

# VISUAL AIDS HANDBOOK

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

CAP 637

CIVIL AVIATION AUTHORITY, LONDON

# Acknowledgements

## VISUAL AIDS HANDBOOK

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John Hopson  
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# VISUAL AIDS HANDBOOK

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

## Introduction

- 1 Visual Aids in the form of lighting, surface markings, signs and signals are provided in varying degrees of complexity at all UK licensed aerodromes and are notified in the appropriate aerodrome entry at AGA 2 and AGA 3 of the AIP.
- 2 The minimum standards and specifications for installed visual aids other than Visual Docking Guidance Systems are laid down in CAP 168 Licensing of Aerodromes.
- 3 The aim of this document is to explain in general terms the purpose and significance of those visual aids currently employed at licensed aerodromes in the UK. Pilots should note that as improvements to the design of aerodrome equipment take place, changes to the visual aids illustrated herein will occur from time to time.
- 4 Readers should note that the precise legal meaning of the Signals described at Tables A to F of Section 6 herein is to be found at Section IX of the Rules of the Air Regulations (the Rules) and that where any difference between the meanings described herein and those defined in the Rules is perceived, the meaning defined in the Rules shall take precedence.

**1. AERONAUTICAL GROUND LIGHTING**

**2. SURFACE MARKINGS**

**3. SIGNS**

**4. VISUAL DOCKING GUIDANCE SYSTEMS  
(VDGS)**

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# 1. AERONAUTICAL GROUND LIGHTING

# 1. AERONAUTICAL GROUND LIGHTING

## 1.1 General

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 Category III ILS procedures. The following paragraphs outline those systems that have been accepted by the CAA as meeting both aerodrome licensing and internationally agreed requirements.

### 1.1.1 *Civil Aerodromes*

Particulars of AGL, where available at individual aerodromes, are listed in the UK AIP (Air Pilot) at AGA 2, AGA 3 and on the appropriate Instrument Approach Charts. The AGL at licensed aerodromes is inspected at intervals by the CAA. Where a licensed aerodrome does not meet the minimum lighting requirements, the appropriate aerodrome entry at AGA 2 or AGA 3 will be annotated '**not licensed for night use**'. Lighting at unlicensed aerodromes listed in AGA 3 is neither inspected nor approved by the CAA and may be of a non-standard pattern.

### 1.1.2 *Military Aerodromes*

The aerodrome lighting systems installed at Military and Government aerodromes listed at AGA 3 are not inspected by the CAA and may differ from those installed at civil aerodromes notably with respect to approach lighting, as shown at Figs 1b and 2. Sodium lamps may be used to supplement approach, threshold and apron lighting.

### 1.1.3 *Colour and Intensity of Lights*

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 for the independent control of brilliancy of each element of the system. The intensities are set up by ATC in order to suit local

# 1. AERONAUTICAL GROUND LIGHTING

conditions and a pilot should ask ATC to adjust them if they are found to be inappropriate.

- 1.1.4 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.
- 1.1.5 Low intensity systems are provided at those aerodromes at which operations are conducted at night but not in low visibility conditions; the brilliancy of low intensity systems is not normally adjustable.

## 1.2 Aerodrome Beacon

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.

### 1.2.1 *Identification Beacon*

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. Military aerodromes are normally equipped with a **red** identification beacon.

### 1.2.2 *Location Beacon*

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:

# 1. AERONAUTICAL GROUND LIGHTING

(a) **White** flashing light

Where the aerodrome is also situated well away from areas of high background lighting, the Location Beacon would display a **white** flashing light.

(b) *Alternately flashing green and white* 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.

## 1.3 Approach Lighting

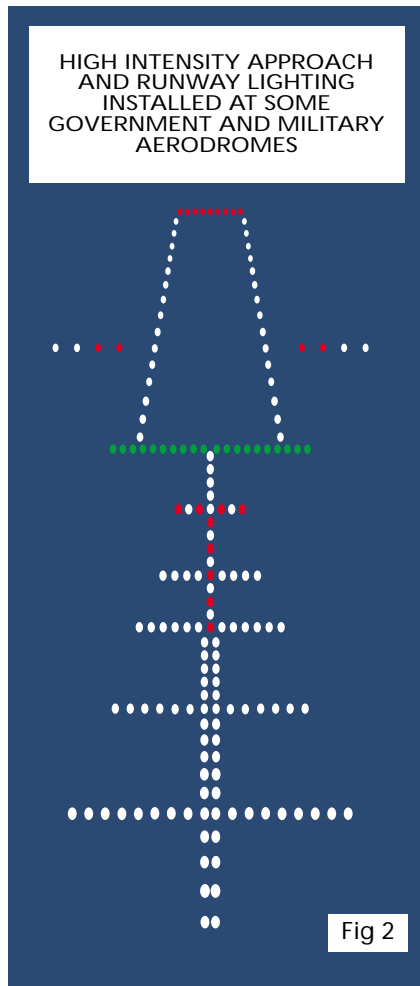
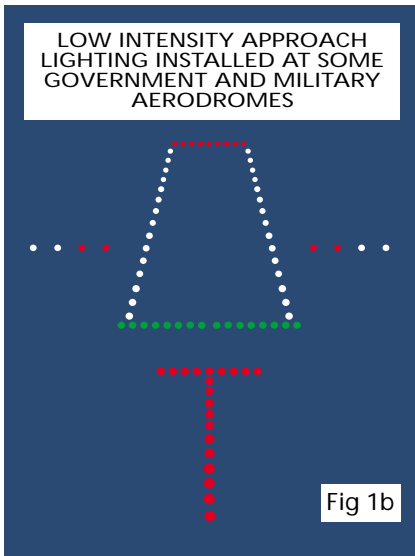
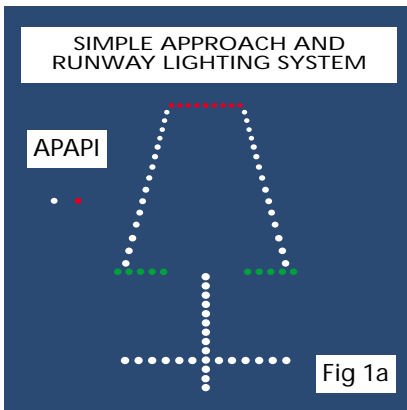
A variety of approach lighting systems, based on the centre line and cross bar concept, are in use at aerodromes throughout the UK. These systems range from the simple low intensity centre line and cross bar – shown at Fig 1(a) and (b) – intended to serve visual runways at night only, to the more complex Calvert System comprising centreline and 5 cross bars (CL5B) – shown at Fig 3 and 4 – required for day and night use on ILS equipped runways. At some aerodromes where, because of high levels of background lighting, the approach lighting is difficult to pick out at distance, strobe lighting may be provided either in addition to the standard approach lighting or on its own as illustrated at Fig 5. Simple approach lighting systems normally commence 500m prior to the runway threshold whilst the full CL5B commences 900m 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 RVR minimum associated with the instrument procedure adjusted accordingly. Approach lighting systems in common use outside UK are illustrated at Appendix A. Except where supplemented by **red** side barrettes as described in para 1.3.1 below, approach lighting is **white** in colour.



# 1. AERONAUTICAL GROUND LIGHTING

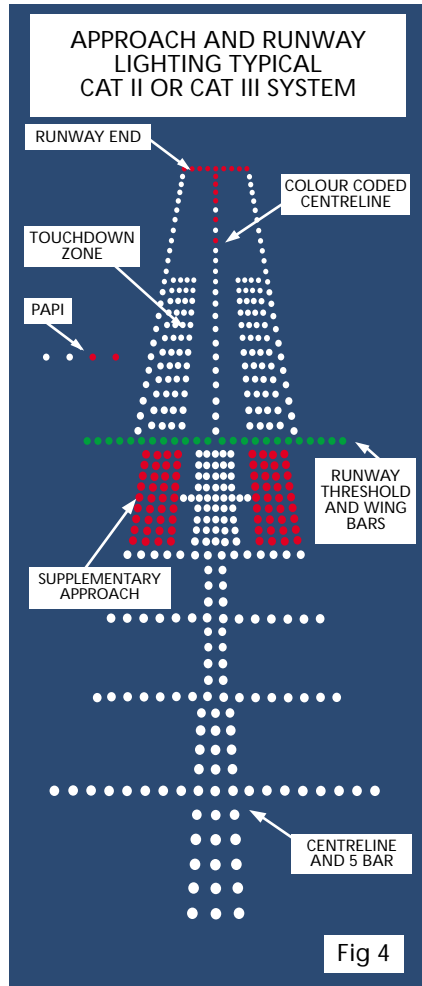
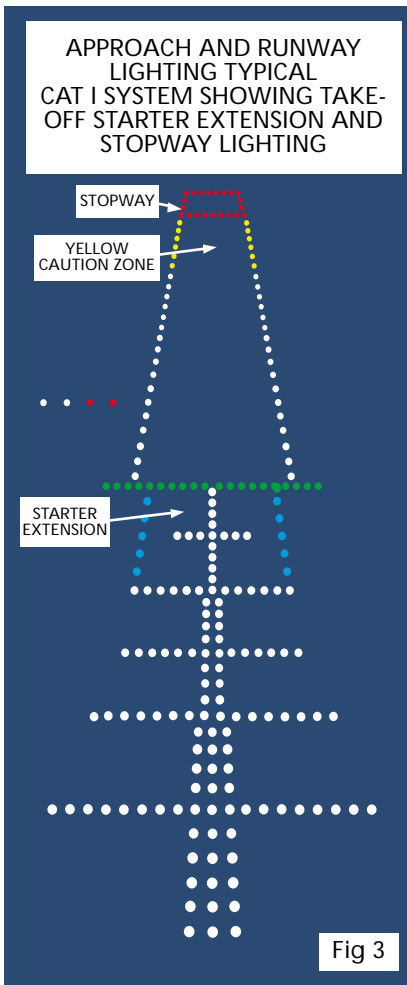
## 1.3.1 *Supplementary Approach Lighting*

At those aerodromes where Category II and III ILS approaches are conducted, Supplementary Approach Lighting consisting of **white** centreline barrettes and two rows of **red** side barrettes, as shown at Fig 4, is installed in order to provide the pilot with enhanced visual cues over the last 300m of the approach.

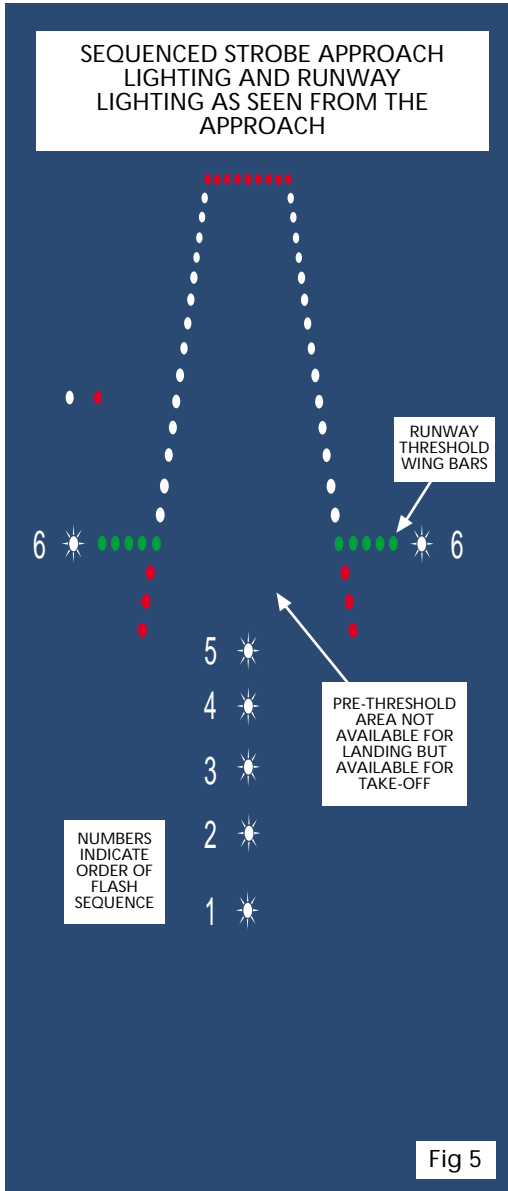


# 1. AERONAUTICAL GROUND LIGHTING

*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 ATC to adjust the intensity or extinguish the offending system.



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# 1. AERONAUTICAL GROUND LIGHTING

## 1.3.2 *Precision Approach Path Indicator (PAPI)*

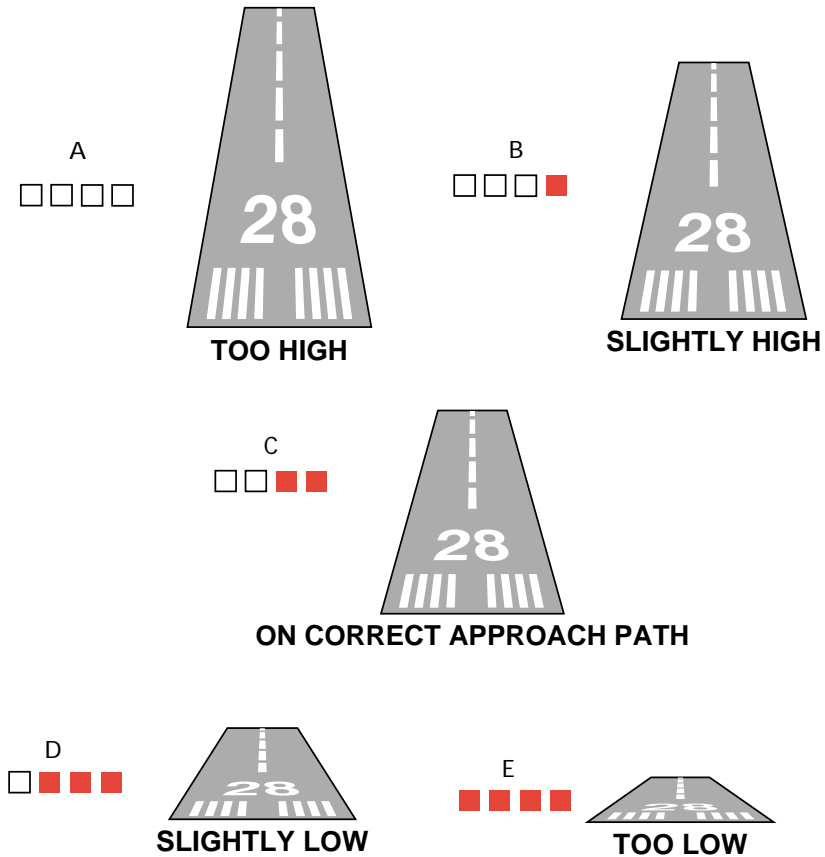
- 1.3.2.1 This aid provides visual approach slope guidance by use of **red** and **white** light signals which are interpreted as illustrated at Fig 6. The system normally comprises a single row of 4 light units except that on those runways without ILS, a 2 unit system (APAPI) may be used. The system is normally installed on the left side of the runway as seen from the approach. However, at some aerodromes, additional units are located on the right side in order to give better roll guidance. 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. The PAPI signal should not 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 AGA 2 or 3 will be annotated to that effect.

- 1.3.2.2 The Minimum Eye Height over the Threshold (MEHT), which is notified in AGA 2 or AGA 3, 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 onslope 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.

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Fig 6 TYPICAL PAPI SYSTEM



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1.3.2.3 Where used together with ILS, PAPI is located so as to ensure, as far as is practicable, correlation between the two glide 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 (e.g. Shorts 330) may see a PAPI indication 'slightly low' (see Fig 6D) when on the ILS glide path.

## 1.4 Runway Lighting

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.

### 1.4.1 Runway Edge Lighting

1.4.1.1 Runway Edge Lighting is normally located along the edges of the area declared for use as the runway. However, where a paved surface is wider than the declared runway width, the lights may be located at the edge of the pavement and the declared width delineated by **white** edge markings as described at para 2.1.1. Edge lighting 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 are located on the grass shoulder beyond the declared runway width. Portable battery operated lights or "Gooseneck" paraffin flares may be used in place of fixed lamp fittings at certain aerodromes where limited operations take place at night.

1.4.1.2 *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 Fig 3, is installed on the upwind 600m 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.

# 1. AERONAUTICAL GROUND LIGHTING

(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 Fig 7. 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 Fig 7.

(c) *Runway Exit Lighting*

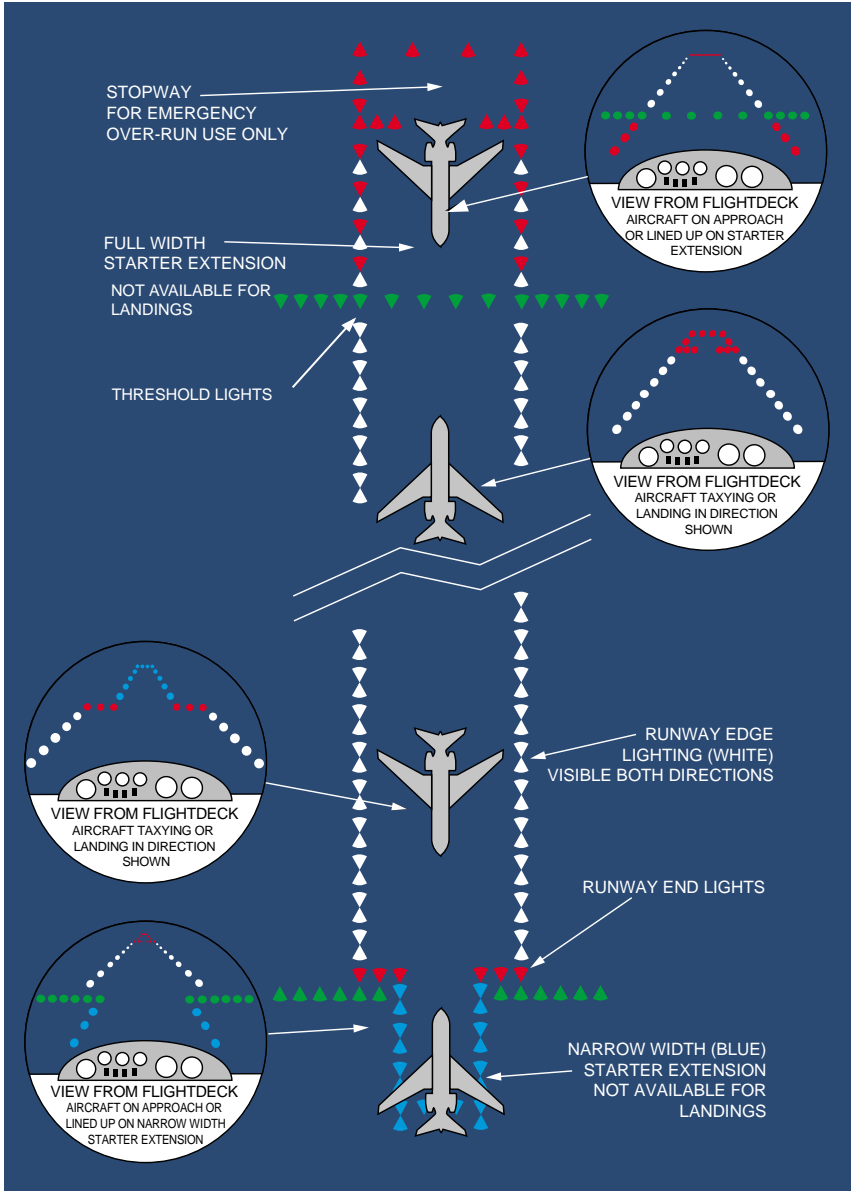
One or two omni-directional **blue** lights may replace or supplement the edge lights in order to indicate an exit taxiway.

