NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

JANUARY 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: DRONE PILOT TECHNICIAN

LEVEL: NTA 5

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ABBREVIATIONS

API	Application Programming Interface
CBET	Competency Based Education and Training
DC	Direct Curent
ESC	Electrical Speed Controller
FPV	First Person View
GPS	Global Positioning System
IMU	Inertial Measurement Unit
KV	Kilovolt
Li-po	Li-polymer Battery
MOPP	Maintenance Operation Processes and Procedures
NACTVET	National Council for Technical and Vocational Education and Training
Ni-Cd	Ni-Cd battery
Ni-Mh	Ni-Mh battery
NOS	National Occupational Standards
OS	Occupational Standards
PID	Proportional, Integral and Derivative Control
RC	Radio Control

RTK	Real-time Kinematic
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training
UAV	Unmanned Aerial Vehicle

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as a performance tool of assessment of the prescribed outcomes.
Occupational/Job analysis:	A process used to identify the tasks that are important to employees in any given occupation**.**
Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative

statements.

Skills: The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.

Standards: A set of statements, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.

Task Analysis: The process of analysing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.

Task: A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.

Underpinning Knowledge: Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.

Verification Process: The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs troubleshooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to the demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programmes. TET institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Drone Pilot Technician Occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The *10-year National Skills Development Strategy (2016-2026)* was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes.

These sectors include: Transport and Logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The occupational standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the Occupational Standards. Engineers, supervisory technicians on the job, and experienced Drone Pilot Technicians were key informants in the survey to discover occupational trends. This information was used to gain insight from the workplaces

regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of ... online surveys were completed by experts from the labour market across the country. Apart from the surveys aiding in defining the scope for the occupational analysis, they also served to engage a wide cross-section of experts in the occupation. Apart from this, the stakeholders' forum was attended by ... participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR DRONE PILOT TECHNICIANS

The standards cover a broad range of duties and tasks that can be performed by a Drone Pilot Technician. However, the occupational standards are not meant to replace individual job descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Drone Pilot Technicians may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

The Drone Pilot Technicians shall work under the supervision of senior technicians, plan flight routes for aerial photography, inspection, as well as surveying and mapping, install and debug multi-rotor, fixed-wing and composite-wing UAVs, perform aerial photography, patrol inspection and surveying and mapping, and diagnose and eliminate faults of various unmanned aerial vehicles, power system parts and load equipment during task execution. Generally, the Drone Pilot Technician performs the following responsibilities:

a) General services for aerial photography and inspection surveying and mapping

b) Planning of flighting tasks of multi-rotor, fixed-wing and composite-wing UAVs

c) Assembly, debugging and maintenance of multi-rotor, fixed-wing and composite-wing UAVs

d) Assembly, debugging and maintenance of multi-rotor, fixed-wing and composite-wing UAV power system

e) Assembly, debugging and maintenance of multi-rotor, fixed-wing and composite-wing UAV control system

f) Assembly, debugging and maintenance of multi-rotor, fixed-wing and composite-wing UAV loading system

g) Execution of tests in line-of-sight and flight tasks of all kinds of unmanned aerial vehicles

i) Execution of over-the-horizon tests and flight tasks of all kinds of unmanned aerial vehicles

j) Maintenance of the safety system of all kinds of unmanned aerial vehicles

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA level 4, 5 and 6.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR DRONE PILOT TECHNICIAN - NTA 5

