MASTER DISPOSITION OF PUBLIC COMMENTS

AC 25.1581-1 Change 1 Airplane Flight Manual

October 16, 2012

No.	Comment	Requested Change	Disposition
	Commenter: Hawker Beechcraft Corporation (ref. letter number 940-2012-00839). April 6, 2012		
1.	In *Paragraph 2.b.(3) – Operating Limitations*: Comment 1: There is an item titled "(a) En Route Flight Paths." on page 5 of this proposed Change 1. Of what is this item (a) a sub-paragraph? This seems to have spread confusion to the items that follow as well. Comment 2: Item 3 of the sub-paragraph (a) cited in Comment 1 above states that "[…] en route flight path data must be presented in the AFM for all altitudes and temperatures within the operating envelope limits of the airplane." • Suggest clarifying in this Change 1 whether or not the AFM must present en route flight path data that account for the effect of the wind component along the airplane flight path. The applicable regulation, §25.123, refers to "weight, altitude, and ambient temperature," but does not mention wind.	Address comments 1 and 2. Clarify this Change 1 as appropriate.	In the conversion to the current FAA AC formatting criteria, the En Route Flight Paths sub-paragraph was mis-labeled. It should have been sub-paragraph (b). However, after further review, this sub-paragraph has been deleted. En route flight paths are not considered operating limitations. Per § 25.1587(b) en route flight path data determined in accordance with § 25.123 must be furnished as performance information in the airplane flight manual. This is noted in the AC by paragraph 2d(12). Accounting for the wind component along the flight path is also addressed in that paragraph.

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	• Furthermore, if data for tailwinds and headwinds are to be presented in the AFM, this Change 1 should provide guidance as to the headwind and tailwind speeds appropriate for en route. Most AFMs utilize the same wind speeds as those adopted for field performance, but is it reasonable to expect tailwind / headwinds of this magnitude (-10 kt / +30 kt) when flying at 30,000+ ft?		
2.	In *Paragraph 2.d.(1) – General, (c)2 - Airspeed and Altimeter*: Comment: The "speed for 1.2 g buffet onset margin" is cited. A buffet onset margin of 1.2g means that buffet would begin just above 2.2g (i.e., 1g + 1.2g). • Is this the intent, or is the buffet onset margin intended to be 0.2g, with buffet beginning just above 1.2g?	Address question. Clarify this Change 1 as appropriate.	The intent is for a 0.2g margin to buffet onset. The text has been clarified.
3.	In *Paragraph 2.d.(7) - Takeoff and Accelerate-Stop Distances, item (b)*:	Address question. Clarify this Change 1 as appropriate.	The text has been clarified to explain the intent of the rule and that this intent can be met through either of the methods described by the commenter.

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	Comment: The words in this paragraph (b) are confusing. Is their intent to communicate that – • The TC or STC applicant must publish an AFM (or AFMS) in which - for the given airplane configuration, weight, and ambient conditions - the accelerate-stop and takeoff distances on a wet runway (at the wet runway V_1 speed and with the wet runway braking coefficient) are at least as long as the corresponding distances on a dry runway (using the dry runway V_1 speed and braking coefficient), or that -- • The operator of the airplane must complete Step 1 through Step 5 in this paragraph (b) and use the longer distance thus determined to arrive at the maximum allowable runway-length-limited takeoff weight?		
4.	In *Paragraph 2.d.(11) - Takeoff Flight Path Data, item (c)*:	Change: "The AFM acceleration height should be […]" To: The AFM acceleration height of § 25.115(c) should be […]"	Section 25.115(c) prescribes how the net gradient margin of § 25.115(b) is to be applied during the acceleration segment. It does not specify that there be an acceleration segment. The text has been revised for clarity, but the change suggested by the

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			commenter has not been adopted.
5.	In *Paragraph 2.d.(15) – Approach Climb Performance*:	Change: "[…] (e.g., procedures and speeds)." To: "[…] (e.g., procedures, power or thrust setting, and speeds)." Change: "The affects of ice accretion […]" To: "The ~~affects~~ effects of ice accretion […]"	The suggested changes have been made.
6.	Global comment (applicable to AC 25.1581-1 Change 1 in its entirety): Ensure a consistent adoption of "power/thrust" and "power or thrust".	Change "power" and "thrust" to "power/thrust" or "power or thrust" in all applicable instances.	The suggested changes have been made.

