SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

SAE AS8016

REV. A

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VERTICAL VELOCITY INSTRUMENT
(Rate-of-Climb)

FOREWORD

Changes in the revision are format/editorial only.

1. SCOPE:

1.1 Types:

This AS covers Vertical Velocity Instruments which display the rate of change of pressure altitude of an aircraft, as follows:

Type A - Direct reading, self-contained, pressure actuated
Type B - Electrically or electronically operated, self-contained, pressure actuated
Type C - Electrically or electronically operated, input from a remote pressure sensor

1.2 Range:

The range of operation of the instrument and the altitude range when applicable shall be as marked on the instrument face or nameplate.

1.3 Purpose:

This SAE Aerospace Standard (AS) establishes the minimum performance standards for vertical velocity instruments for aircraft use.

2. APPLICABLE DOCUMENTS:

The following documents shall form a part of this AS to the extent specified herein:

2.1 Radio Technical Commission for Aeronautics (RTCA) Document DO-160, "Environmental Conditions and Test Procedures for Airborne Electronic/Electrical Equipment and Instruments," dated 28 February 1975. Copies may be obtained from the RTCA Secretariat, 1717 H Street, N.W., Washington, DC 20006.

2.2 U.S. Standard Atmosphere, 1962. Copies may be obtained from the RTCA Secretariat, at the address given in 2.1.

2.3 "Rules for SAE Use of SI (metric) Units - SAE document J916b," dated July 1976. Copies may be obtained from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

3. GENERAL STANDARDS:

3.1 Indicating Means:

The vertical velocity shall be indicated by means of a pointer, dial tape, drum, or other type of moving element, or by a digital display with appropriate direction indication. Relative motion of the index with respect to the scale, or of the direction indicator (either the index or the scale may be the moving element) must be clockwise, up, or to the right for ascending vertical velocity.

3.2 Display:

3.2.1 Graduation (If Applicable): The graduations shall be arranged to provide the maximum readability consistent with the accuracy of the instrument, with at least 100 ft/minute (30 m/minute), graduations to 1000 ft/minute (300 m/minute). Major graduations shall be at 1000 ft/minute (300 m/minute), intervals and the minor graduations shall be at 500 ft/minute (150 m/minute) intervals.

3.2.2 Numerals (If Applicable): The display shall include sufficient numerals to permit quick and positive identification of each graduation.

3.2.3 Limits: The indicating means shall be limited in such a way that the moving element will not move more than (a) 10 degrees for circular display, or (b) 0.25 inch (.6 mm) for linear displays beyond the greatest graduation in both ascending and descending directions. When the instrument is pegged at its maximum rate indication, the direction of that indication, whether ascending or descending, shall be clear and unambiguous. If a digital display is used, a positive indication shall be provided on the display when the vertical velocity of the aircraft exceeds the instrument readout capability.

3.2.4 Visibility: The indicating means must be visible from all points within a space defined by a surface generated by lines making an angle of at least 30 degrees with the perpendicular to the display surface and diverging from the perimeter of the instrument window aperture. If integral lighting is provided, it must make all indicia within the instrument easily readable and not allow any objectionable stray light to come from the instrument.

3.2.5 Zero Setting: Means for manually zeroing the instrument shall be provided for Type A, and shall be optional for Types B and C. The zero adjust range shall be not less than 400 ft/minute up and down movement. These methods shall meet the requirements of 3.5.

3.3 Fire Resistance:

Except for small parts (such as knobs, fasteners, seals, grommets, and small electrical parts) that would not contribute significantly to the propagation of a fire, all materials used must be self-extinguishing when tested in accordance with the requirements of Federal Aviation Regulation 25.1359(d) and Appendix F thereto, with the exception that materials tested may be configured in accordance with paragraph (b) of Appendix F or may be configured as used.

3.4 Reflectance, Cover Glass:

The total reflectance of the instrument cover glass including the integral lighting wedge, if applicable, shall not exceed 10% of the incident light. This reflectance applies over the visible light spectrum from 450 millimicrons to 600 millimicrons, and over an incident solid angle of 60° perpendicular to the viewing plane.

3.5 Accessibility of Controls:

Controls not normally adjusted in flight must not be readily accessible to flight personnel.

3.6 Acceleration Sensitive Device:

Any device used in the instrument to superimpose an acceleration-sensitive indication of vertical velocity on the pressure-actuated indication of vertical velocity shall be fail safe and shall not degrade the normal operation of the instrument.

3.7 Interchangeability:

Instruments which are identified with the same manufacturer’s part number shall be interchangeable.

3.8 Effects of Tests:

Unless otherwise stated, the application of the specified tests shall not produce a condition which would be detrimental to the continued performance of the instrument.