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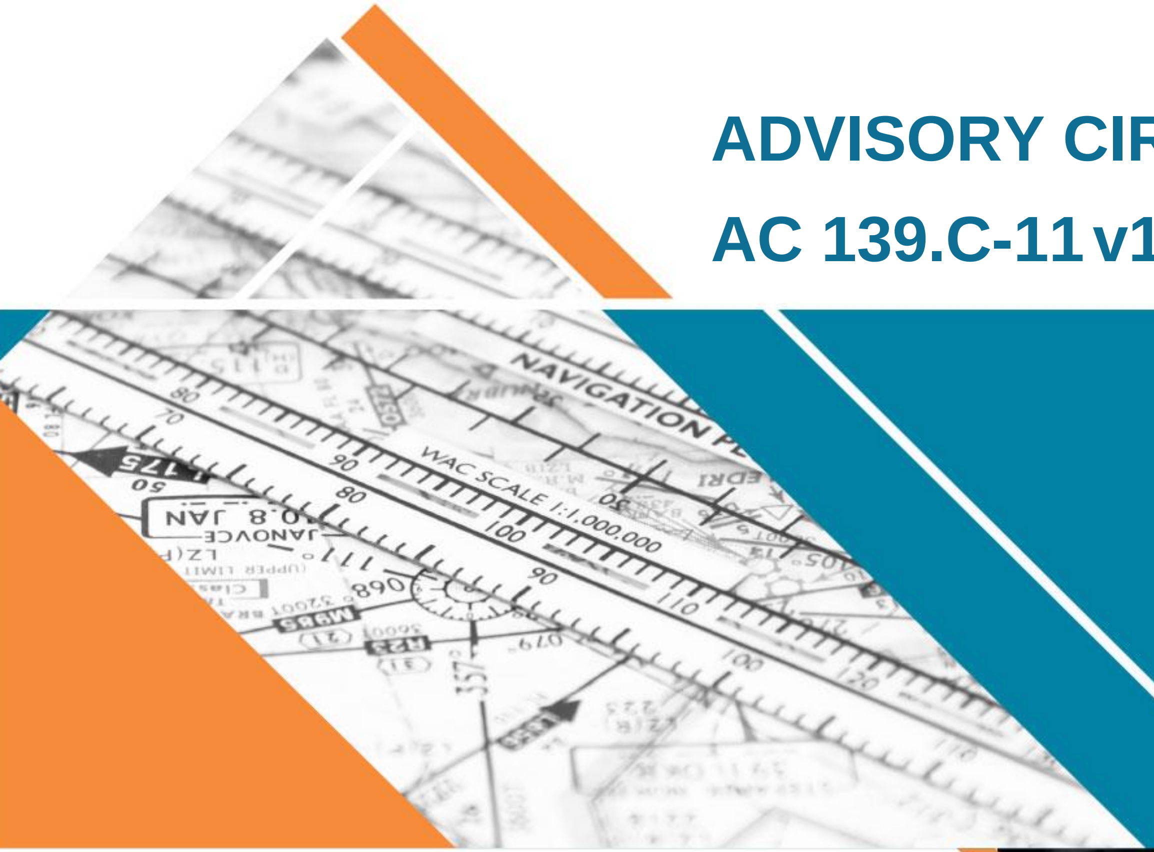

ADVISORY CIRCULAR
AC 139.C-11 v1.0

Commissioning of aerodrome lighting systems

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Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory Circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- aerodrome owners/operators
- aerodrome lighting system operators
- persons conducting ground checks of aerodrome lighting systems
- persons conducting flight checks of aerodrome lighting systems.

Purpose

This AC provides general information and advice on the requirements and method of commissioning various aerodrome lighting systems. For those systems that require a flight check as part of the commissioning process, advice on the conduct of the flight check is also provided.

For further information

For further information, contact CASA's Personnel Licensing, Aerodromes and Air Navigation Standards (telephone 131 757).

Status

This version of the AC is approved by the Branch Manager, Flight Standards.

Version	Date	Details
v1.0	December 2021	This AC replaces AC 139-04(0) - Commissioning of aerodrome lighting systems.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	advisory circular
AIP-ERSA	aeronautical information publication – en route supplement Australia
AT-VASIS	abbreviated T visual approach slope indicator system
CAR	*Civil Aviation Regulations 1988*
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
CAT	when referring to an instrument approach, category
ILAC	International Laboratory Accreditation Corporation
ILS	instrument landing system.
MEHT	minimum eye height over the threshold
MOS	Part 139 (Aerodromes) Manual of Standards
NATA	National Association of Testing Authorities
NOTAM	notice to airmen
PAL	pilot activated lighting system
PAPI	precision approach path indicator
RTIL	runway threshold identification lights
T-VASIS	T visual approach slope indicator system
VASIS	visual approach slope indicator system

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
aerodrome beacon	an aeronautical beacon used to indicate the location of an aerodrome from the air
aeronautical beacon	an aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the Earth
aeronautical ground light	any light specially provided as an aid to air navigation, other than a light displayed on an aircraft
apron	a defined area on a land aerodrome to accommodate aircraft for the purposes of loading or unloading passengers, mail or cargo, fuelling, parking, or maintenance
barrette	3 or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light
critical obstacle	the obstacle within the take-off climb area, or within the approach area, or within both areas, which subtends the greatest vertical angle when measured from the inner edge of the take-off climb surface and/or the approach surface
fixed light	a light having constant luminous intensity when observed from a fixed point
frangible object	an object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft
hazard beacon	an aeronautical beacon used to designate a danger to air navigation
light failure/outage	the light is deemed to be unserviceable (that is, in a failed state) when the main beam average intensity, assessed in consideration of the specified angles of beam elevation, toe-in and beam spread,: a. is less than 50% of the value specified in the appropriate figure showing the isocandela diagram or the higher design value for lights with higher designed main beam average intensity; or b. ceases to illuminate. **Note:** Any deterioration in a light, detectable by the human eye is likely to be a failure
lighting system outage	a light or lighting system is experiencing a deteriorated performance level (including total failure) which requires: a. the fixing of the light or lighting system as soon as possible; and b. a report to be made to AIS provider requesting that a NOTAM be issued.
lighting system reliability	the probability that the complete installation operates within the specified tolerances and that the system is operationally usable.
obstacles	fixed (whether temporarily or permanently) and mobile objects, structures, and parts of such objects and structures, that: a. are located on an area provided for the surface movement of aircraft; or

Term	Definition
	b. extend above a defined surface designated to protect aircraft in flight; or c. stand outside the defined surfaces mentioned in paragraphs (a) and (b) and that have been assessed as being a hazard to air navigation.
runway	a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
runway guard light	a light system provided to caution pilots or vehicle drivers that they are about to enter an active runway.
runway holding position	a designated position at a controlled aerodrome that is provided to protect a runway, an obstacle limitation surface, or an ILS or MLS critical or sensitive area, at which taxiing aircraft and vehicles must stop and hold, unless otherwise authorised by the aerodrome control tower. Note For the use of runway holding positions at non-controlled aerodromes, refer to CAAP 166-1.
scheduled air transport operation	an air transport operation conducted in accordance with a published schedule.
secondary power supply	for an aerodrome’s functionality, an electrical power supply that: a. is automatically connected to the relevant load when the primary power source fails; and b. is derived from: i the normal public electrical power supply, but in a way that: (a) supplies power for the aerodrome’s functionality from a special substation that is not the normal substation; (b) supplies the power through a special transmission line that follows a route different from the normal power supply route; and (c) makes extremely remote the possibility of a simultaneous failure of the normal public electrical power supply and the power supply for the aerodrome; or ii 1 or more generators, batteries, or similar devices which deliver a constant, reliable and sufficient supply of electrical power for the relevant aerodrome service. **Note:** See also sections MOS 9.03 and 9.04.
Supply Authority	the body for an area that is approved, licensed or authorised by the State or Territory government of the area (the polity), or by the legislation of that polity, to supply electrical power to the general public of the area.
switch-over time	for a light, the time required for the actual intensity of a light measured in a given direction to fall from 50% and recover to 50% during a power supply changeover when the light is being operated at intensities of 25% or above.
taxiway	means a defined path on an aerodrome on land, established for the taxiing of aircraft from 1 part of an aerodrome to another. A taxiway includes a taxilane, an apron taxiway and a rapid exit taxiway
touchdown zone	the portion of a runway, beyond the threshold, where landing aeroplanes are to first contact the runway.

