

CAP 637

Visual Aids Handbook

A compendium of Visual Aids intended
for the guidance of Pilots and Personnel
engaged in the handling of aircraft

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Foreword

This document provides pilots and ground personnel engaged in the handling of aircraft with a general description of the purpose and meaning of visual aids that are typically displayed at aerodromes in the United Kingdom licensed by the Civil Aviation Authority. However, it is not intended to provide an assurance that the visual cues provided by a visual aid are correct or appropriate for a given flight operation.

This document is not to be used to design or specify visual aids for the purpose of aerodrome licensing. Licensing criteria, which include the technical specifications and display patterns of aeronautical ground visual aids, are contained in CAP 168, Licensing of Aerodromes.

Visual aids provided at licensed aerodromes are notified in the UK Aeronautical Information Publication (AIP).

Acknowledgements

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Chapter 1 Aeronautical Ground Lighting

1 General

- 1.1 Aeronautical Ground Lighting (AGL) is the generic term used to describe the various lighting systems that are provided on an aerodrome for the guidance of pilots operating aircraft both at night and in low visibility conditions. AGL systems vary in complexity from the basic patterns found at small aerodromes in support of flying training operations, to the more advanced systems used in support of "all-weather operations", usually associated with an Instrument Landing System (ILS).
- 1.2 The following paragraphs outline the AGL systems that have been accepted by the CAA as meeting both UK aerodrome licensing criteria and internationally agreed standards and recommended practices.

2 Civil Aerodromes

- 2.1 Details of AGL, where available at individual aerodromes, are notified in the UK AIP and on the appropriate Instrument Approach Charts. Where the AGL provided at a licensed aerodrome does not conform to the applicable specification in CAP 168, an appropriate aerodrome entry is included in the UK AIP or, if the deficiency is of a temporary nature, a Notice to Airmen (NOTAM) is issued detailing the AGL that is available.
- 2.2 AGL at unlicensed aerodromes are neither inspected nor approved by the CAA, and may be of a non-standard pattern.

3 Government (Military) Aerodromes

- 3.1 AGL installed at Government aerodromes are not regulated or approved by the CAA, and may differ from those installed at civil aerodromes. The Ministry of Defence is now, however, applying civil standards for aerodrome design and facilities wherever practicable.

4 Colour and Intensity of Lights

- 4.1 Unless otherwise indicated, AGL systems emit a steady **white** light. High intensity AGL systems that are provided in support of low visibility operations normally have facility to independently control the luminance intensity of each element of the system. The intensities are set up, usually by the air navigation service provider, to suit local conditions. A pilot may ask for the intensity of an element(s) of the system to be adjusted if found to be inappropriate for the flight operation.
- 4.2 The performance specification of high intensity lighting is defined by the need to provide guidance by day in low visibility conditions; the highest intensity settings are normally used in these conditions. Lower intensities are normally used by night.
- 4.3 Low intensity systems are provided at those aerodromes at which operations are conducted at night but not in low visibility conditions; the luminance intensity of these systems is not normally adjustable.

5 Aerodrome Beacon

- 5.1 An Aerodrome Beacon would normally be provided at those aerodromes that operate at night and where the level of background lighting, the surrounding terrain, the proximity of other aerodromes or the lack of navigation aids would make the aerodrome difficult to locate or to identify. There are two types of Aerodrome Beacon: the Identification Beacon and the Location Beacon.
- 5.2 An Identification Beacon flashing a two letter identification code in **green** would normally be provided at an aerodrome where a number of aerodromes in the same vicinity operate at night and confusion could arise as to identity. Government aerodromes are normally equipped with a **red** identification beacon.
- 5.3 A Location Beacon would normally be provided at an aerodrome that is situated well away from other aerodromes and where no confusion could exist as to identity. The signal produced by a Location Beacon is determined by the amount of background lighting as follows:
- Where the aerodrome is also situated well away from areas of high background lighting, the Location Beacon would display a **white** flashing light.
 - Where the aerodrome is situated in an area where there is a high level of background lighting, such as in the vicinity of a city where a flashing **white** light would be difficult to see, the Location Beacon would display a **green** light flashing alternately with a **white** light.

6 Approach Lighting

- 6.1 A variety of approach lighting systems, based on the centre line and cross bar concept, are in use at aerodromes throughout the UK. These systems range from the simple low intensity centre line and cross bar - shown at Figure 1.1 - intended to serve visual runways at night only, to the more complex Calvert System comprising centreline and 5 cross bars - shown at Figure 1.3 and 1.4 - for day and night use on ILS equipped runways.
- 6.2 Simple approach lighting systems normally commence 500 m prior to the runway threshold whilst the full Calvert System commences 900 m prior to runway threshold. Where, because of the geography of the approach, it is not possible to install a full system, a shortened system is employed and the Runway Visual Range (RVR) minima associated with the instrument approach procedure adjusted accordingly. Except where supplemented by red side barrettes as described below, approach lighting is **white** in colour.

Figure 1.1

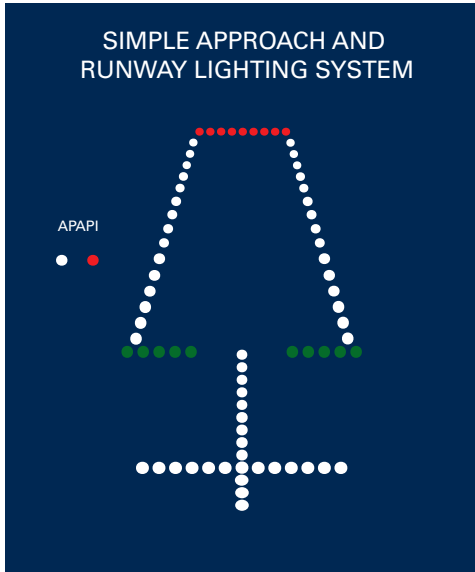


Figure 1.2

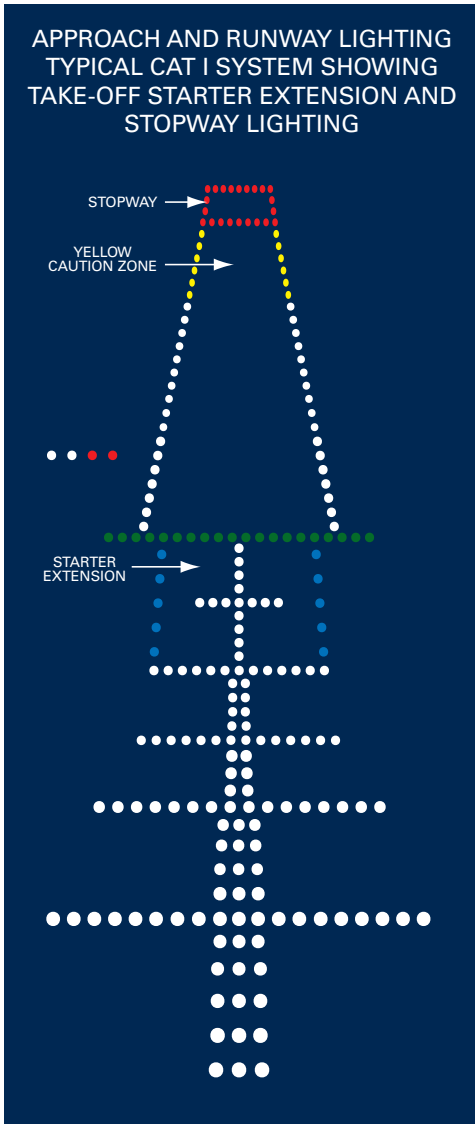
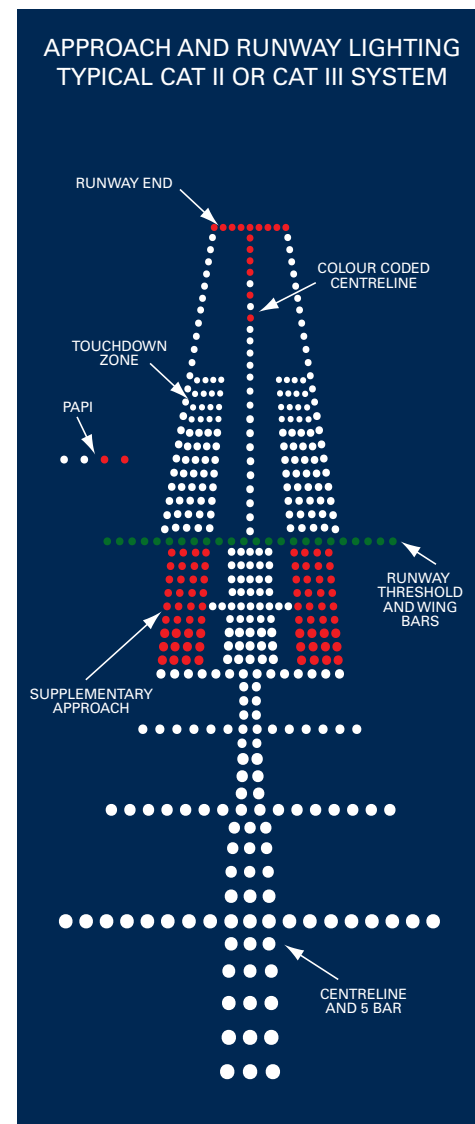


Figure 1.3



7 Supplementary Approach Lighting

- 7.1 At those aerodromes where Category II and III approaches are conducted, Supplementary Approach Lighting consisting of **white** centreline barrettes and two rows of **red** side barrettes, as shown at Figure 1.3, is installed in order to provide the pilot with enhanced visual cues over the last 300 m of the approach.

NOTE: At certain aerodromes with displaced thresholds, the supplementary approach lighting is inset into the runway and in certain weather and ambient light conditions the centreline barrettes, at the higher intensity settings, can partially obscure the runway centreline lighting to pilots lining up for departure. Pilots experiencing problems of this nature should ask for the intensity of the supplementary lighting to be adjusted or extinguished.

8 Precision Approach Path Indicator (PAPI)

- 8.1 This visual aid provides approach slope guidance by use of **red** and **white** light signals which are interpreted as illustrated at Figure 1.4. The PAPI normally comprises a single row of 4 light units except that, on those runways that do not support jet public transport operations, an abbreviated 2 unit system (APAPI) may be used. The system is normally installed on the left side of the runway as seen from the approach. However, at some aerodromes, the units are located on the right side if it is impracticable to install on the left.

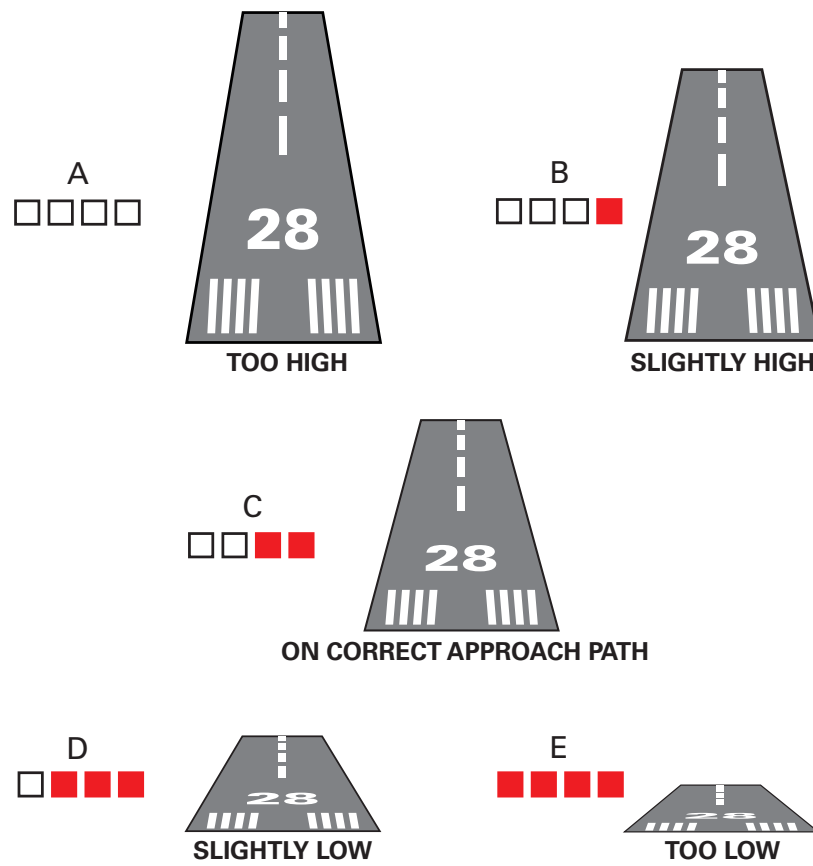
- 8.2 At those aerodromes where aircraft with short take-off and landing (STOL) characteristics operate regularly, an additional separately selected PAPI, set at a steeper approach angle, may be provided. These STOL units are normally situated on the right side of the runway and operate only for STOL approaches.

- 8.3 At Government aerodromes PAPI units may be provided on both sides of the runway.

- 8.4 The PAPI signal is not designed to be used beyond 15° either side of the runway centreline. Any additional restrictions placed on the use of a particular installation will be notified under the 'Warnings' section of the appropriate aerodrome entry in the AIP.

NOTE: Where obstacles located at the extremities of the visual signal preclude the provision of safe clearance, the appropriate aerodrome entry in the UK AIP will be annotated to that effect.

- 8.5 The Minimum Eye Height over Threshold (MEHT), which is notified in AIP, is a reference value, calculated with respect to the promulgated approach angle for each PAPI. It is the lowest eye height over the runway threshold at which an on-slope indication will be seen. From examination of published MEHT, it may at first sight appear that for some runways, adequate wheel clearance at the threshold is not assured for all types of aircraft likely to use those runways. However, a typical eye height achieved in practice when crossing the threshold following well established 'on slope' approach would in fact be well above the published MEHT value.

Figure 1.4 Typical PAPI System

- 8.6 Where used together with ILS, PAPI is located so as to ensure, as far as is practicable, correlation between the two approach paths. However, such a siting is made on the assumption that the pilot's eye level is above the ILS glide path receiver aerial, as is the case with most commercial aircraft. Pilots of aircraft in which the ILS aerial is mounted above the level of the pilot's eye may see a PAPI indication 'slightly low' (see Figure 1.4 D) when on the ILS glide path.

9 Runway Lighting

- 9.1 All runways licensed for night use have Edge, Threshold and End Lighting. Centreline and Touchdown Zone Lighting is provided as additional guidance in support of low visibility operations.

9.2 Runway Edge Lighting

- 9.2.1 Runway Edge Lighting is located along the edges of the area declared for use as the runway delineated by **white** edge markings, and may be provided either by elevated or by flush fitting lamp fixtures. At some aerodromes where elevated runway edge lights are employed, the light fixtures may be located on the grass shoulder just beyond the declared runway width. Portable battery operated lights may be used in place of fixed lamp fittings at small aerodromes where limited operations take place at night.

