



## **Advisory Circular NCAA-AC-PEL 026**

### **SUBJECT: AIRCRAFT MAINTENANCE ENGINEER (MECHANIC) SKILL TEST STANDARDS**

### **ADVISORY CIRCULAR NCAA-AC-PEL026**

**DATE: 02<sup>ND</sup> JUNE 2010**

#### **0.0 FOREWORD**

0.1 The Nigerian Civil Aviation Authority (NCAA) has developed skill test standards for airmen licences and ratings and these are published as Advisory Circulars (ACs). This AC establishes the standards for the Aircraft Maintenance Engineer (Mechanic) skill test. Nigerian inspectors and designated aircraft maintenance engineer examiners shall conduct skill tests in compliance with these standards. Aircraft maintenance engineer instructors and applicants should find these standards helpful in skill test preparation. Other ACs have been developed for other airmen licences and can be obtained from the NCAA website: <http://www.ncaa.gov.ng>.

0.2 Information considered directive in nature is described in this skill test 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.

0.3 The Nigerian Civil Aviation Regulations (Nig. CARs) can be obtained from the NCAA at the address given below. Nig. CARs Part 2 cover the requirements for personnel licensing.

0.4 This Skill Test Standard may be downloaded from the NCAA website at <http://www.ncaa.gov.ng>.

. Subsequent changes to the Skill Test Standard will also be available on the NCAA web site.

0.5 Comments regarding this publication should be sent to:

Nigerian Civil Aviation Authority  
Aviation House  
Murtala Muhammed Airport  
Ikeja

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**Dr. H. O. Demuren**  
**Director General, Civil Aviation Authority**

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**SKILL TEST STANDARDS**  
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# SECTION ONE

## PURPOSE

**1.1** The purpose of this AC is to prescribe the standards that shall be used by NCAA inspectors and designated aircraft maintenance engineer examiners when conducting Aircraft Maintenance Engineer skill tests. Aircraft maintenance engineer instructors are expected to use this document when preparing applicants for skill tests. Applicants should be familiar with this document and refer to these standards during their training.

## GENERAL

**1.2** The NCAA has developed this skill test AC as the standard that shall be used by NCAA inspectors and designated aircraft maintenance engineer examiners when conducting Aircraft Maintenance Engineer skill tests. Aircraft maintenance engineer instructors are expected to use this book when preparing applicants for skill tests. Applicants should be familiar with this book and refer to these standards during their training.

## SKILL TEST STANDARD CONCEPT

**1.3** (1) The Nig. CARs specify the areas in which knowledge and skill must be demonstrated by the applicant before the issuance of a licence or rating. The Nig. CARs provide the flexibility to permit the NCAA to publish Skill Test Standards (STS) containing the AREAS OF OPERATION and specific TASKS in which pilot competency shall be demonstrated.

"Knowledge" (oral) elements are indicated by use of the words *"Exhibits knowledge of..."*

"Skill" (practical) elements are indicated by the use of the words *"Demonstrates the ability to..."*

(2) The NCAA will revise this STS whenever it is determined that changes are needed in the interest of safety. Adherence to the provisions of the regulations and the STS is mandatory for evaluation of pilot applicants.

## SKILL TEST DESCRIPTION

**1.4** (1) This AC contains the STS for the Aircraft Maintenance Engineer licence. The Aircraft Maintenance Engineer Skill Test Standards include the subject areas of knowledge and skill for the issuance of an Aircraft Maintenance Engineer licence and/or the addition of a rating. The subject areas are the topics in which Aircraft Maintenance Engineer applicants must have knowledge and/or demonstrate skill

(2) The REFERENCE identifies the publication(s) that describe(s) the subject area. Descriptions of the subject area are not included in the skill test standards, because this information can be found in references listed and/or in manufacturer or NCAA-approved or acceptable data related to each subject area. Publications other than those listed may be used as references if their content conveys substantially the same information as the referenced publications. Except where appropriate, (e.g., pertinent Nig. CARs) references listed in this document are NOT meant to supersede or otherwise replace manufacturer or other NCAA-approved or acceptable data, but to serve as general information and study material sources.