1.3 References

Legislation

Legislations are available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Regulation 139.065	Aerodrome facilities and equipment
Part 139 MOS Chapter 9 Division 2	Commissioning of Lighting Systems

Advisory material

CASA's advisory materials are available at https://www.casa.gov.au/publications-and-resources/guidance-materials

Document	Title
AC 139.C-09	Visual aids, markings, signals and signs
AC 139.C-10	Aerodrome lighting[1]
AC 139.C-15	Safe planning and conduct of aerodrome works[2]

[1] AC 139.C-10 Aerodrome lighting is under development at the time of publishing of this AC.
[2] AC 139.C-15 Safe planning and conduct of aerodrome works is under development at the time of publishing of this AC.

2 Aerodrome lighting systems

2.1 Introduction

2.1.1 Aerodrome lighting provides visual guidance for pilots when approaching, landing and operating at an aerodrome at night or in reduced visibility conditions.

2.1.2 A new aerodrome lighting system must not be made available for use until it has been commissioned. This means that an aerodrome operator must ensure that they have completed a series of checks that confirm the lighting system meets the required standards as prescribed within the Part 139 (Aerodromes) Manual of Standards (MOS).

2.1.3 Where an existing commissioned lighting system is replaced or upgraded, it must also be commissioned before it can be made available for use.

2.1.4 In certain circumstances, CASA may direct the completion of a ground and/or flight check of an already commissioned aerodrome lighting system. These circumstances include a substantial change to the system or the receipt of an adverse performance report from a pilot or aircraft operator.

2.1.5 Aerodrome lighting system commissioning consists of a ground check including light fitting compliance, and may include, depending on the type of system, a flight check.

2.1.6 The aerodrome operator is responsible for providing written evidence to CASA of the commissioning process and for ensuring that all required check reports are obtained prior to requesting a NOTAM or updating their AIP-ERSA information reflecting the commissioned lighting system's details.

2.2 Steps to commission an aerodrome lighting system

2.2.1 Commissioning an aerodrome lighting system involves the engagement of one or more qualified persons undertaking a variety of documentary, physical and operational checks. These checks are documented in written reports which, when received by the aerodrome operator, permit them to initiate a NOTAM and/or AIP-ERSA amendment detailing the commissioned lighting system.

2.2.2 There are two types of aerodrome lighting system commissioning checks:

- ground check
- flight check.

2.2.3 While a ground check must be completed for every aerodrome lighting system, a flight check is only required for specific lighting systems. These systems are:

- an approach lighting system
- an instrument runway lighting system
- VASIS
- Pilot-Activated Lighting (PAL) system at aerodromes with scheduled air transport operations and any other aerodrome where the system is newly installed.

2.2.4 A ground check involves a confirmation that light fittings comply with the MOS requirements for photometric, frangibility, supply and other relevant specifications as well as a confirmation that the system has been correctly installed.

2.2.5 The ground check is completed when the qualified person is satisfied with the compliance of the system and supplies a written determination to this effect to the aerodrome operator.

2.2.6 For those systems that also require a flight check, this should be undertaken following completion of the ground check and the determination that all requirements of the ground check have been met.

2.2.7 A flight check consists of a qualified flight checker operating to, from, and in the vicinity of the aerodrome confirming the operational performance of the aerodrome lighting systems meets the requirements of the MOS.

2.2.8 This process also results in the production of a written report which is supplied to the aerodrome operator. This report and the ground check determination are provided to CASA and, providing compliance with MOS is confirmed, trigger the request for a NOTAM and/or amendment of the aerodrome's AIP-ERSA entry.

3 Ground checks

3.1 Introduction

3.1.1 A ground check confirms that the aerodrome lighting system has been correctly installed, and that the system complies with the relevant specifications and standards prescribed in the MOS.

3.2 Who can carry out a ground check?

3.2.1 A ground check must only be carried out by a person that:

- has demonstrable relevant aerodrome lighting knowledge and experience with respect to the electrical specifications and technical standards set out in the MOS
- is, either an electrical engineer or a licensed electrician.

3.2.2 A person conducting a ground check of a VASIS must:

- have demonstrable knowledge of siting, set up, and protection of VASIS
- be technically qualified or experienced in surveying, or a civil engineer with survey experience.

3.3 Completing a ground check

3.3.1 Suitability of light fitting types, models and versions

3.3.1.1 In order to verify the compliance of light fittings, the aerodrome operator must provide the ground check qualified person with either:

- an independent compliance statement from each of the manufacturers, and the supplier, of the aerodrome lighting system

  or
- a test report from either:
  - a National Association of Testing Authorities (NATA) accredited laboratory
  - an overseas accrediting authority mutually recognised by NATA, as long as NATA confirmation that the overseas accrediting authority has the competency to carry out the required testing is provided
  - an accredited laboratory that has a mutual recognition arrangement administered by the International Laboratory Accreditation Corporation (ILAC) in accordance with ISO/IEC 17011.

3.3.1.2 Early acquisition of these documents will expedite the commissioning process by ensuring the product meets requirements prior to installation.

3.3.2 General procedures

3.3.2.1 As a minimum, the following should be checked and confirmed via a review of associated design and technical documentation, a visual inspection, and/or physical measurement. The standard to be confirmed is that:

- the lighting system is at least the minimum required, is appropriate to the type of operations intended to be conducted, the complexity of the aerodrome layout, and the traffic density
- the power supply, including primary source, secondary source, switchover time between sources, and electrical circuitry, are in accordance with the relevant standards. Current settings should be measured and recorded (with true RMS instruments)
- light fittings are in accordance with the relevant standards and are fit for the purpose. For checking compliance with photometric standards, the use of documentation as outlined in section 3.3.1.1 of this AC is acceptable
- light fittings are correctly located, including spacing, pattern, alignment and levelling. Methods of mounting or attachment are such that fittings cannot move and thus retain alignment and level
- colour of light is correct (because of some of the technologies used to produce coloured light, the lights must be turned on for this check). For checking compliance with chromaticity standards, the use of documentation as outlined in section 3.3.1.1 of this AC is acceptable
- the installation does not pose a hazard to aircraft; equipment mountings are frangible; footings and foundations do not extend above the surrounding ground level
- the overall condition of the installation has not been adversely impacted by checking the cleanliness of optical surfaces; removal of construction materials and potential 'foreign object debris' materials; reinstatement and consolidation of surfaces that were disturbed or excavated.

3.3.2.2 Ground control of lighting systems should also be confirmed as working correctly. Remote control and monitoring, including fault indication, provided to air traffic control towers, CA/GRO and UNICOM operators, should be fully exercised and confirmed, including any interlocks present. Training availability for such operators should be checked. Where light-sensitive switches are incorporated into control systems, their location should be checked to ensure correct operation, free from the effect of any artificial lights in the vicinity.