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	TASK ANALYSIS OF FIXED-WING AERIAL VEHICLES	**DUTY NO.**	501
TASK TITLE	ANALYSIS OF THE IMPACT OF WEATHER AND TERRAIN ON OPERATION AND THAT OF OPERATION ON THE ENVIRONMENT.	**TASK NO.**	5011
PERFORMANCE CRITERIA	The person performing this task must be able to analyse the impact of weather and terrain on operation and that of operation on the environment in accordance with flight safety and requirements.		
RANGE STATEMENT	The task can be performed indoors or at the flight site under the supervision of senior drone pilot technicians. The tools and equipment to be used include: 1. Computers.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyse the contents of inspection task planning books; 2. Abide by the laws and regulations on low-altitude management; 3. Check the flying weather; 4. Check whether the take-off and landing sites meet the range requirements for the gliding and flying sites and whether there are any obstacles at the cruising altitude; 5. Select the fixed-wing aerial vehicle to perform the task; 6. Plan flight operations; 7. Fill in the flight schedule.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Fill in the flight schedule; 1.2 Investigate the flight environmental conditions of the fixed-wing aerial vehicle; 1.3 Plan the flight route of the fixed-wing aerial vehicle. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The weather and terrain requirements for fixed-wing aerial vehicles; 2.2 The laws and regulations on low-altitude management. **3.0 Theories** The person performing this task must be able to

	explain the following: 3.1 Factors affecting the flight operation of the fixed-wing aerial vehicle. **4.0 Essential Skills** 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Computer skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The impact of weather and terrain on operation and that of operation on the environment are analysed in accordance with flight safety and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Analysis of meteorological and geographical conditions; 2. Flight safety of fixed-wing aerial vehicles.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	TASK ANALYSIS OF FIXED-WING AERIAL VEHICLES	**DUTY NO.**	501
TASK TITLE	FLIGHT PLAN REPORTING ACCORDING TO THE TASK FLOWS	**TASK NO.**	5012
PERFORMANCE CRITERIA	The person performing this task must be able to conduct flight plan reporting according to the laws and regulations of the low-altitude management and the task flows.		
RANGE STATEMENT	The task can be performed indoors or at the flight site under the supervision of senior drone pilot technicians. The tools and equipment to be used include: 1. Computers; 2. Internet.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Login to the website to make platform registration and flight application; 2. Abide by the laws and regulations on low-altitude management; 3. Check the flying weather and topography; 4. Choose the aerial vehicles to perform tasks; 5. Report the information about flight dynamic.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Conduct the flight plan reporting. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The laws and regulations on low-altitude management; 2.2 The weather and terrain requirements for fixed-wing aerial vehicles; 2.3 Procedures of flight reporting. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The weather and terrain conditions affecting the UAV flight. **4.0 Essential Skills** 4.1 Reading comprehension skills;

	4.2 Communication skills; 4.3 Computer skills; 4.4 Customer service skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Flight reporting is conducted according to the content of the flight schedule.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Analysis of meteorological and geographical conditions; 2. Flight safety of fixed-wing aerial vehicles.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	TASK ANALYSIS OF FIXED-WING AERIAL VEHICLES	**DUTY NO.**	501
TASK TITLE	ROUTE PLANNING OF INSPECTION TASKS	**TASK NO.**	5013
PERFORMANCE CRITERIA	The person performing this task must be able to complete the route planning of inspection tasks according to the laws and regulations of the low-altitude management and the task flows.		
RANGE STATEMENT	The task can be performed indoors or at the flight site under the supervision of senior drone pilot technicians. The tools and equipment to be used include: 1. Ground control stations.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyze the inspection tasks and the content of flight task books; 2. Abide by the laws and regulations on low-altitude management; 3. Check the flying weather and topography; 4. Analyse the take-off and landing points, task areas and geographic space, and determine the route planning space; 5. Fill in the flight schedule.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Plan the flight route; 1.2 Set the flight movements. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The laws and regulations on low-altitude management; 2.2 The weather and terrain requirements for fixed-wing aerial vehicles. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Factors affecting route planning; 3.2 Safety operations of ground stations. **4.0 Essential Skills** 4.1 Reading comprehension skills;