**Information contained in manufacturer and/ or NCAA-approved/acceptable data always takes precedence over advisory or textbook referenced data.** Written instructions given to applicants for the completion of assigned skill portions of the skill test standard may include service bulletins; airworthiness directives or other CFRs; type certificate data sheets or specifications; manufacturer maintenance manuals or other similar approved/acceptable data necessary for accomplishment of objective testing.

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Reference List

NIG. CARS Part 1	General Policies, Procedures, and Definitions
NIG. CARS Part 2	Personnel Licensing
NIG. CARS Part 5	Airworthiness
NIG. CARS Part 7	Aircraft Instruments and Equipment
NIG. CARS Part 8	Operations
NIG. CARS Part 9	Air Operator Certification and Operation
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(3) Each subject area has an objective. The objective lists the important knowledge and skill elements that must be utilized by the examiner in planning and administering Aircraft Maintenance Engineer tests, and that applicants must be prepared to satisfactorily perform.

(4) EXAMINER is used in this standard to denote either the NCAA Inspector or NCAA Designated Aircraft Maintenance Engineer Examiner (DAME) who conducts the skill test.

(5) The following abbreviations have the meanings shown

ADF	Automatic Direction Finder
ADM	Aeronautical Decision Making
AIRMETS	Airman’s Meteorological Information
APV	Approach with Vertical Guidance
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATS	Air Traffic Service
NIG. CARS	Civil Aviation Regulations
CDI	Course Deviation Indicator
CFIT	Controlled Flight into Terrain
CRM	Crew Resource Management
DA	Decision Altitude
DH	Decision Height
DME	Distance Measuring Equipment

DP	Departure Procedure
NCAA	Nigerian Civil Aviation Authority
FDC	Flight Data Center
FMS	Flight Management System
FSTD	Flight Simulation Training Device
GLS	GNSS Landing System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
IAP	Instrument Approach Procedure
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IPC	Instrument Proficiency Check
LAHSO	Land and Hold Short Operations
LCD	Liquid Crystal Display
LDA	Localizer-type Directional Aid
LED	Light Emitting Diode
LOC	ILS Localizer
LORAN	Long Range Navigation
MAP	Missed Approach Point
ACA	Minimum Descent Attitude
METAR	Aviation Routine Weather Report
MLS	Microwave Landing System
NAVAID	Navigational Aid
NDB	Non-Directional Beacon
NOTAM	Notice to Airmen
NPA	Nonprecision Approach
PA	Precision Approach
RAIM	Receiver Autonomous Integrity Monitoring
RMI	Radio Magnetic Indicator
RNAV	Area navigation
SAS	Stability Augmentation System
SDF	Simplified Directional Facility
SIGMETS	Significant Meteorological Advisory
SRM	Single Pilot Resource Management
STAR	Standard Terminal Arrival
STS	Skill Test Standards
TCAS	Traffic Alert and Collision Avoidance System
VDP	Visual Descent Point
VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	Very High Frequency Ominidirectional Range

## 1.5 USE OF THE SKILL TEST STANDARDS

(1) The NCAA requires that all skill tests be conducted in accordance with the appropriate Aircraft Maintenance Engineer Skill Test Standards. When using the skill test, the examiner must evaluate the applicant's knowledge and skill in sufficient depth to determine that the objective for each subject area element selected is met.



(2) An applicant is not permitted to know before testing begins which selections in each subject area are to be included in his/her test (except the core competency elements, which all applicants are required to perform). Therefore, an applicant should be well prepared in *all* oral and skill areas included in the skill test standard.

## **1.6. SKILL TEST PREREQUISITES**

An applicant for an Aircraft Maintenance Engineer skill test is required to meet the applicable experience requirements in Nig. CARs Part 2 for an Aircraft Maintenance Engineer license.