9.2.2 Runway Edge Lighting is **white** except in the following instances:

a) **Caution Zone Lighting**

On ILS equipped runways without centreline lighting, **yellow** edge lighting as illustrated at Figure 1.2, is installed on the upwind 600 m or one third of the lighted runway length available, whichever is the less. The **yellow** 'caution zone' so formed gives a visual warning of the approaching runway end.

b) **Pre-Threshold Lighting**

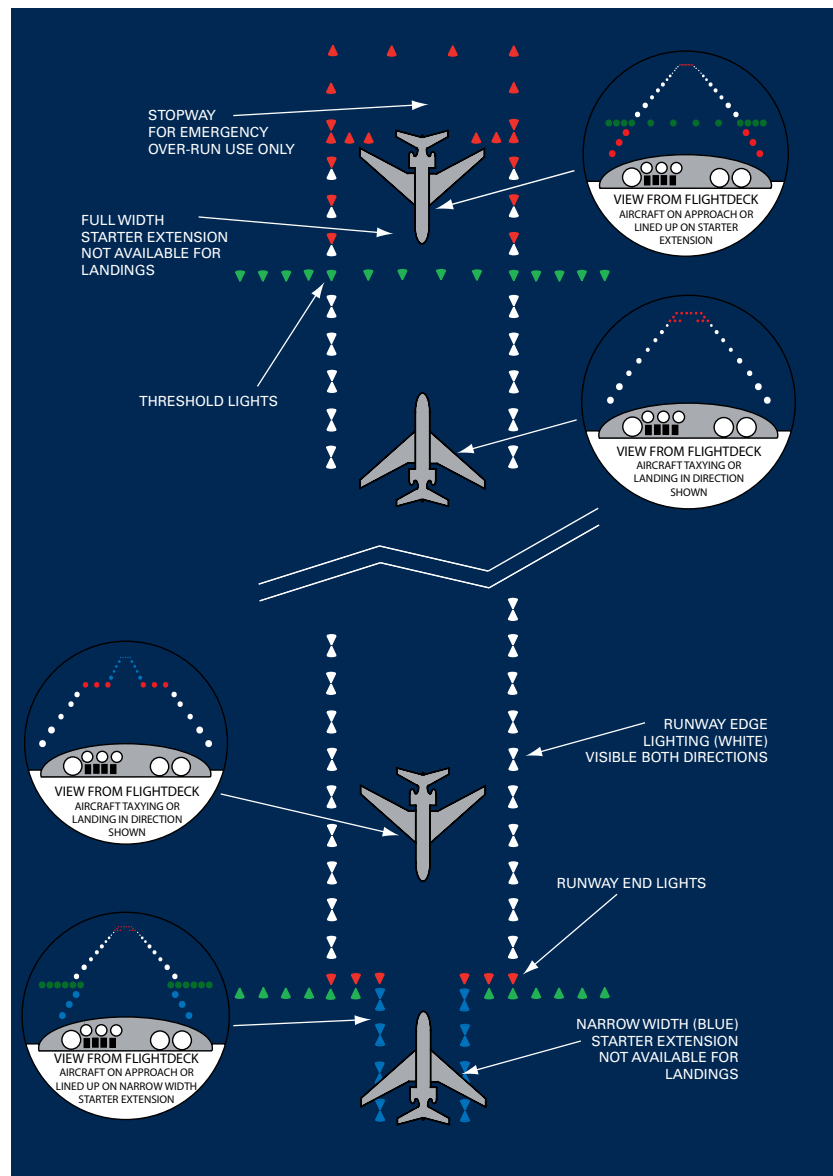
Where a landing threshold is displaced, but the pre-threshold area is available for the take-off run, the lights between the beginning of the runway pavement and the displaced threshold show **red** from the approach, as illustrated at Figure 1.5. Pilots taking off in such a situation would see **red** edge lights up to the **green** threshold then **white** edge lights beyond. Where a starter extension, narrower than its associated runway is provided, **blue** edge lighting is normally used to mark the edges, as illustrated at Figure 1.5.

c) **Runway Exit Lighting**

One or two omni-directional **blue** lights may replace or supplement the edge lights in order to indicate an exit taxiway.

d) **Stopway Lighting**

Where stopway is provided at the end of a runway, the declared stopway is delineated by **red** edge and end lighting as illustrated in Figure 1.5 showing ONLY in the direction of landing. A stopway is provided for emergency use only and is not normally suitable for routine use.

Figure 1.5 Runway Edge, Threshold and Edge Lighting

9.3 Runway Threshold and Runway End Lighting

9.3.1 Runway threshold lighting is **green** and indicates the start of the available landing distance. **Green** threshold wing-bars are provided at certain aerodromes where there is a need to accentuate the threshold. Patterns vary from the full threshold and wing-bar lighting shown at Figures 1.2, 1.3, and 1.5 to abbreviated versions shown at Figures 1.1 and 1.5. Runway end lighting is **red** and marks the extremity of the runway that is available for manoeuvring. Pilots should not land before the **green** threshold lighting nor continue a landing roll or taxi beyond the **red** runway end lights.

9.4 Runway Centreline Lighting

9.4.1 High intensity centreline lighting is provided **in addition** to edge lighting on runways equipped for low visibility operations. The centreline lighting is colour coded in order to warn a pilot of the approaching end of the runway. **White** centreline lighting extends from the threshold to 900 m from the runway end, the following 600 m is lit with alternate **white** and **red** lights, and the final 300 m lit by **red** centreline lighting, as shown at Figure 1.3.

9.5 Touchdown Zone (TDZ) Lighting

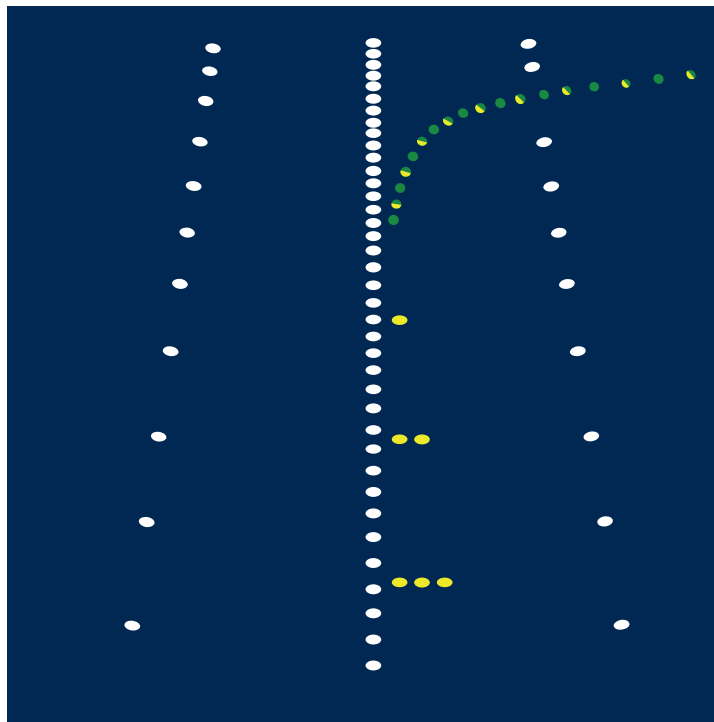
- 9.5.1 On runways equipped for Category II and III approaches, additional lighting consisting of two rows of **white** barrettes, as shown at Figure 1.3, is installed in order to provide textural cues in the touchdown area. The additional lighting extends from the threshold either for 900 m or to the midpoint of the runway, whichever is the lesser distance.

NOTE: The length of the TDZ lighting (normally 900 m) determines the length of the Obstacle Free Zone (OFZ) established to protect CAT II and III approaches below decision height (DH) and in the event of a baulked landing (or go-around) after DH. A go-around initiated beyond the end of the TDZ lighting is unlikely to be contained within the OFZ.

9.6 Rapid Exit Taxiway Indicator Lights

- 9.6.1 Rapid exit taxiway indicator lights (RETILs) provide pilots with distance to go information to the nearest rapid exit taxiway on the runway, to enhance situational awareness in low visibility conditions and enable pilots to apply braking action for more efficient roll-out and runway exit speeds.
- 9.6.2 RETILs consist of six **yellow** lights adjacent to the runway centreline and configured in a three/two/one pattern spaced 100 m apart; the single light is 100 m from the start of the turn for the rapid exit taxiway, see Figure 1.6.

Figure 1.6 Rapid Exit Taxiway Indicator Lights



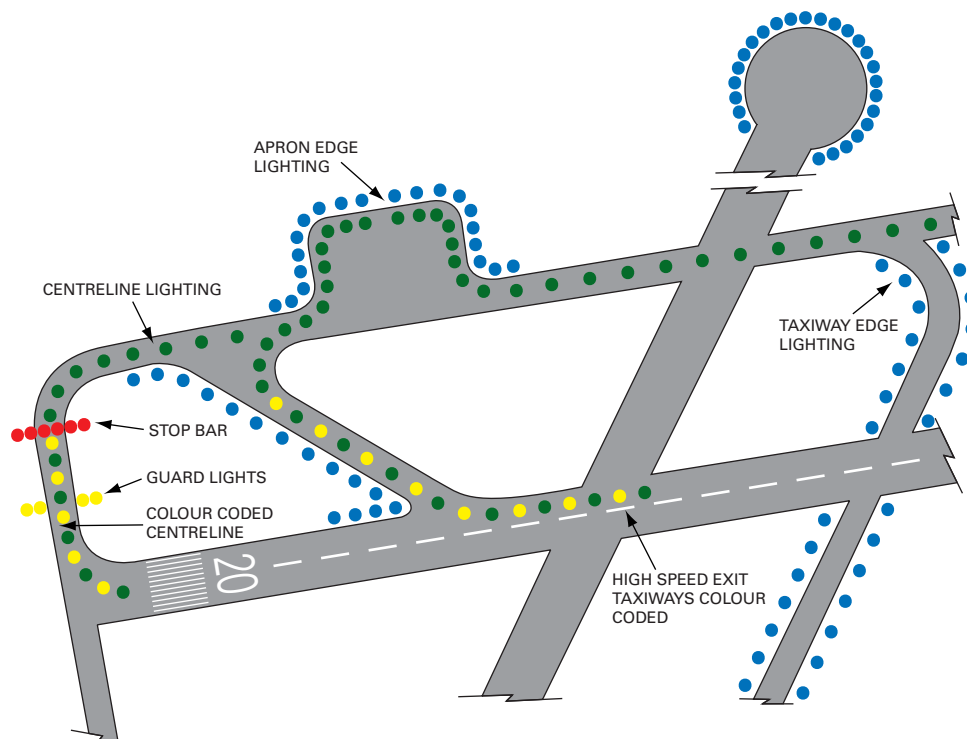
10 Taxiway Lighting

- 10.1 At those aerodromes equipped for low visibility operations, taxiways are equipped with **green** centreline lighting, otherwise **blue** edge lighting is provided, as shown in Figure 1.7. Where **green** centreline lighting is provided, **blue** taxiway edge lighting may also be installed as additional guidance on sections of taxiway that are difficult to negotiate. **Green** taxiway centreline lighting may be provided on the runway prior to an exit taxiway in order to give lead-off guidance. However, see paragraph 10.5. The edge of aprons, turning and holding areas are normally marked by **blue** lighting.

NOTE 1: Where centreline lighting is installed on a taxiway leading onto a runway, the taxiway lighting is curved onto the near side of the runway centreline and pilots should make an appropriate allowance for any loss of Runway Declared Distance incurred in following the 'lead-on' lighting whilst lining up for take-off.

NOTE 2: Taxiway centrelines are intended to provide safe clearance between the largest aircraft that the taxiway is designed to accommodate and fixed objects such as buildings, aircraft stands etc, provided that the pilot of the taxiing aircraft keeps the 'Cockpit' of the aircraft on the centreline and that aircraft on stands are properly parked. Taxi Holding Positions are normally located so as to ensure clearance between an aircraft holding and any aircraft passing in **front** of the holding aircraft, provided that the holding aircraft is properly positioned **behind** the holding position. **Clearance to the rear of any holding aircraft cannot be guaranteed.** When following a taxiway route, pilots and persons towing aircraft are expected to keep a good lookout, consistent with the prevailing visibility and are responsible for taking all possible measures to avoid a collision with another aircraft or a vehicle.

Figure 1.7 Taxiway Lighting

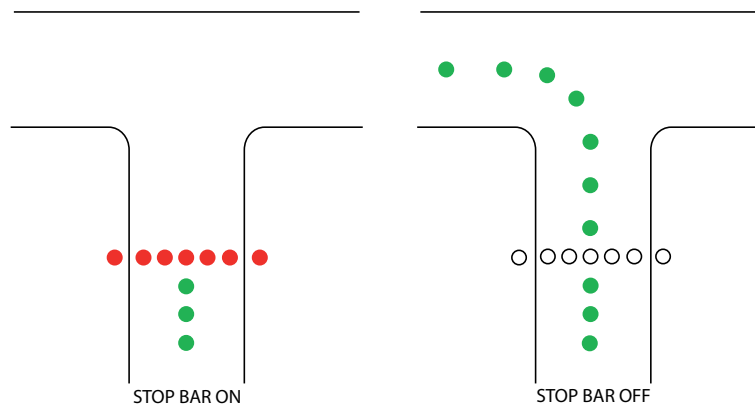


10.2 Stop Bars and Lead-on Lights

10.2.1 Lighted Stop Bars and Lead-on Lights are provided at those aerodromes authorised for low visibility operations. A Stop Bar consists of a row of lights spaced equally across the taxiway normally at right angles to the centreline and showing **red** towards an approaching aircraft when lit. Stop Bars are normally installed in association with **green** Lead-on Lights which form part of the taxiway centreline lighting beyond the Stop Bar. The Lead-on Lights are interlinked with the Stop Bar so that when the Stop Bar is 'on' the **green** centreline beyond the Stop Bar is 'off' and vice versa, as shown in Figure 1.8. In this way, the Stop Bar and associated Lead-on Lights act in the same sense as traffic lights; therefore *pilots must not taxi an aircraft across a Stop Bar that is lit*. Stop bars are provided at entrances to runways, e.g. runway holding positions, and may also be provided at taxiway intersections and at other locations.

NOTE: At some aerodromes where, for example, a Stop Bar is located on or close to a bend in the taxiway route, additional elevated **red** lights may be installed outboard of each taxiway edge as shown at Figure 1.7, in order to provide maximum advanced warning of the Stop Bar location.

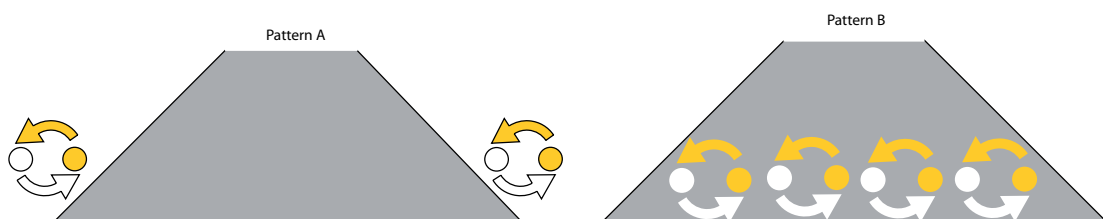
Figure 1.8 Stop Bar and Lead-on Lights



10.3 Runway Guard Lights

10.3.1 Runway Guard Lights are pairs of alternately flashing **yellow** lights, one pair located on each side of the taxiway and provide a warning of the close proximity of the runway. Where the taxiway is wider than normal, an alternative form of Runway Guard Light may be provided comprising additional pairs of flashing **yellow** lights inset into and stretching across the full width of the taxiway. The electrical circuits are so arranged that alternate lights flash in unison. Runway Guard Lights, often referred to as "Wig Wags", are illustrated at Figure 1.9.

Figure 1.9 Runway Guard Lights



10.4 Taxiway Guidance System

10.4.1 At aerodromes where Category II and III operations take place or where ground movement requirements are complex, a surface movement guidance and control system (SMGCS) may be installed in order to regulate traffic. The system operates by selective switching of the taxiway centreline lighting so that individual sections or routes, each terminating at a lit Stop Bar, are illuminated in order to show the way ahead. The Stop Bar is extinguished as the next section of taxiway centreline lighting is selected.

10.5 Colour Coded Taxiway Centreline Lighting

10.5.1 Where part of a taxiway equipped with centreline lighting lies within the ILS Sensitive Area or is sufficiently close to a runway that aircraft on that part of the taxiway would present an obstruction to aircraft landing or taking-off, that part of the taxiway will be identified by alternate **green** and **yellow** centreline lights, as shown at Figure 1.6 and 1.7. Pilots should avoid stopping with any part of their aircraft in such areas.

10.6 Taxiway Intersection Lights

10.6.1 At some aerodromes where multiple intersecting taxiways are not provided with selective route guidance, Taxiway Intersection Lights may be provided. These consist of a row of at least 3 steady **yellow** lights disposed symmetrically about the taxiway centreline. Pilots approaching an intersection where these lights are displayed should give way to crossing traffic unless otherwise instructed by air traffic control (ATC).

10.7 Reflective Taxiway Edge Markers and Centreline Studs

10.7.1 On taxiways that are used infrequently, reflective edge markers or centreline studs may be used instead of taxiway lighting. Edge markers are **blue** and centreline studs are **green**.

10.8 Unpaved Taxiway Routes

10.8.1 Where taxiing is confined to specific routes on unpaved areas, the routes may either be edged with **blue** portable lights laid out as for normal taxiway edge lighting, or be provided with reflective taxiway edge markers. In certain circumstances, apron floodlighting may be accepted as sufficient illumination of adjacent taxiways. On grass aerodromes where specific taxiways are not provided, portable **white** lights may be used to mark the boundary of the manoeuvring area.

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Chapter 2 Surface Markings

1 General

- 1.1 Surface Markings are provided on aerodromes in order to assist pilots in identifying certain locations and to provide guidance for ground movement by day. For the purposes of this document, Surface Markings have been divided into two groups, namely Paved Surface Markings and Unpaved Surface Markings.

