ADVISORY CIRCULAR

SLCAA-AC-AGA007-Rev. 01

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SIERRA LEONE CIVIL AVIATION AUTHORITY

Surface Movement Guidance and Control System

Moses Tiffa Baio
Director General
Sierra Leone Civil Aviation Authority

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1. GENERAL

The Sierra Leone Civil Aviation Authority's Advisory Circulars contains information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated Regulations.

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

Information considered directive in nature is described in this AC in terms such as "shall" and "must", indicating the actions are mandatory. Guidance information is described in terms such as "should" and "may" indicating the actions are desirable or permissive, but not mandatory

1.1 Purpose

This Advisory Circular provides methods, acceptable to SLCAA, for showing compliance with the Surface Movement Guidance and Controls Systems requirements of the Sierra Leone Civil Aviation Regulations, Part 14A as well as explanatory and interpretative material to assist in showing compliance.

1.2 Description of Changes

This AC is the second to be issued on this subject

1.3 References

a) SLCAR Part 14A – Aerodrome Design and Operations Standards

b) SLCAA-AC-AGA021-Rev00 - Apron Management Services

c) SLCAA-AC-AGA014-Rev.01 – Visual Aids

1.4 Cancelled Documents

This document repeals and replaces the previous guidance prescribed in **SLCAA-AC-AATNS007 – SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEMS**

2. INTRODUCTION

2.1 Overview of Surface Movement Guidance and Control Systems

2.1.1 **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.

2.1.2 **Composition**. A SMGCS comprises an appropriate combination of visual aids, non-visual aids, procedures, control, regulation, 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.

2.1.3 **Governing Factors**. The SMGCS 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.

2.1.4 **Objective.** The objective of an SMGCS 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 SMGCS is to safeguard against unauthorised or inadvertent entry onto operational runways. Another important safety function of an SMGCS is to provide assistance to rescue and fire fighting vehicles in locating and proceeding to the site of an accident on the movement area.

2.1.5 **Operational Requirements of SMGCS.** The system shall be appropriate to the visibility and traffic density and shall provide:

(a) Requirements of a general nature

(i) 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;

(ii) acceptable work-loads on the users of the SMGCS

(iii) optimum use of aids and procedures already specified Part 14A and in ICAO Doc 9476 regulatory documents;

(iv) compatibility between individual elements of the guidance and control systems; and

(v) current and forecast meteorological conditions

(b) Requirements of Pilots

(i) 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;

(ii) information on the route to be followed;

(iii) information on position along the route being followed;

(iv) guidance along the route being followed and parking guidance;

(v) warning of;

(1) changes in direction;

(2) stops and other speed adjustments;

(vi) identification of areas to be avoided;

(vii) information to prevent collision with other aircraft, ground vehicles or obstacle; and

(viii) information on system failures affecting safety

(c) Requirements of appropriate control units

(i) information on the identity, position and progress of aircraft including aircraft under tow;

(ii) Information on the identity, position and progress of ground vehicles whose movements might conflict with aircraft movements;

(iii) Information on the presence of temporary obstacles or other hazards;

(iv) Information on the operational status of elements of the system; and

(v) Facilities appropriate to the control to be exercised.

(d) Requirements of ground vehicles on the movement area

(i) emergency vehicles

(1) information on the route to be followed;

(2) guidance along the route being followed;

(3) capability to locate the site of an emergency;

(4) information to prevent collision with aircraft and ground vehicles; and

(ii) other ground vehicles

(1) information on the route to be followed;

(2) guidance along the route being followed;

(3) information to prevent collision with aircraft and ground vehicles

2.1.6 **Future Considerations.** All aerodromes require a SMGCS. 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.

3. AERODROME SMGCS

3.1 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 system (SMGCS) for an airport. For the purpose of discussing SMGCS, visibility and traffic conditions have been subdivided and defined according to the terms indicated in Appendix 2. Whenever these terms are used in this AC, they have the meanings given to them in Appendix 2.

3.1.1 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)

3.1.2 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.

