

AERONAUTICAL CHARTING FORUM
Charting Group
Meeting 13-01 – April 24-25, 2013

RECOMMENDATION DOCUMENT

FAA Control # ACF-CG RD 13-01-266

Subject: Standardized Depiction of Altitude Restrictions on Bottom, Top and Maintain Altitudes Standard Terminal Arrival (STAR) and Standard Instrument Departures (SIDs)

Background/Discussion: Increasing numbers of STAR and SID procedures contain charted altitude and speed restrictions. The restrictions often provide an optimized vertical profile for arrivals and departures. In complex Metroplex designs, the crossing restrictions are critical to ensuring separation of departing and arriving aircraft. ATC issues a 'Descend Via' clearance to require compliance with the published restrictions. 'Climb Via' procedures, under development since 2004 and scheduled for implementation in 2013, require compliance with the SID restrictions.

Although the STAR/SID charts graphically depict the crossing restrictions, there are continuing challenges with compliance with restrictions. These are variously attributed to procedure design, chart clutter, lack of standardization of notes, note location, misunderstanding of the ATC clearance, lack of standardization of PDC, etc. A common factor for both STAR and SID charts is that nowhere on the chart, other than the graphic is there any prompt to the pilot indicating the procedure has a stepped climb or descent profile. Although RD- 05-01-174, Top Altitude Note on Standard Instrument Departures (SIDs) proposed establishing a standard method of depicting the ATC "Top Altitude" on a SID graphic chart, the RD was transferred to the ATC/MCA Crossing Altitude subcommittee at Meeting 08-01 and closed. No action has been taken to date.

ATC is circulating Document Change Proposals (DCPs) to incorporate into the Pilot/Controller Glossary (PCG) definitions for:

- Descend Via: An abbreviated ATC clearance that requires compliance with a published procedure lateral path, associated speed restrictions and provides a pilot-discretion descent to comply with published altitude restrictions.
- Bottom Altitude: In reference to published altitude restrictions on a STAR or STAR runway transition, the lowest altitude authorized.
- Climb Via: An abbreviated ATC clearance that requires compliance with the procedure lateral path, associated speed restrictions and altitude restrictions along the cleared route or procedure.
- Top Altitude: In reference to SID published altitude restrictions the charted 'maintain' altitude contained in the procedure description or assigned by ATC.

[Reference: ACF RD [05-01-174 – Top Altitude Note on Standard Instrument Departures \(SIDs\)](#)]

Recommendations: Recommend development of a standard depiction of stepped climb/descent and maintain altitude information box for the pilot briefing strip.

Comments: The intent of this recommendation is not to recreate all of the charted information in the briefing strip. The intent is to draw attention to:

- The fact that the STAR has a stepped descent profile and compliance with altitude restrictions is mandatory when cleared to 'Descend Via'.
- The fact that the SID has a stepped climb profile and compliance with published restrictions is required.
- Standardize the location/format for the 'Maintain' altitude information on a SID, e.g., Maintain FLxxx, expect filed altitude 10 minutes after departure.

Submitted by: James Arrighi
Organization: FAA/AJV-141
Phone: 202-385-4680
E-mail: james.arrighi@faa.gov
Date: April 2, 2013

MEETING 13-01: Jim Arrighi, AJV-141, briefed the topic. Jim reviewed the history of previous discussions held within the ACF Charting Group regarding climb via and descend via (Reference to RD 05-01-174 Top Altitude Note – available at http://www.faa.gov/air_traffic/flight_info/aeronav/acf/media/RDs/05-01-174_Top_Altitude_Note_on_SIDs.pdf and stated that this issue has yet to be sufficiently resolved.

Jim described the increasing number of Departures and Arrivals with crossing altitude restrictions and speeds and noted that though these procedures were designed to provide an optimum vertical profile, pilots continue to face challenges complying with the restrictions. He suggests that the lack of indication that a given procedure utilizes a stepped climb or profile descent is a contributor.

