

AEROSPACE INFORMATION REPORT

SAE AIR818

REV.
D

Issued 1963-03
Revised 2001-07
Reaffirmed 2008-02

Superseding AIR818C

Aircraft Instrument and Instrument System Standards: Wording Terminology, Phraseology, Environment and Design Standards For

FOREWORD

Changes in this Revision are format/editorial only.

INTRODUCTION

This Aerospace Information Report, (AIR) is intended to provide the sponsors of Aerospace Standards, (AS), with standard wording, formatting, and minimum environment and design requirements for use in the preparation of their document.

The individual shall use only those parts of this AIR which apply to their particular document. The individual sponsor may expand the standard wording, especially under Sections 4, 5, and 6 as required.

The paragraphs of this AIR shall be used verbatim wherever possible.

Unless otherwise directed by SAE, cross referenced documents shall be called out by specific revision letter, e.g. "shall be in accordance with ASXXXXB." In addition, all non-SAE documents called out shall include the document title when initially identified in Section 2. However, every effort shall be made to keep cross-referencing to an absolute minimum.

TITLE

The title shall be in uppercase lettering and may include an alternate common usage title in parenthesis.

VERTICAL VELOCITY INSTRUMENT (Rate-of-Climb)

When the particular document has a restrictive application, that restriction shall appear in the title in parenthesis.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2008 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: <http://www.sae.org>

SAE AIR818 Revision D

**LATERAL VELOCITY INSTRUMENT SYSTEM
(Rotary Wing Aircraft Only)**

unless otherwise directed by SAE, the document shall be structured as described in this AIR. In those instances where the major section is not applicable, the major section will be listed and the non-applicability noted, e.g.

8. Individual Tests

This section is not applicable to this document.

MINIMUM PERFORMANCE STANDARDS

1. SCOPE:

This AS covers _____ which measure and display _____

or

This AS covers _____ basic types of (no capitals) instruments as follows:

TYPE I: _____

TYPE II: _____

Note: Each type number to be followed by a brief description as it would if the scope were covering only a single type. As many types as required may be used.

1.1 Purpose:

This Aerospace Standard, (AS), specifies minimum performance standards for _____ (Instrument or instrument systems) which are primarily intended for use with (vehicles capable of flight), ((fixed wing, rotary wing) aircraft), (other special modifiers); (and whose purpose is to display _____ information).

2. APPLICABLE DOCUMENTS:

The following documents shall form a part of this standard to the extent specified. In event of conflict between these documents and this standard, the contents of this standard shall govern.

2.1 Federal Air Regulations:

List all appropriate Federal Aviation Agency documents identifying them by document number and date of issue.

SAE AIR818 Revision D

2.2 Military Specifications:

List all appropriate referenced documents.

2.3 SAE Documents:

List all appropriate referenced documents.

2.4 Other:

List all appropriate referenced documents (i.e. AIAA, ASTM, ATA, ICAO, RTCA, etc.)

3. GENERAL STANDARDS:

3.1 Material:

Material shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.2 Workmanship:

Workmanship shall be consistent with high grade aircraft instrument manufacturing practice.

3.3 Compatability:

If components are individually acceptable but require matching for proper operation, they shall be identified in a manner that will insure performance to the requirements of this AS.

3.4 Interchangeability:

Instruments and instrument systems which are identified with the same manufactured part or model number shall be completely interchangeable.

3.5 Accessibility of Controls:

Controls which are not normally adjustable in flight shall not be readily accessible to flight personnel when the instrument is installed in accordance with the manufacturer's instructions.

3.6 Self-Test Capability:

Self test provisions should be spring-loaded or otherwise arranged to automatically return to the normal operating mode following self-testing.

3.6.1 In-Flight Testing: In flight, self-test activation controls must provide a means to warn the pilot or appropriate flight crew member of this mode of operation.

SAE AIR818 Revision D

3.6.2 Combined Systems: If the equipment contains integral arrangements to permit pre-flight and/or in-flight self-test checks on the operation of the equipment in combination with other aircraft subsystems, a means shall be provided to deactivate any subsystem which might be adversely affected during the self-test cycle.

3.7 Effect of Tests:

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

3.8 Malfunction Indication:

Means must be provided to indicate malfunctions or failures in a positive manner.

3.8.1 Power Failure Indication: Means shall be incorporated in the instrument to indicate when adequate electrical power (voltage and/or current of all required phases), is not being made available for proper operation of the instruments.

3.8.2 Fail Safe Provisions: No failure or malfunction of the instrument system shall introduce unsafe transients to associated interconnected instruments.

3.8.3 Remote Indicator: Means shall be incorporated to detect an internal malfunction or loss of "information valid" signal from the remote source providing the information to be indicated.

3.9 Multiple Mode:

When an instrument or instrument system has more than one mode of operation, each mode of operation shall be identified by the instrument manufacturer.

3.9.1 Multiple Mode Indications: When an instrument has more than one mode, means shall be provided to indicate the mode of operation.

