



AEROSPACE STANDARD	AS8008™	REV. A
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Superseding AS8008		
Flight Director Equipment		

RATIONALE

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1. PURPOSE: This Standard specifies the minimum Standards for Flight Director Equipments under standard and environmental conditions.
2. SCOPE: This Aerospace Standard covers Flight Director Equipments which display to the pilot a computed command for the operation of an aircraft in accordance with selected Mode(s). The term "Equipment" may include controls, displays, computers, etc. and may include sensors if furnished as a part of the Flight Director.
3. GENERAL STANDARDS:
 - 3.1 Operation of Controls: The design of the equipment shall be such that the controls intended for use during flight cannot be operated in any possible position combinations or sequences that would result in a condition detrimental to the continued performance of the equipment or have any detrimental effect on associated equipments.
 - 3.2 Accessibility of Controls: Controls not intended for adjustment in flight shall not be readily accessible to flight personnel.
 - 3.3 Fire Hazard: Except for small parts (such as knobs, fasteners, seals, grommets, and 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.
 - 3.4 Control Command Display: Where indicated by two symbols, one representing the airplane and one representing the direction of command control, the symbols shall diverge as the aircraft departs from a computed steering command and converge as it returns. Departure in the direction of a left roll, or a decreased heading or course, shall cause the aircraft symbol to appear to move laterally or rotationally to the left with respect to the command symbol, and in the opposite direction for an increased heading.

3.4 (Continued):

Departure in the direction of nose down pitch attitude or decreased altitude shall cause the aircraft symbol to appear to move below the command symbol, and in the opposite direction for a nose up departure. Control commands shall be satisfied when the symbols coincide.

Where command Control is presented by a cross pointer display, the sensing of the command presentation shall be such that the aircraft is flown toward the indication to satisfy the command i.e. the 'fly to the needle' convention shall apply.

3.5 Heading and Course Selectors (if applicable):

(a) Heading Selector - Means shall be provided to permit setting the desired heading into the Flight Director Equipment. The indication of the heading selected shall be continuously displayed.

(b) Course Selector - Means shall be provided to permit setting the desired course into the Flight Director Equipment. The indication of the course selected shall be continuously displayed.

3.6 Corrective Control Range: The flight director equipment shall present effective control information for recovery of the aircraft to straight and level flight from any attitude about the three axes throughout the following minimum ranges from level flight:

Pitch: $\pm 50^\circ$

Roll: $\pm 75^\circ$

Yaw: $\pm 20^\circ$

3.7 Function Selection: Means shall be provided for selecting the desired modes of operation and indicating the operative mode or sub-mode, as applicable. Possible modes of operation may include, but are not limited to the following:

- (a) Preselect Altitude and Hold
- (b) Preselect Heading and Hold
- (c) Altitude Hold
- (d) Airspeed Hold
- (e) ILS Approach
- (f) VOR/LOC Course

Where there may be armed modes as well as capture modes there shall be provisions to annunciate both the armed mode(s) and the operative mode(s).

3.8 System Interlock: Means shall be provided to prevent the flight director from presenting command signals until it has reached a fully operable condition. An inoperative condition shall be made obvious to the flight crew by such means as warning flags and/or retraction of command bars from view, or other positive means. As an example, loss of ILS ground station validity during use of selected approach modes would be indicated.

3.8 (Continued):

Provisions shall be made to prevent simultaneous application of control signals which may result in unsafe command indications. As an example, simultaneous application of GS and constant altitude control signals would be considered unsafe.

- 3.9 Malfunction Indication: Means shall be incorporated in the equipment to indicate when adequate primary power is not being made available to the equipment for proper operation. In addition, for those display functions which employ a follow-up positioning mechanism, the follow-up mechanism shall be monitored. A means of malfunction indication shall be provided for all modes presented.

The means shall indicate malfunctions in a positive manner.

