GHANA
CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR
AC 14-027

VISUAL AIDS SYSTEM

GENERAL
The Ghana Civil Aviation Authority (GCAA) Advisory Circulars from Aerodrome Safety and Standards (ASAS) contain information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with associated Directives.

An AMC is not intended to be the only means of compliance with a Directive, and consideration will be given to other methods of compliance that may be presented to the Authority.

PURPOSE
This Advisory Circular provides methods, acceptable to the Authority, for showing compliance with Part 24 o f t h e Ghana Civil Aviation (Aerodrome) Directives, 2011, LI 2004, as well as explanatory and interpretative material to assist in showing compliance.

REFERENCE
This Advisory Circular relates specifically to the Aerodrome GCADs and Manual of Standards (MOS)

STATUS OF THIS AC
This is the first AC to be issued on this subject.

FORWARD
This document provides guidance to aerodrome operators on Information on Visual aids system at aerodrome intended for use by international commercial air transport as specified in GCAD Part 24 and MOS.

APPROVAL

Issue No : 01	Approved by: Director-General	2015

Contents

CHAPTER 1 AERONAUTICAL GROUND LIGHTING

1 General

1.1 Aeronautical Ground Lighting (AGL) is the generic term used to describe the various lighting systems that are provided on an aerodrome for the guidance of pilots operating aircraft both at night and in low visibility conditions. AGL systems vary in complexity from the basic patterns found at small aerodromes in support of flying training operations, to the more advanced systems used in support of "all-weather operations", usually associated with an Instrument Landing System (ILS).

2 Aerodromes operated under Part 24 of GCADs

2.1 Details of AGL, at these aerodromes, are published in the Ghana Aeronautical Information Publication (AIP) and on the appropriate Instrument approach charts. Where the AGL provided at any of these aerodromes does not conform to the appropriate aerodrome entry in the Ghana AIP or, if the deficiency is of temporary nature, a Notice to Airmen (NOTAM) is issued detailing the AGL that is available.

2.2 AGL at Ghana aerodromes are inspected to ensure compliance with standards.

3 Colour and Intensity of Lights

3.1 Unless otherwise indicated, AGL systems emit a steady white light. High intensity AGL systems that are provided in support of low visibility operations normally have facility to independently control the luminance intensity of each element of the system. The intensities are set up, usually by the air navigation service provider, to suit local conditions. A pilot may ask for the intensity of an element of the system to be adjusted if found to be inappropriate for the flight operation.

3.2 The performance specification of high intensity lighting is defined by the need to provide guidance by day in low visibility conditions; the highest intensity settings are normally used in these conditions. Lower intensities are normally used by night.

3.3 Low intensity systems are provided at those aerodromes at which operations are conducted at night but not in low visibility conditions; the luminance intensity of these systems is not normally adjustable.

4 Aerodrome Beacons

4.1 An Aerodrome Beacon would normally be provided at those aerodromes that operate at night and where the level of background lighting, the surrounding terrain, the proximity of other aerodromes or 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.

4.2 An Identification Beacon flashing a two-letter identification code in green would normally be provided at an aerodrome where a number of aerodromes in the same vicinity operate at night and confusion could arise as to identity.

4.3 A Location Beacon would normally be provided at an aerodrome that is situated well away from other aerodromes and where no confusion could exist as to identity. The signal produced by a Location Beacon is determined by the amount of background lighting as follows:

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.

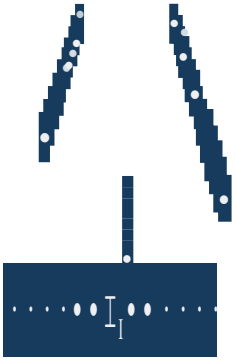
5 Approach Lighting

5.1 A variety of approach lighting systems based on the centre line and cross bar concept, is in use at aerodromes. These systems range from the simple low intensity centre line and cross bar-shown at Figure 1.1-intended to serve visual runways at night only, to the more CAT II/III approach lighting system comprising centreline and cross bars-shown at Figure 1.3 and 1.4-for day and night use on ILS equipped runways.

5.2 Simple approach lighting systems normally commence 420m prior to the runway threshold whilst the full CAT II/III approach lighting system 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 Runway Visual Range (RVR) minima associated with the instrument approach procedure adjusted accordingly. Except where supplemented by red side barrettes as described below, approach lighting is white in colour.

FIGURE1.1

SIMPLE APPROA.CH AND
RU'tfflAY LIGHTING SVSTEM



F IG U RE1.2

APPROACH ANO RUNWAY
LIGHTING TYPICAL CAT I SYSTEM
SHOWINGTAKE-OFF STARTER
EXTENSION ANO STOP WAY
LI GHTING

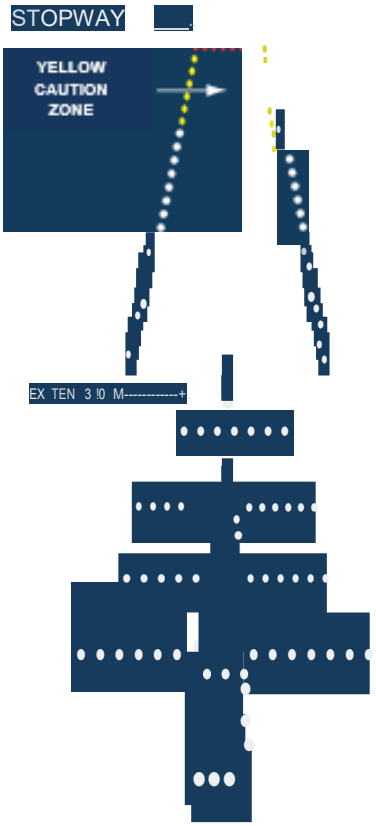
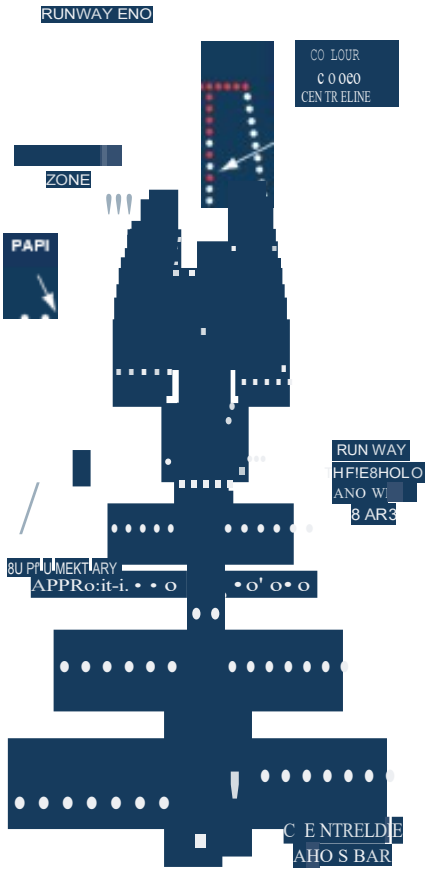


FIGURE1.3

APPROACH ANO RUNWAY U GHTING
TYPICAL CAT II OR HI SYSTEM



6 Supplementary Approach Lighting

7.1 At those aerodromes where Category II and III approaches are conducted, Supplementary Approach Lighting consisting of white centreline barrettes and two rows of red side barrettes, as shown at Figure 1.3, is installed in order to provide the pilot with enhanced visual cues over the last 300m of the approach.
NOTE: *At certain aerodromes with displaced thresholds, the supplementary approach lighting is inset into the runway and in certain weather and ambient light conditions the centreline barrettes, at the higher intensities settings, can partially obscure the runway centreline lighting to pilots lining up for departure. Pilots experiencing problems of this nature should ask for the intensity of the supplementary lighting to be adjusted or extinguished.*

7 Precision Approach Path Indicator (PAPI)

7.1 This visual aid provides approach slope guidance by use of red and white light signals which are interpreted as illustrated at Figure 1.4. The PAPI normally comprises of a single row of 4 light units. The system is normally installed on the left side of the runway as seen from the approach.

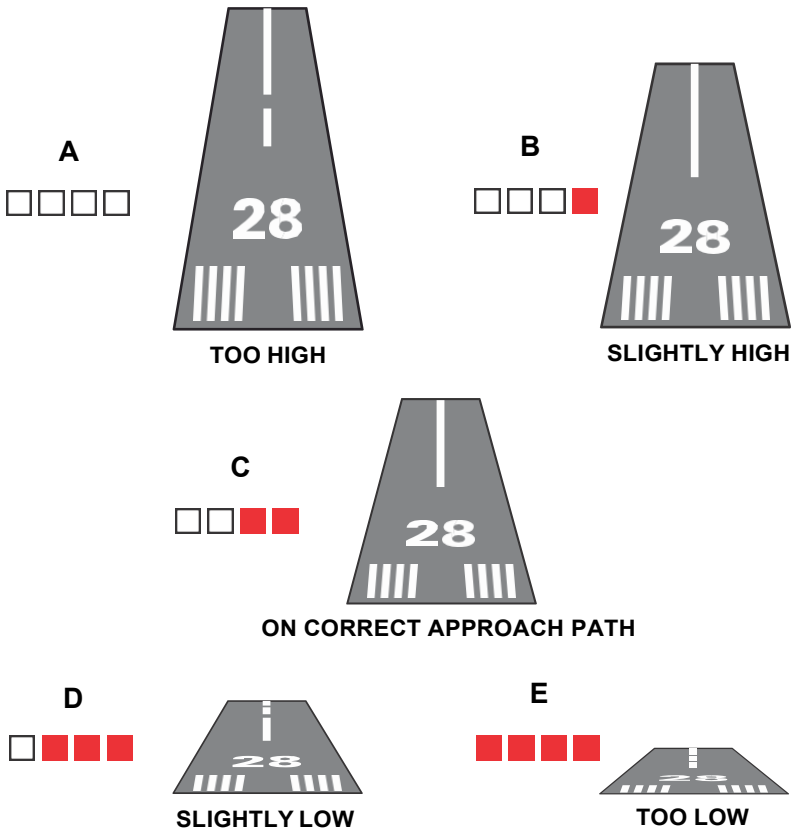
7.2 The PAPI signal is not designed to be used beyond 15°either side of the runway centreline.

NOTE: *Where obstacles located at the extremities of the visual signal preclude the provision of safe clearance, the appropriate aerodrome entry in the Ghana AIP will be annotated to that effect.*
The Minimum Eye Height over Threshold (MEHT), which is published in AIP, is a reference value, calculated with respect to the promulgated approach angle for each PAPI. It is the lowest eye height over the runway threshold at which an on-slope indication will be seen.

7.3 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.