3.10 Identification:

The following information shall be legible and permanently marked on the instrument or nameplate attached thereto:

- (a) Name of instrument
- (b) Manufacturer's part number
- (c) Manufacturer's serial number or date of manufacture
- (d) FAA TSO (or SAE AS number or equivalent approval identification)
- (e) Aircraft identification, if applicable
- (f) Range, if applicable
- (g) Rating (electrical, pneumatic, vacuum), if applicable
- (h) Environmental categories
- (i) Manufacturer's name or trademark

3.11 Display:

- 3.11.1 Indicating Means: The functions shall be indicated, by means of one or more pointers, dials, tapes, drums, digital displays or other devices. Unless otherwise specified, relative motion of the index with respect to the scale, when moving elements are employed, (either the index or the scale may be the moving element), shall be clockwise, up or to the right for increasing values.
- 3.11.2 Graduations: The graduations shall be arranged to provide the maximum degree of readability consistent with the accuracy of the instrument.
- 3.11.3 Numerals: The display shall include sufficient numerals to permit quick and positive identification of each significant graduation.
- 3.11.4 Ambiguity: Appropriate means shall be provided to prevent ambiguous indications within the extremes of the operating range of the instrument.
- 3.11.5 Instrument Title: The instrument title when used, shall be of the same approximate size but no larger than the numerals. The title may be of the same finish as the numerals.
- 3.11.6 Instrument Function: Where more than one function is displayed on a single instrument, the function name, when used, shall be of the same approximate size but no larger than the numerals and/or instrument title.
- 3.11.7 Units of Measure: The units of measure, when applicable, shall appear on the display dial, (or face), in lettering noticeably smaller than either the numerals or the title.
- 3.11.8 Dial Finish: Where applicable, unless otherwise specified by the user, matte white material shall be applied to graduations, numerals and pointers. Non-functional surfaces shall be dull black. The manufacturer's name or trade-mark shall not appear on the dial unless in black-on-black.

SAE AIR818 Revision D

3.11.9 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 indicator window aperture.

3.11.10 Cover Glass Reflectance: The total reflectance of the display cover glass including the integral lighting wedge, if applicable, shall not exceed 10 percent of the incident light. This reflectance applies over the visible light spectrum from 450 milli-microns to 600 milli-microns and over an incident solid angle of 60 degrees perpendicular to the viewing plate.

3.11.11 Integral Lighting: When integral lighting is provided, it must, under normal cockpit lighting conditions, make all markings within the required visibility easily readable. No direct light shall radiate from the instrument within an angle of 45° either side of the vertical center line of the instrument face in the horizontal plane, and above 30° to the longitudinal axis in the vertical plane.

3.12 Hermetic Sealing:

When hermetically sealed, the case shall be filled with an inert gas, free of dust particles, and sufficiently dry so that fogging of the indicator glass does not occur during the low temperature and fogging tests of this Aerospace Standard.

3.13 Decompression:

When installed in accordance with the instrument manufacturer's instructions, the instrument shall function and not be adversely affected following exposure to a pressure decrease and decompression time as specified in RTCA DO-160A, paragraph 4.6.2.

3.14 Outgassing:

The instrument shall be so designed as to safeguard against hazards to the aircraft and crew, and/or malfunction of the instrument due to outgassing of compounds when subject to a vacuum equivalent to 12.7 mm (0.50 inches) of mercury for a period of two hours.

3.15 Explosion Proof:

The instrument, when intended for installation in uninhabited, non-pressurized areas shall not cause an explosion when operated in an explosive atmosphere. The instrument shall meet the requirements of Section 5 of this Aerospace Standard.

3.16 Fire Resistance:

Except for small parts, (e.g. fasteners, grommets, knobs, seals, 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.

SAE AIR818 Revision D

3.17 Magnetic Effects:

The magnetic field of the instrument shall not adversely affect the performance of other instruments installed in the same aircraft.

3.18 Radio Interference:

The instrument shall not be a source of objectionable interference and shall conform to the requirements of RTCA document DO-160A.

4. MINIMUM PERFORMANCE STANDARDS UNDER STANDARD CONDITIONS:

The Aerospace Standard shall identify those parameters, (factors), which relate to the acceptable minimum performance standards for the instrument under standard conditions. Each parameter shall be identified as a sub-paragraph under this section, (i.e. scale error, friction, case leakage, etc.)

The test conditions applicable to determining the performance of the instrument are set forth in Appendix A of this Aerospace Standard as recommended by the manufacturer.

The manufacturer shall conduct sufficient tests to prove compliance with this Aerospace Standard.

5. MINIMUM PERFORMANCE STANDARDS UNDER ENVIRONMENTAL CONDITIONS:

Unless otherwise specified herein, the procedures applicable to a determination of the performance of (type of instrument) under environmental conditions are set forth in Radio Technical Commission for Aeronautics, RTCA, document number DO-160A, entitled "Environmental Conditions and Test Procedures for Airborne Electronic/Electrical Equipment and Instruments," dated January, 1980. Performance tests specified after subjection to test environments may be made after exposure to several environmental conditions. The order of tests shall be in accordance with paragraph 3.2, page 4, of DO-160A.

The test procedures specified or referenced are satisfactory for use in determining the performance of (type of instrument) under standard and extreme environmental conditions. Alternate approved test procedures that provide equivalent results may be used.

As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this paragraph, shall be tested in accordance with the manufacturer's recommendations.

Each applicable test and the appropriate paragraphs of DO-160A shall be identified as a sub-paragraph within this section, (i.e. Temperature, Altitude, Humidity, Shock, Vibration, etc.). Within a given sub-paragraph, the applicable test and appropriate paragraphs of DO-160A shall be identified under a sub-heading, (i.e. Low Temperature, high Temperature, etc.).