AERONAUTICAL CHARTING MEETING
Instrument Procedures Group
Meeting 19-02 – October 2019

RECOMMENDATION DOCUMENT

FAA Control #19-02-346

Subject: Deceleration Segment on STARs Supporting Compliance with 14 CFR 91.117(c)

Background/Discussion:

14 CFR 91.117(c) states:

> **§91.117 Aircraft speed.**
>
> (c) No person may operate an aircraft in the airspace underlying a Class B airspace area designated for an airport or in a VFR corridor designated through such a Class B airspace area, at an indicated airspeed of more than 200 knots (230 mph).

Two letters of interpretation (Duncan 2015 and Seltzer 2010 – attached) issued by the FAA Office of the Chief Counsel state the above speed limit cannot be canceled or otherwise amended by ATC (and by inference, by a published speed restriction on a procedure, e.g., a STAR) and that if an aircraft can be safely configured, it must do so to comply with this speed limit below the floor of Class B airspace.

US Standard for Terminal Instrument Procedures (JO 8260.3D) publishes guidance on STARs for deceleration segments intended to meet published speed restrictions) in paragraph 2-2-10. This also includes a deceleration segment to meet the 250 knot speed restriction when operating below 10,000 feet MSL (ref: 14 CFR §91.117(a)). However, this paragraph does not require nor identify the need for a deceleration segment supporting a speed reduction from 250 knots – or a previously published speed restriction – to 200 knots required by 14 CFR 91.117(c) when the altitude restrictions published on the STAR takes the aircraft below the floor of Class B airspace.

For example, the published altitude restrictions on EMOZH Three (RNAV) STAR for Oakland CA (KOAK) – Figure 1 -- are below the floor of the San Francisco (SFO) Class B airspace starting MYNEE (at 7000') and it remains below the SFO Class B airspace until BIGPD (at or above 4500') – Figure 2. The distance between MYRIB and MYNEE is 9.4 NM. Using the "at or above 9000'" restriction at MYRIB, the descent gradient to the "at 7000'" restriction is 212 ft/NM. However, descending on this path would result in the aircraft going below the SFO Class B's 8000' floor approximately 1.8 NM prior to MYNEE.

Most business airplanes descend on a default path (e.g., 3.0 degrees/ 318 ft/NM). Descending on this default path to the "at 7000'" restriction at MYNEE results in aircraft crossing MYRIB at 9,989 feet MSL, which is in compliance with the "at or below 10,000'" restriction published at this fix. This descent path leaves little opportunity for the crew to reduce speed from the 240 knot restriction at MYRIB to 200 knots below 8000 by 1.8 NM prior to MYNEE (floor of the SFO Class B). NBAA has received reports by member flight crews of the difficultly in reducing speed to

comply with §91.117(c) while descending to meet the published altitude restriction on this STAR.

The guidance in TERPS paragraph 2-2-10 provides some clue as to what descent gradient might be needed. MYRIB has an "at or above 9000'" restriction and MYNEE has an "at 7000'" restriction. MYRIB also has a published speed of 240 knots. Applying formula 2-2-2 in paragraph 2-2-10:

Formula 2-2-2. Minimum Deceleration Distance (NM)

$$Decel_D = \frac{Alt_1 - Alt_2}{G} + K$$

Where:
Alt_1 = Minimum altitude at the fix prior to the speed restriction
Alt_2 = Minimum altitude at the fix with the speed restriction
G = The applicable gradient value (330/318/250).
K = 1 NM for every 10 KIAS of deceleration required

Since the speed reduction required is to below 220 KIAS or less, the value for "G" is equal to 250 ft/NM (ref TERPS para. 2-2-10. b. (1)).