(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 Fig 7 showing **ONLY** in the direction of landing. A stopway is provided for emergency use only and is not normally suitable for routine use.

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Fig 7 RUNWAY EDGE, THRESHOLD AND EDGE LIGHTING





# 1. AERONAUTICAL GROUND LIGHTING

## 1.4.2 *Runway Threshold and Runway End Lighting*

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 wingbar lighting shown at Figs 2, 3, 4 and 7 to abbreviated versions shown at Figs 1, 5 and 7. Runway end lighting is **red** and marks the extremity of the runway that is available for manoeuvring. Typical layouts are shown at Figs 1 – 5 and 7. Pilots must **NOT** land before the **green** threshold lighting nor continue a landing roll or taxi beyond the **red** runway end lights.

## 1.4.3 *Runway Centreline Lighting*

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 900m from the runway end, the following 600m is lit with alternate **white** and **red** lights, and the final 300m lit by **red** centreline lighting, as shown at Fig 4.

## 1.4.4 *Touchdown Zone Lighting*

On runways equipped for Category II and III approaches, additional lighting consisting of two rows of **white** barrettes, as shown at Fig 4, is installed in order to provide textural cues in the touchdown area. The additional lighting extends from the threshold either for 900m or to the midpoint of the runway whichever is the lesser distance.

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

# 1. AERONAUTICAL GROUND LIGHTING

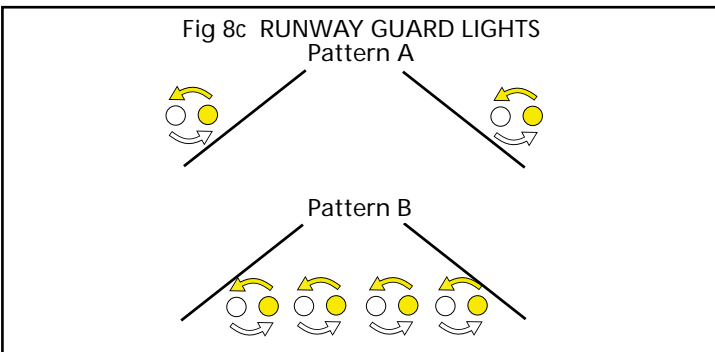
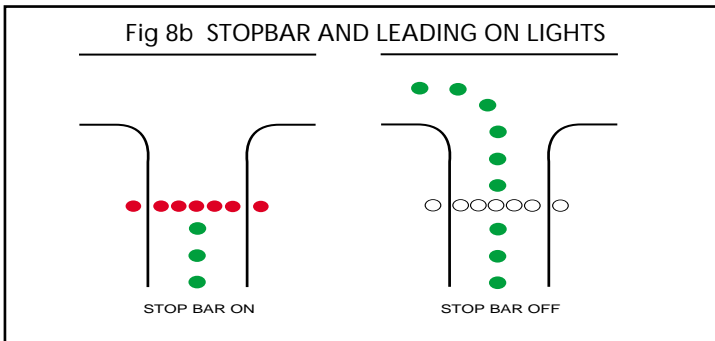
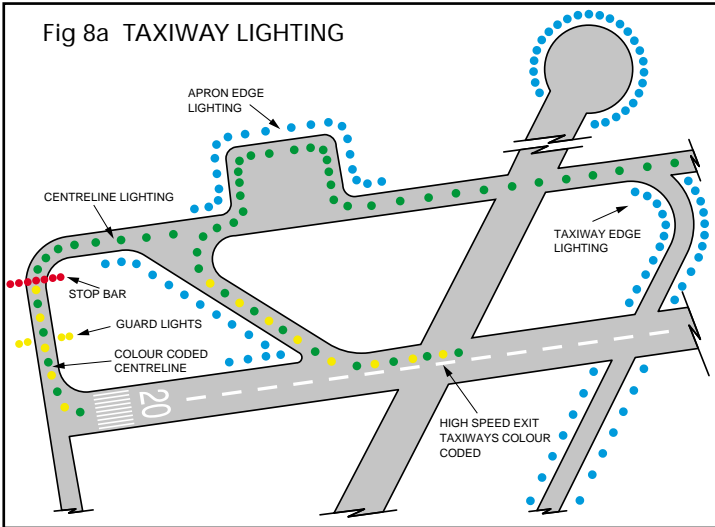
## 1.5 Taxiway Lighting

At those aerodromes equipped for low visibility operations, taxiways are equipped with **green** centreline lighting, otherwise **blue** edge lighting is provided, as shown in Fig 8. 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. Where centreline lighting is employed, **green** taxiway centreline lighting is provided on the runway prior to an exit taxiway in order to give lead-off guidance. The edges 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 located so as 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 are expected to keep a good lookout, consistent with the prevailing visibility and are responsible for taking all possible measures to avoid collisions with other aircraft and vehicles.

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## 1.5.1 *Stop Bars and Lead-on Lights*

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. 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 are installed outboard of each taxiway edge as shown at Fig 8, in order to provide maximum advanced warning of the Stop Bar location. 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. In this way, the Stop Bar and associated Lead-on Lights act in the same sense as traffic lights and thus ***pilots should not taxi an aircraft across a lighted Stop Bar.***

## 1.5.2 *Taxiway Guidance System*

At aerodromes where Category II & III operations take place or where ground movement requirements are complex, a taxiway guidance system 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 lighted 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.

## 1.5.3 *Runway Guard Lights*

On aerodromes equipped for low visibility operations, all runway entry points are "protected" by Runway Guard Lights. These 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

# 1. AERONAUTICAL GROUND LIGHTING

in unison. Runway Guard Lights, often referred to as “Wig Wags”, are illustrated at Fig 8 (b) and (c).

## 1.5.4 *Colour Coded Taxiway Centreline Lighting*

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 Fig 8. Pilots should avoid stopping with any part of their aircraft in such areas.

## 1.5.5 *Taxiway Intersection Lights*

At some aerodromes where multiple intersecting taxiways are not provided with selective route guidance, Taxiway Intersection Lights may be provided. These lights 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 ATC.

## 1.5.6 *Reflective Taxiway Edge Markers and Centreline Studs*

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**.

## 1.5.7 *Unpaved Taxiway Routes*

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 flood-lighting may be accepted as sufficient illumination of adjacent taxiways. On grass aerodromes where specific taxiways are not provided, the taxiway lighting requirement may be met by portable **white** lights marking the boundary of the manoeuvring area.

## 2. SURFACE MARKINGS

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### 2 General

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.

#### 2.1 Paved Surface Markings

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.

##### 2.1.1 *Paved Runway Markings*

Paved Runway Markings are **white** and those in use at aerodromes in UK are explained below. Illustrations of the various markings are given at Fig 9.

###### (a) *Runway Designation Marking*

All paved runways in regular use 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 in regular use have centreline and threshold markings, the latter varying from the runway designation number alone to separate threshold and designation markings, according to the classification of

## 2. SURFACE MARKINGS

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 apparent 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 not fully load bearing. 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 Fig 9, 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 bearing strength as illustrated at Fig 9 (d) & (e).

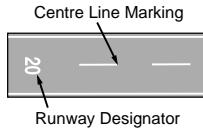
(d) *Touchdown Zone and Aiming Point*

All ILS equipped runways and those other runways where the touchdown zone is insufficiently conspicuous are provided with Touchdown Zone and Aiming Point markings as shown at Fig 9(c). These markings are intended to give added visual texture 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 Threshold Marking, as seen from the approach, is intended to aid pilots in judging their angle of approach.

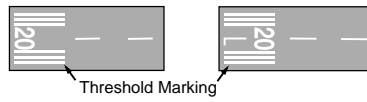


# 2. SURFACE MARKINGS

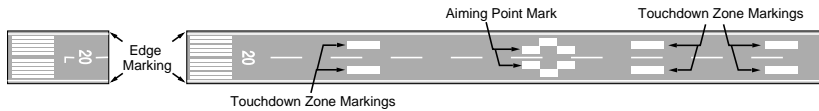
(a) Visual Runways - LDA <1200m



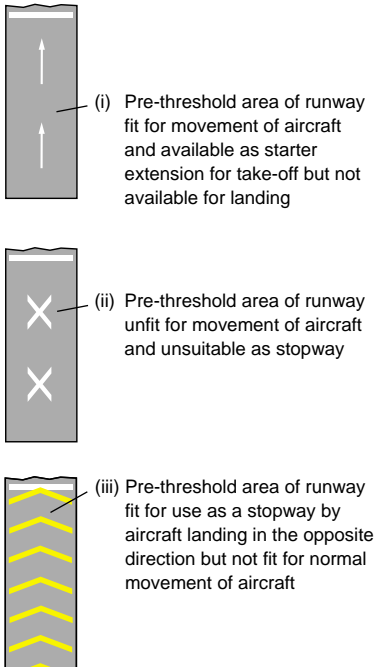
(b) Non Precision Approach Runways, Visual Runways of LDA >1200m and where Threshold requires emphasis



(c) Precision Approach Runways



(d) Permanently Displaced Threshold  
Pre-Threshold Markings



(e) Temporarily Displaced Threshold  
and Pre-Threshold Markings

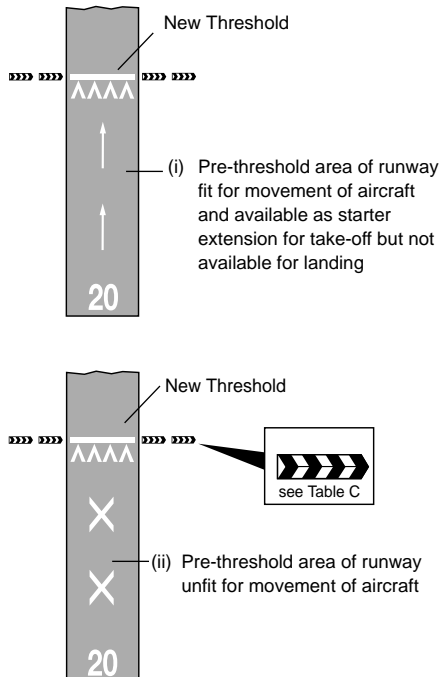


Fig 9 PAVED RUNWAY MARKINGS (Not to Scale)

## 2. SURFACE MARKINGS

### 2.1.2 *Paved Taxiway markings*

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 Fig 10 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 para 3.1. i.e. – the direction from which the sign face is visible indicates the direction in which the holding requirement applies.

#### (a) *Centreline Marking*

Taxiway Centreline Marking consists of a single continuous **yellow** line marking the declared 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 so as 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. 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 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:** 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 whilst lining up for take-off.

## 2. SURFACE MARKINGS

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

**1** Runway Taxi-Holding Position marking pattern 'A' identifying the last holding position prior to entering runway. Marks visual/CAT I Hold where earlier CAT II/III Hold provided. Marks visual/CAT I & CAT II/III Taxi-Holding Positions where only one Taxi-Holding Position provided.

**2** Runway Taxi-Holding Position marking pattern 'B' identifying Category I, II OR III where a closer visual/CAT I Taxi-Holding Position is provided.

**3** Intermediate Taxi-Holding Position markings.

**4** Taxiway edge marking indicates paved shoulder of bearing strength less than Taxiway or area beyond mark not intended for aircraft use.

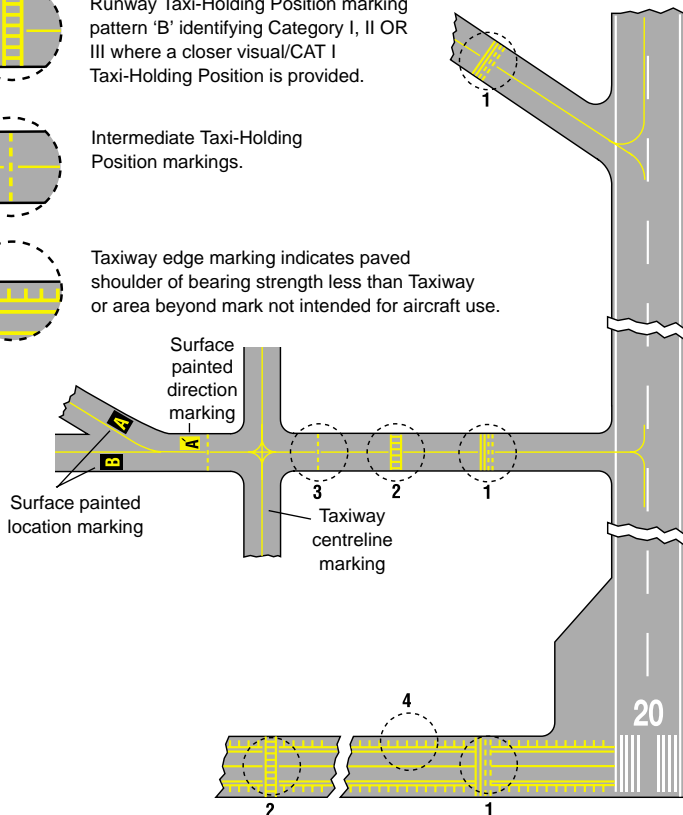


Fig 10 PAVED TAXIWAY MARKINGS (Not to Scale)

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(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 both of which are illustrated at Fig 10 and described as follows:

(i) *Pattern 'A'*

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 10).

(ii) *Pattern 'B'*

A Pattern 'B' style RTHP marking, consists of a ladder style mark laid across the entire width of the taxiway and normally at right angles to the taxiway centreline (see enlargement 2 Figure 10).

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 para 3.1.

**NOTE:** 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 conceding right of 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

## 2. SURFACE MARKINGS

normally at right angles to the taxiway centreline as illustrated in Fig 10 enlargement 3. An ITHP marking is supported by a sign as described at para 3.1.5. 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 Fig 10 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 employed where the use of a sign might cause an unacceptable obstruction. Examples of Information Markings are shown at Fig 10.

*NOTE:* 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, ensuring that no part of the aircraft protrudes beyond the marking.

### 2.1.3 *Paved Apron Markings*

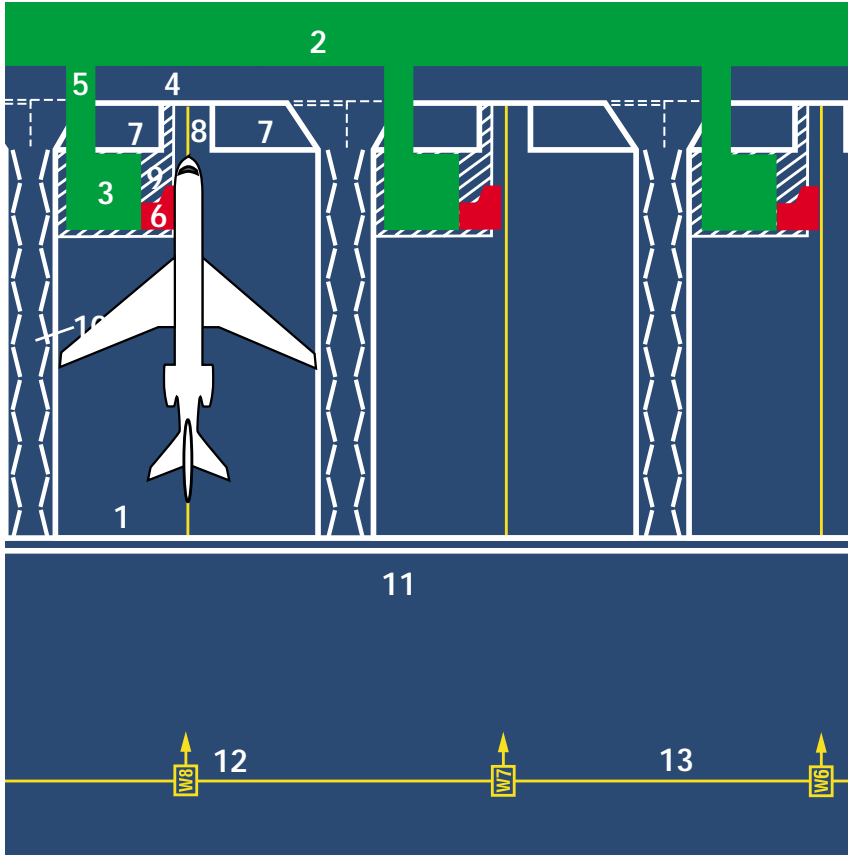
Apron markings intended for pilot use are **yellow** in colour. Where markings are provided for the guidance of pilots parking aircraft on stands, the position of the marking is determined on the basis that the pilot will endeavour to keep the aircraft *nosewheel* (see note to para 2.1.3.2) on the stand centreline. Other colours may be used for markings intended for the guidance of service vehicle drivers.

#### 2.1.3.1 *Stands Provided with Visual Docking Guidance*

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 11(a). Visual Docking Guidance Systems (VDGS) are described at Section 4.