## **1.7 EXAMINER RESPONSIBILITY**

The examiner who conducts the skill test is responsible for determining that the applicant meets acceptable standards of knowledge and skill in the assigned subject areas within the appropriate skill test standard. Since there is no formal division between the knowledge and skill portions of the skill test, this becomes an ongoing process throughout the test.

The following terms may be reviewed with the applicant prior to, or during, element assignment.

1. "Inspect" means to examine by sight and/or touch (with or without inspection enhancing tools/equipment).
2. "Check" means to verify proper operation.
3. "Troubleshoot" means to analyze and identify malfunctions.
4. "Service" means to perform functions that assure continued operation.
5. "Repair" means to correct a defective condition.

## **1.8 PERFORMANCE LEVELS**

The following is a detailed description of the meaning of each level.

### **Level 1**

- Know basic facts and principles.
- Be able to find information and follow directions and written instructions.
- Locate methods, procedures, instructions, and reference material.
- Interpretation of information not required.
- No skill demonstration is required.

**Example:**

**Z3b.** Locate specified nondestructive testing methods. (Level 1)

**Performance Standard:** The applicant will locate information for nondestructive testing.

**Level 2**

- Know and understand principles, theories, and concepts.
- Be able to find and interpret maintenance data and information, and perform basic operations using the appropriate data, tools, and equipment.
- A high level of skill is not required.

**Example:**

**Z3c.** Detect electrical leakage in electrical connections, terminal strips, and cable harness (at least ten will have leakage faults). (Level 2)

**Performance Standard:** Using appropriate maintenance data and a multimeter, the applicant will identify items with leakage faults.

**Level 3**

- Know, understand, and apply facts, principles, theories, and concepts.
- Understand how they relate to the total operation and maintenance of aircraft.
- Be able to make independent and accurate airworthiness judgments.
- Perform all skill operations to a return-to-service standard using appropriate data, tools, and equipment. Inspections are performed in accordance with acceptable or approved data.
- A fairly high skill level is required.

**Example:**

**Z3e.** Check control surface travel. (Level 3)

**Performance Standard:** Using type certificate data sheets and the manufacturer's service manual, the applicant will measure the control surface travel, compare the travel to the maintenance data, and determine if the travel is within limits.

**1.9 SATISFACTORY PERFORMANCE**

The skill test is passed if the applicant demonstrates the prescribed proficiency in the assigned elements (core competency and other selected elements) in each subject area to the required standard. Applicants shall not be expected to memorize all mathematical formulas that may be required in the performance of various elements in this skill test standard. However, where relevant, applicants must be able to locate and apply necessary formulas to obtain correct solutions.

## **1.10 UNSATISFACTORY PERFORMANCE**

(1) If the applicant does not meet the standards of any of the elements performed (knowledge, core competency, or other skill elements), the associated subject area is failed, and thus the skill test is failed. The examiner or the applicant may discontinue testing any time after the failure of a subject area. In any case, the applicant is entitled to credit for only those subject areas satisfactorily completed.

(2) Typical areas of unsatisfactory performance and grounds for disqualification include the following.

1. Any action or lack of action by the applicant that requires corrective intervention by the examiner for reasons of safety.
2. Failure to follow acceptable or approved maintenance procedures while performing skill (practical) projects.
3. Exceeding tolerances stated in the maintenance instructions.
4. Failure to recognize improper procedures.
5. The inability to perform to a return to service standard, where applicable.
6. Inadequate knowledge in any of the subject areas.

## SECTION TWO

## SECTION I—AIRCRAFT MAINTENANCE ENGINEER GENERAL

### A. BASIC ELECTRICITY

\*Core competency element.