3.3.2.3 If a Pilot Activated Lighting (PAL) system is to be commissioned, the following technical performance and unit settings must be confirmed through either a review of the verified technical standards of the PAL unit, an inspection of the PAL unit, an inspection of associated structures and equipment, or a ground-based test. The checks to be completed are:

- The accepted carrier signal frequency range is 118 MHz to 136 MHz with channel separation at 25 kHz and stability within ±0.0010% over the temperature range of -10°C to +60°C.
- The minimum detectable input signal must be greater than or equal to 15 µV, adjusted to minimise nuisance activations from aircraft operating into other aerodromes.
- The carrier detector bandwidth is ±7.5 kHz (within 3dB nominal), ±16 kHz (greater than 60dB below nominal) and spurious (not less than 80 dB below nominal)

- Radio activation is carried out from the aerodrome movement area with activation of the lighting system is observed as well as the radio confirmation message. Further the turn-off warning is observed, and radio message heard.
- Manual activation is carried out through an on/off switch that, when switched on, activates the lights which remain on and, when switched off, the unit enters the PAL operate mode and completes a standard PAL cycle, including the 10-minute turn-off warning. The manual switches are always readily accessible to the responsible person(s) and if provided at a controlled aerodrome, they override the PAL cycle.
- Fail-safe arrangements are designed so that, in the event of a failure of the PAL unit, lighting facilities will automatically activate and that a bypass switch will allow for manual activation. Transient electrical surges do not affect the PAL. Following a PAL failure, the lighting system is activated and, if fitted, the pilot is notified via a radio transmission. A power failure for a PAL fitted with standby power notifies users via radio transmission that the lights are not energised.
- The antenna location is such that it will receive signals from aircraft in the air and aircraft, ground vehicles and mobile personnel on the movement area. The antenna also has unity gain with respect to a dipole, vertical polarisation, omnidirectional radiation pattern in the horizontal plane, voltage standing wave ratio, when matched to the PAL antenna input, of not greater than 1.5:1 over the frequency range of 118 to 136 MHz and a height of the mounting above local ground level of not less than 4.5 m

3.3.2.4 The results of this part of the ground check should be recorded for inclusion with the documentation supporting commissioning. A suggested report for recording the results of a lighting system ground check is included at Appendix A.

3.3.2.5 The ground check of Visual Approach Slope Indicator System (PAPI and T-VASIS) should also include the additional processes contained in Sections 3.4 and 3.5 of this AC.

3.4 Ground check – PAPI

3.4.1.1 The ground check is to measure and confirm position, alignment, and light beam angles. It should be carried out in such a way that the normal aircraft operations at the aerodrome are not affected.

3.4.1.2 The results of the ground check should be recorded for inclusion with the documentation supporting commissioning. A suggested report for recording the results of a PAPI Ground Check is included as Appendix B. When identifying individual PAPI units, the naming convention shown in the MOS, Chapter 9, “Figure 9.50 (5) The arrangement of a PAPI and the resulting display”, is to be used.

3.4.1.3 Before conducting the ground check survey, the surveyor needs to obtain from the aerodrome operator or the PAPI installation designer, the design details for the report which include the:

- aircraft on which the design was based, it's eye-to-wheel height, and, which of the four eye-to-wheel height group applies to that aircraft
- design wheel clearance over the threshold

- design approach angle
- resultant minimum eye height over threshold (MEHT), used in the design
- critical obstacle, if any, within the approach surface.

3.4.1.4 Check that the PAPI system has appropriate multiple intensity stages, and that they operate correctly. If there is a maintenance intensity stage provided (typically with current setting of approximately 2.8 amps), this will allow maintenance technicians and ground surveying staff to observe the PAPI units from reasonably close range. If a maintenance intensity stage is not provided, the lowest available intensity stage should be used during the conduct of the ground survey, but the viewing distance in front of the PAPI unit will have to be increased, and this in turn will result in the line of sight being at a higher level above the ground, and the viewer may need to be on a stable elevated work platform.

Note: When the maintenance intensity setting has been used, ensure that the control equipment is re-set to normal operation, following maintenance and/or ground survey checks.

3.4.2 Position and alignment

3.4.2.1 Check that the PAPI has been installed in accordance with the design, particularly in regard to PAPI light spacings, alignment, and distance from the threshold.

3.4.2.2 Mounting heights specified in the siting design for the PAPI units should be confirmed, as should minimum clearances from pavements. The elevation is measured to the source of the light not the outer housing.

3.4.2.3 Levelling of the light units should be confirmed with the precision instruments appropriate to the equipment model. Alignment of lamps within the light units should be confirmed in accordance with methods specific to the equipment model.

3.4.2.4 Foundations should be examined, and an assessment made of their stability including their designed depth or bulk as suitable for the type of soil at the site.

3.4.3 Light beam vertical colour transition angles

3.4.3.1 The following procedure represents one approach that is considered acceptable. An alternative method may be undertaken providing that the performance requirements of the lighting system are confirmed, and the assessment methodology is appropriately detailed in the ground check report and determination.

3.4.3.2 This procedure is repeated for each PAPI unit according to the following steps and is designed to ensure that the colour transition angle is set in accordance with Table 1 and that the corresponding box angle is recorded for future checking and maintenance:

a. Set a theodolite (or total station theodolite) on or over the PAPI unit being checked. Measure the distance (x) between the centre of the light beam and the centre of the theodolite telescope.
b. A survey assistant holding a staff with a moveable marker is stationed 20-30 m in front of the PAPI unit.
c. Either with the aid of a combination square held on the side of the staff or some other method, the survey assistant determines the point where the colour changes from red to white. It should be noted that, at this distance, the colour of the light

beam does not change abruptly from red to white (despite compliance with the requirements of MOS 9.48 (6)). Instead, the point of colour transition can be measured as the mid-point between the highest point at which red only can be seen, and the lowest point at which white only can be seen.

d. The square or other marker is then raised vertically above this point by the distance x.

e. The surveyor reads the vertical angle to the marker with the theodolite. If the measured angle does not fall within the requirements, the PAPI unit is adjusted and the transition angle, remeasured. If the measure angle is compliant, the test is repeated to confirm this reading with the assistant moving to another location in front of the same PAPI unit. If the second reading falls outside the permissible limits, the PAPI unit is adjusted, and the entire testing process is repeated.

f. If a clinometer is to be used for ongoing checks and maintenance, the unit angle should also be measured in accordance with the manufacturers' instructions and recorded for use in the ongoing maintenance checks.

3.4.3.3 The colour transition angles should comply with the following, based on a standard 3° approach slope. Sites with more than a 3° slope will need to be adjusted accordingly.

Table 1: PAPI Unit Colour Transition Angles

PAPI Unit	Without an ILS	Harmonized with an ILS
A/H	2° 30' ± 3'	2° 25' ± 3'
B/G	2° 50' ± 3'	2° 45' ± 3'
C/F	3° 10' ± 3'	3° 15' ± 3'
D/E	3° 30' ± 3'	3° 35 ± 3'

3.4.4 Light beam horizontal spread

3.4.4.1 For the horizontal spread of the light beam, the survey assistant moves laterally towards the runway from the extended centreline of each PAPI unit, until the light is just not visible. The surveyor then measures the horizontal angle of that position. The process is repeated with the survey assistant moving away from the runway. Repeat this process and record the angles for each PAPI unit.

Note: If there is a restriction on the azimuth spread, for example due to the presence of an obstacle, the surveyor should direct the assistant to move to the limit of the azimuth restriction, and the assistant should confirm that the light beam cannot be seen from that position.

3.4.5 Obstacle clearance check

3.4.5.1 Using obstacle survey data, either from the previous aerodrome technical inspection, if completed within the previous 12 months, or at the time of the ground check by a suitably qualified person, determine obstacle clearance according to the standards contained in MOS 9.45.

3.4.5.2 If an object or structure is found to infringe the obstacle assessment surface, then it must either be removed, or details sent to CASA for a written determination of its impact on the safety of aircraft operations. That determination may still require removal of the object or structure, or, if that is not possible, variation to the approach slope, reduction of the horizontal spread, displacement of the VASIS axis or displacement of the threshold.