The deceleration distance (DecelD) required to cross MYNEE at 200 knots is equal to (9000-7000/250) + 4) or 12 NM. This equates to a 166.7 ft/NM descent gradient. Compare this to the lowest descent path (212 ft/NM) that complies with the published altitude restrictions at MYRIB and MYNEE. However, the deceleration to 200 knots must be completed 1.8 NM prior to MYNEE if the aircraft is below 8000' at this position. If the 166.7 ft/NM descent gradient is extended backwards from MYNEE, the aircraft would cross the boundary of the SFO Class B airspace (at 7300' MSL where its speed would need to be at or below 200 knots.

Recommendations:

The subject of the relevance of the 200 knot speed limit published in 14 CFR 91.117(c) is not germane to this request. Unless and until this rule is amended, the TERPS criteria for STARs must account for a deceleration segment allowing compliance with all relevant 14 CFR §91.117 speed limits, including §91.117(c).

NBAA recommends that AFS 420 publish guidance in paragraph 2-2-10 for a deceleration segment supporting a speed reduction to 200 knots in accordance with 14 CFR §91.117 (c) when the altitude restrictions on a STAR please the aircraft below the floor of the overlying Class B airspace.

Comments:

This recommendation affects U.S. Standard for Terminal Instrument Procedure Order 8260.3

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Fig 1 – EMOZH Three (RNAV) STAR – KOAK