2 Paved Surface Markings

- 2.1 Paved Surface Markings are normally produced by the application of skid resistant paints or thermo-plastic materials directly onto the pavement. The markings fall into three categories namely Paved Runway Markings, Paved Taxiway Markings and Paved Apron Markings, all of which are described in the following paragraphs.

2.2 Paved Runway Markings

- 2.2.1 Paved Runway Markings are **white** and those in use at aerodromes in UK are explained below. Illustrations of the various markings are given at Figure 2.1.

a) Runway Designation Marking

All paved runways are identified by a Runway Designation Marking. This marking consists of a two digit number indicating the magnetic heading of the runway to the nearest 10 degrees. At those aerodromes with parallel runways where the same magnetic heading applies to more than one runway, the Designation Marking will include a letter, such as 'L' identifying the left runway as seen from the approach, 'C' identifying the centre runway where there are 3 parallel runways or 'R' for the right runway, as appropriate.

b) Threshold, Edge and Centreline Markings

All paved runways have Centreline and Threshold Markings. The Threshold Markings differ according to the classification of the runway. Runway Edge Marking is normally provided on all ILS equipped runways and those other runways where there is insufficient contrast between the runway and its shoulders or where the declared runway width is less than the paved width.

c) Displaced Threshold Markings

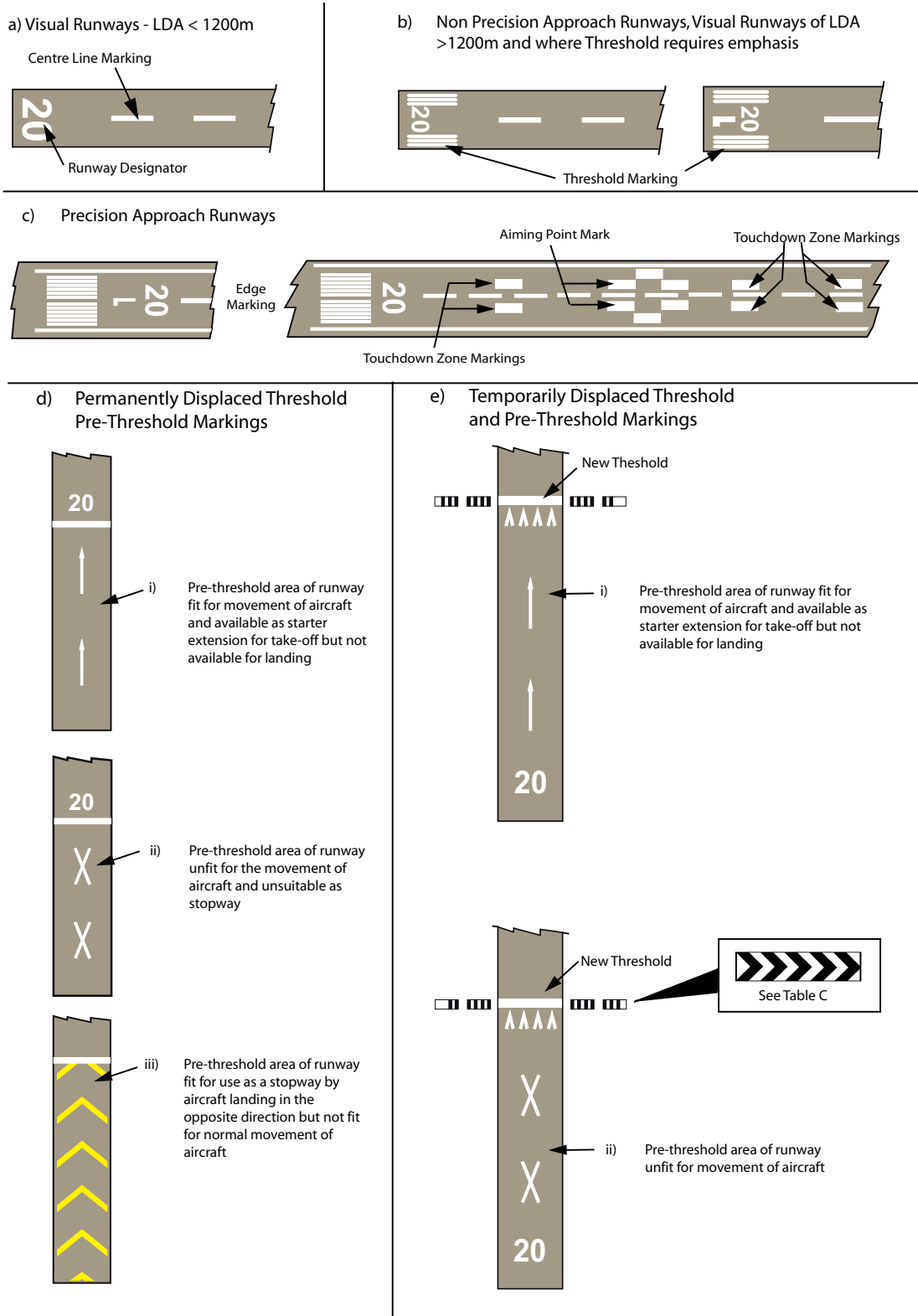
While Threshold Markings are normally located at the beginning of the paved runway surface, they may be displaced along the runway where, for example, there are obstructions on the approach or where the first portion of the pavement is unfit for the movement of aircraft. Where displacement is of a temporary nature, e.g. to accommodate runway maintenance, the normal threshold markings will be obscured and the appropriate Displaced Threshold Marking and threshold marker boards, illustrated at Figure 2.1 (e), put in place in order to mark the new threshold. Whenever a threshold is displaced, the pre-threshold area will be marked according to its usability at Figure 2.1 (d) and (e).

d) TDZ and Aiming Point Markings

All ILS equipped runways and those other runways where the touchdown zone is insufficiently conspicuous are provided with TDZ and Aiming Point Markings as shown at Figure 2.1 (c). These markings are intended to give added visual cues to

the runway surface, particularly in conditions of poor visibility; they also indicate the optimum touchdown zone on the runway. The apparent distance between the Aiming Point Marking and the Runway Threshold Marking, as seen from the approach, is intended to aid pilots in judging their angle of approach.

Figure 2.1 Paved Runway Markings (not to scale)



2.3 Paved Taxiway markings

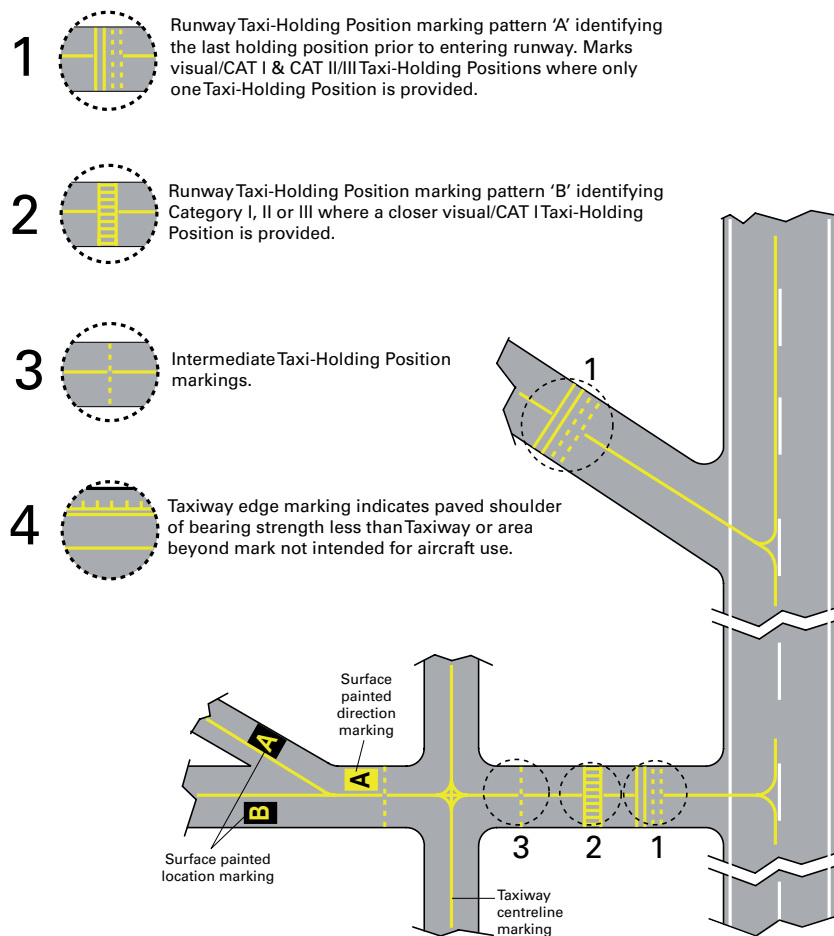
2.3.1 Paved Taxiway Markings are **yellow** in colour and consist of Centreline, Runway Taxi-Holding Position, Intermediate Taxi-Holding Position, Edge and Information markings all of which are illustrated at Figure 2.2 and described below. The direction in which the holding instruction implicit in the Runway Taxi-Holding Position Pattern 'B' and Intermediate Taxi-Holding Position Markings applies, is determined by the accompanying sign described in Chapter 3 paragraph 2, i.e. the direction from which the sign face is visible indicates the direction in which the holding requirement applies.

a) Centreline Marking

The Taxiway Centreline Marking consists of a single continuous **yellow** line marking the centre of the taxiway. Where a taxiway crosses a runway, the Taxiway Centreline Marking will indicate the route to be followed but the marking is interrupted as necessary in order to accommodate the runway markings. Taxiway centrelines are located to provide safe clearance between the largest aircraft that the taxiway is designed to accommodate and fixed objects such as buildings, aircraft stands etc, provided that the pilot of the taxiing aircraft keeps the '*Cockpit*' of the aircraft on the centreline and that aircraft on a stand are properly parked.

NOTE 1:At runway-taxiway intersections, where the taxiway centreline is curved onto the nearside of the runway centreline, pilots should take account, where appropriate, of any loss of Runway Declared Distances incurred in following the 'lead-on' line lining up for take-off.

NOTE 2:At major aerodromes in the UK, the taxiway width is determined to ensure a specified minimum clearance between the outer wheels of the largest aircraft that the taxiway is designed to accommodate and the taxiway edge. The minimum wheel to edge clearance is assured in turns provided that the pilot keeps the 'Cockpit' over the taxiway centreline.

Figure 2.2 Paved Taxiway Markings (not to scale)**b) Runway Taxi-Holding Position (RTHP) Marking**

RTHPs are established on each taxiway leading to a runway in order to protect aircraft on take-off and landing by ensuring that other taxiing aircraft and vehicles are held well clear of the runway and, where appropriate, outside the ILS Sensitive Area. There are two styles of RTHP marking, patterns A and B, both of which are illustrated at Figure 2.2.

- i) A Pattern 'A' style RTHP marking consists of two solid and two broken lines laid across the entire width of the taxiway and normally at right angles to the taxiway centreline, the broken lines being closer to the runway (see enlargement 1 Figure 2.2).
- ii) A Pattern 'B' style RTHP marking, consists of a ladder mark laid across the entire width of the taxiway and normally at right angles to the taxiway centreline (see enlargement 2 Figure 2.2).

The last RTHP on a taxiway prior to entering the runway is always marked by a Pattern 'A' RTHP marking; other RTHPs, where established on the same taxiway, are marked by a Pattern 'B' style marking. RTHP markings are supported by the appropriate RTHP sign as described at Chapter 3 paragraph 2.

Taxi Holding Positions are normally located so as to ensure clearance between an aircraft holding and any aircraft passing in **front** of the holding aircraft, provided that the holding aircraft is properly positioned **behind** the holding position. **Clearance to the rear of any holding aircraft cannot be guaranteed.** When

following a taxiway route, pilots and persons towing an aircraft are expected to keep a good lookout and are responsible for taking all possible measures to avoid collisions with other aircraft and vehicles.

NOTE 1: Upon reaching a Taxi Holding Position identifying a taxi clearance limit, the pilot should stop the aircraft as close as possible to the Taxi-Hold Position Marking, whilst ensuring that no part of the aircraft protrudes beyond the marking.

NOTE 2: At those aerodromes where an ATC unit is established, pilots must not taxi beyond a Taxi-Holding Position marking towards a runway without ATC clearance. Where there is no ATC unit, the Pattern 'A' RTHP marking is used to indicate the position where aircraft and vehicles are required to hold whilst giving way to aircraft using, or on approach to, the runway.

c) **Intermediate Taxi-Holding Position (ITHP) Marking**

At those aerodromes where the taxiway layout is complex or involves multiple intersecting taxiways, ITHPs may be established in order to protect a priority taxiway route. These holding positions are marked by a single broken line laid across the entire width of the taxiway and normally at right angles to the taxiway centreline as illustrated in Figure 2.2 enlargement 3. An ITHP marking is supported by a sign as described at Chapter 3 paragraph 2.5. These markings are located so as to provide clearance from aircraft passing *in front* of the holding aircraft.

d) **Taxiway Edge Marking**

Edge markings as illustrated at Figure 2.2 enlargement 4, are used where the area beyond the taxiway edge is paved but not normally available for use by aircraft.

e) **Information Markings**

Information Markings, in the form of surface painted directions, may be provided where the use of a sign might cause an unacceptable obstruction or to assist in the prevention of runway incursions. Examples of Information Markings are shown at Figure 2.2.

2.4 **Apron Markings**

2.4.1 Apron markings intended for pilot use are **yellow** in colour. Where a marking is provided for the guidance of pilots parking aircraft on stands, this normally comprises just a stand centreline marking.

2.4.2 **Stands Provided with Visual Docking Guidance**

2.4.2.1 At those airports where visual docking guidance is provided, a variety of different stand layout markings are used. An example of the layout and markings used at some airports in the UK is illustrated at Figure 2.3. Visual Docking Guidance Systems (VDGS) are described at Chapter 4.