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

Figure 1.4 A Typical PAPI System



9 Runway Lighting

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

9.2 Runway Edge Lighting

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

9.2.2 Runway Edge lighting is white.

a) Pre-Threshold Lighting

Where a landing is displaced, but the pre-threshold area is available for the take-off run, the lights between the beginning of the runway pavement and the displaced threshold show red from the approach, as illustrated at Figure 1.5. Pilots taking off in such a situation would see red edge lights up to green threshold the white edge lights beyond.

b) Runway Exit Lighting

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

c) Stopway Lighting

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

9.3 Runway Threshold and Runway End Lighting

9.3.1 Runway threshold lighting is green and indicates the start of the available landing distance. Green threshold wing-bars are provided at certain aerodromes where there is a need to accentuate the threshold. Runway end lighting is red and marks the extremity of the runway that is available for manoeuvring. Pilots should not land before the green threshold lighting nor continue a landing roll or taxi beyond the red runway end lights.

9.4 **Runway Centreline Lighting**

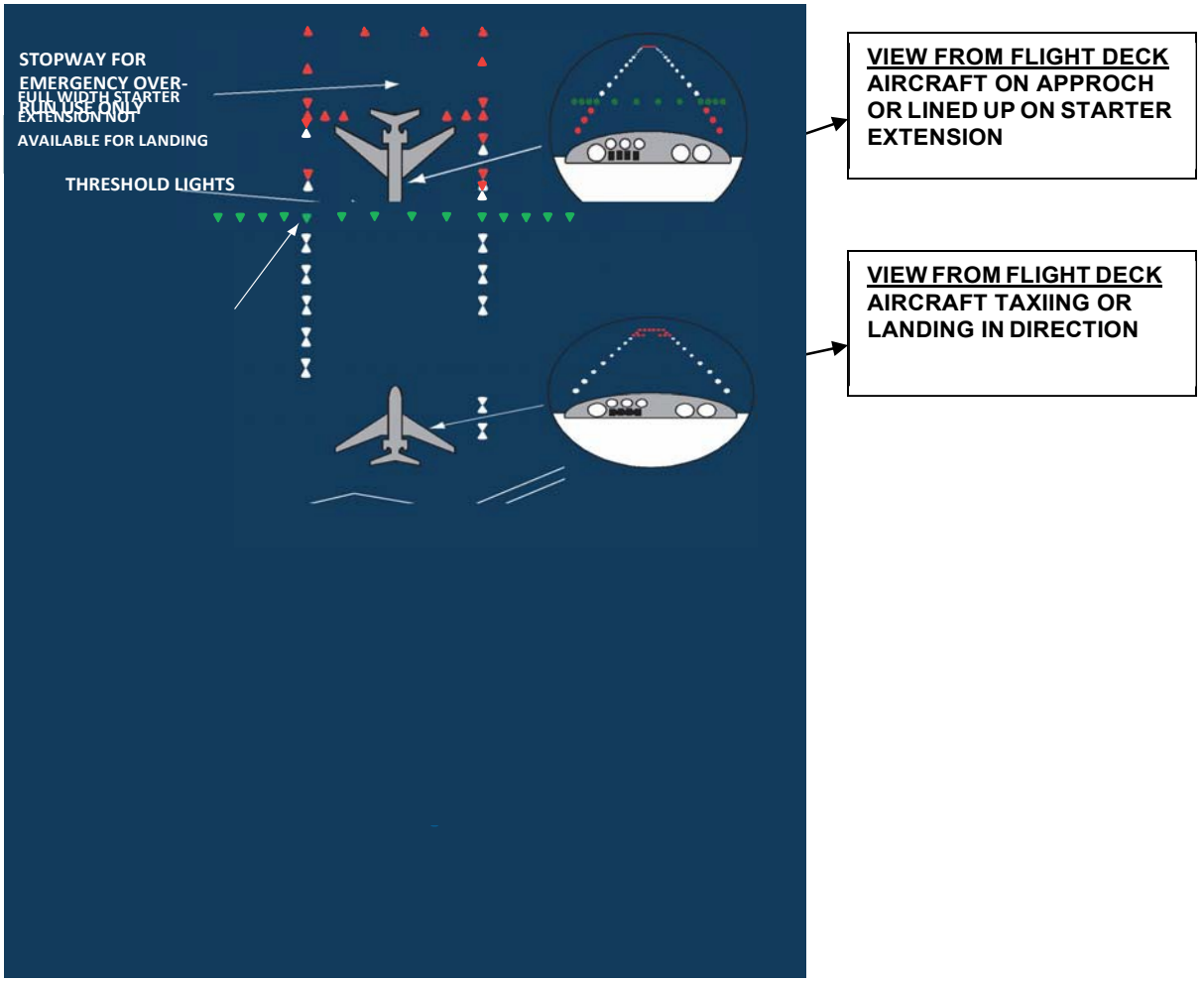
9.4.1 High intensity centreline lighting is provided in addition to edge lighting on runways equipped for low visibility operations. The centreline lighting is colour coded in order to warn a pilot of the approaching end of the runway. White centreline lighting extends from the threshold to 900m from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

9.5 **Touchdown Zone (TDZ) Lighting**

9.5.1 On runways equipped for Category II and III approaches, additional lighting consisting of two rows of white barrettes, as shown in Figure 1.3, is installed in order to provide textual cues in the touchdown area. The additional lighting extends from the threshold either for 900m or to the midpoint of the runway less than 1800m in length.

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

Figure 1.5 Runway Edge, Threshold and Edge Lighting

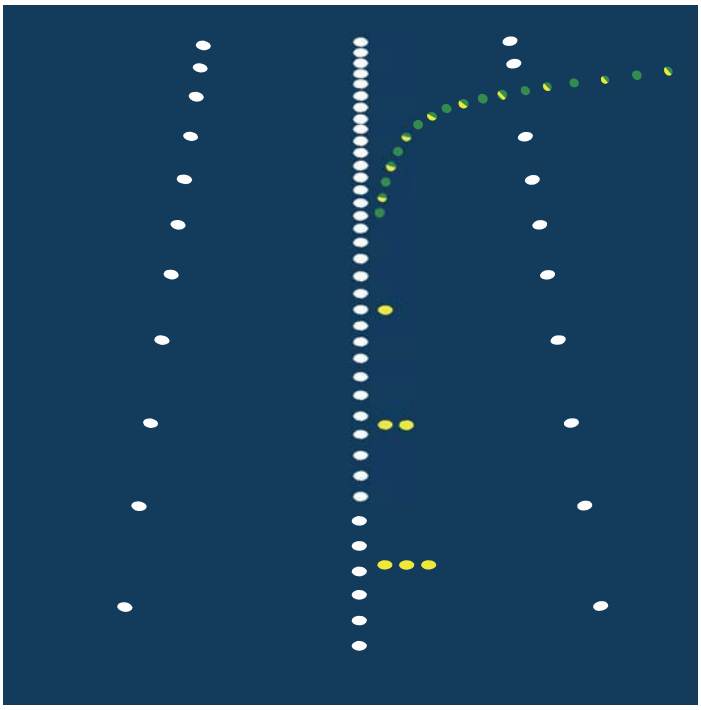


9.6 Rapid Exit Taxiway Indicator Lights

9.6.1 Rapid Exit Taxiway Indicator Lights (RETILs) provide pilots with distance to go information to the nearest rapid exit taxiway on the runway, to enhance situational awareness in low visibility conditions and enable pilots to apply braking action for more efficient roll-out and runway exit speeds.

9.6.2 RETILs consist of six yellow lights adjacent to the runway centerline and configured in a three/two/one pattern spaced 100 m apart; the single light is 100m from the start of the turn for the rapid exit taxiway, see Figure 1.6.

Figure 1.6 Rapid Exit Taxiway Indicator Lights



10 Taxiway Lighting

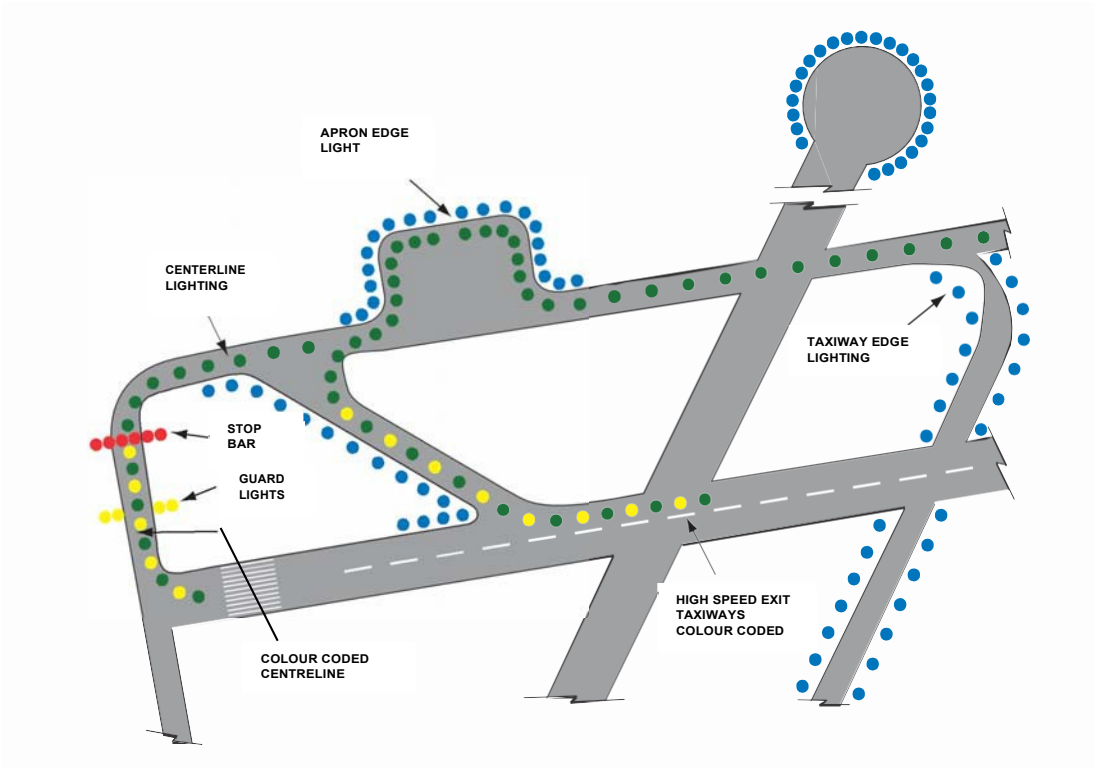
10.1 At those aerodromes equipped for low visibility operations, taxiways are equipped with green centreline lighting, otherwise blue edge lighting is provided, as shown in Figure 1.7. Where green centreline lighting is provided, blue taxiway edge lighting may also be installed as additional guidance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

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

NOTE 2: *Taxiway centrelines are intended to provide safe clearance between the largest aircraft that the taxiway is designed to accommodate and fixed objects such as buildings, aircraft stands etc, provided that the pilot of the taxiing aircraft keeps the 'Cockpit' of the aircraft on the centreline and that aircraft on stands are properly parked. Taxi Holding Positions are normally located so as to ensure clearance between an aircraft holding and any aircraft passing in* ***front*** *of*

the holding aircraft, provided that the holding aircraft is properly positioned ***behind*** *the holding position.* ***Clearance to the rear of any holding aircraft cannot be guaranteed.*** *When following a taxiway route, pilots and persons towing aircraft are expected to keep a good lookout, consistent with prevailing visibility and are responsible for taking all possible measures to avoid a collision with another aircraft or a vehicle.*