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. sources and/or effects of capacitance in a circuit.
  - b. uses of capacitance in a circuit.
  - c. sources and/or effects of inductance in a circuit.
  - d. uses of inductance in a circuit.
  - e. operation of basic AC and/or DC electrical circuits.
  - f. Ohm's law.
  - g. Kirchoff's law(s).
  - h. procedures used in the measurement of voltage, current, and/or resistance.
  - i. determining power used in simple circuits.
  - j. troubleshooting, and/or repair or alteration using electrical circuit diagrams.
  - k. common types of defects that may occur in an installed battery system.
  - l. aircraft battery theory/operation.
  - m. servicing aircraft batteries.
2. \*Demonstrates the ability to perform both of the following—
  - a. use measuring equipment to measure in a circuit or circuit component(s), at least one of the following: voltage, current, resistance, or continuity. (Level 3)
  - b. determine the appropriateness of measurement(s) according to instructions/specifications. (Level 2)
3. Demonstrates the ability to perform at least one of the following—
  - a. read and interpret one or more electrical circuit diagrams. (Level 2)
  - b. troubleshoot an electrical circuit. (Level 3)
  - c. calculate voltage, current, and resistance using Ohm's Law. (Level 2)
  - d. inspect a battery and installed battery system. (Level 3)
  - e. accomplish a battery state-of-charge (hydrometer) and/or electrical leak (cell imbalance) test. (Level 3)
  - f. accomplish removal and/or installation of a battery in an aircraft. (Level 3)
  - g. set-up and connect a charger to one or more batteries for constant current and/or constant voltage charging. (Level 3)

### B. AIRCRAFT DRAWINGS

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. characteristics and/or uses of any of the various types of drawings/blueprints and/or system schematics.
  - b. the meaning of any of the lines and symbols commonly used in aircraft sketches/drawings/blueprints.
  - c. using charts or graphs.

- d. troubleshooting an aircraft system or component(s) using drawings/blueprints and/or system schematics.
  - e. inspection of an aircraft system or component(s) using drawings/blueprints and/or system schematics.
  - f. repair or alteration of an aircraft system or component(s) using drawings/blueprints and/or schematics.
  - g. use of drawings/blueprints in component fabrication.
  - h. terms used in conjunction with aircraft drawings/blueprints and/or system schematics.
2. Demonstrates the ability to perform at least one of the following—
- a. maintenance and/or inspection using drawings/blueprints and/or system schematics. (Level 3)
  - b. preventive maintenance using drawings/blueprints and/or schematics. (Level 3)
  - c. troubleshooting using drawings/blueprints and/or schematics. (Level 3)
  - d. use a control cable tension chart. (Level 3)
  - e. use a servicing, limitation, or calculation chart or graph. (Level 3)
  - f. draw a sketch of an alteration or repair. (Level 2)
  - g. draw a diagram of an electrical circuit or other system, or portion thereof, and explain the drawing. (Level 2)

### C. WEIGHT AND BALANCE

\*Core competency element.

**Objective.** To determine that the applicant:

- 1. Exhibits knowledge of at least two of the following—
  - a. the purpose(s) of weighing or reweighing.
  - b. general preparations for weighing, with emphasis on aircraft preparation and/or weighing area considerations.
  - c. the general location of airplane center of gravity (CG) in relation to the center of lift for most fixed main airfoils.
  - d. definitions of any of the following: datum, arm, moment (positive or negative), or moment index.
  - e. the meaning and/or application of any terms/nomenclature associated with weight and balance other than those mentioned in element “d” above, including but not limited to any of the following: tare, ballast, and residual fuel/oil.
  - f. procedures for finding any of the following: datum, arm, moment (positive or negative), or moment index.
  - g. purpose and/or application of mean aerodynamic chord (MAC).
  - h. adverse loading considerations.
- 2. \*Demonstrates the ability to calculate weight and balance CG and complete aircraft weight and balance documentation. (Level 3)
- 3. Demonstrates the ability to perform at least one of the following—
  - a. weighing equipment preparation and setup according to manufacturer’s instructions. (Level 3)
  - b. locate procedures for leveling and the leveling points for an aircraft. (Level 2)
  - c. locate weigh points, procedures for determining CG, and determine the weigh point arms for an aircraft. (Level 2)
  - d. identify tare items for a specific aircraft and weighing procedure. (Level 2)
  - e. find the datum for at least two different aircraft. (Level 2)
  - f. determine the weight and location of required ballast after an (actual or hypothetical) equipment change. (Level 2)

## D. FLUID LINES AND FITTINGS

\*Core competency element.

