV-553, stated that it is a common misconception that the localizer fan symbols depicted on Instrument Approach Procedures (IAPs) are an indication of the service volume for the ILS. She said that is not the case, never has been and referenced guidance published in the [FAA Chart User's Guide](#). Ted Thompson, Jeppesen, agreed with Valerie and said that it is important not to use a symbol that can mean two different things. He suggested that a line, label or fix be used to indicate the service volume and stressed that the indicator of the limit needs to be documented on the procedure source form.

Joel agreed that a visual indication of the service volume limit for GLS is needed and he committed to working on a proposal for graphic depiction on the charts and to determine how it should be documented on the procedure source form.

**STATUS: OPEN**

**ACTION:** Joel Dickenson, FAA/AFS-470, will continue to work with the proponent and others to come up with a graphical depiction of the GLS service volume limit and how to document it on the procedure source form.

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**MEETING 18-02**

Joel Dickinson, FAA/AFS-470, reviewed the issue and [presented an update](#). He said that he has been working closely with United Airlines, the original proponent of this item, to come up with a solution to make pilots aware of the service volume limit on GLS approaches. He reported that the FAA is working to establish a standard approach service volume (ASV) for GLS approaches. He said that he is working to have the new standardized GLS ASV published in the next edition of the Aeronautical Information Manual (AIM) and Instrument Procedures Handbook (IPH).

Michael Stromberg, UPS, questioned artificially limiting the ASV in order to make it standard for the purposes of avoiding a charted DMAX and expressed frustration at how this potential decision will hamper procedure design. He stated that the GLS service volume usually extends out from the sensor in all directions, not merely the “cone” Joel has described, and that it often extends to much greater distances than what the proposed standard service volume is defined to be. He explained that ILS’s are based on a directional antenna array, with considerable signal reflection/deflection challenges and as such we have a defined directional service volume. The GLS service volume is technically defined by a distance from the broadcasting ground antenna that does not rely on reflection/deflection. To create a smaller runway specific service volume based on an unrelated technology will mislead people how the technology works. In addition it could be limiting in creating approaches where a small part of the proposed GBAS enabled approach may be located outside the actual service volume. This would lead to having a waiver where none is needed, or the possibility of an approach not being created. Possible examples of where this could happen would be a large airport with the antenna not centrally located on the field, a location where the standard service volume would have to be reduced due to poor reception resulting from a particular, perhaps terrain, blocked range of azimuths, or when a nearby airport wants to create an approach off of an existing antenna at a closely located airport. All of this could be avoided by defining the service volume as the certified distance from the antenna.

Joel said that his office has followed ICAO guidance for the ASV and that the FAA already has a mechanism in place to extend the service volume if necessary, but he recognizes that this still needs attention with regard to GLS approaches. John Barry, FAA/AIR-6B1, offered to take the issue of expanding the GLS service volume to the RTCA GBAS working group for discussion.

Joel presented several options for depicting the GLS ASV on the Instrument Approach Procedure Charts ([See slides 9-15](#)). He also presented the option of no charting depiction because the ASV will be standardized and published in the pilot guidance.

Ron Baker, United Airlines, [made a presentation](#) in support of United Airlines original request to show the service volume limit on GLS signal on approach charts. He added that United would also like to see ILS Localizer service volumes accurately indicated on approach charts. Valerie Watson, FAA/AJV-553, stated that this specific discussion needs to be limited to the GLS issue and a proposal related to the depiction of localizer service volumes would have to be brought to the ACM as a new recommendation. Ron agreed.

Valerie asked the audience if they agreed with Ron that it is necessary to have a charted indication of GLS ASV along the final approach course. There was audience agreement. After considerable discussion regarding the various suggested depictions, Valerie asked that the audience reconsider Ron Renk’s [original charting solution](#) of labeling the first fix on the Final Approach Course (FAC) or the extended FAC inside of the lateral extent of the GLS signal with “(DMAX)” text designation. Since the term (DMAX) is no longer appropriate, it was suggested to use (GLS) instead. There was audience consensus for this solution. Valerie stated that if that is how it will be charted, she agreed that the definition of what that point means on the chart will need to be clearly explained in the chart legend, e.g., the first point on the FAC or extended FAC where the pilot can intercept lateral GLS guidance. Valerie stated that pilot instruction, such as “switch to approach mode” would NOT be appropriate – the FAA chart will show where the lateral guidance is available, but not what action the pilot is to take.

Valerie then asked John Bordy, FAA/AFS-420, if he could pursue FAA Order 8260.19 changes to support documentation of the (GLS) fix designation on GLS procedure source forms. He agreed.