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	Commenter: Boeing April 9, 2012		
1.	Page 14, Paragraph 2.d.(7)(b) The proposed text states: *"(b) . . .*	We recommend the text be revised as follows: *"(b) . . .* *Step 3: For the lowest takeoff weight determined in steps 1 and 2, determine*	The suggested change has been made.

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	Step 3: For the lowest takeoff weight determined in steps 1 and 2, determine and compare the accelerate-stop and takeoff distances applicable to both dry and wet conditions. . . . " . . .	*and compare the accelerate-stop and takeoff distances applicable to both dry and wet conditions* ***a dry runway based on the dry V_1 speed and a wet runway based on the wet V_1 speed.*** . . . " Our suggested revised text will provide better clarity to the instructions and requirements	

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	Commenter: MDA Systems Inc April 9, 2012		
1.	2. b. (1) (a) 8 Runway Slope From our experiences across the industry, we have learned that there has been a certain degree of uncertainty surrounding the 2% slope limitation as it applied to modern runway slope calculation methods and requirements. The primary method for slope calculation, and common method listed in most AFMs, is to use the 100% method where by the user looks at the start and end elevations on a runway, subtracts the DER from the AER, divides this numerator by the	We recommend that this section be expanded by a sentence or two to indicate the potential confusion regarding the slope limitation and operator calculation methods and highlight the importance for a statement in the AFM to indicate the methods of calculating slope for which the limitation is applicable.	As an operating limitation specified as part of the airplane's type certificate, the runway slope limitation applies to all types of operations with that airplane. We recognize that there are different methods for determining the slope of the runway, particularly when the slope may vary significantly along its length. However, the airplane flight manual, and hence this AC, is not the correct place to provide guidance on acceptable methods for determining the runway slope applicable to a particular operation. The slope limitation furnished in the AFM applies to all operations, using whatever accepted method the operator uses to determine the overall slope of the runway, or portion of the runway used in the particular

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	reported or measured length between the AER and DER and multiplies the result by 100 to achieve a value of slope in the form of a percentage. Modern procedure design methods and airport surveying both require and provide additional information about the vertical profile of a runway. This allows users to calculate slope values which are specific to the intended operation (RNP-AR, Intersection departures, 80% methods, finite element slope computations, etc). While we anticipate that the AFM, and the subsequent 2% slope limitation, is not intended to cover all of these situations, we are requesting that the slope limitation be clarified to apply to only those calculations which it is intended to restrict.		operation.
2.	2. b. (4) Center-of-Gravity Limits It has been our experience that information pertaining to the center-of-gravity limitations, in the limitations section of an AFM, usually includes some insight into certain operational moments that either have or have not been included in the	We recommend that this section of the AC recommend to AFM creators to consider the inclusion of a list of common operational curtailments and flight conditions that are either 1. Accounted for in the operational envelope 2. Not-accounted for in the	Text has been added to the AC to address this suggestion.

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	certified mass and cg envelope. However, we have encountered several operators and inspectors that have interpreted a single certified envelope presentation, and the lack of any additional envelopes for separable flight conditions, to mean that the operator needs no additional information in order to operate the aircraft in a manner that is not directly stated in the AFM. (ferry flights, evaluation flights) In other words, they believe that the aircraft only has one envelope for all operations be they normal or abnormal. In addition, we have also encountered some operators that are unaware of the operational curtailments that have been applied to the mass and cg envelope in the limitations section of their AFM. In these situations, certain moments generated from fuel consumption, passenger movement or cargo bin centroid positioning have been considered by the AFM, but the flight crew was unaware of their consideration leading them to create an operational set of curtailments that repeated the AFM's curtailments.	operational envelope 3. Require a separate operational envelope for the flight condition We would also like to see additional language in this section of the AC indicating that while AFMs are not required to present separate envelopes for each non-standard flight condition, they should indicate certain MEL or QRH configurations for which the basic operating envelope is not applicable	