3.4.6 Overall system check

3.4.6.1 If CASA has exempted the aerodrome operator from completing a flight check, a simulated pilot's view of the system should be completed by viewing the system from an elevated work platform located an appropriate distance in front of the system. The following checks should be made:

- the light units appear to be in a horizontal line
- the light units appear to be of uniform intensity on all daylight settings
- for the night intensity stages, the intensity of the PAPI units is visually compatible with the runway edge lights and the threshold lights
- the colour transition of the individual PAPI units changes in a uniform progression as the viewing position is raised/lowered.

3.5 Ground check – T-VASIS

3.5.1 The ground check is to measure and confirm position, alignment, and level of T-VASIS boxes, and the light distribution within each T-VASIS box. It should be carried out in such a way that the normal aircraft operations at the aerodrome are not affected.

3.5.2 The results of the ground check should be recorded for inclusion with the documentation supporting commissioning. A suggested report for recording the results of a T-VASIS Ground Check is included as Appendix C of this AC. When identifying individual T-VASIS boxes, the naming convention shown in the MOS, Chapter 9, "Figure 9.46 (1) T-VASIS layout", is to be used.

3.5.3 Before conducting the ground check, the person conducting the check needs to obtain from the aerodrome operator or the T-VASIS installation designer, the following design details:

- the design eye-height over threshold
- the design approach angle
- any design variations from the standard layout
- the design layout showing T-VASIS box locations, and specified mounting pillar heights
- the critical obstacle, if any, within the approach surface.

3.5.4 Check that the T-VASIS system has appropriate multiple intensity stages, and that they operate correctly.

3.5.5 Position and alignment

3.5.5.1 Check that the T-VASIS has been installed in accordance with the design, particularly in regard to T-VASIS light spacings, alignment, and distance from the threshold.

3.5.5.2 Mounting heights specified in the siting design for the T-VASIS units should be confirmed, as should minimum clearances from pavements.

3.5.5.3 Foundations should be examined, and an assessment made of their stability including their designed depth or bulk as suitable for the type of soil at the site.

3.5.6 Light unit level

3.5.6.1 Check the level of each T-VASIS box by following this procedure:

a. As the accuracy of the precision level can be affected by thermal expansion, level checking should not be carried out during hot sunny days; or alternatively, the spirit level should be shaded from the sun while in use.
b. Rough handling of a precision level can cause incorrect indication. Check the accuracy of the precision level by 'end-for-ending' it and noting the bubble indication.
c. Check the level across the front of the T-VASIS box. Then check the level front-to-rear on each side of the box.
d. Repeat the level check for each T-VASIS box in the system.

3.5.7 Lamp alignment

3.5.7.1 When checking the lamp alignment, protective eyewear, such as welders' goggles, should be used by the observer when looking into the light.

3.5.7.2 Check the lamp alignment in each T-VASIS box as per the following procedure.

- Using the maximum day intensity, at a position approximately 10 m in front of the T-VASIS box and on its centreline, check that the lamps present the maximum flashed area.
- **For a fly-up box**: observe the light source from above the cut-off and come down into the main beam.
- **For a fly-down box**: observe from below cut-off and come up into the beam.
- **For a bar box**: the inner day lamps should appear to be full on above the red filter and the outer day lamps full on through the red filter.
- When the lamp is correctly aligned the first small portion of light should appear to the observer as a continuous white line, not dotted. At the same time check that the signal cuts "on" or "off" over the whole width of the aperture and does not appear to "slide" across as the observer raises or lowers his eyes. Observe that the intensities are consistent across the full width of the beam.
- On completion of the day lamp alignment check of a box, select maximum night intensity and check that the night lamps present the maximum flashed area.

3.5.7.3 The fly-up and fly-down boxes use the same procedure as for day lamps, with the main beam peaking as the light beam is first observed. The night lamps on a bar box are to be fully flashed just above the edge of the red filter.

3.5.8 Light beam horizontal spread

3.5.8.1 To check the light beam horizontal spread, the following procedure must be applied to each box:

- set up a theodolite on or over the centre rear of the T-VASIS box
- have the survey assistant move laterally towards the runway from the extended centreline of each box, until the light is just not visible
- the surveyor then measures the horizontal angle of that position
- the process is repeated with the survey assistant moving away from the runway.

3.5.8.2 Because T-VASIS have different azimuth spread for day- and night- intensity, this check should be done twice: with day intensity selected and again with night intensity selected.

Note: If there is a restriction on the azimuth spread, for example due to the presence of an obstacle, the surveyor should direct the assistant to move to the limit of the azimuth restriction, and the assistant should confirm that the light beam cannot be seen from that position.

3.5.9 Obstacle clearance check

3.5.9.1 Using obstacle survey data, either from the previous aerodrome technical inspection, if completed within the previous 12 months, or at the time of the ground check by a suitably qualified person, determine obstacle clearance according to the standards contained in MOS 9.45.

3.5.9.2 If an object or structure is found to infringe the obstacle assessment surface, then it must either be removed, or details sent to CASA for a written determination of its impact on the safety of aircraft operations. That determination may still require removal of the object or structure, or, if that is not possible, variation to the approach slope, reduction of the horizontal spread, displacement of the VASIS axis or displacement of the threshold.

4 Flight checks

4.1 Introduction

4.1.1 For certain lighting systems, the usability of the system needs to be confirmed from the air by a qualified person.

4.2 Lighting systems that require a flight check

4.2.1 In addition to the requirement for a ground check, the following lighting systems also require a flight check:

- approach lighting system
- runway lighting systems for instrument runways
- visual Approach Slope Indicator System (VASIS)
- a Pilot Activated Lighting System (PAL).

4.2.2 An aerodrome operator may apply for an exemption from the flight check requirement for temporary VASIS with the submission of a safety assessment that supports their case. This exemption would cover scenarios such as displaced thresholds due to works. If granted, the exemption must be issued in writing by CASA.

4.3 Who can carry out a flight check?

4.3.1 Only a person approved by CASA is authorised to conduct flight checks of aerodrome lighting systems.

4.3.2 A list of qualified flight checkers is available on the CASA website.

4.4 Obtaining CASA approval to conduct flight checks

4.4.1 As per MOS 139.9.18 (3), a flight check must be completed by a qualified flight checker. A qualified flight checker is a person who has been approved by CASA in accordance with this section of this AC.

4.4.2 Any person seeking to become a qualified flight checker should apply to CASA using the prescribed form with supporting documentation. The applicant will be assessed by CASA to ensure that they have the following knowledge and competencies:

- knowledge of the relevant lighting standard
- how the lighting system supports aircraft operations
- an understanding of the objectives of the flight check and parameters to be checked
- documentation of flight check outcomes

4.4.3 The approval process may include a competence assessment and/or an interview.

4.4.4 Approvals will be issued in writing for a finite period, not greater than three years, subject to renewal and conditions. Conditions may include limitations on the types and complexity of lighting systems that may be checked by the qualified flight checker.

4.4.4.1 Authorisations granted under CASR Part 11 may continue in force until CASA provides a decision to an applicant, provided the applicant submits a complete application for a new approval before an existing approval expires, and the application is consistent with the type and scope of the previous approval.

4.5 Conducting a flight check

4.5.1 The scope of the flight check is dependent on the aerodrome lighting systems that have been installed, upgraded, and/or replaced. This scope should be formally established by the aerodrome operator and provided to the qualified flight checker.

4.5.2 For ease of presentation, a series of steps for checking lighting systems are set out below. **Providing all checks that are required by the scope are completed, it is not necessary that the steps be followed in numerical order**. Also, with experience and planning, some of the steps may be combined resulting in a reduction in the number of approaches flown.

4.5.3 Where the lighting system is intended for day and night use, flight checks will need to be conducted during the day and in twilight conditions as per paragraph 4.5.9.2 of this AC.

4.5.4 Flight checks should be conducted under weather condition which allow for safe and effective visual assessment of light system(s) concerned while maintaining sufficient visual reference with the aerodrome and potential obstacles.

