ADVISORY CIRCULAR

NIGERIA CIVIL AVIATION AUTHORITY

NCAA- AC-AWS061
APR 2023

REMOTELY PILOTED AIRCRAFT (RPA) OPERATIONS, DESIGN SPECIFICATION, MAINTENANCE AND TRAINING OF HUMAN RESOURCES FOR OPERATIONS IN NIGERIAN AIRSPACE.

CONTENTS

1. REFERENCES

Nig. CARs Part 21

2. PURPOSE

2.1 This Advisory Circular (AC) has been developed to provide guidance to operators of RPAs in the operation of RPAs and the means whereby they may safely and legally operate RPA systems. This document also provides guidance to NCAA staff on the processing of operators certificate and approvals for RPA operation. While this document prescribes a means of compliance with legislation, alternate procedures demonstrating an equivalent or greater level of safety may be considered on a case by case basis.

3. STATUS OF THIS AC

3.1 This AC is the first to be published on this subject in Nigeria and is subject to review as the need arises.

4. BACKGROUND

4.1 Flight by remotely piloted aircrafts (RPAs) in controlled airspace and over populated areas presents problems to the regulator in terms of ensuring the safety of other users of airspace and persons on the ground. In the past, safety assurance would normally have been in the form of a prohibition of such activities, however, improvements in the technology associated with RPAs means that the potential exists for the operators of RPAs to comply with any safety, security and privacy requirements imposed by the Authority, which will ensure an adequate level of safety. The penalties for the operator may be increased complexity, increased weight, reduced payload and increased cost. In most cases, these factors will render commercial operations non-viable, however, as costs reduce and miniaturization continues, builders of RPAs may soon be able to develop cost effective solutions to current constraints.

4.2 The RPAS comprises not just the aircraft, it also consists of the RPA ground control system, communications/datalink system, the maintenance system and the operating personnel. Thus, when considering requests for RPA operating approval, the regulator will assess the RPA system as a whole. The guidance contained in this advisory circular should be considered during development of a RPA system.

5. OPERATION OF RPAS IN CONTROLLED AIRSPACE

5.1 General

5.1.1 In general, when operating in controlled airspace, RPAs should be operated in accordance with the rules governing the flights of manned aircraft as specified by the Nigerian Airspace Management Agency (NAMA). RPA operators should be able to comply with ATC regulations and equipment requirements applicable to the class of airspace within which they intend to operate.

5.2 Procedures and Authorisations

5.2.1 The procedures and authorisations in this Section apply specifically to RPA operations within controlled airspace and include procedures and authorisations required to govern RPA take off, climb, descent, and landing. These are required to provide for the pre co-ordination and procedures necessary to safely recover a RPA through controlled airspace should RPA system failure preclude the ability to remain outside controlled airspace.

5.2.2 These procedures apply specifically to those RPAs that can be monitored and controlled in real-time from a RPA control station. Nothing contained in this document is meant to preclude operation of a RPA in an "autonomous" or programmed flight mode, provided that RPA performance and designated ATC communication circuits are continuously monitored by the RPA operating crew, and that the RPA system and crew are capable of immediately taking active control of the RPA.

5.3 Flight Manual

5.3.1 RPA flights in controlled airspace should only be conducted if an approved RPA Flight Manual is immediately available to the Remote Pilot within the RPA control station.

5.3.2 NCAA will not approve flights in controlled airspace by civil non-certificated RPAs. All RPAS operations must be certified, licenced and approved by NCAA.

5.4 Flight Testing

5.4.1 RPA flight testing and certification flights should normally be conducted outside controlled airspace, however, flights within line of sight of the Remote Pilot may be carried out in an approved operating area in accordance with an approval issued by NCAA subject to ATC clearance.

5.5 Rules of Operations

5.5.1 All flights outside visual sight of the Remote Pilot should be conducted:

(a) in accordance with conditions specified in an approval issued by NCAA;

(b) in an approved operating area; or

(c) in a known traffic environment — in accordance with regulations governing the flight of a manned aircraft.

5.6 Flight Notification

5.6.1 Where a RPA flight is to be conducted in airspace shared with manned aircraft, flight notification may be in the form of a NOTAM or may be filed in accordance with the normal procedures for IFR flight. The flight plan should

indicate that the aircraft is unmanned and provide as much detail as possible concerning the nature of the flight.

5.6.2 The RPA may not enter controlled airspace without approval of the controlling authority; this would normally be in the form of an airways clearance. RPA flight procedures when operating within controlled airspace are as directed by the controlling authority.

5.6.3 When the operation of a RPA does not involve flight higher than 400 ft AGL or within close proximity to an aerodrome, the operator may exercise discretion in lodging flight notification. Where there is doubt, the operator should seek guidance from NCAA.

5.7 Collision Avoidance

5.7.1 Unless the Remote Pilot of a RPA is provided with sufficient visual cues to enable the acquisition and avoidance of other air traffic, RPA flights in controlled airspace will be treated as IFR flights, subject to ATC control.

5.7.2 NCAA may require a large RPA to be equipped with an SSR transponder, a collision avoidance system or forward looking television as appropriate for the type of operation.

5.8 Noise Abatement

5.8.1 RPAs should follow applicable local noise abatement procedures at their launch and recovery sites such as operating hours, directed flight paths/altitudes, etc., consistent with safe operation of the RPA.

5.9 Take off and Landing

5.9.1 When a RPA is operated at an aerodrome normally used by manned aircraft, take off and landing should be in accordance with normal procedures and the RPA should follow ATC instructions unless otherwise authorized.

5.9.2 For RPAs, which are manually controlled for, take off by the launch controller, VFR procedures, local airfield pattern regulation, and VFR weather minima for the class of airspace will apply. After takeoff, the launch controller should manoeuvre the RPA as required to maintain visual contact. During takeoff and evolution from direct to autonomous control, the RPA system must be monitored by the RPA Pilot in Command to verify RPA system status and compliance with navigational and flight path clearances. The Pilot in Command is responsible during this phase for collision avoidance but should allow the launch controller to manoeuvre the RPA as directed by ATC under IFR procedures.

5.9.3 For RPAs, which are manually controlled for landing by the launch controller, VFR procedures, local airfields pattern regulations, and VFR weather minima for the class of airspace, will apply. The RPA should be flown according to ATC instruction with traffic separation provided by ATC, to a pre-designated recovery point, entering a holding pattern until visual sight of the RPA is acquired by the Pilot in Command. At this point, the Pilot in Command assumes responsibility for traffic separation and collision avoidance. The Pilot in Command should monitor the recovery evolution to

manual control to verify RPA performance and compliance with navigational and flight path clearances.

5.9.4 For RPAs equipped with automatic take off and landing systems, the Pilot in Command should monitor RPA system status and compliance with ATC clearances, making flight path corrections as required and/or directed by ATC.

5.10 Emergency Procedures

5.10.1 The RPA flight plan should include information and procedures regarding pre-planned emergency flight profiles in the event positive data link control of the RPA is lost. Dependent on system capabilities, these profiles could include:

(a) RPA autonomous transit to a pre-designated recovery area followed by an autonomous recovery;

(b) RPA autonomous transit to a pre-designated recovery area followed by activation of a flight termination system (FTS).

5.10.2 *Abort Procedures*. Specific abort and flight termination procedures should be developed by the Pilot in Command, and should be briefed to ATC as required. At a minimum, information regarding pre-programmed loss-of-link flight profile (including termination actions should the control link not be re-established), flight termination capabilities, and RPA performance under termination conditions should be briefed.

5.10.3 The data link should be continuously and automatically checked and a real time warning should be displayed to the RPA crew in case of failure. In case of loss of data link other than intermittent loss of signal or during programmed periods of outage, SSR 7700 code should be squawked both automatically and manually by the Remote Pilot and emergency recovery procedures should be executed. The parameters, which determine acceptable intermittent loss of signal and total loss, will be set by the manufacturer. An RPA, which has lost total control data link and is conducting an autonomous pre-programmed flight profile to termination or recovery will be handled by ATC as an emergency aircraft.

5.10.4 In the event of communications failure between the Pilot in Command and ATC, the RPA should squawk SSR code 7600 (mode 3A) and attempt to establish alternate communications. Pending reestablishment of communications with ATC, the RPA will be controlled in accordance with last acknowledged instruction or should be commanded to orbit in its current position. If communications with ATC are not re- established, the RPA sortie should be aborted.