3.2 Basic Equipment Requirement

(a) The equipment required at a particular aerodrome for provision of SMGCS 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 SMGCS and should therefore be provided at all aerodromes:

(b) Minimum Equipment Requirements for SMGCS for all Aerodromes

(i) Markings

(1) Runway Centreline

(2) Taxiway Centreline

(3) Taxi-holding Position

(4) Taxiway Intersection

(5) Apron

(6) Restricted Use Area

(ii) Lighting

(1) Runway Edge

(2) Taxiway Edge

(3) Obstacle

(4) Restricted use areas

(iii) Signs

(1) Mandatory Signs

(2) Information Signs

(iv) Other

(1) aerodrome chart

(2) aerodrome control service

(3) signalling lamp

(4) radiotelephony equipment

3.3 Basic Procedural/Administration Requirements

Procedures are an important and integral part of SMGCS 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 SMGCS 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 SMGCS and should therefore be implemented at all aerodromes:

(a) Aerodrome authority

(i) designation of taxiways

(ii) movement area inspections

(iii) regulation of ground staff conduct on the movement area

(iv) regulation 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 SMGCS aids

(c) Pilot

(i) adherence to ground movement traffic rules and regulations

(ii) use of radiotelephony procedures and phraseology

3.4 Matching Aids to Aerodrome Conditions

(a) Appendix 1 of this AC, 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.

(b) It also 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:

(i) the number of aircraft using the aircraft stand

(ii) weather conditions

(iii) space available on the apron

(iv) precision required at the parking position

(v) availability and cost of alternative means

(c) 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.

(d) Charts are another aid which cannot be precisely specified. A ground movement chart can be provided however, when it is incapable of showing all required 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 1. The aerodrome operator should assess the number of charts required in accordance with the amount of information required to be shown.

3.5 Matching Procedures to Aerodrome Conditions

(a) Appendix 2 below 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.

(b) It is to be noted that a separate section of Appendix 2 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.

3.6 Review of System and Improvement

(a) Regular reviews of the SMGCS should be carried out to ensure that the system is fulfilling its intended task, and to assist the aerodrome operator 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 should 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.

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

(i) the volume of traffic increases significantly;

(ii) operations in lower visibility conditions are planned; and

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

(c) 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.

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

(i) a marked increase in the loading on the communications channels used for SMGCS;

(ii) 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

(iii) the occurrence of bottlenecks, congestion and delays in surface traffic movements

(e) 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.

4. DIVISION OF RESPONSIBILITIES

4.1 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.

(a) **Air Traffic Services.**

(i) 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.

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

(iii) Issue of taxi clearance to facilitate SMGCS.

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

(v) 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.

(vi) 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.

(vii) Operation of visual guidance and control aids. The appropriate aerodrome control service should 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.

(viii) Division of responsibility between the controllers 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.

(b) **Apron Management Service.**

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

(c) **Pilots.**

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

(d) **Aerodrome Operator**

(i) Movement area inspections. The aerodrome operator shall 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.

(ii) Ground staff. The aerodrome operator and ATS shall be responsible for the regulation and control, respectively, of ground staff on the movement area. The aerodrome operator shall be responsible for ensuring that ground staff are properly trained particularly in RTF and monitored in its use.

(iii) Servicing of SMGCS aids. The aerodrome operator shall normally be responsible for ensuring that all visual components of the SMGCS are kept serviceable. This shall require frequent physical inspections of these visual components.

(iv) Designation of taxiways and standard taxi routes. In conjunction with the ATS, the aerodrome authority shall 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.

(e) **Airside Drivers**

Drivers of ground vehicles must comply with aerodrome regulations and ATC instructions. Notwithstanding this, drivers shall be responsible for exercising due care and attention so as to avoid collisions between their vehicles and aircraft, and between their vehicles and other vehicles.

4.2 Avoidance of Over Control

(a) The surface movement guidance and control system shall provide a degree of control which is adequate to meet the needs of pilots and controllers.

(b) It is important to ensure that the efficiency of the over-all system is not impaired by the imposition of unnecessary controls and restrictions on pilots and controllers. Pilots and controllers should be allowed to exercise their specific responsibilities when circumstances so permit. When circumstances do not allow this, additional restraints are progressively required to ensure safety of ground movement. It is particularly important that these restraints be removed promptly as conditions improve.

(c) With contemporary SMGC systems the traffic capacity may be reduced by the need, in certain circumstances such as during low visibility operations, to exercise high levels of control. Future advances in automated systems may permit a higher degree of control without adverse effect on capacity.