4.5.5 A ground party consisting of representatives of the lighting system installer and/or the aerodrome's electrical maintenance team, should be present while flight checks are being conducted. The ground party should have the necessary tools, test equipment, and expertise, to adjust to the lighting systems if unacceptable or deficient performance is identified by the pilot, during the flight check process.

4.5.6 A flight check report is to be prepared by the qualified flight checker, for all flight checks conducted, including those checks that found the lighting system to be deficient or unacceptable. Where appropriate, the pilot conducting the flight check is to certify that the performance of the lighting system meets operational requirements for commissioning. The report should detail all the checks made, including description of all the approaches flown, and any necessary corrective action as a result of the flight checks. Suggested flight check report forms are included as Appendices C, D, E, F, and G of this AC.

4.5.7 Flight check reports should be provided to the aerodrome operator, for inclusion with the documentation to support commissioning. CASA inspectors may subsequently refer the flight check reports as part of the on-going surveillance of the aerodrome.

4.5.8 Approach lights – recommended procedure

4.5.8.1 Carry out a normal ILS approach from 4 NM starting with all the approach lights at maximum intensity setting.

4.5.8.2 Confirm that the pattern is correct for the approach category and for Cat II/III systems, that the colour of the side row barrettes is correct.

4.5.8.3 Check that the lights show a uniform pattern by varying the approach path. Small variations in elevation and azimuth should not present any noticeable change in the intensity of the lights while a large variation should produce a progressive reduction in intensity as the aircraft leaves the area of primary coverage of the lights. These changes in intensity should be similar for all lights. Irregular changes indicate incorrect setting angles of individual light units and should be noted for corrective action on the ground.

4.5.8.4 During the approach call for the progressive reduction in intensity down to the minimum setting. Check that all lights respond correctly and simultaneously to the intensity setting changes, and that any period of light extinction between intensities is sufficiently brief as to be operationally acceptable.

4.5.8.5 With the approach lights and the runway lights selected to the same intensity stage, check that the intensity of the approach lights is visually compatible with the runway edge lights and the threshold lights. Repeat this check for all intensity stages.

Note: While the approach lights will be brighter than the runway and threshold lights, they should not visually dominate them.

4.5.8.6 With the approach lights set at a suitable intensity setting (the lowest at which the lights are discernible is normally best), check that all the individual lights are illuminated record any light outages or misalignment.

4.5.9 Runway edge, threshold, end lights – recommended procedure

4.5.9.1 For each runway direction, during take-off, landing and going around, check that the runway edge, threshold and runway end lights show:

- a uniform pattern
- the correct colour
- a progressive and even reduction in the intensity of the lights as the aircraft leaves their area of primary cover.

4.5.9.2 Fly the circuit at low level at dusk or dawn (i.e., with light sufficient to avoid any obstacles but dim enough to see the lights) and approach each end of the runway to determine that the visual cues provided by the lights are adequate for a visual circuit and that the lights clearly define the runway.

4.5.9.3 Carry out a normal approach from approximately 4 NM, initially with the runway lights at maximum intensity setting. Call for progressive reductions in light intensities down to the minimum setting, checking that all lights respond correctly and simultaneously to the setting changes, and that any period of light extinction between intensities is sufficiently brief as to be operationally acceptable.

4.5.9.4 At a low intensity setting, carry out a low go-around and record any light outages or misalignment.

4.5.9.5 Whilst on the runway, check that from a height of 3 m above the runway surface, there is an unobstructed line of sight to runway edge and runway end lights within 600 m.

4.5.10 Runway centreline lights – recommended procedure

4.5.10.1 Carry out a normal precision approach procedure from 4 NM starting with the runway centreline lights at maximum intensity setting. Confirm that the:

- pattern is correct, and uniform
- colour/pattern of the last 900 m of centreline lighting is correct.

4.5.10.2 It may be easier to observe this if the runway edge lights are extinguished while making this check.

4.5.10.3 During the approach call for the progressive reduction in intensity down to the minimum setting. Check that all lights respond correctly and simultaneously to the intensity setting changes, and that any period of light extinction between intensities is sufficiently brief as to be operationally acceptable.

4.5.10.4 With the runway centre line lights, the approach lights and the runway edge lights all selected to the same intensity stage, check that the intensity of the runway centre line lights is visually compatible with the other lighting systems. Repeat this check for all intensity stages.

4.5.10.5 With the runway centre line lights set at a suitable intensity setting for the prevailing visibility, (and the runway edge lights also on to the corresponding intensity), carry out an approach, landing, and roll-out to the far end of the runway. Check the adequacy of visual cues, and absence of dazzle. Also check that all the individual lights are illuminated and record any light outages or misalignment.

4.5.11 Runway touchdown zone lights – recommended procedure

4.5.11.1 Carry out a normal precision approach procedure from 4 NM starting with the runway touchdown zone lights at maximum intensity setting, confirm that the pattern is correct, and uniform.

Note: It may be easier to observe this if the runway edge lights are extinguished, but the approach lights and runway centre line lights are illuminated, while making this check.

4.5.11.2 During the approach call for the progressive reduction in intensity down to the minimum setting. Check that all lights respond correctly and simultaneously to the intensity setting changes, and that any period of light extinction between intensities is sufficiently brief as to be operationally acceptable.

4.5.11.3 With the runway touchdown zone lights, the runway centreline lights, the approach lights and the runway edge lights all selected to the same intensity stage, check that the intensity of the runway touchdown zone lights is visually compatible with the other lighting systems. Repeat this check for all intensity stages.

4.5.11.4 Also, with the above lighting systems illuminated, carry out an approach, landing, and roll-out to at least beyond the far end of the touchdown zone lights, and check:

- the coherence of the visual pattern, but not the colour, provided by the Cat II/III approach light side row barrettes and the touchdown zone light barrettes
- for the absence of dazzle
- that all the individual lights are illuminated and record any light outages or misalignment.

4.5.12 PAPI – recommended procedure

4.5.12.1 The flight check is to confirm the system usability. The system is usable if:

- it can be seen and interpreted at a sufficient distance prior to the threshold
- the colour changes are sharp
- the colour change increments are uniform
- the indicated approach slope is compatible with that provided by other approach aids such as an ILS, where they are co-located.

4.5.12.2 A suggested form for recording the results of a PAPI flight check is included at Appendix E of this AC. When identifying individual PAPI units, use the naming convention shown in the MOS, Chapter 9, “Figure 9.50 (5) The arrangement of a PAPI system and the resulting display”.

4.5.13 Day check

4.5.13.1 Where possible the day check should be carried out in bright sunlight to confirm the clarity of appearance of the PAPI in the most demanding visual conditions:

a. With the PAPI on maximum intensity stage, position the aircraft at approximately 5 NM from the threshold at 1200 ft AGL on the runway extended centreline. Hold this altitude and make a qualitative check of the system to determine that there are no obvious deficiencies such as lights not operating. Also, check that:
   i. the lights appear of uniform intensity throughout the system
   ii. the lights appear to be in a straight line along a horizontal plane
   iii. the signal changes from red to white is sharp and appears to occur instantly
   iv. the colour change sequence is even
   v. where a PAPI is on both sides of the runway, the colour change of corresponding opposite units is coincident.

b. During the approach call for the progressive reduction in intensity. Check that all lights respond correctly and simultaneously to the intensity setting changes, and that any period of light extinction between intensities is sufficiently brief as to be operationally acceptable. Select the intensity stage appropriate for the ambient conditions for the remainder of the checks.

c. Commence the next approach from approximately 5 NM from the threshold at 1200 ft AGL. Intercept the visual glide path and note the maximum range at which an on-slope indication can be clearly recognized, i.e., the difference between the red and white lights is clearly discernible. The minimum acceptable range is 4 NM in visibility greater than 10 km. While maintaining an “on-slope” indication, note the system sensitivity.

