



Advisory Circular

Subject: ALSF-2/SSALR Circuit Interleaving

Issuing Office:	Civil Aviation, Standards	Document No.:	AC 300-016
File Classification No.:	Z 5000-34	Issue No.:	01
RDIMS No.:	12702002	Effective Date:	2017-08-04

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1.0 INTRODUCTION

- (1) This Advisory Circular (AC) is provided for information and guidance purposes as a result of numerous queries from stakeholders looking for guidance on the application of the standard. It may describe an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or allow deviations from regulatory requirements, nor does it set up standards.

1.1 Purpose

- (1) This AC discusses circuit interleaving design of SSALR and ALSF-2 approach lighting systems for precision runways with respect to the standard in TP312 – Aerodrome Standards and Recommended Practices.

1.2 Applicability

- (1) This document applies to all aerodrome operators using a precision runway. This information is also available to the aviation industry for information purposes.

1.3 Description of Changes

- (1) Not applicable

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

- (1) It is intended that the following reference materials be used in conjunction with this document:
- (a) Transport Canada Publication, TP312 – Aerodrome Standards and Recommended Practices;

2.2 Cancelled Documents

- (1) Not applicable.
- (2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void, unless an earlier issue remains valid under coming into force provision by regulation.

2.3 Definitions and Abbreviations

- (1) The following **abbreviations** are used in this document:
- (b) **AC**: Advisory Circular
 - (c) **SSALR**: Simplified Short Approach Lighting System
 - (d) **ALSF-2**: Approach Lighting System with Flashing lights for category II or III operations
 - (e) **RAIL**: Runway Alignment Indicator Lights
 - (f) **AGL**: Aeronautical Ground Light
 - (g) **ICAO**: International Civil Aviation Organization
 - (h) **TCCA**: Transport Canada Civil Aviation

3.0 BACKGROUND

- (1) The absence of technical information on circuit interleaving for SSALR and ALSF-2 approach lighting systems may have led to improper circuit designs, which could therefore result in non-compliance. Since 1990, TP312 states that for a precision runway, the electrical circuits for the power supply, lighting and control of the lighting systems shall be so designed that the failure of one circuit will not leave the pilot without visual guidance nor will it result in a misleading pattern.

*Note: For the latest version of that standard, see TP312, 5th edition at:
<https://www.tc.gc.ca/eng/civilaviation/publications/tp312-menu-4765.htm>.*

- (2) The objective of interleaving the lights of ALSF-2 and/or SSALR systems stems from the need to maintain visual guidance to a pilot in the final stage of a precision approach in the event that one circuit inadvertently fails. This is to ensure the shape or pattern of the visual cues remains relevant enough to the pilot in that critical phase of flight.

Note: Continued operation of an approach lighting system with a failed circuit is not acceptable as this would result in exceeding the maximum number of light outages. See Chapter 9 of TP312 for further details.

4.0 CIRCUIT INTERLEAVING

Note: Regardless of the type of interleaving method chosen, calculation of circuit loading is required to optimize load balance and remain within limits. The calculation takes into consideration the lamp load, lamp tolerances, AGL transformer efficiencies, secondary cable losses, primary cable losses and feeder cable losses.

4.1 Rationale

- (1) In order to maintain a basic visual pattern in the approach lighting system, the steady burning lights of ALSF-2 and/or SSALR systems are on separate interleaved circuits. Circuit interleaving can be accomplished by interleaving individual barrettes, which is interleaving the bars of lights at selected light “stations”, by interleaving individual lights within the barrettes, or by using a combination thereof. The most commonly used method is interleaving individual barrettes. The lights of the approach lighting threshold bar are always interleaved by alternating individual lights.

4.2 SSALR

- (1) The steady burning lights of an SSALR system are on a minimum of two circuits, whether the SSALR is a standalone system or embedded within an ALSF-2 system. Figure 1 in Appendix A shows an example of barrettes circuit interleaving for the steady burning lights of a standalone SSALR approach lighting system serving a 45 m wide precision runway. This two-circuit configuration is also used when a SSALR is embedded within an ALSF-2.

4.3 ALSF-2

- (1) The steady burning lights of a standalone ALSF-2 are on a minimum of two circuits. If the ALSF-2 has a SSALR embedded within it, then the result is a minimum of four circuits for all the steady burning lights of a combined SSALR/ALSF-2 system. Figure 2 in Appendix A shows an example of barrettes circuit interleaving for the steady burning lights of a combined SSALR/ALSF-2 approach lighting system serving a 45 m wide precision runway.

4.4 RAIL

- (1) The circuits for the sequenced flashing lights of the RAIL component of the SSALR and the ALSF-2 (not shown in the figures) are independent and without interleaving. The RAIL may be

provisioned by separate wiring or by use of addressable remote control modules to energize the required lights for SSALR (5 flashing lights) and ALSF-2 (15 flashing lights).