- 3.10 Interface Parameter Characteristics: In the event that the equipment manufacturer is not providing the complete flight director equipment, but is providing only a portion, such as an indicator, it is required that the manufacturer either define all of the interface parameter characteristics to assure that the combination of components comprising the total equipment meet the general performance requirements of this standard under normal and environmental conditions, or specify the complimentary components.

- 3.11 Reflectance: The total reflectance of the indicator cover glass, including the integral lighting wedge, if applicable, shall not exceed 10% of the incident light. This reflectance applies over the visible light spectrum from 450 milli-microns, and to 600 milli-microns and over an incident solid angle of 60° perpendicular to the viewing plane.

4. PERFORMANCE STANDARDS UNDER STANDARD CONDITIONS: The standard test conditions applicable to a determination of the performance of Flight Director Equipments are set forth in DO-160. All equipments shall be tested in accordance with the manufacturer's recommendations. The manufacturer shall conduct sufficient tests to prove compliance with this standard.

5. PERFORMANCE STANDARDS UNDER ENVIRONMENTAL CONDITIONS: Unless otherwise specified herein, the procedures applicable to a determination of the performance of Flight Director Equipment under environmental conditions are set forth in Radio Technical Commission for Aeronautics (RTCA) Document No. DO-160, entitled "Environmental Conditions and Test Procedures for Airborne Electronic/Electrical Equipment and Instruments", dated 28 February 1975. The order of tests shall be in accordance with paragraph 3.2, page 4, of DO-160. The test procedures specified or referenced are satisfactory for use in determining the performance of Flight Director equipments under standard and extreme environmental conditions. Alternate approved test procedures that provide equivalent results may be used. As many equipments as deemed necessary to demonstrate that all equipments will comply with the requirements of this paragraph, shall be tested in accordance with the manufacturer's recommendations.

5.1 Temperature - Altitude:

- (a) Low Temperature - The equipment shall be subjected to the tests of DO-160, paragraph 4.4. During the test, the equipment shall operate electrically and mechanically and the requirements of paragraph 4 of this standard shall be met.
- (b) High Temperature - The equipment shall be subjected to the tests of DO-160, paragraph 4.5.1 and 4.5.2. During the test, paragraph 4.5.1, the equipment shall operate electrically and mechanically and there shall be no evidence of materials such as potting and sealing compounds exuding or dripping from or within the equipment. When subjected to the tests of paragraph 4.5.2, the equipment shall operate electrically and mechanically and the requirements of paragraph 4 of this standard shall be met.
- (c) Altitude - The equipment shall be subjected to the tests of DO-160, paragraphs 4.6.1, 4.6.2, and 4.6.3. During the test, paragraph 4.6.1, the equipment shall operate electrically and mechanically and the requirements of paragraph 4 of this standard shall be met. After being subjected to the tests of paragraph 4.6.2, the requirements of paragraph 4 of this standard shall be met at standard conditions, and after being subjected to the tests of paragraph 4.6.3, the requirements of paragraph 4 shall be met.

5.2 Humidity: The equipment shall be subjected to the tests of DO-160, paragraph 6. After the equipment is subjected to the appropriate tests of paragraph 6, it shall meet the requirements of paragraph 4 of this standard.

5.3 Shock: The equipment shall be subjected to the tests of DO-160 paragraphs 7.1 and 7.2.

- (a) After the equipment is subjected to the tests of paragraph 7.1, it shall meet the requirements of paragraph 4 of this standard under standard conditions.
- (b) Following the tests of paragraph 7.2, the equipment or dummy load shall have remained in its mounting and no parts of the equipment or its mounting base become detached and free of the shock test equipment.

5.4 Vibration: The equipment shall be subjected to the tests in accordance with DO-160, paragraph 8.2. During the test, it shall operate electrically and mechanically and the requirements of paragraph 4 shall be met.

5.5 Power Input:

(a) Normal Electrical Input Variation Test:

- (1) The equipment shall be subjected to the tests in DO-160, paragraph 16.3.1. During the test, it shall meet the requirements of paragraph 4 of this standard.