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. tubing materials.
  - b. tubing materials application.
  - c. tubing sizes.
  - d. flexible hose material.
  - e. flexible hose materials application.
  - f. flexible hose sizes.
  - g. flexible hose identification.
  - h. AN, MS, and/or AC plumbing fittings.
  - i. rigid line fabrication techniques/practices.
  - j. rigid line installation techniques/practices.
  - k. flexible hose fabrication techniques/practices.
  - l. flexible hose installation techniques/practices.
2. \*Demonstrates the ability to perform at least one of the following—
  - a. rigid line fabrication to include tube fittings, bending, and tube flaring. (Level 3)
  - b. flexible line fabrication using replaceable fittings on at least one end. (Level 3)
3. Demonstrates the ability to perform at least one of the following—
  - a. inspect for and identify defects in rigid and/or flexible lines. (Level 3)
  - b. install and remove a rigid and/or flexible line. (Level 3)
  - c. identify correct and/or incorrect rigid line installations. (Level 2)
  - d. identify correct and/or incorrect flexible line installations. (Level 2)
  - e. form a bead on tubing. (Level 3)
  - f. select components and assemble a flareless fitting tube connection. (Level 3)
  - g. repair a damaged rigid line. (Level 3)
  - h. identify various sizes and types of aircraft fittings. (Level 2)
  - i. secure a rigid line with clamps. (Level 3)
  - j. identify fluid and/or air lines that may be installed on an aircraft. (Level 2)

## E. MATERIALS AND PROCESSES

\*Core competency element.

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. any of the metals commonly used in aircraft and their general application.
  - b. composites and other nonmetallic components and their general application.
  - c. heat-treated parts precautions, using DD or "icebox" rivets.
  - d. typical wood materials and fabric coverings.
  - e. visible characteristics of acceptable and/or unacceptable welds.
  - f. precision measurement and precision measurement tools.
  - g. using inspection techniques/methods, including any of the following: visual, metallic ring test, dye/fluorescent penetrant, magnetic particle, and/or eddy current.
  - h. identification, selection, installation, and/or use of aircraft hardware.
  - i. safetying of components and/or hardware.
  - j. finding information about material types for specific application(s).
2. \*Demonstrates the ability to torque to specification(s), and safety-wire aircraft component(s)/hardware. (Level 3)
3. Demonstrates the ability to perform at least one of the following—
  - a. select and install standard aircraft hardware, to include one or more self-locking nuts. (Level 3)
  - b. select, install, and secure a clevis bolt and associated hardware. (Level 3)
  - c. select and install one or more appropriate screws/bolts, nuts, cotter pins, and washers. (Level 3)
  - d. inspect hardware for defects, proper installation. (Level 3)
  - e. safety a turnbuckle. (Level 3)
  - f. perform a dye or fluorescent penetrant inspection. (Level 3)
  - g. find a (not visible) defect using eddy current or ultrasonic inspection equipment. (Level 2)
  - h. perform, read, and record a precision measurement using a dial indicator, or micrometer, or vernier caliper. (Level 2)
  - i. visually inspect welds and determine acceptability. (Level 3)
  - j. identify rivets by physical characteristics. (Level 2)

## F. GROUND OPERATION AND SERVICING

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. general procedures for towing aircraft.
  - b. Air Traffic Control (ATC) considerations/requirements for towing aircraft on or across active runways.
  - c. general procedures for starting, ground operating, and/or taxiing a reciprocating engine powered aircraft.