5.11 Meteorological Conditions

5.11.1 Weather minima for RPA flight should be determined by the equipment and capabilities of each specific RPA system, the qualifications of the Pilot in Command and the class of airspace in which the flight is conducted.

5.11.2 *Visibility*. For RPAs operating under VFR procedures for launch and recovery, visibility requirements are as defined for the type of airspace, but in no case less than 5 km and 1000 foot ceiling. For RPA systems equipped with an internal automatic precision landing aid such as those based on the Global

Positioning Systems (GPS), weather minima should be sufficient for an external observer to visually verify the RPA flight path and alert the Remote Pilot of unsatisfactory landing approach in sufficient time to execute a missed approach; as such, minimum visibility is dependent on RPA approach speed, size, and performance capabilities.

5.12 Co-ordination/Authorisation with NCAA

5.12.1 Subject to review, NCAA may approve RPA systems for operations within published guidelines. The review will include but not be limited to RPA certification, Remote Pilot qualification, flight planning, weather minima, and installed equipment and maintenance procedures. Operations outside published guidelines will require special approval on a case-by-case basis.

5.12.2 *Local Operations*. Prior to the commencement of RPA operations, RPA operating personnel should establish Local Operating Procedures for RPA operations with the appropriate ATS authority. Specific procedures should be established for ground RPA operations, flight plan filing procedures, integration of RPAs into local traffic pattern, RPA takeoff and landing procedures, local airspace restrictions, noise abatement procedures, right-of-way rules, communications requirements, and RPA emergency procedures. Designated "safe areas" will be established for emergency RPA holding and flight termination.

5.13 Interfacing with Air Traffic Services

5.13.1 RPAs operating within radar controlled airspace should be equipped with a SSR transponder capable of operating in modes 3A and C. The Pilot in Command should have the capability to change the SSR code and squawk identification when required.

5.13.2 *Flight Deviations*. All requests for flight deviations should be made by established procedures to the appropriate ATS authorities.

5.13.3 *Communications*.The Remote Pilot in Command should initiate and maintain two way communications with the appropriate ATC authorities for the duration of any flight.

5.13.4 *Position Reporting*. RPAs operating in controlled airspace should be continuously monitored for adherence to the approved flight plan by the Pilot in Command. The Remote Pilot in Command should make all position and other required reports to the appropriate ATC unit. Automatic Dependent Surveillance systems (ADS) may be suitable for this purpose.

5.13.5 *Tracking*. Where radar coverage is provided, ATC will continuously monitor the flight path of the RPA. Outside of radar coverage, NCAA may require the fitment of additional equipment to facilitate tracking of the RPA and separation from other aircraft. ADS or similar equipment may be suitable for this purpose.

5.13.6 *RPA Identification*. Each RPA flight should have some means of informing ATC that the flight is unmanned. Therefore, all RPA call signs should include the word 'UNMANNED'.

5.14 Line-of-Sight Operations

5.14.1 For purposes of RPA operations within controlled airspace, 'line-of sight' refers to visual versus radio data link line-of-sight. Accordingly, the only applicability to operations as discussed in this document is to the takeoff and landing phase.

(a) *Mission Briefing*. The following information should be included in any flight authorisation requests and flight plans when applicable. When RPA takeoff and landing is to be accomplished by a launch controller under visual conditions, the Piot in Command should ensure appropriate airport/ATC personnel are briefed on the specific evolution of control to be conducted and are aware of the specific RPA operating procedures required. In addition to the information required for the flight plan, procedures for RPA taxi, take off, separation, local traffic pattern restrictions, Remote Pilot hand-over, departure, abort to recovery, and flight termination should be briefed.

(b) *Communication Requirements*. Communication requirements for RPA line- of-sight operations are as required for the class of airspace in which the flight will occur. When the Remote Pilot is not co-located with the launch controller, the launch and recovery control station as well as the primary RPA control station must have established communications with ATC authorities responsible for the area of flight prior to commencement of flight.

5.15 Operations Beyond Line-of-Sight

5.15.1 *Mission Briefing*. The following information should be included in any flight authorization requests and flight plans when applicable.

5.15.2 *Performance Requirements*. Any performance requirements or limitations unique to the RPA should be provided to the ATC unit as appropriate prior to the flight. The pilot in command should not request any clearance (i.e. SID, precision approach, altitude, holding pattern) that the RPA is not capable of executing within its approved flight envelope.

5.15.3 *Abort Procedures*. Specific abort and flight termination procedures should be developed by the Pilot in Command, and should be provided to ATC as required.

At a minimum, information regarding pre-programmed loss-of-link flight profile (including terminal actions should the control link not be re-established), flight termination capabilities, and RPA performance under termination conditions should be briefed.

5.15.4 *Direct Communications Required*. Communications between the Remote Pilot in Command and the controlling ATC authority should be as required for the class of airspace in which operations occur. The RPA control station should

utilize a communications architecture, which interfaces with existing ATC communications equipment and procedures, so that the fact that the Remote Pilot in Command is on the ground is transparent to ATC personnel. Upon checking with ATC personnel, the Pilot in Command should request a direct telephone number for ATC for contingency use should radio communications fail.

5.15.5 *Qualification of the Remote Pilot in Command*. At a minimum, the Remote Pilot in Command should have completed the ground training applicable to the issue of an instrument rating in order to operate RPAs in controlled airspace under an IFR clearance.

5.16 Operation of Equipment

5.16.1 *Equipment Requirements*. The following equipment should be fitted and operable prior to a flight under IFR procedures:

(a) *Position Lights*. These lights should normally be turned on at all times the RPA is in motion including taxi, takeoff, flight, and landing, unless otherwise approved by NCAA.

(b) *Anti-Collision Lights*. These lights should normally be turned on at all times the RPA is in flight unless otherwise directed by NCAA.

(c) *Transponder*. The Pilot in Command should have the capability to turn the transponder on and off, manually select codes, and squawk and identification as directed, while the RPA is airborne.

(d) *Radios*. RPA communication architecture should allow the Remote Pilot in Command to communicate with the ATC facilities controlling the RPA regardless of its location.

(e) *Acquisition light*. The light should be operable on command as an aid to identification of the RPA.

5.16.2 *RPA System and Attitude Displays*. The RPA system should be capable of displaying to the Remote Pilot in Command all aircraft system and attitude information necessary for safe operation, control, and navigation.

5.16.3 *Flight and Voice Recorder*. Where recording systems are required by NCAA to record RPA systems and navigational status, and radio and intercom voice communications, such systems should be operable for the duration of the flight. This system will normally be installed within the RPA control station.

5.16.4 *Flight Termination*. RPAs should not operate within controlled airspace without an operable flight termination system or a system which provides autonomous recovery to a predetermined recovery area following failure to maintain safe flight control or operation within parameters agreed by the operators and NCAA.

6.0 OPERATION OF RPAS OVER POPULATED AREAS

6.1 General

6.1.1 The paramount factor to be addressed when considering flight by RPAs over populated areas is the safety of people and property on the ground. The risk of injury or damage resulting from the crash of a RPA is dependent upon a variety of factors:

(a) mass of the RPA;
(b) composition of the RPA;
(c) velocity of the RPA at impact.

6.1.2 The potential of the RPA to crash is also dependent upon a variety of factors:
(a) integrity of the airframe;
(b) reliability of the engine;
(c) reliability of control systems;
(d) reliability of the control communications system;
(e) ability of the Remote Pilot.

6.1.3 NCAA is charged with the responsibility of ensuring the safety of flying operations, the following guidance in this section has been developed for that purpose.

6.2 Procedures and Authorisation

6.2.1 The procedures and authorisations in this Section apply specifically to RPA operations over populated areas and are additional to any requirements specified in Section 5 where populated areas and controlled airspace are coincident.

6.2.2 These procedures apply specifically to those RPAs that can be monitored and controlled in real-time from a RPA control station or which are operated by line of sight control. Nothing herein is meant to preclude operation of a RPA in an 'autonomous' or programmed flight mode, provided that RPA navigation performance can be continuously monitored by the Remote Pilot, and that the RPA system and crew are capable of immediately taking active control of the RPA.

6.3 Flight Manual

6.3.1 RPA flights over populated areas should be conducted only if an approved RPA Flight Manual is immediately available to the Remote Pilot in Command within the RPA control station. (See paragraph 5.3).