## 2. SURFACE MARKINGS

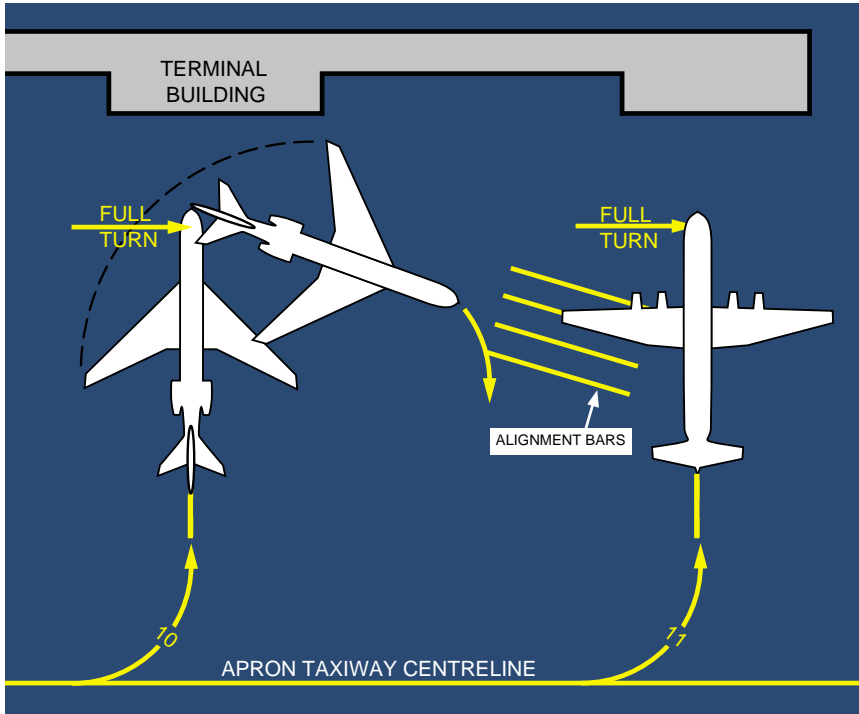
Fig 11a TYPICAL STAND LAYOUT AND MARKINGS



- |   |                        |    |                                    |
|---|------------------------|----|------------------------------------|
| 1 | Stand                  | 8  | Tug Area (No Parking)              |
| 2 | Pier                   | 9  | No Parking Area                    |
| 3 | Gate Room              | 10 | Interstand Clearway                |
| 4 | Airside Road           | 11 | Boundary between Apron and Taxiway |
| 5 | Low Bridge             | 12 | Stand number and centreline        |
| 6 | Jetty                  | 13 | Taxi-lane centreline               |
| 7 | Equipment Parking Area |    |                                    |

## 2. SURFACE MARKINGS

Fig 11b SELF MANOEUVRING STAND MARKINGS



### 2.1.3.2 Self-manoeuvring Stand Markings

The aprons of some aerodromes are provided with surface markings intended to assist pilots in taxiing their aircraft to the correct parking position without the assistance either of a marshaller or of VDGS. These markings are known as Self-manoeuvring Stand Markings. A variety of different styles of marking are in use throughout the UK. An example of one style is at Fig 11 (b); the method of use is described below:

- (a) 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;

## 2. SURFACE MARKINGS

- (b) 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 aeroplane, is initiated in the direction indicated. This turn is continued until the longitudinal axis of the aeroplane is parallel with the alignment bars seen ahead of the aeroplane as the designed parking angle is reached;
- (c) When the aeroplane is parallel to the alignment bars, the turn is discontinued and the aeroplane permitted to roll forward a distance of not more than 3m in order to straighten the nose wheel. The aeroplane is then stopped;
- (d) On departure, 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 aeroplanes 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 aeroplane 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 ask for assistance.

### 2.1.3.3 *Parking Spots and Parking Circles*

At some small aerodromes where aircraft parking space is at a premium, yellow spots or circles may be painted on the apron indicating individual aircraft parking positions. 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.

## 2.2 **Unpaved Surface Markings**

- 2.2.1 Apart from the Signals described at Table 'C' specified for the purpose of identifying those areas of an aerodrome that are unfit for use by aeroplanes, Unpaved Surface Markings are normally confined to unpaved runways and consist of Unpaved Runway Edge, Centreline, Threshold and End Markings.



## 2. SURFACE MARKINGS

### 2.2.2 *Unpaved Runway Edge and Centreline Marking*

The edges of unpaved 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.

### 2.2.3 *Unpaved Runway Threshold and End Marking*

The threshold and end of an unpaved runway are provided with markers of a similar type, size and colour as the edge markers. These markers are placed along the declared 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 ten degrees.

### 3. SIGNS

# 3. SIGNS

## 3 General

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.

### 3.1 Mandatory Signs

3.1.1 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 Fig 12 & 13. RTHP and ITHP signs are located alongside the appropriate surface marking described in para 2.1.2 and identify the holding position as well as indicate the direction in which the holding instruction applies. Pilots must not proceed beyond a Mandatory Sign without first obtaining ATC clearance to do so.

3.1.2 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 Fig 13.

#### 3.1.3 *RTHP Sign for Visual and Category I Operations*

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 Fig 13 (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.

# 3. SIGNS

(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 I Taxi-Holding Position only where a visual Taxi-Holding Position is established closer to the runway in order 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 III 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 Runway 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 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 16 is used.

Fig 12 EXAMPLE OF MANDATORY SIGNS FOR AIRCRAFT SURFACE MOVEMENTS (Not to scale)

# 3. SIGNS

## 3.1.4 *RTHP Sign for Category II and III Operations*

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 Figs 12 & 13. 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 Fig 13 (e) and (f). Exceptionally, CAT I RTHPs may be established in this manner, as illustrated at Fig 12 (b), for the same reason.

## 3.1.5 *ITHP Signs*

The style of sign illustrated at Fig 12 (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.

## 3.1.6 *No Entry Signs*

Where part of an aerodrome is restricted to one way traffic or is withdrawn from use, No Entry Signs, as illustrated at Fig 12 (g), are located on both sides of the mouth of the area showing the direction from which entry is prohibited.

## 3.2 **Information Signs**

Information Signs consist of Location, Direction and Destination Signs; they are provided only where there is an operational need and should be used in conjunction with an aerodrome chart.

## 3. SIGNS

### 3.2.1 *Location Signs*

3.2.1.1 Location Signs are used to identify taxiways and where necessary (such as at complicated intersections), runways. Taxiways are normally designated by a single letter of the alphabet, e.g. 'A' for taxiway Alpha, 'B' for Bravo etc. The letters 'O', '1' and 'X' are not used. On larger aerodromes with many taxiways, double letter designators may be used in order to identify minor taxiways adjoining a main route e.g. 'BA' for a minor taxiway adjoining taxiway Bravo. Runway Location Signs use the first two numbers of the runway magnetic heading.

3.2.1.2 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 Fig 14 (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 Fig 14 (a) (ii), is used.

### 3.2.2 *Direction and Destination Signs*

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 14. Direction Signs are normally accompanied by a Location Sign and positioned on the left side of a taxiway or runway before an intersection.

## 3.3 **Typical Layout of Signs**

Typical layout patterns of Information and Mandatory Signs are illustrated at Figs 13, 15 and 16.

# 3. SIGNS

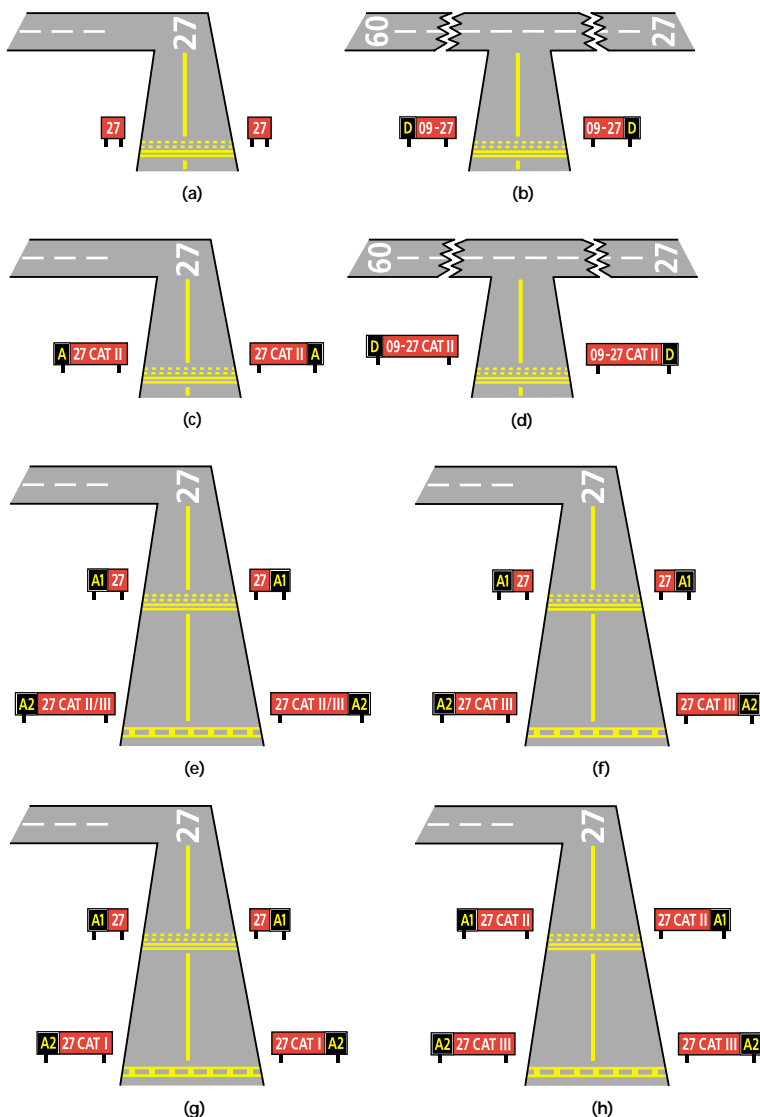
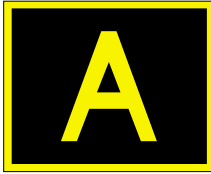


Fig 13 TYPICAL RUNWAY TAXI-HOLDING POSITION SIGNS AND ASSOCIATED TAXIWAY MARKINGS

The diagrams 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 Figs (b) and (d) above are handed to show a left turn is required to reach the threshold of Rwy 09 and a right turn to reach the threshold of Rwy 27.

### 3. SIGNS



(i)

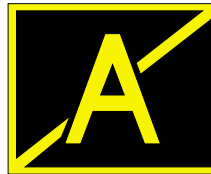
Designation

(a) Taxiway Location Signs



(ii)

Specific Location

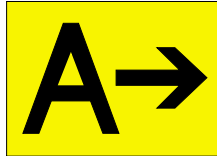


(iii)

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



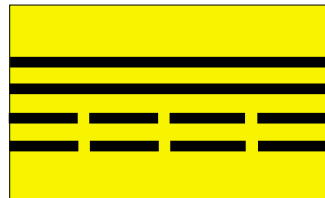
(e) Destination Sign to Different Runways



(f) Inbound Destination Sign



(g) Stand Destination Sign

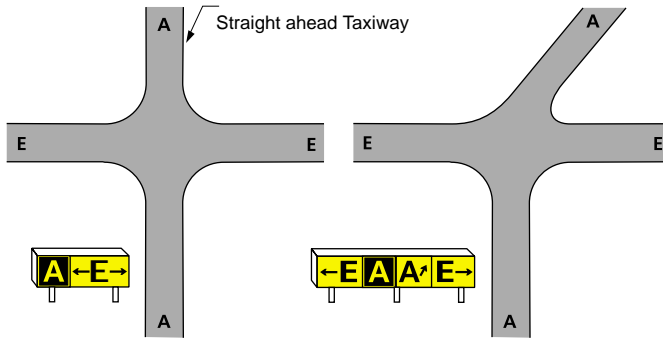


(h) Runway vacated sign  
(Not currently used in the UK)

Fig 14 EXAMPLES OF INFORMATION SIGNS (Not to Scale)

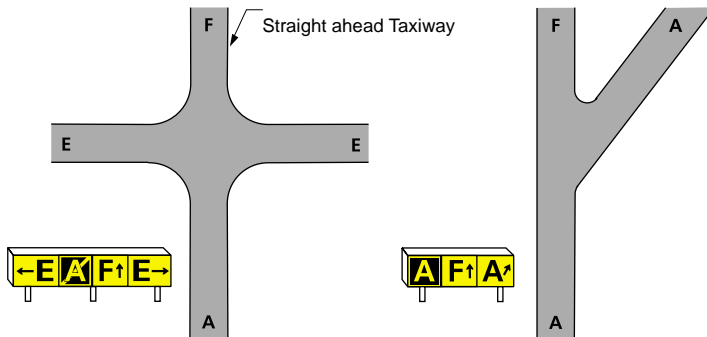


# 3. SIGNS



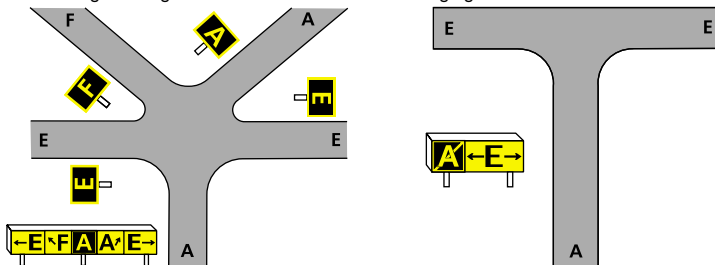
(a) Standard 4 - Way Intersection

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



(c) Straight ahead Taxiway has changed designation

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



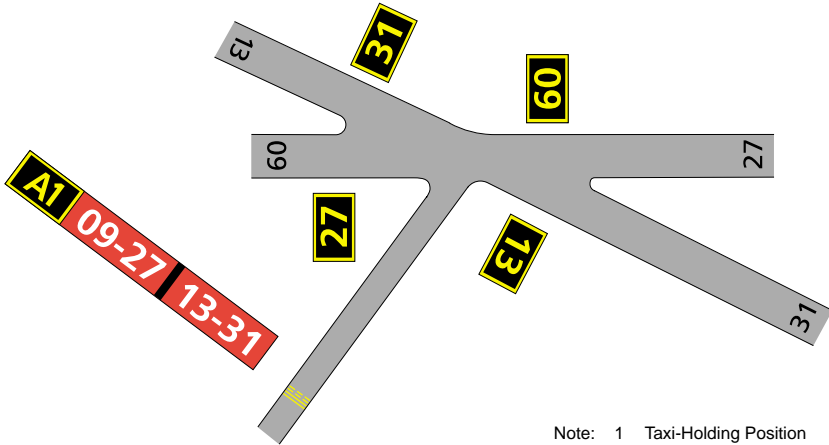
(e) Location signs indicating exit from intersection

(f) Taxiway ending sign

Fig 15 EXAMPLES OF TAXI GUIDANCE SIGNS AT TAXIWAY INTERSECTIONS (Not to Scale)

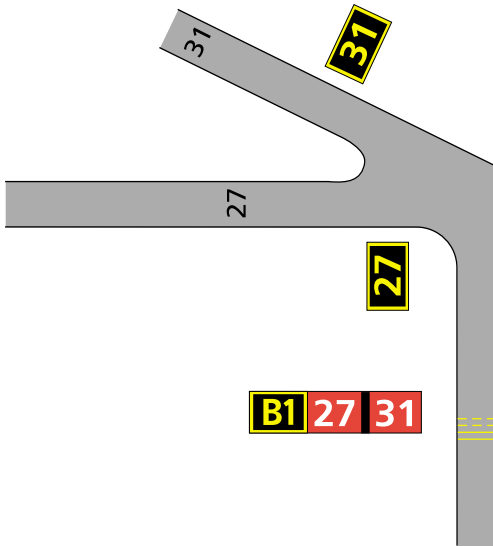
Note: Signs are laid out as shown above, ie. from left to right in a clockwise manner. Left turn signs are on the left of the taxiway Location Sign. Right turn signs on the right, except in situations corresponding to (a) & (f) above where the double arrow direction sign is inboard of the taxiway location sign. Adjacent signs are separated by a black vertical delineator.

# 3. SIGNS



(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

Fig 16 EXAMPLES OF USE OF RUNWAY LOCATION SIGNS AND SIGNS AT RUNWAY TAXI-HOLDING POSITIONS SERVING MORE THAN ONE RUNWAY

## 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

## 4 General

Visual Docking Guidance Systems (sometimes referred to as Nose-in Docking Guidance Systems or Stand Entry Guidance Systems) provide guidance where pilot-interpreted alignment and stopping information is required for accurate parking, particularly at airbridges. Those systems currently in use in the UK are as follows:

- (a) Azimuth Guidance for Nose-in Stands (**AGNIS**), supported by either Parallax Aircraft Parking Aid (**PAPA**), Side Marker Boards (**SMB**) or Side Marker Lines (**SML**)
- (b) Safegate
- (c) Aircraft Positioning and Information System (**APIS**), Aircraft Positioning System (**APS**) and Airpark
- (d) Mirror

All these systems are described in the following paragraphs and the Stands where they are in use are indicated in paragraph 26 of the relevant aerodrome entry in the Air Pilot at AGA 2.

*NOTE 1:* A pilot **should not** assume that a stand is safe to enter simply because the stand 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 aeroplane should be stopped immediately and assistance requested.

*NOTE 2:* Except under the guidance of a marshaller, an aeroplane should not be taxied onto a VDGS equipped stand when the guidance system is switched off.

*NOTE 3:* Ground staff should NOT activate 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 aeroplane assigned.