Jim cited several specific locations where there are concerns, and discussed problems with the BAYLR ONE at Denver, the JUTES TWO at La Guardia and the EAGUL FIVE at Phoenix. Valerie Watson, AJV-3B, asked Jim if he felt that this was an issue of how the procedure was developed or how the procedure is depicted.

Jim replied that it was an issue of how the procedure is depicted. He believes that depicting stepped climb/descent and maintain altitude information clearly on the chart would significantly improve understanding. He proposes clear depiction of a "bottom altitude" for STARs and a "top altitude" for Departures.

Paul Eure, AJE-31, commented that the problem is further complicated by the fact that many Departures have multiple transitions and many STARs have multiple runway arrivals. He suggested that a single bottom or top altitude may not be sufficient.

Tom Schneider, AFS-420, agreed with Paul and asked if, on a Departure, would there be a single top altitude for the entire procedure or one top altitude per transition. Jim replied that he envisions a single top altitude for the entire procedure. Tom then asked if the top altitude would apply to the end of the SID prior to the transitions. Jim said that no, enroute transitions would have a top altitude.

Bill Hammett, Contract Support, AFS-420, asked if this would impact naming conventions of SIDs. Jim replied that naming conventions are a separate issue.

Valerie commented that if the top/bottom altitude (and the fix or transition it is associated with) is on the procedure source document, the Terminal group can chart it, but the source will need to be clear and standard depiction (position, type size, boxed, etc.) will need to be established. Jim agreed that the information will need to be on the source document.

Valerie added that, regarding Jim's recommendation that the top/bottom altitude be shown in the "briefing strip", FAA SID and STAR charts do not have briefing strips and a standard will need to be established for the location of the information on the plate.

Ted Thompson, Jeppesen, commented that Jeppesen does not publish briefing strips on SIDs either. One of the issues he sees is that it sounds like the top/bottom altitude information will be communicated as a chart note. Chart producers struggle with knowing which notes are more important than others and how to accentuate them sufficiently for pilots to make them stand out. Lev Prichard, APA, asked why it is necessary to depict the top altitude on the chart. Why can't that piece of information be given by ATC?

Jim answered by stating that he believes all of the procedure information should be provided to the pilot via the chart.

Paul agreed with having the altitudes on the chart and commented that it would simplify matters for both pilots and ATC. Paul stated that at present, when a 'descend via' or a 'climb via' altitude is given, there is a perception that altitude restrictions depicted on the chart no longer apply. He believes that providing the top/bottom altitude will reinforce the altitude restriction(s).

There was a general consensus within the group that altitude restrictions should be depicted on the charts in a standardized fashion.

There are issues pertaining to how the information is to be sourced and Valerie reiterated that the altitudes and the fixes or transitions they are associated with must be clearly annotated on the procedure source documents. The charting offices will work on the detail of how (boxed, type size, etc.) the information will be charted. Ted concurred.

STATUS: OPEN

ACTION: Tom Schneider, AFS-420, to draft proposed revision to FAA Order 8260.46 to support top altitudes on SIDs and report back at next ACF.

ACTION: Jim Arrighi, AJV-141, to draft proposed revision to FAA Order JO 7100.9 to support bottom altitudes on STARs and report back at next ACF.

ACTION: Valerie Watson, AJV-3B, and Ted Thompson, Jeppesen, will create prototype charts with proposed depiction of these altitudes on SIDs & STARs for discussion at next ACF.

MEETING 13-02:

Valerie Watson, AJV-3, briefed the issue, [showed the audience prototype depictions](#) of both Departure and Arrival charts with top and bottom altitude notes.

Tom Schneider, AFS-420, stated that language supporting the requirement for top altitudes on departures has been added to the draft version of FAA Order 8260.46, Departure Procedure (DP), and is expected to be final in April 2014.

Jim Arrighi, AJV-141, commented that because FAA Order JO 7100.9, Standard Terminal Arrival (STAR) Program and Procedures, was just updated and published in September, it would be some time before the bottom altitude provision would be accommodated (2014 – 2015). He stated that bottom altitudes on STARs would be tied to different runway transitions, not fixes or waypoints.