Figure 1.7 Taxiway Lighting



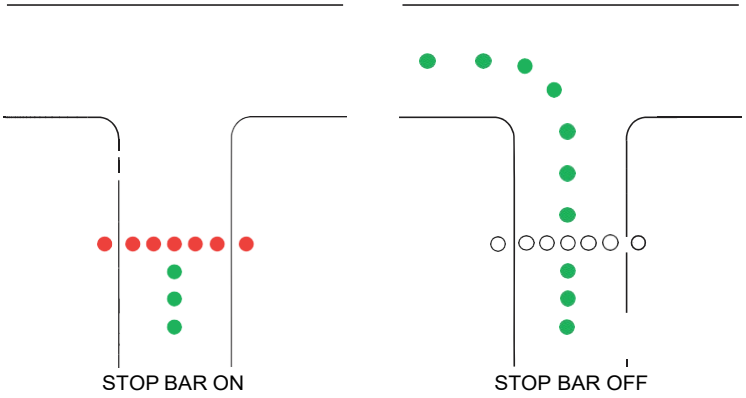
10.2 Stop Bars and Taxiway centreline Lights

10.2.1 Lighted Stop Bars and Taxiway centreline lights are provided at aerodromes authorised for low visibility operations. A Stop bar consists of a row of lights spaced equally across the taxiway normally at right angles to the centreline and showing red towards an approaching aircraft when lit. Stop Bars are normally installed in association with green Taxiway centreline lights which form part of the taxiway centreline lighting beyond the Stop Bar. The Taxiway centreline lights are interlinked with the Stop Bar so that when the Stop Bar is 'on' the green centreline beyond the Stop bar is 'off' and vice versa, as shown in Figure1.8. In this way, the Stop Bar and associated Taxiway centreline lights act in the same sense as traffic lights; therefore *pilots* **must** *not taxi an aircraft across a Stop Bar that is lit.* Stop Bars are provided at entrances to runways, e.g. runway holding

positions, and may also be provided at taxiway intersections and at other locations.

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

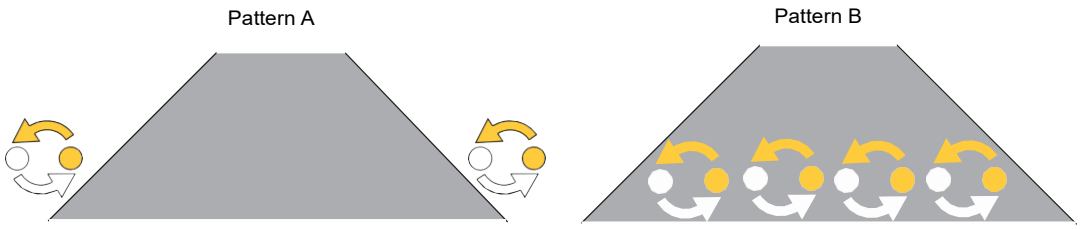
Figure 1.8 Examples of Stop Bar and Taxiway centreline lights



10.3 Runway Guard Lights

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

Figure 1.9 Runway guard Lights



10.4 Taxiway Guidance System

10.4.1 At aerodromes where Category II and III operations take place or where ground movement requirements are complex, a surface movement guidance and control system (SMGCS) may be installed in

order to regulate traffic. The system operates by selective switching of the taxiway centreline lighting so that individual sections or routes, each terminating at a lit Stop Bar, are illuminated in order to show the way ahead. The Stop Bar is switched off as the next section of taxiway centreline lighting is selected.

10.5 Colour Coded Taxiway Centreline Lighting

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

10.6 Intermediate holding position Lights

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

10.7 Taxiway Edge Markers

10.7.1 On taxiways that are used infrequently, reflective edge markers may be used instead of taxiway lighting. Edge markers are blue are green lights.

CHAPTER 2 SURFACE MARKINGS

1 General

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

2 Paved Surface Markings

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

2.2 Paved Runway Markings

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

a) Runway Designation Marking

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

b) Threshold, Edge and Centreline Markings

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

c) Displaced Threshold Markings

While Threshold Markings are normally located at the beginning of the paved runway surface, they may be displaced along the runway where, for example, there are obstructions on the approach or where the first portion of the pavement

is unfit for the movement of aircraft. Where displacement is of a temporary nature, e.g. to accommodate runway maintenance, the normal threshold markings will be obscured and the appropriate Displaced Threshold Marking and threshold marker boards, illustrated at Figure 2.1 (e), put in place in order to mark the new threshold. Whenever a threshold is displaced, the pre-threshold area will be marked according to its usability at Figure 2.1 (d) and (e).

d) TDZ and Aiming Point Markings

All ILS equipped runways and those other runways where the touchdown zone is insufficiently conspicuous are provided with TDZ and Aiming Point Markings as shown at Figure 2.1 (c). These markings are intended to give added visual cues to the runway surface, particularly in conditions of poor visibility; they also indicate the optimum touchdown zone on the runway. The apparent distance between the Aiming Point Marking and the Runway Threshold Marking, as seen from the approach, is intended to aid pilots in judging their angle of approach.

2.3 Paved Taxiway Markings

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

a) Centreline Marking

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

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

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

Figure 2.1 Paved Runway Markings (not to scale)

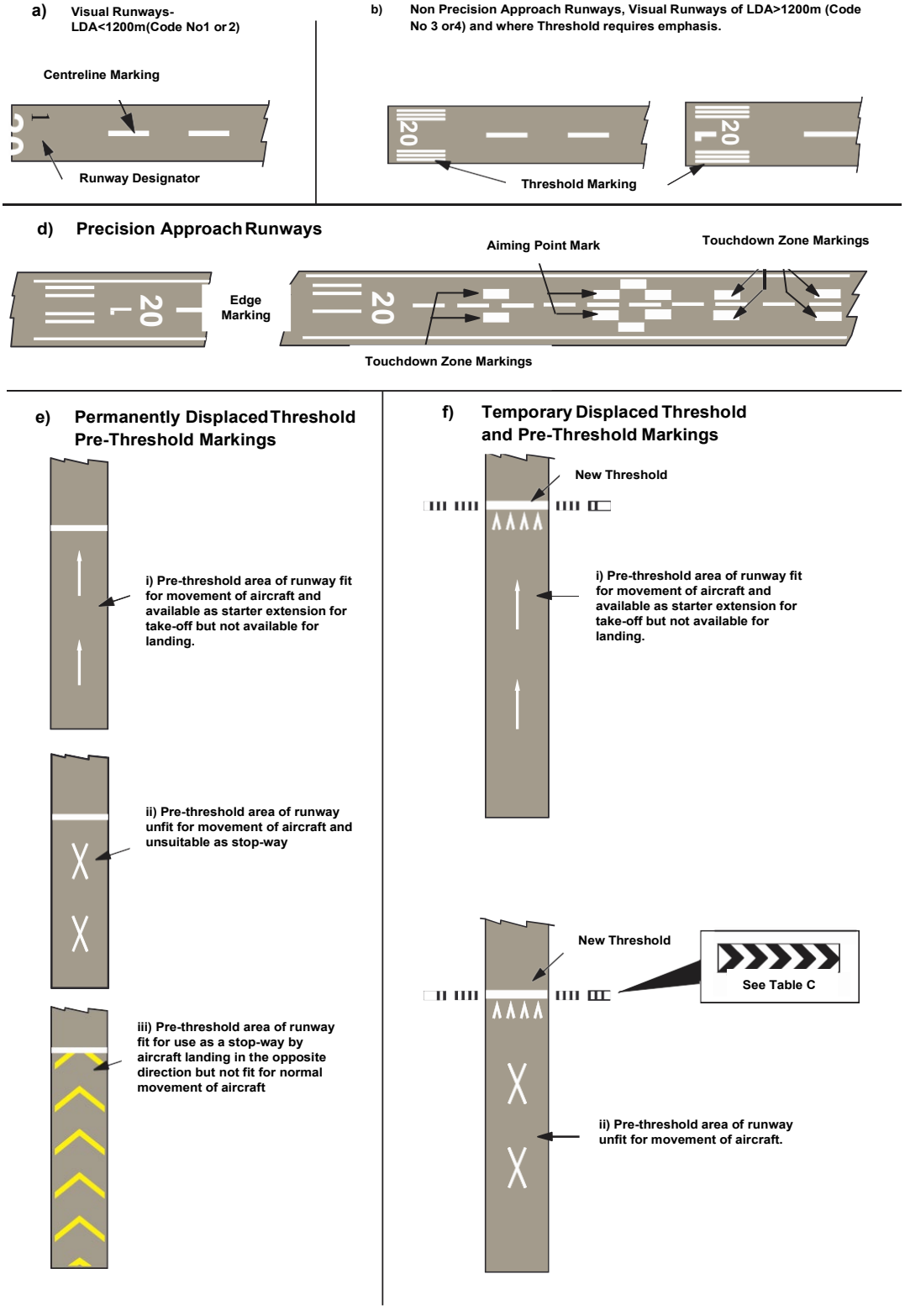
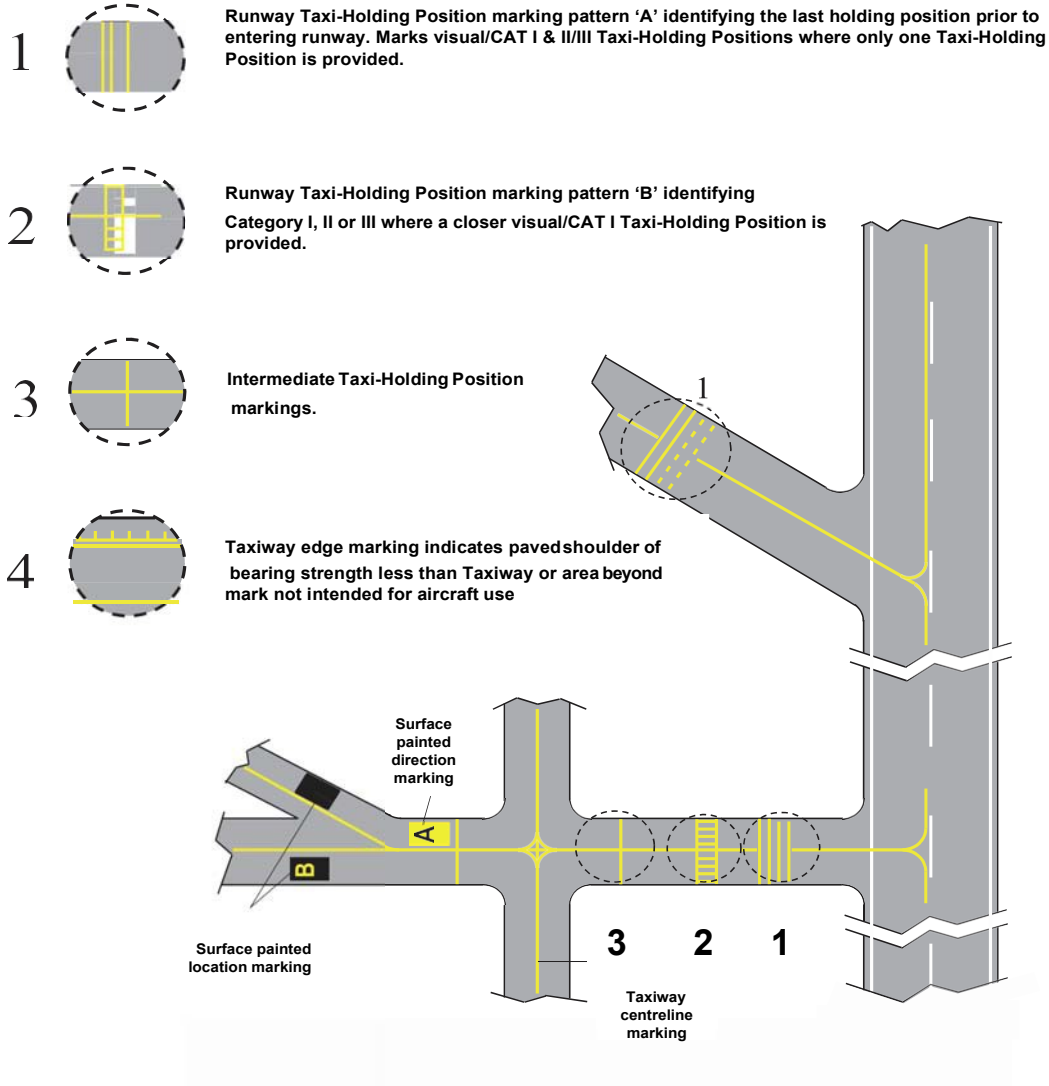