- d. general procedures for starting, ground operating, and/or taxiing a turbine engine powered aircraft.
  - e. the hazards associated with starting, ground operating, and/or taxiing aircraft and procedures for preventing, minimizing or otherwise managing any of them.
  - f. procedures for refueling and/or defueling aircraft.
  - g. oxygen system safety practices/precautions.
  - h. characteristics of aviation gasoline and/or turbine fuels, including basic types and means of identification.
  - i. fuel contamination hazards.
  - j. fuel additives commonly used in the field.
  - k. use of automobile fuel in aircraft engines.
  - l. types/classes of fires, using proper fire extinguishers/methods.
2. Demonstrates the ability to perform at least one of the following—
- a. service an aircraft with compressed air or nitrogen. (Level 3)
  - b. set-up an aircraft and cockpit controls for engine start. (Level 2)
  - c. start and ground operate an aircraft engine\* (taxiing optional), and use or respond to standard hand or light wand signals. (Level 3)
  - d. determine the engine oil for a specific engine. (Level 2)
  - e. secure an aircraft for outside storage. (Level 3)
  - f. fuel and/or defuel an aircraft (may be simulated). (Level 3)
  - g. sample fuel and inspect for proper fuel and contaminants. (Level 3)
  - h. set-up and connect an aircraft to an external power source. (Level 2)
  - i. connect a towbar to an aircraft and prepare for towing. (Level 3)
  - j. direct the movement (may be simulated) of aircraft. (Level 3)
  - k. locate and clear a liquid lock (actual or simulated) in an aircraft engine. (Level 3)
  - l. identify the types/classes of fires that local shop and/or flightline fire extinguishers may be used on. (Level 2)

\*If an operable engine is available.

## **G. CLEANING AND CORROSION CONTROL**

\*Core competency element.

**Objective.** To determine that the applicant:

- 1. Exhibits knowledge of at least two of the following—
  - a. aircraft preparation for washing, general aircraft cleaning (washing) procedures.
  - b. postcleaning (washing) procedures.
  - c. corrosion theory.
  - d. types/effects of corrosion.
  - e. conditions that cause corrosion.
  - f. corrosion prone areas in aircraft.
  - g. corrosion preventive maintenance procedures.
  - h. inspection for and identification of corrosion in any of its various forms.
  - i. corrosion removal and treatment procedures.
  - j. use of Material Safety Data Sheets (MSDS).
- 2. \*Demonstrates the ability to inspect for and identify two or more of the various forms of corrosion that affect aircraft. (Level 3)

3. Demonstrates the ability to perform at least one of the following:
  - a. identify and select materials used to clean interior and/or exterior surfaces according to aircraft manufacturer's instructions. (Level 2)
  - b. corrosion removal from any of the metals commonly used in aircraft. (Level 3)
  - c. preventive corrosion treatment on any of the metals commonly used in aircraft. (Level 3)
  - d. identify and select appropriate corrosion preventive methods and materials for a specific aircraft application. (Level 2)

## H. MATHEMATICS

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. areas of various geometrical shapes.
  - b. volumes of various geometrical shapes.
  - c. definitions/descriptions of geometrical terms, including but not limited to any of the following: polygon, pi, diameter, radius, and hypotenuse.
  - d. ratio problems, including one or more examples of where or how they may be used in relation to aircraft maintenance or system(s) operation.
  - e. proportion problems, including one or more examples of where or how they may be used in relation to aircraft maintenance or system(s) operation.
  - f. percentage problems, including one or more examples of where or how they may be used in relation to aircraft maintenance or system(s) operation.
  - g. algebraic operations, including one or more examples of where or how they may be used in relation to aircraft maintenance.
  - h. conditions or areas where metric conversion may be necessary.
2. Demonstrates the ability to perform at least one of the following, using appropriate formulas—
  - a. calculate the area of a polygon and/or circle. (Level 2)
  - b. calculate the volume of a sphere, cube, or cylinder. (Level 2)
  - c. algebraic operations involving addition, subtraction, multiplication, and/or division of positive and negative numbers. (Level 2)
  - d. locate mathematical formulas used to assist in the maintenance, preventive maintenance, or alteration of aircraft. (Level 1)

**NOTE:** The practical portion of the Mathematics subject area may be tested simultaneously when performing calculation(s) in subject areas Basic Electricity and/or Weight and Balance.