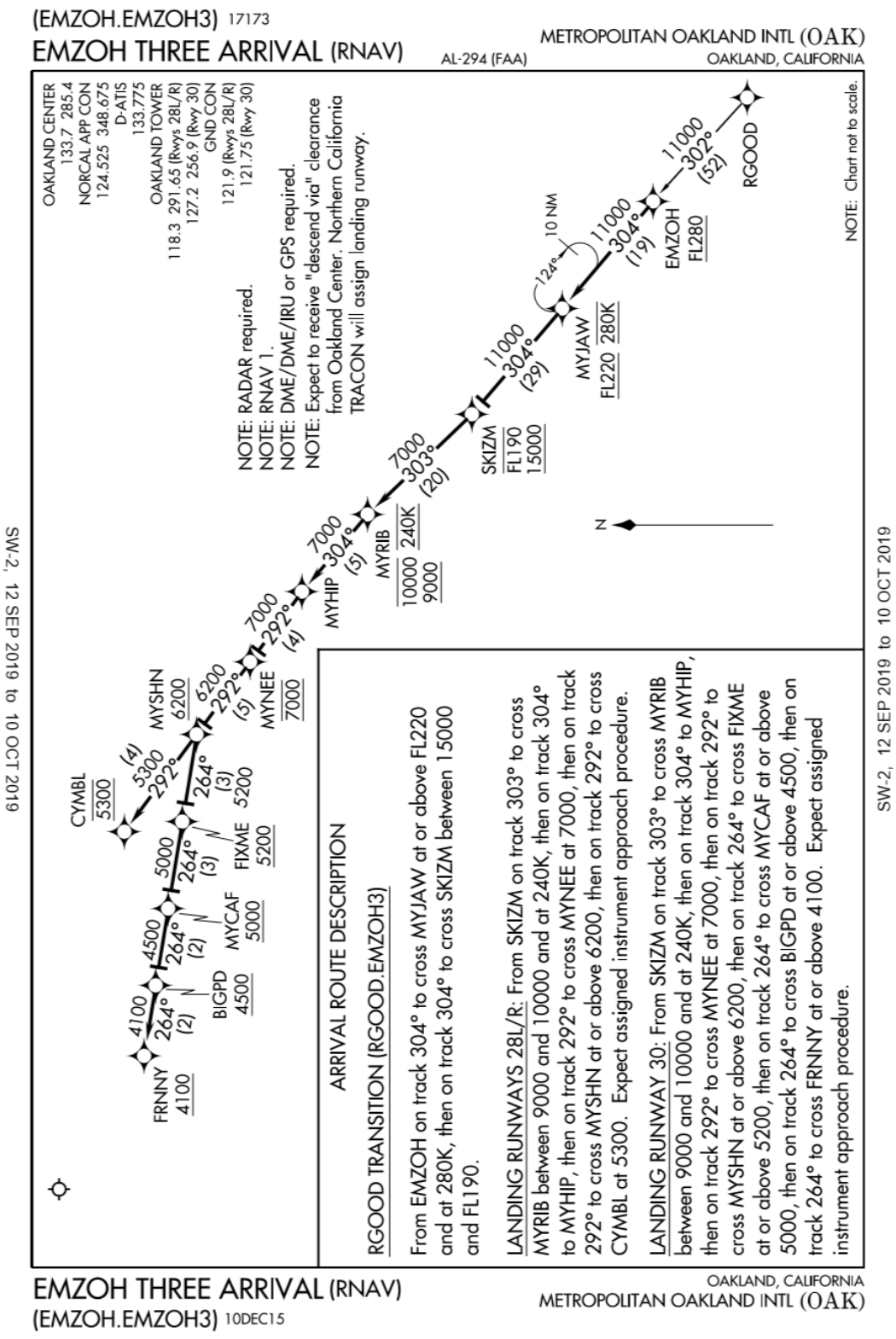

Fig 2 – SFO Class B & EMOZH waypoints

Initial Meeting 19-02: Rich Boll, NBAA, briefed the new issue using slides regarding the need for a speed reduction segment evaluation when a procedure takes the pilot below the class B airspace. Some speed restrictions on a procedure make it difficult to comply with required speeds further along the procedure. Lev Prichard, Allied Pilots Association, asked Rich about the interpretation letter issued by the FAA Office of the Chief Counsel regarding speed below Class B airspace. Lev suggested adding a 200 kt. speed restriction at a fix prior to going below the Class B shelf since this is a high workload and safety issue. Gary McMullin, Southwest Airlines, said procedures should be designed so all aircraft can fly them; adding a formula could end up being more restrictive than needed. Jeff Rawdon, Flight Procedures and Airspace Group, will look at Lev's suggestion on charting 200 kts at fixes proceeding a route segment below a Class B shelf, possibly with an Order 8260.3 note for developers to consider this during procedure design. Ron Renk, United Airlines, agreed with Lev's idea on the 200 kt speed restriction. Gary Fiske (CTR), FAA/AJV-P31 discussed design issues for segments below Class B shelves, to avoid workload for the pilot. Rich and Gary McMullin will be included in any discussions.

Action Items:

- FAA Flight Procedures and Airspace Group will review and consider the NBAA recommendation.
- FAA Flight Procedures and Airspace Group will look at the 200 kt. speed restriction, as discussed by Lev Prichard for a fix prior to passage below the Class B shelf.

Status: Item open.

Meeting 20-02: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue summary and current status from the slide. Jeff said the STAR Working Group will start up again soon and would include this request with additional STAR criteria revision discussions. To address a previous suggestion of incorporating a mandatory 200 KIAS speed restriction, Jeff presented a hypothetical situation to demonstrate a concern with that proposal. Lev Prichard, Allied Pilots Association, referred to the Oakland area, and said the STAR for the primary airport should be designed to remain in the Class B airspace. Gary McMullin, Southwest Airlines, said in the Oakland example, speed reduction was considered in the arrival design and was not an issue. He added this requirement to consider the FAR speed limit in arrival design is already in criteria. Rich Boll, NBAA, said in the original RD the speed was not required by design, so the Order may have changed. Gary said TARGETS evaluates this by adding a temporary fix for evaluation purposes, but Jeff said that is a best practice method but not by criteria. Gary suggested a criteria requirement to apply speeds per FAR requirements. Jeff said this would only be at issue if the arrival might take an aircraft below Class B airspace, and only then would be necessary to ensure the leg length would be adequate for deceleration. Also, he does not intend to refer developers to the FAR as a reference, but rather include any pertinent information.

Action Items:

- Flight Procedures and Airspace Group will continue to work the issue and report back.

Status: Item open.