6.4 Flight Testing

6.4.1 RPA flight testing and certification may not be carried out over populated areas.

6.5 Rules of Operations

6.5.1 RPA flights over populated areas may not be conducted except:

(a) by a RPA certificated for such flight; and
(b) in accordance with conditions specified in an approval issued by NCAA; or
(c) at an altitude which would allow the RPA to clear the area in the event of engine failure.

6.5.2 Generally, the requirement for an operator's certificate will limit flights over populated areas to large RPAs, however, the designer of a small RPA may apply for a type certificate subject to the requirements of Nig CARs 2015 Part 5.3.1.3 and 5.3.1.4. Provided that the aircraft meets NCAA's requirements, the RPA may be eligible for an operators certificate.

6.6 Noise Abatement

6.6.1 RPAs should follow the principles of noise abatement procedures during flight over populated areas consistent with safe operation of the RPA.

6.7 Emergency Procedures

6.7.1 The RPA flight plan should include procedures to be followed in the event of:

(a) engine failure;
(b) loss of data link;
(c) loss of control;
(d) failure of navigation;
(e) airframe damage.

6.7.2 Emergency procedures may include the use of recovery devices, such as parachutes, where a failure subjects persons or property to immediate danger or, where the immediate risk of hazard from failure is minimal:

(a) RPA autonomous transit to a pre-designated recovery area followed by an autonomous recovery;
(b) RPA autonomous transit to a pre-designated recovery area followed by activation of a flight termination system.

7. RPA OPERATION OVER UNPOPULATED AREAS

7.1 Micro and Small RPAs

7.1.1 Provided that a small RPA is operated not above 400ft AGL and remains within 10NM of the controlling station and clear of designated airspace, aerodromes and populated areas, there are no restrictions imposed upon the operation of a small RPA. The operator is responsible for ensuring that the RPA is operated safely and remains clear of potential low level traffic, structures, powerlines etc, except where operation in close proximity is part of an operation authorised on the operator's certificate. The operator should consider the benefit of a thorough reconnaissance of the proposed route beforehand.

7.1.2 Where a person wishes to operate a micro or small RPA above 400ft AGL, that person must do so in accordance with conditions imposed by NCAA. Such conditions may specify:

(a) maximum altitudes;
(b) communication requirements;
(c) operating times;
(d) operating area limitations;
(e) RPA equipment etc.

7.2 Medium and Large RPAs

7.2.1 A person wishing to operate a medium or large RPA may only do so if it has been issued with Certificate of Registration and either an Experimental certificate or a certificate of airworthiness in the Restricted category and is operated in accordance with an approval issued by NCAA.

8. DESIGN SPECIFICATION FOR RPA SYSTEMS

8.1 General

8.1.1 A RPA system comprises both airborne and ground based equipment and should be designed to minimize the potential for a failure of any component to prevent continued safe flight and recovery of the RPA. Because of the wide range of airborne vehicles and ground stations which potentially form part of a RPA system and the wide diversity of possible operations, some design criteria may apply to all RPA systems and some may be unique to a type or class of RPA. Thus, the potential developer of a RPA system is encouraged to consult with NCAA prior to commencement of a project. The following design criteria are for general guidance only.

8.1.2 The guidance pertains to the design of seven critical RPA subsystems for operations outside of an approved operating area:

(a) flight control;

(b) electrical;

(c) communications/data link;

(d) navigation;

(e) propulsion;

(f) RPA control station;

(g) flight termination.

8.2 Design Criteria

8.2.1 Flight control design should facilitate control of the RPA by the Remote Pilot and provide unambiguous operations and clear indications of RPA flight status. Design criteria should minimise the potential for human error. All flight indications and warnings necessary to ensure safe control of the RPA flight path should be provided. In particular, the Remote Pilot in Command should be informed of any degraded mode of operations due to any failure, including cases in which there is an automatic switching to an alternate or degraded mode of operation.

The control station should include a diagnostic and monitoring capability for the status of the vehicle. Real time, direct communications/surveillance, and continuous data transmission capability should be provided.

8.2.2 A RPA system should incorporate a fail-safe flight termination system (FTS) or autonomous recovery system (ARS), which provides recovery to a predetermined recovery area. This system should operate on demand or automatically following failure to maintain safe flight control or operation within parameters agreed by the operators and NCAA. The need for this feature will be given greater emphasis where operations are planned over or close to populated areas or where they will be within

or close to controlled airspace. Less emphasis on a FTS/ARS will be accorded for those RPAs operating in remote areas.

8.3 Safety Standards

8.3.1 RPA operations should be as safe as manned aircraft insofar as they should not present or create a hazard to persons or property in the air or on the ground greater than that created by manned aircraft of equivalent class or category.

8.4 Registration

8.4.1 NCAA requires the operator of a large RPA to hold a certificate of registration for the aircraft and to maintain the information required for compilation of RPA reliability and failure rates.

8.4.2 Although a small RPA is exempt from the requirement for aircraft registration, each RPA should have affixed to it a durable identification plate inscribed with appropriate marks to identify ownership and identity/serial number of the particular aircraft.

8.5 Technical Issues and Related Criteria

8.5.1 Proven fail-safe principles will govern the design of RPA systems. System independence and adequate redundancy and back-up features should provide for safe functioning of the RPA in the event of a system failure. Redundancy of system management functions also should be built into the system. A description of what constitutes 'fail-safe' design appears at Appendix 2.

8.5.2 RPA system design should provide for a failure detection apparatus (pre-flight and in-flight built-in-test) that will immediately notify the Remote Pilot in Command of a system failure. Adequate provision for the safe operation of the RPA following a system failure should be provided. Potential human Remote Pilot errors should be considered by RPA designers and adequate provisions should be taken to minimize the effects of such errors. Additionally, an engineering analysis of any RPA design should be submitted to NCAA to assist in the further review of RPA design criteria. The following are considered critical system design criteria for RPAs.

8.5.3 *Software*. All RPA system software should be verified and validated in accordance with manufacturers approved specification. Safety critical software may be subject to additional verification by NCAA.

8.5.4 *Flight Management System*. The flight management system includes Remote Pilot controls, sensors, computers and actuation parts necessary to control the RPA. Any single failure of the flight control system should not affect the ability to control RPA recovery. Provisions for possible reversion to degraded modes of operation also should be incorporated into flight management system design. Provision for continued control of the RPA should be made in the event of a propulsion or power generation system failure.

8.5.5 *Electrical System*. The electrical system should provide sufficient power and endurance to ensure safe operations and recovery throughout all phases of flight even in the event of an emergency. Consideration should be given to the ability to shed non- essential load in the event of a power generation failure. Similar considerations apply to the ground control station.

8.5.6 *Communications System/Data Link*. Approval for all frequencies used in RPA operations must be obtained from Nigerian Communications Commission (NCC) and other relevant Government agencies as appropriate. Data link signal strength should be continuously monitored and appropriate maximum data link range cues should be provided to the Pilot in Command. Any single failure of the communications system (uplink or downlink) should not affect normal control of the RPA. Uplinks/downlinks are sensitive to electromagnetic interference (EMI) and should be adequately protected from this hazard. Provisions for direct communications between the Pilot in Command and the appropriate ATC via two way radio should be incorporated in the system design.

8.5.7 *Navigation System*. The RPA navigation system should meet the required navigation performance standards of the flight rules and the specific requirements for the airspace in which the operations are to be conducted. Only navigation systems meeting the requirements for 'sole means navigation' will normally be considered for flights under IFR and in controlled airspace.

8.5.8 *Propulsion System*. All essential elements of the propulsion system should meet required reliability standards as approved by NCAA.

8.5.9 *RPA Control Station*. In its simplest form, the RPA control station may consist of a hand held transmitter incorporating basic flight controls and rudimentary displays similar to those of a model aircraft. Control stations for RPA operations beyond line of sight should include controls and displays for aircraft attitude and performance, propulsion, navigation, aircraft systems and sensor operation as well as flight system and voice recording equipment. NCAA will assess the control station against the requirement to assure the safety of air navigation of the RPA.

8.5.10 *RPA Structure*. RPA aircraft structure should be designed to withstand the maximum expected operational loads as determined by the intended operational flight envelope of the RPA. Structural design of small RPAs should meet the standards applicable to the construction of model aircraft of the same weight category, which may be obtained from the State of manufacture. Large RPAs should comply with the appropriate design requirements advised by letter in accordance with Nig CARs 2015 Part 8.8.1.33 (b) 1(v).