Figure 2.3 Typical Stand Layout and Markings

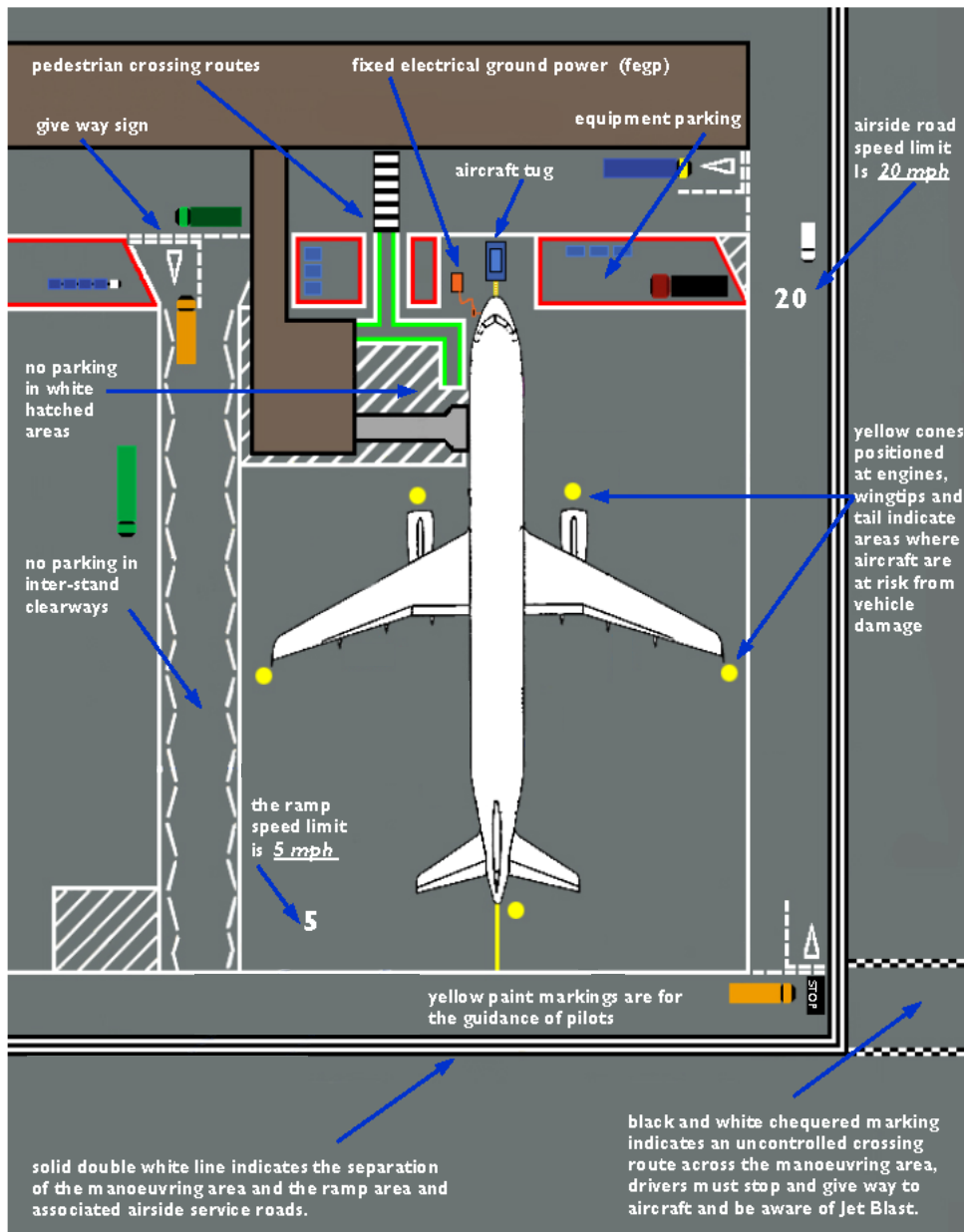
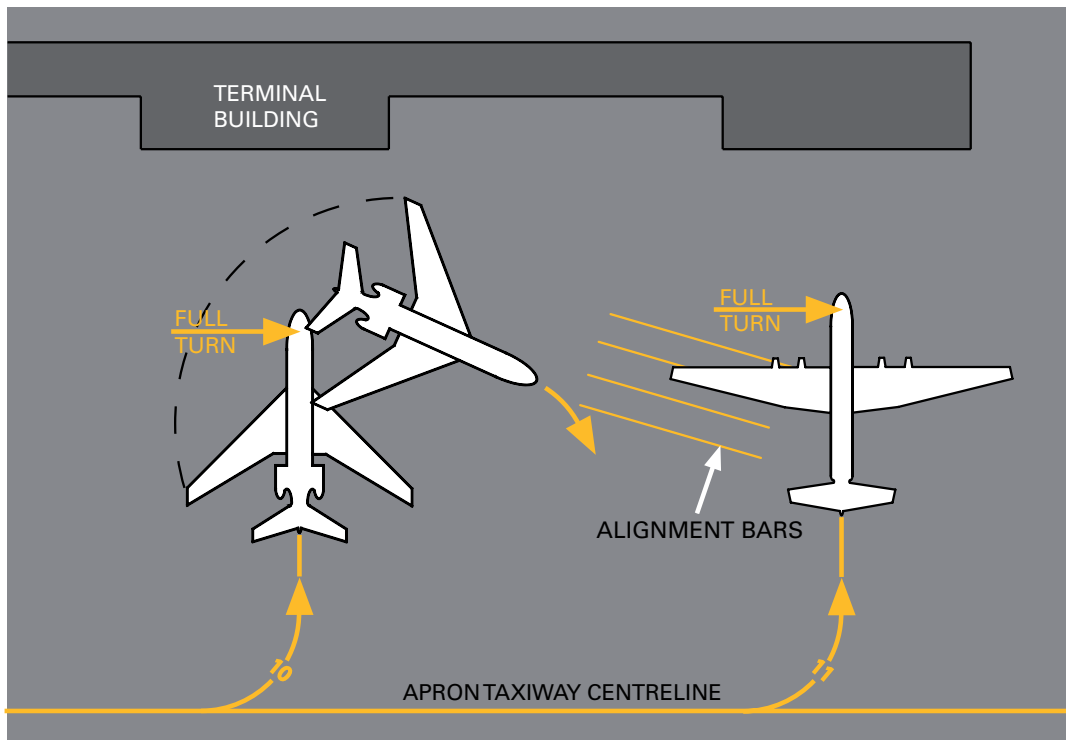


Figure 2.4 Self Manoeuvring Stand Markings

2.4.3 Self-manoeuvring Stand Markings

2.4.3.1 Self-manoeuvring stand markings are provided to assist pilots in taxiing their aircraft to the correct parking position without the assistance either of a marshaller or a VDGS. A variety of different styles of marking are in use throughout the UK. An example of one style is at Figure 2.4; the method of use is described below:

- The pilot turns off the apron taxiway at the arrow which bears the allocated stand number and follows the lead-in line keeping the **nosewheel** on the centreline;
- When the FULL TURN arrow is directly abeam the first pilot's position, a turn, using the maximum nose wheel steering angle appropriate to the type of aircraft, is initiated in the direction indicated. This turn is continued until the longitudinal axis of the aircraft is parallel with the alignment bars seen ahead of the aircraft as the designed parking angle is reached;
- When the aircraft is parallel to the alignment bars, the turn is discontinued and the aircraft permitted to roll forward a distance of not more than 3 m in order to straighten the nose wheel. The aircraft is then stopped;
- When cleared to taxi by ATC, the pilot taxis off the stand in the direction indicated by the curved lead-off arrow disregarding the alignment bars.

NOTE: The provision of safe clearances from other aircraft and fixed obstacles relies heavily on the accuracy with which the pilot follows the surface markings; turning too late, using too great a radius of turn or taxiing the aircraft too far forward, may reduce the clearances below the safe limit. Unlike the principle used on taxiways (cockpit on centreline), when manoeuvring onto stands the pilot must keep the nosewheel on the stand centreline. If in doubt the aircraft commander should seek assistance from a marshaller.

2.4.4 Parking Spots and Parking Circles

2.4.4.1 At some small aerodromes where aircraft parking space is at a premium, a **yellow** spot, number or circle may be painted on the apron indicating an individual aircraft parking position. Pilots should be aware that parking on the spot or within the circle does not guarantee safe separation either from fixed obstacles or from adjacent aircraft.

2.4.5 Additional Apron Markings NOT for Pilot use

2.4.5.1 **White** markings on an apron are intended for the guidance, control and movement of ground service vehicles. **White** hatched diagonal markings adjacent to an aircraft parking stand delineate an area that ground service vehicles should not park or stop in at any time.

2.4.5.2 Some aprons may also provide additional markings to highlight safe routes for pedestrian access to an aircraft stand or the terminal building, typically these are **green** with a **white** inset border (with a Pedestrian symbol inside the border).

2.4.5.3 Vehicle and equipment storage bays are typically depicted by a **red** box inset by a **white** border.

NOTE: Enhanced hatched markings in clearways or other areas are used to denote where vehicles are not permitted to stop.

3 Unpaved Surface Markings

3.1 Unpaved surface markings are normally confined to runways and consist of Runway Edge, Centreline, Threshold and End Markings.

3.1.1 Runway Edge and Centreline Marking

3.1.1.1 The edges of runways are delineated by markers placed at regular intervals along the declared edges of the runway. Where provided, a centreline marking consists of rectangular markers inset flush with the runway surface and spaced at regular intervals along the declared runway centreline. Edge and centreline markers are normally **white** but may be of any single colour that best contrasts with the background.

3.1.2 Runway Threshold and End Marking

3.1.2.1 The Threshold and End of a runway are provided with markers of a similar type, size and colour as the edge markers. These markers are placed along the threshold and end of the runway and so positioned in relation to the edge markers as to form an 'L' shaped mark at each corner of the runway. In addition, each threshold is marked with a two character designator showing the magnetic heading of the runway to the nearest whole 10 degrees.

Chapter 3 Signs














1 General

- 1.1 The signs located on an aerodrome when used in conjunction with an aerodrome chart are intended to simplify surface movement guidance and control procedures, particularly in conditions of low visibility. Signs are divided into two categories, namely Mandatory Signs and Information Signs.

2 Mandatory Signs

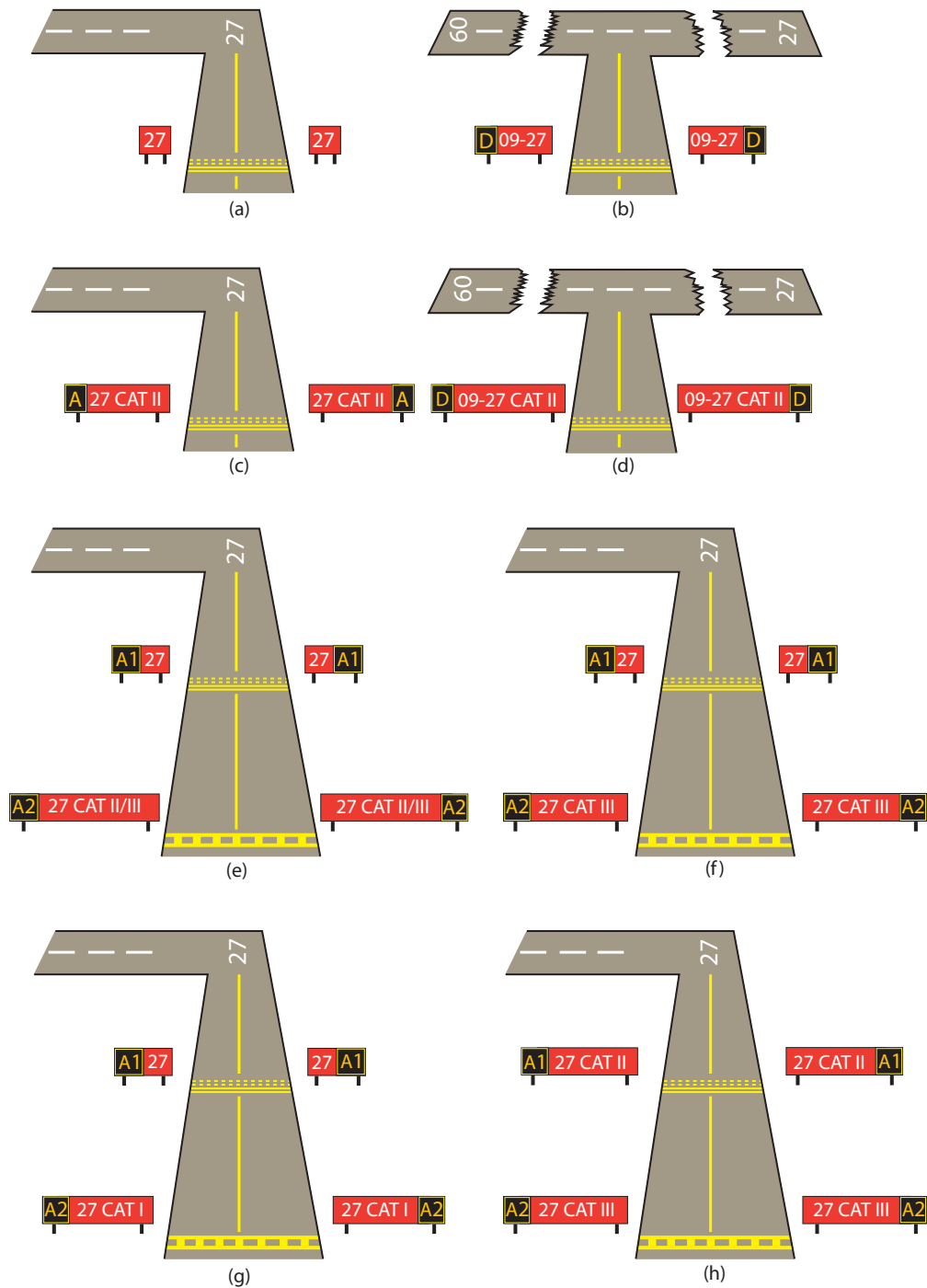
- 2.1 Mandatory Signs consist of Runway Taxi-Holding Position (RTHP) signs, Intermediate Taxi-Holding Position (ITHP) signs and No Entry signs and display **white** characters on a **red** background as illustrated at Figure 3.1 and 3.2. RTHP and ITHP signs are located alongside the appropriate surface marking described in Chapter 2 paragraph 2.3 and identify the holding position as well as indicate the direction in which the holding instruction applies. Pilots should not proceed beyond a Mandatory Sign unless directed to do so by ATC.
- 2.2 Where there is more than one taxiway serving a runway or more than one RTHP on a taxiway, a Location Sign is normally attached to the RTHP sign in order to assist in identifying the position as illustrated at Figure 3.2.
- 2.3 **RTHP Sign for Visual and Category I Operations**
- 2.3.1 Where an aerodrome is equipped for operations up to and including ILS Category I approaches, an RTHP sign displaying the runway designator is located on both sides of the taxiway as illustrated at Figure 3.2 (a). However, at smaller aerodromes supporting only visual operations, the sign may be located on one side only (normally the left side) of the taxiway. Where there is no ATC unit, the RTHP sign identifies the position where aircraft and vehicles are required to hold whilst conceding right of way to aircraft using or on approach to the runway.

Figure 3.1 Example of Mandatory Signs for Aircraft Surface Movements

a) Visual Runway Taxi-holding position - denotes the visual Taxi-Holding Position and also the ILS Cat I Holding Position where the Visual and CAT I Holding Positions are co-located.	(i) 
	(ii) 
b) CAT I Runway Taxi-Holding Position Sign - denotes ILS CAT II Taxi-Holding Position - a Visual/CAT I Taxi-Holding Position may be established closer to the runway where it is necessary to expedite traffic flow.	(i) 
	(ii) 
c) CAT II Runway Taxi-Holding Position Sign - marks the ILS CAT II Taxi-Holding Position - a Visual/CAT I Taxi-Holding Position may be established closer to the runway where it is necessary to expedite traffic flow.	(i) 
	(ii) 
d) CAT II Runway Taxi-Holding Position Sign - marks the ILS CAT III Taxi-Holding Position - a CAT II Taxi-Holding Position and a Visual/CAT I Taxi-Holding Position may be established closer to the runway where it is necessary to expedite traffic flow.	(i) 
	(ii) 
e) Combined Taxi-Holding Position Sign - marks the Taxi-Holding Position where the ILS - Taxi-Holding Positions are co-incident. A Visual or CAT I Taxi-Holding Position Sign may be established or closer to the runway where it is necessary to expedite traffic flow.	(i) 
	
	(ii) 
f) Intermediate Taxi-Holding Position Sign - marks a Holding Position established to protect a priority route.	
g) No Entry Sign	

- Note: 1: The signs at (i) are used where the taxiway normally serves only one runway direction. The signs at (ii) are used where the taxiway normally serves both runway directions.
- 2: Where a runway Taxi-Holding Position serves more than one runway, the sign layout at Figure 3.5 is used.

Figure 3.2 Typical Runway Taxi-Holding Position Signs and Associated Taxiway Markings



The diagrams in Figure 3.2 illustrate typical signs associated with various Runway Taxi-holding positions on Taxiway 'A' leading to the threshold of Runway 27 and on Taxiway 'D' leading to an intermediate taxiway entrance to Runway 09-27.

NOTE: The signs at intermediate taxiway entrances as shown at Figure 3.2 (b) and (d) show the runway designation in both directions; a left turn is required to reach the threshold of Runway 09 and a right turn to reach the threshold of Runway 27.

2.4 Runway Taxi-Holding Position Sign for Category II and III Operations

2.4.1 At aerodromes equipped for Category II and III ILS approaches, RTHP signs are annotated CAT II, CAT III or CAT II/III as appropriate, in the manner illustrated in Figures 3.1 and 3.2. However, because of the need to provide greater protection to Category II and III ILS systems, the RTHPs associated with these procedures are set farther back from the runway than those associated with visual or Category I operations; where this distance is such that it would hinder the expeditious flow of traffic when Category II or III procedures are not in force, a visual RTHP may be established in addition, closer to the runway, in the manner illustrated at Figure 3.2 (e) and (f). Exceptionally, CAT I RTHPs may be established in this manner, as illustrated at Figure 3.1 (b), for the same reason.

2.5 Intermediate Taxi-holding Position

2.5.1 The style of sign illustrated at Figure 3.1 (f) is used to identify those locations where ITHPs have been established in order to protect a priority route. The signs display the taxiway designator accompanied by a number identifying the individual holding position.

2.6 No Entry

2.6.1 Where part of an aerodrome is restricted to one way traffic or is withdrawn from use, No Entry Signs, as illustrated at Figure 3.1 (g), are located on both sides of the mouth of the area showing the direction from which entry is prohibited.

3 Information Signs

3.1 Information Signs consist of Location, Direction and Destination Signs; they are provided only where there is an operational need to provide additional guidance to pilots manoeuvring on the ground, and should be used in conjunction with an aerodrome chart.