Joel said that he would take the ACM consensus back to his management. He also said he would look into taking the issue to the U.S. Instrument Flight Procedures Panel (US-IFPP). John Bordy also said he would take the recommendation back to his management for discussion and potential support in FAA Order 8260.19 so that the “(GLS)” designation is properly documented on the procedure source documents assigned (and then charted) to the correct fix.

**STATUS: OPEN**

**ACTION:** Joel Dickinson, FAA/AFS-470, and John Bordy, FAA/AFS-420, will take the ACM consensus for the charting of the GLS Approach Service Volume on Instrument Approach Procedure charts to the US-IFPP.

**ACTION:** John Bordy, FAA/AFS-420, will pursue 8260.19 revision to support “(GLS)” fix designation.

**ACTION:** Valerie Watson, FAA/AJV-553, to draft an Interagency Air Committee (IAC) Specification change for charting of the GLS Approach Service Volume on Instrument Approach Procedure charts.

**ACTION:** John Barry, FAA/AIR-6B1, will take the issue of expanding the GLS service volume to the RTCA GBAS working group.

**MEETING 19-01**

Valerie Watson, FAA/AJV-A250, briefed the issue. She reviewed that at the last ACM, Joel Dickinson, FAA/AFS-410, presented several charting options for depiction of the GLS approach service volume (ASV) on Instrument Approach Procedure (IAP) charts. At that time, Joel also presented the option of “no charted depiction” because he asserted that the ASV will be standardized and published in pilot guidance. There was audience agreement at the last meeting in support of a charted indication of the GLS ASV using the text “(GLS)” at the first fix on the final approach course (or final approach course extended) where lateral guidance is provided by the GLS signal. Based on this agreement, Joel accepted an action from last meeting to take the ACM-supported charting depiction to the U.S. Instrument Flight Procedures Panel (US-IFPP) for discussion.

At the current meeting, Joel reported that he continues to believe that a charting solution is unnecessary because the standard ASV guidance has now been published in the Aeronautical Information Manual (AIM). Valerie pointed out that of the few currently published GLS procedures, the service volume is *not* standard in all cases and that is the reason pilots wish to know the specific service volume on each procedure. She stated that knowing the “standard” does not help pilots with the non-standard examples.

Michael Stromberg, UPS, commented that GLS ASV as described in the AIM mimics ILS service volume in that it only extends in a single direction, in a cone like configuration. Michael stated GLS service volume in reality projects a distance from the antenna in *all* directions and would better be described in a circular extension. Michael disagrees that the AIM language is sufficient.

Joel stated that there is international agreement on an established ASV for GLS systems. He said that for today, GLS systems are using straight-in criteria. If this is expanded in the future, the explanatory guidance will be revised accordingly.

Valerie asked if it is the Flight Operations Branch position that they will not support a graphic depiction on GLS procedures to indicate the first fix on the final approach course (or final approach course extended) from which lateral guidance from the GLS antenna can be received. She stated that the indication cannot be charted if Flight Standards does support it. Joel stated that Flight Standards will not support a charting solution based on his assertion that the February 2019 update to the AIM guidance is sufficient.

As Joel maintains that his office will not support this proposal, Valerie stated the issue should be closed as a charting solution cannot be obtained without Flight Standards' support. She stated that she will first reach out to Ron Renk, United Airlines, the original proponent of this RD, to update him on the discussions and ask for his concurrence to close.

**STATUS: OPEN**

**ACTION:** Valerie Watson, FAA/AJV-A250, will reach out to Ron Renk, United Airlines, to discuss the response received from FAA/AFS-410.

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**MEETING 19-02**

Samer Massarueh, FAA/AJV-A221, reviewed the history of this issue. Valerie Watson, FAA/AJV-A250, stated that at the last meeting it was determined that the Flight Operations Group will not support a graphic depiction on GLS procedures to indicate the first fix on the final approach course from which lateral guidance from the GLS antenna can be received. That office's position is that graphic depiction is unnecessary because the standard approach service volume (ASV) guidance has been published in the Aeronautical Information Manual (AIM).

Ron Renk, United Airlines, the original proponent of the Recommendation Document (RD), stated that he does not agree with the position that the guidance in the AIM is sufficient and he does not agree to close this item. He also said he plans to submit a new RD at the next meeting to propose a charted indication of service volume on all precision approaches.

Valerie stated that this discussion needs to be limited to the GLS issue and a proposal related to other service volume depictions would have to be discussed as part of a new recommendation.