8.5.11 *Flight Termination System*. A RPA system should incorporate a fail-safe flight termination system (FTS) or autonomous recovery system (ARS), which provides recovery to a predetermined recovery area. This system should operate on demand or automatically following failure to maintain safe flight control or operation within parameters agreed by the operators and NCAA. The need for this feature will be given greater emphasis where operations are planned over or close to populated areas or where they will be within or close to controlled airspace. Less emphasis on a FTS/ARS will be accorded for those RPAs operating in remote areas.

8.6 Equipment requirements

8.6.1 The following equipment and instrument capabilities should be installed on the RPA and/or be available to the Pilot in Command in order to comply with the requirements for safe flight under IFR procedures:

(a) *Position Lights*. RPAs should have position lights installed as required. The Remote Pilot in Command may be given the capability to turn these lights on and off while the RPA is airborne, however they will normally be turned on at all times the RPA is in motion including taxi, takeoff, flight, and landing, unless otherwise directed by NCAA.

(b) *Anti-Collision Lights*. RPAs should have strobe lights installed as required.

The Remote Pilot in Command may be given the capability to turn these lights on and off while the RPA is airborne, however they will normally be turned on at all times the RPA is in flight unless otherwise directed by NCAA.

(c) *Transponder*. For operation in controlled airspace, and where otherwise required by NCAA, RPAs should have an operable SSR transponder installed. The Pilot in Command should have the capability to turn the transponder on and off, manually select codes, and squawk and identification as directed, while the RPA is airborne. NCAA may approve operation without in-flight resettable SSR codes and identification capability on a case by-case basis.

(d) *Radios*. The Pilot in Command should have full and immediate access to two way radios within the RPA control station as required to maintain communications. RPA communication architecture will be designed to allow the Remote Pilot to communicate with the ATC facilities and RPA ground crews controlling the RPA regardless of their location.

(e) *Navigation Systems*.Navigational information should be available to the Pilot in Command in a format required for reporting in accordance with ATC requirements.

(f) *RPA System and Attitude Displays*. The RPA system should display to the Pilot in Command all aircraft system and attitude information required for safe operation, control, and navigation.

(g) *Flight and Voice Recorder*. NCAA may require the RPA system to have a recorder to record RPA systems and navigational status, and radio and intercom voice communications. This recorder will normally be installed within the RPA control station.

(h) *Built-in Test*. Some aircraft may require procedures designed to exercise critical components and systems and provide an indication of their state of health together with an appropriate display. This information may be available to the ground station during flight. A set of diagnostic procedures should also be included to aid fault location. For in-flight use this should include remaining emergency power reserve.

9. REMOTELY PILOTED AIRCRAFT CERTIFICATION

9.1 General

9.1.1 RPAs may be certificated in the Experimental or the Restricted category under Nig CARs 2015 Part 5.4.1.4(b). An experimental certificate would allow a builder to conduct research and development, demonstrate compliance, train Remote Pilots, and exhibit and demonstrate a RPA. The Restricted certificated would be required for any other use. Each application for certification will be assessed on its merits. Applicants are advised to make contact with NCAA as early as possible in the design stage so that a standard (which will be advised in writing) can be agreed.

9.1.2 RPA control stations may be approved as a discrete element of a RPA system where such stations are capable of adaptation to different RPA types.

9.1.3 Because of the wide range of types of aircraft and methods of construction potentially forming part of a RPA system and the wide diversity of possible operations, there will be some variety in the requirements pertaining to the certification of individual RPAs. Thus, the potential developer of a RPA system is encouraged to consult with NCAA prior to commencement of a project.

10. REMOTELY PILOTED AIRCRAFT SYSTEM MAINTENANCE

10.1 General

10.1.1 A large RPA is a Class B aircraft and must be maintained in accordance with the relevant provision of Nig CARs 2015 Part 5. RPAs other than large RPAs should be maintained in accordance with standard procedures applicable to model aircraft.

10.1.2 For purposes of RPA airworthiness, the RPA and all support equipment (e.g., RPA control station) should be considered as components of a RPA system. Each manufacturer of a large RPA should develop, prepare and provide a set of maintenance and inspection manuals for operational use of their RPA. These manuals should include guidelines for appropriate skill levels to perform required inspection, maintenance and repair tasks. The manufacturer of RPAs should provide aircraft specific or type training as required.

10.2 Maintenance and Repair

10.2.1 The Nigerian Civil Aviation regulation, Nig CARs 2015 Part 5 requires the holder of design approval for an aircraft to furnish at least one set of instructions for continuing airworthiness in accordance with applicable airworthiness standards to the owner of each aircraft. Thus, the mechanism is in place for NCAA to determine and impose maintenance requirements on a large RPA.

10.2.2 Maintenance practices vary greatly with the design and construction of each type of RPA. Standard aircraft maintenance practices should be followed to the maximum extent possible. Considerable valuable information can be obtained from the manufacturer of the aircraft and can be used as a basis to establish inspection and repair information.

10.2.3 Maintenance and repair of RPAs should follow manufacturer's guidance. Personnel performing maintenance and repair should be appropriately trained and qualified.

10.2.4 Maintenance of the ground control equipment should be governed by manufacturers recommended period of inspection and overhaul as applicable.

10.3 Manufacturer's Guidance

10.3.1 For each model of RPA produced, the manufacturer should provide a set of procedures for the following:

(a) *Inspections*. Pre-and post flight inspections including frequency, equipment and skill levels required to perform the inspections.

(b) *Maintenance*. Diagnostic procedures, repair and replacement of components, including equipment and skill level required to perform.

(c) *Repair Station*. Recommendations on minimum and preferred equipment for field and base facilities.

(d) *In-flight Diagnostics*. Mission abort thresholds and recommended actions for in-flight systems shutdown and return to base.

(e) *Flight Termination System (FTS)*. FTS components should be verified to be within calibration tolerance at intervals established by the manufacturer. Satisfactory status of the FTS should be verified by the Remote Pilot prior to each flight.

(f) *Collision Avoidance System*. The Collision Avoidance System, if installed, should be exercised prior to each flight in accordance with manufacturers recommended procedures.

(g) *Checklist*. The manufacturer should provide a set of check list procedures to be followed prior to and during any flight.

(h) *Data Collection*: Each autonomous element of a RPA system (e.g. aircraft, control station, recovery system) should have a unique identification number. Critical components within each element are also to be assigned unique identification numbers. Details of hours flown, hours run, cycles undertaken and maintenance/inspections carried out on each component/element are to be recorded.

11. TRAINING REQUIREMENTS FOR REMOTE PILOTS OF REMOTELY PILOTED AIRCRAFT.

11.1 General

11.1.1 Training requirements are essential to the establishment of effective RPA operations. A defined set of training requirements must continue to be refined on the basis of continued experience from ongoing RPA operations. Adoption of these requirements by the segments of approved training organisations (ATOs) involved in RPA training and operation will ensure that appropriate safety levels are maintained and public trust in RPA operations is gained.

11.2 Training and Operations Criteria

11.2.1 Some of the difficulties currently encountered in establishing a set of acceptable RPA training and operations criteria result from the wide variety of RPA sizes and RPA types with widely differing technology architecture envisioned for production and from diversity of RPA operation. Some RPA training criteria may apply to all RPAs and some may be unique to certain types and classes of vehicles.

11.2.2 Future RPA training and operational provisions will eventually accommodate virtually all classes of RPAs and all types of RPA use. The data collected and experience gained in future civil RPA operations will also provide NCAA and the aviation industry with the expertise necessary to adequately determine the best method of controlling and integrating RPA operations with existing procedures.

11.3 Medical Standards

11.3.1 Working in a relatively benign environment, the medical requirements for Remote Pilot may not need to be as stringent as for conventional aircrew. However, as a rule, Remote Pilots involved in command and control of RPA operations should be assessed as medically fit and should abstain from the use of stimulants, drugs or alcohol in the same manner as the driver of a motor vehicle.

11.4 Ground Training

11.4.1 Remote Pilots should have completed thorough ground instruction equivalent to that undertaken by aircrew of comparable aircraft. The depth of knowledge required will depend on the operating environment. The following topics, which are not exhaustive, should be covered:

(a) aerodynamics, including effects of controls;

(b) aircraft systems;

(c) performance;

(d) navigation;

(e) meteorology;

(f) airspace;

(g) rules of the air;

(h) radio telephony procedures; and

(i) emergency procedures management.

