Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
Loads and Dynamics Harmonization Working Group

Task 7 – Design Flap Speeds

Task Assignment

Aviation Rulemaking Advisory Committee; Transport Airplane and Engine Issues

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of new task assignments for the Aviation Rulemaking Advisory Committee.

SUMMARY: Notice is given of new task assignments for the Loads and Dynamics Harmonization Working Group of the Aviation Rulemaking Advisory Committee (ARAC). This notice informs the public of the activities of the ARAC.

FOR FURTHER INFORMATION CONTACT: Michael H. Borfitz, Assistant Executive Director, Aviation Rulemaking Advisory Committee, Transport Airplane and Engine Issues, FAA Engine & Propeller Directorate, 12 New England Executive Park, Burlington, Massachusetts 01803; telephone (617) 238–7110, fax (617) 238–7199.

SUPPLEMENTARY INFORMATION: On January 22, 1991 (56 FR 2190), the Federal Aviation Administration (FAA) established the Aviation Rulemaking Advisory Committee (ARAC). The committee provides advice and recommendations to the FAA Administrator, through the Associate Administrator for Regulation and Certification, on the full range of the FAA's rulemaking activities with respect to aviation-related issues..

In order to develop such advice and recommendations, the ARAC may choose to establish working groups to which specific tasks are assigned. Such working groups are comprised of experts from those organizations having an interest in the assigned tasks. A working group member need not be a representative of the full committee. One of the working groups established by the ARAC is the Loads and Dynamics Harmonization Working Group.

The FAA announced at the Joint Aviation Authorities (JAA)-Federal Aviation Administration (FAA) Harmonization Conference in Toronto, Canada June 2–5, 1992, that it would consolidate within the ARAC structure an ongoing objective to "harmonize" the Joint Aviation Requirements (JAR) and the Federal Aviation Regulations (FAR).

Tasks

The Loads and Dynamics Harmonization Working Group's tasks are as follows:

Task 1—Interaction of Systems and Structure: Review existing special conditions for fly-by-wire airplanes and existing requirements for control systems, including automatic and/or power-operated systems, and recommend to the ARAC any new revised general requirements needed for flight control systems and structures affected by those systems (§§ 25.302, 25.671, 25.1329, part 25 appendix K).

Task 2—Continuous Turbulence Loads: Review the requirement for the continuous turbulence standard in light of the ARAC proposal for a tuned discrete gust requirement in order to determine whether the continuous turbulence requirement should be revised or removed from the FAR/JAR for better consistency with the new proposed tuned discrete gust criteria (§ 25.305(d)).

Task 3—Strength and Deformation: Review the recent requirements adopted in the FAR by Amendment 25–77 (for the design of transport airplanes against buffet and forced structural vibrations) and consider appropriate changes for the JAR and FAR to harmonize these rules (§§ 25.305 (e) and (f)).

Task 4—Design Flap Speeds: Review the current flap design loads requirements to resolve differences in interpretation between the FAA and JAA concerning the structural design stall speeds on which the flap design speeds are based. Recent measurements of gust speeds at low altitudes, where flaps are normally extended, indicate a more severe gust environment may be present. Review all aspects of the flap design load requirements, including the design airspeeds, vertical and head-on design gust criteria, and the effects of automatic retraction and load relief systems (§ 25.335(e)).

Task 5—Residual Strength Loads for Damage Tolerance: Review the differences in residual strength design load requirements between the FAR and JAR and resolve differences to harmonize this rule. Prepare a Notice of Proposed Rulemaking or make recommendations to other ARAC efforts concerning FAR § 25.571, so that they can be included in rulemaking that may be forthcoming from those efforts (§ 25.571(b)).

Task 6—Shock Absorption Tests: Review the changes recently introduced into the JAR that have resulted in differences between the FAR and JAR in regard to the requirement for shock absorption tests. Review those changes in view of harmonizing the FAR and JAR (§ 25.723(a)).

Task 7—Rough Air Speed: The ARAC has proposed a new § 25.1517 concerning rough air speed design standards in its proposal for a tuned discrete gust requirement. This action is harmonized with the current JAR 25.1517; however, further changes in the rough air speed requirement may be needed in both the FAR and JAR. Review JAR 25.1517 and the new proposed FAR 25.1517 to determine if further changes are needed. If so, prepare a Notice of Proposed Rulemaking, or, if possible, combine these changes with other rulemaking efforts (§ 25.1517).

Task 8—Taxi, Takeoff, and Landing Roll: Prepare an advisory circular that establishes criteria that may be used to calculate rough runway and taxiway loads, as required by §§ 25.491, 25.235, and 25.305.

Task 9—Braked Roll Conditions: Review the provisions of § 25.493 of the FAR and JAR concerning the braked roll condition and finalize a harmonized Notice of Proposed Rulemaking.

