



US009409654B2

(12) **United States Patent**
Johnson et al.

(10) **Patent No.:** **US 9,409,654 B2**
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **SYSTEM AND METHOD FOR IMPROVED LOW AIRSPEED WARNING**

5,225,829 A 7/1993 Bateman
6,169,496 B1* 1/2001 Martin G05D 1/0072
244/179

(71) Applicant: **HONEYWELL INTERNATIONAL INC.**, Morristown, NJ (US)

2004/0210355 A1 10/2004 Gaidelis, Jr. et al.

FOREIGN PATENT DOCUMENTS

(72) Inventors: **Steve Johnson**, North Bend, WA (US);
Yasuo Ishihara, Kirkland, WA (US);
Charles Donald Bateman, Bellevue, WA (US)

WO 2011078847 A1 6/2011

OTHER PUBLICATIONS

(73) Assignee: **HONEYWELL INTERNATIONAL INC.**, Morris Plains, NJ (US)

Extended EP Search Report for EP 15163939.0-1754; dated Nov. 9, 2015.

Fabre-Raimbault, N. et al.; Low Energy Awareness Protection on Airbus Fly-By-Wire Aircraft; Low Airspeed Alerting Task Appendix 1; Sep. 16, 2010.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 190 days.

* cited by examiner

(21) Appl. No.: **14/265,723**

Primary Examiner — Mussa A Shaawat

(22) Filed: **Apr. 30, 2014**

(74) *Attorney, Agent, or Firm* — Ingrassia, Fisher & Lorenz, P.C.

(65) **Prior Publication Data**

US 2015/0314884 A1 Nov. 5, 2015

(51) **Int. Cl.**
B64D 45/00 (2006.01)
B64D 43/02 (2006.01)

(57) **ABSTRACT**

(52) **U.S. Cl.**
CPC **B64D 45/00** (2013.01); **B64D 43/02** (2013.01)

A method and system are provided for generating a low airspeed warning in an aircraft. This method creates a scale factor that is a factor of engine thrust and aircraft altitude. A low airspeed threshold is determined that varies according to the aircraft altitude with respect to a predetermined altitude band and the engine thrust with respect to a predetermined engine thrust band. A low airspeed alert is generated in response to the determination of the low airspeed threshold. This method provides a pilot with earlier knowledge of low airspeed conditions when the aircraft is in a target altitude band, increasing the pilot's response time and thereby enhancing overall aircraft safety.

(58) **Field of Classification Search**
CPC B64D 43/02; B64D 45/00
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,965,572 A * 10/1990 Adamson G01S 17/95
340/963
5,220,322 A 6/1993 Bateman et al.

17 Claims, 4 Drawing Sheets