Based on the fact that the Departure documentation will be released in April and there is no anticipated date for the Arrivals, Valerie stated she would draft an IACC specification change addressing only top altitudes on Departures.

Lev Prichard, APA, expressed a desire to see the top/bottom altitude information appear in a consistent location on the charts, as much as possible. Valerie agreed and stated that part of the RD would serve to establish a standard preferred location, likely the upper right hand corner of the planview.

STATUS: OPEN

ACTION: Valerie Watson, AJV-3, to draft an IACC Requirement Document for the publishing of top altitudes for Departures.

ACTION: Tom Schneider, AFS-420, to provide confirmation of publication of FAA Order 8260.46E to accommodate top altitudes on DPs.

ACTION: Jim Arrighi, AJV-141, to provide an update on progress made on modifying/updating the FAA Order JO 7100.9 to accommodate bottom altitudes on STARs.

MEETING 14-01:

Tom Schneider, AFS-420, reported that the language supporting the requirement for a top altitude on departures has been added to FAA Order 8260.46E which is set to be finalized in June 2014.

Valerie Watson, AJV-3, reported that an IACC Requirement Document to support the publication of a top altitude on departures has been submitted to the MPOC.

Jim Arrighi, AJV-141, reported that the Office of Responsibility for FAA Order 7100.9 will be changed from AJV-0 to AFS-400 within a couple of months. Jim stated that there will be no policy changes made to the Order until the handoff is made official. (Meaning that no Bottom Altitude changes have been or will be made to the Order until it is in the hands of Flight Standards.)

Mike McGinnis, American Airlines, brought a concern to the group on behalf of Lev Prichard, APA. Mike briefed the group on the [NELYN Departure for DFW](#) which has what could be

interpreted as two top altitudes associated with different departure runways. The original proposal, agreed upon at the last ACF, was understood to be for a single top altitude to be established/designated for each departure procedure. The group agreed that there are many departures currently published that do not lend themselves to the single top altitude philosophy and will need to be redesigned in order to comply.

Brad Rush, AJV-3, stated that the procedure being discussed does not comply with the new criteria and that there are many more in the system that do not.

Jim Arrighi stated that he has always asserted that multiple top altitudes would need to be supported. A lengthy and spirited discussion ensued which resulted in the conclusion that there had been a breakdown in communication regarding single vs multiple top altitudes on a departure. Minutes from the previous ACF support agreement that only a single altitude would be supported. In the interim, Tom revised FAA Order 8260.46 and Valerie created charting specifications in accordance with this decision. Tom expressed frustration that when the draft version of the FAA Order 8260.46E (containing guidance supporting a single top altitude) was circulated for comment, no objections were received. Jim stated that the departure guidance needs to be rewritten to include the possibility of more than one top altitude and that when the guidance is written for arrival procedures, it too will need to support multiple altitudes.

Ted Thompson, Jeppesen, said there is an underlying problem with showing more than one top altitude. Pilots will still have to read through multiple altitudes and decide at which point in the procedure which altitude is important to them. Ted expressed a concern over the fact that techniques to highlight, denote or identify a single altitude on charts will not work in cases where multiple altitudes may be used. He asserted that when numerous items are highlighted on a chart, the "highlighting" is lost and the effort is moot.

Rob Goodson, NGA, stated that he supports the depiction of only a single top altitude. He suggested that if there are multiple top altitudes, the transitions should be broken up onto multiple procedures. Jim responded that this avenue was considered and may well be the ideal solution, but is not likely to be supported for financial reasons.

Tom restated his dissatisfaction with the fact that the FAA Order 8260.46 changes have already been coordinated and are scheduled to be published in June 2014, but agreed to pull the Top Altitude guidance from the Order until a final decision has been made regarding charting. Once this is complete, the language can be rewritten accordingly.

Valerie stated that she will create new prototype charts and rewrite the charting specification to support the possibility of multiple Top Altitudes.

STATUS: OPEN

ACTION: Valerie Watson, AJV-3, will create prototypes for the depiction of multiple top altitudes on Departures.

ACTION: Valerie Watson, AJV-3, will draft a revised IACC Recommendation Document to support the publication of multiple top altitudes on Departures.

