NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

JANUARY 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN

LEVEL: NTA 5

TABLE OF CONTENT

CONTENTS

ABBREVIATIONS

6s	Seiri, Seiton, Seiso, Setketsu, Shtsuke and Safety
CBET	Competency Based Education and Training
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
PCB	Printed Circuit Board
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

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 and Vocational Education and Training of Tanzania 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 Occupational 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 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 Electronic Equipment Assembly and Repair 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 experts 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 Electronic Equipment Assembly and Repair Technicians were key informants in the survey to discover occupational trends. The 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 survey 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 ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIANS

The standards cover a broad range of duties and tasks that can be performed by an Electronic Equipment Assembly and Repair 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 Electronic Equipment Assembly and Repair Technician 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 Electronic Equipment Assembly and Repair Technician shall be mainly engaged in Printed Circuit Board (PCB) assembly, debugging and repair of power supply and circuits, office and digital electronic equipment repairing and service acceptance under the supervision of engineers. They can also perform electronic equipment assembly, debugging and repair, service acceptance and other work in the workshop or user site. Generally, the Electronic Equipment Assembly and Repair Technician performs the following responsibilities:

a) Manual assembly of PCB
b) Semi-automatic mixing assembly of PCB
c) Automatic mixing assembly of PCB
d) DC voltage-stabilized power and debugging of basic circuits
e) Debugging of switching power supply
f) Debugging of high-voltage power supply
g) Debugging of analog-digital hybrid circuits
h) Maintenance of analog-digital hybrid circuits
i) Debugging of high frequency circuits
j) Installation and debugging of electronic equipment
k) Faults and maintenance of electronic equipment
l) Quality inspection and acceptance of small electronic products
m) Quality inspection and acceptance of electronic equipment installation
n) Quality inspection and acceptance of electronic equipment repair

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 ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN – NTA 5

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SEMI-AUTOMATIC MIXING ASSEMBLY OF PCB	**DUTY NO.**	501
TASK TITLE	ASSEMBLY OF PCB	**TASK NO.**	5011
PERFORMANCE CRITERIA	The person performing this task must be able to assemble the PCB in accordance with the technical documents and process documents.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Tweezer; 2. Needle-nose pliers; 3. Diagonal pliers; 4. Electric soldering irons; 5. Dip soldering equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read the requirements of the instructions of equipment and instruments, design technical documents and process documents; 2. Read the specifications, models, pin numbers and other information of three common pin components; 3. Determine the installation sequence of components; 4. Operate the dip soldering equipment to weld the PCB; 5. Abide by the preventive measures for health and safety when performing this task; 6. Clean the tools, equipment and workplaces, 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 Read assembly process documents of the PCB; 1.2 Assemble and weld the PCB; 1.3 Inspect the assembly quality of the PCB. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principles of commonly-used triodes; 2.2 Working principles of the dip soldering equipment. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Underpinning knowledge of triodes; 3.2 Reading methods of common triodes; 3.3 Underpinning knowledge of using dip soldering equipment and tools. **4.0 Essential Skills** 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Writing skills.

DESCRIPTION OF THE END PRODUCT / SERVICE	Components are correctly identified in accordance with technical requirements and product manuals.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrostatic protection; 2. Electrical safety; 3. Safe and civilized production; 4. Occupational health and safety.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SEMI-AUTOMATIC MIXING ASSEMBLY OF PCB	**DUTY NO.**	501
TASK TITLE	CABLE PROCESSING	**TASK NO.**	5012
PERFORMANCE CRITERIA	The person performing this task must be able to process cables using tools and equipment in accordance with design technical documents and process documents.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Network cable crimper; 2. Wire cutter; 3. Wire stripper; 4. Cable opener; 5. Wire stripping and crimpling pliers; 6. Scissors; 7. Measuring tape; 8. File; 9. Tester.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read the requirements of design technical documents and process documents of cable processing; 2. Select cable processing tools or equipment; 3. be careful not to damage the core wire and isolating layer; 4. Use manual press pliers to conduct molded pressing and pit pressing on multicore cable. 5. Detect the quality of cable processing, shielded cable processing and multicore cable pressing; 6. Abide by the preventive measures for health and safety when performing this task; 7. Clean the tools, equipment and workplaces, 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 Read the documents for cable processing; 1.2 Process the cable; 1.3 Check the cable quality. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of cable processing; 2.2 Basic principles of cable testing. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Cable classification and application; 3.2 Knowledge of cable processing; 3.3 Knowledge of cable quality inspection.

