GHANA
CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR
AC 14-026

SURFACE MOVEMENT GUIDANCE AND CONTROLS SYSTEMS

GENERAL

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 the 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 32 of the Ghana Civil Aviation (Aerodromes) Directives, as well as explanatory and interpretative material to assist in showing compliance.

REFERENCE

The Advisory Circular relates specifically to the Aerodrome GCADs.

STATUS OF THIS AC

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

FORWARD

This document provides guidance in respect of Surface Movement Guidance and Control Systems (SMGC) systems. The objective of an SMGC system is to enable an aerodrome to operate safely in the intended condition and to prevent collisions between aircraft, between aircraft and ground vehicles, between aircraft and obstacles, between vehicles and obstacles, and between vehicles. An essential safety function of an SMGC system is to safeguard against unauthorised or inadvertent entry onto operational runways. Another important safety function of an SMGC system is to provide assistance to rescue and fire fighting vehicles in locating and proceeding to the site of an accident on the movement area.

APPROVAL

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CHAPTER 1 — INTRODUCTION

1.1 Overview of Surface Movement Guidance and Control Systems

1.1.1 Meaning. Surface Movement Guidance and Control Systems (SMGCS) are the provision of guidance to, and control of, all aircraft and ground vehicles on the aerodrome. A Surface Movement Guidance and Control Systems assist in safeguarding against unauthorised or inadvertent entry on to operational runways.

1.1.2 Composition. A SMGC system comprises an appropriate combination of visual aids, non-visual aids, procedures, control, Directive, and management and information facilities frequency of operations. Systems range from the very simple at small aerodromes, with light traffic operating in good visibility conditions, to the complex systems necessary at large aerodromes with heavy traffic operating in low visibility conditions.

1.1.3 Governing Factors. The SMGC system to be provided at an aerodrome depends primarily upon two operational conditions viz: the visibility conditions under which the aerodrome authority plans to maintain operations; and the traffic density.

1.1.4 Objective. The objective of an SMGC system is to enable an aerodrome to operate safely in the intended condition and to prevent collisions between aircraft, between aircraft and ground vehicles, between aircraft and obstacles, between vehicles and obstacles, and between vehicles. An essential safety function of an SMGC system is to safeguard against unauthorised or inadvertent entry onto operational runways. Another important safety function of an SMGC system is to provide assistance to rescue and fire fighting vehicles in locating and proceeding to the site of an accident on the movement area.

1.1.5 Operational Requirements of SMGCS. The system should be appropriate to the visibility and traffic density and should provide:

1. Requirements of a general nature

    a. communication capability between the appropriate control unit(s), between the appropriate control unit(s) and aircraft and between the appropriate control unit(s) and ground vehicles;

    b. acceptable work-loads on the users of the SMGC system;

c. optimum use of aids and procedures already specified in ICAO regulatory documents;

d. compatibility between individual elements of the guidance and control systems; and

e. current and forecast meteorological conditions.

2. Requirements of Pilots

a. orientation, guidance and control beginning at the end of landing roll-out on arrival, to the parking position, and from the parking position up to alignment for take-off on departure;

b. information on the route to be followed;

c. information on position along the route being followed;

d. guidance along the route being followed and parking guidance;

e. warning of;

i. changes in direction;

ii. stops and other speed adjustments;

f. identification of areas to be avoided;

g. information to prevent collision with other aircraft, ground vehicles or obstacle; and

h. information on system failures affecting safety.

3. Requirements of appropriate control units

a. information on the identity, position and progress of aircraft including aircraft under tow;

b. Information on the identity, position and progress of ground vehicles whose movements might conflict with aircraft movements;

c. Information on the presence of temporary obstacles or other hazards;

d. Information on the operational status of elements of the system; and

e. Facilities appropriate to the control to be exercised.

4. Requirements of ground vehicles on the movement area

a. emergency vehicles

i. information on the route to be followed;

ii. guidance along the route being followed;

iii. capability to locate the site of an emergency;

iv. information to prevent collision with aircraft and ground vehicles; and

b. other ground vehicles

i. information on the route to be followed;

ii. guidance along the route being followed;

iii. information to prevent collision with aircraft and ground vehicles.

1.1.6 Future Considerations. All aerodromes require a SMGC system. However, each system must be related to the operational conditions under which it is intended that the aerodrome shall operate. Failure to provide a system appropriate to the demands placed on an aerodrome will lead to a restricted movement rate.