11.4.2 Ground instruction should be delivered by personnel with appropriate experience and/or qualifications in the relevant topic.

11.5 Flight Training

11.5.1 Remote Pilots should have undertaken thorough practical training in the control of a RPA in flight, which may consist of a proportion of simulated flight training. The training should enable the remote pilot to demonstrate that he/she can control a specific RPA throughout its design parameters and potential operating conditions, including dealing correctly with emergencies and system malfunction.

11.5.2 All instruction should be conducted by personnel who are acceptable to NCAA as being qualified to conduct RPA flight training.

11.6 Proficiency/Currency Requirements

11.6.1 The currency/proficiency of Remote Pilot should be maintained by regular practice, which may be computer based. Additionally, all Remote Pilots should be subject to periodic theoretical and practical examination. These requirements should be addressed in the operations manual.

11.7 Remote Pilots Qualification

11.7.1 Since RPA systems vary so widely and missions envisioned so diverse, co- ordination between the RPA manufacturer and NCAA to build a consensus as to the appropriate level of training should be exercised. RPA systems which operate in an IFR environment will require a high level of training or experience, while operation and use of the RPA system in remote areas and class G airspace, determined by NCAA as posing no threat to public safety or property, may require only a minimal level of training.

11.8 Initial Certification

11.8.1 Civil Remote Pilots should be required to demonstrate satisfactory knowledge of ground and flight operations via oral/written examinations and initial flight check by NCAA.

11.9 Maintenance Personnel

11.9.1 The training required of maintenance personnel will vary according to the complexity of the RPA system. NCAA will require that a person intending to operate a RPA system ensures that persons required to perform maintenance on a large RPA system are trained to the standard shown in Nig CARs 2015 Part 5.

12. GETTING APPROVAL

12.1 Who Needs Approval

12.1.1 A person considering the use of a RPA for a particular task should first consider whether the operation will need approval or RPA Operators Certificate (ROC) from NCAA before it can commence. The operation of a micro or small RPA will not require a ROC if it remains clear of designated airspace, aerodromes and populated areas and remains below 400ft AGL and within Line of Sight from the controlling station except it is used for commercial purposes. The operator is responsible for ensuring that the RPA is operated safely and remains clear of potential low level traffic, structures, powerlines etc, except where operation in close proximity is part of an operation authorised on the operator's ROC. All other operations will require an approval from NCAA, this approval is not to be confused with a RPA Operators Certificate (ROC), which is required for all Government (Civil) and Commercial RPA operations.

12.2 Types of Approval

12.2.1 Operating Area Approval. An operating area approval may be for a temporary area approved for a single RPA operation, a semi-permanent area established for a regular RPA activity or a permanent area established for a special purpose. A permanent or semi- permanent area may be established in order to alert other users of airspace to the possible presence of RPAs in the area. NCAA will negotiate with the RPA operator, NAMA and all other relevant agencies prior to requesting the declaration of a particular area as a 'Danger Area'.

12.2.2 Operator Approval. An RPA operators' certificate (ROC) is required for all Government (Civil) and commercial use of RPAs (see Appendix 3 for details). NCAA may issue an ROC if it is satisfied that the person/organization/agency can conduct the operation safely and will thus need to be satisfied that the operator fulfils the minimum requirements for issue of an ROC and any other requirements necessary according to the type of operation and the location of the intended operation. The ROC will have appropriate conditions imposed on it and may contain approval for unrestricted operations of a type described in the operations manual.

12.2.3 Aircraft Approval. Approval for a particular RPA to fly in Nigerian airspace is in the form of a certificate of airworthiness (C of A). A C of A is not necessary for a small RPA, which is not normally permitted to fly over populated areas or in controlled airspace. However, if a small RPA is constructed in accordance with certain design standards, it may qualify for the issue of a C of A in the same manner as a large RPA. Approval to operate in particular airspace or over certain areas will then be dependent upon conditions imposed on its C of A.

12.2.4 Operating Approval — Micro and Small RPAs. A micro or small RPA, which is to be operated above 400ft AGL or have a camera installed for recreational or private uses will need NCAA approval. The approval will be in written form covering:

(a) who may operate the RPA;

(b) operating area;
(c) operating altitudes;
(d) operating times;
(e) notification requirements:
  (i) AIC;
  (ii) NOTAM;

(f) communication requirements:
  (i) broadcast;
  (ii) telephone, etc;

(g) limitations and restrictions; and

(h) safety requirements.

12.2.5 Before granting this approval, NCAA will consider the nature of the proposed operation and other traffic using the airspace and may require compromises in order for the RPA operation to fit in with other traffic.

12.2.6 Operating Approval — Medium and Large RPAs. A RPA Operators Certificate (ROC) is required for all medium and large RPAs. Approval for operation outside controlled airspace will be given in the same manner as for small RPAs. For operation over populated areas or in controlled airspace, approval will be given in accordance with limitations in both the C of A and the operations manual of the operator. The operation of a Large RPA (25kg and above) will require special approval from the Authority.

12.3 Who May Give Approval

12.3.1 The NCAA which is responsible for granting the permit in which the RPA operation is to take place may approve the operation subject to any conditions, which are considered necessary in the interest of safety, security and privacy. Such conditions should be based upon but not limited to consideration of:

(a) RPA characteristics;
(b) population density;
(c) airspace requirements;
(d) nature of other air traffic;
(e) timing and duration of the activity.

12.4 Submission of Requests for Approval

12.4.1 The advance notice required for the granting of an approval to operate a RPA depends upon the degree to which arrangements are already in place and the complexity of the operation. For instance, if an ROC has already been issued and the operation is confined to a remote area, the notice required may be only a number of days. However, for initial issue of an ROC and approval of a complex operation, the notice required may be a number of months. Operators are urged to give the maximum notice possible and not leave requests for approval to the last minute.

12.5 Considerations

12.5.1 When considering a request for approval to conduct a particular operation with a RPA, NCAA must ensure that the operation of the RPA will pose no greater threat to the safety of air navigation than that posed by a similar operation involving a manned aircraft. This characteristic may be termed 'acceptable'. NCAA will consider either in combination or in isolation the benefits of systems which:

(a) allow the Remote Pilot to detect and/or avoid other aircraft;
(b) reduce the hazards resulting from engine or component failure to an acceptable level;
(c) demonstrate an acceptable level of reliability;
(d) can be shown to pose no significant risk to persons or property.

12.6 Limitations

12.6.1 When issuing approval, NCAA may impose limitations on the operation of a RPA in order to ensure that the RPA will pose no greater threat to the safety of air navigation than that posed by a similar operation involving a manned aircraft. Such limitations may include:

(a) altitude restrictions;
(b) geographical restrictions;
(c) operational restrictions;
(d) broadcast requirements;
(e) provision of observers;
(f) restricted timing of operations.

12.7 Legal Obligations

12.7.1 Any approval which may be granted by NCAA would not confer on an operator of a RPA any rights as against the owner or occupier of any land on or over which the operations are conducted, or prejudice in any way the rights and remedies which a person may have in respect of any injury to persons or damage to property caused directly or indirectly by the RPA. Furthermore, such approval would not absolve the operator/remote pilot from compliance with any other regulatory requirements, which may exist under Federal, State or local law.

13. RPA OPERATORS CERTIFICATE (ROC)

13.1 General

13.1.1 An operator intending to conduct commercial operations utilising RPAs must be the holder of a ROC issued under Nig CAR 8.8.1.33. Guidelines for the issue of ROCs are shown at Appendix 3.

13.2 ACCIDENT AND INCIDENT REPORTING

13.2.1 Reporting system

The accountable manager is responsible for ensuring that the following is reported to the Authority in accordance also with Nig.CARs Part 5.5.1.5 within 72 Hours of the occurrence :

(a) Accidents or incidents which result in injury of persons or animals or damage to property on the ground and in the air,

(b) Deviations from the conditions specified in an issued approval or from operational instructions which involve risks specified in point 1.

(c) There shall be a Civil Aviation Issues Reporting System, which will be provided as a means to raising issues (concerns, complaints and suggestions for improvement) to the Authority. It will be a tool to anonymously report any suspicious aviation activity, such as illegal or unsafe use of any aircraft.

(d) The more specific the details about a perceived contravention, the easier it is for NCAA's enforcement officials to process the report.

(e) If you suspect someone has committed a criminal offence, please contact your local police station or the Authority.