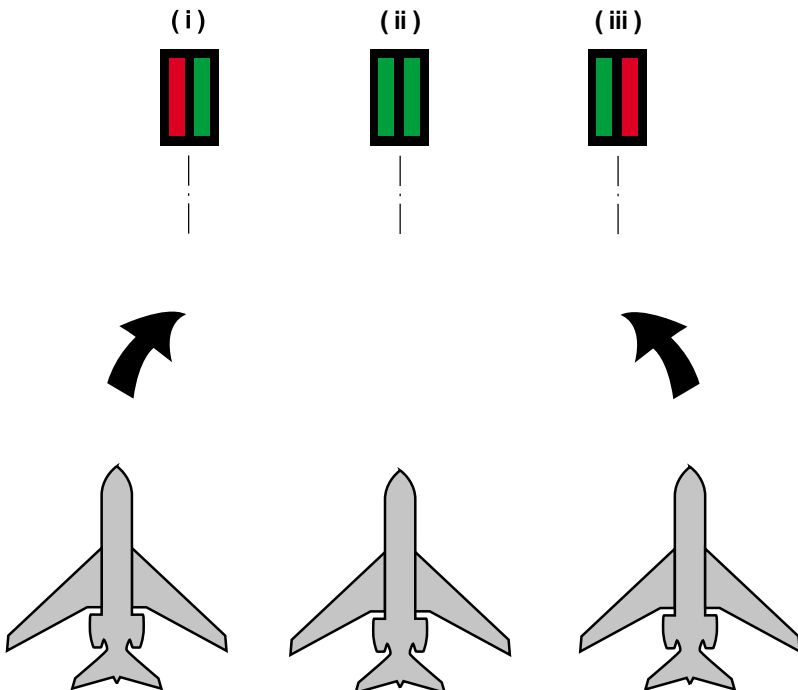
# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

## 4.1 Azimuth Guidance for Nose-in Stands (AGNIS)

4.1.1 AGNIS provides Stand centreline alignment guidance and is normally used in conjunction with either PAPA, SMB or SML which provide stopping guidance separately. The system is designed for use from the left pilot position and the unit displays two closely spaced vertical light bars mounted in a box, as illustrated at Fig 17, 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 Fig 17 (i) & (iii), indicating that the pilot should steer **away from the red towards the green** bar, or

Fig 17 AGNIS



## 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

- (b) **two green bars**, indicating correct alignment, as illustrated at Fig 17 (ii).

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

- (a) PAPA

This aid is positioned to the left side of the Stand centreline and provides stopping guidance by employing a black board marked with white vertical lines bearing aeroplane type identification labels and in which a horizontal slot has been cut, as illustrated at Fig 18 (i). A short distance behind the slot is a vertically-mounted white fluorescent light tube which, when aligned with the required aeroplane type line, indicates the stop-point, as shown at Fig 18 (ii). An alternative layout is illustrated at Fig 18 (iii) where the board is provided without a slot and the tube is mounted in front of it; the method of use is identical.

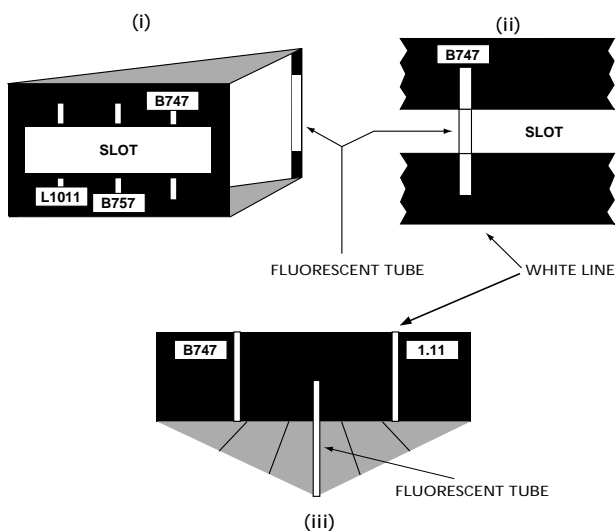


Fig 18 PAPA

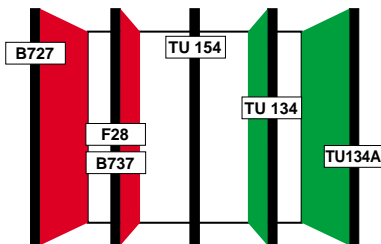
# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

(b) SMB

This aid is positioned to the left of the Stand and provides stopping guidance by employing a series of vertically mounted boards bearing aeroplane type identification labels. The boards are viewed against a contrasting background and as the aeroplane enters the Stand, the pilot sees the board faces as **green** in colour – meaning **continue** ahead – and the rear faces as **red** – indicating **too far** – appropriate to the aeroplane type. The stop point is abeam the appropriate board viewed end-on with **neither the green face nor the red face visible to the handling pilot**, as illustrated at Fig 19.

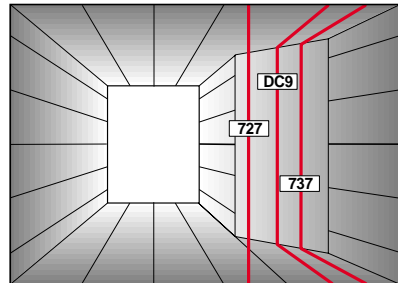
(c) SML

Where the required stop-point is abeam the jetty itself, it may not be possible to employ SMB and type-labelled SML are painted inside the jetty end. The stop-point is where the appropriate SML appears to the pilot to be entirely vertical as illustrated at Fig 20.



Illustrates correct stop position for TU 154

Fig 19 SMB



Illustrates correct stop position for B727

Fig 20 SML

# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

## 4.2 Safegate

4.2.1 Safegate is designed for use from the left pilot position and combines both alignment and stopping guidance in one display. The following elements of the display correspond to the letters illustrated at Fig 21:

- (a) An alphanumeric **white** dot matrix light element indicating, as appropriate:
  - (i) Aeroplane Type e.g. *A310*
  - (ii) *STOP SHORT*
  - (iii) *TOO FAR*
  - (iv) *OK*
  - (v) *STOP*
  - (vi) Door Number (which may alternate with aeroplane type) e.g. *DOOR 2*

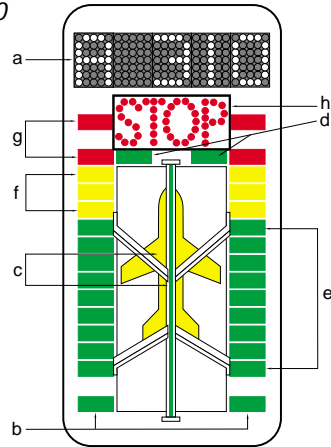


Fig 21

- (b) One pair of **green** lights – meaning gate ready for parking.
- (c) Alignment bar and aeroplane symbol – providing centrelines guidance.
- (d) One pair of **green** reference lights – indicating the **notional stop position**.
- (e) 9 pairs of **green** progress lights – providing guidance on the closing rate with the notional stop position up to **three metres before STOP**.
- (f) 3 pairs of **yellow** progress lights – indicating **three metres before STOP**.
- (g) Two pairs of **red** lights – STOP signal.
- (h) Display indicating STOP; **red** light matrix.



# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

4.2.2 Before entering the stand, a pilot **must** ensure that the following signals, as illustrated at Fig 22, are displayed:

- (a) *The CORRECT AEROPLANE TYPE DESIGNATOR is displayed in flashing white.*
- (b) *The bottom pair of green lights is flashing – indicating 'ready for docking.'*

**NOTE:** These lights turn to steady when aeroplane enters stand.

**FAILURE TO DO SO MAY RESULT IN THE AEROPLANE COLLIDING WITH GROUND EQUIPMENT.**

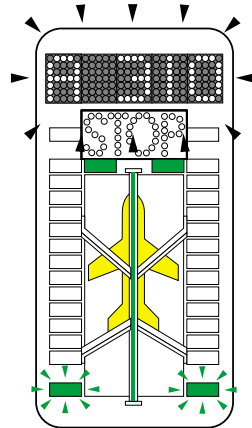
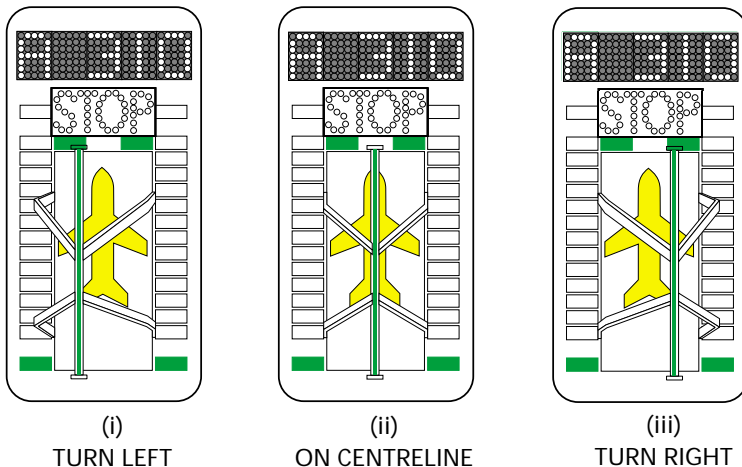


Fig 22

4.2.3 When the aeroplane is on the Stand centreline the **green** alignment bar and the **yellow** aeroplane symbol coincide, otherwise the pilot should steer the aeroplane in the direction indicated by the displacement of the aeroplane symbol in relation to the alignment bar, as illustrated at Fig 23.

Fig 23

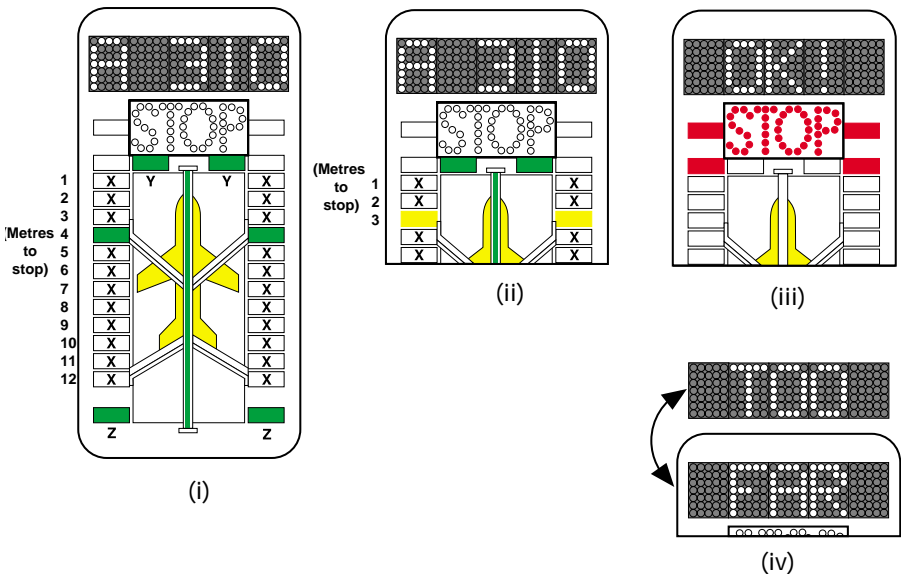


# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

4.2.4 The stopping guidance sequence is illustrated at Fig. 24 and described as follows:

- (a) The aeroplane nose-wheel activates sensors in the pavement 12m from **STOP**. At this stage, lights Y and Z (Fig 24 (i)) are continuously lighted while the **green** progress lights marked 'X' in Fig 24, will illuminate one pair at a time from the bottom pair upwards indicating closure with the notional stopping position (reference lights marked 'Y' in Fig 24) in 1m stages. The progress lights indicating the final 3m, are **yellow**. Fig 24 illustrates the display state with 4m to run at (i) – (the last of the **green** sequence) and with 3m to run at (ii) – (the first **yellow** pair).

Fig 24



## 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

- (b) When the aeroplane reaches the stop position (Fig 24 iii), the **STOP** signal and the adjacent **red** lamps illuminate. The alignment bar and **green** reference lights then extinguish. **OK!** is displayed if the aeroplane is correctly parked and shortly afterwards the entire display will switch off.
- (c) If the aeroplane has overrun the stop position, the **TOO FAR** signal appears as separate words flashing alternately on the top display panel as illustrated at Fig 24 (iv).
- (d) The **STOP SHORT** signal will appear on the top panel if either of the following events occur:
  - (i) an object (e.g. a tow bar) is left on the sensors,  
or
  - (ii) the aeroplane stops short of the correct stopping point.
- (e) During the docking procedure a **STOP** signal will be displayed whenever either of the following events occur:
  - (i) The ground crew activates the emergency stop signal  
or
  - (ii) The system's self-test function detects an error in the system during the docking procedure.

## 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

### 4.3 Aircraft Positioning and Information System (APIS), Aircraft Positioning System (APS) and Airpark

4.3.1 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 Fig 25 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 aeroplane over the last 16m of the approach to the stop position.
- (c) An azimuth guidance element employing a moiré pattern.

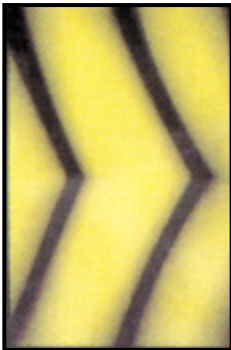
4.3.2 Prior to entering the stand the pilot must ensure that the following signals are displayed:-

- (a) **Correct aeroplane type**
- (b) **Correct stand number**

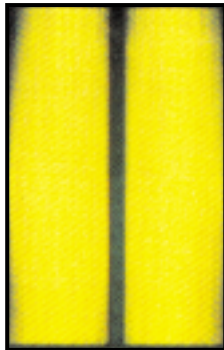
***FAILURE TO DO SO MAY RESULT IN THE AEROPLANE COLLIDING WITH GROUND EQUIPMENT***

4.3.3 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 Fig 25.

# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

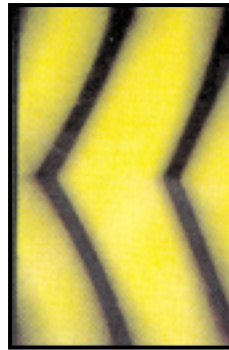


TURN RIGHT



Azimuth Guidance

ON CENTRELINE



TURN LEFT

Fig 25 APIS

## 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

- 4.3.4 The stopping guidance sequence employs safe laser technology and is activated as follows:-
- (a) As the system detects an approaching aeroplane, the progress strip will decrease in length by one row at a time (representing a 0.6m stage). When the aeroplane is in the correct stop position, the progress strip is extinguished as shown in Fig 25 (d).
  - (b) When the aeroplane is correctly parked  $OK_{STOP}$  is displayed, as illustrated in Fig 25 (e).
  - (c) If the aeroplane has over-run the correct stop position  $TFAR_{STOP}$  will appear as illustrated at Fig 25 (f).
  - (d) An  $ESTP_{STOP}$  signal will appear if any foreign object is detected ahead of the aeroplane by the system sensors or if the emergency stop procedure is activated by ground crew.
  - (e) An  $STSH$  signal will appear along with the appropriate progress strip display if the aeroplane has for any reason stopped short of the correct stopping position.
- 4.3.5 A simpler version of APIS known as Aircraft Positioning System (APS) is in use at some major airports. APS uses the same laser sensors and moiré pattern but has a limited alphanumeric display which normally displays only the aeroplane type for which the stand is prepared.
- 4.3.6 Airpark, illustrated at Fig 26, employs 2 identical moiré pattern elements to provide both azimuth guidance onto the Stand centreline and Stop indication. The system is not used on stands employing airbridges.

# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

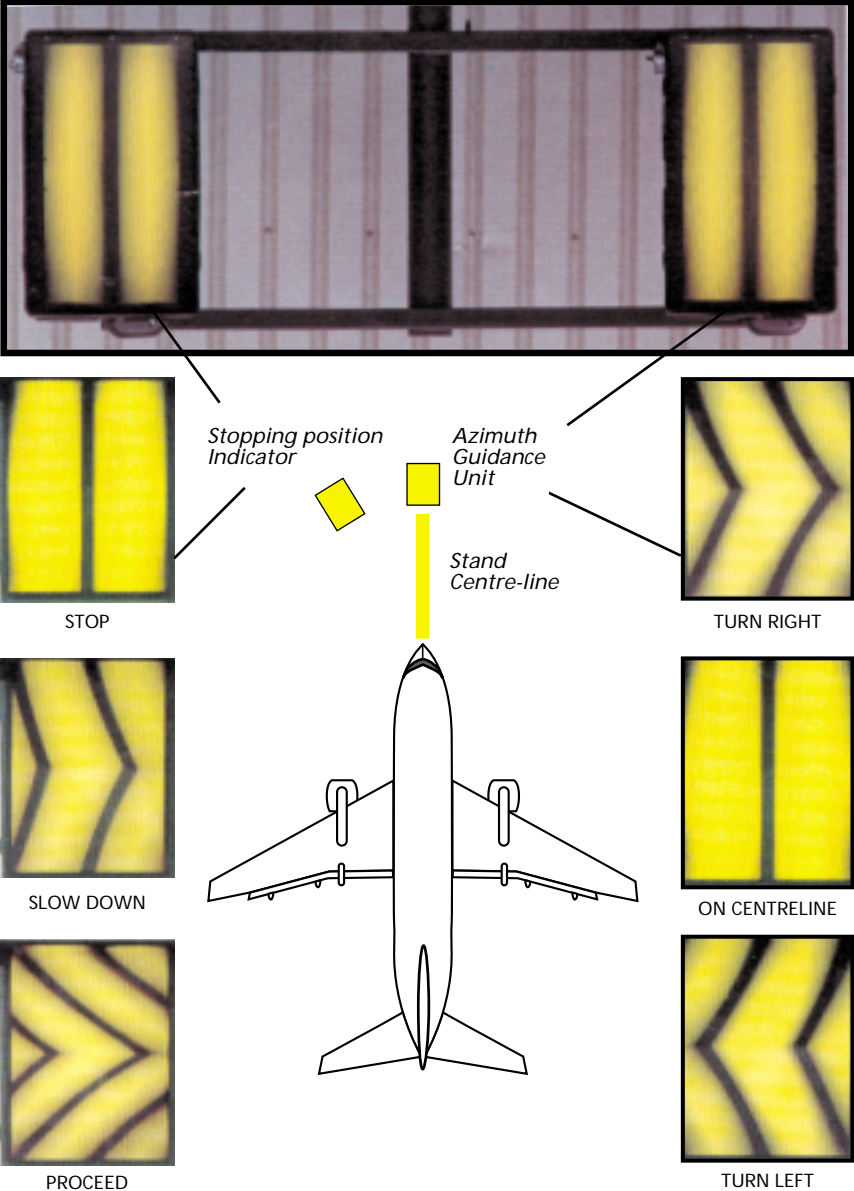


Fig 26 AIRPARK

# 4. VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

## 4.4 Mirror

- 4.4.1 The Mirror system is designed for use from the left pilot position and consists of a mirror mounted to the left of the stand centreline and facing the approaching aeroplane. The mirror is angled so that the pilot can see the reflection of the aeroplane nose wheel during the last few metres of the parking manoeuvre.
- 4.4.2 The correct stopping position is indicated by aeroplane type symbols marked in mirror image on the apron surface. As the aeroplane approaches, the pilot is able to see a reflection in the mirror of the aeroplane nose wheel and the appropriate type symbol alongside which the aeroplane should be stopped.