## I. MAINTENANCE FORMS AND RECORDS

\*Core competency element.

REFERENCES: Nig. CARs Parts 1, 5 and 8.

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. writing descriptions of work performed and approval for return to service after minor repairs or minor alterations.
  - b. the content, form, and disposition of aircraft maintenance records reflecting approval for return to service after a 100-hour inspection.

- c. the content, form, and disposition of aircraft maintenance records reflecting disapproval for return to service after a 100-hour inspection.
  - d. the recording content, form, and disposition requirements for certificated Aircraft Maintenance Engineers (without an Inspection Authorization) who perform major repairs and/or major alterations.
  - e. the inoperative instruments or equipment provisions of relevant parts of the Regulations..
  - f. the definition/explanation of any of the terms used in relation to aircraft maintenance, such as overhaul(ed), rebuilt, time in service, maintenance, preventive maintenance, inspection, major alteration, major repair, minor alteration, and minor repair.
2. \*Demonstrates the ability to write appropriate entries on relevant Forms , Major Repair and Major Alteration, indicating performance of a major repair, and make appropriate corresponding aircraft maintenance record entry. (Level 3)
3. Demonstrates the ability to write entries for at least one of the following—
- a. performance of minor repair or minor alteration. (Level 3)
  - b. performance of preventive maintenance. (Level 3)
  - c. compliance with an airworthiness directive. (Level 3)
  - d. performance of a 100-hour inspection with approval for return to service, including a list of some allowable inoperative instruments or equipment in accordance with the provision of relevant parts of the Regulations . (Level 3)
  - e. performance of a 100-hour inspection with disapproval for return to service because of needed maintenance, or noncompliance with applicable specifications or airworthiness directive(s). (Level 3)
  - f. Relevant Forms, Major Repair and Major Alteration, for additional equipment installation or an alteration in accordance with a supplemental type certificate (STC) and make appropriate maintenance record entry. (Level 3)
  - g. Relevant Forms , Malfunction or Defect Report. (Level 3)

## **J. BASIC PHYSICS**

**Objective.** To determine that the applicant:

- 1. Exhibits knowledge of at least two of the following—
  - a. any of the simple machines, how they function, and/or how mechanical advantage is applied in one or more specific examples.
  - b. sound resonance, how it can be a hazard to aircraft, and how sound may be used to aid in inspecting aircraft.
  - c. the relationship between fluid density and specific gravity.
  - d. the characteristic of specific gravity of fluids and how it may be applied to aircraft maintenance.
  - e. the general effects of pressure and temperature on gases and liquids and how the qualities of compressibility and/or incompressibility of gases and liquids are generally applied to aircraft systems.
  - f. density altitude and the effects of temperature, and/or pressure, and/or humidity on aircraft and/or engine performance.
  - g. heat, how it is manifested in matter, and how heat transfer is accomplished through conduction, and/or convection, and/or radiation.
  - h. coefficient of linear (thermal) expansion as related to aircraft materials.
  - i. aircraft structures and theory of flight/physics of lift.
  - j. the operation of aerodynamic factors in the flight of airplanes and/or helicopters.
  - k. the relationship between force, area, and pressure.
  - l. the five forces or stresses affecting aircraft structures.
  - m. the two forms of energy and how they apply to aircraft and/or aircraft systems.

2. Demonstrates the ability to perform at least one of the following—
  - a. identify any parts or systems of an aircraft and/or engine where Bernoulli's principle and/or Newtonian law is applied. (Level 2)
  - b. identify parts or systems of an aircraft where Boyle's, Charles', and/or Pascal's Laws apply. (Level 2)
  - c. calculate force, area, or pressure in a specific application. (Level 3)
  - d. identify one or more methods of heat transfer in aircraft systems and where and how heat damage may occur when performing aircraft maintenance. (Level 2)
  - e. identify any of the following and describe how they function aerodynamically: stall strips, wing fences, vortex generators, flaps, slats, spoilers, ailerons, stabilators, elevators, rudders, or trim tabs. (Level 2)
  - f. determine which of the five forces/stresses are acting on an aircraft or aircraft parts at specific points under given conditions. (Level 2)
  - g. design a simple machine (on paper) that uses one or more methods of mechanical advantage. (Level 2)

## K. MAINTENANCE PUBLICATIONS

\*Core competency element.