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	It is our opinion that a few additional statements in the AC regarding the construction of the center-of-gravity limitations could greatly help AFM creators, (and the subsequent operators and inspectors) 1. Avoid unnecessary repeated curtailments 2. Have better immediate insight regarding when to seek out additional mass and cg envelopes for flight conditions which should be separated from standard limitations section		
3.	The draft AC highlights a number of areas where the results of the AFM creator's interpolation, extrapolation and substantiation methods has a direct influence on operator Safety Risk Management and advanced flight procedure design capabilities. We also recognize that the while this information is important to advanced aircraft operators, it may not necessarily belong in an AFM. We therefore believe that several of the subjects that this AC brings to light should be combined with other general discussions regarding detailed information required for 91-K/121/125/135 operations,	We recommend that additional guidance is added to the AC to encourage the creation and distribution of Performance Engineering Manuals. The focus of the guidance should be to help operators understand: a. Methods behind chart construction that could impact risk management decisions b. Data substantiation methods used that could impact risk management decisions c. Additional performance	This AC identifies the information that must be provided in the airplane flight manual (AFM) per § 25.1581 and provides guidance on the format of the information provided in that document. Performance Engineers' Manuals (PEMs), and the information that may be provided in them, are not required to be furnished by the 14 CFR part 25 type certification requirements and are beyond the scope of this AC.

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	but not for Part 25 compliance. In particular, we feel that the following sections of the AC should be considered for expansion or annotation within the context of a PEM. 2. d. (2) Performance Procedures – Clarification on the kinds of information that should be provided to help operators understand the basis of the performance computation – We believe this should include • Flight test vs calculated performance • Substantiation Data Report Handling • Any sources for conservatism that would be important for the operator to consider • Any sources of error which were introduced and	variables that may not be required by Part 25 regulations but are required for aircraft operation, SMS and procedure design. If this recommendation is accepted, we would like the AC to clearly indicate those existing sections that can benefit from PEM handling by directing the reader of the draft AC to the section or Appendix of the AC concerning the PEM. This could be achieved by a special character, annotation or direct reference to the section in the AC where the PEM inclusion would be described	

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	accepted by the FAA but aren't readily apparent to the operator – In particular this discussion should include • V-Speeds • Flight Path Data • Critical field lengths • Gradient measurements 2.d. (6) Takeoff Speeds (a) – Additional information from this section regarding • How the 100ft padding should be applied to declared distance performance calculations • How the 100ft value should be handled in terms of an SMS HIRA and altitude based departure procedure design		

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	2. d. (7) Takeoff and Accelerate Stop Distances – The methods used in the AFM to handle the V1 tolerance of 1.5kts and 100ft will be of significant importance to SMS and departure procedure design processes • How to handle situations when the TOD and TOR that would result from certain wet distances will be incorrect by a value equal to or greater than the 100ft previously prescribed AC25.1581-1 2.d.(6)(a) • Better understanding of the wet vs dry discrepancy when the creator of an AFM uses the 15ft screen height option for wet takeoff performance but		

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	increases the TOR/TOD to match the dry distances 2. d. (11) Takeoff Flight Path Data – Additional guidance regarding construction or placement of the 3rd segment which reflects more challenging flight procedures • 3rd segment following the thrust time limit • Recommended methods for translating the 3rd segment distance presented in the AFM from net to gross – Additional information for handling the wind presentation to reflect non-2D obstacle clearance situations • Guidance regarding the ability of the		

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	operator to make wind based path adjustments which are independent of the climb gradient or runway limiting performance • Guidance on how to appropriately extend or contract certain portions of the flight path based on intermittent winds experienced during a 4d flight path (especially if the flight path reference system is index based and already includes a conservative wind effect)		
4.	2. d. (8) Climb Limited Takeoff Weight and (10) Takeoff Climb Performance We have encountered considerable variations across many different AFMs on the subject of takeoff climb performance.	We would like to recommend that this section of the AC guides the reader to incorporate information regarding the altitude range of each gradient or limiting weight calculation in addition to the flap, thrust and speeds used to	Winds do not enter into the determination of climb-limited takeoff and landing weights. The climb-limited weights are based on a calculation of gradient capability at a single point in the flight path without consideration of the vertical profile with respect to the ground.