3.2 Location Signs

3.2.1 Location Signs are used to identify taxiways and where necessary, runways, such as at complicated intersections. Taxiways are normally designated by a single letter of the alphabet, e.g. 'A' for taxiway Alpha, 'B' for Bravo etc. The letters 'O', 'I' and 'X' are not used. On larger aerodromes, where there are more taxiways than letters of the alphabet, double letter designators may be used in order to identify minor taxiways or taxiway stubs. Runway Location Signs use the first two numbers of the runway magnetic heading.

3.2.2 A Location Sign consists of the characters identifying the runway or taxiway in **yellow** lettering on a **black** background surrounded by a **yellow** border, as illustrated in Figure 3.3 (a) and (b). Where there is a need to identify a specific position on a taxiway, a Location Sign, displaying the taxiway designator accompanied by an identifying number as illustrated at Figure 3.3 (a) (ii), is used.

3.3 Direction and Destination Signs

3.3.1 Direction and Destination Signs consist of a route or destination label accompanied by an arrow pointing in the appropriate direction, displayed in **black** characters on a **yellow** background as illustrated at Figure 3.3. Direction Signs are normally accompanied by a Location Sign and positioned on the left side of a taxiway before an intersection, as shown at Figure 3.4, or adjacent to a runway, as shown at Figure 3.5.

Figure 3.3 Examples of Information Signs (not to scale)



(i)
Designation



(ii)
Specific Location



(iii)
Taxiway Ending



(b) Runway Location Sign



(c) Direction Sign



(d) Runway Destination Sign



Note the use of a hyphen to separate reciprocal designators and the use of a dot to separate other designators



(e) Destination Sign to Different Runways

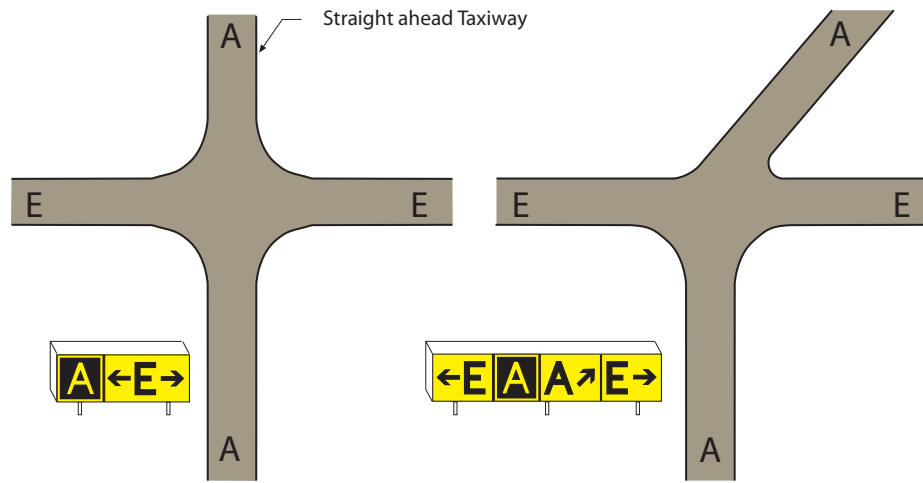


(f) Inbound Destination Sign



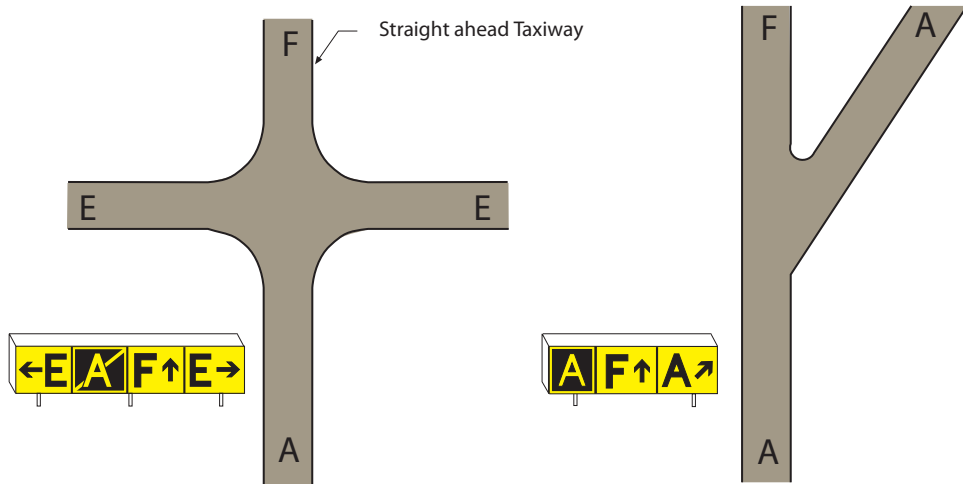
(g) Stand Destination Sign

Figure 3.4 Examples of Taxi Guidance Signs at Taxiway Intersections (not to scale)



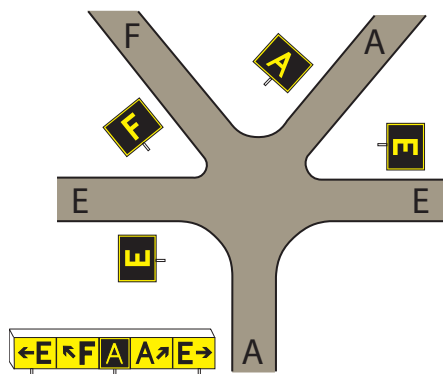
(a) Standard 4 – Way Intersection

(b) Straight ahead Taxiway has direction change greater than 25 degrees

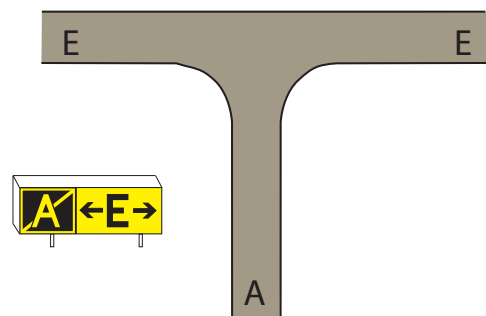


(c) Straight ahead Taxiway has changed designation

(d) Y configuration with Taxiway 'A' changing direction

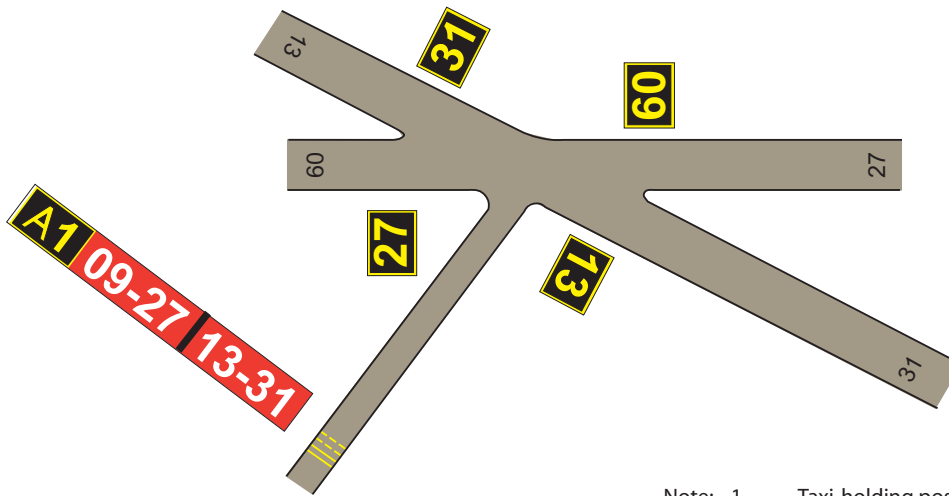


(e) Location signs indicating exit from intersection



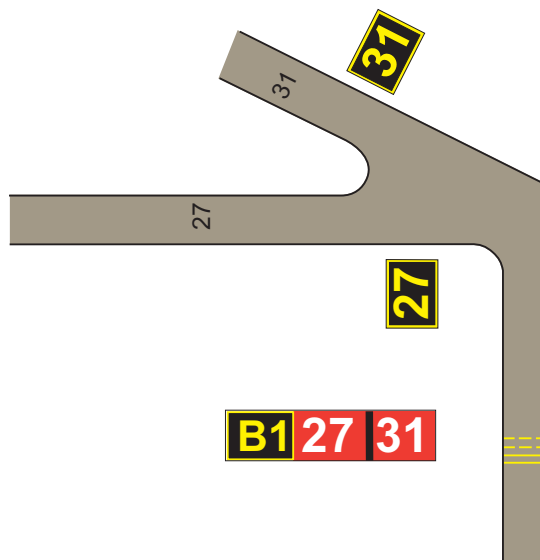
(f) Taxiway ending sign

Figure 3.5 Examples of use of Runway Location Signs and Signs at Runway Taxi-Holding Positions Serving more than one Runway



a) Taxiway entrance at intersection of two runways

- Note: 1 Taxi-holding position signs installed at intersections such as those illustrated here are handled in the manner shown.
- 2 Runway location signs for runways 31 and 13 are shown in this example on the right side of the runway in order to avoid confusion.



b) Taxiway entrance at intersection of two runway ends

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Chapter 4 Visual Docking Guidance Systems

1 General

1.1 Visual Docking Guidance Systems (VDGS), sometimes referred to as Nose-in Docking Guidance Systems or Stand Entry Guidance Systems (SEG), provide guidance where accurate aircraft parking is required. This is usually the case where airbridges are used. Those VDGS currently in use in the UK include Azimuth Guidance for Nose-in Stands (AGNIS), supported by Parallax Aircraft Parking Aid (PAPA). In some cases, mirrors may be provided to permit a pilot to view the position of the nosewheel of the aircraft relative to the stopping position.

1.2 At major aerodromes Advanced Visual Docking Guidance Systems (AVDGS) are installed that provide electronically displayed information, such as the azimuth position of the aircraft and stopping distance. In some cases, the AVDGS determines the aircraft type automatically and sets the relevant guidance parameters accordingly. These systems are described in detail below.

NOTE 1: A pilot **should not** assume that a stand is safe to enter simply because the stand (A)VDGS is active or lit. Where ground handling personnel are not present on the stand or if the pilot has any doubt about the position of any equipment on **or NEAR** to the stand, the aircraft should be stopped immediately and assistance requested.

NOTE 2: Except under the guidance of a marshaller, an aircraft should not be taxied onto a (A)VDGS equipped stand when the guidance system is switched off or appears inactive.

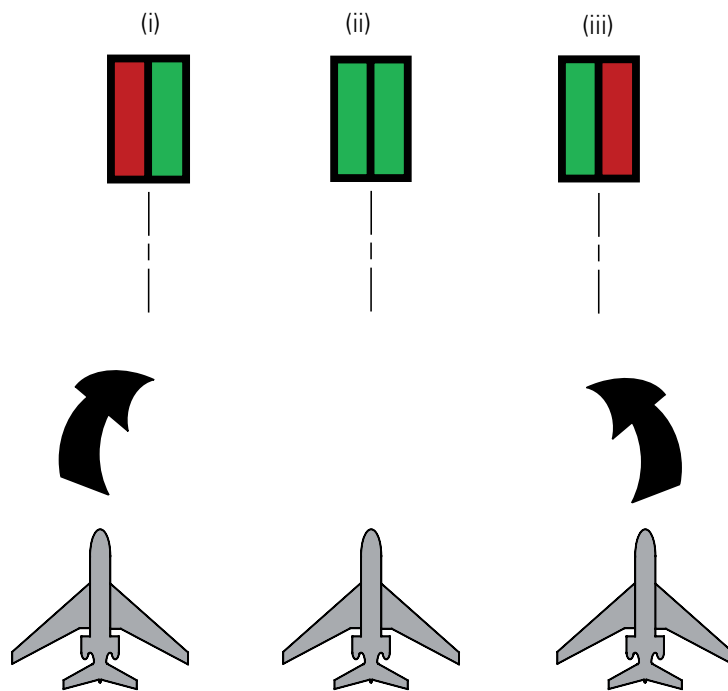
NOTE 3: Ground staff should NOT activate a (A)VDGS until a thorough inspection of the stand and its immediate surrounds has been made in order to ensure that all equipment is correctly parked in allocated areas and that the stand is safe for use by the type of aircraft assigned.

2 Azimuth Guidance for Nose-in Stands (AGNIS)

2.1 AGNIS provides Stand centreline alignment guidance and is normally used in conjunction with PAPA, marker boards, lines or mirrors, which provide stopping guidance separately. The system is designed for use from the left pilot position only and the unit displays two closely spaced vertical light bars mounted in a box, as illustrated at Figure 4.1, at about flight deck height ahead of the pilot. The light bars display one of the following signals:

- a) one **red** bar and one **green** bar as illustrated at Figure 4.1 (i) and (iii), indicating that the pilot should steer away from the **red** towards the **green** bar, or
- b) two **green** bars, indicating correct alignment, as illustrated at Figure 4.1 (ii).

Figure 4.1 AGNIS

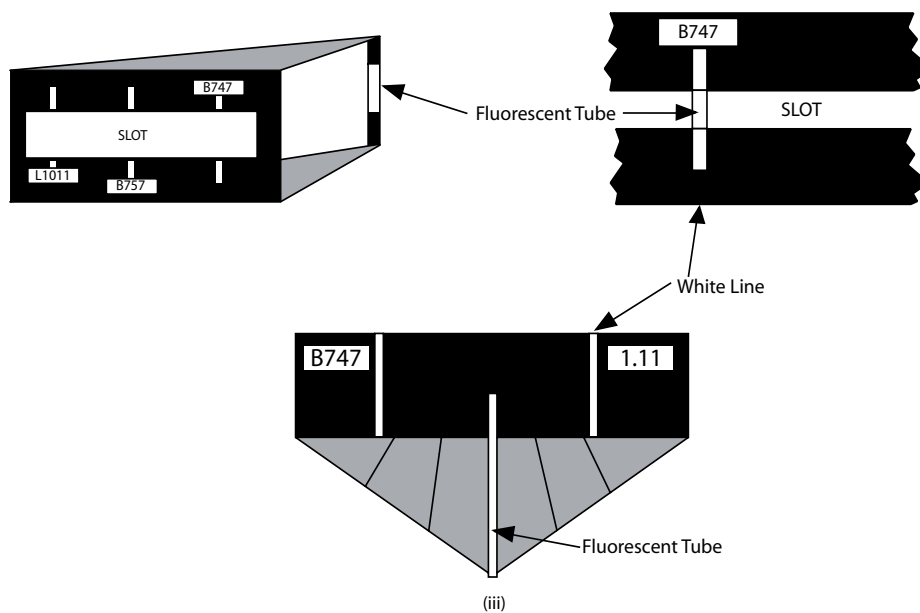


2.2 AGNIS may be supported by one of the following aids:

a) **PAPA**

This aid is normally positioned to the right side of the Stand centreline and provides stopping guidance by employing a black board marked with white vertical lines bearing aircraft type identification labels and in which a horizontal slot has been cut, as illustrated at Figure 4.2 (i). A short distance behind the slot is a vertically-mounted white fluorescent light tube which, when aligned with the required aircraft type line, indicates the stop-point, as shown at Figure 4.2 (ii). An alternative layout is illustrated at Figure 4.2 (iii) where the board is not provided with a slot and the tube is mounted in front of it; the method of use is identical.

Figure 4.2 PAPA



b) Mirror

The Mirror system consists of a mirror mounted to the left of the stand centreline and facing the approaching aircraft. The mirror is angled so that the pilot in the left hand seat can see the reflection of the aircraft nose wheel during the last few metres of the parking manoeuvre.

The correct stopping position is indicated by aircraft type designators painted in mirror image on the apron surface. As the aircraft approaches, the pilot is able to see in the mirror a reflection of the aircraft nose wheel and an appropriate designator where the aircraft should be stopped. A **yellow** javelin headed arrow may be used as the designator, with the aircraft type given.