Reports

For each task listed, the Loads and Dynamics Harmonization Working Group should develop and present to the ARAC:

1. A recommended work plan for completion of the task, including the rationale supporting such plan, for consideration at the meeting of the ARAC to consider transport airplane and engine issues held following publication of this notice;

2. A detailed conceptual presentation on the proposed recommendation(s), prior to proceeding with the work stated in item 3. below;

3. A draft Notice of Proposed Rulemaking, with supporting economic and other required analyses, and/or any other related guidance material or collateral documents the working group determines to be appropriate; or, if new or revised requirements or compliance methods are not recommended, a draft report stating the rationale for not making such recommendations; and

4. A status report at each meeting of the ARAC held to consider transport airplane and engine issues.

Participation in Working Group Task

An individual who has expertise in the subject matter and wishes to become a member of the working group should write to the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire, describing his or her interest in the task(s), and stating the expertise he or

she would bring to the working group. The request will be reviewed with the assistant chairman and working group leader, and the individual will be advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the information and use of the Aviation Rulemaking Advisory Committee are necessary in the public interest in connection with the performance of duties imposed on the FAA by law. Meetings of the Aviation Rulemaking Advisory Committee will be open to the public, except as authorized by section 10(d) of the Federal Advisory Committee Act. Meetings of the working group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on June 3, 1994.

Chris A. Christie,

Executive Director, Aviation Rulemaking Advisory Committee.

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Analysis completed; no recommendation resulted.

U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

MAY 15 1998

Mr. Craig R. Bolt
Manager, Systems Development and
Validation
Pratt & Whitney
400 Main Street
Mail Stop 162-24
East Hartford, CT 06108

Dear Mr. Bolt:

We have begun an effort to close out old Aviation Rulemaking Advisory Committee (ARAC) tasks and recommendations. In our review of the oldest tasks, it became apparent that several assigned to Transport Airplane and Engine Issues can be closed.

In its most recent report, the Loads and Dynamics Harmonization Working Group has advised ARAC that no changes to 14 CFR Title 14 are necessary under Task 6 (Strength and Deformation) or Task 7 (Design Flap Speeds), and consequently the working group will not be submitting any recommendations to ARAC.

The Loads and Dynamics Harmonization Working Group also has recommended to ARAC that Task 10 (Rough Air Speed) be combined with Task 5 (Continuous Turbulence Loads).

The General Structures Harmonization Working Group has advised ARAC that the substance of its Task 6 (Residual Strength Loads for Damage Tolerance) is being addressed in its Task 5 (Damage Tolerance and Fatigue) and, therefore, Task 6 can be closed.

The Engine Harmonization Working Group has advised ARAC that Task 5 (Turbine Rotor Overtemperature) is no longer considered a Significant Regulatory Difference with the Joint Aviation Authorities JAR-E regulations and, therefore, the task can be closed.

If ARAC agrees with the above, the FAA will consider Loads and Dynamics Harmonization Working Group Tasks 6, 7, and 10; Engine Harmonization Working Group Task 5; and General Structures Harmonization Working Group Task 6 closed. Please advise us as soon as possible.

If you have any questions, please call Jean Casciano on (202) 267-9683.

Sincerely,

Guy S. Gardner
Associate Administrator for
Regulation and
Certification

U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Subject: DESIGN DIVE SPEED **Date:** 9/29/00 **AC No.** 25.335-1A
Initiated by: ANM-110

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1. PURPOSE. This advisory circular (AC) sets forth an acceptable means, but not the only means, of demonstrating compliance with the airworthiness standards for transport category airplanes related to the minimum speed margin between design cruise speed and design dive speed. Like all AC's, it is not regulatory but provides guidance for applicants in demonstrating compliance with the objective safety standards set forth in the rule.

2. CANCELATION. Advisory Circular 25.335-1, Design Dive Speed, dated 10/20/97, is canceled.

3. RELATED FAR SECTIONS. Part 25, Section 25.335 "Design airspeeds."

4. BACKGROUND. Section 25.335(b) requires the design dive speed, V_D, of the airplane to be established so that the design cruise speed is no greater than 0.8 times the design dive speed, or that it be based on an upset criterion initiated at the design cruise speed, V_C. At altitudes where the cruise speed is limited by compressibility effects, § 25.335(b)(2) requires the margin to be not less than 0.05 Mach. Furthermore, at any altitude, the margin must be great enough to provide for atmospheric variations (such as horizontal gusts and the penetration of jet streams), instrument errors, and production variations. This AC provides a rational method for considering the atmospheric variations.

5. DESIGN DIVE SPEED MARGIN DUE TO ATMOSPHERIC VARIATIONS.

a. In the absence of evidence supporting alternative criteria, compliance with § 25.335(b)(2) may be shown by providing a margin between V_C/M_C and V_D/M_D sufficient to provide for the following atmospheric conditions:

(1) Encounter with a Horizontal Gust. The effect of encounters with a substantially head-on gust, assumed to act at the most adverse angle between 30 degrees above and 30 degrees below the flight path, should be considered. The gust velocity should be 50 fps in equivalent airspeed (EAS) at altitudes up to 20,000 feet. At altitudes

above 20,000 feet the gust velocity may be reduced linearly from 50 fps in EAS at 20,000 feet to 25 fps in EAS at 50,000 feet, above which the gust velocity is considered to be constant. The gust velocity should be assumed to build up in not more than 2 seconds and last for 30 seconds.