## 5. OBSTACLE LIGHTING & MARKINGS

# 5. OBSTACLE LIGHTING & MARKINGS

## 5 General

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.

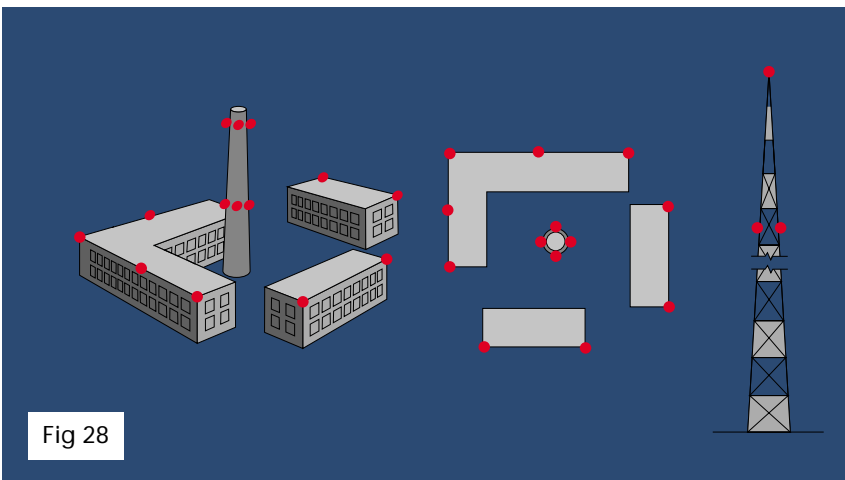
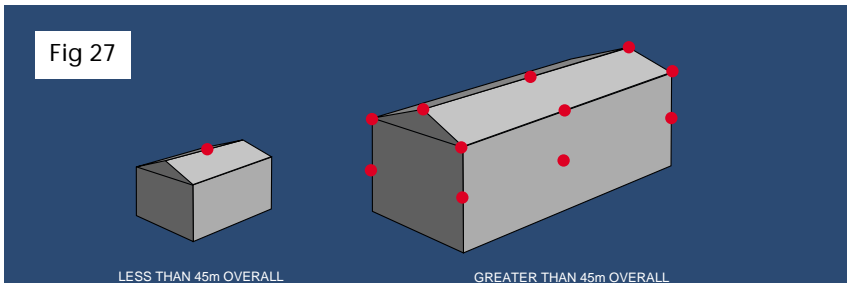
### 5.1 Aerodrome Obstacles

- 5.1.1 All objects located within a 15km radius of an aerodrome 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 Figs 27, 28, 29, and 30. Bad ground markers are illustrated at Table 'C'.

# 5. OBSTACLE LIGHTING & MARKINGS

## 5.1.2 Lighting

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 Fig 27. 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.



# 5. OBSTACLE LIGHTING & MARKINGS

## 5.1.3 *Marking*

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 Fig 29. Bad ground markers are illustrated at Table 'C'.

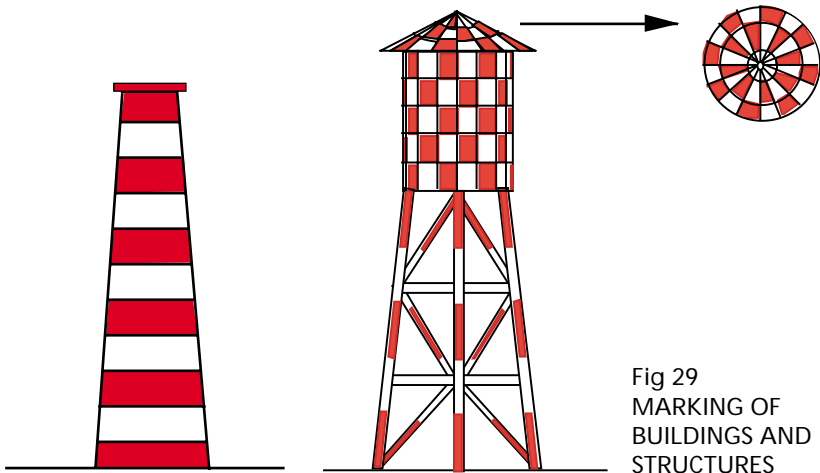


Fig 29  
MARKING OF  
BUILDINGS AND  
STRUCTURES

# 5. OBSTACLE LIGHTING & MARKINGS

## 5.2 En-route Obstacles

5.2.1 Objects located beyond a 15km radius of an aerodrome are normally considered to be obstacles to aircraft in flight only if they exceed 150m 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.

5.2.2 En-route obstacles are normally lit by **steady red lights at night** and high intensity **flashing white lights by day**. However, there are exceptions particularly in areas where environmental issues militate against the use of high intensity flashing lights. Normally a minimum of two vertical levels of lighting are provided, with additional levels according to the height of the structure. Methods of lighting En-route Obstacles are illustrated at Fig 28. In certain circumstances, complex obstacles may display high intensity flashing white lights by night as well as by day, as illustrated in Fig 30.

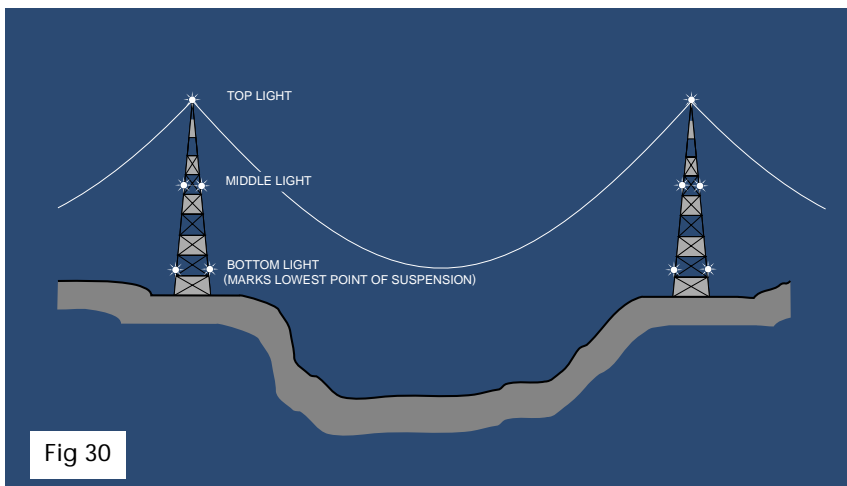


Fig 30

## 6. AERODROME SIGNALS

# 6. AERODROME SIGNALS

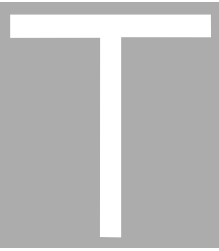
## 6 General

- 6.1 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 12m 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.
- 6.2 In addition, these aerodromes may display signals, having the meaning described at Table B, suspended from a mast adjacent to the Signals Area.
- 6.3 The Signals and Markings illustrated at Table C may be used at any aerodrome whether or not a Signals Area is displayed.
- 6.4 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.
- 6.5 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.
- 6.6 Other Marshalling Signals in common use but not prescribed by the Rules of the Air Regulations are illustrated at Tables G and H.
- 6.7 Where signals are applicable only to helicopter operations, they are marked by the symbol.

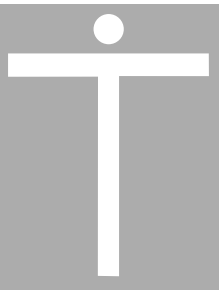


## 6. AERODROME SIGNALS

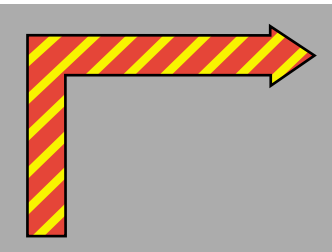
**Table A** – Meaning of Signals Displayed in the Signals Area  
(Reference Section IX Rules of the Air Regulations)



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.

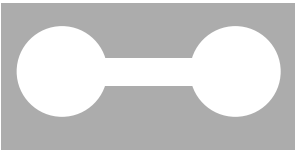


## 6. AERODROME SIGNALS

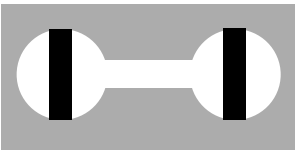


**Table A** – Meaning of Signals Displayed in the Signals Area

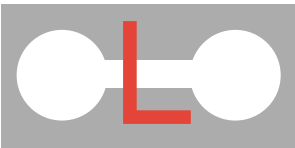
A red panel square with yellow stripes along each diagonal signifies that the aerodrome is unsafe for the movement of aircraft and that landing is prohibited.



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



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.



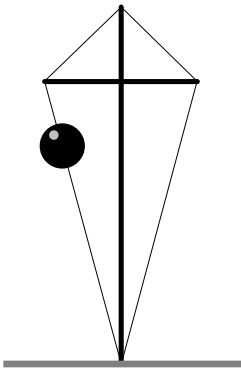
A white double cross signifies that glider flying is in progress.



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

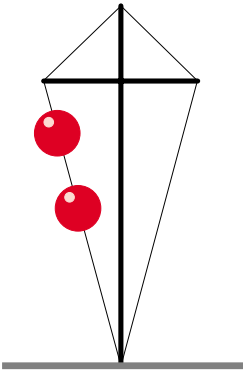
## 6. AERODROME SIGNALS

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

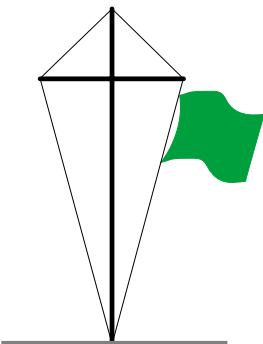


### Description & Meaning

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




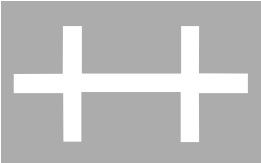
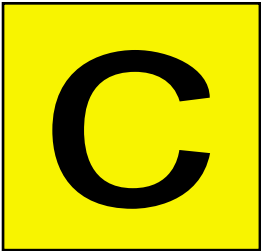
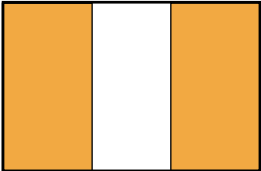
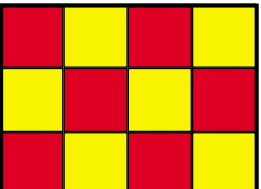
Two red balls disposed one above the other, and suspended from a mast, signify that glider flying is in progress at the aerodrome.



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






# 6. AERODROME SIGNALS

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

| Signal/Marking  | Location   | Description & 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. |

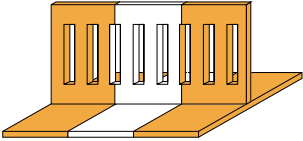
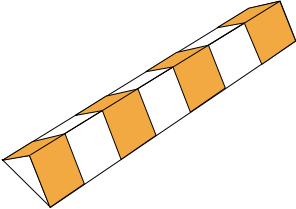
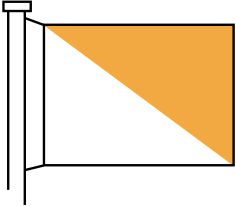
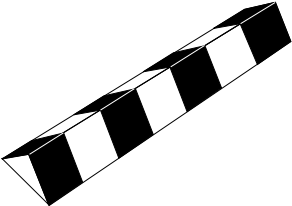
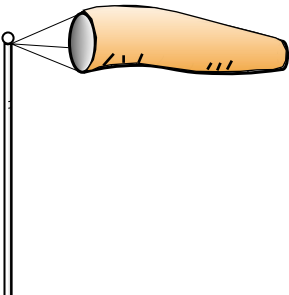
## 6. AERODROME SIGNALS

**Table C** – Meaning of Signals Displayed on the Aerodrome

| Signal/Marking  | Location                                       | Description & Meaning  |
|---|--|--|
|    | On the landing area                            | A large white letter L indicates an area normally of grass reserved for landing and take-off of light aircraft   |
|    | 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 an elongated 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 mark in the shape of a St. Andrew's 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 take-off and landing.   |

# 6. AERODROME SIGNALS

**Table C** – Meaning of Signals Displayed on the Aerodrome

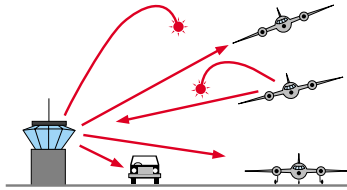
| Signal/Marking  | Location   | Description & Meaning   |
|---|--|---|
|    | <p>Along the boundary of the designated area.</p>  | <p>Orange and white markers or flags delineate an area of the surface considered to be unfit for use by aircraft.</p> |
|    | <p>Along the boundary of the designated area.</p>  |   |
|    | <p>Along the boundary of the designated area.</p>  |   |
|   | <p>At displaced threshold on both sides 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.<br/>Sometimes lit at night.</p> | <p>Orange (or other conspicuous colour) wind sleeve indicates wind direction and speed.</p>                           |

# 6. AERODROME SIGNALS

**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**

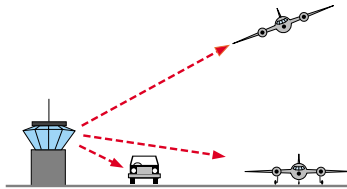
Do not land. Give way continue circling.

Immediate assistance required.

Stop.

**Signal**

Flashing red light to aircraft or vehicle.



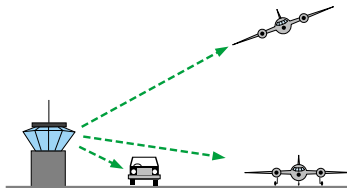
**Meaning**

Do not land; aerodrome closed.

Move clear of landing area.

**Signal**

Flashing green light to aircraft or vehicle.



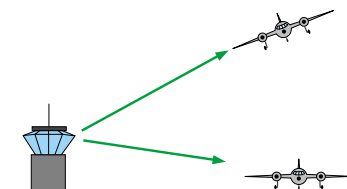
**Meaning**

return to aerodrome await landing clearance.

Cleared to taxi/move on the manoeuvring area.

**Signal**

Steady green light to aircraft.



**Meaning**

Cleared to land.

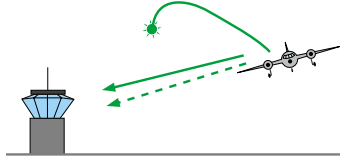
Cleared to take-off.

# 6. AERODROME SIGNALS

**Table D** – Meaning of Light and Pyrotechnic Signals

**Signal**

Steady or flashing green or green flare from aircraft.

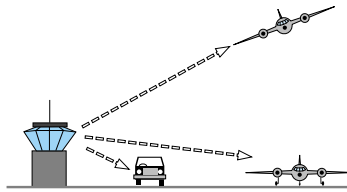


**Meaning**

By Night – may I land.  
By Day – may I land in a direction different from that indicated.

**Signal**

White flashes to aircraft or vehicle.



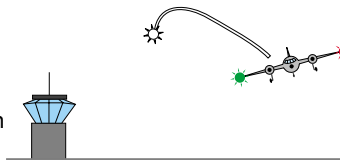
**Meaning**

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.

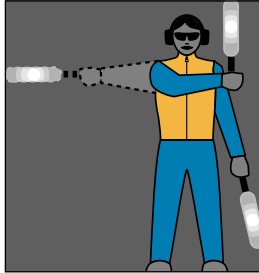
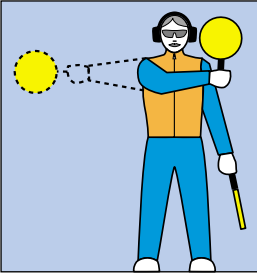


**Meaning**

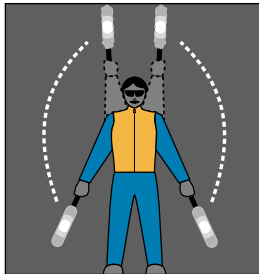
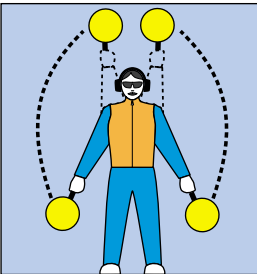
I am compelled to land.

# 6. AERODROME SIGNALS

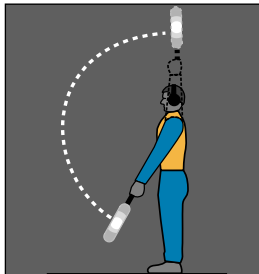
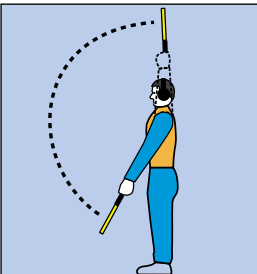
**Table E** – Meaning of Marshalling Signals  
(Reference Section IX Rules of the Air Regulations)



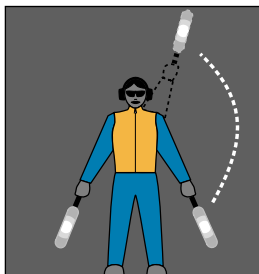
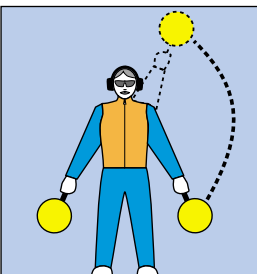
(a) Right or left arm down, the other arm moved across the body and extended to indicate position of the other marshaller.  
**Meaning** Proceed under guidance of another marshaller.



(b) Arms repeatedly moved upward and backward, beckoning onward.  
**Meaning** Move ahead.



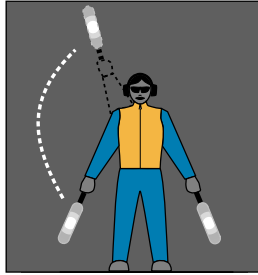
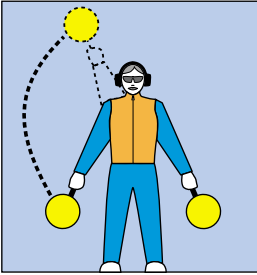
(c) Right arm down, left arm repeatedly moved upward and backward. The speed of arm movement indicates the rate of turn.  
**Meaning** Open up starboard engine(s) or turn to port.