3 Aircraft Positioning and Information System (APIS/APIS++)

3.1 APIS/APIS++ is designed for use from the left pilot position and combines both alignment and stopping signals in one visual display mounted at flight deck height ahead of the pilot. The elements of the display as illustrated at Figure 4.3 are as follows:

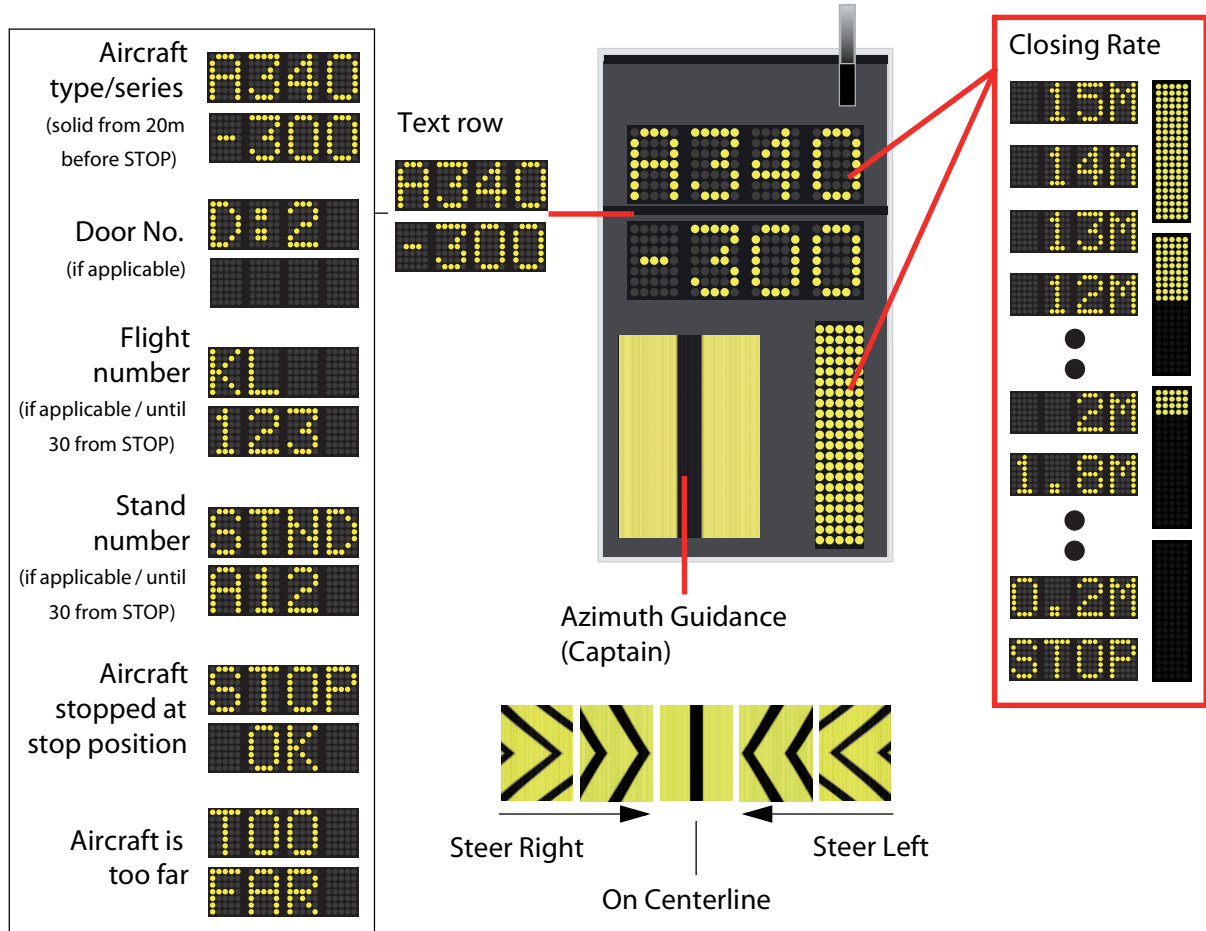
- a) An alphanumeric **yellow** dot matrix element displayed in the upper portion of the unit indicating as appropriate, any of the signals illustrated.
- b) A **yellow** dot matrix progress strip element displayed on the lower left side of the unit indicating progress of the aircraft over the last 16.2 m of the approach to the stop position.
- c) An azimuth guidance element employing a moiré pattern.

3.2 Prior to entering the stand the pilot must ensure that the following signals are displayed:

a) Correct aircraft type**b) Correct stand number**

3.3 The Azimuth Guidance element consists of a yellow moiré pattern signal providing directional guidance to the pilot in relation to the stand centreline as illustrated in Figure 4.3.

Figure 4.3 APIS++



FMT APIS++ (Aircraft Parking and Information System)

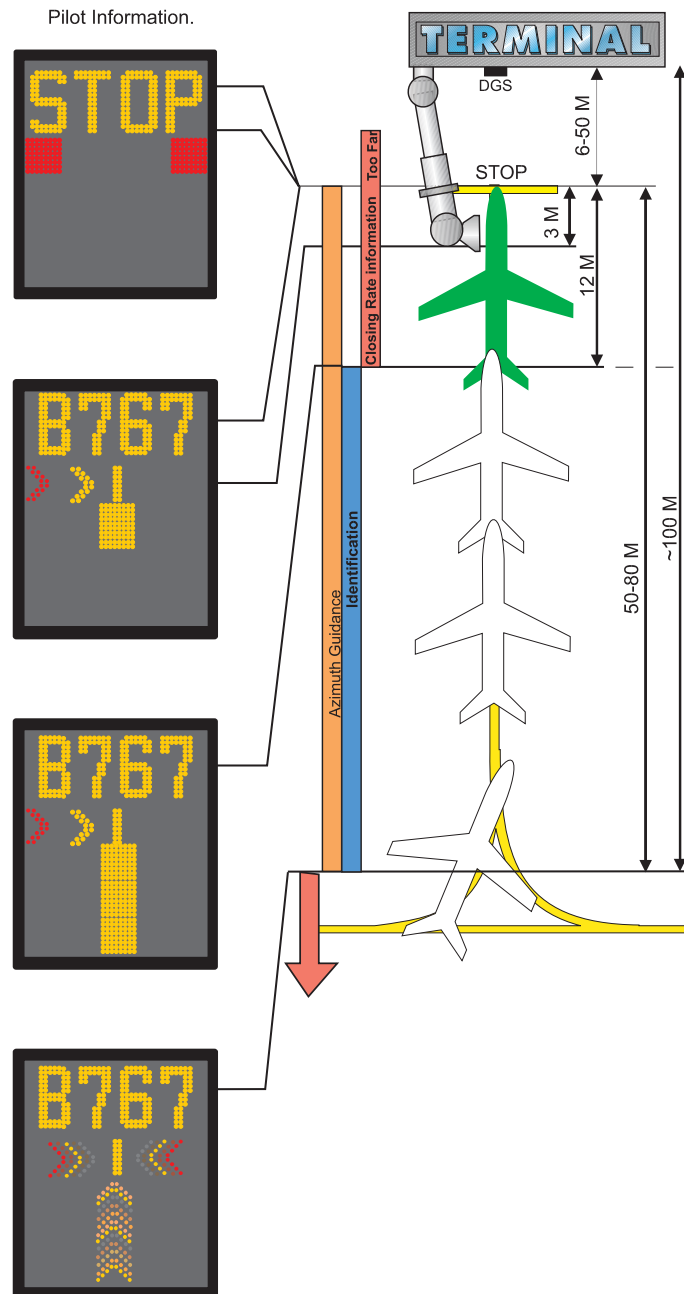
Azimuth and stopping guidance are provided from a display unit mounted at the extension of the stand centerline.

Abort docking if display shows STOP or wrong aircraft type/series, or if the azimuth guidance display is not activated.

4 Safegate Safedock

4.1 The Safegate Docking Guidance System (known as Safedock) is an AVDGS that provides azimuth guidance, distance to stop information, aircraft type and door in use guidance on a single electronic display, as illustrated at Figure 4.4.

Figure 4.4 Safedock Guidance System



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Chapter 5 Obstacle Lighting and Markings

1 General

- 1.1 Obstacles to air navigation are divided into two groups, namely Aerodrome Obstacles and En-route Obstacles. The following paragraphs outline the methods of marking and lighting obstacles in order that they may be readily identified.

2 Aerodrome Obstacles

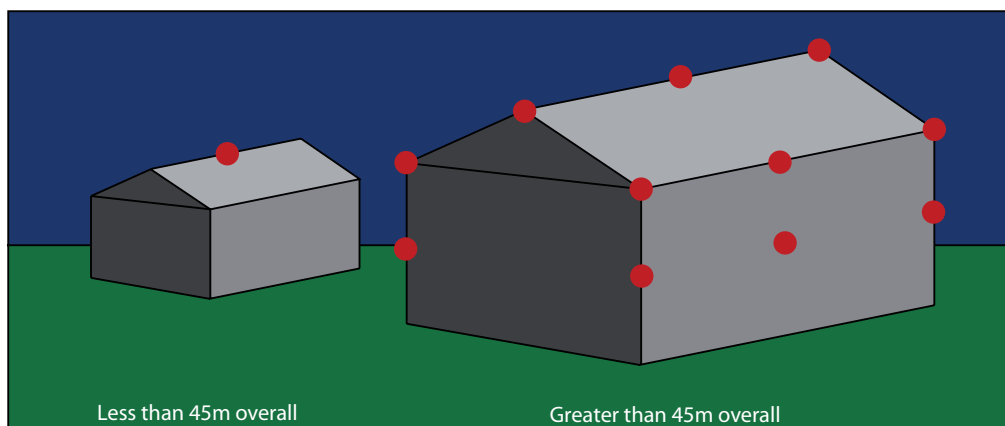
- 2.1 An aerodrome obstacle is one that is located on an area intended for the surface movement of an aircraft or that extends above a defined surface intended to protect aircraft in flight or exceeds 150 m height above ground, within a radius of up to 15 km of the aerodrome. Significant aerodrome obstacles are listed in the AD section of the UK AIP and are shown on Instrument Approach and Landing Charts.

- 2.2 All objects that are considered to be obstacles to aircraft in flight or manoeuvring on the ground are normally lit at night and, where the obstacle is insufficiently conspicuous by day, marked in contrasting colours. Surface obstructions and areas of bad ground on aerodrome movement areas are marked by the use of coloured markers or flags. The methods of marking and lighting of aerodrome obstacles are illustrated at Figures 5.1 and 5.2. Bad ground markers are illustrated in Chapter 6 Table C of this document.

2.3 Lighting

- 2.3.1 Fixed obstacles of 45 m or less in height, width and length are normally lit by a single steady **red** light placed at the highest practicable point; those obstacles of greater size are normally provided with additional **red** lights in order to outline the extent of the obstruction as shown in Figure 5.1. Surface obstructions and unserviceable parts of the movement area are normally delineated by portable **red** lights. Mobile obstacles such as vehicles and equipment frequently employed on the movement area normally display a **yellow** flashing light except that emergency service vehicles responding to an incident display flashing **blue** lights.

Figure 5.1

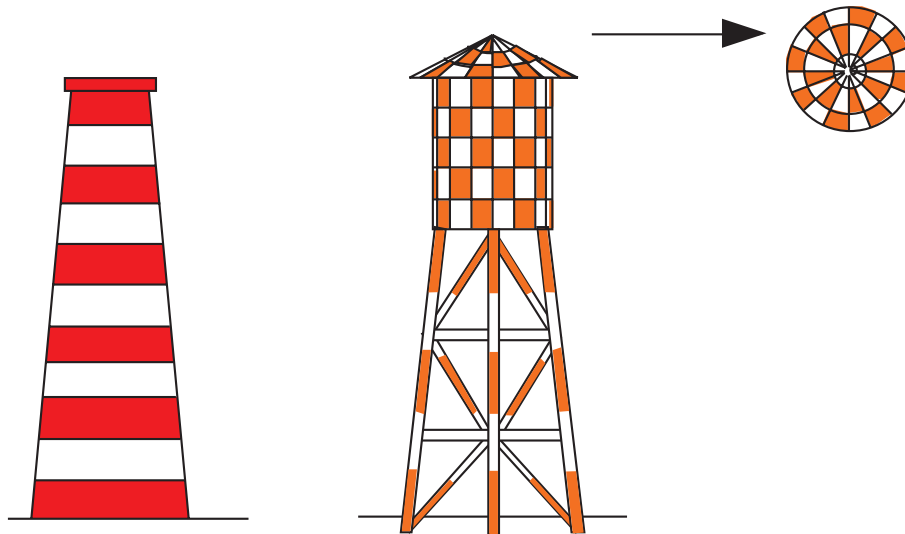


2.4 Marking

- 2.4.1 Where fixed obstacles are insufficiently conspicuous by day, they are normally marked either by alternating bands or by a chequered pattern of **red** or **orange** and

white. Vehicles and other mobile equipment frequently employed on the movement area are normally painted **yellow** or alternatively may be fitted with distinctive **yellow** markers or flags. Unserviceable parts of the movement area are normally delineated either by marker boards painted in alternate bands of **red** or **orange** and **white**, or by diagonally split **orange/white** flags. Where practicable, an unserviceable part of the movement area would also be marked by one or more large **white** crosses. Methods of marking obstacles are shown at Figure 5.2. Bad ground markers are illustrated at Chapter 6 Table C.

Figure 5.2 Marking of Buildings and Structures



3 En-route Obstacles

- 3.1 Objects located beyond the vicinity of an aerodrome are considered to be obstacles to aircraft in flight if they exceed 150 m in height. However, prominent objects of lesser height may also be regarded as obstacles where, for example, they are located on or adjacent to routes regularly used by helicopters or low flying (military) aircraft.
- 3.2 En-route obstacles are normally lit by **steady red lights at night** and, in exceptional circumstances, by high intensity **flashing white lights**.

Chapter 6 Aerodrome Signals

1 General


- 1.1 At those aerodromes where General Aviation movements are significant, visual aids displayed in a Signals Area may be employed in order to provide information relating to the conduct of flying operations. Where provided, the Signals Area, measuring approximately 12 m square and bounded by a white border, is so located on the aerodrome that it is visible from all directions of approach. The meaning of individual signals displayed within the Signals Area is described at Table A.
- 1.2 In addition, these aerodromes may display signals, having the meaning described at Table B, suspended from a mast adjacent to the Signals Area.
- 1.3 The Signals and Markings illustrated at Table C may be used at any aerodrome whether or not a Signals Area is displayed.
- 1.4 Light Signals and Pyrotechnic Signals may also be used to convey instructions to pilots and ground staff and have the meanings described at Table D.
- 1.5 The meaning of Aircraft Marshalling Signals prescribed by the Rules of the Air Regulations is described at Table E, whilst Table F describes the meaning of signals made by a pilot to a marshaller.
- 1.6 Where signals are applicable only to helicopter operations, they are marked by the symbol. 

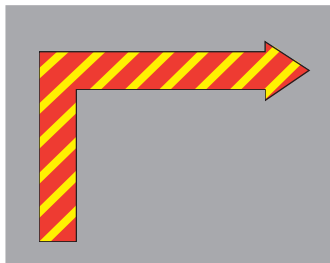
Table A Meaning of Signals Displayed in the Signals Area
(Reference Section IX Rules of the Air Regulations)



A white landing T signifies that aeroplanes and gliders taking-off or landing shall do so in a direction parallel with the shaft of the T and towards the cross arm, unless otherwise authorised by the appropriate ATC unit.



A white disc displayed alongside the cross arm of the T in line with the shaft of the T signifies that the direction of landing and take-off do not necessarily coincide.



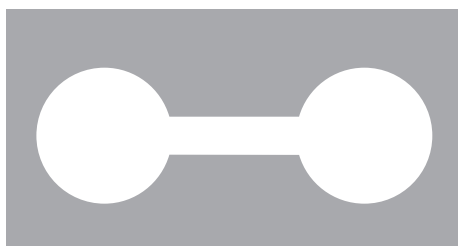
A red and yellow striped arrow placed along the whole of two adjacent sides of the signals area and pointing in a clockwise direction signifies that a right hand circuit is in force.



A red panel square with a yellow diagonal stripe signifies that the state of the manoeuvring area is poor and pilots must exercise special care when landing.

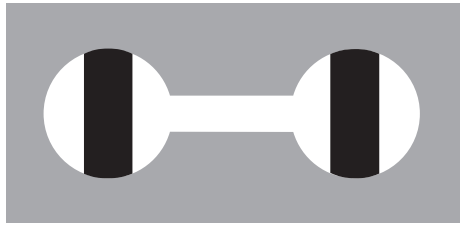


A red panel square with yellow stripes along each diagonal signifies that the aerodrome is unsafe for the movement of aircraft and that landing is prohibited.

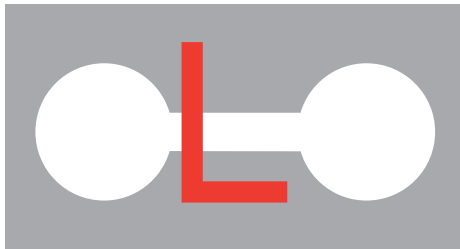


A white dumb-bell signifies that movements of aeroplanes and gliders on the ground shall be confined to paved, metalled or similar hard surfaces.