CHAPTER 2 — AN AERODROME SMGCS SYSTEM

2.1 Visibility and Traffic Conditions

The visibility conditions under which the Aerodrome Operator plans to maintain operations and the traffic density are the two most important factors to be considered when selecting components for a surface movement guidance and control (SMGC) system for an airport. For the purpose of discussing SMGC systems, visibility and traffic conditions have been subdivided and defined according to the terms indicated in Appendix B. Whenever these terms are used in this AC, they have the meanings given to them in Appendix B.

2.1.1 Visibility Conditions

a. Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, and for personnel of control units to exercise control over all traffic on the basis of visual surveillance;

b. Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and an intersections by visual reference, but sufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance; and

c. Visibility less than 400m RVR (low visibility operations)

2.1.2 Traffic Density (in mean busy hour)

a. **Light**. Not greater than 15 movements per runway or typically less than 20 to 35 total aerodrome movements; and

b. **Medium.** Of the order of 16 to 25 movements per runway or typically between 20 to 35 total aerodrome movements; and

c. **Heavy.** Of the order of 20 movements per runway or typically more than 35 total aerodrome movements.

2.2 Basic Equipment Requirement

The equipment required at a particular aerodrome for provision of SMGC systems will depend both on the density of traffic and the visibility conditions in which the operations should take place. However, the following equipment is fundamental to any SMGC systems and should therefore be provided at all aerodromes:

2.2.1 Minimum Equipment Requirements for SMGC Systems for all Aerodromes

a. Markings
   i. Runway Centreline
   ii. Taxiway Centreline
   iii. Taxi-holding Position
   iv. Taxiway Intersection
   v. Apron
   vi. Restricted Use Area

b. Lighting
   i. Runway Edge
   ii. Taxiway Edge
   iii. Obstacle
   iv. Restricted use areas

c. Signs
   i. Mandatory Signs
   ii. Information Signs

d. Other
   i. aerodrome chart
   ii. aerodrome control service
   iii. signalling lamp
   iv. radiotelephony equipment

2.3 Basic Procedural/Administration Requirements

Procedures are an important and integral part of SMGC systems and they are implemented partly by the Aerodrome Operator, partly by the air traffic control unit and partly by the pilot. As in the case of SMGC aids, the procedures to be employed at a particular aerodrome will be dictated by both traffic density and visibility conditions. For guidance on this, see 2.5. However, the following procedures are

fundamental to any SMGC systems and should therefore be implemented at all aerodromes:

a. Aerodrome operator
   i. designation of taxiways

   ii. movement area inspections

   iii. Directive of ground staff conduct on the movement area

   iv. Directive of ground staff radiotelephony procedures

   v. periodic electrical monitoring of SMGC aids

   vi. initiation of amendment of aerodrome chart as necessary

   vii. apron management

b. Air Traffic Services
   i. designation of taxiways

   ii. provision of air traffic control services

   iii. use of radiotelephony procedures and phraseology

   iv. use of signalling lamp

   v. monitoring of SMGC aids

c. Pilot
   i. adherence to ground movement traffic rules and Directives

   ii. use of radiotelephony procedures and phraseology.

2.4 Matching Aids to Aerodrome Conditions

(1) Appendix A lists the aids considered appropriate for each of the nine possible combinations of traffic and visibility conditions. It will be observed that the table includes not only the basic aids detailed in Section 2.2 above but also the additional aids needed to ensure safe and expeditious movement of aircraft under different traffic and density conditions.

(2) The Appendix lists the visual docking guidance system as an essential aid for a few combinations of traffic and visibility conditions. A visual docking guidance system may be used in other situations as well. In evaluating the need for a visual docking guidance system the following factors merit consideration:

a. the number of aircraft using the aircraft stand

b. weather conditions

c. space available on the apron

d. precision required at the parking position

e. availability and cost of alternative means.

(3) Signs are a basic aid. They serve an important function in informing a pilot and reducing RTF communications. The number and quality of signs provided at an aerodrome is a variable which is not reflected in the Appendix. As traffic increases or visibility decreases improvements in the signs provided as well as the lighting and electronic aids used for guidance and control are required.

(4) Charts are another aid which cannot be precisely specified. Until recently, only an aerodrome chart was defined in Annex 4. This is now recognized as insufficient, as more information about the aerodrome is often required than can be shown on the aerodrome chart. Accordingly, a ground movement chart is specified and when this too is incapable of showing all information an apron parking/docking chart is required. As the provision of these charts is related to the complexity of the aerodrome and not visibility or traffic conditions only one entry, “Charts”, is included in Appendix A. The aerodrome authority should assess the number of charts required in accordance with the amount of information required to be shown.