Figure 2.2 Paved Taxiway Markings (not to scale)



b) Runway Holding Position Marking

Runway Holding Positions 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 Runway Holding Position marking, Patterns A and B, both of which are illustrated at Figure 2.2.

I. A Pattern ‘A’ style Runway Holding Position marking consists of two solid and two broken lines laid across the entire width of the taxiway and normally at right angles to the taxiway centreline, the broken lines being closer to the runway (see enlargement 1 Figure 2.2).

II. A Pattern ‘B’ style Runway Holding Positions marking, consists of a ladder mark laid across the entire width of the taxiway and normally at right angles to the taxiway centreline (see enlargement 2 Figure 2.2).

The last Runway Holding Position on a taxiway prior to entering the runway is always marked by a Pattern ‘A’ Runway Holding Position marking; other Runway Holding Positions, where established on the same taxiway, are marked by a Pattern ‘B’ style marking. Runway Holding Position markings are supported by the appropriate Runway Holding Position sign as described at Chapter 3 paragraph 2.
Runway Holding Positions are normally located so as to ensure clearance between an aircraft holding and any aircraft passing in ***front*** of the Holding aircraft, provided that the holding aircraft is properly positioned ***behind*** the holding position. **Clearance to the rear of any holding aircraft cannot be guaranteed.**
When following a taxiway route, pilots and persons towing an aircraft are expected to keep a good lookout and are responsible for taking all possible measures to avoid collisions with other aircraft and vehicles.

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

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

c) Intermediate Holding Position Marking

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

d) Taxiway Edge Marking

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

e) Information Marking

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

2.4 Apron Marking

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

2.4.2 Stands provided with Visual Docking Guidance

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

Figure 2.3 Typical Stand Layout and Markings

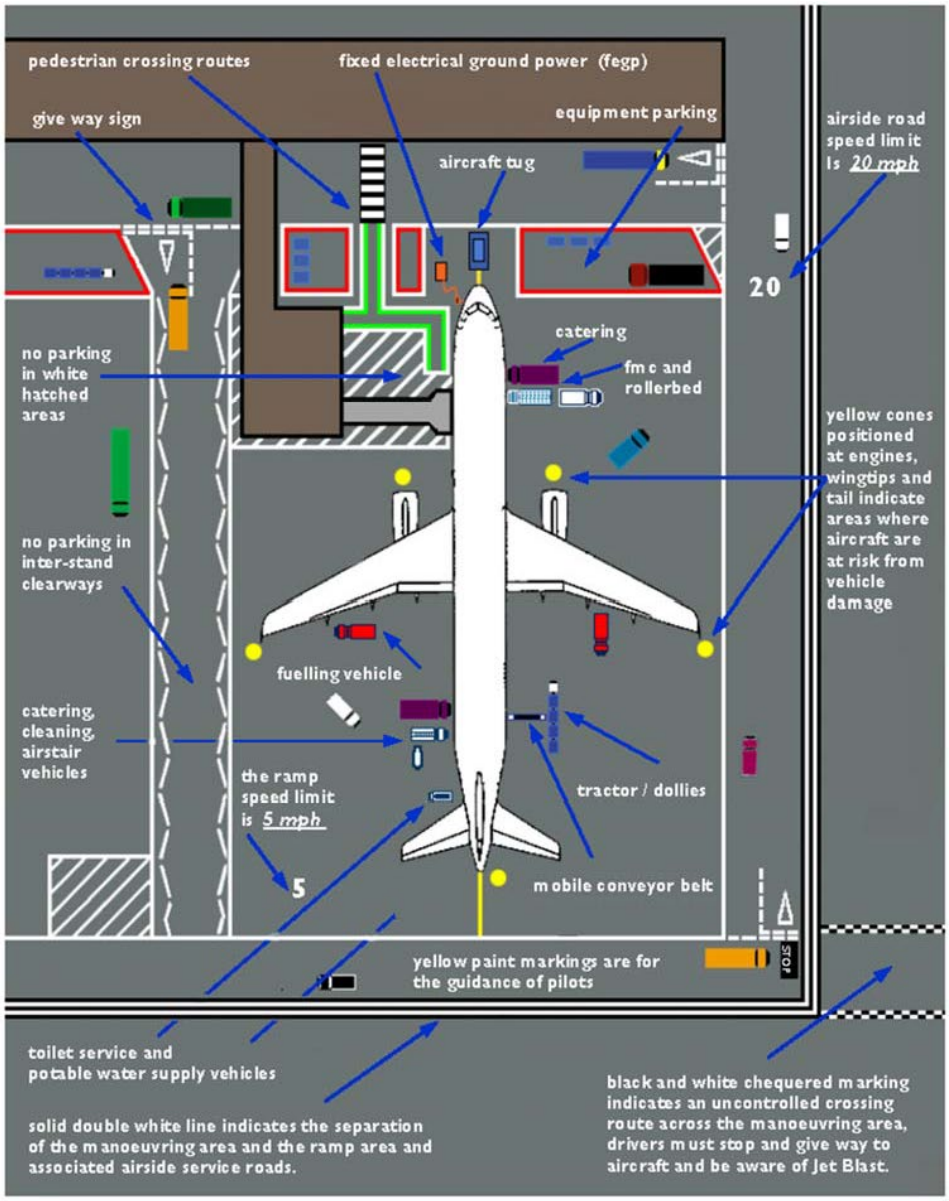
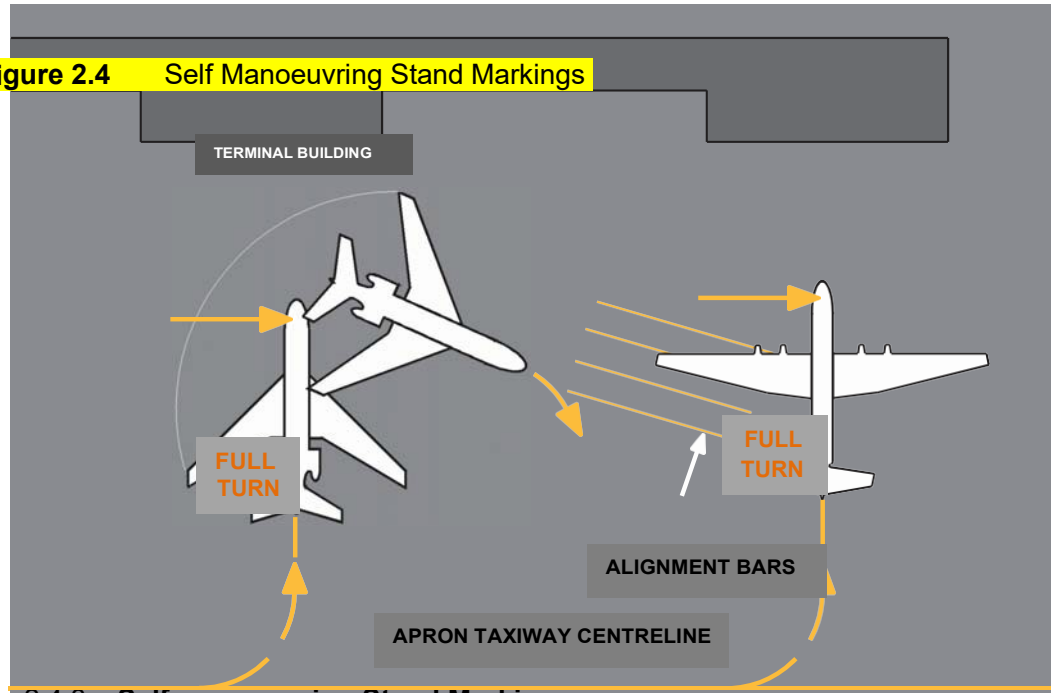


Figure 2.4 Self Manoeuvring Stand Markings



2.4.3 Self-manoeuvring Stand Markings

2.4.3.1 Self-manoeuvring stand markings are provided to assist pilots in taxiing their aircraft to correct parking position without the assistance either of a marshaller or a VDGS. A variety of different styles of marking are in use throughout Ghana. An example of one style is at Figure 2.4 and 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 ***nose wheel*** on the centreline;

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 aircraft, is initiated in the direction indicated. This turn is continued until the longitudinal axis of the aircraft is parallel with the alignment bars seen ahead of the aircraft as the designed parking angle is reached;

c) When the aircraft is parallel to the alignment bars, the turn is discontinued and the aircraft permitted to roll forward in order to straighten the nose wheel. The aircraft is then stopped;

d) When cleared to taxi by ATC, the pilot taxies out of the stand in the direction indicated by the curved lead-out arrow disregarding the alignment bars.

NOTE: *The provision of safe clearances from other aircraft and fixed obstacles relies heavily on the accuracy with which the pilot follows the*

surface markings; turning too late, using too great a radius of turn or taxiing the aircraft too far forward, may reduce the clearances below the safe limit. Unlike the principle used on taxiways (cockpit on centreline), when manoeuvring onto stands the pilot must keep the nose wheel on the stand centreline. If in doubt the aircraft commander should seek assistance from a marshaller.