	4.2 Communication skills; 4.3 Computer skills; 4.4 Customer service skills; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Flight inspection tasks are successfully completed based on merit-based selections of route planning and movement setting operations.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Analysis of meteorological and geographical conditions; 2. Flight safety of fixed-wing aerial vehicles.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	INSTALLATION AND DEBUGGING OF FIXED-WING AERIAL VEHICLES	**DUTY NO.**	502
TASK TITLE	INSTALLATION OF FIXED-WING AERIAL VEHICLES	**TASK NO.**	5021
PERFORMANCE CRITERIA	The person performing this task must be able to install the equipment in accordance with technical requirements and installation manuals of fixed-wing aerial vehicle manufacturers.		
RANGE STATEMENT	The task can be performed in the installation and debugging workshop under the supervision of senior technicians of the manufacturers of fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Balancing tools; 2. Weighing tools; 3. Testing instruments; 4. Full set of UAV installation and debugging toolboxes; 5. Electric welding equipment and heat guns; 6. Different kinds of glue and connecting rods; 7. Accessories of fixed-wing aerial vehicles; 8. Electronic accessories such as steering engines, motors, electric adjusters, batteries and receivers; 9. Load equipment of surveying and mapping; 10. Transmission systems.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the safety operations and precautions when performing tasks; 2. Read the requirements of the installation manual for fixed-wing aerial vehicles; 3. Select appropriate tools and equipment; 4. Install the fuselage section of the fixed-wing aerial vehicle; 5. Fix the engine on the nose position of the aerial vehicle; 6. Install the landing gear; 7. Install the wing section of the fixed-wing	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Install the wing, fuselage and tail fin; 1.2 Connect the circuits of aerial vehicles. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Flight principles of fixed-wing aerial vehicles;

aerial vehicle; 8. Install the tail fin of the fixed-wing aerial vehicle; 9. Install the servo steering gear; 10. Connect the fuselage, wing and tail fin; 11. Fix the load equipment; 12. Connect all circuits; 13. Clean the tools, equipment and workplaces; 14. Arrange and store the tools and equipment; 15. Fill in the installation manual.	2.2 Working principles of UAV steering gears; 2.3 The laws and regulations on low-altitude management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The functions of various parts of fixed-wing aerial vehicles; 3.2 Installation procedures of fixed-wing aerial vehicles; 3.3 Usage of tools and equipment. **4.0 Essential Skills** 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Teamwork skills; 4.4 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The installation of aerial vehicles is completed in accordance with installation manuals and technical requirements of fixed-wing aerial vehicle manufacturers.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Waste disposal methods.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	INSTALLATION AND DEBUGGING OF FIXED-WING AERIAL VEHICLES	**DUTY NO.**	502
TASK TITLE	DEBUGGING OF FIXED-WING AERIAL VEHICLES	**TASK NO.**	5022
PERFORMANCE CRITERIA	The person performing this task must be able to debug the equipment in accordance with technical requirements and debugging manuals of fixed-wing aerial vehicle manufacturers.		
RANGE STATEMENT	The task can be performed in the installation and debugging workshop or at the flight site under the supervision of Senior Technicians of the manufacturers of fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Balancing tools; 2. Weighing tools; 3. Testing instruments; 4. Full set of UAV installation and debugging toolboxes; 5. Electric welding equipment and heat guns; 6. Different kinds of glue and connecting rods; 7. Charging equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the precautions of safety operation; 2. Read the requirements of the debugging manual of fixed-wing aerial vehicles; 3. Select appropriate tools and equipment; 4. Adjust the center position of fixed-wing aerial vehicles; 5. Adjust the steering gear angle; 6. Test the engine; 7. Run in the engine; 8. Troubleshoot the engine faults; 9. Adjust the parameters of flight controllers; 10. Debug the load equipment; 11. Clean the tools, equipment and workplaces; 12. Arrange and store the tools and equipment;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Adjust the servo steering gear angle; 1.2 Adjust the state of the engine; 1.3 Adjust the parameters of flight controllers. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Flight principles of fixed-wing aerial vehicles; 2.2 Working principles of UAV steering gears. **3.0 Theories**