4.5 Approach Lighting Threshold Bar

- (1) The circuitry for the lights of an approach lighting threshold bar (see TP312, 5th, section 5.3.6) associated with a precision approach lighting system depends on the SSALR and/or ALSF-2 configurations. Embedded in the approach lighting threshold bar are the standard runway threshold lights (see TP312, 5th, section 5.3.7), which are connected to the interleaved circuits of the runway edge lights and runway end lights. If the configuration of the approach lighting system is a standalone SSALR or a standalone ALSF-2, then the steady burning lights of the approach lighting threshold bar associated with the SSALR, or ALSF-2 respectively, (ie other than the standard runway threshold lights) are connected to a minimum of two of circuits described at para 4.2 & 4.3 above. If the configuration is a combined SSALR/ALSF-2, then the steady burning lights of the approach lighting threshold bar (ie other than the standard runway threshold lights) can be connected to a minimum of three circuits, two from the ALSF-2 circuits and one of the SSALR circuits.

5.0 INFORMATION MANAGEMENT

- (1) Not applicable.

6.0 DOCUMENT HISTORY

- (1) Not applicable.

7.0 CONTACT OFFICE

For more information, please contact the appropriate TCCA Regional Office listed at the following address:

<http://www.tc.gc.ca/eng/regions.htm>

Suggestions for amendment to this document are invited, and should be submitted via:

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APPENDIX A – EXAMPLES OF INTERLEAVING CIRCUITS FOR SSALR/ALSF-2

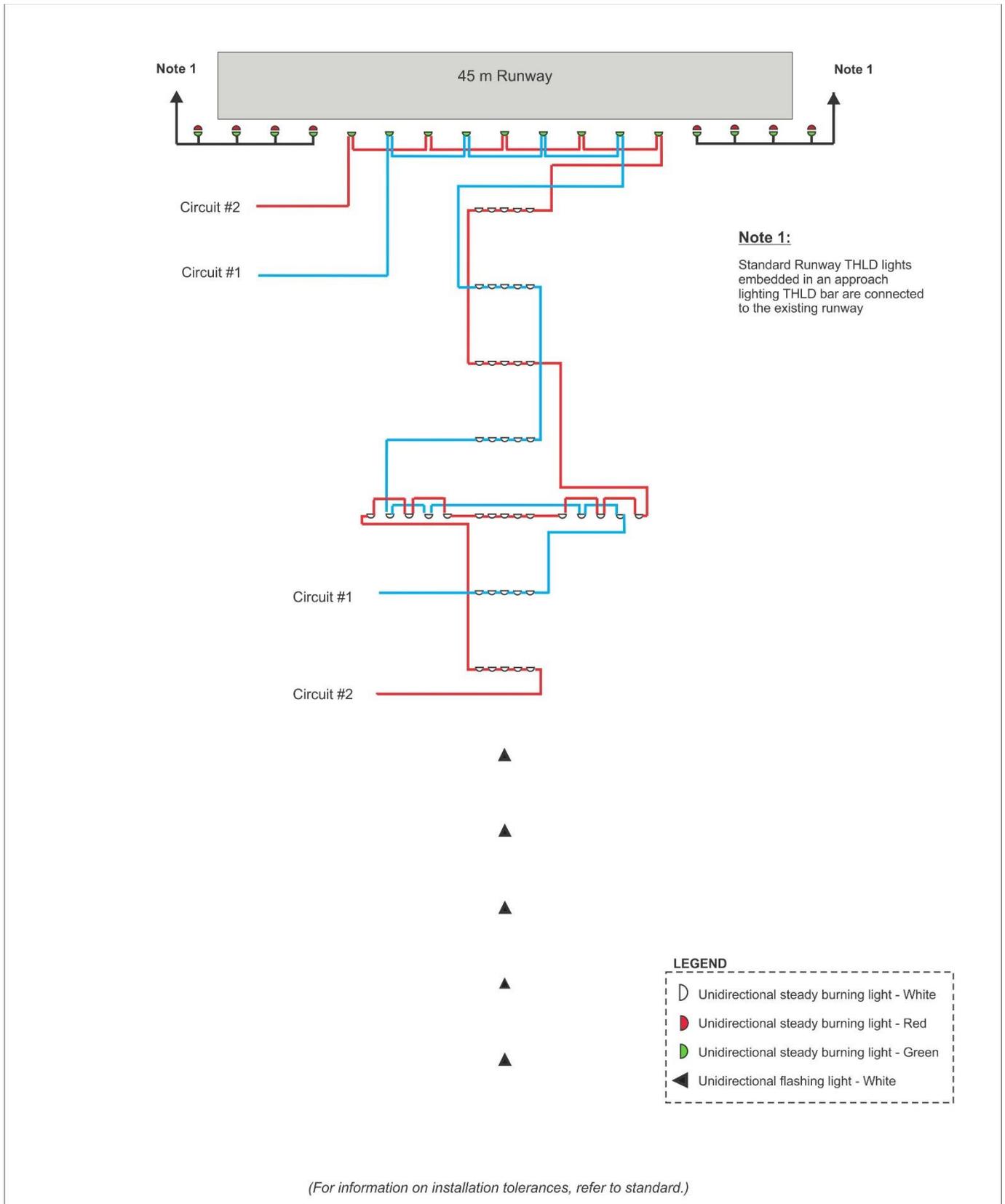


Figure 1. Interleaving - SSALR Approach Lighting System

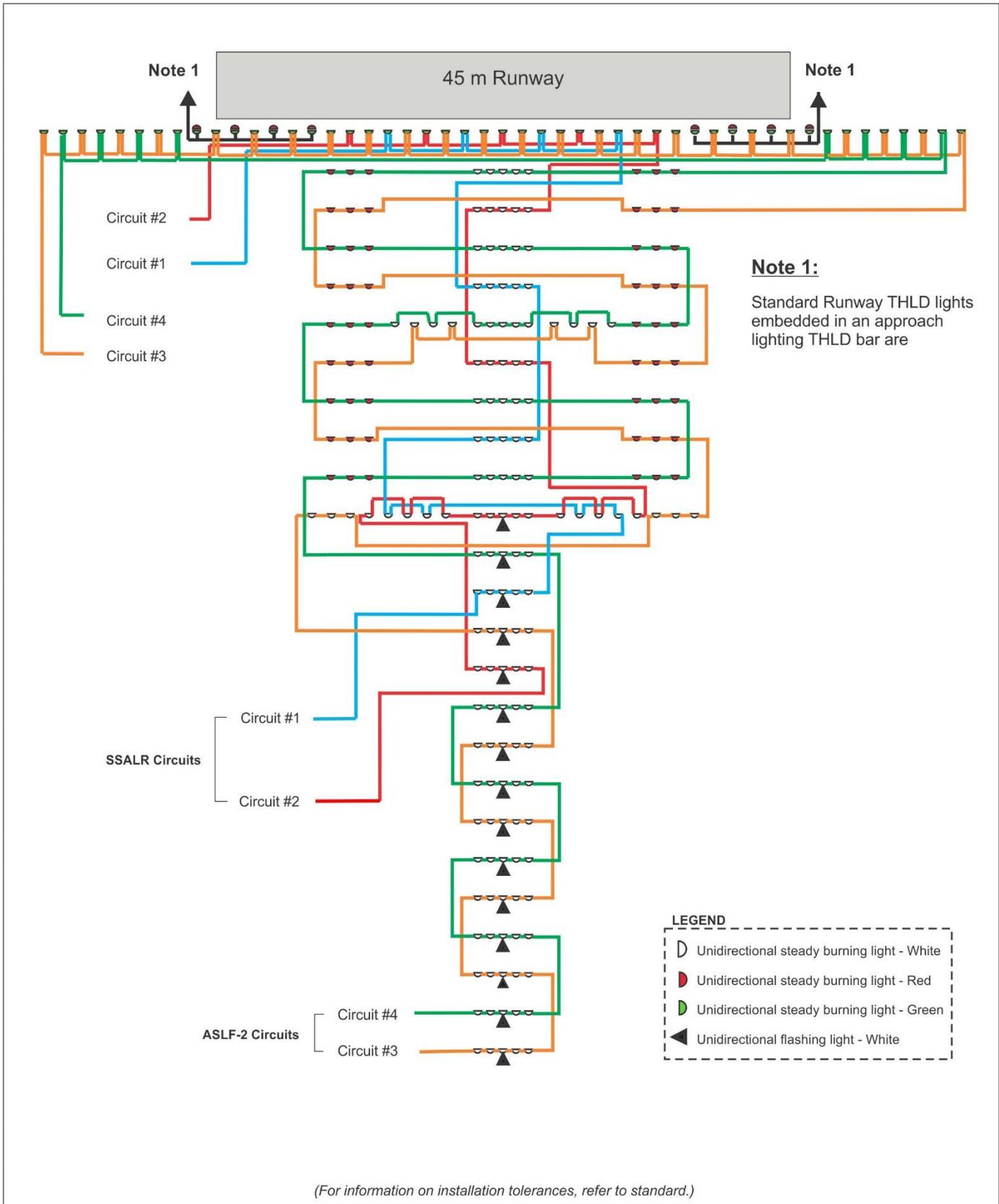


Figure 2. Interleaving - ALSF-2 Approach Lighting System with Embedded SSALR