(2) Entry into Jetstreams or Regions of High Windshear.

(i) Conditions of horizontal and vertical windshear should be investigated taking into account the windshear data of this paragraph which are world-wide extreme values.

(ii) Horizontal windshear is the rate of change of horizontal wind speed with horizontal distance. Encounters with horizontal windshear change the airplane apparent head wind in level flight as the airplane traverses into regions of changing wind speed. The horizontal windshear region is assumed to have no significant vertical gradient of wind speed.

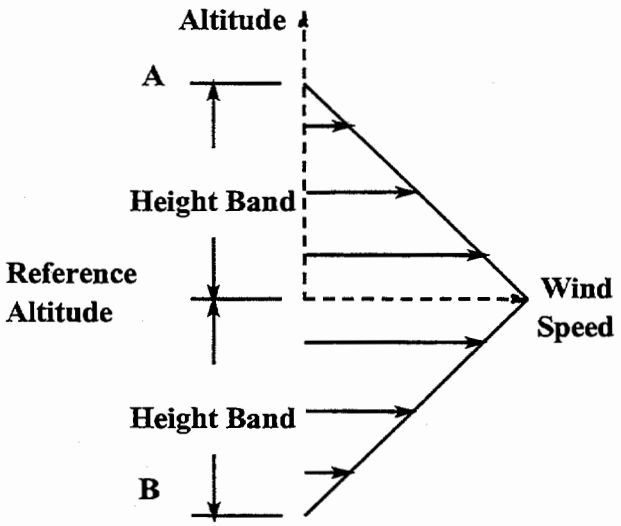
(iii) Vertical windshear is the rate of change of horizontal wind speed with altitude. Encounters with windshear change the airplane apparent head wind as the airplane climbs or descends into regions of changing wind speed. The vertical windshear region changes slowly so that temporal or spatial changes in the vertical windshear gradient are assumed to have no significant affect on an airplane in level flight.

(iv) With the airplane at V_C/M_C within normal rates of climb and descent, the most extreme condition of windshear that it might encounter, according to available meteorological data, can be expressed as follows:

(A) Horizontal Windshear. The jet stream is assumed to consist of a linear shear of 3.6 KTAS/NM over a distance of 25 NM or of 2.52 KTAS/NM over a distance of 50 NM or of 1.8 KTAS/NM over a distance of 100 NM, whichever is most severe.

(B) Vertical Windshear. The windshear region is assumed to have the most severe of the following characteristics and design values for windshear intensity and height band. As shown in Figure 1, the total vertical thickness of the windshear region is twice the height band so that the windshear intensity specified in Table 1 applies to a vertical distance equal to the height band above and below the reference altitude. The variation of horizontal wind speed with altitude in the windshear region is linear through the height band from zero at the edge of the region to a strength at the reference altitude determined by the windshear intensity multiplied by the height band. Windshear intensity varies linearly between the reference altitudes in Table 1.

Figure 1 - Windshear Region



Note:
The analysis should be conducted by separately

descending from point "A"
and
climbing from point "B"

into initially increasing headwind.

Table 1 - Vertical Windshear Intensity Characteristics

	Height Band - Ft.			
	1000	**3000**	**5000**	**7000**
Reference Altitude - Ft.	**Vertical Windshear Units: ft./sec. per foot of height (KTAS per 1000 feet of height)**			
0	0.095 (56.3)	0.05 (29.6)	0.035 (20.7)	0.03 (17.8)
40,000	0.145 (85.9)	0.075 (44.4)	0.055 (32.6)	0.04 (23.7)
45,000	0.265 (157.0)	0.135 (80.0)	0.10 (59.2)	0.075 (44.4)
Above 45,000	0.265 (157.0)	0.135 (80.0)	0.10 (59.2)	0.075 (44.4)
Windshear intensity varies linearly between specified altitudes.				

(v) The entry of the airplane into horizontal and vertical windshear should be treated as separate cases. Because the penetration of these large scale phenomena is fairly slow, recovery action by the pilot is usually possible. In the case of manual flight (i.e., when flight is being controlled by inputs made by the pilot), the airplane is assumed to maintain constant attitude until at least 3 seconds after the operation of the overspeed warning device, at which time recovery action may be started by using the primary aerodynamic controls and thrust at a normal acceleration of 1.5g, or the maximum available, whichever is lower.

b. At altitudes where speed is limited by Mach number, a speed margin of .07 Mach between M_C and M_D is considered sufficient without further investigation.

DORENDA D. BAKER
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service, ANM-100

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