14. INSURANCE

14.1 General

14.1.1 NCAA mandates that operators of RPAS must hold third party insurance cover for Commercial, Corporate and Government (Civil) RPA operations. NCAA would strongly recommend that the operator discusses with an insurance analyst the liability that he or she might incur for any damage to third parties resulting from the operation of the RPA and any procedures for reducing that liability.

15. COMPLIANCE AND ENFORCEMENT

15. 1 General

15.1.1 The DG NCAA has powers under the Civil Aviation Act 2006 and Nig. CARs to exercise broad range of enforcement actions he considers necessary to ensure compliance with statutory and regulatory requirements by the industry.

(a) Under Section 27 Civil Aviation Act 2006, the NCAA has powers to carry out investigation into complaints and occurrences and to conduct hearing and if satisfied after hearing that any person is violating any provisions of the Civil Aviation Act 2006, Regulations, Rules or Orders to require the person to take such action which in the opinion of the NCAA that is necessary to prevent violations of the Civil Aviation Act 2006, Regulations, Rules, Orders, including to ground any aircraft and seal the premises of any air transport service provider or provider of allied aviation services, in

order to secure compliance with the provisions of the Civil Aviation Act 2006, Regulations, Rules and Orders, Term, Condition and Authorization.

(b) Section 30(10) Civil Aviation Act 2006 allows the NCAA to provide for the imposition of penalties, for various offences against the regulations including but not limited to suspension and revocation of certificates, licenses, authorization and fines of various categories from N50,000 up toN10,000,000 depending on the type of offence, various terms of imprisonment from one month up to 5 years depending on the offence (Sections 36, (4), 42(3),43(4) and 54 – 60 CAA 2006).

(c) Section 63 (2) Civil Aviation Act 2006 provides for the NCAA to initiate and undertake prosecution in its name of any person in respect of any offence committed under the Civil Aviation Act 2006 or regulations with the consent of the Attorney General of the Federation. Part 18 Nig. CARs 2006 as amended by Part 1.3 Nig. CARs 2009 contain detailed table of sanctions and procedures which NCAA may apply against non-compliance which include to review any reported violation, conduct investigations and hearings, issues subpoenas, take evidence and dispositions and require the production of any records, documents and property.

15.1.2 Administrative Action: - NCAA shall take action against a violator including oral or written counseling, informal action, remedial training, warning notices and letters of correction.

15.1.3 Legal Enforcement Action: – Furthermore, action shall be taken against a violator including certificate actions, civil penalties, and imprisonment and criminal referrals. These include but are not limited to:

(a) **Negligence**; meaning a conduct falling below the standard required for the protection of others against unreasonable risks of harm.

(b) **Recklessness**; meaning a gross disregard for safety standards or norms for reasonably prudent conduct, considering the certification level of the individual and the type of operation involved.

(c) **Violation**; The breach of any provisions of the Civil Aviation Law. The terms violation and contravention are used interchangeably

Sign: *Date:*

Capt. Musa Nuhu

DIRECTOR GENERAL (NCAA)

Appendix 1

Definitions

RPA Control Station: A flight deck on the ground without external flight environment clues, i.e., no direct visual contact with the RPA, used for control of a RPA.

Autonomous Operation: A pre-programmed, automated flight profile that does not require human intervention for normal operation.

Beyond Line of sight: When neither the remote pilot nor RPA observer(s) can maintain direct unaided visual contact with the RPA, the operations are considered BVLOS. The range not exceeding 10km.

Built In Test: A set of aircraft internal software procedures to determine the level of functionality of predetermined critical systems or components.

Controlled Airspace: An airspace of defined dimension within which air traffic control service is provided to flights in accordance with the airspace classification.

Evolution: The process of transferring control of the RPA from manual control to autonomous control or vice versa.

Fail-safe: A provision built in to an equipment so that the equipment does not cause disastrous consequences even if it, or part of it, fails to perform its designed function.

Launch Controller: The person who will input command to the RPA or to the RPA system during the landing and takeoff phases of operation when the RPA is being controlled manually by line of sight.

Flight Controller: The person who will input commands to the RPA or to the RPA system once the RPA is transferred from line-of-sight control to autonomous control.

Remote Pilot in Command: The designated person within the controlling RPA control station tasked with overall responsibility for operation and safety of the RPA in flight.

Pre-Flight Inspection: Set of manufacturer recommended systems and components functional tests to be performed prior to any launch.

Remotely Piloted Aircraft (RPA): Means a powered, unmanned aerial vehicle, other than a model aircraft used for sport and recreation, which may be operated autonomously beyond line of sight of the Remote Pilot but, in all cases, would be subject to remote control by the Remote Pilot.

Large RPA means any of the following:

(a) a remotely piloted airship with an envelope capacity greater than 100 cubic metres;
(b) a remotely piloted powered parachute with a launch mass not greater than 25 kilograms;

(c) a remotely piloted aeroplane with a launch mass not greater than 25 kilograms;
(d) a remotely piloted rotorcraft with a launch mass not greater than 25 kilograms;
(e) a remotely piloted powered lift device with a launch mass not greater than 25 kilograms.
(f) a RPA with a gross weight greater than 15kg but not exceeding 25kg.

Medium RPA means a RPA with a gross weight greater than 7kg but not exceeding 15kg.

Small RPA means a RPA with a gross weight greater than 100grms but not exceeding 7kg.

Micro RPA means a RPA with a gross weight not greater than 100 grams.

APPENDIX 2

THE FAIL-SAFE DESIGN CONCEPT

The fail-safe design concept considers the effects of failure and combinations of failures in defining a safe design.

1. FUNDAMENTALS

1.1 The following fundamental objectives apply:

1.1.1 In any system or subsystem, the failure of any single element, component, or connection during any one flight should be assumed, regardless of the probability. Such single failures should not prevent continued safe flight and recovery.

1.1.2 Subsequent failures during the same flight, whether detected or latent, and combinations thereof, should also be assumed, unless their joint probability with the first failure is shown to be negligible.

2. CONCEPT

2.1 The fail-safe design concept uses the following design principles or techniques to ensure a safe design. The use of only one of these principles or techniques is seldom adequate. A combination of two or more is usually needed to provided a fail-safe design; i.e. to ensure that marginal and critical failure conditions are remote or improbable and that catastrophic failure conditions are incredible:

2.1.1 Design integrity and quality, including life limits, to ensure intended function and minimize the Occurrence and/or the effects of failures.

2.1.2 Redundancy or a back-up system to enable continued function after any single (or other defined number of) failure(s); e.g. two or more engines, hydraulic systems, flight control system, etc.

2.1.3 Isolation (especially physical or spatial separation) and independence of systems, components, and elements so that the failure of one does not cause the failure of another.

2.1.4 Proven reliability so that multiple, independent failures are unlikely to occur during the same flight.

2.1.5 Failure warning or indication to provide detection.

2.1.6 Flight controller(s) procedures for use after failure detection, to enable continued safe flight and landing by Pilot in Command(s) corrective action.

2.1.7 The capability to check a component’s condition.

2.1.8 Failure containment to limit the safety impact of a failure.

2.1.9 Design failure path to control and direct the effects of a failure in a way that limits the safety impact.

2.1.10 Error tolerance that considers adverse effects of foreseeable error during RPA design, test, manufacture, operation, and maintenance.

2.1.11 Margins or factors of safety to account for foreseeable but uncertain or undefined adverse conditions.

APPENDIX 3

GUIDELINES FOR RPA OPERATOR CERTIFICATION

1. GENERAL

1.1 This appendix lists the general requirements for issue of a RPA Operators Certificate (ROC). NCAA may relax the requirements according to the type of operation for which the permit is sought according to the potential impact of the operation on the safety of air navigation or the safety of persons generally. Similarly, where concerns exist for the safety of other aircraft or persons generally, NCAA may require more stringent conditions to be satisfied before issuing an ROC.

2. RPA OPERATORS CERTIFICATE CONDITIONS

2.1 No operator, or Remote Pilot, may conduct commercial operation unless the operator of the RPA holds a valid ROC, issued by NCAA under Nig CARs 2015 Part 8.8.1.33.

2.2 An applicant for an ROC or variation of an ROC should allow the Authority to examine all safety aspects of the proposed operation.

2.3 An applicant for an ROC must satisfy the Authority that he is able to conduct safe operations.

2.4 An operator should grant the Authority access to his organization and aircraft and should ensure that access is granted to their associated maintenance organization for the purpose of determining continued compliance with these Regulations and, where appropriate, continued airworthiness of aircraft.