ACTION: Tom Schneider, AFS-420, will pull the single top altitude language from FAA Order 8260.46E and rewrite it to support the revised decisions made regarding charting multiple top altitudes on Departures.

ACTION: Jim Arrighi, AJV-141, will provide an update on the progress of the transfer of FAA Order JO 7100.9 to AFS-400.

MEETING 14-02

Valerie Watson, AJV-344, briefed the issue. Valerie reported that AFS-420 has provided interim “Top Altitude” guidance via memo until FAA Order 8260.46F is released. Valerie showed [sample charts](#) to the group depicting how the “Top Altitude” box will appear on the planview of FAA charts.

Ted Thompson, Jeppesen, [presented prototypes](#) of Jeppesen’s “Top Altitude” chart depiction, which will incorporate the altitudes into a specifically labeled “Top Altitude” column as part of the Departure Routing text block.

Valerie briefed that Top Altitude publication will begin with the Denver SIDs for the November 13 effective date cycle. A prioritized schedule is being established, in concert with Air Traffic, to place all SIDs with Top Altitude into production.

Tom Schneider, AFS-420, briefed the interim Top Altitude guidance and stated that the final guidance will be published in FAA Order 8260.46F, due to be published next September.

Tom also discussed the proposed “Bottom Altitude” changes to the STAR Order, which is in the process of being transferred to AFS-400 and incorporated into Orders 8260.3, 8260.19, and 8260.58. Once the transfer has been completed, likely sometime in 2015, Order JO 7100.9E will be cancelled. Tom has draft language prepared to support the requirement for “Bottom Altitudes” on STARs for insertion into Draft FAA Order 8260.19G.

Jim Arrighi, AJV-151, stated that the language in the order must be written to allow for one Bottom Altitude per runway transition.

STATUS: OPEN

ACTION: Tom Schneider, AFS-420, to provide an update on the transfer of FAA Order JO 7100.9 (STAR Order) to AFS-400.

ACTION: Valerie Watson, AJV-344, to draft an IACC Recommendation Document to support the charting of Bottom Altitudes on STARs and to create prototype STAR charts.

MEETING 15-01

Tom Schneider, AFS-420, briefed the issue. Tom stated that the interim guidance for publication of Top Altitudes on Standard Instrument Departures (SIDs) has been published via memo until FAA Order 8260.46F is released. The publication of Top Altitudes on SIDs is being implemented.

Tom reported that the issue of publication of Bottom Altitudes on Arrivals is still being worked in the Climb/Descend Via Workgroup. Tom reported that there are some complicated aspects to bottom altitudes, both with the overall policy and with individual procedures – these issues are being worked. It has been determined that there will be no limit on the number of Bottom Altitudes that can be depicted on a STAR procedure.

Bottom Altitudes may be related to transitions, airports, aircraft type, direction or runway. Also see new agenda item 15-01-293, STAR Terminus Point Standardization.

Tom also reported that the Bottom Altitude language has been incorporated into Draft FAA Order 8260.19G, and that AFS-400 is in the process of resolving comments received.

STATUS: OPEN

ACTION: Tom Schneider, AFS-420, to provide an update on the Bottom Altitude guidance in FAA Order 8260.19G.

ACTION: Valerie Watson, AJV-553, to draft an IACC Requirement Document to support the charting of Bottom Altitudes on STARs and to create prototype STAR charts.

MEETING 15-02

Valerie Watson, AJV-553, reviewed the history of the issue. Valerie stated that 2/3 of published Standard Instrument Departure (SID) Procedures now depict a Top Altitude. The process to add a Top Altitude to the remaining charts is ongoing.

Valerie also reported that basic guidance for Bottom Altitudes on Arrivals has been captured in the Draft of FAA Order 8260.19G and there is a charting specification in place though implementation has not begun nor been finalized. The topic of Bottom Altitudes is still under discussion in the PARC PCPSI and may require further revision. It was decided that this issue may be closed in this forum and if changes to prior decisions are made in the future, the subject will be revisited.

STATUS: CLOSED