(d) Major considerations of ground movement control in low visibility operations shall be to:

(i) avoid traffic conflicts between taxiing aircraft and between an aircraft and a ground vehicle;

(ii) ensure that aircraft or ground vehicles do not enter the ILS critical or sensitive areas at an improper time;

(iii) ensure that the runway in use is clear when an aircraft is landing or taking off;

(iv) facilitate taxiing to and from the runway; and

(v) maintain the maximum safe capacity of the airport

4.3 Ground Movement Communications

(a) The communication aspects of an aerodrome control service fall into three main categories:

(i) control of air traffic in the circuit and in the approach, landing and departure phases of flight;

(ii) control of taxiing aircraft and vehicles on the manoeuvring area; and

(iii) acquisition and passing of airways clearances, weather information and other flight data

(b) At an aerodrome with light traffic one controller may be responsible for all of these duties, using one RTF channel for all purposes. At a large aerodrome with heavy traffic, the aerodrome control service may be shared between a number of controllers and assistants. The increase in traffic demand may also carry an increase in total RTF loading which demands the use of separate channels.

(c) In a developing aerodrome or traffic situation the point at which additional control positions need to be introduced may hinge solely upon RTF channel loading, or the decision may be prompted by other factors such as controller work-load generated by the particular mix of traffic, complexity of aerodrome layout or the need to provide a control position which offers a better view of the manoeuvring area. Whether or not the duplication of positions is due to RTF loading, each position shall have its own discrete frequency.

(d) A typical usage of two RTF channels is to have the service described in 4.3(a)(i) on one frequency and 4.3(a)(ii) and c) on the other; b) and c) subsequently become divided when work-load develops to the point at which another channel is required. In some instances it may become necessary to open an additional frequency or frequencies, during the busy hours of the day and then revert to a more limited communication channel usage in the less busy periods.

(e) It is customary for non-aeronautical radio frequencies to be used for communication between ground vehicles and various aerodrome agencies such as contractors, customs, police, airline companies, etc., but it must be ensured that when operating on the movement area use of the non-aeronautical frequency does not preclude maintenance of a listening watch on the ground movement control frequency.

(f) A spare frequency for use if a normal channel is jammed / over loaded is a highly desirable facility which can, on occasion, save a great deal of trouble and delay.

(g) At an aerodromes provision should be made for a discrete RTF contact between emergency services vehicles and an aircraft which has landed after declaring an emergency, or in any emergency when the aircraft is on the ground and capable of being manoeuvred. This is of particular significance with large aircraft where it is important for the crews of the emergency vehicles to be aware of the pilot's intentions so that risk to aircraft occupants and to personnel on the emergency vehicles may be minimized. For such a discrete frequency to be of value it is obviously necessary that the users of radiotelephony equipment in these circumstances be able to communicate in a common language. For situations where a common language does not exist, communication between the pilot and the fire service will have to be relayed by ATC.

4.4 Standard Taxi Routes for Aircraft

(a) At an aerodrome, the movement of taxiing aircraft generally falls into a distinctive pattern in which the major traffic flows are between:

(i) runways and aprons

(ii) aprons and maintenance areas

(iii) maintenance areas and runways

Where possible, standard taxi routes which are direct, simple and capable of being used in both good and bad visibility, which offer minimum conflict with the routes of other aircraft or vehicles shall be arranged between these locations. One-way systems shall be introduced where this can be done without greatly extending taxiing distances as, among other things, long taxi distances result in higher temperatures for brakes and tires.

(b) Care must be taken in ensuring that the routes are adequate for the largest aircraft likely to use them, and that aircraft using them do not offer problems of:

(i) interference with navigation aids;

(ii) penetration of the obstacle free zone and, where possible, penetration of other obstacle limitation surfaces;

(iii) obstruction of radar transmissions;

(iv) physical obstruction (e.g. inadequate clearance from aircraft holding for take-off from an intermediate point); or

(v) jet blast

(c) Routes will vary according to the runways in use for landing and take-off. A route plan must allow for an orderly transition from one operational mode to another, e.g. following a runway change, and also the aircraft which, after taxiing for take-off, needs to return to the apron.

(d) For aerodromes where standard taxi routes are provided, details of such routes shall be published in the aeronautical information publication and shown on aerodrome charts. Routes shall normally be identified by designators. The designators of taxi routes shall be distinctively different from those of the runways, taxiways and instrument departure routes. Where a route includes taxiing between areas under control of ATS and the apron management service, the transition points shall be indicated on either the aerodrome chart or ground movement chart.

(e) An established standard taxi route system offers advantages over a random system, in that it increases safety, expedites movement, provides for more confident operation in reduced visibility and decreases the RTF work-load.