2.5 Matching Procedures to Aerodrome Conditions

(1) Appendix B lists the procedures considered appropriate for each of the nine possible combinations of traffic density and visibility conditions. It will be observed that the table includes not only the basic procedures detailed in Section 2.3 but also the additional procedures needed to

ensure safe and expeditious movement of aircraft under different traffic and visibility conditions.

(2) It is to be noted that a separate section of Appendix B has been devoted to apron management procedures. This has been done to conveniently isolate applicable procedures for the case where it is intended to establish a self-contained apron management unit. If no separate apron management unit is established, responsibility for these procedures will rest, in part, with the ATS unit and, in part, with the Aerodrome Operator.

2.6 Review of System and Improvement

(1) Regular reviews of the SMGC systems should be carried out to ensure that the system is fulfilling its intended task, and to assist the aerodrome authority in planning ahead for the orderly introduction of a more advanced system and the necessary supporting facilities, as and when warranted. Ideally, a master plan will have been prepared for the aerodrome in the early stages of its development, in which case a review of the system at regular intervals will serve to monitor the development of the aerodrome in relation to the time frame employed in the master plan.

(2) In all cases, the SMGC systems will need to be reviewed under one or more of the following circumstances:

a. the volume of traffic increases significantly;

b. operations in lower visibility conditions are planned; and

c. the aerodrome layout is changed, i.e. new runways, taxiways, or aprons are brought into operation.

(3) It is also conceivable that ATS restructuring of the airspace surrounding the aerodrome, or other external circumstances, may affect the flow of traffic to and from the aerodrome, and consequently the pattern of movements on the runways, thereby influencing the SMGC systems requirements.

(4) Apart from traffic movement counts, the extent to which increased traffic volume is causing a deterioration of the effectiveness of the SMGC systems may be determined by the appearance of the following symptoms:

a. a marked increase in the loading on the communications channels used for SMGC;

b. an increase in the number of problems occurring at crossing points and runway/taxiway intersections, requiring intervention by the controller and thereby contributing to the increase in radio communications; and

c. the occurrence of bottlenecks, congestion and delays in surface traffic movements.

(5) A marked need for increased vigilance in the visual surveillance of surface traffic movements, generated by the number of movements occurring simultaneously throughout the aerodrome complex.

CHAPTER 3 — DIVISION OF RESPONSIBILITIES

3.1 Introduction

The ability of SMGCS to achieve required objective in an aerodrome would depend on the timely performance of duties and responsibilities necessary for the effective and smooth functioning of associated aids and procedures by assigned personnel. The disciplines mostly involved in SMGCS are pilots, apron management, airside drivers, Aerodrome Operator and air traffic services.

3.1.1 Air Traffic Services.

(1) Use of radiotelephony procedures and phraseology. Radiotelephony as the primary means of communication between ATS and aircraft, surface vehicles and rescue and fire fighting vehicles operating on the manoeuvring area.

(2) When aircraft and vehicles operate outside the manoeuvring area but under the guidance of an ATS unit is preferable that detailed written procedures governing their operation be employed.

(3) Issue of taxi clearance to facilitate SMGC.

(4) Determination of taxi routes to be followed. ATS and the aerodrome authority should determine jointly the routings to be taken by aircraft and vehicles.

(5) Monitoring of SMGC system aids. This monitoring may take the form of visual surveillance of lights, taking into account reports from pilots, and of electrical monitoring of electrical and electronic components of the system.

(6) Control of traffic other than aircraft on the manoeuvring area. When visibility reduces, it shall be at the discretion of the air traffic controller to restrict movements of vehicles as necessary. The amount of control over the movement of ground vehicles exercised by the aerodrome control service will increase as visibility reduces. With the exception of rescue and fire fighting vehicles responding to an emergency, the controllers should ensure that aircraft receive priority and are not hindered by the movement of vehicles.

(7) Operation of visual guidance and control aids. The appropriate aerodrome control service will be responsible for operating the

visual components of the control system, including stop bars, taxiway centre line lights and routing designators. That unit will also need to ensure that the lights are illuminated at the appropriate time.