2.4.4 Parking Spots and Parking Circles

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

2.4.5 Additional Apron Markings NOT for Pilot use

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

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

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

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

3 Unpaved Surface Markings

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

3.1.1 Runway Edge and Centreline Marking

3.1.1.1 The edges of runways are delineated by markers placed at regular intervals along the declared edges of the runway. Where provided, a centreline marking consists of rectangular markers inset flush with the runway surface and spaced at regular intervals along the declared runway centreline. Edge and centreline

markers are normally white but may be of any single colour that best contrasts with the background.

3.1.2 Runway Threshold and End Marking

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

CHAPTER 3 SIGNS

1 General

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

2 Mandatory Signs

2.1 Mandatory Signs consist of Runway Holding Position signs, Intermediate Holding Position signs and No Entry signs and display white characters on a red background as illustrated at Figure 3.1 and 3.2. Runway Holding Position and Intermediate Holding Position signs are located alongside the appropriate surface marking described in Chapter 2 paragraph 2.3 and identify the holding position as well as indicate the direction in which the holding instruction applies. Pilots should not proceed beyond a Mandatory Sign unless directed to do so by ATC.

2.2 Where there is more than one taxiway serving a runway or more than one Runway Holding Position on a taxiway, a Location Sign is normally attached to the Runway Holding Position sign in order to assist in identifying the position as illustrated at Figure 3.2.

2.3 Runway Holding Position Sign for Visual and Category I Operations

2.3.1 Where an aerodrome is equipped for operations up to and including ILS Category I approaches, a Runway Holding Position sign displaying the runway designator is located on both sides of the taxiway as illustrated at Figure 3.2 (a). Where there is no ATC unit, the Runway Holding Position sign identifies the position where aircraft and vehicles are required to hold whilst conceding right of way to aircraft using or on approach to the runway.

Figure 3.1 Examples of Mandatory Signs for Aircraft Surface Movements

a) Visual Runway 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 Holding Position Sign – denotes ILS CAT I Runway Holding Position – a Visual/CAT I Runway Holding Position may be established closer to the runway where it is necessary to expedite traffic flow.

(i)

(ii)

c) CAT II Runway Holding Position Sign – marks the ILS CAT II Runway Holding Position – a Visual/CAT II Runway Holding Position may be established closer to the runway where it is necessary to expedite traffic flow.

(i)

(ii)

d) CAT III Runway Holding Position Sign – marks the ILS CAT III Runway Holding Position – a CAT II Runway Holding Position and a Visual/CAT I Runway Holding Position may be established closer to the runway where it is necessary to expedite traffic flow.

(i)

(ii)

e) Combined Runway Holding Position Sign – marks the Taxi-Holding Position where the ILS – Runway Holding Positions are co-incident. A Visual or CAT I Runway Holding Position Sign may be established or closer to the runway where it is necessary to expedite traffic flow.

(i)

(ii)

f) Runway Holding Position Sign – marks a Holding Position established to protect a priority route.

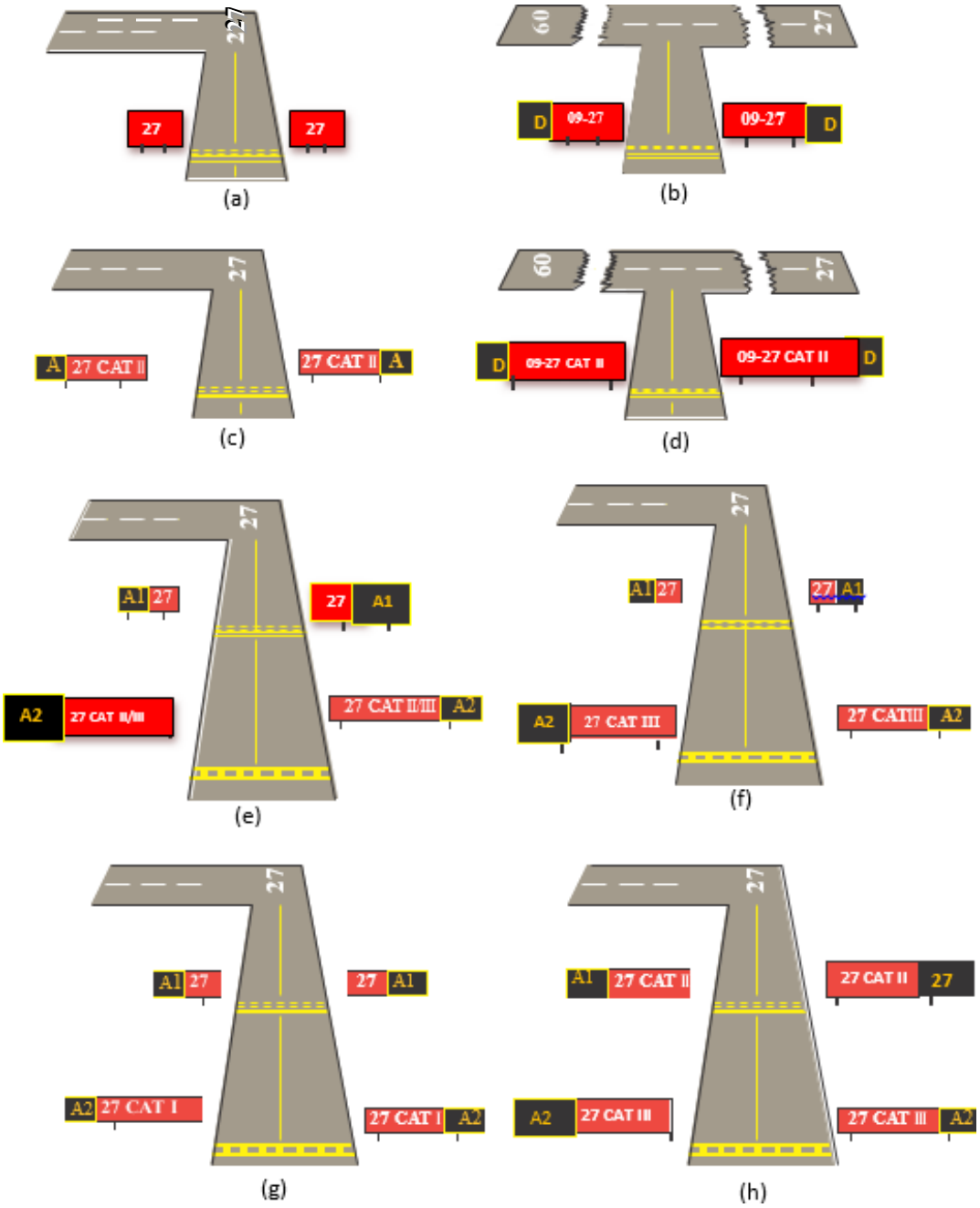
g) No Entry Sign

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 holding position serves more than one runway, the sign layout at Fig 3.5 is used.

Figure 3.2: Typical Runway Holding Position Signs and Associated Taxiway Markings.



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

> ***NOTE:*** *The signs at intermediate taxiway entrances as shown at Figure 3.2 (b) and (d) show the runway designation in both directions; a left turn is required to*

reach the threshold of Runway 09 and a right turn to reach the threshold of runway 27.

2.4 Holding Position Sign for Category I, II and III Operations

2.4.1 At aerodromes equipped for Category I, II and III ILS approaches, Runway Holding Position signs are annotated CAT II, CAT III or CAT II/III as appropriate, in the manner illustrated in Figures 3.1 and 3.2. However, because of the need to provide greater protection to Category I, II and III ILS systems, the Runway Holding Positions associated with these procedures are set farther back from the runway than those associated with visual operations as indicated in figure 3.2 (e), (f) and (g).

2.5 Runway-Holding Position Sign

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

2.6 No Entry

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

3 Information Signs

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

3.2 Location Signs

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

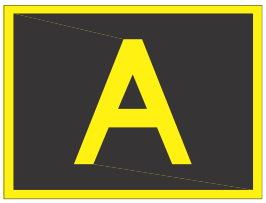
3.2.2 A Location Sign consists of the characters identifying the runway or taxiway in yellow lettering on a black background surrounded by a yellow border, as

illustrated in Figure 3.3 (a) and (b). Where there is a need to identify a specific position on a runway, a Location Sign, displaying the taxiway designator accompanied by an identifying number as illustrated at Figure 3.3 (a) (ii), is used.

3.3 Direction and Destination Signs

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

Figure 3.3: Examples of Information Signs (not to scale)



(i)
Designation
(a)Taxiway Location Signs

(ii)
Specific Location

(iii)
Taxiway Ending

(b) Runway Location Sign

(c) Direction Sign

(d) Runway Designation Sign

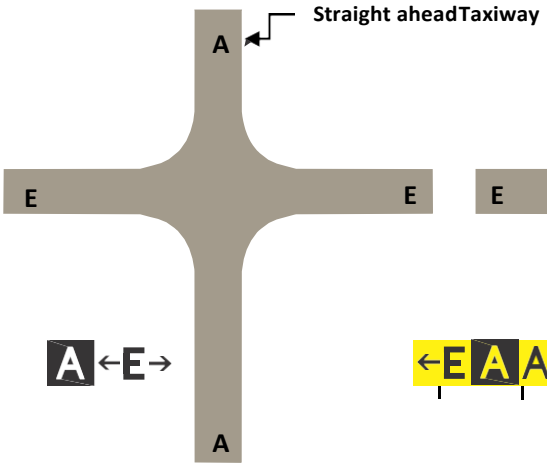
Note the use of a hyphen to separate reciprocal designators and the use of a dot to separate other designators.