4.5 Monitoring

(a) **Lighting aids**

(i) Surface movement guidance and control relies heavily upon lights for safe operations in reduced visibility and at night, and it is of vital importance that ATC must be aware of any discrepancies between the lighting selected on the lighting control panel in the control tower and the lights which actually show on the aerodrome surface. Normally in good conditions at night, it is not difficult to see whether the switches operated bring on the appropriate surface lights; the problems arise in reduced visibility when the lights are not visible to the controller.

(ii) Ideally all lights shall be operative but as a guide for maintenance it is considered that not more than 20 per cent of taxiway centre line lights shall be inoperative, and two consecutive taxiway centre line lights shall not be inoperative. Because of the normally high reliability of aerodrome lighting systems, an electrical monitoring system may not be required, but visual inspection shall be carried out with sufficient frequency to ensure adequacy of the taxiway lighting system.

(iii) In conditions when direct visual appraisal of aerodrome surface lights is not possible, monitoring is usually carried out by:

(1) observation of "mimic" or "tell-tale" lights on the lighting control panel; and

(2) checking of power supply and circuit state indicators

Many lighting control panels provide a tell-tale indication only of the lighting selected and do not indicate whether the lights are actually lit. A feedback mimic may indicate whether a particular group of lights is on or not, but may not reflect individual light failures which could be significant for movement in low visibility. Power supply and circuit state indications can provide information on the percentage of light outage without showing the specific nature of the failures. Problems can arise from failure of lamps to extinguish, as well as from failure to light, on selection. Safe and efficient ground movement in low visibility demands a monitoring system so designed that the controller is quickly aware, and continuously reminded, of any lighting failure which could affect safety or cause taxiing difficulties in the area for which he has responsibility.

(iv) Information is available in the Advisory Circular SLCAA-AC-AGA044-Rev01 -, Electrical Systems, concerning the type of electrical monitoring system which shall be installed to verify instantly that all lighting equipment is in good working order. Sample monitor signals to indicate the operational status of an installation is:

(1) Installation out of order: tell-tale light off;

(2) Installation in order: tell-tale light on and steady; and

(3) Installation faulty when switched on: tell-tale light blinking.

Different blinking frequencies to indicate different degrees of fault and a failure warning, is accompanied by a sound alarm.

(v) The extent and detail of monitoring that can be done in the control tower will depend upon the size and complexity of the lighting system. For an elementary layout full system monitoring might be acceptable in the tower. At a large aerodrome, well equipped for low visibility operations, lighting control and monitoring might need to be concentrated in a technical control room. The panel in the control tower would indicate a fault, the more sophisticated engineer's panel would indicate the precise nature of the fault and this information would be immediately relayed to the appropriate ATS unit.

(vi) To ensure the integrity of monitoring systems, it is desirable that their power supply must be obtained from a separate source. (See also SLCAR Part 14A, section 8 for specifications regarding the application and characteristics of a secondary power supply.)

(b) **Non-visual aids**

With the introduction of non-visual aids to SMGC the dependence of ATC upon the correct functioning of the non-visual aids will be such that, as with aerodrome lighting, a monitor system must be provided to indicate any malfunction.

4.6 Training

(a) The training requirements of licensed personnel, e.g. air traffic controllers and pilots, is the responsibility of the ANSP or Airline but the training of other personnel authorized to operate on the movement area or involved in the provision of the SMGC system, is the responsibility of the aerodrome oprator. Training falls into two main categories: initial and recurrent or proficiency training.

(b) Initial training is provided by the aerodrome operator to all new employees and newcomers to a specific unit. It normally covers but is not limited - to:

(i) RTF procedures

(ii) Aerodrome layout

(iii) Aerodrome procedures

(iv) Aerodrome emergency procedures

(v) Aerodrome low visibility procedures

(vi) Aerodrome special procedures

(vii) Aircraft recognition

(viii) Vehicle operating procedures.

(c) Recurrent or proficiency training shall not be overlooked. When dealing with low visibility operations, this training may be critical since the exposure to low visibility procedures is limited due to one or both of the following:

(i) The infrequent occurrence and short duration of low visibility conditions; and

(ii) Individual shift rotation or extended absence from duty for whatever reason.

(d) It is suggested that appropriate recurrent training be given at least every six months. Such training can take different forms depending on the degree of involvement of the staff member. It should be designed keeping in mind the safety of aircraft and the effect of misapplication of an aerodrome procedure.