(8) Division of responsibility between controller and pilot. Prevention of collision is a joint pilot/ATS responsibility with the controller always responsible for resolution of intersection conflicts. In the lower visibilities, the overall responsibility for the avoidance of collision becomes increasingly that of the ATS Unit.

3.1.2 Apron Management Service.

(1) At aerodromes where management of traffic on the apron is not the responsibility of the air traffic control unit, there should be an apron management service responsible for ensuring the safe movement of aircraft on the apron. All rules and Directives applicable to aircraft movements on the apron should be consistent with the rules and Directives applicable to the manoeuvring area and close liaison between the apron management service and ATS unit is essential.

3.1.3 Pilots.

(1) The pilot will respond to the instructions given by the apron management service and the air traffic control unit and follow the designated taxiway route.

3.1.4 Aerodrome Operator

(1) Movement area inspections. The Aerodrome Operator will be responsible for conducting frequent inspections of the movement area to ensure that the areas intended for aircraft movement are kept un-obstructed and in good repair.

(2) Ground staff. The Aerodrome Operator and ATS will be responsible for the Directive and control, respectively, of ground staff on the movement area. The Aerodrome Operator will be responsible for ensuring that ground staff are properly trained particularly in RTF and monitored in its use.

(3) Servicing of SMGC aids. The Aerodrome Operator will normally be responsible for ensuring that all visual components of the SMGC system are kept serviceable. This will require frequent physical inspections of these visual components.

(4) Designation of taxiways and standard taxi routes. In conjunction with the ATS, the aerodrome authority will be responsible for the designation of taxiways and for the establishment of standard taxi routes applicable to the types of operations expected to take place at the aerodrome. This becomes particularly important for intended operations at busy aerodromes in low visibility conditions.

3.1.5 Airside Drivers

(1) Drivers of ground vehicles must comply with aerodrome Directives and ATC instructions. Notwithstanding this, drivers are responsible for exercising due care and attention so as to avoid collisions between their vehicles and aircraft, and between their vehicles and other vehicles.

CHAPTER 4 — RUNWAY PROTECTION METHODS AND EQUIPMENT

4.1 Introduction

This chapter outlines the operational problem for which runway protection has to be applied and gives some protection methods and equipment that can be used by the appropriate aerodrome and air traffic control (ATC) agencies to check and, if necessary, enhance their operating procedures.

4.2 The Operational Problem

The runway is the first point of contact with the airport movement area for a landing aircraft and the last area during take-off. Much as it is used for take- off and landing by aircraft, it cannot be reserved for its exclusively use. Maintenance and service vehicles will need access to the runway and at most aerodromes certain vehicles and taxiing or towing aircraft will need to cross. This exposes aircraft and vehicles to the risk of collision and further increases this danger in operational conditions where there is pressure reduce runway occupancy time due to increasing capacity problems. There is therefore a need for adequate protection measures to be in place to guard against collision between aircraft and other objects.

4.3 Types of Runway Encroachment

4.3.1 Accidental Entry. Entry to the runway by a vehicle whose driver has lost his way and somehow entered the manoeuvring area; the movement area must be fenced or otherwise protected against unauthorized entry, and should be provided with controlled entry points. Although such a fence protects far more than the runway itself, it is the first and most important method of runway protection since it will keep out the driver to whom movement area signs and signals would be meaningless.

Another aspect of the same problem is when a vehicle, which is authorized to enter the movement area, e.g. the apron, mistakenly strays onto the maneuvering area for which it has no clearance. To preclude accidental entry, a thorough briefing of all persons in charge of vehicles authorized to enter the movement area is necessary and they should be familiar with all surface markings, signs and lights. Mistakes may occur but the provision of positive ground movement rules and Directives should reduce the chances of mistakes occurring to a minimum.

4.3.2 Mistaken Route. An aerodrome can be a very confusing place, even to those who are familiar with its operation and topography. Changes in visibility or light intensity, the disappearance of familiar landmarks, use of a rarely employed taxiway or runway, even a change of aircraft type or vehicle, i.e. a different

viewing aspect from cockpit or driving seat, can all contribute to mistakes being made in location identification and direction of movement. Obviously, the better the taxiway system is marked, the less likely that a mistake will be made, but at many large aerodromes errors of this kind can and do occur. A misrouting confined to taxiways can cause disruption, delays and considerable frustration but rarely causes a major incident; the danger comes with unauthorized movement on to an operational runway. It must be recognised that in restricted visibility or at night this can happen without the ATC controller being immediately aware that an unauthorized entry to a runway has taken place. Even with Surface Movement Radar (SMR) it is not feasible to monitor continuously every authorized movement on a busy aerodrome. Protection from this type of encroachment must rest solely on an operational runway being clearly and unmistakably marked as such from any point of access. Permanent marking as a runway may not be sufficient because non-operational runways can be used as a taxi route and entered without special clearance. Therefore, there must be some other positive method of indicating that a runway is active and taxi holding position lights and stop bars fulfill this function.