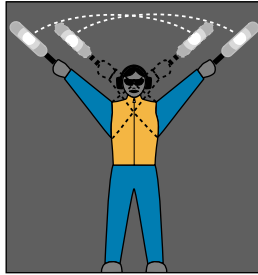
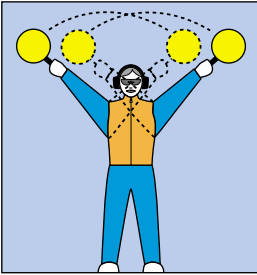
# 6. AERODROME SIGNALS

**Table E** – Meaning of Marshalling Signals



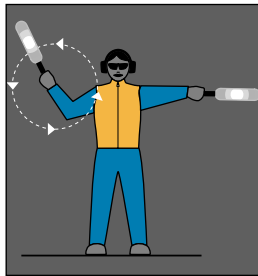
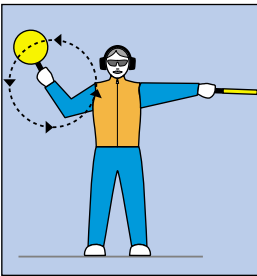
(d) Left arm down, the right arm repeatedly moved upward and backward. The speed indicates the rate of turn.

**Meaning** Open up port engine(s) or turn to starboard.



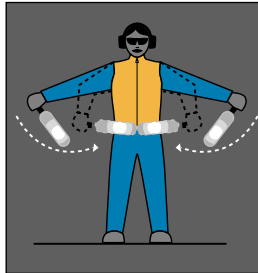
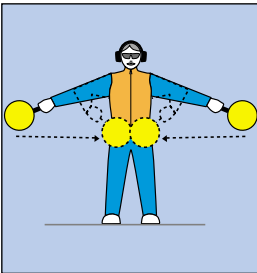
(e) Arms repeatedly crossed above the head. The speed of arm movement indicates the urgency of the stop.

**Meaning** Stop.



(f) A circular motion of the right hand at head level, with the left arm pointing to the appropriate engine.

**Meaning** Start engine. See also (w)

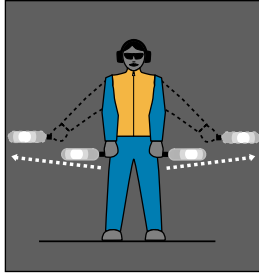
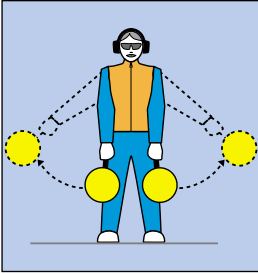


(g) Arms extended, the palms facing inwards, then swung from the extended position inwards.

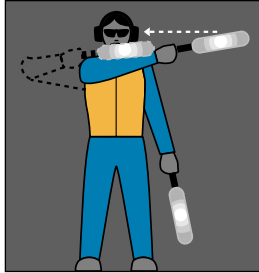
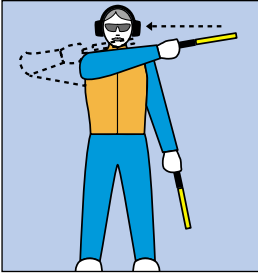
**Meaning** Chocks inserted.

# 6. AERODROME SIGNALS

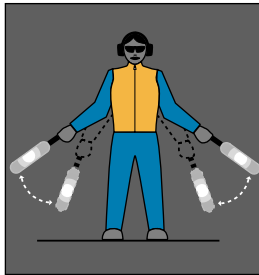
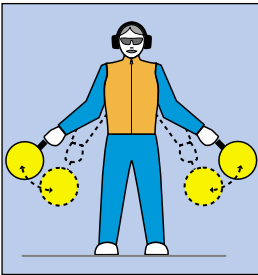
**Table E** – Meaning of Marshalling Signals



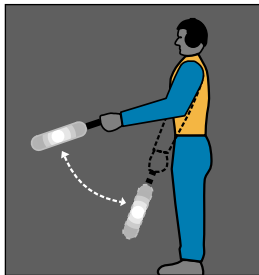
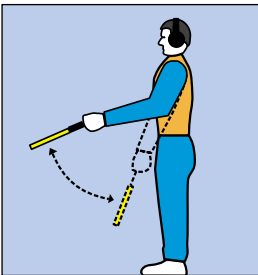
(h) Arms down, the palms facing outwards, then swung outwards.  
**Meaning** Chocks away.



(i) Either arm and hand placed level with the chest, then moved laterally with the palm downwards.  
**Meaning** Cut all engines.

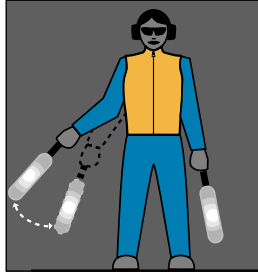
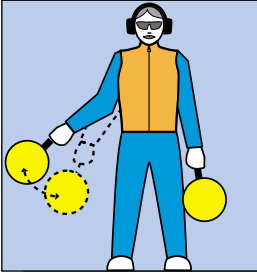


(k) Arms placed down, with the palms towards the ground, then moved up and down several times.  
**Meaning** Slow down.



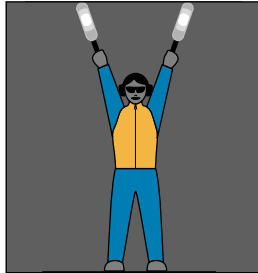
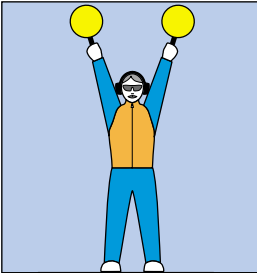
# 6. AERODROME SIGNALS

**Table E** – Meaning of Marshalling Signals



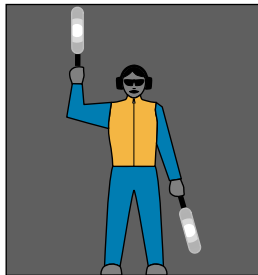
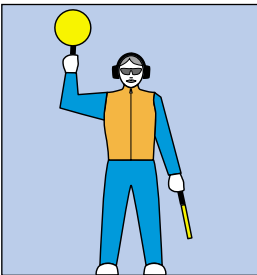
**(l)** Arms placed down, with palms towards the ground, then either arm moved up and down several times.

**Meaning** Slow down engine(s) on side indicated by moving arm.



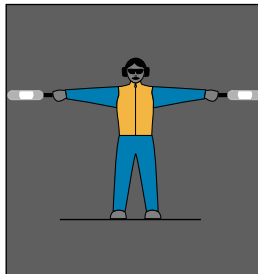
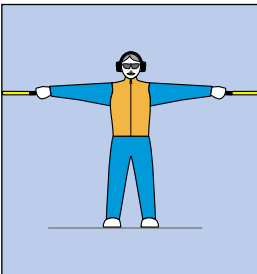
**(m)** Arms placed above the head in a vertical position.

**Meaning** This bay.



**(n)** The right arm raised at the elbow, with the palm facing forward.

**Meaning** All clear: Marshalling finished.



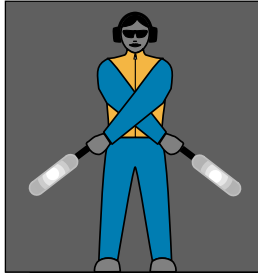
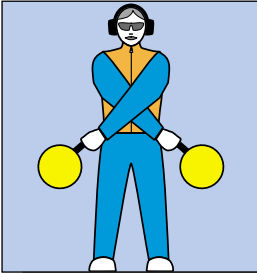
**(o)** Arms placed horizontally sideways.

**Meaning** Hover.



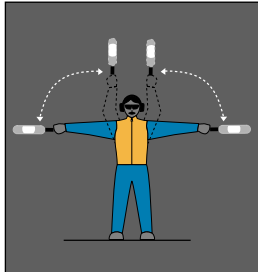
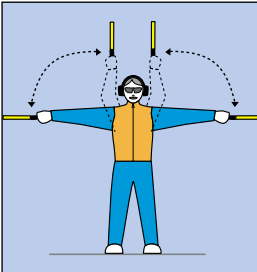
# 6. AERODROME SIGNALS

**Table E** – Meaning of Marshalling Signals



(p) Arms placed down and crossed in front of the body.

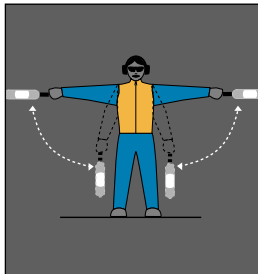
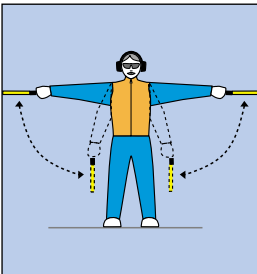
**Meaning** Land.



(q) Arms placed horizontally sideways with the palms up beckoning upwards.

The speed of arm movement indicates the rate of ascent.

**Meaning** Move upwards.



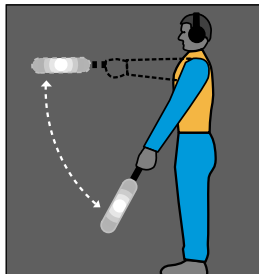
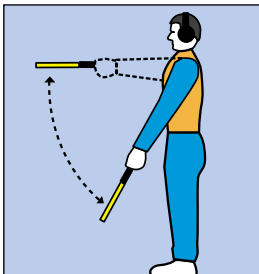
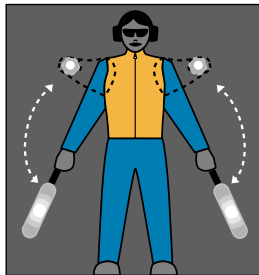
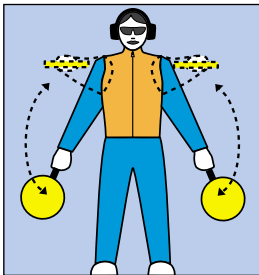
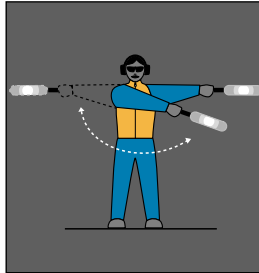
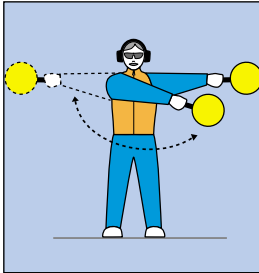
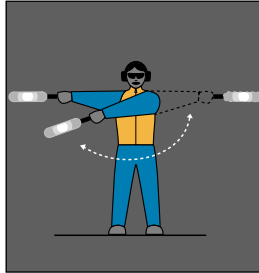
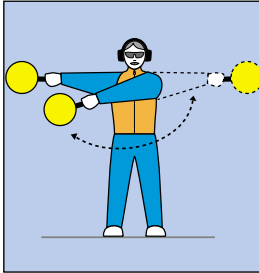
(r) Arms placed horizontally sideways with the palms towards the ground beckoning downwards. The speed of arm movement indicates the rate of descent.

**Meaning** Move downwards.



# 6. AERODROME SIGNALS

**Table E** – Meaning of Marshalling Signals



(s) Either arm placed horizontally sideways, then the other arm moved in front of the body to that side, in the direction of the required movement; repeated several times.

**Meaning** Move horizontally in the direction indicated.



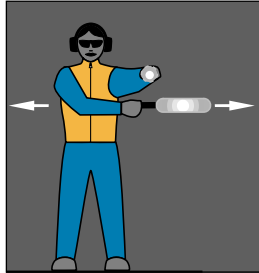
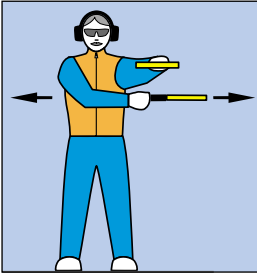
(t) Arms placed down, the palms facing forward, then repeatedly swept up and down to shoulder level.

**Meaning** Move back.



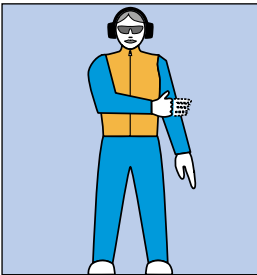
# 6. AERODROME SIGNALS

**Table E** – Meaning of Marshalling Signals



**(u)** Left arm extended horizontally forward, then right arm making a horizontal slicing movement below left arm.

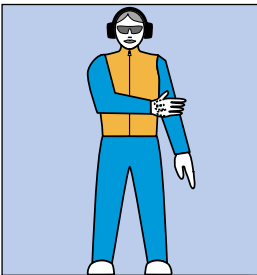
**Meaning** Release load.



**Signal not used at night**

**(v)** Raise arm with fist clenched, horizontally in front of body, then extend fingers.

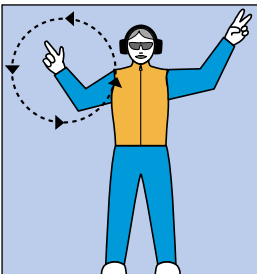
**Meaning** Release brakes.  
See also Table G (f)



**Signal not used at night**

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

**Meaning** Engage brakes.  
See also Table G (f)



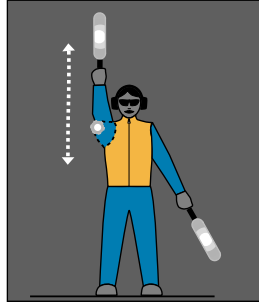
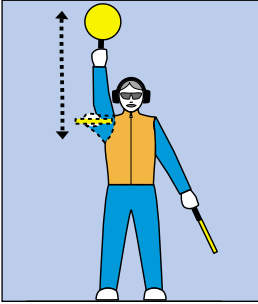
**Signal not used at night**

**(w)** Left hand over head with the number of fingers extended, to indicate the number of the engine to be started, (see para (e) Table F) and circular motion of right hand at head level.

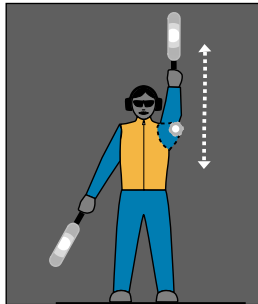
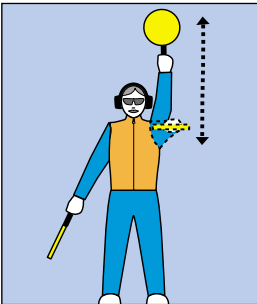
**Meaning** Start engine(s).

# 6. AERODROME SIGNALS

Table E – Meaning of Marshalling Signals



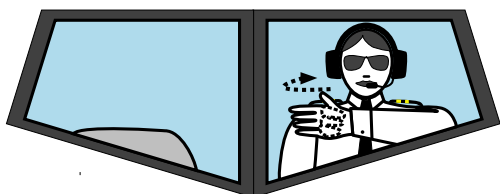
(x) Point left arm down, move right arm down from overhead, vertical position to horizontal forward position, repeating right arm movement.  
**Meaning** Back aircraft tail to starboard.



Point right arm down, move left arm down from overhead, vertical position to horizontal forward position, repeating left arm movement.  
**Meaning** Back aircraft tail to port.

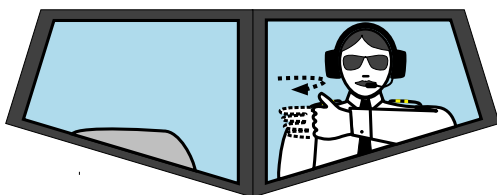
## 6. AERODROME SIGNALS

**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.



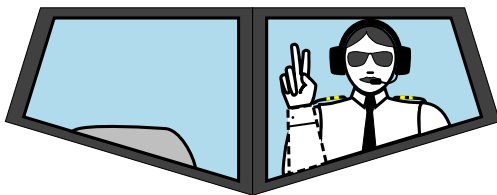
(c) Arms extended palms facing outwards, move hands inwards to cross in front of face.

**Meaning** Insert chocks.



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

**Meaning** Remove chocks.



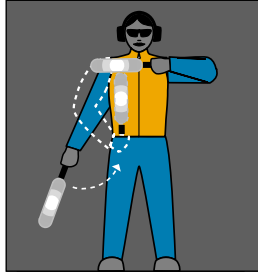
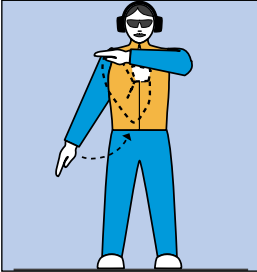
(e) Raise the number of fingers on one hand indicating the number of the engine to be started. For this purpose the aircraft engines shall be numbered as follows, No. 1 engine shall be the port outer engine, No. 2, the port inner engine, No. 3, the starboard inner engine and No. 4, the starboard outer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

**Meaning** Ready to start engine indicated.

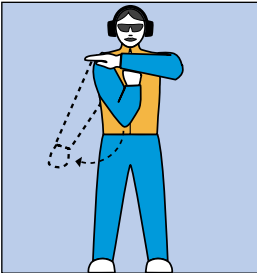


# 6. AERODROME SIGNALS

**Table G** – Other Marshalling Signals in Common Use  
(Not prescribed by the Rules of the Air Regulations)



(a) One arm horizontal in front of the body at shoulder level hand outstretched with palm facing downwards. Other arm, fist clenched, brought up to form a 'T'.  
**Meaning** Ground power connected/request permission to connect ground power.



(b) One arm horizontal in front of the body at shoulder level hand outstretched with palm facing downwards. Other arm, fist clenched, held vertical to form a 'T'. Leaving the horizontal arm in place, return the other arm smartly to the side of the body.  
**Meaning** Ground power disconnected/request permission to disconnect ground power.

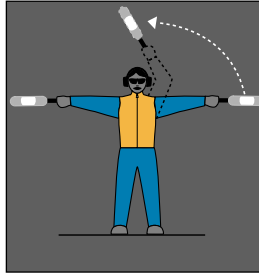
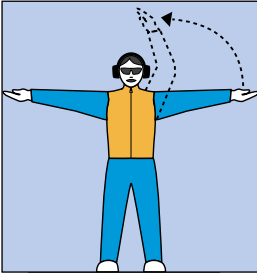


(c) Circular motion in the horizontal plane with the right hand above the head.  
**Meaning** Start rotors.