5. LOW VISIBILITY OPERATIONS

5.1 Purpose

(a) The purpose of this chapter is to briefly outline the preparation necessary for aerodrome operating agencies to provide for low visibility operations. Guidance on the selection of particular SMGC system components for visibility condition 3 is contained in Appendix 1 of this AC. Guidance information and advice is also provided in the Advisory Circular SLCAA.AC.AGA014-Rev00 – Visual Aids, and the Manual of All- Weather Operations (ICAO Doc 9365).

(b) Although this chapter relates more to Category III type operations, it is important to note that many aerodromes not equipped for landing in low visibility often conduct take-off operations in low visibility and thus many of the points discussed are equally pertinent to this form of operation.

5.2 Preparation for Low Visibility Operations

(a) The introduction of low visibility operations is considerably more complex than a simple adjustment of existing procedures and restrictions. Ground operations below an RVR of 400 m create additional problems due to the reduced ability of controllers, pilots, drivers and other relevant personnel to control and operate on an aerodrome in reduced visibility without risk of collision with others and infringement of an active runway. It is therefore essential that no agency be allowed to operate independently from another and, before embarking on such operations, the aerodrome operator must administer and control the various organizations and provide specific low visibility procedures and regulations.

Working group

(b) No two aerodromes are exactly alike and thus during the preparation period, it is essential that all aspects of an aerodrome operation which might affect the introduction of low visibility procedures shall be examined. The administrative process will vary from aerodrome to aerodrome but the most effective method is to form a working group composed of representatives of all parties involved in such operations. The working group will need to identify many general factors pertinent to operation below 400 m RVR. These include:

(i) the need for additional and more reliable ground equipment and aircraft systems;

(ii) the special requirements for the training and qualification of flight crew and ground personnel;

(iii) the stringent criteria required for obstacle clearance;

(iv) the aerodrome layout and the nature of the surrounding terrain;

(v) the stringent criteria required for the protection of the ILS signal;

(vi) the adequacy of runways and taxiways; approach, runway and taxiway lighting and marking for such operations;

(vii) the need for a more comprehensive control of ground movement traffic; and

(viii) the deployment of rescue and fire fighting services

It will be necessary for the working group to establish a work programme; based on a time schedule, in which these subjects and many others are examined.

Operational assessment

(c) Low visibility operations demand higher specifications in the form of equipment and training. Study will be necessary in the initial planning stage to decide whether such operations are justified. This study will need to consider such factors as the incidence of low visibility, present and forecast traffic volumes, the proximity of suitable diversion aerodromes and the potential for improvement in regularity of operations and safety standards.

(d) In addition to the introduction and revision of low visibility procedures, the working group shall also have to decide on the visual and non-visual components of the SMGC system and the control methods to be employed.

Safety assessment and procedures

(e) The working group shall also need to make a comprehensive safety assessment of the aerodrome. Guidance on this assessment is given in the ICAO 9365 Manual of All-Weather Operations, Chapter 5 and shall take account of the lowest RVR at which the aerodrome intends to remain operational and the expected volume of aerodrome traffic movements.

(f) In particular, the assessment shall take account of the increased operating risk due to the lack of visual control that can be exercised by ATC as visibility decreases. One method is to use the same figure that is often quoted in the development of aircraft operating minima, i.e. "risk not in excess of the probability of one fatal accident per $l0^7$ operations". Although this figure is used for higher aircraft movement speeds than would be expected when taxiing in low visibility, it does include the probability of runway intrusion at the time of aircraft landing or taking off and, as such, is pertinent to the over-all ground movement scenario. As an aircraft is at its most vulnerable when landing or taking off and is virtually incapable of taking any avoiding action, the attention of the working group shall be focused specifically on the probability of runway intrusion by taxiing aircraft and/or vehicles. In this respect the following action shall be taken:

(i) Examination of the movement area design with specific attention being given to aircraft routings between apron and runways, ground traffic control points and movement area entrances;

(ii) Examination of the existing ATS instructions, standard operating procedures and company rules that are relevant to the general ground movement scenario;

(iii) Examination of meteorological records and movement statistics for aircraft and other vehicles;

(iv) Examination of any past records of runway intrusion. If no records are available, it may be necessary to establish an incident rate by discussion with controllers, inspecting authorities, etc. or refer to general international experience;

(v) Examination of existing airport security programme. The possibility of runway intrusion as an aggressive act is not large in comparison with the possibility of an inadvertent intrusion but the use of the airport security programme can have a significant effect upon the over-all intrusion probability; and

(vi) A comprehensive inspection of the total movement area accompanied by the relevant experts and stakeholders during which the findings from a) to e) shall be verified

(g) This safety assessment shall be considered by the working group as part of a complete SMGC system and shall be completed in the early stages of the preparation process. Those areas of operation which are considered to have a high level of risk will require extra protection measures and associated procedures.