4.3.3 Misunderstood Clearance. This is probably the most common cause of unauthorized entry to an operational runway and is also the most difficult to prevent. If a pilot or driver believes that he has clearance to enter a runway then, unless there is some obvious danger, he will proceed. The problem is compounded by the radiotelephone (RTF) broadcast system where all those on the frequency can hear the instructions that are passed. The fact that the controller, driver and pilot may be using a language which is not necessarily their mother tongue together with the pressures associated with a busy environment, are all factors which result in a misinterpretation of what is said. Until the development of discrete data transfer between the controller and individual aircraft/vehicles on the aerodrome surface, the possibility of misunderstanding or misinterpretation will remain. It follows that in the interests of runway protection, communication methods must be such to reduce the likelihood of misunderstanding and the procedures used should be such that they will not result in an aircraft or vehicle entering an operational runway without clearance. The most effective way of reducing the possibility of a misunderstood clearance which may result in an encroachment on to an operational runway is for verbal instructions to be associated with an appropriate visual signal such as the switching off of a stop bar and the switching on and off of taxiway centre line lights, beyond the stop bar.

4.4 Runway Protection Methods

(1) The primary method of protection must be the provision of sufficient visual information to pilots and drivers that they are approaching an active runway in order that they can conform to the recognised procedures. This visual

information in the form of signs, surface markings and lighting equipment can be supported by more sophisticated non-visual electronic detection equipment where traffic density and airfield complexity increase risk of a possible infringement of the runway. The following are for use as runway protection aids:

a. taxi-holding position markings

b. stop bars

c. taxi-holding position lights

d. signs:
   i. holding position

   ii. taxiway/runway intersection

   iii. STOP

   iv. NO ENTRY

Details on the characteristics and installation of these aids is given in GCADs.

(2) Ghana Civil Aviation (Aerodrome) Directives recommends the provision of taxi holding position lights (sometimes referred to as runway protection lights) which consist of two alternate flashing yellow lights. At present, these lights are only recommended for a precision approach runway Category III, but consideration is being given to recommending their provision at precision approach Category II runways. Nevertheless, the installation of these lights at all taxi holding positions regardless of the runway type should be seriously considered as they are a very effective and reasonably inexpensive method of delineating an active runway in all visibility conditions.

(3) A further method of safeguarding a runway is the installation of switchable stop bars as described in Aerodrome Standards Manual, which are also a standard requirement for precision approach runways, Category III.

4.5 Non Visual Electronic Protection Equipment

(1) The problem of continuing aerodrome operation at an acceptable level of safety and capacity in reduced visibility has led to the development of many techniques for non-visual surveillance. Many of these systems have been

designed to monitor the whole of the movement area but can be scaled down to cover just the runway and its immediate environs where a more complex SMGC system cannot be justified. These techniques offer three basic forms of non-visual surveillance:

a. the use of radar sensors which produce a facsimile display of the runway and the immediate taxiways together with the operating traffic;

b. the use of linear sensors to monitor the entry and exit of traffic on defined divisions or blocks close to the runway, this being displayed on a suitable indicator; and

c. the use of small area sensors to indicate the occupancy of sectors close to a runway.

(2) Further guidance on the use of this equipment can be found in the GCADs and ICAO Manual on Surface Movement Guidance and Control Systems

CHAPTER 5 — APRON MANAGEMENT SERVICE

5.1 Introduction

(1) The air traffic control service at an aerodrome extends throughout the maneuvering area, but no specific instructions relating to such a service cover the apron. Therefore apron management is required to regulate the activities and movement of aircraft, vehicles and personnel on the apron

(2) The GCADs recommends that an apron management service be provided when warranted by the volume of traffic and operating conditions. Guidance on apron management and safety is given in Part 8, Chapter 10 of the Airport Service Manual.

(3) It is not possible to define at what levels of traffic volume and under what operating conditions an apron management service should be established. Generally speaking the more complex the apron layout the more comprehensive an apron management service needs to be, particularly when taxiways are included in the apron area.

