



AEROSPACE STANDARD	AS440™	REV. B
	Issued 1963-02 Revised 1996-09 Stabilized 2020-12 Superseding AS440A	
Automatic Pilots (Turbine Powered Subsonic Aircraft)		

RATIONALE

This standard 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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This document has been declared "Stabilized" by the SAE A-4 Aircraft Instruments Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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FOREWORD

Changes in the revision are format/editorial only.

1. SCOPE:

This SAE Aerospace Standard (AS) covers automatic pilots intended for use on aircraft to automatically operate the primary and trim aerodynamic controls to maintain stable flight and/or to provide maneuvering about any of the three axes through servo control. Automatic control functions essential for primary or augmented flight control are excluded.

1.1 Purpose:

To establish essential minimum safe performance standards for automatic pilots primarily for use with turbine powered subsonic transport aircraft, the operation of which may subject the instrument to the environmental conditions specified in Section 3.3.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 NTIS Publications:

Available from NTIS, Springfield, VA 22161.

NACA Report 1235

3. GENERAL REQUIREMENTS:

3.1 Material and Workmanship:

3.1.1 Materials: Materials shall be of 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.

3.2 Identification:

The following information shall be legibly and permanently marked on each of the components or attached thereto:

- a. Name of unit
- b. SAE AS440A
- c. Manufacturer's part number
- d. Manufacturer's serial number or date of manufacture
- e. Manufacturer's name and/or trademark
- f. Range (if applicable)
- g. Rating (if applicable)
- h. Explosion category (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 temperatures as listed in Column A below and shall not be adversely affected by exposure to the temperature shown in Column B below.

TABLE 1

Instrument Location	A	B
Power Plant Accessory Compartment	-30 to 150°C	-65 to 150 °C
Pressurized Areas	-30 to 50 °C	-65 to 70 °C
Non-Pressurized or External Areas	-55 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. The instrument shall not be adversely affected following exposure to extremes in ambient pressure of 50 and 3 inches Hg absolute respectively.

TABLE 2

Instrument Location	Altitude	Temperature
Power Plant Accessory Compartment	50,000 feet	80 °C
Pressurized Areas	15,000 feet	50 °C
Non-Pressurized or External Areas	50,000 feet	20 °C

- 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.

TABLE 3

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

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

3.4 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, shall not cause an explosion when operated in an explosive atmosphere. The component shall 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 which combustible fluid or vapor may result from abnormal conditions, e.g., fuel line leakage, shall 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 shall meet the requirements of Category II, listed below:

TABLE 4

Category	Definition	Requirements
I	Explosion Proofed: case not designed to preclude flame or explosion propagation.	Paragraph 7.3.1
II	Explosion Proofed: case designed to preclude flame or explosion propagation.	Paragraph 7.3.2
III	Hermetically Sealed	Paragraphs 7.7 and 6.1.2.1
IV	Instrument not capable of causing an explosion.	Shall not be capable of producing a capacitive or inductive spark of more than 0.2 millijoules of energy or a contact spark of more than 4.0 millijoules of energy.

3.5 Fire Hazard:

The instrument shall 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 shall not exceed 200 °C due to self-heating.