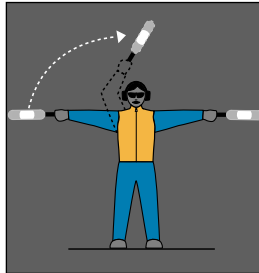
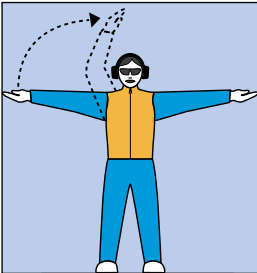
# 6. AERODROME SIGNALS

**Table G** – Other Marshalling Signals in Common Use



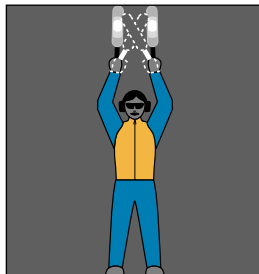
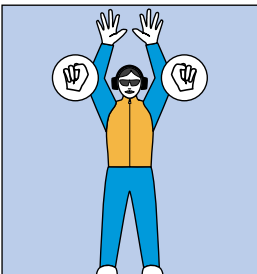
(d) Right arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement.

**Meaning** Move to left.



(e) Left arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement.

**Meaning** Move to right.



(f) **'On' Day:** Arms above head, open palms and fingers raised with palms towards aircraft, then fist closed.

**'On' Night:** Arms above head then wands crossed.

**'Off' Day:** Reverse of the above.

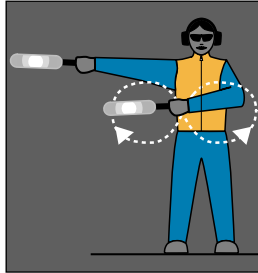
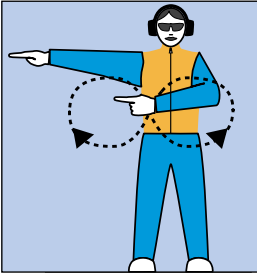
**'Off' Night:** Crossed wands then uncrossed.

**Meaning** Brakes on/off.

See also Table E (v)

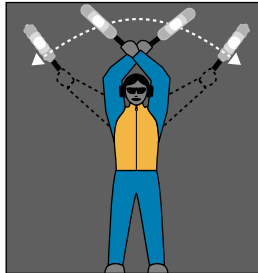
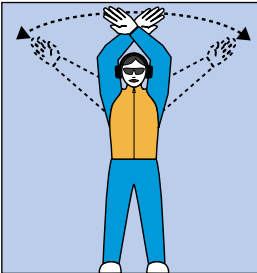
# 6. AERODROME SIGNALS

**Table G** – Other Marshalling Signals in Common Use



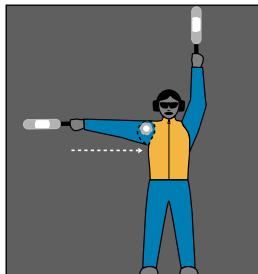
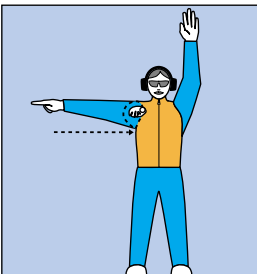
(g) Make rapid horizontal figure-of-eight motion at waist level with either arm, pointing at source of fire with the other.

**Meaning** Fire.



(h) Waving of arms over head.

**Meaning** Wave off.

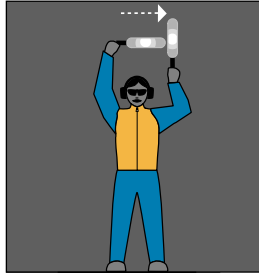
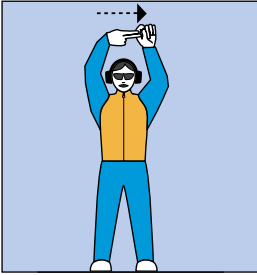


(j) Left hand raised vertically overhead, palm towards aircraft. The other hand indicates to personnel concerned and gestures towards aircraft.

**Meaning** Personnel approach the aircraft/ request permission for personnel to approach aircraft.

# 6. AERODROME SIGNALS

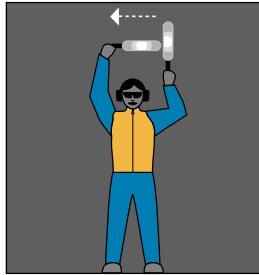
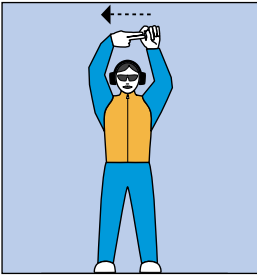
**Table G** – Other Marshalling Signals in Common Use



**(k)** Hands above head, left fist partially clenched, right hand moved in direction of left hand with first two fingers extended and inserted into circle made by fingers of the left hand.

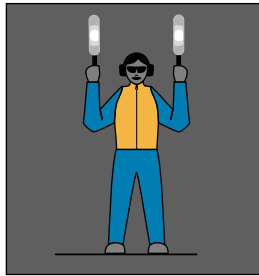
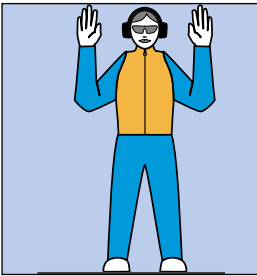
See also Table G (a)

**Meaning** Ground power connected/request permission to connect ground power.



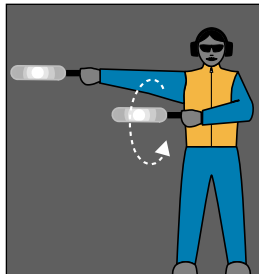
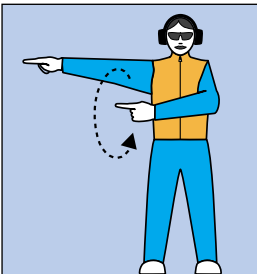
**(l)** Hands above head, left fist partially clenched, right hand moved away from left hand, withdrawing first two fingers from circle made from fingers of the left hand. See also Table G (b)

**Meaning** Disconnect ground power.



**(m)** Both hands raised to eye level, elbows flexed and palms turned towards the aircraft in a policeman's stop.

**Meaning** Stop.

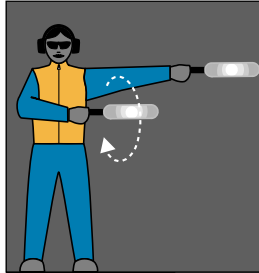
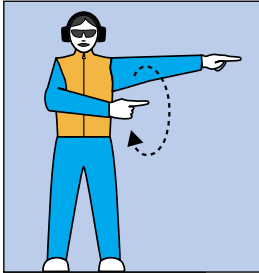


**(n)** Point right, rotate left.

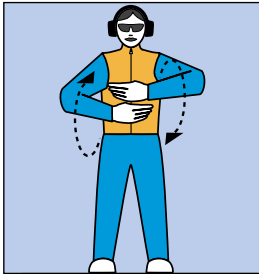
**Meaning** Power back aircraft tail to left.

# 6. AERODROME SIGNALS

**Table G** – Other Marshalling Signals in Common Use



Point left rotate right.  
**Meaning** Power back aircraft tail to right.  
See Table E(x)



Rotate arms in rolling action.  
**Meaning** Power back straight.  
See Table E(x)

## Contact after Push-back

If communication with the ground crew is required after the ground headset has been disconnected the following procedure should be employed:

### (a) Flight Deck to Ground Crew:

Stop the aircraft. Flash the left-hand turn-off light (or taxi light) and continue flashing the light until acknowledged by the Ground Crew waving a headset;

### (b) Ground Crew to Flight Deck:

The ground Crew will wave the headset by day and flash the marshalling signal wands at night.

### (c) Flight Deck to Ground Crew:

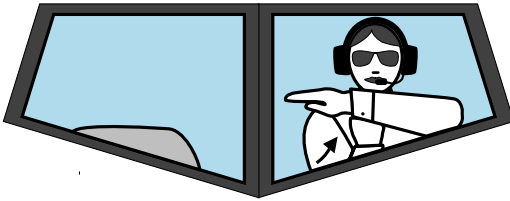
Acknowledge the Ground Crew signal by flashing the same light as in (a).

### LANDING LIGHTS SHOULD NOT BE USED FOR THIS SIGNAL

Landing and turn-off lights must not be switched on during push-back, even during daytime, as the tug driver could be dazzled to the extent that it causes temporary blindness.

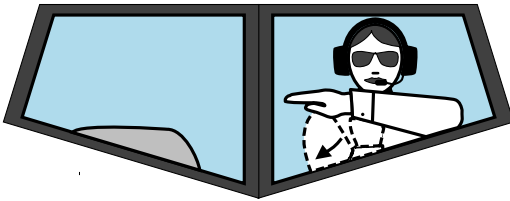
## 6. AERODROME SIGNALS

**Table H** – Other Signals made by Pilot to a Marshaller  
(Not prescribed by the Rules of the Air Regulations)



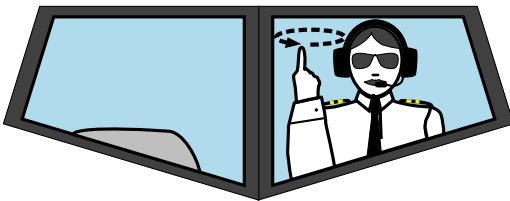
(a) One arm held at face level hand outstretched with palm facing downwards. The other arm, fist clenched, brought up to form a 'T' of forearms.

**Meaning** Connect ground power.



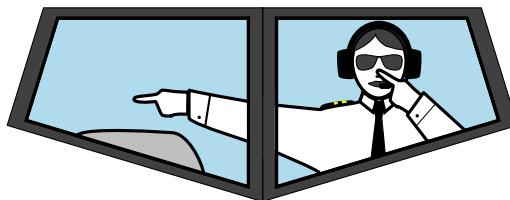
(b) One arm held horizontal at face level hand outstretched with palm facing downwards. The other arm, fist clenched, forming a 'T' of forearms. Leaving the horizontal arm in place, lower the vertical arm until out of view.

**Meaning** Remove ground power.



(c) Circular motion in the horizontal plane with right hand.

**Meaning** Starting Rotors/ engines.



(d) Finger of one hand on nose point with other hand in the direction the aircraft nose is to face after push-back.

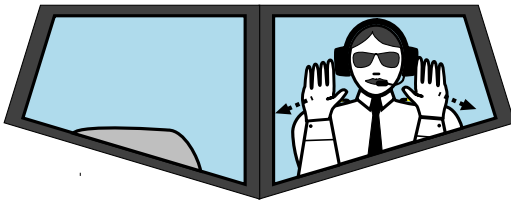
**Meaning** Push-back so that nose is facing in direction indicated.

## 6. AERODROME SIGNALS

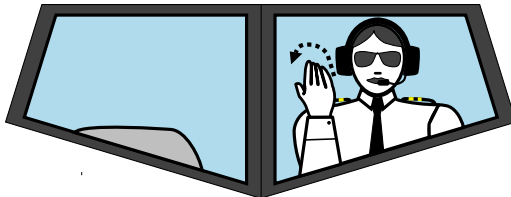
**Table H** – Other Signals made by Pilot to a Marshaller



(e) Rotate arms in rolling action.  
**Meaning** Power back straight.



(f) Both hands raised to eye level, elbows flexed and palms turned towards the ground crew – hands moved in pushing motion.  
**Meaning** Push back.



(g) Right hand raised to eye level, elbow flexed and palms turned away from the ground crew – hand moved in beckoning motion.  
**Meaning** Clear to approach.

# APPENDICES



# APPENDIX A

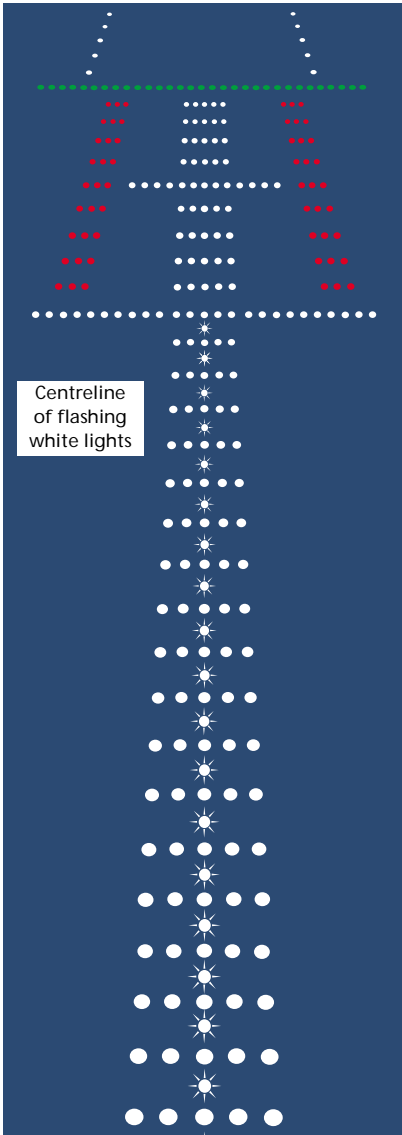
## OTHER VISUAL AIDS

- 1 Although the visual aids illustrated in Sections 1–3 of this document are employed in most ICAO States, some differences to these standards exist at major international and regional aerodromes outside the UK.
- 2 This Appendix outlines the major differences in lighting, markings and signs commonly found.

In addition the following points should be noted:–

- (a) Some States do not provide PAPI on runways equipped with electronic precision approach aids.
- (b) In States where lying snow and surface ice might render white runway markings difficult to interpret, yellow runway markings are used.
- (c) Yellow reflective markers are used in some States to illuminate taxiway centrelines at night.
- (d) The provision of runway centreline lighting in support of CAT II & III approaches is not universal.

# APPENDIX A



- 3 The ALSF-2 illustrated at Fig A1, is a high intensity approach lighting system with sequenced strobe centreline used in support of CAT II & III operations. The system extends up to 900m from the threshold but can be as short as 450m. The strobes are omitted in the last 300m of the approach. The system is often installed without the sequenced strobe lighting and as such may be referred to as ICAO CAT II / III approach lighting system.

Fig A1 ALSF – 2

# APPENDIX A

- 4 The ICAO Barrette Centreline Approach Lighting System illustrated at Fig A2, is a high intensity approach lighting system with sequenced strobe centreline used in support of CAT I operations. The system extends up to 900m from the threshold, the strobes being omitted in the last 300m of the approach. Shorter versions are used at some airports resulting in a higher RVR minimum for the approach.

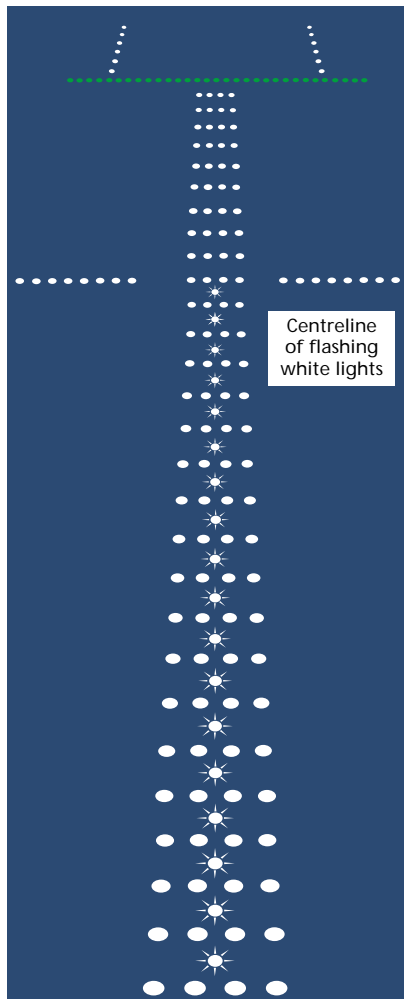


Fig A2 ICAO BARRETTE  
CENTRELINE APPROACH LIGHTING  
SYSTEM

# APPENDIX A

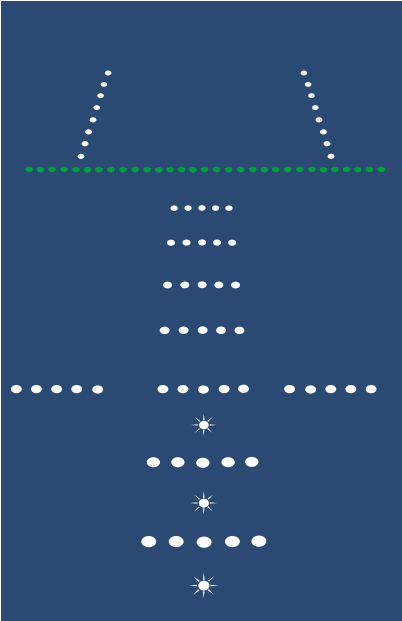


Fig A3 MALSF/MALS

- 5 MALSF illustrated at Fig A3, is a medium intensity approach lighting system incorporating 3 strobe lights on the centre-line prior to the crossbar. The system is often provided without the strobe lights and in such a configuration referred to as MALS. The system is intended to support non-precision and visual approaches but is often used to support CAT I operations; it extends to 480m.

# APPENDIX A

- 6 MALSR illustrated at Fig A4, is a medium intensity approach lighting system similar to MALS but incorporating an extended centre-line of sequenced flashing white lights. The system is intended to support both precision and non-precision approaches and extends to 750m from the threshold.