(4) The decision whether or not to provide an apron management service at a particular airport must rest with the aerodrome authority. If firm guidelines were given here on the conditions under which such a service should be provided it would remove the flexibility needed by individual States to design an apron management service more suitable to their particular needs.

(5) Most aerodromes will already have some form of apron management. This may simply be an area set aside for the parking of aircraft, with painted lines to guide pilots to self-maneuvering aircraft stands. At the other end of the scale the apron area may be a large part of the movement area with numerous nose-in stands, several terminals and complex taxiways forming part of the layout. A complex apron area such as this will need a comprehensive apron management service including radio communication facilities.

5.2 Scope of Apron Management Service

(1) The following should be taken to consideration when considering the scope of Apron Management Service

a. Is the apron area sufficiently large, complex or busy to merit a separate staff to manage it?

b. What RTF facilities does the staff need to exercise control over their own vehicles, airline vehicles and, if necessary, over aircraft using apron taxiways?

c. If apron management staff members are required to exercise control over aircraft and vehicles on the apron area to ensure safe separation, then such staff should be properly trained.

d. Will the apron management service issue its own instructions such as start up, push back, taxi clearances, and stand allocation or will these be given by the ATS unit as an element of the apron management service?

e. How will the various airline service vehicles be regulated on the apron as well as on airside roads serving aircraft stands? Is there a need for roads, controlled or uncontrolled, crossing apron taxiways?

f. Who will be responsible for inspection, maintenance and cleanliness of the aprons?

g. What size marshalling service, including leader van service (follow-me vehicles), is required to meet aircraft parking needs?

h. Are low visibility operations contemplated at the aerodrome? If so what procedures need to be developed to ensure safety on the apron area?

i. Are there procedures to cater for contingencies such as accidents, emergencies, diversion aircraft, flow control when the stands are nearly all occupied, maintenance work, stand cleaning and security?

5.3 Who Operates Apron Management Service

(1) Apron management services may be provided by the air traffic service unit, by a unit set up by the Aerodrome Operator, by the operator in the case of a company terminal, or by coordinated control between ATS and the Aerodrome Operator or operating company.

(2) One system of operating aprons has been to set up a traffic management control procedure in which a single unit takes over the responsibility for aircraft and vehicles at a pre-determined handover point between the apron and the manoeuvering area. Generally, the edge of the maneuvering area represents the handover point. In any event, the handover point should be clearly indicated on the ground and on appropriate charts, for example the aerodrome

chart, for the benefit of aircraft/vehicle operators. The apron management unit will then assume responsibilities for managing and coordinating all aircraft traffic on the apron, issuing verbal instructions on an agreed radio frequency, and managing all apron vehicle traffic and other apron activities in order to advise aircraft of potential hazards within the apron area. By arrangement with the aerodrome ATS unit, start-up and taxi clearance to the handover point will be given to departing aircraft where the ATS unit assumes responsibility.

(3) One form of the coordinated apron management service is where radio communication with aircraft requiring start-up or push-back clearance on the apron is vested in the air traffic service unit, and the control of vehicles is the responsibility of the Aerodrome Operator. At these aerodromes, ATS instructions to aircraft are given on the understanding that safe separation between the aircraft and vehicles not under radio control is not included in the instruction.

(4) The apron management service maintains close communication with the aerodrome control service and is responsible for aircraft stand allocation, dissemination of movement information to aircraft operators by monitoring ATC frequencies, and by updating basic information continuously on aircraft arrival times, landings and take-offs. The apron management service should ensure that the apron area is kept clean by airport maintenance and that established aircraft clearance distances are available at the aircraft stand. A marshalling service and a leader Van (Follow-me vehicle) service may also be provided.

5.4 Responsibilities and Functions

(1) Whichever method of operating an apron management service is provided, the need for close liaison between the aerodrome authority, aircraft operator and ATS is paramount. The operational efficiency and safety of the system depends very largely on this close co-operation. The following items are of importance to both ATS and the Aerodrome Operator.

a. Aircraft Stand Allocation. Over-all responsibility for aircraft stand allocation is normally retained by the Aerodrome Operator although for operational convenience and efficiency a system of preferred user stands may be established. Instructions should clearly state which stands may be used by which aircraft or groups of aircraft. Where considered desirable, a preferred order of use of stands should be laid down. Apron management staff should be given clear guidance on the stand occupancy times to be permitted and the steps to be taken to achieve compliance with the rules.