	4.0 Essential Skills 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Ability of innovation.
DESCRIPTION OF THE END PRODUCT / SERVICE	The cable is processed and the quality of the processed cable is inspected according to the design technical documents of the design and process documents
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Electrostatic protection; 3 Safe and civilized production.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SEMI-AUTOMATIC MIXING ASSEMBLY OF PCB	**DUTY NO.**	501
TASK TITLE	CABLING	**TASK NO.**	5013
PERFORMANCE CRITERIA	The person performing this task must be able to conduct cabling using tools and equipment in accordance with design technical documents and process documents.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Magnifier; 2. Marker pen; 3. Tester; 4. Distribution board; 5. Laptops.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read the unit wiring diagram, interconnection wiring diagram, and terminal wiring diagram; 2. Read the unit wiring table, interconnection wiring table, and terminal wiring table; 3. Identify power cord, control cable, and signal wire based on conductor color; 4. Prepare conductors and other auxiliary materials according to the wiring diagram and table; 5. Conduct cabling according to the requirements of the cabling process documents; 6. Conduct cabling of power cord, signal wire, and control cable separately; 7. Organize cabling harnesses; 8. Use cable ties and binding ropes for cabling harness binding; 9. Use isolation, sheathing, and other methods to protect the cabling harness; 10. Use magnifier and other tools to	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read cabling process documents; 1.2 Read the wiring diagram; 1.3 Conduct cabling according to the cabling process documents; 1.4 Use cable ties and binding ropes for cabling and binding according to the process documents; 1.5 Use isolation, sheathing, and other methods to protect the cabling; 1.6 Conduct visual inspection and continuity testing of cabling. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles for drawing wiring diagrams; 2.2 Principles for preparing wiring tables; 2.3 Principles for cabling process preparation; 2.4 Wiring quality inspection. **3.0 Theories** The person performing this task must be able to explain the following:

visually inspect excess products; 11. Check the appearance quality of cabling binding spacing, bending radius, and tightness; 12. Use a multimeter or continuity tester to check the cabling for continuity; 13. Abide by the preventive measures for health and safety when performing this task; 14. Clean the tools, equipment and workplaces, and store the tools and equipment.	3.1 Knowledge of conductor color and usage; 3.2 Knowledge of electrical drawing and viewing; 3.3 Knowledge of reading wiring diagrams and tables; 3.4 Cabling knowledge; 3.5 Knowledge of cabling binding; 3.6 Measurement knowledge. **4.0 Essential Skills** 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Ability of innovation; 4.4 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Read wiring diagrams and tables; Cabling, arrangement, and binding are conducted using wiring harness knowledge and skills according to the design technical documents and cabling process documents.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Electrostatic protection; 3. Safe and civilized production.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF SWITCHING POWER SUPPLY	**DUTY NO.**	502
TASK TITLE	READING OF THE SCHEMATIC DIAGRAM, WIRING DIAGRAM, AND STANDARD OPERATION PROCEDURES FOR DEBUGGING OF THE SWITCHING POWER SUPPLY COMPONENT	**TASK NO.**	5021
PERFORMANCE CRITERIA	The person performing this task must be able to read the schematic diagram, wiring diagram, standard operation procedures for debugging, and other materials of the switching power supply component in accordance with the relevant reading standards of the electrical industry.		
RANGE STATEMENT	The task can be performed in the technical development group of the electronic production line under the supervision of senior technicians or electronic engineers. The tools and equipment to be used include: 1. Altium Designer and computers; 2. Multimeters; 3. Vernier calipers; 4. Commonly-used tools such as tweezers, diagonal pliers, and needle-nose pliers; 5. Personal protective equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Determine the functions completed in the block diagram; 2. Clarify the internal functions and pin functions of key components; 3. Understand the working process of power startup, voltage stabilization, and protection circuit; 4. Clarify the input and output terminals of the power supply, and build a power debugging circuit; 5. Clarify the requirements for debugging operation and draft debugging steps.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read the block diagram of the switching power supply; 1.2 Read the component schematic diagram of the switching power supply; 1.3 Read the circuit schematic diagram of the switching power supply; 1.4 Read the circuit wiring diagram of the switching power supply; 1.5 Read the standard operation procedures for debugging the circuit of the switching power supply. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Rules for graphical symbols used in electrical diagrams;