Note: A correctly adjusted system provides a less sensitive indication of “on-slope” than the T-VASIS. There is approximately 17 ft between “3 red” and “3 white” at the threshold. This difference is approximately 213 ft at 2 NM.

4.5.13.2 **Compatibility with Non-visual Aids.** Where an instrument glidepath is available, carry out an instrument approach maintaining the glidepath. Check that the PAPI indicates “on-slope” from a range of 4 NM to the threshold.

Note: The ILS glidepath should be near the lower limits of the PAPI “on-slope” signal if an aeroplane with a small eye-to-aerial height is used.

4.5.13.3 **Obstacle check.** From a range slightly beyond 4 NM, fly an approach sufficiently low so as to be just within the all-red indication, i.e., the fourth light unit is indicating just red. Hold this indication throughout the approach and check that there are no obstacles throughout the azimuth coverage of the light beams.

4.5.14 Night check

4.5.15 From a range of approximately 4 NM, fly an approach with both the PAPI and the runway lights on. Call for the progressive reduction in intensity of the lower intensity stages, stages 4 to 1 for a 6-stage installation, or Twilight and Night intensity for a 3-stage installation, and check that:

a. all PAPI lights respond correctly and simultaneously to the intensity setting changes

b. the intensity of the PAPI is visually compatible with the runway edge lights and the threshold lights for each of the relevant intensity stages.

4.5.16 T-VASIS – recommended procedure

4.5.16.1 The flight check of a T-VASIS is to confirm that the various light beam cut-off angles are correct, and to confirm the system's usability. Factors influencing usability include:

- the range at which the system can be used
- the uniformity of the light pattern
- the compatibility of the indicated approach slope with that provided by other approach aids, such as an ILS, where they are co-located.

4.5.16.2 A suggested form for recording the results of a T-VASIS flight check is included at Appendix F of this AC. When identifying individual T-VASIS boxes, use the naming convention shown in the MOS, Chapter 9, “Figure 9.46(1) T-VASIS layout”.

4.5.16.3 Part of the flight check requires the accurate tracking of the flight test aircraft as it follows a particular approach path indicated by the T-VASIS system. Any appropriate method may be used to track the aircraft, and in the past theodolite tracking, laser rangefinder tracking, and precision 3-dimensional GNNS position logging have been used.

4.5.17 Day check

4.5.17.1 Where possible the day check should be carried out in bright sunlight to confirm the clarity of appearance of the T-VASIS in the most demanding visual conditions:

a. With the T-VASIS on maximum intensity stage, fly a cross-over at approximately 700 ft AGL from approximately 4 NM from the threshold, and make a qualitative check of the system to determine that there are no obvious deficiencies such as lights not operating nor properly aligned, cut-off angles of corresponding boxes not matched, etc.

b. Fly an approach, keeping the aircraft on the “on-slope” signal, while tracking the aircraft position, and thus determining the angle of elevation of the “on-slope” signal. The standard angle is 3.0º ± 0.05º.
c. While the “on-slope” angle is being checked, a subjective assessment of the sensitivity of the system should be made by the pilot. A correctly adjusted system provides a relatively sensitive indication of deviations from the optimum approach slope. The sensitivity is determined by the settings of boxes 3 and 4, (and 9 and 10 if installed). If the angles at which these pairs of lights are set are divergent, the sensitivity will be “sloppy”.

Note: The “on-slope” signal is the result of a delicate balance between light box intensity and the background brightness therefore on a dull day the “on-slope’ signal may appear to be too tight unless the intensity is lowered to stage 5. Alternatively, intensity stage 5 will provide a signal that is too “sloppy” on a bright day.

d. Fly an approach, keeping the aircraft on the “top of the red” signal of the crossbars, while tracking the aircraft position, and thus determining the angle of this signal. This angle should be 1.9º, must never be less than 1.9º, but may be up to 2.0.º.
e. At approximately 1200 ft AGL, and at approximately 4 NM from the system, fly a partial orbit to check the azimuth through which the whole system can be recognized. The required minimum is 5º either side of the extended runway centre line. No adjustment is possible but the value obtained must be recorded.
f. Fly an approach to determine the cut-off angle of box 1 (and 7 if present), while tracking the aircraft position. Standard angle is 2.83º ± 0.05º.
g. Fly an approach to determine the top of the red sector of box 1 (and 7 if present), while tracking the aircraft position. This angle must be identical for boxes 1 and 7, and between 1.9º and 2.0º.
h. Fly a cross-over at approximately 700 ft AGL, and by qualitative means, determine that the cut-off angles and the top of the red sectors of box 2 and 8 (if present) are the same, and that these angles are midway between those of boxes 1 (and 7) and 3 (and 9).
i. Fly an approach to determine the cut-in angle of box 6 (and 12 if present), while tracking the aircraft position. Standard angle is 3.23º ± 0.05º.
j. Fly a cross-over at approximately 700 ft AGL, and by qualitative means, determine that the cut-in angles of box 5 and 11 (if present) are the same, and that this angle is midway between the cut-in angles of boxes 4 (and 10) and 6 (and 12).
k. Fly a straight-in approach and measure the maximum range at which the system can be recognized and flown. The minimum range is 4 NM.
l. Fly a cross-over at approximately 1200 ft AGL and check the following:
    i. that the light appears of uniform intensity throughout the system
    ii. that the lights forming the pattern appear to be substantially in a horizontal plane
    iii. that for the cross-bars and the “fly-up” lights, the corresponding lights on either side of the runway change simultaneously

iv. that the corresponding “fly-up” lights on either side of the runway disappear simultaneously
v. that the corresponding “fly-down” lights on either side of the runway appear simultaneously

m. Fly a straight-in approach and call for the progressive reduction in day intensities (Stages 6, 5, and 4):
i. check that the intensities are uniform throughout the system
ii. check that all lights respond correctly and simultaneously to the intensity setting changes, and that any period of light extinction between intensities is sufficiently brief as to be operationally acceptable.

4.5.17.2 **Compatibility with Non-visual Aids.** Where an instrument glidepath is available, carry out an instrument approach maintaining the glidepath. Check that the T-VASIS indicates “on-slope” from a range of 4 NM to the threshold.

4.5.17.3 **Obstacle check.** From a range slightly beyond 4 NM, fly an approach sufficiently low so as to be just within the "fly-up" T indicating just red. Hold this indication throughout the approach and check there are no obstacles throughout the azimuth spread of ± 5º from the extended runway centreline.

4.5.18 Night check

4.5.18.1 From a range of approximately 4 NM, fly an approach with both the T-VASIS and the runway lights on. Call for the progressive reduction in intensity of the lower intensity stages, stages 4 to 1 for a 6-stage installation, or Twilight and Night intensity for a 3-stage installation, and check that:

a. intensity matching of the bar to bar and bars to legs are uniform throughout the system, for each intensity stage
b. the intensity of the T-VASIS is visually compatible with the runway edge lights and the threshold lights for each intensity stage
c. all T-VASIS lights respond correctly and simultaneously to the intensity setting changes.

4.5.19 Pilot-Activated Lighting (PAL) system – recommended procedure

4.5.19.1 The flight check is to confirm the operation of the PAL, and its usability. Factors influencing usability include the ease with which a pilot can enter the activation code; the range at which the system can be used, both on the aerodrome and in flight approaching the aerodrome; and the conspicuity of the ten-minute turn-off light.