Therefore stand allocation may be delegated to an airline where that airline has a dedicated terminal or apron area.

b. Aircraft arrival/departure times. Foreknowledge of arrival and departure times scheduled, estimated and actual is required by ATS, apron management, terminal management and the operators. A system should be established to ensure that this information is passed between all interested parties as quickly and efficiently as possible.

c. Start-up clearances. Normally these are given by the ATC unit. Where an apron management service operates its own radio communication on the apron area procedures will need to be established between the apron management service and the ATC unit to ensure the efficient co-ordination and delivery of such clearances.

d. Dissemination of information to operators. A system should be established to ensure the efficient distribution of relevant information between apron management, ATS and operators. Such information could include notification of work in progress, non-availability of facilities, snow clearance plans and low visibility procedures.

e. Security arrangements. In addition to normal security arrangements there are security requirements which are of interest to many parties who operate on the apron. These would include contingency plans for such eventualities as baggage identification on the stand, bomb warnings and hijack threats.

f. Availability of safety services. The rescue and firefighting services (RFF) are normally alerted to an incident on the movement area by ATS. However, at aerodromes where aircraft on the apron area are controlled by the apron management service, a communication system needs to be established to alert the RFF when an incident occurs in the apron area of responsibility.

g. Apron discipline. The apron management service will be responsible for ensuring compliance by all parties with Directives relating to the apron.

(2) Aircraft parking/docking guidance system

a. The apron guidance system provided will depend upon the accuracy of parking required and the types of aircraft operating on the apron. The simplest form of stand guidance, where precise accuracy is not required, will comprise stand identification and centre line paint markings. Guidance on apron markings is given in Part 4 of the Aerodrome Design Manual,.

The apron management service should monitor all paint markings to ensure that they are maintained in a clean condition to retain maximum visibility. Where more accurate parking/docking is required then one of the guidance systems conforming to the specifications in Aerodrome Standards Manual must be installed. Details of these systems are given in Part 4, Chapter 12 of the ICAO Aerodrome Design Manual. The apron management service should monitor these systems and associated guidance lights to ensure that they are inspected at least weekly to maintain high standards of serviceability.

(3) Marshalling service

a. An aerodrome marshalling service should be provided where parking or docking guidance systems do not exist or are unserviceable or where guidance to aircraft parking is required to avoid a safety hazard and to make the most efficient use of available parking space. Proper training arrangements should exist for marshallers and only those who have demonstrated satisfactory competence should be permitted to marshal aircraft. Where aerodrome marshalling is provided, comprehensive instructions should be written for marshallers including:

i. the absolute necessity for using only authorised signals (copies of these should be displayed at suitable points);

ii. the need to ensure that prior to using the authorised signals the marshaller shall ascertain that the area within which an aircraft is to be guided is clear of objects which the aircraft, in complying with his signals, might otherwise strike;

iii. the circumstances in which one marshaller may be used and the occasions when wing walkers are necessary;

iii. the action to be taken in the event of an emergency or incident involving an aircraft and/or vehicle occurring during marshalling, e.g. collision, fire, fuel spillage;

iv. the need to wear a distinctive jacket at all times. This jacket can be of the waistcoat variety coloured day-glow red, reflective orange, or reflective yellow; and

iv. the action to be taken when re-positioning of aircraft is to be carried out by tractor and signalling is necessary to close down engines.

APPENDIX A- GUIDANCE ON SELECTING SMGCS SYSTEM AIDS

VISIBILITY ……..... TRAFFIC DENSITY…….