	2.2 Rules for the preparation of documents for electrical technology; 2.3 General rules for the formulation of text symbols in electrical technology; 2.4 Identification of electric equipment terminals and of terminations of certain designated conductors, and general rules for an alphanumeric system. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Basic knowledge of electronic circuits; 3.2 Underpinning knowledge of CAD drawing; 3.3 Knowledge of electronic production processes; 3.4 Principles and applications of integrated circuits. 4.0 Essential Skills 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Ability of innovation.
DESCRIPTION OF THE END PRODUCT / SERVICE	The schematic diagram, wiring diagram, and standard operation procedures for debugging of the switching power supply component are read.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of computer technology application; 2. Altium Designer; 3. Occupational health and safety; 4. Electrostatic protection.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF SWITCHING POWER SUPPLY	**DUTY NO.**	502
TASK TITLE	DEBUGGING OF THE SWITCHING POWER SUPPLY	**TASK NO.**	5022
PERFORMANCE CRITERIA	The person performing this task must be able to correctly use tools and equipment to debug the switching power supply, record the debugging technical parameters, and evaluate the power supply performance according to the requirements of the debugging process documents.		
RANGE STATEMENT	The task can be performed in the electronic equipment production line under the supervision of senior technicians or electronic engineers. The tools and equipment to be used include: 1. Multimeter; 2. AC / DC voltmeter; 3. AC / DC ammeter; 4. Oscilloscopes; 5. Millvoltmeter; 6. Screw driver; 7. Tweezer; 8. Electric soldering iron.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read the circuit debugging process documents of the switching power supply; 2. Establish a debugging environment for switching power supply; 3. Check if the debugging environment is correct; 4. Correctly debug the relevant parameters of the switching power supply according to the debugging process document. 5. Record relevant parameters and conduct error analysis; 6. Abide by the preventive measures for health and safety when performing this task; 7. Clean the tools, equipment and workplaces, 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 Read the debugging process documents of the switching power supply; 1.2 Establish a debugging environment for switching power supply; 1.3 Use instruments and apparatus to debug the system; 1.4 Evaluate the quality of power supply. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of quality inspection of electronic products; 2.2 Principles of error analysis; 2.3 Quality evaluation standards for switching power supply; 2.4 Industry standards for testing electronic