4.5.19.2 A suggested form for recording the results of a PAL flight check is included as Appendix G of this AC.

4.5.19.3 On the ground

4.5.19.4 Conduct the following checks:

a. Ascertain that all the lighting facilities are activated by the PAL system.

b. Confirm that the activation code complies with the type of PAL unit (stand-alone, AFRU+PAL or PAL+AA) as per the En Route Supplement Australia Introduction (section 23).
c. Activate the lights from the apron.
d. Activate the lights from the runway holding position or threshold of each runway.
e. Check that the ten-minute turn-off warning lights are clearly visible from each of the above locations.
f. Check that the illumination period meets the specified time for the particular aerodrome.
g. Check that when the ten-minute turn-off warning lights are flashing, that transmitting the turn-on code reactivates the aerodrome lighting for another full illumination cycle.
h. Where the PAL activates a multistage intensity facility, have the electrician simulate the transition from day to twilight to night, by controlling the amount of light reaching the light sensitive switch. Check that the various aerodrome lighting systems respond correctly to these changes.

4.5.19.5 In the air

4.5.19.6 Conduct the following checks:

a. Activate the lights from within the circuit area.
b. Activate the lights from 15 NM from the aerodrome at the lowest safe altitude (LSALT) on the route with the lowest LSALT, or the main routes to the aerodrome.
c. Check that the ten-minute turn-off warning lights (for primary and, where this function is provided, the secondary illuminated wind direction indicators) are clearly visible in the circuit area and on final approach to each runway with a ground lighting system controlled by the PAL.
d. Where the PAL activates a multi-stage intensity facility, check that the various aerodrome lighting systems respond correctly to the changes in background luminance. Check that at night, the intensity of the visual approach slope guidance system is visually compatible with the runway edge lights and the threshold lights.

4.5.19.7 **Weak transmitter simulation.** To simulate an aircraft with a weak transmitter, the following checks are suggested. A hand-held transceiver may be used for each of the on-aerodrome checks, and the in-the-air check (b) can be carried out from a distance of 30 NM at the lowest safe altitude plus 1500 ft.

4.5.20 Optional Aerodrome Lights – recommended procedure

4.5.20.1 The aerodrome operator may elect to have the following lighting systems checked as part of a flight check.

4.5.20.2 **Taxiway lights**. While on the ground, check that the taxiway lights:

- provide adequate and un-ambiguous guidance
- are the correct colour
- does not cause confusion to aircraft surface movements

- where runway guard lights, intermediate holding position lights, or stop bars, are provided, check that they are clearly visible from the taxiway when approaching the holding position, and that the location, pattern, colour, flashing characteristic, etc., are correct.

4.5.20.3 **Movement Area Guidance Signs** (where provided). While on the ground, check that these signs are:

- clearly visible
- the correct colour
- that inscriptions are legible from runways and taxiways at a sufficient distance prior to the sign, to enable safe aircraft surface movement, by both day and night.

4.5.20.4 **Illuminated wind direction indicators.** While on the ground and in the air, check that all illuminated wind direction indicator(s) (IWDI) are:

- conspicuous from the approach, the circuit area, the apron and the runway threshold
- showing a true representation of surface wind in the vicinity of the runway(s), and are not adversely affected by adjacent structures, trees, etc
- not adversely impacted by glare from IWDI floodlights.

4.5.20.5 **Apron floodlights.** While on the ground, check that the apron floodlights provide adequate illumination on the apron to manoeuvre, load/unload, and fuel aircraft, as appropriate and while in the air, check that the apron floodlights do not cause glare to a pilot circling, approaching to land, or on the movement area.

4.5.20.6 **Aerodrome environment.** While in the air, check that:

- obstacle lights in the vicinity of the aerodrome are operating effectively
- there are no extraneous lights on and within 6 km of the aerodrome which may cause confusion
- where an aerodrome beacon is provided, it is not visually shielded by objects, does not cause dazzle, flashes at the correct rate, has the correct colour light flashes, and that from the required range, it can be seen.

Appendix A

Ground check report – Aerodrome lighting systems

A.1 Ground check report – Aerodrome lighting systems

AERODROME		Date	
Runway(s)		Approach Type	

LIGHTING SYSTEM REQUIREMENT	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Light Fittings Performance		
Independent compliance statements		
OR		
Test reports from either		
• a NATA laboratory		
• a NATA mutually recognised overseas accrediting authority		
• an ILAC mutually recognised accredited laboratory		
Lighting System		
• **Suitability**		
Minimum requirement		
Appropriate to		
• operations		
• layout complexity		
• traffic density		
• **Power Supply** (in accordance with relevant standards)		
Primary source		
Secondary source (if provided)		
• Switch over time		
Electrical circuitry		
Current settings		

LIGHTING SYSTEM REQUIREMENT	FINDINGS (satisfactory / unsatisfactory)	REMARKS
• **Light fittings positioning & colour**		
Location		
Spacing		
Pattern		
Alignment		
Levelling		
Mounting/attachment		
Colour (test certificates may be used)		
• **Aircraft Safety**		
Not hazardous		
Frangible mounting		
Flush foundation		
• **Surrounding Areas**		
Cleanliness of fittings		
Removal of construction materials		
Presence of FOD		
Reinstatement of disturbed or excavated areas		
Lighting Control Systems		
• **ATS Provider, CA/GRO or UNICOM Operator Control System**		
Activation (including interlocks)		
Intensity control		
Monitoring:		
• activation		
• intensity		
• fault indication		
Operator training		

LIGHTING SYSTEM REQUIREMENT	FINDINGS (satisfactory / unsatisfactory)	REMARKS
• **Ground (Manual) Control System**		
Activation (including interlocks)		
Intensity control		
Monitoring:		
• activation		
• intensity		
• fault indication		
Operator training		
• **Pilot Activated Lighting Control System**		
Frequency range, separation & stability		
Minimum detectable input signal		
Carrier detector bandwidth		
Radio activation (inc radio messages)		
Manual activation (inc radio messages)		
Fail-safe arrangements (inc radio messages)		
Antenna specifications		
• **Light Sensitive Switches**		
Operational		
No artificial light interference		

A.2 General Remarks

A.2.1 Add additional pages, if necessary

I certify that I have checked this lighting installation, and the system meets the relevant Specifications and Standards.

Signature ______________________________ Date _____________________

Name (print) ____

Qualification ____

Appendix B

Ground check report – PAPI

B.1 Ground check report – PAPI

AERODROME		Date	
Runway		Design Aircraft	
PAPI Manufacturer Type		Eye-to-wheel-height group	
Single or Double Sided		Design wheel clearance over threshold	
Critical Obstacle, if any; (location and height)		Design approach angle	
ILS co-sited (Yes/No)		Design minimum eye height over threshold	
Any non-standard design aspects, such as reduced azimuth. (Give details)			

Distance from Threshold - Design	Left Side Light Units A-B-C-D	Right Side (if installed) Light Units E-F-G-H
Distance from Threshold - Design		
Distance from Threshold - Measured		
Distance - R/W edge to D & E		
Distance - D to C & E to F		
Distance - C to B & F to G		
Distance - B to A & G to H		
Aligned along front of units (yes/no)		
Aligned in horizontal plane or permitted transverse slope (yes/no)		
Levelling (clinometer setting) of - A & H		
Levelling (clinometer setting) of - B & G		
Levelling (clinometer setting) of - C & F		
Levelling (clinometer setting) of - D & E		
Foundations, assessed as stable - have the footings been designed for the local soil conditions(yes/no)		
Vertical colour transition angle of - A & H		
Vertical colour transition angle of - B & G		

Distance from Threshold - Design	Left Side Light Units A-B-C-D	Right Side (if installed) Light Units E-F-G-H
Vertical colour transition angle of - C & F		
Vertical colour transition angle of - D & E		
Light beam horizontal spread - A & H		
Light beam horizontal spread - B & G		
Light beam horizontal spread - C & F		
Light beam horizontal spread - D & E		
Vertical angle of Obstacle Assessment Surface, and are there any identified penetrations		
Critical Obstacle (if any). Angle to top.		

B.2 Overall System Check, and General Remarks

B.2.1 Add additional pages, if necessary

I certify that I have checked this PAPI installation, and the system meets the relevant Specifications and Standards.

