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| Issued        | 1965-02 |
| Reaffirmed    | 1991-05 |
| Noncurrent    | 1996-11 |
| Reaf. Noncur. | 2008-02 |

**Mach Meters  
(Turbine Powered Subsonic Aircraft)**

**FOREWORD**

This document has been declared "NONCURRENT". It is recommended, therefore, that this document not be specified for new designs. "NONCURRENT" refers to those documents which have previously been widely referenced and may continue to be required on some existing designs. "NONCURRENT" documents are available from SAE upon request.

**1. PURPOSE:**

This Aerospace Standard establishes the essential minimum safe performance standards for mach meter instruments primarily for use with turbine powered subsonic transport aircraft, the operation of which may subject the instruments to the environmental conditions specified in Section 3.3.

**2. SCOPE:**

This Aerospace Standard covers the direct reading pressure actuated type mach meter.

**3. GENERAL REQUIREMENTS:**

**3.1 Materials and Workmanship:**

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

**3.1.2 Workmanship:** Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

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## SAE AS436

### 3.2 Identification:

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

- a. Name and type of instrument
- b. SAE AS 436
- c. Manufacturer's part number
- d. Manufacturer's serial number or date of manufacture
- e. Manufacturer's name and/or trademark
- f. Range
- g. Rating (if applicable)
- h. Aircraft identification (if applicable)

### 3.3 Environmental Conditions:

The following conditions have been established as minimum design requirements. Tests shall be conducted as specified in Sections 5, 6, and 7.

- 3.3.1 Temperature: When installed in accordance with the instrument manufacturer's instructions, the instrument shall function over the range of ambient temperature shown in Column A below and shall not be adversely affected by exposure to the range of temperature shown in Column B below.

| <u>Instrument Location</u> | <u>A</u>  | <u>B</u>    |
|----------------------------|-----------|-------------|
| Pressurized Areas          | 0 to 70 C | -65 to 70 C |

- 3.3.2 Altitude: When installed in accordance with the instrument manufacturer's instructions, the instrument shall function from sea level up to the altitudes and temperatures listed below. Altitude pressure values are per NACA Report 1235. Pressure sensing instruments which are connected to the static system shall withstand an external case pressure of 55 in. Hg abs when installed properly and vented to an atmospheric pressure of approximately 29.92 in. Hg abs.

| <u>Instrument Location</u> | <u>Altitude</u> | <u>Temperature</u> |
|----------------------------|-----------------|--------------------|
| Pressurized Areas          | 15,000 ft.      | 50 C               |

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- 3.3.3 Vibration: When installed in accordance with the instrument manufacturer's instructions, the instrument shall function and shall not be adversely affected when subjected to vibrations of the following characteristics:

| Instrument<br>Location | Frequency<br>(cps) | Max. Double<br>Amplitude<br>(In.) | Maximum<br>Acceleration<br>(g) |
|------------------------|--------------------|-----------------------------------|--------------------------------|
| Flight Deck            | 5-30               | 0.020                             | -                              |
| Area                   | 30-1000            | -                                 | 0.25                           |

- 3.3.4 Humidity: The instrument shall function and shall not be adversely affected following exposure to any relative humidity in the range from 0 to 95% at a temperature of approximately 70 C.

3.4 Fire Hazard:

The instrument shall be so designed to safeguard against hazards to the aircraft in the event of malfunction or failure.

3.5 Radio Interference:

The instrument shall not be the source of objectionable interference, under operating conditions at any frequencies used on the aircraft, either by radiation or feedback, in electronic equipment installed in the same aircraft as the instrument.

3.6 Magnetic Effect:

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

3.7 Decompression:

When installed in accordance with the instrument manufacturer's instruction, the instrument shall function and not be adversely affected following exposure to a pressure decrease from 22 to 2 in. Hg in 2 seconds.

3.8 Interchangeability:

Instruments and components which are identified per paragraph 3.2 shall be directly and completely interchangeable.

3.9 Operational Range:

The operational range of the instrument shall be from Mach 0.3 to 1.0.

#### 4. DETAIL REQUIREMENTS:

##### 4.1 Display Markings:

- 4.1.1 Finish: Unless otherwise specified by the user, Matte white material shall be applied to all graduations, numerals and indication means.

Non-functional surfaces and markings shall be durable dull black.

- 4.1.2 Graduations: The graduations shall be arranged to provide the maximum of readability consistent with the accuracy of the instrument.

- 4.1.3 Numerals: The display shall include sufficient numerals to permit quick and positive identification of each graduation.

Numerals shall distinctly indicate the graduation to which each applies.

- 4.1.4 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.

- 4.1.5 Visibility: The indicating means (indices, pointers, counters, etc.) shall be completely visible from all points within a space defined by a surface generated by lines making angles of at least 30 degrees with a perpendicular to the display surface and diverging from the perimeter of the instrument window aperture.

##### 4.2 Indicating Means:

The mach number shall be indicated by means of one or more pointers, dials, tapes, drums or other types of moving elements. Relative motion of the index with respect to the scale (either the index or the scale may be the moving element) shall be clockwise, up, or to the right for increasing mach number.

##### 4.3 Limitation of Pointer Movements:

The indicating means shall be limited by stops in the mechanism in such a way that the pointer will not be permitted to move more than 10 degrees for circular or 0.25 in. for linear dials beyond the highest graduation. Stops may also be incorporated in the instrument mechanism to limit counter-clockwise motion of the pointer beyond the lowest graduation.

##### 4.4 Case Markings:

The input connections in the rear of the case shall be as marked:

"P" - Pitot Pressure Connection  
"S" - Static Pressure Connection