	components; 2.5 Industry standards for appearance inspection of electronic products; 2.6 The structure and working principle of oscillation circuits; 2.7 The structure and working principle of rectifier and filter circuits. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Basic instructions on switching power supply; 3.2 Basic knowledge of electronic technology; 3.3 Basic knowledge of electronic measurement and instruments. **4.0 Essential Skills** 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Ability of innovation; 4.4 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The switching power supply is debugged by correctly using the tools and equipment, the debugging technical parameters are recorded, and the power supply performance is evaluated according to the requirements of the debugging process documents.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrostatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF ANALOG-DIGITAL HYBRID CIRCUITS	**DUTY NO.**	503
TASK TITLE	READING SCHEMATIC DIAGRAMS OF LOW-FREQUENCY ANALOG CIRCUITS AND DIGITAL CIRCUITS	**TASK NO.**	5031
PERFORMANCE CRITERIA	The person performing this task must be able to read schematic diagrams of low-frequency analog circuits and digital circuits in accordance with relevant drawing reading standards of the electrical industry.		
RANGE STATEMENT	The task can be performed in the technical development group of the electronic production line under the supervision of senior technicians or electronic engineers. The tools and equipment to be used include: 1. Altium Designer and computers; 2. Multimeter; 3. Vernier caliper; 4. Commonly-used tools such as tweezers, diagonal pliers, and needle-nose pliers; 5. Personal protective equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Identify the basic AC amplifier circuit of transistors; 2. Identify feedback amplifier circuit of transistors; 3. Identify low-frequency power amplifier circuit of transistors; 4. Identify DC amplifier circuit and integrated operational amplifier; 5. Identify sine wave oscillation circuits; 6. Identify modulation, demodulation, and frequency conversion; 7. Identify basic gate circuit and combinational logic circuit; 8. Identify sequential logic circuit and trigger; 9. Identify digit-analog and analog-digit conversion.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read analog circuit diagram; 1.2 Read digital circuit diagram. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Rules for graphical symbols used in electrical diagrams; 2.2 Rules for the preparation of documents for electrical technology; 2.3 General rules for the formulation of text symbols in electrical technology; 2.4 Identification of electric equipment terminals and of terminations of certain designated conductors, and general rules for an alphanumeric system; 2.5 Rules for drawing circuit diagrams. **3.0 Theories** The person performing this task must be able to explain

	the following: 3.1 Basic knowledge of electronic circuits; 3.2 Underpinning knowledge of CAD drawing; 3.3 Knowledge of electronic production processes. **4.0 Essential Skills** 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Ability of innovation; 4.4 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Materials such as schematic diagrams of low-frequency analog circuits and digital circuits are read.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Basic knowledge of electronic technology; 2. Altium Designer; 3. Basic computer knowledge; 4. Occupational health and safety.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF ANALOG-DIGITAL HYBRID CIRCUITS	**DUTY NO.**	503
TASK TITLE	CONSTRUCTION OF THE DEBUGGING SYSTEM OF LOW-FREQUENCY ANALOG CIRCUITS AND DIGITAL CIRCUITS	**TASK NO.**	5032
PERFORMANCE CRITERIA	The person performing this task must be able to use tools and equipment correctly to build the debugging system of low-frequency analog circuits and digital circuits.		
RANGE STATEMENT	The task can be performed in the technical development group of the electronic production line under the supervision of senior technicians or electronic engineers. The tools and equipment to be used include: 1. Multimeter; 2. AC / DC voltmeter; 3. AC/DC ammeter; 4. Oscilloscope; 5. Logic analyzer; 6. Millvoltmeter; 7. Screw driver; 8. Tweezer; 9. Electric soldering iron; 10. Adjustable DC voltage-stabilized power (1V-24V).		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and understand the requirements of process documents of low-frequency analog circuits and digital circuits; 2. Build a low-frequency analog circuit debugging environment; 3. Check if the debugging environment is correct; 4. Pay special attention not to damage circuit components when building the debugging environment; 5. Abide by the preventive measures for health and safety when performing this task; 6. Clean the tools, equipment and workplaces, 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 Read and understand the requirements of process documents of low-frequency analog circuits and digital circuits; 1.2 Correctly build a low-frequency analog circuit debugging environment; 1.3 Check if the debugging environment is correct. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Specification for the construction of electronic product debugging system; 2.2 Identification of electric equipment terminals and of terminations of certain designated conductors,