Signature ______________________________ Date ____________________

Name (print) ____

Qualification ____

Appendix C

Ground check report – T-VASIS

C.1 Ground check report – T-VASIS

AERODROME	
Runway	
Design eye-height over threshold	
Design approach angle	
AT-VASIS or T-VASIS	
ILS co-sited?	
Critical Obstacle (location and height)	
Any design variations from standard layout. (Give details)	

C.2 Ground check report

(Details of all checks made, and any necessary corrective actions as a result of the checks, are listed below. Add additional pages if necessary)

I certify that I have checked this T-VASIS installation, and the system meets the relevant specifications and standards.

Signature ______________________________ Date ____________________

Name (print) ____

Qualification ____

Appendix D

Flight check report – Aerodrome lighting systems

D.1 Flight check report – Aerodrome lighting systems

AERODROME		Date	
Runway		Time	
Approach Cat.		Weather	
Aircraft		Visibility	
Crew		Cloud	

Note: Not all systems listed on this form will necessarily require checking at a particular aerodrome

LIGHTING SYSTEM (where provided)	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Approach Lights		
Pattern		
Colour		
Uniformity		
Intensity Changes:		
• Correct		
• Simultaneous		
• Compatibility with Runway lights		
Outages		
Runway Lights		
• **Edge**		
Pattern		
Colour		
Intensity		
• **Threshold** (including RTIL and Wing Bars, where provided)		
Pattern		
Colour		
Intensity		
• **Runway End**		

LIGHTING SYSTEM (where provided)	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Pattern		
Colour		
Intensity		
• **Visual Cues**		
Visual circuit		
Runway definition		
600m line of sight		
Runway Centreline Lights		
Pattern		
Uniformity		
Colour (including last 900m)		
Intensity Changes:		
• Correct		
• Simultaneous		
• Period of extinction		
• Compatibility with other light systems		
Approach, Landing & Roll Out		
• Visual cues		
• Absence of dazzle		
Runway Touchdown Zone Lights		
Pattern		
Uniformity		
Intensity Changes:		
• Correct		
• Simultaneous		
• Period of extinction		

LIGHTING SYSTEM (where provided)	FINDINGS (satisfactory / unsatisfactory)	REMARKS
• Compatibility with other light systems		
Approach, Landing & Roll Out		
• Visual coherence		
• Absence of dazzle		
• Outages/misalignment		
Optional Aerodrome Lights (at aerodrome operator discretion)		
• **Taxiway Lights** (Edge, centreline, turning node and/or runway holding positions)		
Adequate guidance		
Colour		
Holding points: location, pattern, colour and flash		
• **Movement Area Guidance Signs**		
Visible		
Colour		
Legible		
• **Illuminated Wind Direction Indicator**		
Conspicuous		
Truly representative		
No glare		
• **Apron Floodlights**		
Adequate Illumination		
No glare		
• **Aerodrome Environment**		
Obstacle lights		
Extraneous light		
Aerodrome Beacon		

D.2 Remarks

(Add additional pages if necessary)

I certify that I have flight checked the aerodrome lighting system/s, and the system/s meets the relevant operational requirements.

Signature ______________________________ Date ____________________

Name (print) ____

Letter of Competency No. ____

Appendix E

Flight check report – PAPI

E.1 Flight check report – PAPI

AERODROME		Date	
Runway		Time	
Single/Double		Weather	
ILS co-sited?		Visibility	
Design Angle		Cloud	
Aircraft		Crew	
Any design variations from standard layout. (Give details)			

ITEM	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Day check		
Qualitative check of System		
• Uniformity of intensity		
• Straight, Horizontal appearance		
• Colour change sharpness		
• Steady progression of signal		
• Double sided – Symmetry (L-R)		
Day Intensities		
• Response to Change of Intensity		
Range of System		
Sensitivity of "on-slope" signal.		
Compatibility with ILS (where present)		
Obstacle clearance on Approach		
Azimuth restrictions (if applicable)		
Night check		
Night Intensities		
• Matching of PAPI to Runway (for each Night Intensity)		

ITEM	FINDINGS (satisfactory / unsatisfactory)	REMARKS
• Response to Change of Intensity		

E.1.1 Subjective assessment of aiming point (and relation to touchdown zone marking)

E.2 Remarks

(Add additional pages if necessary).

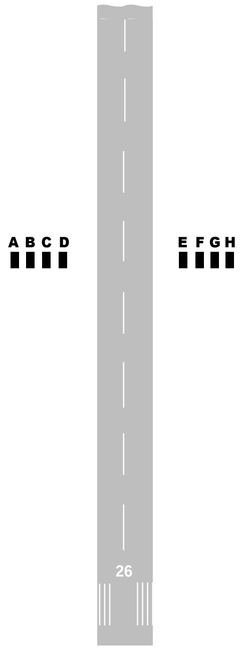

Figure 1: PAPI Unit Labels

I certify that I have flight checked this PAPI installation, and the system meets the relevant operational requirements.

Signature ______________________________ Date ____________________

Name (print) ____

Letter of Competency No. ____

Appendix F

Flight check report – T-VASIS

F.1 Flight check report – T-VASIS

AERODROME		Date	
Runway		Time	
AT or T-VASIS		Weather	
ILS co-sited?		Visibility	
Design Angle		Cloud	
Aircraft		Crew	
Any design variations from standard layout. (Give details)			

F.1.1 Day check

ITEM	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Qualitative check of system		
"On-slope" angle		
Sensitivity of "on-slope" signal.		
Top of red sector on cross-bars		
Day Azimuth		
Cut-off angle – Box 1 (and 7)		
Top of red sector – Box 1 (and 7)		
Cut-off angle – Box 2 (and 8)		
Top of red sector – Box 2 (and 8)		
Cut-in angle – Box 6 (and 12)		
Cut-in angle – Box 5 (and 11)		
Range of system		
System uniformity		
Day Intensities		
Matching of bar to bar		
Matching of bar to legs		
Response to change of intensity		
Compatibility with ILS (where present)		

ITEM	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Obstacle clearance on approach		

F.1.2 Night check

ITEM	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Night Intensities		
Matching of bar to bar		
Matching of bar to legs		
Matching of T to runway (for each Night Intensity)		
Response to change of intensity		

F.2 Remarks

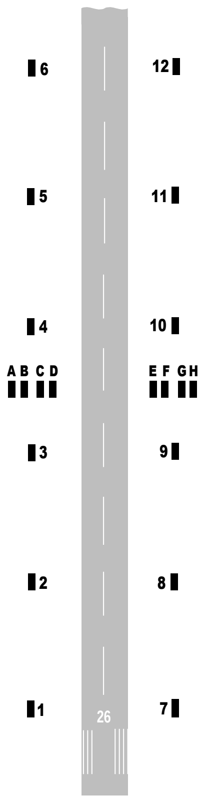

Figure 1: T-VASIS Unit Labels

I certify that I have flight checked this T-VASIS installation, and the system meets the relevant operational requirements.

Signature ____________________________ Date ____________________

Name (print) ____

Letter of Competency No. ____________________________________

Appendix G

Flight check report – Pilot activated lights

G.1 Flight check report – Pilot activated lights

AERODROME		Date	
Aircraft		Time	
Crew		Weather	
Visibility		Cloud	

ITEM	FINDINGS (satisfactory / unsatisfactory)	REMARKS
Checks on the Ground		
Activate from apron		
Activate from thresholds		
Vis. of turn-off lights		
Period lights are on		
Re-activation during last-ten-minute warning		
Automatic intensity change		
Checks in the Air		
Activate from circuit area		
Activate from 15 NM		
Vis. of turn-off lights		
Intensity:		
• Correct control of various lighting		
• Intensity changes		
• Compatibility with runway lights		

I certify that I have flight checked this PAL system, and the system meets the relevant operational requirements.

Signature ________________________________ Date ______________________

Name (print) ____

Letter of Competency No. ____