

**AERONAUTICAL CHARTING FORUM**  
**Charting Group**  
**Meeting 09-02 - October 28-29, 2009**

**RECOMMENDATION DOCUMENT**

**FAA Control # 09-02-218**

**Subject:** Incompatibility Issues between the Enhanced Flight Vision System (EFVS) and Light Emitting Diodes (LEDs).

**Background/Discussion:** The EFVS is an infrared (IR) based system that utilizes conventional (incandescent) approach light and runway/taxiway lighting fixtures. The EFVS operates in the Near IR bands and Mid Wave bands (1.2 – 5 um) range. Performance in fog has been proven with the human eye, a result of transmission of near and mid wave IR thru the atmosphere. Light in the normal spectral regions cannot penetrate fog, haze, snow and other low visibility obscurants like infrared based EFVS systems. The IR emitted by the incandescent lighting technologies enables the EFVS.



With EFVS

Without EFVS

Airport taxiway and a limited number of runway LED lighting technologies have recently been deployed by the Office of Airports in accordance with FAA Advisory Circular 150/5340-30D and Engineering Brief 67. IR emissions associated with LEDs are essentially zero, therefore disabling the ability of the EFVS to provide airport lighting cues on approach and/or taxing.

**Recommendations:** We are recommending the incorporation of “negative symbology” in the Airport Facility Directory, U.S. Terminal Procedures and other applicable documents where LEDs are installed. This will alert the pilot of an EFVS equipped aircraft that LEDs are installed therefore notifying the pilot that the runway/taxiway lighting may not be visible when using the EFVS.

**Comments:** This recommendation affects airports that have LEDs airport lighting installed and EFVS equipped aircraft that intend to use these airports.

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**Date:** June 25, 2009

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**MEETING 09-02:** Mr. John Moore, FAA/AeroNav Services, presented the issue for Mr. Alvin Logan, FAA/AAS-100, who was not available. EFVS is an infrared (IR) based system that utilizes conventional (incandescent) approach light and runway/taxiway lighting fixtures. EFVS operate in the Near IR band and Mid Wave band (1.2 – 5 um) range. Performance in fog has been proven with the human eye, a result of transmission of near and mid wave IR through the atmosphere. Light in the normal spectral regions cannot penetrate fog, haze, snow and other low visibility obscurants like infrared-based EFVS systems. The IR emitted by the incandescent lighting technologies enables the EFVS.

The Office of Airports, in accordance with FAA Advisory Circular 150/5340-30D and Engineering Brief 67, has recently deployed a limited number of airport taxiway and runway LED lighting technologies. IR emissions associated with LEDs are essentially zero, therefore disabling the ability of the EFVS to provide airport lighting cues on approach and/or taxing.

The recommendation was made to place a note or “negative symbology” on TPPs, A/FDs and any other documents to indicate that LED lights are installed. This will notify the pilot of EFVS-equipped aircraft that LEDs are installed and that the runway/taxiway lighting may not be visible when using the EFVS. The consensus from pilots present was that this information would be valuable. Mr. Ted Thompson, Jeppesen, expressed concerns about source reliability on providing and maintaining the specifics of LED lighting installation availability. This would include if an airport has installed LED lighting, which airport lighting components might be involved, i.e., runway edge lights, taxiway lights, etc., and what additional limitations may exist, i.e., first 500 feet Taxiway X LED lights, etc.

The ACF fully realizes that the collection and maintenance of airport-related source data is a major outstanding issue to be overcome. The availability of source information for LED lighting systems represents yet another weakness in that the information cannot be charted, either as a general airport note or a specific graphic, if there is no reliable source.

Mr. EC Hunnicutt, FAA/Airports, suggested that airport surveys could be used to collect LED lighting information. Mr. John Moore, FAA/AeroNav Services, noted that, even if airport surveys could collect the data, it would be difficult to communicate to the pilot the details of exactly where the LEDs are positioned. Ms. Valerie Watson, FAA/AeroNav Services, voiced the opinion that if any action is taken to inform the pilot of the presence of LED lighting at an airport, specifics not be given, but only a simple indication that LED lighting exists. Tracking and publishing in detail which twy, rwy, apch, etc., lights are affected is not feasible. More discussion is needed before any charting solutions are proposed.

**ACTION:** Mr. Logan will provide a follow-up at the next ACF.

**MEETING 10-01:** Ms. Terry Stubblefield and Mr. Bryant Welch, FAA/AFS-410, recapped the issue and added that an SAE Tech Committee has been established to determine how to design a system that would enable EFVS with LED. They do not want to diminish the operational credit provided by EFVS as it is part of the NexGen push. FedEx is equipping their entire fleet with EVFS and Net Jets is a heavy user of EVFS. There are approximately two thousand EFVS units currently in use and expanding. Due to a concern raised by Steve Serur, ALPA, they were aware that pilots with color vision issues are affected and it was being looked at by the industry to see if a solution to the LED frequency could aid those pilots. Due to congressional mandate all airports are converting all incandescent lights to LED's including obstruction lighting.

Mr. Ted Thompson, Jeppesen, noted that the issue of LED usage has more aspects than just taxiway and obstruction lighting. If airports are required to replace all lights how will that affect approaches? There are two regimes that must be considered: airborne and surface. How will LED usage affect SMGCS operations? Will minimums have to be raised or changed?