5.3 Low Visibility Procedures

(a) The procedures required for low visibility operations vary with each aerodrome. The low visibility procedures developed for a particular aerodrome must take into account local conditions; however, the basic factors that follow will need to be considered.

(i) All drivers and other personnel authorized to operate on the movement area are adequately trained in these procedures and are aware of the additional responsibilities placed upon them in low visibility.

(ii) A record is maintained by the ATS of persons and vehicles on the manoeuvring area.

(iii) All non-essential vehicles and personnel, e.g. works contractors and maintenance parties must be withdrawn from the manoeuvring area.

(iv) Essential vehicles permitted to enter the manoeuvring area are kept to a minimum and must be in RTF communication with ATC.

(v) Where the possibility of inadvertent entry onto the manoeuvring area exists and where physical closure is not practical, e.g. between aircraft maintenance areas and manoeuvring areas, entry points shall be manned. If an opening is too wide for visual surveillance then it shall be fitted with intruder detection equipment and those areas with intensive vehicular movement adjacent to the manoeuvring area and with no traffic control shall be regularly patrolled.

(vi) All unguarded gate entrances to the movement area are kept locked and inspected at frequent intervals.

(vii) There is adequate provision for alerting airlines and other organizations with movement area access of the introduction of low visibility procedures. This is particularly important where companies exercise control over their own apron areas and maintenance facilities adjacent to the manoeuvring area.

(viii) All personnel whose presence on the movement area is not essential to the operation shall be withdrawn.

(ix) Appropriate emergency procedures must be developed (see 5.4 below).

(b) Consideration shall also be given to the closure of runway access taxiways that are not essential for entrance to or exit from the particular runway. This can be achieved by taxi-holding position lights, traffic control lights, red stop bars or by physical closure using the serviceability markers specified in SLCAR Part 14A, Chapter 7. Also, where possible, there shall be a limitation on the number of routes for taxiing to and from the runway in low visibility and these shall be identified, marked and published for the use of aircraft operators.

(c) This AC defines visibility condition 3 as "visibility less than 400 m RVR"; however, it will be necessary for the appropriate authority to provide specific procedures at a much higher RVR value dependent on the type of aerodrome operation. The figure of 400 m RVR has the advantage of being easily identified with the top limit of Category (II) but has the disadvantage in prompting the quite unwarranted belief that low visibility procedures and equipment are only necessary at aerodromes capable of sustaining Category (II) landings. At aerodromes not equipped for landing in such conditions aircraft may be able to take off in visibility less than 400 m RVR. As pointed out in 4.1.3 above it will be necessary to introduce specific safeguards and procedures at such aerodromes as well.

(d) The point at which low visibility procedures shall be implemented will vary from aerodrome to aerodrome depending on local conditions. This point may initially be related to a specific RVR/cloud base measurement (e.g. 800 m/200 ft) in a worsening weather situation and will be dependent on the rate of weather deterioration and the amount of lead time necessary to implement the extra measures.

(e) When the low visibility procedures are implemented, it will be necessary for the aerodrome operator to continuously review the effectiveness of the procedures and, when necessary, to amend or update the procedures.

(f) The above is intended as a guideline in establishing low visibility procedures. The actual procedures developed for a particular aerodrome will need to take account of local conditions. Examples of low visibility procedures in use at several airports experienced in such operations can be found in Appendix B of ICAO Doc 9476.

5.4 Emergency Procedures

(a) An essential factor that must be addressed prior to the introduction of low visibility operations is the ability of the rescue and fire fighting service (RFF) to respond quickly to an emergency situation. SLCAR Part 14A, Chapter 9 gives the specifications for the provision of RFF facilities and the requirement for an established aerodrome emergency plan in which ATC are involved. In good visibility it can be assumed that -ATC will either observe an incident or be among the first to know of it, and that they will initiate emergency

action, provide the RFF service with the accident location and aircraft type, take action to safeguard other traffic and maintain contact with the emergency command post.