	and general rules for an alphanumeric system; 2.3 Industry standards for aging testing of electronic products; 2.4 Debugging process documents. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Basic knowledge of electronic technology; 3.2 National Occupational Standards for the electronic industry; 3.3 Operating methods and precautions for instruments and apparatus. **4.0 Essential Skills** 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Ability of innovation; 4.4 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The debugging system of low-frequency analog circuits and digital circuits is constructed by properly using the tools and equipment.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Antistatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF ANALOG-DIGITAL HYBRID CIRCUITS	**DUTY NO.**	503
TASK TITLE	LOW-FREQUENCY ANALOG CIRCUITS AND DIGITAL CIRCUITS DEBUGGING	**TASK NO.**	5033
PERFORMANCE CRITERIA	The person performing this task must be able to correctly use tools and equipment to debug the low-frequency analog circuits and digital circuits, record the debugging technical parameters, and evaluate the power supply performance according to the requirements of the debugging process documents.		
RANGE STATEMENT	The task can be performed in the technical development group of the electronic production line under the supervision of senior technicians or electronic engineers. The tools and equipment to be used include: 1. Multimeter; 2. AC / DC voltmeter; 3. AC/DC ammeter; 4. Oscilloscope; 5. Logic analyzer; 6. Millvoltmeter; 7. Screw driver; 8. Tweezer; 9. Electric soldering iron; 10. Adjustable DC voltage-stabilized power (1V-24V).		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read the debugging process documents for low-frequency analog circuits and digital circuits; 2. Check if the debugging environment is correct; 3. According to the requirements of the debugging process documents, correctly debug the parameters related to low-frequency analog circuits and digital circuits; 4. Correctly record relevant parameters and conduct performance analysis; 5. Pay special attention not to damage circuit components when debugging circuits.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read debugging documents of low-frequency analog circuits and digital circuits; 1.2 Construct power supply debugging systems; 1.3 Use instruments and apparatus to debug the system; 1.4 Evaluate circuit performance and quality. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of quality inspection of electronic products; 2.2 Industry standards for testing electronic components; 2.3 Industry standards for appearance inspection of electronic products;

6. Abide by the preventive measures for health and safety when performing this task; 7. Clean the tools, equipment and workplaces, and store the tools and equipment.	2.4 Industry standards for rework processing; 2.5 Industry standards for EMC noise interference meter testing. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Basic instructions on electronic technology; 3.2 Quality inspection of electronic products; 3.3 Basic methods for debugging electronic products. **4.0 Essential Skills** 4.1 Problem analysis and solving skills; 4.2 Ability of operating debuggers, instruments and apparatus in a standardized way; 4.3 Language communication skills; 4.4 Teamwork ability; 4.5 Ability of innovation.
DESCRIPTION OF THE END PRODUCT / SERVICE	The low-frequency analog circuits and digital circuits are correctly debugged using tools and equipment, the debugging technical parameters are recorded, and the power supply performance is evaluated according to the requirements of the debugging process documents.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Antistatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF ANALOG-DIGITAL HYBRID CIRCUITS	**DUTY NO.**	503
TASK TITLE	READING SOFTWARE PROGRAMMING INSTRUCTIONS	**TASK NO.**	5034
PERFORMANCE CRITERIA	The person performing this task must be able to read and understand the software programming instructions, follow the software programming specifications, prepare software and hardware resources suitable for programming, and formulate a programming plan.		
RANGE STATEMENT	The task can be performed in the electronic equipment assembly workshop under the supervision of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Computers; 2. Windows operating system; 3. Programming tools.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 4. Verify computer hardware system resources; 5. Use computer application systems with programming software; 6. Prepare programming software and target programs according to the standard operation procedures; 7. Use commonly used computer instructions for installation and connection; 8. Read and understand the installation requirements for programming software; 9. Read and understand the interfaces and functional instructions of the programming software; 10. Read and understand the operating steps of the programming software; 11. Read and understand the instructions for installing, connecting, and using the programming tools.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read and understand programming instructions of the software; 1.2 Prepare software and hardware resources according to the programming instructions of the software. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of offline programming. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Basic knowledge of ISP programming in the system; 3.2 Basic knowledge of ICP programming in the circuit; 3.3 Basic knowledge of IAP programming in applications; 3.4 Basic knowledge of software installation; 3.5 Basic knowledge of computer operating systems; 3.6 Knowledge related to programming tools.

