

Memorandum

U.S. Department
of Transportation
**Federal Aviation
Administration**

Subject: **INFORMATION:** Policy Statement on the Installation of
Transport Category Airplane Flightdeck Liquid Crystal
Displays

Date: DRAFT

From: Manager, Transport Airplane Directorate, Aircraft
Certification Service, ANM-100

Reply to
Attn. of: ANM-03-111-18
Dr. John McConnell

To: See Distribution

Regulatory §§ 25.1301, 25.1303,
Reference: 25.1305, 25.1309,
25.1316, 25.1321,
25.1322, AC 25-11

The purpose of this memorandum is to clarify Federal Aviation Administration (FAA) certification policy on the installation of liquid crystal displays (LCD). This memo addresses the lack of published approval criteria for LCD technology and provides guidance on performance levels that have been found to be acceptable for LCDs used as pilot displays in the flightdeck of transport category airplanes.

Current Regulatory and Advisory Material

Section 25.1301 of 14 Code of Federal Regulations (CFR) Part 25 requires that *each item of installed equipment must:*

- (a) *Be of a kind and design appropriate to its intended function;*
- (b) *Be labeled as to its identification, function, or operating limitations, or any applicable combination of these factors;*
- (c) *Be installed according to limitations specified for that equipment; and*
- (d) *Function properly when installed.*

Sections 25.1303 and 25.1305 address specific requirements for Flight and Navigation, and for Powerplant instruments, respectively. Section 25.1309, in brief, requires that:

- (a) *The equipment, systems, and installations, whose functioning is required by this subchapter, must be designed to ensure that they perform their intended functions under any foreseeable operating condition.*
- (b) *The airplane systems and associated components, considered separately and in relation to other systems, must be designed so that--*
 - (1) *The occurrence of any failure condition which would prevent the continued safe flight and landing of the airplane is extremely improbable, and*
 - (2) *The occurrence of any other failure conditions which would reduce the capability of the airplane or the ability of the crew to cope with adverse operating conditions is improbable.*

(c) Warning information must be provided to alert the crew to unsafe system operating conditions, and to enable them to take appropriate corrective action. Systems, controls, and associated monitoring and warning means must be designed to minimize crew errors which could create additional hazards. ...

Sections 25.1321 and 25.1322 address requirements for the installation of airplane instrumentation, alerts and indications, and § 25.1431 addresses the installation of radio and miscellaneous electrical equipment, any of which may utilize LCD technology.

Advisory Circular (AC) 25-11, "Transport Category Airplane Electronic Display Systems," provides guidance for the certification of electronic display systems and was issued when Cathode Ray Tube (CRT) based electronic display systems were prevalent. As a result, AC 25-11 contains many references to criteria and industry standards that are unique to CRTs, but does not contain equivalent criteria and references to industry standards for LCDs.

Relevant past Practice

The policy presented in this memorandum has been substantially utilized as a supplement to the guidance presented in AC 25-11 and has been previously communicated on various projects through the issue paper process. It is based on the industry standard offered in Society of Automotive Engineers (SAE) Aerospace Recommended Practice (ARP) 4256, "Design Objectives for Liquid Crystal Displays for Part 25 (Transport) Aircraft." Additional guidance and rationale may be found in that document.

Policy

Advisory Circular 25-11 has proven to be acceptable guidance for installation of electronic displays in transport category airplanes. The FAA will continue to use this AC as installation guidance for electronic displays, including LCDs. In addition, as specific guidance for the installation of LCDs, SAE ARP 4256 should be referred to in lieu of SAE ARP 1874, "Design Objectives for CRT Displays for Part 25 (Transport) Aircraft." Specifically, for guidance on LCD visual characteristics, the applicant should refer to SAE ARP 4256 rather than to SAE ARP 1874 in paragraphs 6a, 6b(4), and 6c of AC 25-11. In addition, all references in AC 25-11 to CRT displays should be interpreted as also being applicable to LCDs, with the exception of paragraph 6b(4)(vi), which applies only to CRT displays.

NOTE: The most recent revision of the reference SAE ARP documents should be considered. However, in the event of conflicting information between the SAE documents (e.g., SAE ARP 4256) and AC 25-11, other than guidance specific to the use of LCDs, AC 25-11 takes precedence as guidance for the certification of transport category airplane installations.

Effect of Policy

The general policy stated in this document does not constitute a new regulation or create what the courts refer to as a "binding norm." The office that implements policy should

follow this policy when applicable to the specific project. Whenever an applicant's proposed method of compliance is outside this established policy, it must be coordinated with the policy issuing office, e.g., through the issue paper process or equivalent.

Applicants should expect that the certificating officials will consider this information when making findings of compliance relevant to new certificate actions. Also, as with all advisory material, this policy statement identifies one means, but not the only means, of compliance.

Questions regarding this memorandum should be directed to Dr. John McConnell of the Airplane and Flight Crew Interface Branch, ANM-111. Dr. McConnell's telephone number is (425) 227-1365 and his e-mail address is john.mcconnell@faa.gov.

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