13. Fill in the debugging manual.	The person performing this task must be able to explain the following: 3.1 The debugging content of fixed-wing aerial vehicles; 3.2 Operating and using methods of the engine; 3.3 Usage of tools and equipment; 3.4 Usage of flight control debugging software. **4.0 Essential Skills** 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Teamwork skills; 4.4 Computer skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The debugging of aerial vehicles is completed in accordance with debugging manuals and technical requirements of fixed-wing aerial vehicle manufacturers.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Waste disposal methods.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	FIXED-WING FLIGHT OPERATION	**DUTY NO.**	503
TASK TITLE	PREPARATION OF FIXED-WING FLIGHT OPERATION	**TASK NO.**	5031
PERFORMANCE CRITERIA	The person performing this task must be able to conduct pre-operation preparation in accordance with the task requirements and the installed and debugged fixed-wing aerial vehicles.		
RANGE STATEMENT	The task can be performed at the flight site under the supervision of the instructors or captains of the fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Balancing tools; 2. Weighing tools; 3. Testing instruments; 4. Full set of UAV installation and debugging toolboxes; 5. Electric welding equipment and heat guns; 6. Different kinds of glue and connecting rods; 7. Charging equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyse the contents of task planning books; 2. Abide by the laws and regulations on low-altitude management; 3. Check the flying weather and topography; 4. Plan flight operations; 5. Complete the inspection of fixed-wing aerial vehicles; 6. Complete the inspection of load equipment for fixed-wing flight; 7. Complete the inspection of remote controllers of fixed-wing flight; 8. Complete the environmental inspection of fixed-wing flight; 9. Fill in the flight task table.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine no-fly zones and restricted flight zones; 1.2 Check the safety of take-off and landing zones; 1.3 Inspect airspace safety visually; 1.4 Fill in the pre-flight checklist. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principles of load equipment; 2.2 Flight principles of fixed-wing aerial vehicles; 2.3 Flying weather and topography for UAVs;

	2.4 The laws and regulations on low-altitude management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 System structure of fixed-wing aerial vehicles. **4.0 Essential Skills** 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Teamwork skills; 4.4 Computer skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The pre-operation preparation for fixed-wing aerial vehicles is completed in accordance with the content of flight schedules.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrical safety; 2. Occupational health and safety; 3. Analysis of meteorological and geographical conditions.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	FIXED-WING FLIGHT OPERATION	**DUTY NO.**	503
TASK TITLE	IN LINE-OF-SIGHT FIXED-WING FLIGHT OPERATION	**TASK NO.**	5032
PERFORMANCE CRITERIA	The person performing this task must be able to conduct in line-of-sight flight operation in accordance with the task requirements.		
RANGE STATEMENT	The task can be performed at the flight site under the supervision of the instructors or captains of the fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Ground station radios; 2. Ground station computers; 3. Ground station software; 4. Radio communication systems.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyse the contents of task planning books; 2. Abide by the laws and regulations on low-altitude management; 3. Check the flying weather and topography; 4. Plan flight operations; 5. Conduct taking-off and landing of UAVs; 6. Follow the 8-shape flight route; 7. Fill in the flight task table.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Conduct remote control instructions; 1.2 Control the fixed-wing aerial vehicle to take off; 1.3 Follow the 8-shape flight route. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Flight control principles of fixed-wing aerial vehicles; 2.2 Laws and regulations on airspace management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Take-off and landing control methods of fixed-wing aerial vehicles: 3.2 Air-turning control methods of fixed-wing

	aerial vehicles. **4.0 Essential Skills** 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Teamwork skills; 4.4 Computer skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The in line-of-sight flight operation of fixed-wing aerial vehicles is completed in accordance with flight schedules.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Analysis of meteorological and geographical conditions.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	FIXED-WING FLIGHT OPERATION	**DUTY NO.**	503
TASK TITLE	COMPLETION OF THE OVER-THE-HORIZON FLIGHT ALONG THE INSPECTION TASK ROUTE	**TASK NO.**	5033
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the over-the-horizon flight along the inspection task route in accordance with the task requirements.		
RANGE STATEMENT	The task can be performed at the flight site under the supervision of the instructors or captains of the fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Ground station radios; 2. Ground station computers; 3. Ground station software; 4. Radio communication systems.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyse the contents of task planning books; 2. Abide by the laws and regulations on low-altitude management; 3. Check the flying weather and topography; 4. Plan flight operations; 5. Use the ground control system to transmit the picture to complete the waypoint setting of the UAV; 6. Monitor the flight status of the UAV; 7. Use the ground control system to control the flight of UAVs; 8. Fill in the flight task table.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Set the waypoints of aerial vehicles; 1.2 Use ground stations to control aerial vehicles; 1.3 Monitor the flight status. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of ground station controlling; 2.2 Principles of image transmission; 2.3 The laws and regulations on low-altitude management. **3.0 Theories** The person performing this task must be able to explain the following:

	3.1 Operations of load equipment; 3.2 State analysis methods of fixed-wing aerial vehicles. **4.0 Essential Skills** 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Teamwork skills; 4.4 Computer skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The over-the-horizon flight along the inspection task route via fixed-wing aerial vehicles is completed in accordance with the contents of flight schedules.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Analysis of meteorological and geographical conditions.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	Equipment overhaul	**DUTY NO.**	504
TASK TITLE	DETECTION OF THE PARTS OF THE POWER SYSTEM	**TASK NO.**	5041
PERFORMANCE CRITERIA	The person performing this task must be able to detect the parts of the power system of the fixed-wing aerial vehicle according to the overhaul manual.		
RANGE STATEMENT	The task can be performed in the installation and debugging workshop under the supervision of senior technicians of the manufacturers of fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Overhaul manuals; 2. Full set of aerial vehicle equipment; 3. Full set of installation tools for the aerial vehicle; 4. Engine test benches; 5. Blade balancers.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Refer to instructions in the overhaul manual; 2. Choose operating tools and equipment; 3. Detect the servo steering gear; 4. Detect the connecting rod; 5. Detect the fuel tank; 6. Detect the engine; 7. Detect the paddle blade; 8. Fill in the component inspection list; 9. Clean the workplace; 10. Arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Check the steering gear; 1.2 Check the connecting rod and blade. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of component inspection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Component inspection procedures; 3.2 Usage of appropriate tools and equipment; 3.2 Detecting procedures of power systems.

	4.0 Essential Skills 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Teamwork skills; 4.4 Computer skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The detection of the parts of fixed-wing aerial vehicles is completed in accordance with overhaul manuals.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Waste disposal methods.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	EQUIPMENT OVERHAUL	**DUTY NO.**	504
TASK TITLE	REPLACEMENT OF THE PARTS OF THE POWER SYSTEM	**TASK NO.**	5042
PERFORMANCE CRITERIA	The person performing this task must be able to replace the parts of the power system of the fixed-wing aerial vehicle according to the overhaul manual.		
RANGE STATEMENT	The task can be performed in the installation and debugging workshop under the supervision of senior technicians of the manufacturers of fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Overhaul manuals; 2. Full set of aerial vehicle equipment; 3. Full set of installation tools for the aerial vehicle.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Refer to instructions in the overhaul manual; 2. Choose operating tools and equipment; 3. Replace the servo steering gear; 4. Replace the connecting rod; 5. Replace the fuel tank; 6. Change the engine; 7. Replace the blade; 8. Fill in the component replacement list; 9. Clean the workplace; 10. Arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Replace the parts of the power system of UAVs. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of replacing parts and components. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Component replacement procedures; 3.2 Usage of appropriate tools and equipment. **4.0 Essential Skills** 4.1 Reading comprehension skills;

	4.2 Communication skills; 4.3 Teamwork skills; 4.4 Computer skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The replacement of the parts of fixed-wing aerial vehicles is completed in accordance with overhaul manuals.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Waste disposal methods.