	4.0 Essential Skills 4.1 Customer service skills; 4.2 Teamwork skills; 4.3 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The hardware resource requirements and steps of the programming instructions are read and understood, and relevant software and hardware resources are prepared.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrostatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production. 5. Operation specifications of computer system.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF ANALOG-DIGITAL HYBRID CIRCUITS	**DUTY NO.**	503
TASK TITLE	ENVIRONMENT SETTINGS AND STATUS CONFIRMATION OF SOFTWARE AND HARDWARE REQUIRED FOR OFFLINE PROGRAMMING SOFTWARE	**TASK NO.**	5035
PERFORMANCE CRITERIA	The person performing this task must be able to set and confirm the software environment required for programming software, and to set and confirm the tools and hardware required for programming.		
RANGE STATEMENT	The task can be performed in the electronic equipment assembly workshop under the supervision of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Computer and its operating system; 2. Programming tools.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Prepare suitable computers and operating systems according to the standard operation procedures of programming; 2. Prepare suitable programming tools according to the standard operation procedures of programming; 3. Install programming software; 4. Set the software environment required for programming; 5. Install and set the driver for the programming tool; 6. Debug and connect the programming tool with the computer. 7. Complete and confirm the settings of each option in the operation interface according to the standard operation procedures of programming.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Ensure the normal operation of computer hardware resources and the operating system; 1.2 Connect the programming tool; 1.3 Set parameters correctly in the operation interface. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of offline programming. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Basic knowledge of computer resource verification; 3.2 Basic knowledge of software installation; 3.3 Knowledge of software configuration; 3.4 Knowledge of overlapping and debugging the programming tool. **4.0 Essential Skills** 4.1 Language communication skills;

	4.2 Customer service skills; 4.3 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The software environment required by the programming software is set up correctly and confirmed, and the setting and confirmation of the tools required for offline programming are completed according to the standard operation procedures of programming.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrostatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production; 5. Safe operation specifications of computer system.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DEBUGGING OF ANALOG-DIGITAL HYBRID CIRCUITS	**DUTY NO.**	503
TASK TITLE	SOFTWARE PROGRAMMING AND RECORDING	**TASK NO.**	5036
PERFORMANCE CRITERIA	The person performing this task must be able to correctly operate programming into the chip and keep records, and to analyze and handle common programming faults.		
RANGE STATEMENT	The task can be performed in the electronic equipment assembly workshop under the supervision of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Computer and its operating system; 2. Programming tools.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Connect and debug the software and hardware environment for programming; 2. Complete and confirm the settings of each option in the operation interface according to the standard operation procedures of programming; 3. Select the correct target programme and programme it into the chip; 4. Complete programming records; 5. Analyze and handle faults in a timely manner during programming; 6. Routine maintenance of programming equipment; 7. Abide by the preventive measures for health and safety when performing this task; 8. Clean the tools, equipment and workplaces, 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 Perform software programming. 1.2 Complete programming records; 1.3 Troubleshoot common software programming faults. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Specifications of software programming; 2.2 Software testing flow; 2.3 Software troubleshooting specifications. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Chip model identification; 3.2 Overlapping and debugging of programming tools; 3.3 Cognition and operation of the programming software interface; 3.4 Select the target programme. **4.0 Essential Skills** 4.1 Routine fault analysis and handling skills; 4.2 Language communication skills;

	4.3 Teamwork ability; 4.4 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The programming tool is constructed and debugged according to the standard operation procedures for programming, and programming into the chip and the recording are completed. Routine faults are analysed and handled.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrostatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production; 5. Safe operation specifications of computer system.

