



AEROSPACE RECOMMENDED PRACTICE

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Superseding ARP991B

(R) Position and Anticollision Lights - Fixed-Wing Aircraft

RATIONALE

This document is to provide the minimum design requirements with regards to Position and Anticollision light systems on fixed-wing aircraft. The minimum levels stated in this document are significantly above the minimum requirements outlined in the CFR publications. The rationale for this is to take into account real life factors that can impact the overall lighting output of the assembly (i.e., dirt, lamp degradation, etc.). New light assemblies should never be designed to meet the minimum requirements. In addition, with the use of LEDs as replacements for filtered incandescent lamps and strobe tubes, the design requirements need to be higher since LED assemblies do not have a single point failure mode like a burnt-out lamp but have degraded performance with some of the individual LEDs failing while the majority of LEDs continuing to operate. This degraded performance mode inherent with most LED assemblies shows the need to have higher initial design requirements to overcome the loss of some LEDs until the operator can make a determination to remove and replace the entire assembly.

FOREWORD

This SAE Aerospace Recommended Practice (ARP) provides recommendations for a standard for aircraft navigation position lights and anticollision lights which have intensities, redundancy, and are of a configuration commensurate with the vital role these lights play in collision avoidance during nighttime and darkened sky conditions. Since, in some countries, the term "navigation" lights is used and in others, the term "position" lights is used, in this document, the term "navigation position" lights will be used to avoid confusion.

The two lighting systems serve a combined function. The higher intensity of the flashing anticollision lights serves to attract attention to the traffic. The steady-burning navigation position lights can better show position of the aircraft and direction of flight. While the color of the navigation position lights will indicate to the observer, the sector observed, the apparent motion of the light in the observing pilot's windshield is used as primary assessment of a collision threat. Therefore, the intensity of the steady burning light should be such that it becomes visible almost as soon as the observer pilot's attention is attracted to the high intensity flashing light.

The intensities listed in this document are initial intensities for new light assemblies. These intensities are much higher than the intensities necessary for regulatory requirements and/or service performance requirements. One advantage gained by utilizing the intensities specified in this document are longer operating times at intensities above minimum service performance requirements. Increased intensity does marginally increase visibility distance under reduced visibility conditions, and under lower contrast conditions such as in metropolitan areas or in twilight or dawn conditions. These intensities are considerably higher than threshold levels for clear atmospheric conditions, are visible at very long distances, and include substantial allowances for atmospheric factors which may reduce the conspicuity of the lights. The electrical systems on the aircraft should be designed to produce the operating voltages required by the lights covered by this document to meet the design intensity requirements when new and under normal operating conditions.

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Compensation for other factors which may cause the intensities of the lights to degrade in service are also included in the initial intensities. These include exterior dirt, interior contamination, lamp or flashtube degradation, and degradation of reflectors, capacitors and other components.

The initial intensities recommended in this document are not intended to be utilized as regulatory requirements nor to imply any need for new regulatory requirements.

Acceptable service performance requirements need to be defined. It is recognized that the accurate measurement of the photometric quantities included in this document is extremely difficult and that large errors can occur. Test conditions such as test geometry, ambient temperature, lens temperature, ambient illumination, and reflections can be controlled in the laboratory but not in field tests. The result is that field measurements usually have much higher uncertainties than laboratory measurements.