Joel Dickinson, FAA/AFS-410, restated that, at this time, the Flight Operations Group is not in support of charting GLS ASV and again recommended closure. He also stated that the Flight Operations Group is considering the need for a charted indication for when there is a required NAVAID change. He will report on developments of those discussions at the next meeting, which may or may not impact GLS approaches.

**STATUS: OPEN**

**ACTION:** Joel Dickinson, FAA/AFS-410, will report on discussions regarding a charting indication for required NAVAID changes and any relevance to solution of the GLS issue.



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**MEETING 20-02**

Samer Massarueh, FAA/AJV-A221, reviewed the issue. At ACM 19-02, Joel Dickinson, FAA/AFS-410, said that the Flight Operations Group was considering the need for a charted indication on IFR procedures where a required NAVAID change occurs and suggested this would satisfy the request to depict the extent of the GLS signal reception on GLS procedures. At this ACM, Joel reported that he introduced a Recommendation Document at the IPG portion of the ACM ([see IPG issue 20-02-349](#)) the prior day for the charting of required NAVAID changes. Joel recommended closing this issue in the Charting Group per the new RD in the IPG.

Valerie Watson, FAA/AJV-A250, stated that she is not yet ready to close this issue in the Charting Group because there was strong pilot support for this change and it is yet to be determined if the IPG issue will satisfy the original request.

Michael Stromberg, UPS, pointed out that that the Flight Operations Group is researching the addition of this information on a great number of charts when the original request was to only chart it on a few GLS charts. He doesn't feel that the proposed solution will be at all useful to pilots except in a very limited number of cases, such as on GLS procedures. Joel stated his office's position remains that graphic depiction of GLS signal reception limits are unnecessary because the standard approach service volume (ASV) guidance has been published in the Aeronautical Information Manual (AIM). Valerie pointed out that because not all existing GLS procedures adhere to the standard in the AIM, publication of that standard does not satisfy this request. She voiced that she hopes it will be looked at in more detail during the IPG issue discussions. Joel said he will report back on the status of the IPG issue workgroup that will be formed.

Rich Boll, NBAA, said that there is still an interim issue that needs to be addressed for GLS. He said currently the SSV is set at 25 miles because of equipment limitations. He said once GBAS is in place at airports with GLS, the coverage of the GLS will extend to the initial approach fix. Therefore, we may be fighting to get something added to GLS charts that will need to be removed later.

Don McGough, FAA/AJF-170, said Flight Operations currently flight inspects the SSV at 20 miles from the threshold. He added that approval of the SSV on a GLS beyond that distance would not occur in the near future.

This item will remain open for Joel Dickinson to report on the status IPG issue at the next ACM.

**STATUS: OPEN**

**ACTION:** Joel Dickinson, FAA/AFS-410, will report on IPG Item 20-02-349 discussions regarding a charting indication for required NAVAID changes and any relevance to solution of the GLS issue.

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**MEETING 21-01**

Samer Massarueh, FAA/AJV-A223, reviewed the issue. Joel Dickinson, FAA/AFS-410, reported that a workgroup met to discuss [IPG Item 20-02-349](#) regarding the charting of required NAVAID changes. He said they were not able to reach a consensus and the issue was closed. Joel said the Flight Operations Branch does not support this recommendation. He proposed closure of this item in the Charting Group based on the guidance that has been published in the Aeronautical Information Manual (AIM).

Doug Willey, ALPA, voiced his opinion that lack of consensus on IPG Item 20-02-349 is not appropriate justification to close this item, and said Ron Renk, the original proponent of this recommendation, needs to be part of the decision to close. Joel said that Ron was part of the discussions within the IPG working group. Valerie Watson, FAA/AJV-A250, agreed that though Ron may have been part of the larger discussion regarding the depiction of required NAVAID changes on terminal procedures, she will reach out to him to notify him of the continued AFS lack of support for this specific aspect of the issue and will see if he is satisfied with closure of this item.

**STATUS: ON HOLD PENDING PROPONENT INPUT**

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**MEETING 21-02**

Samer Massarueh, FAA/AJV-A223, reviewed the issue. At the last ACM, Joel Dickinson, FAA/AFS-410 said the Flight Operations Branch does not support a charted depiction of GLS service volume and proposed closure of this item based on the guidance that has been published in the Aeronautical Information Manual (AIM). Valerie Watson, FAA/AJV-A250, said she has spoken with the original proponent of this issue, Ron Renk, United Airlines, and notified him of AFS's lack of support for the proposal. Ron agreed with closing the issue.

**STATUS: CLOSED**