(b) During low visibility conditions or at visibilities below the limits of ATC visual surveillance, ATC may not be immediately aware that an incident/accident has occurred. For instance, a brake fire, unless detected on board the aircraft, is not likely to be noticed by ATC and a report, if any, will come from some other source. It is important therefore that those personnel permitted to operate on the movement area be aware of their responsibilities in reporting such incidents quickly and accurately and are well versed in the correct method of notification to ATC and/or the RFF service.

(c) Sometimes the information received may be limited or confused and ATC may need to verify that an incident has occurred and also its location. There is no simple clearly defined operational procedure to suit every situation. It would be wrong if the crash alarm was initiated on every occasion when doubt arose but, on the other hand the time saved in the real event could be imperative. Responsibility for the final decision must rest with the controller on the spot and there should be no operational or commercial pressure that might prompt him to "wait and see" and equally no criticism if, in the final analysis, there was a degree of "over reaction". There shall be no reluctance to call for RFF support.

(d) Once emergency action is initiated, a number of other problems arise as a result of reduced visibility. The primary need is to get the RFF services to the scene of an incident/accident as quickly as possible without creating additional safety hazards. The factors that affect this response time are:

(i) the location of the RFF vehicles;

(ii) the aerodrome layout;

(iii) the nature of the terrain adjacent to the paved areas and in the immediate vicinity of the aerodrome;

(iv) the RFF vehicle capabilities (e.g. cross-country); and

(v) vehicle speed

(e) All the above are pertinent to normal RFF operation but in low visibility the speed and route to an incident/accident can become critical. It is not expected that vehicle speed will be significantly reduced until the visibility falls below 200 m when the need to reduce speed to avoid collisions may affect the RFF response time. Since the location of an incident/accident is random and as many aerodromes have only one RFF station, the response time in low visibility may prove to be excessive. A method of overcoming this is to redeploy the RFF vehicles at two or more dispersal points about the aerodrome to ensure that no incident occurs at more than an acceptable distance from RFF support. The reduction in distance will compensate for any speed loss and is particularly important in the case of fire where rapid intervention may prevent a minor incident escalating to something more serious. In the event of a major accident the over-all loss of a concentration of RFF vehicles

as a result of redeployment is probably offset in the early stages by the more rapid intervention of a smaller RFF force.

(f) The selection of the shortest route shall be dependent upon the geography of the aerodrome and the deployment of RFF vehicles. It is obviously important that RFF personnel must be very familiar with the aerodrome layout, signs, markings and easily identifiable landmarks together with the associated terrain. It is also important that they are kept fully informed of temporary obstructions such as works and maintenance that may affect the choice of route to an incident. ATC may be able to assist by switching taxiway lights to provide a clearly defined route, or by re-routing other traffic clear of the occurrence area and, where available, by the use of surface movement radar (SMR).

(g) The use of SMR simplifies the solution to the many problems associated with the location of an incident and the subsequent guidance and control of RFF vehicles and other traffic. The scattering of debris in a major accident provides a most positive response on modern high definition radars and the ability to display all activity on the aerodrome surface enables controllers to identify the precise location of surface traffic and provide the best route for the RFF services. It is important that, where this facility is available, the RFF and ATC services carry out regular training exercises in order that they are both proficient in the use of the equipment.

(h) When SMR and/or sophisticated lighting systems are not available for vehicle guidance, it may be necessary to consider the provision of extra navigation equipment on board the RFF vehicles. This equipment could vary from a relatively simple beacon homing device through to more complicated thermal image intensifiers or area navigation systems recently developed for vehicles. But whatever the standard of equipment, it is essential that RFF personnel are fully trained in all the problems associated with operating in low visibility and are given opportunities to carry out realistic exercises when these conditions prevail.

6. RUNWAY PROTECTION MEASURES

6.1 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 aerodrome operator and air traffic control (ATC) agencies to check and, if necessary, enhance their operating procedures.

6.2 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 exclusive 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.

6.3 Types of Runway Encroachment

Apart from deliberate intrusion on to a runway for unlawful purposes, which falls outside the scope of this document, there are three types of encroachment:

(a) Accidental Entry

(b) Mistaken Route.

(c) Misunderstood Clearance

6.3.1 **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 shall 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 authorised to enter the movement area is necessary and they shall be familiar with all surface markings, signs and lights. Mistakes may occur but the provision of positive ground movement rules and regulations shall reduce the chances of mistakes occurring to a minimum.