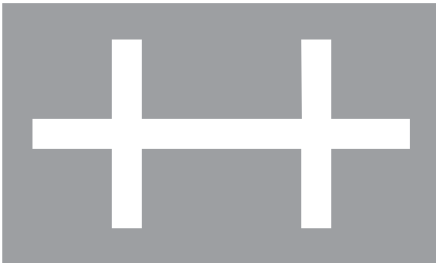
Table A Meaning of Signals Displayed in the Signals Area
(Reference Section IX Rules of the Air Regulations)



A black strip across each disc of the white dumb-bell at right angles to its shaft signifies that aeroplanes and gliders taking-off or landing shall do so on a runway but that movement on the ground is not confined to paved, metalled or similar hard surfaces.



A red letter L displayed on the dumb-bell signifies that light aircraft are permitted to take-off and land either on a runway or on the area on the aerodrome designated by a large white letter L.



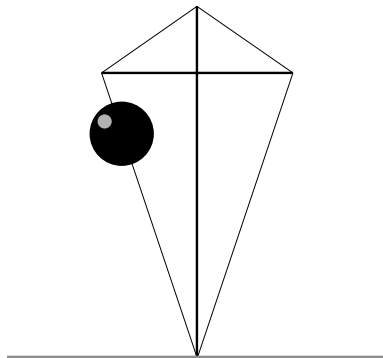
A white double cross signifies that glider flying is in progress.



A white letter H signifies that helicopters shall take-off and land within the area designated by a large white letter H.

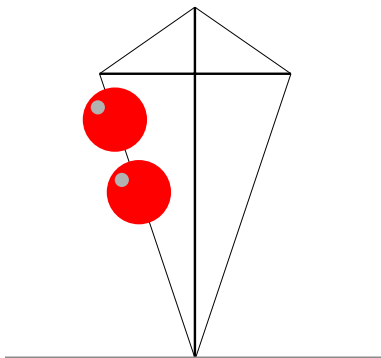


Table B Meaning of Signals Displayed on Signals Mast
(Reference Section IX Rules of the Air Regulations)

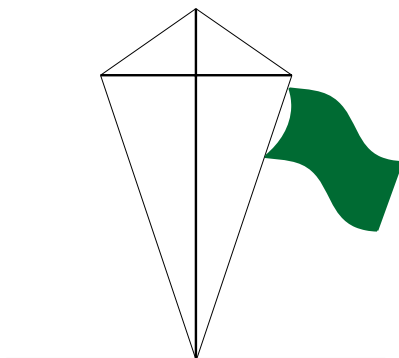


Description and Meaning

A black ball suspended from a mast signifies that the directions of take-off and landing are not necessarily the same.



Two red balls disposed one above the other, and suspended from a mast, signify that glider flying is in progress at the aerodrome.



A rectangular green flag flown from a mast indicates that a right hand circuit is in force.

Table C Meaning of Signals Displayed on the Aerodrome
(Reference Section IX Rules of the Air Regulations)



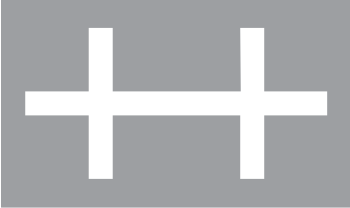
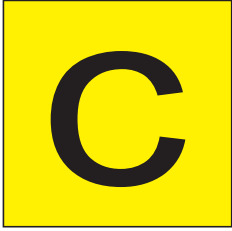
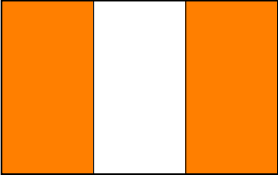
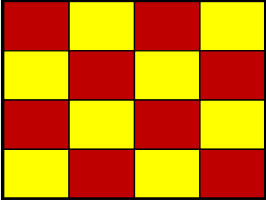

Signal/Marking	Location	Description and Meaning
	On the landing area.	A white letter H indicates an area reserved for take-off and landing of helicopters. 
	On the landing area.	A double white cross indicates an area reserved for the take-off and landing of gliders.
	Aerodrome administrative building/control tower/flight plan office.	A black letter 'C' on a yellow background means pilots of visiting aircraft should report here.
	At intervals along the boundary of an aerodrome.	Orange and white striped markers are used to delineate the boundary where it is insufficiently conspicuous.
	Normally located on the control tower building or, in the case of a flag, flying from the mast described in Table B.	A panel or flag consisting of red and yellow squares indicates that aircraft may taxi only in accordance with ATC instructions.
	On the landing area.	A large white letter L indicates an area normally of grass reserved for landing and take-off of light aircraft.

Table C Meaning of Signals Displayed on the Aerodrome
(Reference Section IX Rules of the Air Regulations)


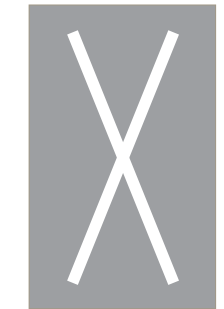


Signal/Marking	Location	Description and Meaning
	On a selected part of the aerodrome.	A yellow marker in the shape of a St. George's cross indicates an area reserved for the dropping of tow ropes or similar articles.
	On a portion of a Runway.	A white mark in the shape of a St. Andrew's Cross indicates that that portion of the runway up to the next standard marking is unfit for use by aircraft.
	On a portion of a taxiway.	A yellow cross indicates that that portion of the taxiway up to the next standard marking is unfit for use by aircraft.
	Normally located on the control tower building.	A black two figure designator against a yellow background indicates the runway in use / direction of takeoff and landing.

Table C Meaning of Signals Displayed on the Aerodrome
(Reference Section IX Rules of the Air Regulations)

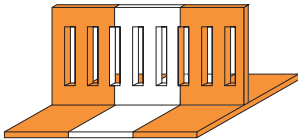
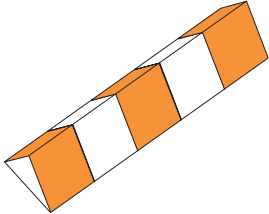
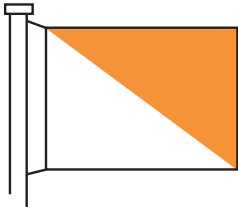
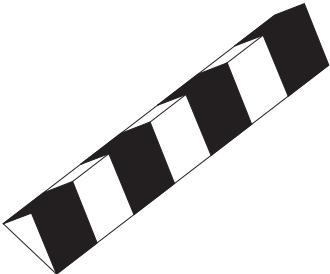
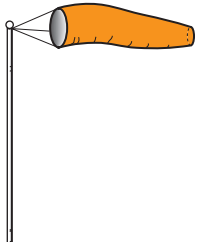
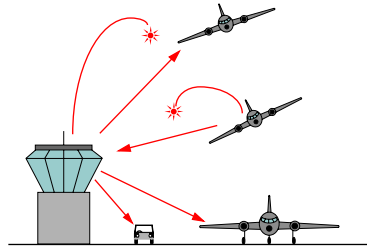
Signal/Marking	Location	Description and Meaning
	<p>Along the boundary of the designated area.</p>	<p>Orange and white markers or flags delineate an area of the surface considered to be unfit for use by aircraft.</p>
	<p>Along the boundary of the designated area.</p>	
	<p>Along the boundary of the designated area.</p>	
	<p>At displaced thresholds on both side of runway.</p>	<p>Black and white triangular box section marking displaced threshold.</p>
	<p>Adjacent to the landing area and visible from each runway threshold and all directions of approach. Sometimes lit at night.</p>	<p>Orange (or other conspicuous colour) wind sleeve indicates wind direction and speed.</p>

Table D Meaning of Light and Pyrotechnic Signals
(Reference Section IX Rules of the Air Regulations)

Signal
Steady red light to aircraft or vehicle as indicated.
Red flare from tower or aircraft.

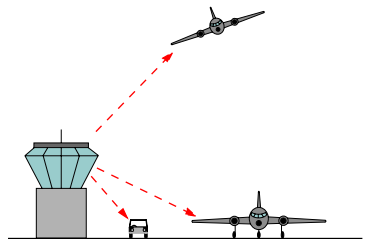


Meaning
Do not land. Give way
continue circling.

Immediate assistance
required.

Stop.

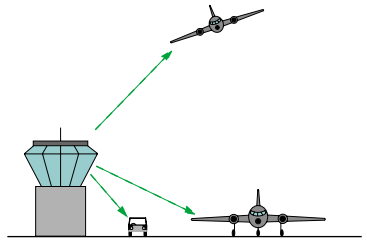
Signal
Flashing red light to
aircraft or vehicle.



Meaning
Do not land; aerodrome
closed.

Move clear of landing
area.

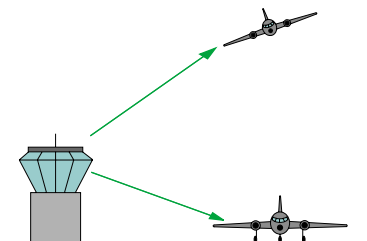
Signal
Flashing green light to
aircraft or vehicle.



Meaning
Return to aerodrome
await landing clearance

Cleared to taxi/move on
the manoeuvring area.

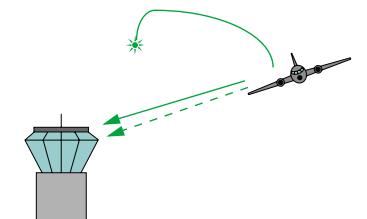
Signal
Steady green light to
aircraft



Meaning
Cleared to land.

Cleared to take-off.

Signal
Steady or flashing green
or green flare from
aircraft.

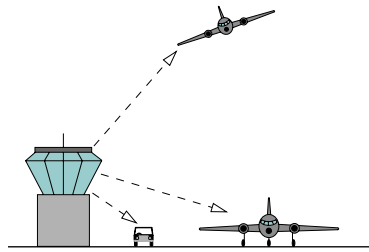


Meaning
By night - may I land.
By day - may I land in a
direction different from
that indicated.

Table D Meaning of Light and Pyrotechnic Signals
(Reference Section IX Rules of the Air Regulations)

Signal

White flashes to aircraft or vehicle.



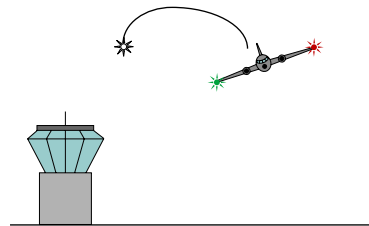
Meaning

Land here on receipt of steady green and await further instructions.

Return to starting point on the aerodrome.

Signal

White flare from aircraft or irregular switching of navigation or landing lights.



Meaning

I am compelled to land.

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)


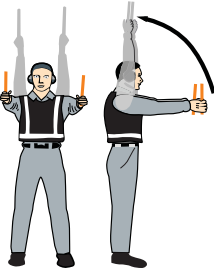

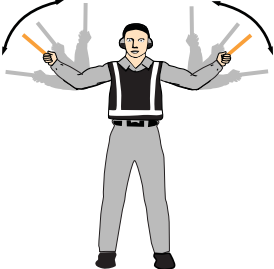
Description of Signal	Meaning of signal
	<p>(1) Raise right hand above head level with wand pointing up; move left-hand wand pointing down toward body.</p> <p>Wingwalker/guide -This signal provides an indication by a person positioned at the aircraft wing tip, to the pilot/ marshaller/ push-back operator, that the aircraft movement on/off a parking position would be unobstructed.</p>
	<p>(2) Raise fully extended arms straight above head with wands pointing up.</p> <p>Identify gate.</p>
	<p>(3) Point both arms upward, move and extend arms outward to sides of body and point with wands to direction of next signalman or taxi area.</p> <p>Proceed to next signalman or as directed by tower/ ground control.</p>
	<p>(4) Bend extended arms at elbows and move wands up and down from chest height to head.</p> <p>Straight ahead.</p>

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)

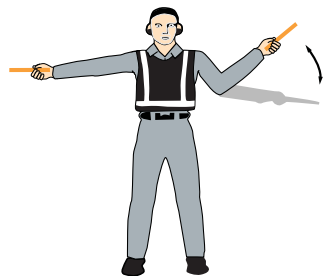
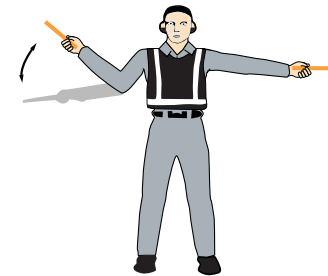
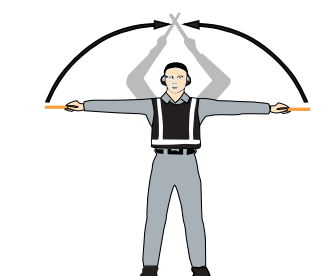
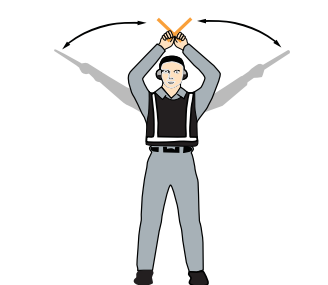
Description of Signal	Meaning of signal
	<p>(5a) With right arm and wand extended at a 90-degree angle to body, make "come ahead" signal with left hand. The rate of signal motion indicates to pilot the rate of aircraft turn.</p> <p>Turn left (from pilot's point of view).</p>
	<p>(5b) With left arm and wand extended at a 90-degree angle to body, make "come ahead" signal with right hand. The rate of signal motion indicates to pilot the rate of aircraft turn.</p> <p>Turn right (from pilot's point of view).</p>
	<p>(6a) Fully extend arms and wands at a 90-degree angle to sides and slowly move to above head until wands cross.</p> <p>Normal stop.</p>
	<p>(6b) Abruptly extend arms and wands to top of head, crossing wands.</p> <p>Emergency stop.</p>

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)


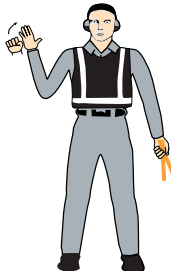


Description of Signal	Meaning of signal
	<p>(7a) Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. Do Not move until receipt of "thumbs up" acknowledgement from flight crew.</p> <p>Set brakes.</p>
	<p>(7b) Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. Do not move until receipt of "thumbs up" acknowledgement from crew.</p> <p>Release brakes.</p>
	<p>(8a) With arms and wands fully extending above head, move wands inwards in a "jabbing" motion until wands touch. Ensure acknowledgement is received from flight crew.</p> <p>Chocks inserted.</p>
	<p>(8b) With arms and wands fully extended above head, move wands outward in "jabbing" motion. Do not remove chocks until authorised by crew.</p> <p>Chocks removed.</p>

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)

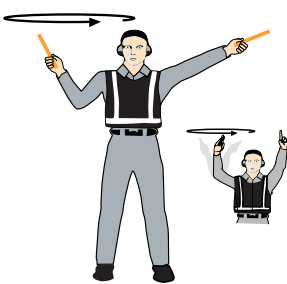
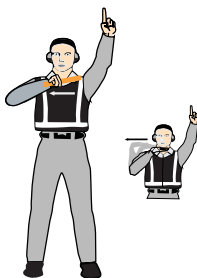
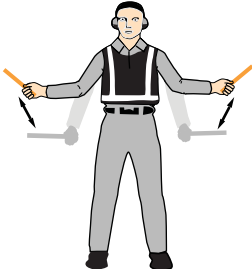
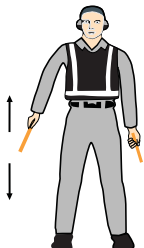
Description of Signal	Meaning of signal
	<p>(9) Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started.</p> <p>Start engine(s).</p>
	<p>(10) Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat.</p> <p>Cut engine(s).</p>
	<p>(11) Move extended arms downwards in a "patting" gesture, moving wands up and down from waist to knees.</p> <p>Slow down.</p>
	<p>(12) With arms down and wands toward ground, wave either right or left wand up and down indicating engine(s) on left or right side respectively should be slowed down.</p> <p>Slow down engine(s) on indicated side.</p>

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)



