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March 16, 2017

Mr. Lance Gant, Manager
Federal Aviation Administration
Rotorcraft Directorate (ASW-100)
Southwest Region Headquarters
2601 Meacham Blvd
Fort Worth, TX 76137

Dear Mr. Gant,

The American Helicopter Society (AHS) International, its membership, advisors and technical experts appreciate the recent action — namely the proposed Policy PS-ASW-27-TBD, "Safety Continuum for Part 27 Normal Category Rotorcraft Systems and Equipment," provided on March 9, 2017 — to provide certification guidance that recognizes modern advancements in safety equipment. In the interest of promulgating this important policy shift toward the maximum improvement in our ability to certify rotorcraft with the equipment needed to meet operational demands, we have developed some important suggestions. Thank you — and the staff of the Rotorcraft Directorate — in advance for your careful consideration.

General recommended corrections:

1. **Eliminate paragraphs 3, 4 and 5 of the proposed policy's "Background" section.**

   These sections render the proposed policy confusing and seem to imply that the policy is applicable only for certain mission segments, although this is stated clearly as not being the intent elsewhere in the document. As written, the 3rd paragraph states that 50% of the accidents occur in private, instruction, and aerial application; however, a vast majority of these accidents are due to loss of control, or collision with obstacles in visual conditions, causal factors for which technology will have limited value. Furthermore, an unintended consequence of this rationale may result in an increase the use of Class II aircraft in lieu of Class III aircraft for commercial (Part 135) operations.

2. **Reduce the Failure Conditions Classifications probabilities for Class III rotorcraft to 10^{-6} (Hazardous) and 10^{-7} (Catastrophic).**

   The FAA has acknowledged the intent of the draft policy was to restore the acceptability of dual systems (either a redundant system, or a primary with a back-up) for functions with these failure severities. Implementation of this intent is of significant importance for the preservation of rotorcraft cost-effectiveness, payload and, very importantly, system simplicity and ergonomics. However, the Safety Continuum's proposed imposition of 10^{-8} on Class III rotorcraft for catastrophic failure conditions will require triplex implementations on these aircraft. Using traditional federated systems, dual systems can typically support a failure probability of 10^{-6} failures per flight hour. Taking advantage of newer, more reliable technology and better designed systems allows a failure probability of 10^{-7} to be achieved.

It is further noted that in the proposed Policy, Class IV helicopters still have a requirement equivalent to transport helicopters and airplanes, thereby providing no safety continuum adjustment in this class. The attached Appendix B provides additional suggestions in this regard.

Recommended additions to the proposed Policy to enable and improve IFR Certifications for single-engine rotorcraft:

3. **Add note to Class I, II and III rotorcraft regarding GPS:**

   Note 5: GPS groundspeed may be considered a back-up for loss of airspeed, and GPS altitude may be considered a back-up for loss of barometric altitude in the event of pitot-static system failure, provided that the single pitot-static system has a selectable alternate static source in accordance with 14CFR 27 Appendix B VIII(b)(5)(iv), and that the display of groundspeed and GPS altitude is with sufficient prominence to allow continued safe flight following the loss of airspeed or altitude.

   This note would allow IFR certification without requiring that a second pitot-static system be installed. Currently, AC 27.1303 b.(4)(B)(5)(ii) requires that in order to comply with Appendix B VIII(b)(5)(iii), loss of all airspeed or loss of all altitude individually must be considered "extremely improbable" (i.e. the loss of either parameter is considered "catastrophic"). This then requires at least dual pitot-static systems be installed. It is generally difficult to install and certify the addition of pitot-static systems on an existing rotorcraft, and this unnecessarily increases aircraft complexity and weight. Additionally, dual pitot-static systems for single pilot in single station IFR certifications can create confusion and additional ergonomic issues.

4. **Add note to Class I, II and III rotorcraft regarding emergency battery duration:**

   Note 6: A placard for emergency battery duration in the event of generator failure may be provided in lieu of the half maximum duration specified by AC 27 Appendix B (14)(i)(H), provided that a minimum of at least 30 minutes' duration is provided by the battery.