	Remark	Traffic	**Light**			**Medium**			**Heavy**		
Aid Condition		Visibility	1	2	3	1	2	3	1	2	3
Apron markings			X	x	x	x	x	x	X	x	x
Runway centre line marking			X	x	x	x	x	x	X	x	x
Taxiway centre line marking			X	x	x	x	x	x	X	x	x
Taxi – holding position marking			X	x	x	x	x	x	X	x	x
Visual aids for denoting restricted use areas			X	x	x	x	x	x	X	x	x
Runway edge lights			X	x	x	x	x	x	X	x	x
Taxiway edge lights			X	x	x	x	x	x	x	x	x
Obstacle lighting			X	x	x	x	x	x	x	x	X
Signs			X	x	x	x	x	x	x	x	X
Taxiway intersection marking			X	x	x	x	x	x	x	x	X
Charts,(aerodrome, movement, apron)			X	x	x	x	x	x	x	x	X
Aerodrome control service			X	x	x	x	x	x	x	x	X
Signalling lamp			X	x	x	x	x	x	x	x	X
Radiotelephony equipment			X	x	x	x	x	x	x	x	X
Taxi – holding position lights					x		x	x	x	x	X
Clearance bars					x		x	x	x	x	X
Electrical monitoring system for lights				x	x		x	x	x	x	X
Taxiway centre line lights					x			x			X
Stop bars					x		x	x		x	X
Selective switching capability for taxiway centre line lights								x			X
Selective switching capability for apron taxiway centre line lights								x			X
Surface Movement Radar (SMR)								x		x	X
Aircraft stand manoeuvring guidance lights					x			x			X
Runway clearance aid					x			x		x	X
Secondary power supply					x		x	x		x	X
Visual docking guidance system					x			x		x	X

See Appendix A for further information on visual aids											

Appendix B: Guidance on Selecting Procedure Component of SMGCS

Condition Procedure	Traffic	Light			Medium			Heavy		
	Visibility	1	2	3	1	2	3	1	2	3
Aerodrome Operator		x	x	x	x	x	x	x	x	x
Periodic electrical monitoring of SMGC aids		x	x	x	x	x	x	x	x	x
Designation of taxiways		x	x	x	x	x	x	x	x	x
Movement area inspection and reporting		x	x	x	x	x	x	x	x	x
Directive of ground staff conduct on the movement area		x	x	x	x	x	x	x	x	x
Initiation of amendment of aerodrome charts as necessary		x	x	x	x	x	x	x	x	x
Directive of ground staff radiotelephony procedures		x	x	x	x	x	x	x	x	x
Establishment of standard taxi routes				x		x	x	x	x	x
Low visibility movement area protection measures				x			x			x
Continual electrical monitoring of SMGC aids				x			x			x
ATS										
Visual monitoring of SMGC aids		x	x	x	x	x	x	x	x	x
Use of radiotelephony procedures and phraseology		x	x	x	x	x	x	x	x	x
Use of signalling lamp		x	x	x	x	x	x	x	x	x
Control of other than aircraft traffic on the manoeuvring area		x	x	x	x	x	x	x	x	x
Operation of lighting aids		x	x	x	x	x	x	x	x	x
Determination of the taxiway route to be followed				x		x	x	x	x	x
Application of sequencing procedure				x	x	x	x	x	x	x
Initiation and termination of low visibility procedures				x			x			x
Application of separation criteria				x			x			x
Continual electrical monitoring of SMGC aids		x	x	x	x	x	x	x	x	x
Monitoring of surface movement on SMR				x			x		X	x
Selective switching of taxiway centre-line lights							x			x
Selective switching of stop bars				x		x	X		x	x
Pilot										
Adherence to ground movement traffic rules and Directives		x	x	x	x	x	x	x	x	x

Use of radiotelephony procedures and phraseology	x	x	x	x	x	x	x	x	x
Apron Management									
Apron Directives and procedures	x	x	x	x	x	x	x	x	x
Emergency procedures	x	x	x	x	x	x	x	x	x
Communication procedures with ATS	x	x	x	x	x	x	x	x	x
Stand allocation and information	x	x	x	x	x	x	x	x	x
Apron security procedures	x	x	x	x	x	x	x	x	x
Operation of lighting and docking aids			x			x			x
Provision of discrete RTF channel						x	x	x	x
Low visibility procedures			x			x			x
See Appendix A for further information on visual aids	x	x	x	x	x	x	x	x	x

Visibility and Traffic Conditions associated with SMGCS

Visibility	Visibility Condition 1	Visibility sufficient for the Pilot to taxi and to avoid collision with other traffic on taxiway and at intersection by visual reference and for personnel of control units to exercise control over all traffic on the basis of visual surveillance.
	Visibility Condition 2	Visibility sufficient for the pilot to taxi and avoid collision with other traffic on taxiways and at intersections by visual reference but sufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance.
	Visibility Condition 3	Visibility less than 400m in RVR (low visibility operation).
Traffic Density	Light	Not greater than 15 movements per runway or typically less than 20 total aerodrome movements.
	Medium	Of the order of 16 to 25 movements per runway or typically between 20 and 35 total aerodrome movements.
	Heavy	Of the order of 26 or more movements per runway or typically more than 35 total aerodrome movement.