OCCUPATION	ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	INSTALLATION AND DEBUGGING OF ELECTRONIC EQUIPMENT	**DUTY NO.**	504
TASK TITLE	INSTALLATION AND DEBUGGING OF OFFICE ELECTRONIC EQUIPMENT	**TASK NO.**	5041
PERFORMANCE CRITERIA	The person performing this task must be able to install and debug office automation electronic equipment in accordance with the requirements of the design technical documents and process documents.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Multimeter; 2. Cable tester; 3. Network cable crimper; 4. Commonly-used screwdriver tool kit.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and understand the requirements of product instructions, design technical documents, and process documents; 2. Use commonly-used debugging equipment and tools for office automation electronic equipment; 3. Debug office automation electronic equipment as required; 4. Abide by the preventive measures for health and safety when performing this task; 5. Clean the tools, equipment and workplaces, 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 Read the instructions for using office automation electronic equipment; 1.2 Test the functions of office automation electronic equipment and verify their performance; 1.3 Methods for testing the functions of office automation electronic equipment; 1.4 Determine the performance standards of office automation electronic equipment; 1.5 Determine the debugging quality of office automation electronic equipment. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of computer operation; 2.2 Working principle of the printer. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Usage methods of common debugging equipment for

	office automation electronic equipment; 3.2 Common debugging rules and methods for office automation electronic equipment; 3.3 Debugging quality control and process requirements for common office automation electronic equipment. **4.0 Essential Skills** 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Common office automation electronic equipment is correctly debugged according to the design technical documents and process document technical requirements, and the products are tested as qualified.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrostatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production; 5. Safe operation specifications of computer system.

OCCUPATION	ELECTRICAL EQUIPMENT INSTALLATION AND MAINTENANCE TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	INSTALLATION AND DEBUGGING OF ELECTRONIC EQUIPMENT	**DUTY NO.**	504
TASK TITLE	INSTALLATION AND DEBUGGING OF DIGITAL ELECTRONIC EQUIPMENT	**TASK NO.**	5042
PERFORMANCE CRITERIA	The person performing this task must be able to correctly install and debug digital electronic equipment.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Power supply; 2. Screwdriver; 3. Junction box; 4. Instructions for using digital electronic equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Prepare the necessary tools according to the installation requirements of digital electronic products; 2. Check the specifications and requirements of digital electronic products; 3. Install the digital electronic products correctly according to the instructions; 4. Connect to the power cord; 5. Check the connection of digital electronic products; 6. Install a driver; 7. Test the functions of digital electronic products; 8. Check the performance of digital electronic products; 9. Adjust the parameters of digital electronic products; 10. Check the quality of digital electronic products.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read the instructions for using digital electronic equipment; 1.2 Test the functions and performance of digital electronic equipment; 1.3 Use the methods for testing the functions of digital electronic equipment; 1.4 Judge the performance standards for digital electronic equipment. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principle of digital electronic equipment; 2.2 Working principle of powering on the equipment for testing. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Installation requirements for digital electronic equipment; 3.2 On site tool usage methods and precautions;

	4.0 Essential Skills 4.1 Language communication skills; 4.2 Teamwork ability; 4.3 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Common digital electronic equipment is correctly debugged according to the design technical documents and process document technical requirements, and the products are tested as qualified.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Antistatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production; 5. Safe operation specifications of computer system.

OCCUPATION	ELECTRICAL EQUIPMENT INSTALLATION AND MAINTENANCE TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	QUALITY INSPECTION AND ACCEPTANCE OF ELECTRONIC EQUIPMENT INSTALLATION	**DUTY NO.**	505
TASK TITLE	INSPECTION OF THE INSTALLATION QUALITY OF OFFICE AND DIGITAL ELECTRONIC EQUIPMENT	**TASK NO.**	5051
PERFORMANCE CRITERIA	The person performing this task must be able to inspect the installation quality in accordance with the quality inspection specifications for office and digital electronic equipment installation, and correctly process the inspection information.		
RANGE STATEMENT	The task can be performed in the inspection room under the supervision of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Withstand voltage tester; 2. Tramegger; 3. Oscilloscope; 4. Multimeter; 5. Other conventional instruments and apparatus.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Inspect the products in a standardized way; 2. Use conventional inspection instruments and apparatus; 3. Establish an inspection environment; 4. Judge whether the product is qualified and complete the record. 5. Clean the tools, equipment and workplaces, 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 Clarify the technical standards for electronic equipment; 1.2 Use appropriate instruments and apparatus to inspect the electronic equipment and record the results in accordance with technical standards. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic working principles of electronic equipment; 2.2 Specifications of the maintenance quality of electronic equipment. 2.3 Processing flow for inspection results of electronic equipment installation. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Knowledge of national quality standards;