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	However, one of the most pervasive issues we have encountered is a general confusion about two critical concepts: 1. The applicability (or non-applicability) of winds on climb limited takeoff weights and climb gradients 2. The range of geometric and pressure altitudes for which takeoff segment based climb gradient information is presented Both of these concepts are central to 3rd party performance applications which are derived from the AFM as well as many operators' use of climb gradient information in computing obstacle clearance along complex departure paths. We would like to see statements in this AC that ensure consistent information is presented regarding the applicability of wind corrections/data along with concrete limitations on altitude ranges for gradient computation. The latter is especially important for helping operators understand when the AFM no longer presents information for a given thrust/flap/speed configuration (i.e. 2nd segment gradient	achieve the gradient. We recommend that this section include language to recommend that the AFM contain the wind assumptions used when presenting a climb gradient or climb limited weight calculation. For gradient based information, the AC should make a reference to include wind based corrections to the flight path gradient information for the purposes of flight path determination or obstacle clearance as appropriate.	The effect of winds does need to be included for takeoff and en route flight paths, which are used to comply with the obstacle clearance requirements specified in the operating rules. Text has been added to the AC to ensure instructions for how to account for the effect of wind is included in takeoff flight path information, and that sufficient information is provided to explain the boundaries within which each set of data can be used and why.

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	data is only applicable from ref 0 to 1500ft above ref 0)		
5.	2. d. (11) Takeoff Flight Path Data We greatly appreciate the expansion that this section received in the latest draft AC. However, we believe that additional information would be of significant value in an AFM for operators to safely calculate obstacle clearance under PBN and traditional OEI special departure procedures. We believe that additional information should be included, either in the AFM or in a PEM, that assists operators with several critical performance assessments regarding: 1. Flight path data along SID paths (beyond 3000ft Net) 2. More information regarding turn radius determination 3. Gradient loss information beyond the traditional 15 degree limit 4. Gradient loss information for non-traditional OEI situations	We recommend an expanded discussion regarding the need for takeoff flight path data to be made available to the highest possible altitudes allowed by extrapolation or flight test data reduction. At a minimum, we would recommend the net flight path should be presented to 3000ft (not the gross). We recommend considering a change to the current statement, "radius of turn, for use in obstacle lateral separation, is not airplane dependent" to reflect something reflective of modern procedure design like the following, "operators have simplified the means of calculating the radius of turn to one which is independent of the aircraft performance." We recommend expanding this section to include guidance in the AC to address some of the more common causes of aircraft specific turn radius assessment including effects of specific engine loss (right/left/center) and non-constant IAS/CAS flight paths (3rd segment, 4th segment). This could be	1. The text has been revised to recommend providing net takeoff flight path data to a height of 3,000 feet above the takeoff surface. 2. The statement that the radius of turn is not airplane dependent is fundamentally correct. This fact is unrelated to procedure design. The original text, slightly edited for clarity, has been retained. 3. This AC provides guidance pertaining to information required to be furnished in the airplane flight manual (AFM). Additional information that may be presented in a Performance Engineers' Manual is not covered by this AC. 4. This AC provides general guidance applicable to all part 25 airplanes. Reference to flight director use and autopilot bank modes would only apply to particular airplanes. To provide coverage for higher than the recommended 15 degrees of bank angle coverage, a sentence has been added to consider providing coverage of higher bank angles as appropriate to the expected operation of the airplane. 5. The gradient decrement information furnished in the airplane flight manual (AFM) is part of the takeoff flight path information required to be in the