(f) Inbound Designation Sign

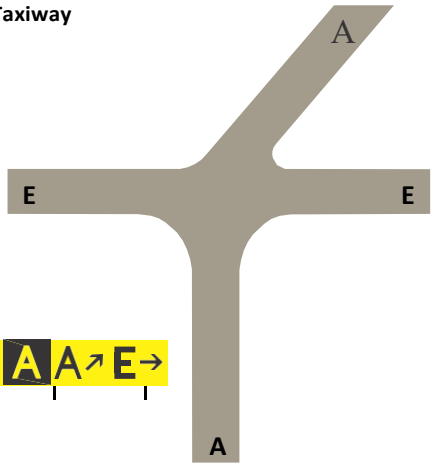
(e) Designation sign to Different Runways

(g) Stand Designation Sign

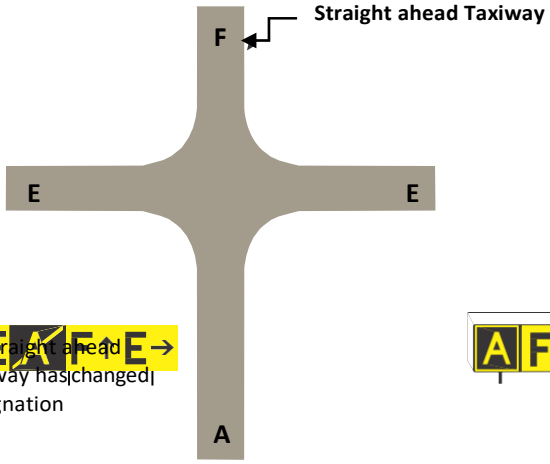
Figure 3.4 Examples of Taxi Guidance Signs at Taxiway Intersections (not to scale)



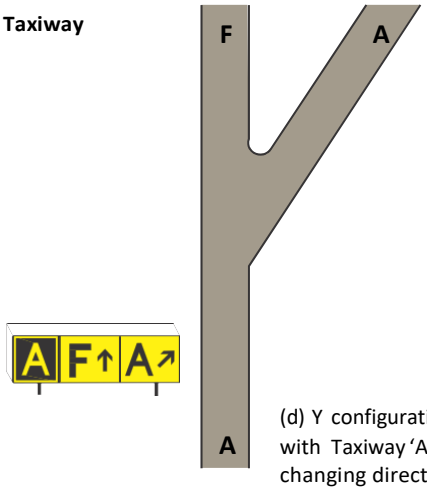
(a) Standard 4 – Way Intersection



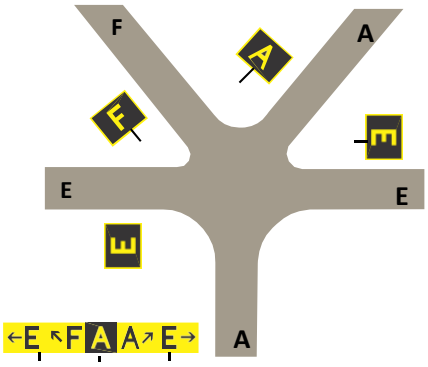
(b) Straight ahead Taxiway has direction change greater than 25 degrees



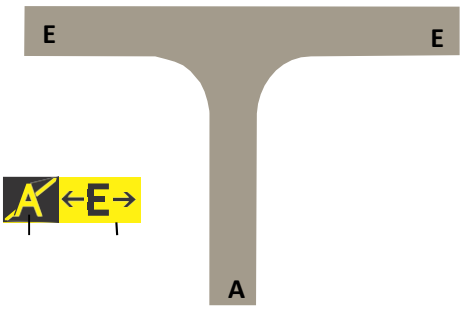
(c) Straight ahead Taxiway has changed designation



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

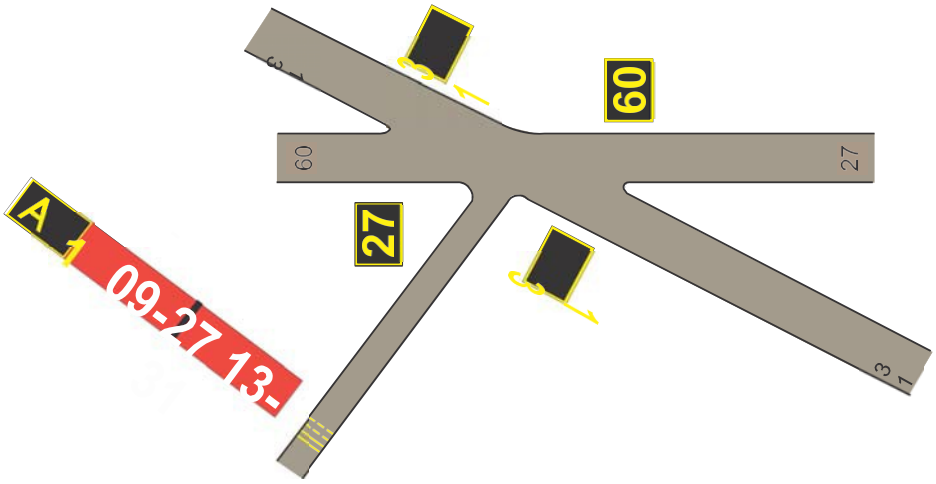


(e) Location signs indicating exit from intersection

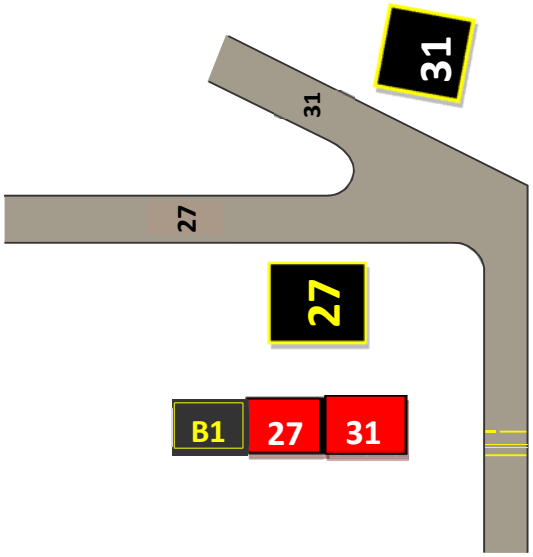


(f) Taxiway ending sign

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



(a) Taxiway entrance at intersection of two runways



(b) Taxiway entrance at intersection of two runway ends

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.

CHAPTER 4 VISUAL DOCKING GUIDANCE SYSTEMS

1 General

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

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 aircraft should be stopped immediately and assistance requested.

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

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

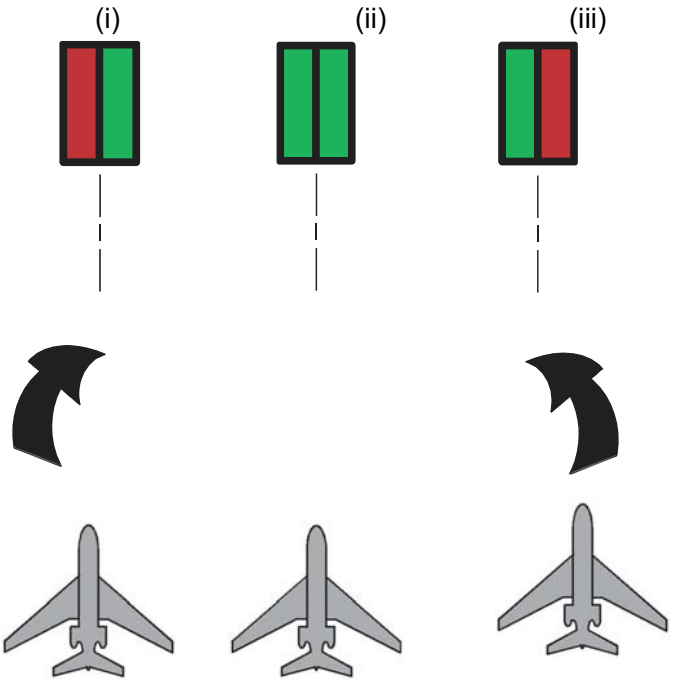
2 Azimuth Guidance for Nose-in Stands (AGNIS)

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

a) one red bar and one green bar as illustrated at Figure 4.1 (i) and (iii), indicating that the pilot should steer away from the red towards the green bar, or

b) two green bars, indicating correct alignment, as illustrated at Figure 4.1 (ii).

Figure 4.1 AGNIS

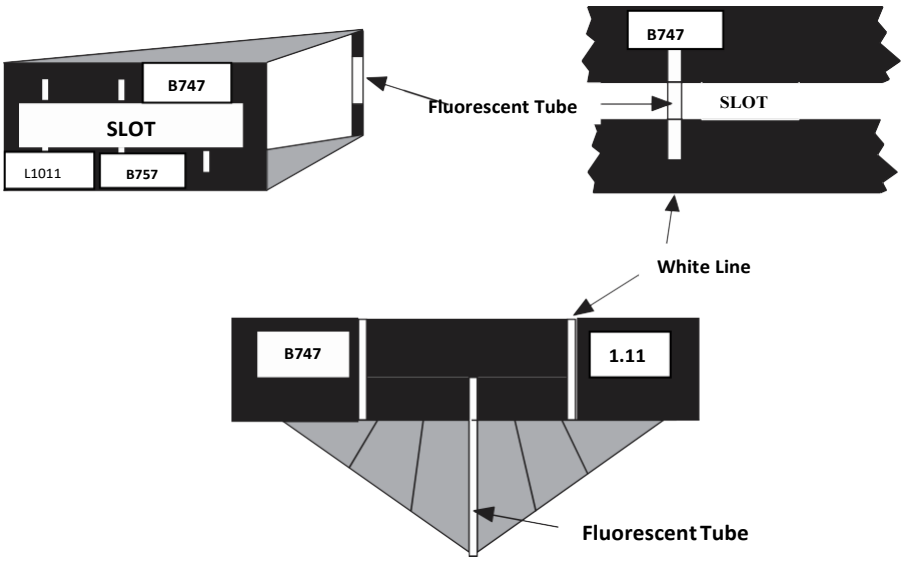


2.2 AGNIS may be supported by one of the following aids:

a) PAPA

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

Figure 4.2 PAPA



b) Mirror

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

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

1. Aircraft Positioning and Information System (APIS/APIS++)

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

a) An alphanumeric yellow dot matrix element displayed in the upper portion of the unit indicating as appropriate, any of the signals illustrated.

b) A yellow dot matrix progress strip element displayed on the lower left side of the unit indicating progress of the aircraft over the last 16.2 m of the approach to the stop position.

c) An azimuth guidance element employing a moiré pattern.