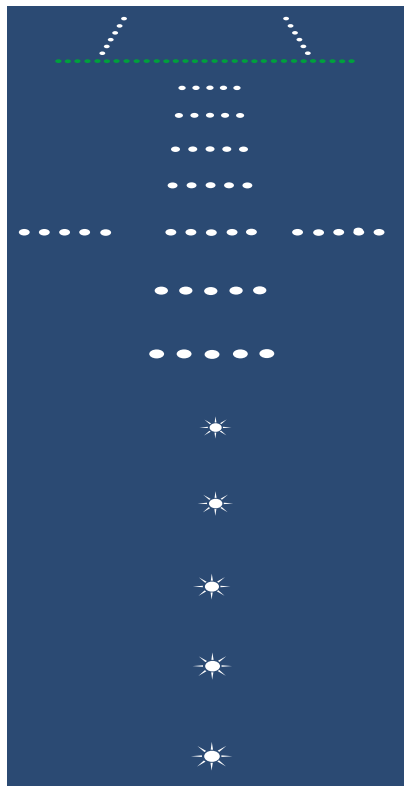
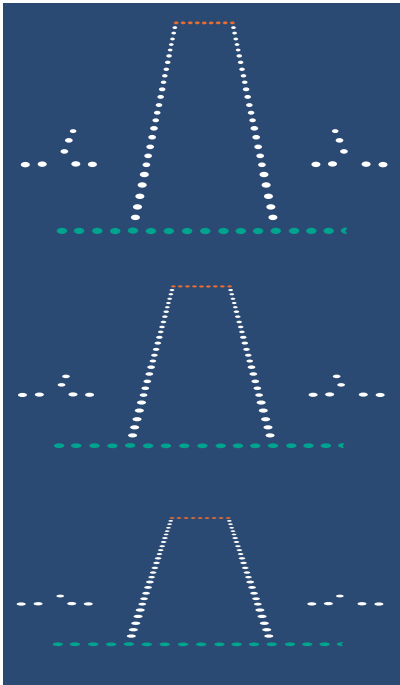


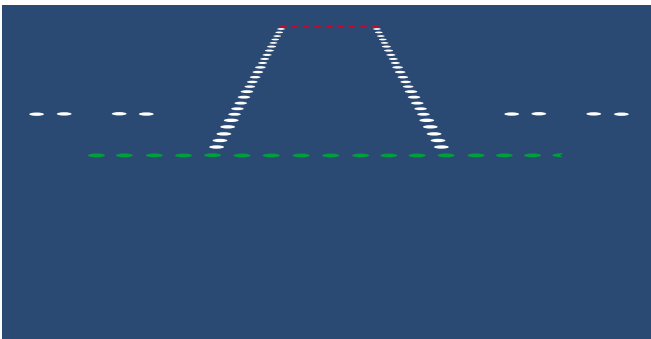
Fig A4 MALSR

# APPENDIX A

- 7 Although PAPI is now in widespread use throughout the ICAO States, there are some countries, notably Australia, where T-VASIs are considered to be more effective. Both PAPI and T-VASI are ICAO approved equipment.



ABOVE APPROACH SLOPE

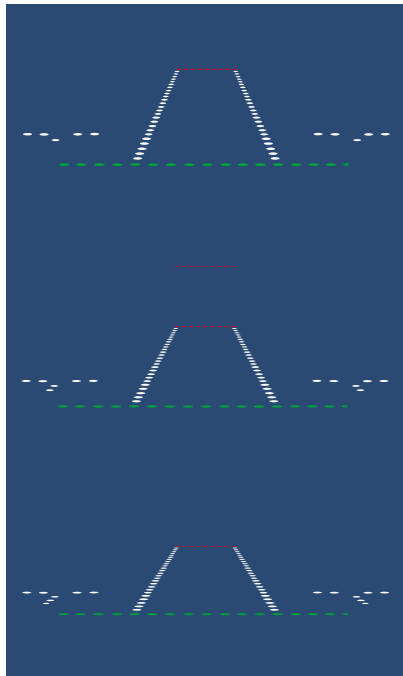


ON CORRECT APPROACH SLOPE

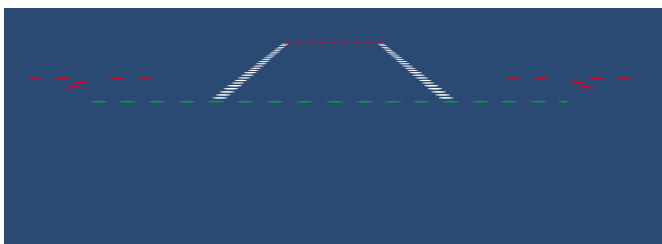
Fig A5(a) T-VASIs (TVA)

# APPENDIX A

- 8 The T-VASI operates on the same principle as the PAPI in that it provides a pilot with guidance in relation to the correct approach slope. The interpretation of the T-VASI signal is illustrated at Fig A5.



BELOW APPROACH SLOPE



GROSS UNDERSHOOT

Fig A5(b) T-VASIs (TVA)

# APPENDIX A

- 9 Although 2 and 3 Bar VASIs are no longer recognised by ICAO as a suitable approach aid, they are still used at some regional airports in the newer ICAO Member States. Like PAPI and T-VASI, the 2 and 3 Bar VASIs provide approach slope guidance but are less accurate. The method of interpreting the signals is illustrated at Fig A6.

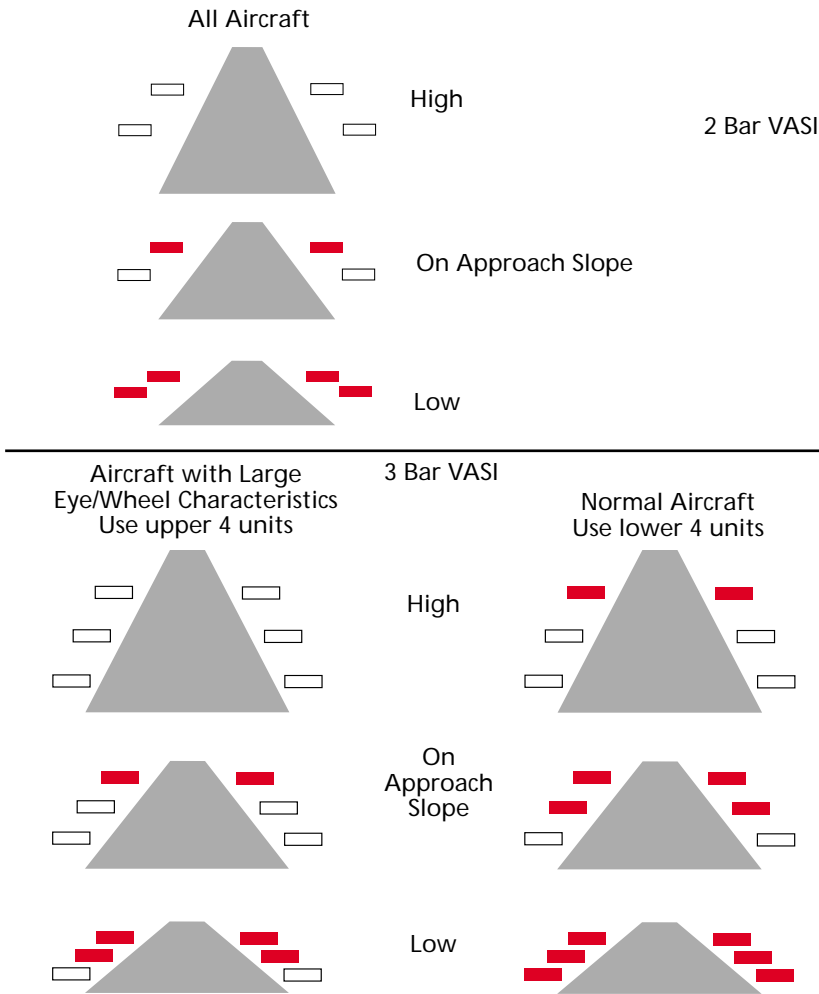
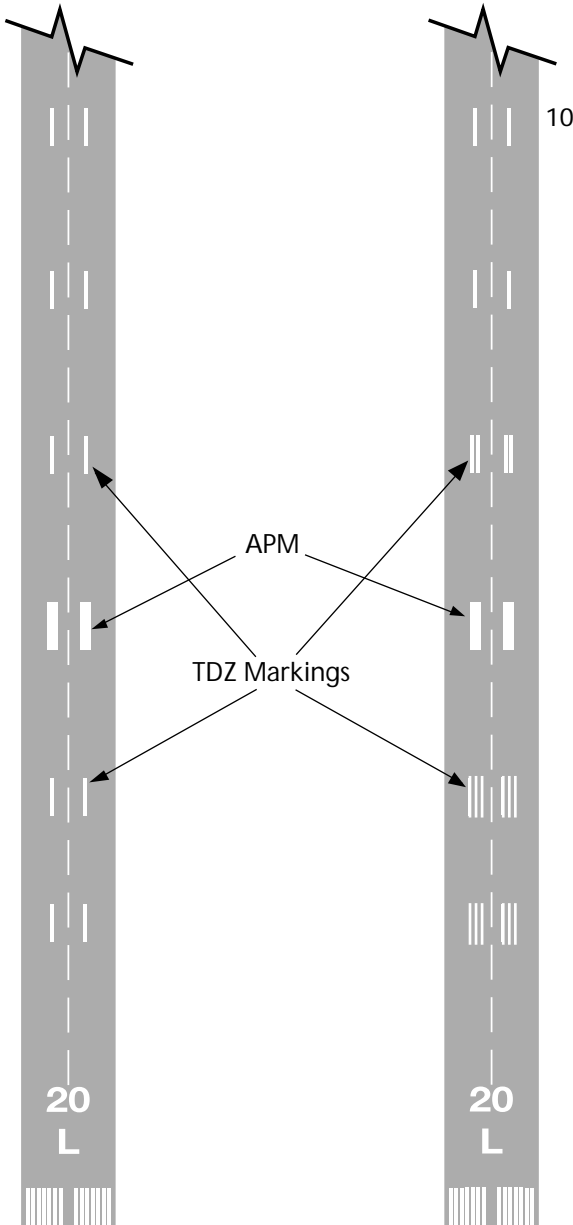


Fig A6 INTERPRETATION OF VASI SIGNALS



# APPENDIX A



Alternative forms of Touchdown Zone and Aiming Point Markings such as those illustrated at Fig A7 are used extensively outside the UK.

Fig A7 TOUCHDOWN ZONE (TDZ) AND AIMING POINT MARKINGS (APM)

# APPENDIX A

- 11 Where a Starter Extension does not extend to full length of available pavement, an alternative form of pre-threshold marking, as illustrated in Fig A8, may be used.

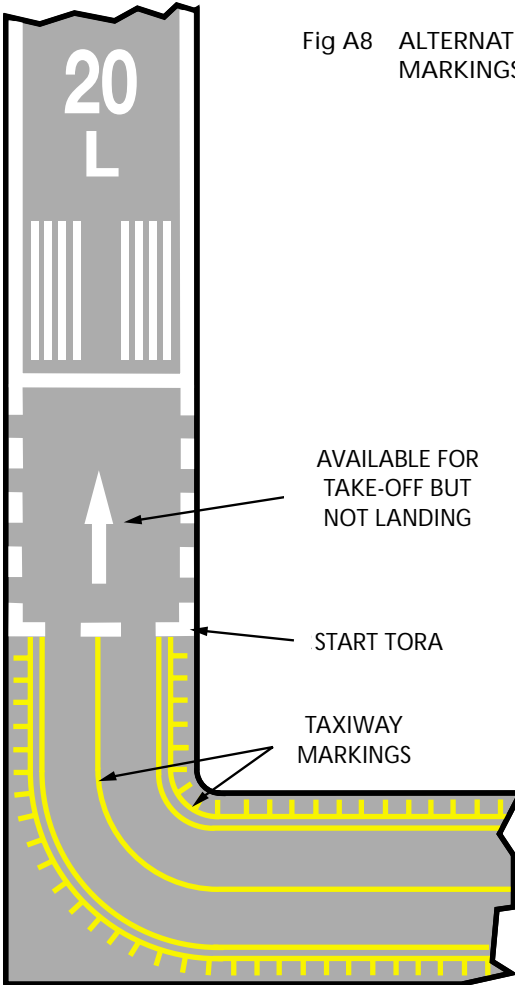




Fig A8 ALTERNATIVE THRESHOLD MARKINGS


# APPENDIX A


12 Some States employ alternative forms of Mandatory and Information Signs. The principal differences are illustrated at Fig A9.

(a)   Single digits for runway designators lying between 010 and 090.

(b)  Indicates a Taxi-holding Position on a taxiway that passes beneath the approach to a runway.

(c)  This sign may be used in place of CAT I, CAT II or CAT III Taxi-holding Position signs.

(d)  A sign displaying alternate black and yellow diagonal lines may be used to indicate the end of a taxiway.

(e)  Black boards displaying white numerals and placed at intervals along the left side of the runway may be used to indicate the distance (in 1000's feet) remaining to runway end.


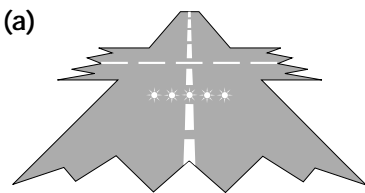
(f)  Blue signs with white characters may be used on apron areas to provide pilot information – stand identification etc.

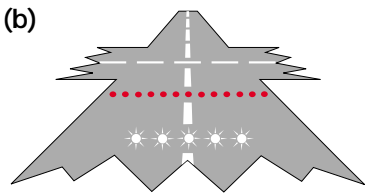
Fig A9 ALTERNATIVE MANDATORY  
AND INFORMATION SIGNS

# APPENDIX A

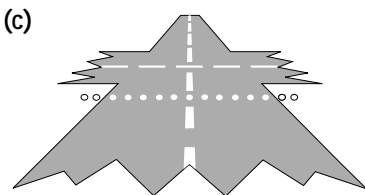
13 Land and Hold Short Operations (LAHSO) involving the simultaneous use of intersecting runways (day and night) are conducted in some States notably Australia, Canada and USA. These procedures involve an aircraft being cleared to land on one runway to hold short of another on which a landing or take-off is in progress. Currently there are no internationally agreed visual aids available to support these operations although trials are underway. Fig A10 illustrates those visual aids currently in use.



(a) The Hold Short Position is marked by 5 flashing white lights. Pilots must **not** proceed beyond these lights on landing without specific ATC clearance. The lights may be **on** permanently whilst LAHSO are taking place and should be ignored on take-off.



(b) The Hold Short Position is marked by a line of red lights stretching across the entire width of the runway in the form of a Stop Bar. In addition a Taxi Speed Bar comprising 5 flashing white lights is located approximately 300m prior to the Hold Short Position. Pilots should plan their landing so that they are at taxi speed at or before the Taxi Speed Bar and must **not** cross the red Hold Short Position lights without specific ATC clearance. The lights are normally switched **off** for take-off.



(c) The Hold Short Position is marked by a row either of steady or of flashing white lights stretching across the entire width of the runway and supported by 2 elevated light fittings each side. Pilots must **not** proceed beyond these lights on landing without specific ATC clearance but the lights should be ignored on take-off.

Fig A10 HOLD SHORT POSITION LIGHTS

# APPENDIX B

## VISUAL AIDS PECULIAR TO HELICOPTER OPERATIONS

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)

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 Fig B1.

NOTE: All signals emanate from a single unit source

| Sector         | Signal         |
|----------------|----------------|
| Above          | Flashing Green |
| On Slope       | Steady Green   |
| Slightly Below | Steady Red     |
| Below          | Flashing Red   |

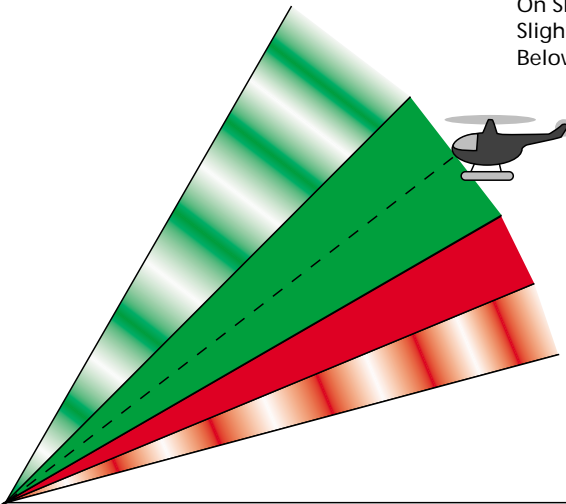
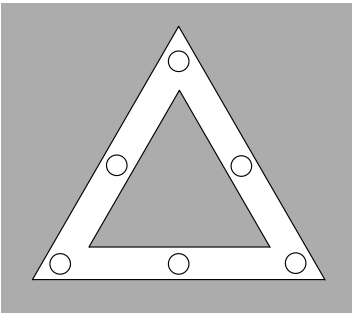


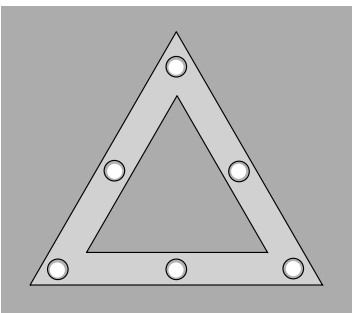
Fig B1 HAPI signal format

## 3 Helicopter Aiming Point Marker

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 Fig B2. From this point the helicopter will normally air-taxi to the helicopter 'Touchdown and Lift-Off Area' (TLOF).



By day



By night

Fig B2 Aiming point lighting

# APPENDIX B

## 4 Air Taxiway Markers

Air Taxiway Markers as illustrated in Fig B3 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.

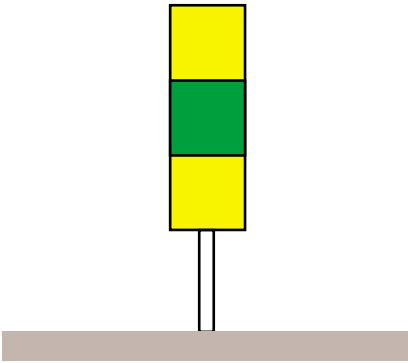


Fig B3 Air taxiway marker

## 5 Touch Down and Lift Off Area (TLOF)

This area is depicted by an 'H' within a circle (Fig B4 (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 Fig B4 (b).



Fig B4a TLOF at sites other than hospitals

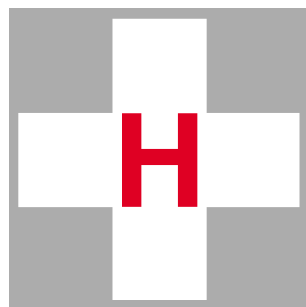


Fig B4b TLOF at hospital site

# APPENDIX B

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

The performance characteristics of some helicopters require a 'runway' (FATO) to which normal taxiways or air taxi routes may be attached. The TLOF maybe 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 Fig B5.



Fig B5 Final approach and take-off area designation marking

## 7 Elevated Helipads

Most elevated helipads in the UK are unlicensed and pilots should obtain details of marking and lighting from the owner. The size of the helipad 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 para 5 of this Appendix. In this application the FATO (see 6 above) and TLOF will be coincident.

## 8 Offshore Helidecks

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.





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