



AEROSPACE RECOMMENDED PRACTICE

ARP416™**REV. B**

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Superseding ARP416A

Directional Indicating System
(Turbine Powered Subsonic Aircraft)

RATIONALE

This Technical Report contains no changes from the previous revision, other than the addition of a Stabilization Notice Page. This document has been determined to contain stable technical information which is not dynamic in nature.

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FOREWORD

Changes in this Revision are format/editorial only.

1. SCOPE:

This recommended practice covers the requirements for gyroscopically stabilized Directional Indicating Systems, which will operate as a 1°/hour latitude corrected, free directional gyro or as a slaved gyro, magnetic compass with 1/2° accuracy.

1.1 Purpose:

To recommend the essential minimum safe performance requirements for gyroscopically stabilized Directional Indicating System, primarily for use with turbine powered subsonic transport aircraft, the operation of which may subject the instruments to the environmental conditions specified in paragraph 3.3.

2. REFERENCES:

There are no referenced publications specified herein.

3. GENERAL REQUIREMENTS:

3.1 Material 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 aircraft instrument manufacturing practice.

3.2 Identification:

The following information should be legibly and permanently marked on the instrument or nameplate attached thereto: (not necessarily in the order shown):

- a. Name of Instrument
- b. ARP416A
- c. Manufacturer's part number
- d. Manufacturer's serial number or date of manufacture
- e. Manufacturer's name and/or trade-mark
- f. Rating (Electrical, etc.)
- g. Explosion Category

3.3 Environmental Conditions:

The following conditions have been established as design criteria only. 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 instruments should function over the range of ambient temperatures as listed in column A below and should not be adversely affected by exposure to the temperature shown in column B below.

TABLE 1

<u>Instrument Location</u>	<u>A</u>	<u>B</u>
Pressurized Areas	-30 to 50 °C	-65 to 70 °C
Non-Pressurized Areas	-55 to 70 °C	-65 to 70 °C

- 3.3.2 Altitude: When installed in accordance with the instrument manufacturer's instructions, the instruments should function from sea level up to the altitudes and temperatures listed below. Altitude pressures are per NACA Report 1235. The instrument should not be adversely affected following exposure to extremes in ambient pressure of 50 and 3 inches Hg absolute respectively.

TABLE 2

<u>Instrument Location</u>	<u>Altitude Feet</u>	<u>Temperature °C</u>
Pressurized Areas	15,000	50
Non-Pressurized or External Areas	60,000	40

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

TABLE 3			
<u>Instrument Location</u>	<u>Frequency Cycles Per Second</u>	<u>Max. Double Amplitude - Inches</u>	<u>Maximum Acceleration</u>
Nacelle, Nacelle Mounts, Wings, Empennage and Wheel Wells	5-1000	0.036	10 g
Fuselage			
Forward of Spar Area	5-500	0.036	2 g
Center of Spar Area	5-1000	0.036	4 g
Aft of Spar Area	5-500	0.036	7 g
	500-1000	-	5 g
Vibration Isolated Rack	5-1000	0.030	1 g
Instrument Panel	5-30	0.020	-
	30-1000	-	0.25 g

- 3.3.4 Humidity: The instrument should function and should 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 Explosion Category:

All instrument components located in the uninhabited areas of non-pressurized aircraft or in the non-pressurized areas of pressurized aircraft should not cause an explosion when operated in an explosive atmosphere. Each component located in such an area should meet the requirements of one of the explosion proof categories given below.

If it is intended that a component which might be an ignition source will be located in an area where combustible fluid or vapor may occur in normal operation, such as a fuel tank, it should be designed to meet the requirements of Category II, below. If the intended location is an area where combustible fluid or vapor may occur only as a result of abnormal conditions, such as leakage of a fuel line, it should be designed to meet the requirements of Category I, below.

TABLE 4

<u>Category</u>	<u>Definition</u>	<u>Requirements</u>
I	Explosion Proofed; case not designed to prevent flame or explosion propagation.	Test per paragraph 7.4.1.1
II	Explosion Proofed; case designed to prevent flame or explosion propagation.	Test per paragraph 7.4.1.2
III	Hermetically Sealed	Test per 7.7
IV	Instrument not capable of causing an explosion	Must not be capable of producing a spark with more than 0.2 millijoules of energy.

3.5 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.

3.6 Radio Interference:

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

3.7 Magnetic Effect:

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

3.8 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 from 22 to 2 inches of mercury in 2 seconds.