2.5 A ROC will be varied, suspended or revoked if the Authority is no longer satisfied that the operator can maintain safe operations.

2.6 The operator must have a management organization capable of exercising operational control and supervision over any flight operated under the terms of its ROC.

2.7 The operator must have nominated an accountable manager acceptable to the Authority who has corporate authority for ensuring that all operations and maintenance activities can be financed and carried out to the standard required by the Authority.

2.8 The operator must nominate post holder(s), acceptable to the Authority, who is (are) responsible for:

(a) flight operations;
(b) the maintenance system;
(c) crew training; and
(d) ground operations.

2.9 The operator must ensure that every flight is conducted in accordance with the provisions of the approved Operations Manual.

2.10 The operator must ensure that its aircraft are equipped and its remote pilots are qualified, as required for the type of operation.

2.11 The operator must comply with such maintenance requirements as are prescribed and contained in the operations manual, for all aircraft operated under the terms of its ROC.

2.12 The operator must provide the Authority with a copy each of their Operations Manual, Exposition and all amendments or revisions to it.

2.13 The operator must maintain operational support facilities, appropriate for the type of operation.

3. ISSUING RPA OPERATORS CERTIFICATE

3.1 An application for a RPA Operators Certificate must be in a form acceptable to NCAA and as prescribed in the guidelines for obtaining a ROC (See appendix 3).

3.2 NCAA must issue a RPA Operators Certificate with Operations Specifications (OpSpecs) if satisfied about the following matters but not limited:

(a) that the operator has produced and will keep up to date an operations manual, acceptable to NCAA, specifying procedures to be followed by Remote Pilots and other relevant persons to ensure the safety of the operator's operations;

(b) where an operator establishes a maintenance system, details of that system will be kept up to date and published in the operations manual;

(c) the operator has complied with paragraph 5.

4. RPA OPERATORS CERTIFICATE CONTENT

4.1 An Operating Certificate must contain at least the following particulars:

(a) name and location (main place of business) of the operator;

(b) date of issue and period of validity;

(c) category of ROC and description of the type of operations authorised;

(d) type(s) of RPA(s) authorised for use;

(e) where appropriate, registration markings of the authorised RPA(s) except that operators may obtain approval for a system to inform the Authority about the registration markings for RPAs operated under its ROC;

(f) Operations Specification and special limitations; (e.g. VFR only, day only, not over populated areas etc.).

5. CHIEF PILOT AND MAINTENANCE CONTROLLER OR SCHEDULER

5.1 An operator must:

(a) establish a position of chief pilot in the organisation with the functions and duties mentioned in paragraph 6;

(b) ensure that, at all times, persons approved by NCAA and appointed as chief Pilot or maintenance controllers or schedulers are occupying or acting in the positions.

5.2 An operator must not, without NCAA's permission, appoint a person to the position of chief Pilot on a part-time basis, except in a single RPA operation.

5.3 Any person or organization appointed to be responsible for the maintenance of the operator's aircraft must be acceptable to NCAA.

5.4 An operator of large RPAs must appoint a person or organization, acceptable to NCAA, to be responsible for the maintenance of the operator's RPAs.

6. FUNCTIONS AND DUTIES OF THE CHIEF PILOT

6.1 The Chief Pilot for an operator is to have control of all Remote Pilot training and operational matters affecting the safety of the flying operations of the operator.

6.2 The responsibilities of a Chief Pilot must, unless the Authority otherwise specifies in writing, include the following responsibilities:

(a) ensuring that the operator's air operations are conducted in compliance with the Act and the Regulations;

(b) maintaining a record of qualifications held by each Remote Pilot;

(c) monitoring operational standards, and supervising the training of Remote Pilots of the operator;

(d) maintaining a complete and up-to-date reference library of operational documents as required by the Authority for the class of operations conducted.

7. QUALIFICATIONS OF CHIEF PILOT

7.1 A Chief Pilot must satisfy the Authority that he or she holds appropriate experience and certificates to permit him or her to act as Remote Pilot of all operations authorized by the operator's certificate.

7.2 The chief pilot of an organization engaged in the operation of medium or large RPAs must be the holder of a Remote Pilot License, however, NCAA may exempt the chief pilot of an organization operating micro or small RPAs from the requirement to hold a Remote Pilot License.

8. ACCEPTANCE OF CHIEF PILOT BY THE AUTHORITY

8.1 A person will not be accepted as a Chief Pilot unless:

(a) he or she can satisfy NCAA that they are able to maintain a satisfactory standard in the conduct or management of flying operations; and

(b) before being approved as a Chief Pilot, the person has:

(i) been assessed by a flying operations inspector as suitable to carry out the responsibilities of a Chief Pilot and

(ii) passed an oral examination conducted by such an inspector covering the regulatory requirements for the safe conduct of operations.

8.2 In addition to the requirements specified in paragraph 8.1, a person proposed for appointment as Chief Pilot may be required to demonstrate to a flying operations inspector his or her controlling proficiency.

8.3 The Authority must give written notice of an approval, or rejection of an approval, for a person to be appointed as, or to act as, a Chief Pilot to the operator and to the person and must, where a proposed appointment is rejected, include in the notice the reasons for the rejection.

8.4 An approval remains in force subject only to the approved person maintaining a satisfactory level of performance.

8.5 An approval relates only to the operator specified in the notice of approval.

9. CANCELLATION OR SUSPENSION OF APPROVAL

9.1 An approval may be cancelled or suspended at any time if, in the opinion of the Authority, the performance of the Chief Pilot is no longer of an acceptable standard.

9.2 Where the Authority cancels or suspends a person's appointment as a Chief Pilot, the Authority must:

(a) notify the person and the operator in writing of the cancellation or suspension; and

(b) provide the person and the operator with reasons.

10. ISSUE, VARIATION AND CONTINUED VALIDITY OF AN RPA OPERATORS CERTIFICATE

10.1 An operator will not be granted an ROC, or a variation to an ROC, and that ROC will not remain valid unless he has satisfied the Authority that he has the ability to:

(a) establish and maintain an adequate organisation;

(b) comply with such maintenance requirements as are prescribed;

(c) comply with the relevant provisions of paragraph 2.

(d) having satisfactorily completed the five phase certification process (See Appendix 4)

10.2 Notwithstanding the provisions of 11.6, the operator must notify the Authority as soon as practicable of any changes to the information submitted in accordance with this paragraph.

11. ADMINISTRATIVE REQUIREMENTS

11.1 An operator should ensure that the following information is included in the initial application for an ROC and, when applicable, any variation or renewal:

(a) the official name and business name, address and mailing address of the applicant;

(b) a description of the proposed operation;

(c) a description of the management organisation;

(d) the name of the accountable manager;

(e) the names of major post holders together with their qualifications and experience; and

(f) the Operations Manual.

11.2 When appropriate, in respect of the operator' s maintenance system only, the following information must be included in the initial application for an ROC and, when applicable, any variation or renewal, and for each RPA system type to be operated:

(a) the maintenance management exposition;

(b) the operator's RPA maintenance program(s);

(c) the RPA technical log;

(d) the number of aircraft.

11.3 The application for an initial issue of an ROC must be submitted at least 90 days before the date of intended operation. Assessment of an application will not commence until NCAA is in receipt of all required documentation.

11.4 The application for the variation of an ROC must be submitted at least 30 days, or as otherwise agreed, before the date of intended operation.

11.5 The application for the renewal of an ROC must be submitted at least 30 days, or as otherwise agreed, before the end of the existing period of validity.

11.6 Other than in exceptional circumstances, the Authority must be given at least 10 days prior notice of a proposed change of a nominated post holder.

12. THE MANAGEMENT AND ORGANISATION OF A RPA OPERATORS CERTIFICATE HOLDER

12.1 General

12.1.1 An operator must have a sound and effective management structure in order to ensure the safe conduct of air operations. Nominated post holders must have proven competency in performance of their role.

12.1.2 In the context of this Appendix, 'competency' means that an individual must have a technical qualification and managerial experience acceptable to the Authority, as appropriate.

12.2 Nominated Post Holders

12.2.1 A description of the functions and the responsibilities of the nominated post holders, including their names, must be contained in the Operations Manual and the Authority must be given notice in writing of any intended or actual change in appointments or functions.