   Currently AC 27 Appendix B (14)(i)(H) requires that a single-engine rotorcraft upgraded to IFR using a single generator and a battery for emergency power should size the capability of the battery "based on one-half the time associated with a worst case maximum flight duration." This requirement penalizes a single-engine rotorcraft's ability to certify for IFR based on its fuel capacity. A placarded duration that makes it clear how long the pilot has to exit IMC and land would seem more appropriate, and should be allowed. In many cases a battery sized to provide half duration is not physically able to fit within the airframe provisions. Complying to the current guidance for many rotorcraft would force much more significant changes to the airframe — increasing weight and reducing payload. Alternately the existing requirement would lead to the artificial restriction of allowed fuel load for IFR in order to limit range — which reduces safety.

5. **Add note to Class I, II and III rotorcraft on HIRF and Lightning means-of-compliance:**

   Note 7: IFR assistive Automatic Flight Control Systems (AFCS) classified as "Level-A" with regards to HIRF and Lightning may be considered equivalent to Level-A display systems in regards to showing compliance IAW AC 20-158A and AC 20-136B, provided

that the aircraft does not require the AFCS to operate in order to meet the flight control and stability requirements for VFR flight.

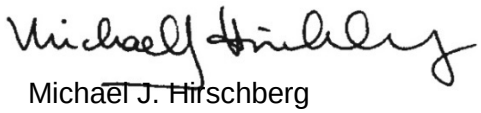
This is because direct aircraft-level testing of an installation for High Intensity Radiated Fields (HIRF) and Lightning can be cost prohibitive and beyond the ability of STC facilities attempting to certify autopilots required for IFR flight. AC 20-158A and AC 20-136B recognize Level-A display systems as requiring less rigor in verification because "*they involve functions for which the pilot will be in the loop through pilot/system information exchange.*" For displays, there is a greater allowance of analysis based on construction. There is an assumption that Level-A control systems (i.e. fly-by-wire flight controls and FADECs) have a more immediate catastrophic effect without the ability for the pilot to intercede. Assistive autopilots/AFCS typically have catastrophic failure effects due to malfunction causing actuator hard-over. Certification further requires an assumption that the pilot may be inattentive for 1 to 3 seconds depending on the phase of flight. But it is clear that the pilot is in the loop for these events and has the ability to intercede, making the event more akin to a Level-A display malfunction. Similar consideration should therefore be afforded here in showing compliance.

See also the attached Appendix A on how these relate to the Associations and Industry White Paper recommendations submitted on November 18, 2015.

Our team of experts believes that if the new policy is revised with the five points described above, it will help the industry make significant improvements in rotorcraft safety.

Again, thank you for your attention to this matter and for the steps you and your team have taken thus far. We look forward to implementing a final policy and onward towards our mutual goal of certification of helicopters significantly safer and more capable than ever. If you have any questions, please don't hesitate to contact me at: +1-703-684-6777 x111 or hirschberg@vtol.org.

Sincerely,



Michael J. Hirschberg
Executive Director
AHS International

Appendix A: Background

On November 18, 2015, a coalition of helicopter manufacturers, operators and associations — namely the General Aircraft Manufacturers Association, AHS International, Aircraft Electronics Association, and the Helicopter Association International — submitted the "14 CFR 27 Single-Engine IFR Certification Proposal; Association and Industry White Paper" to the Rotorcraft Directorate that detailed recommendations intended to reduce Inadvertent Instrument Meteorological Conditions (IIMC) accidents and improve pilot instrument proficiency by removing the barriers to cost-effective IFR certification. These recommendations were written in the form of an alternative means of Part 27 compliance that would achieve this goal without needing a rule change. The White Paper and related links are available at www.vtol.org/se-ifr.