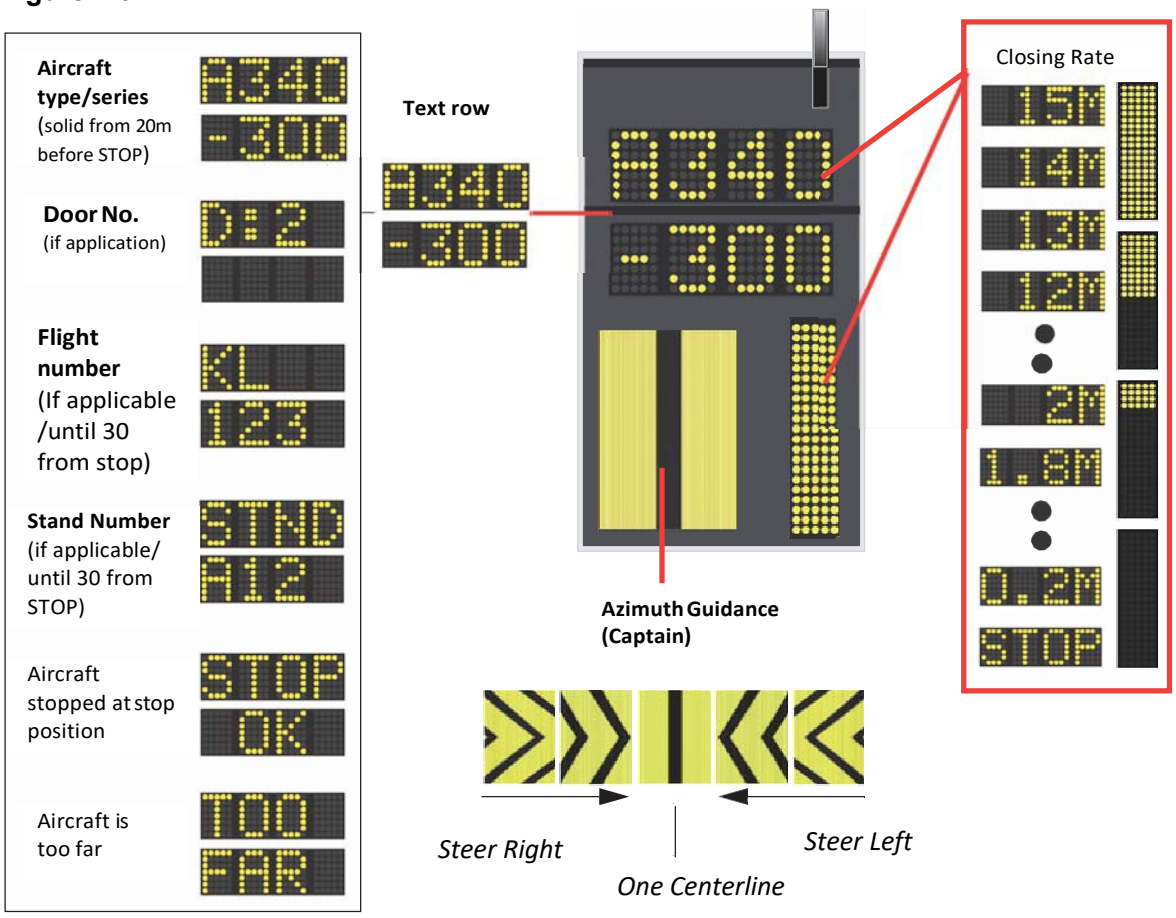
1.2 Prior to entering the stand the pilot must ensure that the following signals are displayed:

a) Correct aircraft type

b) Correct stand number

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

Figure 4.3 APIS++



FMT APIS++ (Aircraft Parking and Information System)

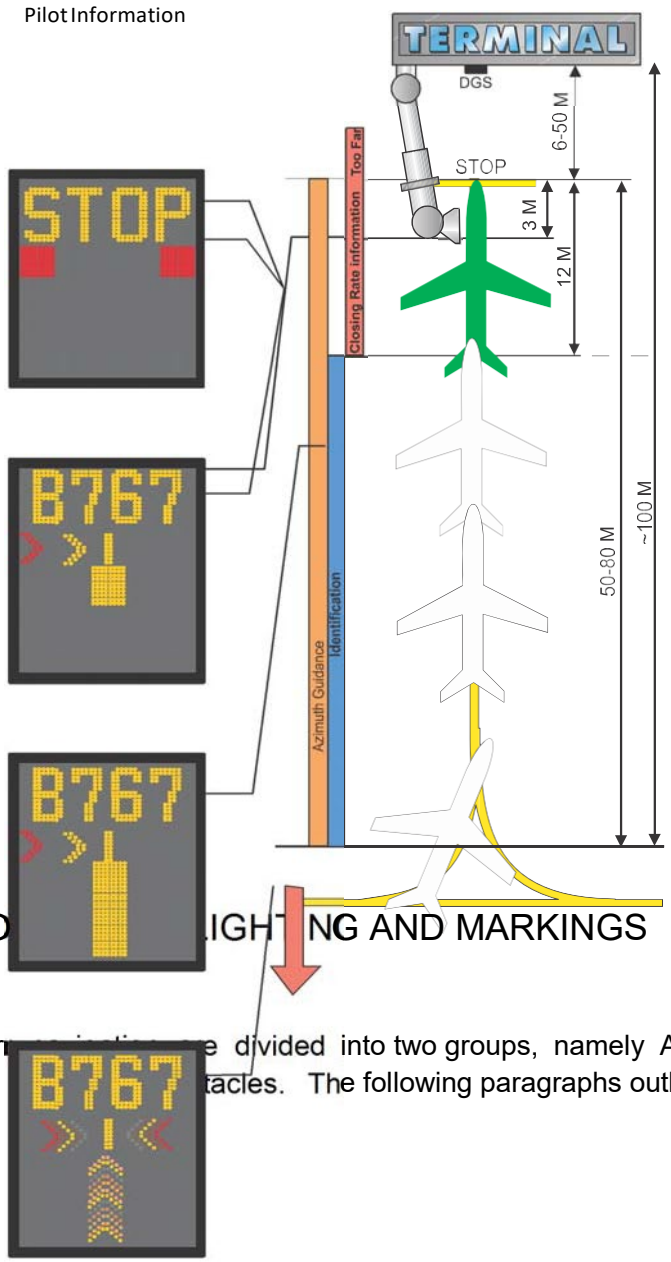
Azimuth and stopping guidance are provided from a display unit mounted at the extension of the stand centreline.

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

4 Safegate Safedock

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

Figure 4.4 Safedock Guidance Systems



CHAPTER 5 O IGHT NG AND MARKINGS

1 General

1.1 Obstacles to air e divided into two groups, namely Aerodrome Obstacles and tacles. The following paragraphs outline the

methods of marking and lighting obstacles in order that they may be readily identified.

2 Aerodrome obstacles

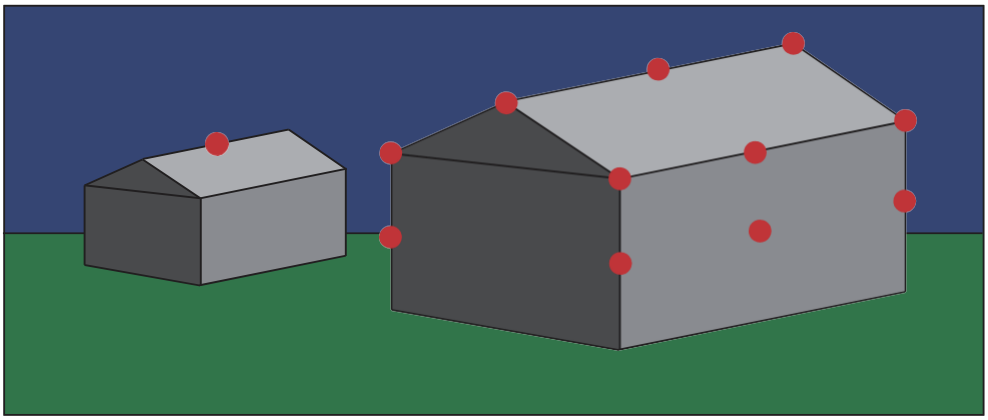
2.1 An aerodrome obstacle is one that is located on an area intended for the surface movement of an aircraft or that extends above a defined surface intended to protect aircraft in flight or exceeds 150m height above ground, within a radius of up to 15km of the aerodrome. Significant aerodrome obstacles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

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

2.3 Lighting

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

Figure 5.1

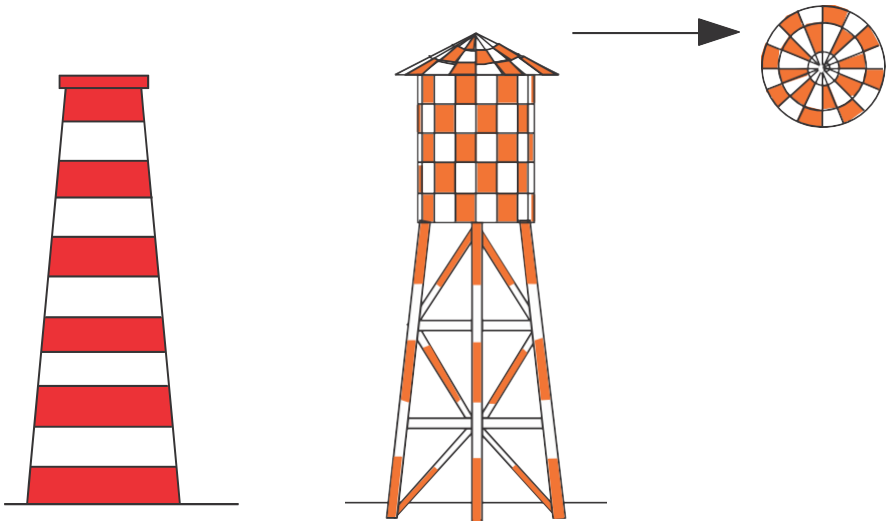


2.4 Marking

2.4.1 Where fixed obstacles are insufficiently conspicuous by day, they are normally marked either by alternating bands or by a chequered pattern of red or orange and white. Vehicles and other mobile equipment frequently employed on the

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

Figure 5.2 Marking of Buildings and Structures



3 En-route Obstacles

3.1 Objects located beyond the vicinity of an aerodrome are considered to be obstacles to aircraft in flight if they exceed 150m in height. However, prominent objects of lesser height should be treated as obstacles due to hazard posed by helicopters or low flying aircraft.

3.2 En route obstacles are normally lit by steady red lights at night and, in exceptional circumstances, by high intensity flashing white lights.

CHAPTER 6 AERODROME SIGNALS

1 General

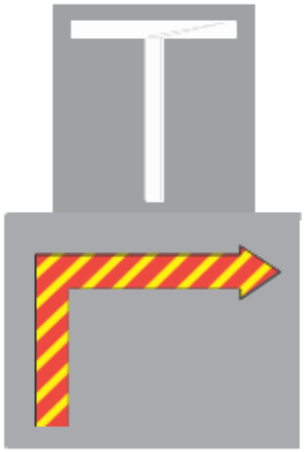
1.1 At those aerodromes where General Aviation movements are significant, visual aids displayed in a Signals Area may be employed in order to provide information relating to the conduct of flying operations. Where provided, the Signals Area, measuring approximately 12m square and bounded by a white border is so located on the aerodrome that is visible from all directions of approach. The meaning of individual signals displayed within the Signal Area is described at Table A.

1.2 Light Signals and Pyrotechnic Signals may also be used to convey instructions to pilots and ground staff and have the meanings described at Table B.

1.3 The meaning of Aircraft Marshalling Signals prescribed is described at Table C, whilst Table D describes the meaning of signals made by a pilot to a marshaller.

1.4 Where signals are applicable only to helicopter operations, they are marked by the symbol.

Table A Meaning of Signals Displayed in the Signals Area

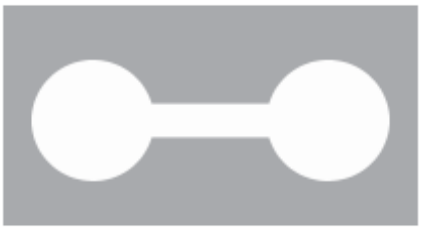


A white landing T signifies that aeroplanes and gliders taking-off or landing shall do so in a direction parallel with the shaft of the T and towards the cross arm, unless otherwise authorised by the appropriate ATC unit.