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		addressed either in the AFM or in a PEM. We recommend including guidance that turning flight path climb gradient decrement information should be presented to match the minimum number of degrees as specified by the flight director under "low bank" mode plus an additional 5 degrees for controllability and pilot training practices. We recommend including guidance that turning flight path climb gradient decrement information should include corrections for All Engines Operating, Two Engines Inoperative (as applicable) and various drag index corrections as applicable.	AFM per 14 CFR 25.1587(b). The net takeoff flight path data that must be provided is based on a one-engine-inoperative flight path per §§ 25.115 and 25.111. There is no part 25 regulatory basis for requiring or recommending inclusion of gradient decrement information for all engines operating or two engines inoperative conditions.
6.	2. d. (12) En Route Flight Path Data Similar to our comment 5. We would like to see additional guidance provided for AFM construction, or PEM inclusion, regarding the implications of 4d procedure design in the enroute phase of flight in support of EROPS, PBN based Driftdown and Depressurization flight path considerations.	We recommend including guidance in the AC We recommend expanding this section to include guidance in the AC to address some of the more common causes of aircraft specific turn radius assessment including effects of specific engine loss (right/left/center) and non-constant IAS/CAS flight paths (initial deceleration, non-standard ETOPS/EROPS profiles). This could	This AC provides guidance regarding the information that must be provided in the airplane flight manual in accordance with 14 CFR part 25 airworthiness certification requirements. There is no part 25 regulatory basis for requiring or recommending inclusion of information regarding turn radius determination, or for gradient loss information for en route flight path data. Unapproved data that can be furnished in other documents, such as a performance engineers

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	We believe that additional information should be included, either in the AFM or in a PEM, that assists operators with several critical performance assessments regarding: 1. More information regarding turn radius determination 2. Gradient loss information beyond the traditional 15 degree limit 3. Gradient loss information for non-traditional OEI situations	be addressed either in the AFM or in a PEM. We recommend including guidance that turning flight path descent gradient decrement information should be presented to match the minimum number of degrees as specified by the flight director under "high bank" mode plus an additional 5 degrees for controllability and pilot training practices. We recommend including guidance that turning flight path descent gradient decrement information should include corrections for All Engines Operating, Two Engines Inoperative (as applicable) and various drag index corrections as applicable.	manual, are beyond the scope of this AC.
7.	2. d. (13) – (16) Landing and Approach Performance and Limits Due to the requirements for operators to demonstrate compliance with OEI and AEO missed approach paths, we are requesting that this section of the AC include references to the CAT II/III and RNP requirements for missed approach flight path data for any aircraft which is	We recommend that a new section is inserted into the Draft AC under 2. d. (13-16) regarding the creation of missed approach flight path information or conversion of takeoff flight path data into missed approach information, along with the configuration and procedures necessary to achieve the stated performance.	The requested change is beyond the scope of the current revision project, which is to move some material from AC 25-7B to AC 25.1581-1 as part of the project to revise AC 25-7B. The requested change would be a significant change that would, at the least, need to be made available for comment by the public.

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	certified to operate under RNP, RNP-AR or conventional CAT II/III instrument approach procedures. If such a section is created, we would recommend that it follows the same format as the draft AC for the takeoff climb flight path data presentation (2.d.(11)) along with some of the additional items that we have also indicated would add significant safety value.	We also recommend that this new section include guidance regarding turning flight path missed approach climb gradient decrement information presented to match the minimum number of degrees as specified by the flight director under "high bank" mode plus an additional 5 degrees for controllability and pilot training practices. We recommend including guidance that turning flight path missed approach climb gradient decrement information should include corrections for All Engines Operating, Two Engines Inoperative (as applicable) and various drag index corrections as applicable.	

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	Commenter: Tiago Antunes Vieira de Menezes (Brazilian Civil Aviation Authority – ANAC)		
1.	The reference to paragraphs 2d(1)(iii)(A) and (B) must be updated in paragraph 2d(1)(c)4 to the new hierarchy scheme used in this revision.	4 Total or Static Air Temperature: For Mach numbers corresponding to the speed ranges noted in paragraphs ~~2d(1)(iii)(A) and (B)~~ 2d(1)(c)1 and 2d(1)(c)2 of this AC.	The suggested changes have been made.