

Flight Envelope Awareness/Protection

RATIONALE

This document has been reaffirmed to comply with the SAE 5-Year Review policy.

FOREWORD

Changes in this reaffirm are format/editorial only.

1. SCOPE:

This annex recommends additional design objectives applicable when control laws or control characteristics are modified for the purpose of Flight Envelope Awareness/Protection. While only manually controlled flight is addressed, it is assumed that Autoflight, Autothrottle, or Autothrust performance is compatible.

2. REFERENCES:

2.1 Applicable Documents:

This annex should be used in conjunction with the ARP4104 core document.

2.2 Definitions:

2.2.1 FLIGHT ENVELOPE AWARENESS: A function that incorporates modification of control characteristics, or control laws outside the normal flight envelope as a means to alert the pilot flying of a specific exceedance of aerodynamic, structural, or other boundaries.

2.2.2 FLIGHT ENVELOPE PROTECTION: A function that incorporates a modification of control laws outside the normal flight envelope in order to prevent or minimize the risk of exceedance of aerodynamic, structural, or other boundaries. Inputs of the pilot flying may be overridden by the system.

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3. OPERATIONAL REQUIREMENTS:

3.1 General Objectives:

- 3.1.1 Flight Envelope Awareness/Protection should be provided when feasible.
- 3.1.2 A Flight Envelope Awareness/Protection may be applied to any flight parameter where enhanced awareness and/or protection is considered beneficial. Sample parameters are: angle of attack, speed, load factor, pitch, roll, yaw, and side-slip.
- 3.1.3 In the absence of failures, the Flight Envelope Awareness/Protection shall be available in all appropriate flight phases. The method of protection shall be consistent in normal operation.
- 3.1.4 Flight Envelope Awareness/Protection inevitably restricts some maneuvering, however it should not compromise the necessary maneuvering capability of the aircraft. Careful consideration shall be given to maximizing remaining maneuver capability to enable the optimum use of available kinetic and potential energy for use in situations such as low speed recovery and windshear.
- 3.1.5 When Flight Envelope Awareness/Protection interfaces with multiple systems, e.g., Flight Control Computer and autothrottle, the resulting commands shall be coordinated.
- 3.1.6 Flight Envelope Awareness activation shall be conveyed in the most instinctive method possible. Tactile feedback through the associated control is preferred.
- 3.1.7 The pilot flying shall be able to override Flight Envelope Awareness using the associated control.
- 3.1.8 When Flight Envelope Protection is implemented, it should be preceded by Flight Envelope Awareness if other cues are inadequate.
- 3.1.9 In the event of excursions outside the Flight Envelope Protection boundaries, the system shall not hinder recovery, and where possible should assist the pilot flying.

4. PANELS:

Number not used.

5. CONTROLS:

Number not used.