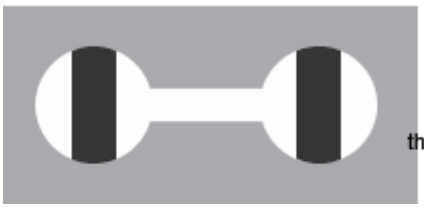
A red and yellow striped arrow placed along the whole of two adjacent sides of the signals area and pointing in a clockwise direction signifies that a right hand circuit is in force.

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

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



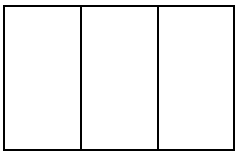
A white dumb-bell signifies that movements of aeroplanes and gliders on the ground shall be co confined to paved, metalled or similar hard surface.



A black strip across each disc of the white dumb-bell at rig right angles to its shaft signifies that aeroplanes and glider 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 whrte double cross signrfies that glider flying is in progress.

A whrte letter H signrfies that helicopters shall take.off and wtthinthe areadesignated by a large white fetter H.



At intervals alongthe boundary ofan aerodrome

Orange and wMestriped markers are used to delineate the boundary whereit is insufficiently conspicuous

On a portion ofa runway

A wMemarkin theshape of St. Andrew'scrossindicatesthatthat portionof therunway up to the next standard markingis unfitfor useby aircraft.

On a portion ofa **taxiway**

A yellow crossindicates that thatportion of tile taxiway up to tile next standard marking is unfitfor use by aircraft.

Table B
Meaning of Light and Pyrotechnic Signals

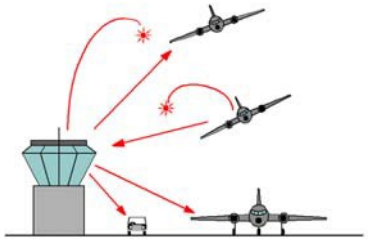
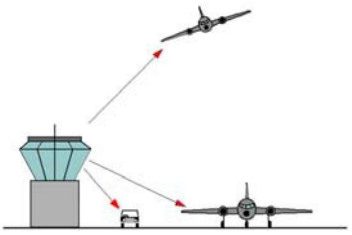
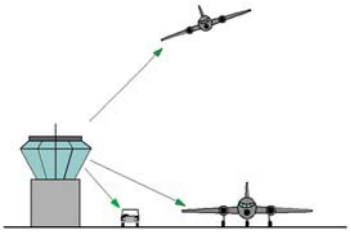
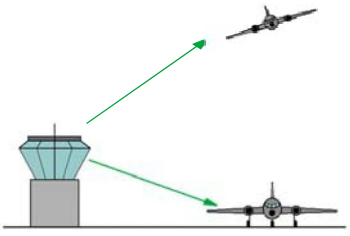
Signal		Meaning
Steady red light to aircraft or vehicle as indicated. Red flare from tower or aircraft		Do not land. Give way continue circling Immediate assistance required Stop
Flashing red light to aircraft or vehicle		Do not land; aerodrome closed Move area clear for landing
Flashing green light to aircraft or vehicle		Return to aerodrome await landing clearance Cleared to taxi/move on the manoeuvring area
Steady green light to aircraft		Cleared to land Cleared to take-off

Table B Meaning of Light and Pyrotechnic Signals

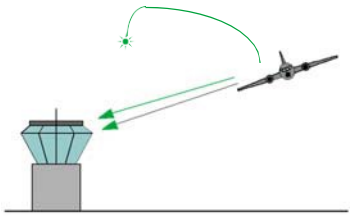
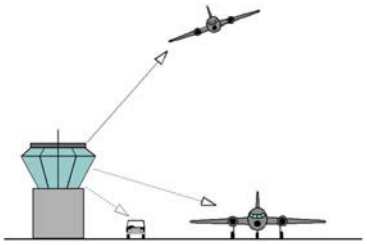
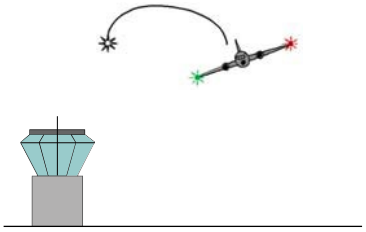
Signal		Meaning
Steady or flashing green or green flare from aircraft		By night- may I land? By day- may I land in a direction different from that indicated?
White flashes to aircraft and vehicle		Land here on receipt of steady green and await further instructions. Return to starting point on the aerodrome.
White flare from aircraft or irregular switching of navigation or landing lights		I am compelled to land

Table C Meaning of Marshalling Signals

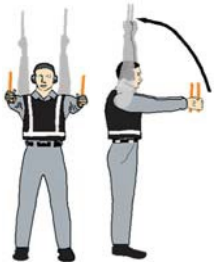
	Description of signal	Meaning of Signal
	**(1)** Raise right hand above head level with wand pointing up; move left-hand wand pointing down toward body	Wing walker/guide-This signal provides an indication by a person positioned at the aircraft wing tip, to the pilot/marshaller/push-back operator, that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

Table C Meaning of Marshalling Signals

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

Table C Meaning of Marshalling Signals

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

Table C Meaning of Marshalling Signals

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

Table C Meaning of Marshalling Signals

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

Table C Meaning of Marshalling Signals

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

Table C Meaning of Marshalling Signals

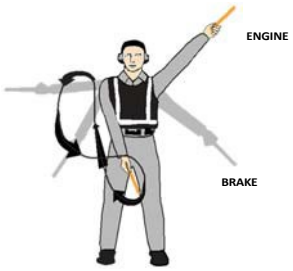
	Description of Signal	Meaning of Signal
	**(19b)** Extend arm horizontally at a 90-degree angle to left side of body. Move other arm in same direction in a sweeping motion.	Move horizontally right (from pilot's point of view). 
	**(20)** Cross arms with wands downwards and in front of body.	Land 
	**(21)**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

Table C Meaning of Marshalling Signals

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

Table C Meaning of Marshalling Signals

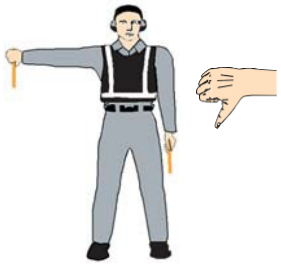
	Description of Signal	**Meaning of Signal**
	**(27)** Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with “thumbs down”; left hand remains at side by knee.	Negative (technical/servicing communication signal).
	**(28)** Extend both arms at 90 degrees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

Table D Meaning of Signals made by Pilot to Marshaller

(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, the 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.

Chapter 7 Visual Aids Specific to Helicopter Operations

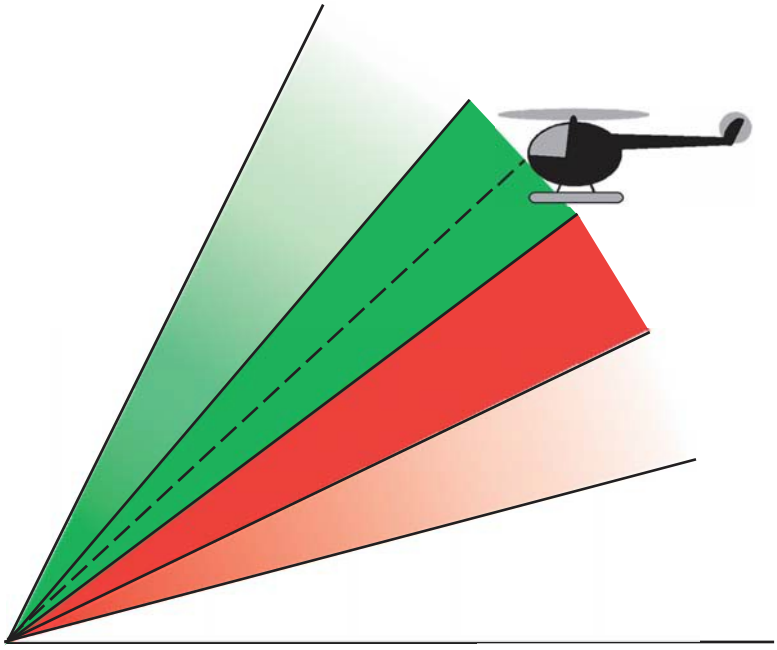
1 General

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

2 Helicopter Approach Path Indicator (HAPI)

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

Figure 7.1 HAPI signal format



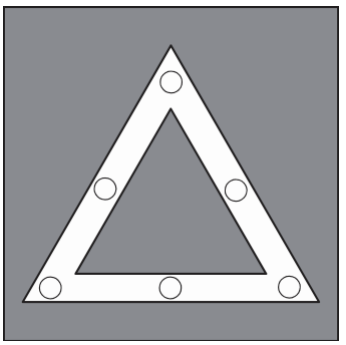
NOTE: All signals emanate from a single source.

Sector	Signal
Above	Flashing green
On the Slope	Steady Green
Slightly below	Steady Red
Below	Flashing Red

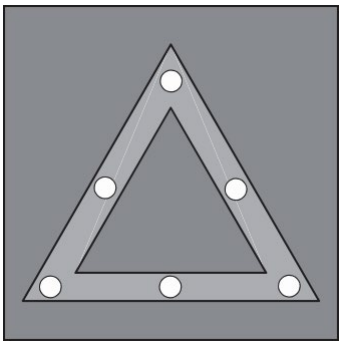
3 Helicopter Aiming Point Marker

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

Figure 7.2 Aiming point lighting



By day

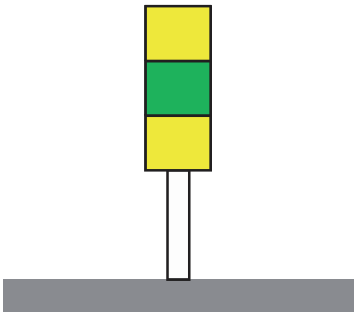


By night

4 Air Taxiway markers

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

Figure 7.3 Air taxiway markers

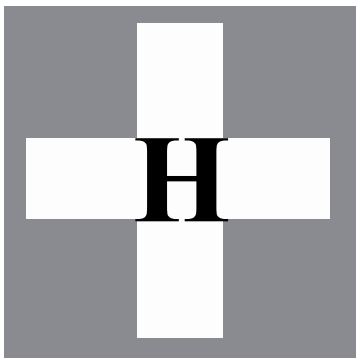


5 Touch Down and Lift Off Area (TLOF)

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

Figure Chapter 7.4a TLOF at sites other than hospitals

Figure Chapter 7.4b TLOF AT Hospital sites



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

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

Figure 7.5 Final approach and take-off area designation

7 Elevated Helicopters

7.1 The size of the heliport will be a function of the performance requirements of the largest helicopter that the site is intended to serve. The TLOF circle dimension is determined as described in paragraph 5.1above. In this application the FATO (see 6.1 above) and TLOF will be coincidental.

8 Helidecks

8.1 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 helidecks is outlined in the Manual of Aerodrome Standards (MOAS).