6.3.2 **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 recognized 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 authorised 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.

6.3.3 **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 shall 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.

6.4 Runway Protection Methods

(a) 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 recognized 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:

(i) taxi-holding position markings

(ii) stop bars

(iii) taxi-holding position lights

(iv) signs:

(1) holding position

(2) taxiway/runway intersection

(3) STOP

(4) NO ENTRY

Details on the characteristics and installation of these aids are given in the SLCAR Part 14A and the Advisory Circular SLCAA-AC-AGA014-Rev. 00 – Visual Aids.

(b) SLCAR Part 14A, Chapter 5 requires the provision of holding and intermediate holding position lights which consist of two alternate flashing yellow lights. At present, these lights are only required for a precision approach runway Category III, but consideration is being given to require their provision at precision approach Category II runways. Nevertheless, the installation of these lights at all holding positions regardless of the runway type shall be seriously considered as they are a very effective and reasonably inexpensive method of delineating an active runway in all visibility conditions.

(c) A further method of safeguarding a runway is the installation of switchable stop bars as described in the SLCAR Part 14A, which are also a standard requirement for precision approach runways, Category III.

6.5 Non Visual Electronic Protection Equipment

(a) 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 SMGCS cannot be justified. These techniques offer three basic forms of non-visual surveillance:

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

(ii) 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

(iii) the use of small area sensors to indicate the occupancy of sectors close to a runway

(b) Further guidance on the use of this equipment is given in the SLCAR's Part 14A and ICAO Manual on Surface Movement Guidance and Control Systems (ICAO Doc 9476)

7. APRON MANAGEMENT SERVICE

7.1 Introduction

(a) 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

(b) The (SLCAR's Part 14A) requires 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 the Advisory Circular SLCAA-AC-AGA-021-Rev. 00 ─ Apron Management Services and ICAO Doc 9137 Part 8, Chapter 10.

(c) It is not possible to define at what levels of traffic volume and under what operating conditions an apron management service shall 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.

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

(e) aerodromes should 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.

7.2 Scope of Apron Management Service

The following shall 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 shall be properly trained.

(d) Will the apron management service issue its own instructions such as startup, 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, and flow control when the stands are nearly all occupied, maintenance work, stand cleaning and security?

7.3 Who Operates Apron Management Services?

(a) 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.

(b) 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 manoeuvring area. Generally, the edge of the maneuvering area represents the handover point. In any event, the handover point shall 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.

(c) 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.

(d) 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 shall 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.

7.4 Responsibilities and Functions

(a) Whichever method of operating an apron management service is provided, the need for close liaison between the aerodrome operator, 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.

(i) 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 shall clearly state which stands may be used by which aircraft or groups of aircraft. Where considered desirable, a preferred order of use of stands shall be laid down. Apron management staff shall 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.

(ii) 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 shall be established to ensure that this information is passed between all interested parties as quickly and efficiently as possible.

(iii) 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.

(iv) Dissemination of information to operators. A system shall 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.

(v) 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.

(vi) 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.

(vii) Apron discipline. The apron management service will be responsible for ensuring compliance by all parties with regulations relating to the apron.

(b) Aircraft parking/docking guidance system

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 the Advisory Circular SLCAA -AC-AGA-014-Rev.00 - Visual Aids and ICAO (Doc 9157), Part 4. The apron management service shall 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 the SLCAR Part 14A must be installed. Details of these systems are given in the ICAO Aerodrome Design Manual, Part 4, chapter 12. The apron management service shall monitor these systems and associated guidance lights to ensure that they are inspected at least weekly to maintain high standards of serviceability.

(c) Marshalling service

An aerodrome marshalling service shall 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 shall exist for marshallers and only those who have demonstrated satisfactory competence shall be permitted to marshal aircraft. Where aerodrome marshalling is provided, comprehensive instructions shall be written for marshallers including:

(i) the absolute necessity for using only authorised signals (copies of these shall 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;

(iv) 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;

(v) 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

(vi) 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 1 - GUIDANCE ON SELECTING SMGCS 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 1 for further information on visual aids											

APPENDIX 2 - 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 SMGCS 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
Regulation 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
Regulation 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 SMGCS aids				x			x			x
ATS										
Visual monitoring of SMGCS 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 SMGCS 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 regulations		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 regulations 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 1 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.