Mr. John Moore, FAA/AeroNav, asked who was controlling the information of exactly what lights are being installed and at which airports. The scope of the problem affects numerous aspects: FAA policy, ESVS systems, Flight Standards (reduced visibilities), systems, airport reporting, source data capture and dissemination, database record modifications, charting requirements. For example, it needs to be understood which lighting systems are affected, what about sourcing and maintenance of the data, how are pilots affected, what is the impact to low visibility procedures (airborne; landing and take-off, and surface movement), and what are the requirements for charting?

Flight Standards and/or the user needs to define the requirement. Mr. Welch said he was unaware of any mandate to track the use of LED's and would have to work on the issue of what lights affect minimums.

Mr. Juergen Kuhnhenh, Lido, commented that EASA ruling states that pilots must determine if EVFS operations are authorized based on lighting configuration (LED) prior to operation.

Mr. Moore acknowledge there was a lot more going on behind the scenes, that this issue should remain open and Charting needs to stay informed of the progress. However, developing a charting option at this time might be premature. It was decided that a Working Group should be established to continue to work on the issue. Mr. Alvin Logan, FAA/AAS-100, will chair the EFVS Working Group listed below.

**EFVS & LED Compatibility Working Group**

<b>Name</b>	<b>Organization</b>	<b>Phone #</b>	<b>Email</b>
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Ms. Adrienne Funk	FAA/AJR-32	202-267-9282	<a href="mailto:adrienne.1.funk@faa.gov">adrienne.1.funk@faa.gov</a>

\*Mr. Steve Serur, ALPA, has agreed to be the point of contact for ALPA until such time as a Pilot Member is assigned.

**ACTION:** Mr. Alvin Logan, Chair of the WG, will report back at the next ACF.

**ACTION:** Mr. Bryant Welch will report on the issue of what lights affect minimums.

**MEETING 10-02:** Ms. Terry Stubblefield, FAA/AFS-410, reported that a technical Working Group within SAE-G20 has been working to determine a solution which can be used to enable LED lights to be seen by EFVS. A November 2010 meeting is scheduled to discuss further developments, but she believes a possible solution has been found.

It was noted that the ACF Working Group put in place last ACF had not convened.

Ms. Valerie Watson, FAA/AJV-3B, noted that there was still no means of tracking what lights are being installed and asked if the LED installation process could be stopped until such time as the ramifications and potential safety concerns could be better understood. Ms. Stubblefield said she is aware of the tracking issue and she is working internally to develop a solution; however, due to the Congressional Mandate there will be no way of stopping the installation of LEDs.

Mr. Moore, FAA/AJV-3B, decided to leave the issue open and asked that the Working Group be convened.

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**NOTE:** Mr. Steve Serur, ALPA, Mr. Dick Temple, FAA/AFS-410, and Mr. Bruce Beard, FAA/AJV-14, have been added to this existing working group. Ms. Adrienne Funk, FAA/AJR-32, has been removed.

**ACTION:** Mr. Dick Temple will report back on the input from SAE-G20 Technical Study Group and the ACF WG at the next ACF.

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**MEETING 11-01:** Ms. Terry Stubblefield, FAA/AFS-410, was not able to attend. Mr. John Moore, FAA/AJV-3B, provided a general overview of the RD. Mr. Bruce McGray, FAA/AFS-410, reported that the FAA test center had been evaluating various solutions that involved the use of infra-red (IR) technology to be installed in conjunction with or as a supplement to existing FAA authorized LED systems.

It was noted that the ACF Working Group established at the last ACF had not yet convened.

Mr. Moore decided to leave the issue open and asked that the Working Group be convened.

**ACTION:** Mr. McGray, FAA/AFS-410, will look into convening the work group as well as moving up the obstacle safety evaluation in terms of priority. Mr. McGray will report back at next ACF.

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**MEETING 11-02:** Mr. Bruce McGray, FAA/AFS-410, provided an update on the work being done to address the issue. Mr. McGray reported that although the previously established ACF Work Group never met, the analysis of the problem is ongoing and that currently, LEDs are being utilized in MALSR, runway, taxiway, centerline obstruction and approaching lighting systems.

Other items being looked into regarding LEDs are spectrum issues, being researched by CAMI. An SAE G-20 Committee investigated the feasibility of a heat source being coupled with an LED system to melt accumulated ice and snow. It was found that the use of a heat source coupled with an LED was more expensive to operate and used more energy than older lighting technologies. (This was to have been a “green” initiative.)

LEDs with IR emitters were also looked into and encountered different issues. IR emitters were fine for approach lighting, but for other applications, the IR emitter took up too much space within the light housing.

The roll out of LEDs continues.

Other issues related to the deployment of LEDs were brought up. Mr. Terry Pearsall, FAA/AJT-28, mentioned that three NASA ASRS (Aviation Safety Reporting System) reports had been filed by pilots for night blindness due to spectrum changes associated with LEDs and impact of brightness of LEDs.

Discussions lead to whether the FAA is aware of where LED lighting exists and type of light. Currently, the FAA does not have a requirement to gather such information. No data exists at this time to gather or to establish a data base to gather such information.

Mr. John Moore, FAA/AJV-3B, stated that at the present time, there is no requirement to chart LEDs and that until such a requirement is established, it seems that the item could be closed. The issue may be reopened when a requirement is established for the FAA to chart or database LED deployment.

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**STATUS: CLOSED**