12.2.2 The operator must make arrangements to ensure continuity of supervision in the absence of nominated post holders.

12.2.3 The operator must satisfy the Authority that the management organization is suitable and properly matched to the operating network and scale of operation.

12.2.4 A person nominated as a post holder by the holder of an ROC must not hold a post under any other ROC, unless acceptable to the Authority.

12.2.5 More than one of the nominated posts may be filled by one person if acceptable to the Authority.

12.3 Adequacy and Supervision of Staff

12.3.1 Crew members. The operator must employ sufficient staff dependent upon the nature and the scale of operations who have a thorough understanding of their responsibilities within the organization.

12.3.2 Supervisors. The number of supervisors to be appointed is dependent upon the structure of the operator and the number of staff employed. The duties and responsibilities of these supervisors must be defined, and any flying commitments arranged so that they can discharge their supervisory responsibilities.

12.3.3 The supervision of all staff must be exercised by individuals possessing experience and personal qualities sufficient to ensure the attainment of the standards specified in the operations manual.

12.4 Facilities

12.4.1 An operator must ensure that facilities available at each operating location are sufficient for the safety of flight operations.

12.4.2 Administrative arrangements must be adequate for timely distribution of operational instructions and other information to all concerned.

12.5 Documentation

12.5.1 The operator must make arrangements for the production of manuals, amendments and other documentation.

APPENDIX 4

GUIDELINES AND REQUIREMENTS FOR GRANT OF RPA OPERATORS CERTIFICATE (ROC) FOR GOVERNMENT (CIVIL) AND CORPORATE RPA OPERATION

1. GENERAL

(i) Application for grant of RPA Operators Certificate (ROC) (non-commercial and corporate categories) shall be made in writing to **the Director General, Nigerian Civil Aviation Authority (NCAA)**

(ii) The application shall be signed by a person duly authorized by the applicant.

(iii) The application shall be submitted to the **Director General** not less than **ninety days (90)** to the expected date of utilization of the RPA. The Authority may waive this provision in public interest.

2. REQUIREMENTS

(i) Applicant's details to be filled as contained in the application form NCAA FORM: AC-AWS061.

(ii) Details of intended operations.

(iii) Statement showing compliance with the existing regulation if the RPAS is leased from an operator.

(iv) Date of expected commencement of the operations.

(v) Receipt of payment of non-refundable processing fee. (Bank Draft made payable to the **NIGERIAN CIVIL AVIATION AUTHORITY**).

3. SECURITY CLEARANCE

No person shall operate a RPA for Government (Civil) and Corporate purposes in Nigeria without security clearance issued by the Office of the National Security Adviser (ONSA). Application of interested parties and other relevant documents shall be forwarded by NCAA to the Office of the NSA for security clearance. The office of the NSA then returns the clearance to the NCAA for final approval to operate.

4. VALIDITY OF ROC

The validity of a ROC shall be a **2 (two)** years.

5. ADDITIONAL INFORMATION

(i) On receipt of an application, the Director General of NCAA may request for additional information from the applicant as may be deemed necessary.

(ii) The outcome of the technical evaluation of the application accompanied by an appropriate recommendation will be forwarded to the **Director General** from the ***General Aviation Directorate*** for consideration and approval.

(iii) The Director General shall refuse to grant a ROC to operate RPA, if the applicant is not cleared by the office of the National Security Adviser.

(iv) ***A ROC at the expiration of its validity period or as specified in the company's approved operational scheduled plan of action shall go through renewal process.***

(v) A ROC not utilised for 12 months after grant shall go through revalidation process as determined by the Authority.

APPENDIX 5

GUIDELINES AND REQUIREMENTS FOR GRANT OF RPA OPERATORS CERTIFICATE FOR RPA IN COMMERCIAL OPERATIONS.

1. GENERAL

(i) Application for grant of ROC for RPA operations shall be made in writing to **the Director General, Nigerian Civil Aviation Authority (NCAA)**

(ii) The application shall be signed by a person duly authorized by the applicant.

(iii) The application shall be submitted to the **Director General** not less than **ninety days (90)** to the expected date of utilization of the RPA. The Authority may waive this provision in public interest.

2. REQUIREMENTS

(i) Applicant's details to be filled as contained in the application form NCAA FORM:-AC-AWS061

(ii) Details of intended operations.

(iii) Statement showing compliance with the existing regulations if the RPAS is leased from an operator.

(iv) Date of expected commencement of the operations.

(v) Receipt of payment of non-refundable processing fee. (Bank Draft made payable to the **NIGERIAN CIVIL AVIATION AUTHORITY**).

3. SECURITY CLEARANCE

No person shall operate a RPA for Commercial purposes in Nigeria without security clearance issued by the Office of the National Security Adviser (ONSA). Application of interested parties and other relevant documents will be forwarded by NCAA to the office of the NSA for security clearance. The office of the NSA then returns the clearance to the NCAA for final approval to operate.

4. VALIDITY OF ROC

The validity of a ROC shall be **2 (two) years.**

5. ADDITIONAL INFORMATION

(i) On receipt of an application, the Director General of NCAA may request for additional information from the applicant as may be deemed necessary.

(ii) The outcome of the technical evaluation of the application accompanied by an appropriate recommendation will be forwarded to the **Director General** from the ***General Aviation Directorate*** for consideration and approval to issue.

(iii) The Director General shall refuse to grant a ROC to operate RPA, if the applicant is not cleared by the office of the National Security Adviser.

(iv) ***A ROC at the expiration of its validity period or as specified in the company's approved operational scheduled plan of action shall go through renewal process.***

(v) A ROC not utilised for 12 months after grant shall go through revalidation process as determined by the Authority.

APPENDIX 6

GUIDELINES AND REQUIREMENTS FOR REGISTRATION AND APPROVAL OF RECREATIONAL RPA ACTIVITIES

1.0 MICRO AND SMALL RPA

a. General

(1) Only micro and small RPAs without camera installed can be used for recreational purposes.

(2) Micro and Small RPAs less than 7kg **used for recreational purposes only** (e.g. hobby and personal enjoyment) **requires NCAA registration**.

(3) RPA/RPAS with a maximum take-off weight of less than 25 kg and used for purposes other than recreation (i.e. flight training, filming, inspection or academia purposes, etc), is **not** considered a Recreational RPA **but** a RPA system subject to Appendix 3 and requires a ROC.

(4) For RPAs weighing less than 7kg and used for recreational purposes, the best practices in sections **b** and **c** below provide guidance for their safe operation.

(5) These shall be regulations regarding micro and Small RPAs:

(a) No person shall fly a micro and small RPA/RPAS or a kite or launch a model rocket or a rocket of a type used in a fireworks display into cloud or in a manner that is or is likely to be hazardous to aviation safety.

b. Safety Considerations for Micro and Small RPAs before Flight

1) Inspect that your micro or small RPA is ready for flight. This means that the RPA, control station components (hardware, software and firmware) and control links are in a fit for flight condition.

2) Seek permission from the property owner on which you intend to operate your Micro or Small RPA.

3) Know the classification of the airspace you want to fly in. It would be inappropriate and unsafe for you to operate in airspace with heavy aircraft traffic, such as around airports. Remain at least 9 km (5 nautical miles) from any aerodromes and heliports.

4) Confirm that there is no radio frequency interference (from a nearby radar site for example) that will interfere with the control of your RPA.

5) Have an emergency plan. This means know the people and equipment available that could help you respond to an incident, accident, medical emergency, you have a fly-away or if your micro or Small RPA becomes uncontrollable.

c. During Flight

1) Operate the RPA safely.
2) Always be able to see the RPA with your own eyes. This means that you should not use an on-board camera, first person view device or other similar devices.
3) Always give way to manned aircraft (e.g. hot air balloons, gliders, ultra-light aeroplanes including powered parachutes, aeroplanes and helicopters).
4) Fly only during daylight and in good weather (e.g. not in clouds or fog).
5) Avoid restricted airspace (e.g. forest fire areas, prisons or military airspace)
6) Remain at least 9 km (5 nautical miles) from any aerodromes and heliports.
7) Maintain below a safe altitude (400 feet (100 metres)) and a safe horizontal distance (minimum 50 feet (17 metres)) from people, structures or buildings.
8) Do not fly in populated areas or overfly assemblies of people (e.g. sporting events, concerts, etc).
9) Do not fly where or when you could interfere with any first responders (fire department, police, etc) as they conduct their duties.
10) Respect the privacy of others.
11) Do not operate with any dangerous goods or lasers on the RPA.