

AEROSPACE RECOMMENDED PRACTICE

SAE ARP794

REV.
A

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Superseding ARP794

Airstream Deviation Instrument (ADI)

FOREWORD

Changes in this Revision are format/editorial only.

1. SCOPE:

This recommended practice covers an instrument which measures and displays angle of deviation of the airstream dependent on mounting location on the aircraft.

1.1 Purpose:

This Aerospace Recommended Practice recommends the industry standards for an Airstream Deviation Instrument primarily for use with turbine-powered, subsonic transport aircraft, the operation of which may subject the instruments to the environmental conditions specified in Paragraph 3.4.

2. REFERENCES:

NACA Report 1235
MIL-I-6181
AS425A
ARP461B

3. GENERAL REQUIREMENTS:

3.1 Materials and Workmanship:

3.1.1 Materials: Materials should 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 should be consistent with high grade instrument manufacturing practice.

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3.2 Identification:

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

- a. Name of instrument - Airstream Deviation Instrument
- b. SAE ARP794A (show number and revision letter)
- 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 (nominal voltage)
- h. Explosion Category

3.3 Compatibility of Components:

If components are individually acceptable, but require matching for proper operation, they should be identified in a manner that will assure proper matching.

3.4 Environmental Conditions:

The following conditions have been established as design requirements. Tests should be conducted as specified in Sections 5, 6 and 7, to insure compliance with this Aerospace Recommended Practice.

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

3.4.1.1 Housing: (That portion of instrument mounted inside of aircraft)

TABLE 1

<u>Instrument Location</u>	<u>A</u>	<u>B</u>
Pressurized Areas	0 to 70 °C	-65 to 70 °C
Non-pressurized Areas	-55 to 70 °C	-65 to 70 °C

3.4.1.2 Sensing Element: (That portion of instrument mounted in airstream)

TABLE 2

A B

External Areas -55 to 70 °C -65 to 70 °C

3.4.2 Altitude: When installed in accordance with the instrument manufacturer's instructions, the instrument should function from minus 1000 ft up to altitudes and temperatures listed below: Altitude pressure values are per NACA Report 1235. The instrument should not be adversely affected following exposure to extremes in ambient pressures of 50 and 2 inches of mercury absolute respectively.

3.4.2.1 Housing:

TABLE 3

<u>Instrument Location</u>	<u>Altitude</u>	<u>Temperature</u>
Pressurized Areas	15,000 ft	See Paragraph 3.4.1
Non-pressurized Areas	60,000 ft	See Paragraph 3.4.1

3.4.2.2 Sensing Element:

TABLE 4

A B

External Areas 60,000 ft See Paragraph 3.4.1

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

TABLE 5

<u>Instrument Location</u>	<u>Frequency cps</u>	<u>Maximum Double Amplitude Inch</u>	<u>Maximum Acceleration g</u>
Nacelle and Nacelle Mounts, Wings, Em- pennage and Wheel Wells	5-1000	0.036	10
Fuselage:			
Forward of Spar Area	5-1000	0.020	2
Center or Spar Area	5-1000	0.020	3
Aft of Spar Area	5-340	0.020	6
	340-1000	0.001	8
Flight Deck Area	5-1000	0.020	.5

- 3.4.4 Humidity: The instrument should function and not be adversely affected following exposure to any relative humidity in the range from 0 to 95% at a temperature of approximately 70 °C.
- 3.4.5 Icing: The instrument should function and not be adversely affected when subjected to icing conditions of 1.00 ± 0.25 grams liquid water per cubic meter of air at temperatures of -15 ± 5 °C and -30 ± 5 °C.

3.5 Explosion Category:

The instrument component, when intended for installation either in uninhabited areas of non-pressurized aircraft or in non-pressurized areas of pressurized aircraft, should not cause an explosion when operated in an explosive atmosphere. The component should meet the requirements applicable to the explosion category below. Specifically, any instrument component which can be an ignition source and is intended for installation in an area in which combustible fluid or vapor may result from abnormal conditions, e.g., fuel line leakage, should meet the requirements of Category I. If the intended location is an area where combustible fluid or vapor can occur during normal operation, e.g. fuel tank, the instrument component should meet the requirements of Category II listed below:

TABLE 6

<u>Category</u>	<u>Definition</u>	<u>Requirement</u>
I	Explosion proofed: Case not designed to preclude flame or explosion propagation.	Paragraph 8.3.1
II	Explosion proofed: Case designed to preclude flame or explosion propagation.	Paragraph 8.3.2
III	Hermetically sealed	Not applicable
IV	Instrument not capable of causing an explosion	Should not be capable of producing a capacitive or inductive spark of more than 0.2 milliojoules of energy or a contact spark of more than 4.0 millijoules of energy.

3.6 Fire Hazard:

The instrument should be so designed to safeguard against hazards to the aircraft in the event of malfunction or failure, and the maximum operating temperature of surfaces of any instrument component contacted by combustible fuel or vapor should not exceed 200 °C due to self-heating.

All materials should be non-combustible and should not liberate gases or fumes which will result in such corrosion as to cause malfunction of equipment or discoloration of dials or indicia, nor should toxic gases or fumes that are detrimental to performance of the aircraft or health of personnel be liberated under the operating conditions specified herein.

3.7 Radio Interference:

The instrument should not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation or feedback, in the electronic equipment installed in the same aircraft as the instrument, in accordance with the latest revision of MIL-I-6181.

3.8 Magnetic Effect:

The magnetic effect of the instrument should not adversely affect the performance of other instruments installed in the same aircraft and should be in accordance with Paragraph 8.9.

3.9 Decompression:

When installed in accordance with the instrument manufacturer's instructions, the instrument should function and not be adversely affected following exposure to pressure decrease from 22 to 2 inches of mercury in 2 seconds.

3.10 Interchangeability:

Instruments and components which are identified in accordance with Paragraph 3.2 should be directly and completely interchangeable.

3.11 Definitions:

Definitions should be in accordance with AS425A, Flight Control Compartment Nomenclature and Abbreviations, and as noted in the glossary of terms defined in Paragraph 9.

4. DETAIL REQUIREMENTS:

4.1 Design:

The instrument should be designed to measure the angles of airflow with respect to a pre-established aircraft reference line. The total range of measurement should be at least 50 angular degrees.

4.2 Operational Characteristics:

The instrument should respond to a change of 0.1 degree of angular deviation of the local airstream throughout a speed range of 80 to 220 knots with an accuracy of ± 0.25 degrees. The instrument should respond to a change of 0.1 degree of angular deviation of the local airstream throughout the speed range of 220 to 660 knots with an accuracy of ± 0.2 degrees.