OCCUPATION	DRONE PILOT TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	EQUIPMENT OVERHAUL	**DUTY NO.**	504
TASK TITLE	DETECTION AND REPLACEMENT OF FIXED-WING LOAD EQUIPMENT	**TASK NO.**	5043
PERFORMANCE CRITERIA	The person performing this task must be able to complete the detection and replacement of the load equipment on fixed-wing aerial vehicles in accordance with overhaul manuals.		
RANGE STATEMENT	The task can be performed in the installation and debugging workshop site under the supervision of senior technicians of the manufacturers of fixed-wing aerial vehicles. The tools and equipment to be used include: 1. Overhaul manuals; 2. Full set of aerial vehicle equipment; 3. Full set of installation tools for the aerial vehicle.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Refer to instructions in the overhaul manual; 2. Choose operating tools and equipment; 3. Detect the appearance of the data transmission modules; 4. Detect the transmission of data transmission links and circuits; 5. Detect the appearance of the image transmission modules; 6. Detect the transmission of image transmission links; 7. Detect the receiving equipment; 8. Detect the auxiliary equipment; 9. Replace data transmission modules and circuits; 10. Replace image transmission modules and circuits; 11. Replace other auxiliary equipment; 12. Fill in the maintenance lists of load equipment;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Detect and replace the image transmission modules; 1.2 Detect and replace the data transmission modules; 1.3 Test and replace the auxiliary equipment. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Detecting principles of load equipment; 2.2 Replacement processes of load equipment. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Detecting procedures for load equipment; 3.2 Replacing procedures for load equipment;

13. Clean the workplace; 14. Arrange and store the tools and equipment.	3.3 Usage of appropriate tools and equipment. **4.0 Essential Skills** 4.1 Reading comprehension skills; 4.2 Communication skills; 4.3 Teamwork skills; 4.4 Computer skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The detection and replacement of the load equipment on fixed-wing aerial vehicles are completed in accordance with overhaul manuals.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Waste disposal methods.

TABLE 1: DACUM CHARTS FOR DRONE PILOT TECHNICIAN - NTA 5

DUTIES	TASKS	ENABLERS
1.0 Task analysis of fixed-wing aerial vehicles	1.1 Analysis of the impact of weather and terrain on operation and that of operation on the environment. 1.2 Flight plan reporting according to the task flows. 1.3 Route planning of inspection tasks.	**General skills and knowledge** · Cooperation with others using communication skills and submission of reports to the superiors · Use of the manufacturer's manual · Environment and flight safety · Flight task flow · Operation of ground station software **Tools and equipment** · Ground control stations **Materials** · Documents and tables **Requirements for employees** · Teamwork spirit, integrity, time management and commitment
2.0 Installation and debugging of fixed-wing aerial vehicles	2.1 Installation of fixed-wing aerial vehicles. 2.2 Debugging of fixed-wing aerial vehicles.	**General skills and knowledge** · Cooperation with others using communication skills and submission of reports to the superiors · Use of the manufacturer's manual · Environment and flight safety · Skills in aerial vehicle installation and debugging · Interpretation of technical documents **Tools and equipment** · Full set of installation and debugging tools for the aerial vehicle · Engine installation table

		· Flight control software · Ground control stations **Materials** · Fixed-wing propellers · Fixed-wing landing gears · Fixed-wing reinforcing screws, straps, glue, etc. **Requirements for employees** · Teamwork spirit, integrity, time management and commitment
3.0 Fixed-wing flight operation	3.1 Preparation of fixed-wing flight operation. 3.2 In line-of-sight fixed-wing flight operation. 3.3 Completion of the over-the-horizon flight along the inspection task route.	**General skills and knowledge** · Cooperation with others using communication skills and submission of reports to the superiors · Use of the manufacturer's manual · Environment and flight safety · Flight task flow · Operation of ground station software **Tools and equipment** · Ground control stations **Materials** · Fixed-wing propellers · Fixed-wing landing gears · Fixed-wing reinforcing screws, straps, glue, etc. **Requirements for employees** · Teamwork spirit, integrity, time management and commitment
4.0 Equipment overhaul	4.1 Detection of the parts of the power system. 4.2 Replacement of the parts of the power system.	**General skills and knowledge** · Cooperation with others using communication skills and submission of reports to the

	4.3 Detection and replacement of fixed-wing load equipment.	superiors · Use of the manufacturer's manual · Environment and flight safety · Flight task flow · Skills in installation and debugging of the load equipment in the aerial vehicle · Interpretation of technical documents **Tools and equipment** · Full set of installation tools for the aerial vehicle · Ground control stations **Materials** · Motors, electric adjusters · Spare parts of engine and oil circuits · Fixed-wing reinforcing screws, straps, glue, etc. · Spare parts of load equipment **Requirements for employees** · Teamwork spirit, integrity, time management and commitment