The proposed acceptable means of compliance detailed in the white paper supported six basic recommendations:

1. Establishment of a graduated level-of-safety based on rotorcraft class similar to that for Part 23 airplanes. [White paper §4.2 & 4.3]

2. Means to satisfy the IFR flight instrument requirements that would allow for a single pitot-static system and would recognition of the back-up capabilities provided by technology such as GPS. [Counter to AC 27.1303 b.(4)(B)(5)(ii)); White paper §4.4)]

3. Recognition that improved visual cues and the IFR workload reduction provided by modern technology is able to reduce the impact of stability augmentation failure, and proposes a performance demonstration as a means-of-compliance. This replaces a desk-top safety assessment and is key to allowing low-cost, single-channel autopilots. [White paper §4.5]

4. Recognition that total loss of radio nav and comm in an IFR rotorcraft is not "Catastrophic" for similar reasons it is not considered catastrophic in a Class I, II, and some Part 23 airplanes. [White paper §4.6]

5. Means to satisfy electrical requirements for IFR using a generator and battery without requiring that the battery be sized to power the systems for half the maximum duration of the rotorcraft fuel supply. [Counter to AC 27 Appendix B (14)(i)(H); White paper §4.7]

6. Relaxed means-of-compliance for showing HIRF and Lightning qualification. Expanded ability to use analysis, generic aircraft attenuation, similarity, and equipment qualification in place of expensive, installation-specific testing. This is key to the financial viability of IFR STCs. [White paper §4.8 & 4.9]

Of these six recommendations, the FAA proposed Policy PS-ASW-27-TBD only partially addresses the first point, thereby obviating the incentives to reduce IIMC accidents.

Appendix B: Considerations for Multiengine Rotorcraft

The current 14CFR Part 27 regulations recognize two distinct categories of multi-engine rotorcraft, Category A and Category B. There are many regulatory differences specific to these Categories that largely recognize the greater expected level of safety provided by a Category A multiengine rotorcraft. It therefore makes sense for the proposed Policy to also recognize this distinction.

14CFR Part 27 Appendix C imposes various Part 29 regulations on Part 27 Category A multi-engine rotorcraft, including provisions of 14CFR 29.1309. Therefore it would seem appropriate that Category A rotorcraft remain at a level equivalent to Transport Category, and that Category B rotorcraft be set to some lesser level. Therefore the following adjustments are proposed to Table 2 (page 5) in the proposed Policy, which (i) breaks out Category A into a "Class V", (ii) inserts suggested probabilities for Category B (Class IV), and (iii) modifies Class III as recommended to facilitate Single-Engine IFR certification for enhanced safety.

Classes of Rotorcraft	**Allowable Quantitative Probabilities and System Development Assurance Levels (FDAL/IDAL) (Note 1)**				
Class I Reciprocating Engine Occupants 5 or less including crew	No Probability or Development Assurance Levels Requirement	$<10^{-3}$ D Notes 1, 2	$<10^{-4}$ C Notes 1, 2 and 4	$<10^{-5}$ C Notes1, 2	$<10^{-6}$ C Notes 1, 2 and 3
Class II Single Turbine Engine Occupants 5 or less including crew Up to 4000lbs Max Gross Weight	No Probability or Development Assurance Levels Requirement	$<10^{-3}$ D Notes 1, 2	$<10^{-5}$ C Notes 1, 2	$<10^{-6}$ C Notes 1, 2	$<10^{-7}$ C Notes 1, 2 and 3
Class III Single Turbine Engine Occupants 6 or more including crew 4001-7000lbs Max Gross Weight	No Probability or Development Assurance Levels Requirement	$<10^{-3}$ D Notes 1, 2	$<10^{-5}$ C Notes 1, 2	$<10^{-6}$ C Notes 1, 2	$<10^{-7}$ B Notes 1, 2 and 3
Class IV Category B multi-engine ~~Twin Turbine~~	No Probability or Development Assurance Levels Requirement	$<10^{-3}$ D Notes 1, 2	$<10^{-5}$ C Notes 1, 2	$<10^{-7}$ C Notes 1, 2	$<10^{-8}$ B Notes 1, 2 and 3
Class V Category A multi-engine ~~Twin Turbine~~	No Probability or Development Assurance Levels Requirement	$<10^{-3}$ D Notes 1, 2	$<10^{-5}$ C Notes 1, 2	$<10^{-7}$ B Notes 1, 2	$<10^{-9}$ A Notes 1, 2 and 3

It is noteworthy that for Part 23 airplanes, equivalent probability to Transport Category applies only to "Commuter Class," which is 12,500 to 16,000 lbs and less than 19 passengers (excluding pilot seats).