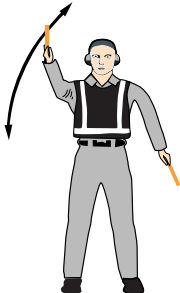

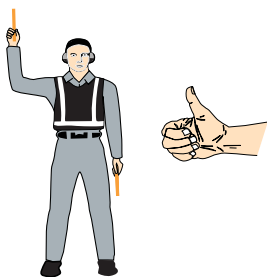
Description of Signal	Meaning of signal
	<p>(13) With arms in front of body at waist height, rotate arms in a forward motion. To stop rearward movement, use signal 6(a) or 6(b).</p> <p>Move Back.</p> 
	<p>(14a) Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.</p> <p>Turns while backing (for tail to starboard).</p>
	<p>(14b) Point right arm with wand down and bring left arm from overhead vertical position to horizontal forward position, repeating left-arm movement.</p> <p>Turns while backing (for tail to port).</p>
	<p>(15) Raise right arm to head level with wand pointing up or display hand with "thumbs up"; left arm remains at side by knee.</p> <p>Affirmative/all clear- This signal is also used as a technical/servicing communication signal.</p>

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)

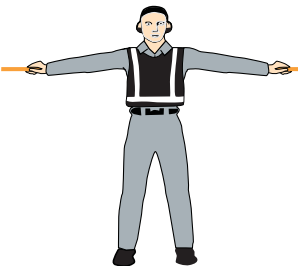

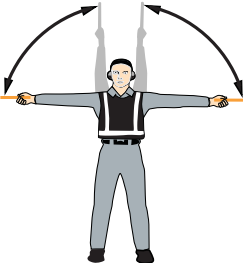

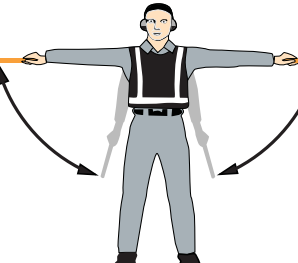

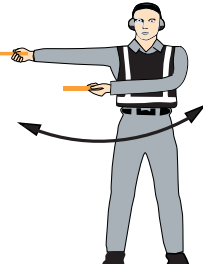

Description of Signal	Meaning of signal	
	<p>(16) Fully extend arms and wands at a 90-degree angle to sides.</p>	<p>Hover.</p> 
	<p>(17) Fully extend arms and wands at a 90-degree angle to sides and, with palms turned up, move hands upwards. Speed of movement indicates rate of ascent.</p>	<p>Move upwards.</p> 
	<p>(18) Fully extend arms and wands at a 90-degree angle to sides and, with palms turned down, move hands downwards. Speed of movement indicates rate of descent.</p>	<p>Move downwards.</p> 
	<p>(19a) Extend arm horizontally at a 90-degree angle to right side of body. Move other arm in same direction in a sweeping motion.</p>	<p>Move horizontally left (from pilot's point of view).</p> 

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)

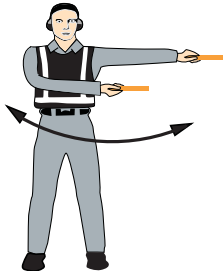



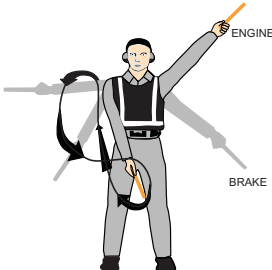
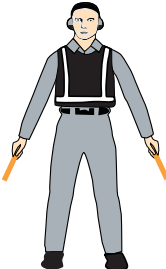
Description of Signal	Meaning of signal
	<p>(19b) Extend arm horizontally at a 90-degree angle to left side of body. Move other arm in same direction in a sweeping motion.</p> <p>Move horizontally right (from pilot's point of view).</p> 
	<p>(20) Cross arms with wands downwards and in front of body.</p> <p>Land.</p> 
	<p>(21) Move right-hand wand in a "fanning" motion from shoulder to knee, while at the same time pointing with left-hand wand to area of fire.</p> <p>Fire.</p>
	<p>(22) Fully extend arms and wands downwards at a 45-degree angle to sides. Hold position until aircraft is clear for next manoeuvre.</p> <p>Hold position/stand by.</p>

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)


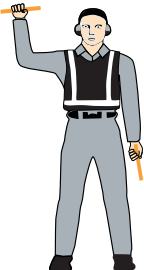
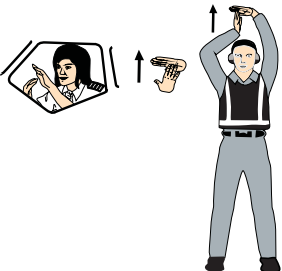
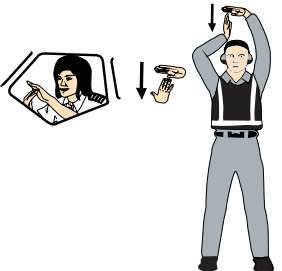
Description of Signal	Meaning of signal
	<p>(23) Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.</p> <p>Dispatch aircraft.</p>
	<p>(24) Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee.</p> <p>Do not touch controls (technical/servicing communication signal).</p>
	<p>(25) Hold arms fully extended above head, open left hand horizontally and move finger tips of right hand into a touch open palm of left hand (forming a "T"). At night, illuminated wands can also be used to form the "T" above head.</p> <p>Connect ground power (technical/servicing communication signal).</p>
	<p>(26) Hold arms fully extended above head with finger tips of right hand touching open horizontal palm of left hand (forming a "T"); then move right hand away from the left. Do not disconnect power until authorised by flight crew. At night illuminated wands can also be used to form the "T" above head.</p> <p>Disconnect power (technical/servicing communication signal).</p>

Table E Meaning of Marshalling Signals
(Reference Section IX Rules of the Air Regulations)

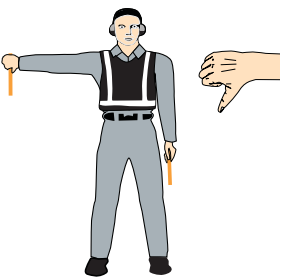
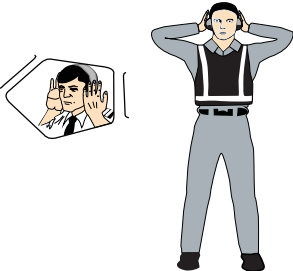

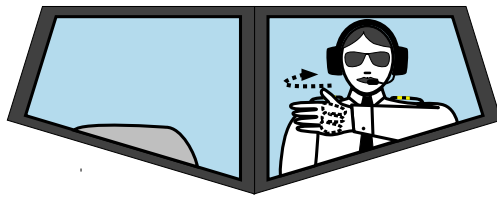
Description of Signal	Meaning of signal
	<p>(27) Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with "thumbs down"; left hand remains at side by knee.</p> <p>Negative (technical/servicing communication signal).</p>
	<p>(28) Extend both arms at 90 degrees from body and move hands to cup both ears.</p> <p>Establish communication via interphone (technical/servicing communication signal).</p>
	<p>(29) With right arm at side and left arm raised above head at 45 degree angle, move right arm in a sweeping motion towards top left shoulder.</p> <p>Open/close stairs (technical/servicing communication signal). This signal is intended mainly for aircraft with the set of integral stairs at the front.</p>

Table F Meaning of Signals made by Pilot to Marshaller
(Reference Section IX Rules of the Air Regulations)

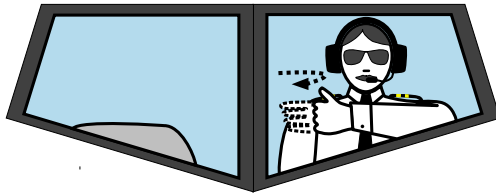


(a)

Raise arm and hand with fingers extended horizontally in front of face, then clench fist.

Meaning

Brakes engaged.

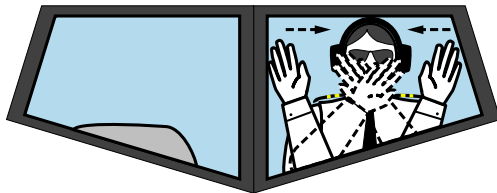


(b)

Raise arm with fist clenched horizontally in front of face, then extend fingers.

Meaning

Brakes released.

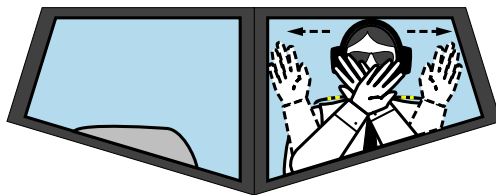


(c)

Arms extended palms facing outwards, move hands inwards to cross in front of face.

Meaning

Insert chocks.

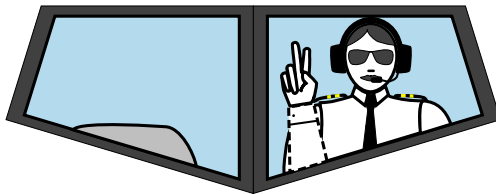


(d)

Hands crossed in front of face, palms facing outwards, move arms outwards.

Meaning

Remove chocks.



(e)

Raise the number of fingers on one hand indicating the number of the engine to be started. For this purpose the aircraft engines shall be numbered as follows, No. 1 engine shall be the port outer engine, No. 2, the port inner engine, No. 3, the starboard inner engine and No. 4, the starboard outer engine.

Meaning

Ready to start engine indicated.

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Chapter 7 Visual Aids Specific to Helicopter Operations

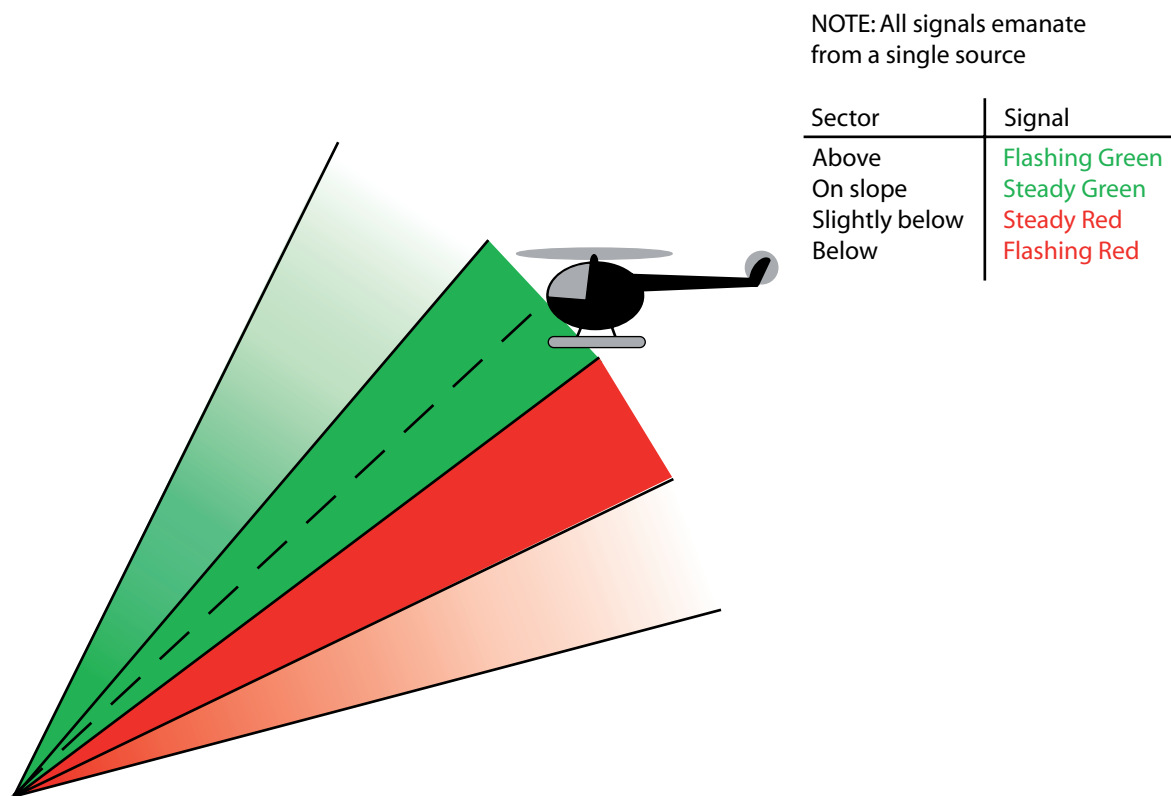
1 General

- 1.1 At those aerodromes that accommodate helicopter operations, helicopter pilots will normally be expected to use the visual aids described in the main body of this document. However, there are some visual aids that are peculiar to helicopter operations and these are described in the following paragraphs.

2 Helicopter Approach Path Indicator (HAPI)

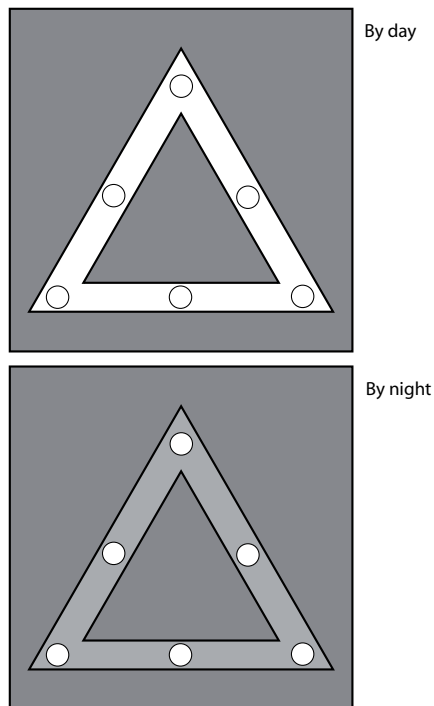
- 2.1 This aid provides the helicopter pilot with guidance similar to that provided by PAPI. However, the display takes a different format and the signal interpretation is illustrated at Figure 7.1.

Figure 7.1 HAPI signal format



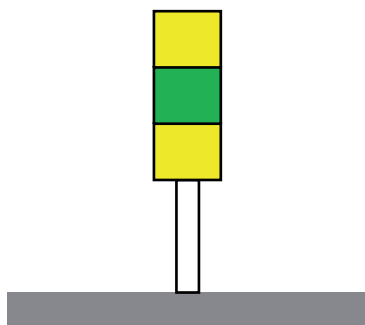
3 Helicopter Aiming Point Marker

- 3.1 This marker may be found on an area designated as a helicopter arriving point at a heliport or aerodrome and is used to mark the point at which a helicopter will arrive at a low hover on completion of an approach. The marker consists of a white equilateral triangle and may be lit as illustrated at Figure 7.2. From this point the helicopter will normally air-taxi to the helicopter 'Touchdown and Lift-Off Area' (TLOF).

Figure 7.2 Aiming point lighting

4 Air Taxiway Markers

- 4.1 Air Taxiway Markers as illustrated in Figure 7.3 are used to mark the route to be followed by helicopters to air taxi from the Aiming Point to the TLOF where these areas are not co-located.

Figure 7.3 Air taxiway marker

5 Touch Down and Lift Off Area (TLOF)

- 5.1 This area is depicted by an 'H' within a circle (Figure 7.4 (a)). The size of the circle will be a function of the undercarriage dimensions of the largest helicopter type that the site is intended to accommodate. At a hospital site, a red 'H' is superimposed on a 'cross' as shown at Figure 7.4 (b).

Figure Chapter 7.4a TLOF at sites other than hospitals**Figure Chapter 7.4b** TLOF at hospital site

6 Final Approach and Take-Off Area (FATO) Designation Marking

- 6.1 The performance characteristics of some helicopters require a 'runway' (FATO) to which normal taxiways or air taxi routes may be attached. The TLOF may be located within the FATO. A FATO with a specific orientation (i.e. to ensure obstacle slope protection) will be designated in a similar manner to a runway and is shown at Figure 7.5.

Figure 7.5 Final approach and take-off area designation

7 Elevated Heliports

- 7.1 Most elevated heliports in the UK are unlicensed and pilots should obtain details of markings and lighting from the owner prior to arrival at the heliport. The size of the heliport will be a function of the performance requirements of the largest helicopter that the site is intended to serve. The TLOF circle dimension is determined as described in paragraph 5.1 above. In this application the FATO (see 6.1 above) and TLOF will be coincidental.

8 Offshore Helidecks

- 8.1 Offshore helidecks will have a TLOF dimension which is a function of the largest overall dimension of the largest helicopter using the deck and the FATO and TLOF will be coincidental. The marking and lighting of offshore helidecks is outlined in CAP 437 'Offshore Helicopter Landing Areas'. Due to the specialist nature of helicopter operations in support of offshore oil installations, full details of the marking and lighting of individual offshore helidecks should be obtained prior to commencing operations.