**Objective.** To determine that the applicant:

1. Exhibits knowledge of at least two of the following—
  - a. how a mechanic makes use of Type Certificate Data Sheets (TCDSs) and/or Aircraft Specifications in conducting maintenance or inspections.
  - b. aircraft maintenance manuals and associated publications including any of the following types of publications and how they are used: service bulletin, maintenance manual, overhaul manual, structural repair manual, or instructions for continued airworthiness.
  - c. the requirements of Relevant parts of the Regulations in the performance of maintenance.
  - d. Airworthiness Directives (AD), including purpose and/or AD categories and/or ADs issued to other than aircraft.
  - e. in what form individuals may receive FAA published AD summaries and/or how they may be obtained.
  - f. the AD identification numbering system.
  - g. NCAA Advisory Circulars (ACs) including any of the following: significance of the AC numbering system, one or more examples of ACs issued to provide information in designated subject areas, one or more examples of ACs issued to show a method acceptable to the NCAA complying with Relevant parts of the Regulations.
  - h. the intent or function of the Aviation Maintenance Alerts.
  - i. the Air Transport Association (ATA) Specification (if applicable)

2. \*Demonstrates the ability to perform both of the following—
  - a. read, comprehend, and apply information contained in a manufacturer's maintenance manual or illustrated parts manual. (Level 3)
  - b. locate and list all applicable ADs for at least one particular make, model, and serial number of an aircraft, engine, propeller, or appliance. (Level 2)
  
3. Demonstrates the ability to read, comprehend, and apply the information contained in at least one of the following—
  - a. service bulletin. (Level 3)
  - b. overhaul manual. (Level 3)
  - c. structural repair manual. (Level 3)
  - d. instructions for continued airworthiness. (Level 3)
  - e. at least one maintenance related section, or appendix, or portion(s) thereof, of Relevant parts of the Regulations. (Level 3)
  - f. an AD. (Level 3)
  - g. Aircraft Specifications or TCDSs to specific maintenance or inspection operations, or portions thereof. (Level 3)

#### **L. AIRCRAFT MAINTENANCE ENGINEER PRIVILEGES AND LIMITATIONS**

REFERENCES: Nig. CARs Part 2

**Objective:** To determine that the applicant:

1. Exhibits knowledge of mechanic privileges and limitations and exercise thereof, including at least two of the following—
  - a. required evidence of eligibility experience satisfactory to the Administrator.
  - b. length of experience required for eligibility.
  - c. practical experience required for eligibility.
  - d. the privileges of a mechanic in relation to 100-hour and annual inspections.
  - e. change of address reporting requirements.
  - f. minimum age requirements.
  - g. recent experience requirements to exercise privileges of a certificate.
  - h. who is authorized to perform maintenance/inspection, preventive maintenance, rebuilding, or alteration and/or approve for return to service afterwards.
  - i. causes for revocation or suspension.
  - j. criteria for determining major and minor repair or alteration.
  
2. When given a copy of Nig. CARs Part 2, demonstrates the ability to understand mechanic privileges and limitations by finding and interpreting/explaining essential information contained in at least two of the following—
  - a. Offenses involving alcohol or drugs. (Level 2)
  - b. Written tests: Cheating or other unauthorized conduct. (Level 2)
  - c. Applications, certificates, logbooks, reports, and records: falsification, reproduction, or alteration. (Level 2)
  - d. Refusal to submit to a drug or alcohol test. (Level 2)
  - e. General privileges and limitations. (Level 2)
  - f. Recent experience requirements. (Level 2)
  - g. Airframe rating; additional privileges and/or Powerplant rating; additional privileges. (Level 2)
  - h. Display of certificate. (Level 2)