	3.2 Knowledge of product quality inspection; 3.3 Product inspection specifications; 3.4 Technical indexes of the products to be inspected; 3.5 Knowledge of testing lines and instruments and apparatus required for the product to be inspected; 3.6 Knowledge of overlapping inspection platforms. **4.0 Essential Skills** 4.1 Using of instruments in a standardized way; 4.2 Language communication skills; 4.3 Teamwork ability; 4.4 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The product quality is correctly inspected according to product quality inspection specifications to determine whether the product is qualified.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Antistatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production; 5. Safe operation specifications of computer system.

OCCUPATION	ELECTRICAL EQUIPMENT INSTALLATION AND MAINTENANCE TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	QUALITY INSPECTION AND ACCEPTANCE OF ELECTRONIC EQUIPMENT INSTALLATION	**DUTY NO.**	505
TASK TITLE	FILLING OUT THE REWORK NOTICE	**TASK NO.**	5052
PERFORMANCE CRITERIA	The person performing this task must be able to correctly fill out rework notices based on the quality inspection results, describe the reasons for product reworking and the specific requirements for product quality, and re-inspect to judge the quality of the reworked product.		
RANGE STATEMENT	The task can be performed in the inspection room under the supervision of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Computer and relevant software; 2. Rework notices.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. According to the different degrees of impact of quality characteristics on the electronic equipment, divide the unqualified categories into three levels: A, B, and C; 2. Fill in the scrap form for electronic equipment of unqualified level A; 3. Fill in the rework notices for electronic equipment of unqualified levels B and C; 4. Send the rework notices to the production management department; 5. Re-inspection, reworking, and repair of electronic equipment; 6. Fill in a quality record report based on the re-inspection results.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Fill out the rework notices in detail; 1.2 Based on the results of the re-inspection, fill in the re-inspection judgment in the rework notice. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Technical standards for electronic equipment; 2.2 Principles for classification of unqualified electronic product. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Knowledge of national quality standards; 3.2 Knowledge of product quality inspection; 3.3 Product inspection specifications; 3.4 Technical indexes of the products to be inspected. **4.0 Essential Skills** 4.1 Language communication skills; 4.2 Writing skills; 4.3 Teamwork ability.

DESCRIPTION OF THE END PRODUCT / SERVICE	The rework notices are filled out correctly based on the quality inspection results, the reasons for product reworking and the specific requirements for reworking are described, and the reworked products are re-inspected and judged.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Electrostatic protection; 2. Occupational health and safety; 3. Waste disposal; 4. Safe and civilized production; 5. Safe operation specifications of computer system.

OCCUPATION	ELECTRICAL EQUIPMENT INSTALLATION AND MAINTENANCE TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	QUALITY INSPECTION AND ACCEPTANCE OF ELECTRONIC EQUIPMENT INSTALLATION	**DUTY NO.**	505
TASK TITLE	COLLECTION OF USER FEEDBACK	**TASK NO.**	5053
PERFORMANCE CRITERIA	The person performing this task must be able to collect user feedback in multiple ways.		
RANGE STATEMENT	The task can be performed through multiple channels under the supervision and cooperation of senior technicians or electronic equipment assembly and repair engineers. The tools and equipment to be used include: 1. Telephone; 2. Computer; 3. Office software; 4. Questionnaire.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Collect information using multiple channels; 2. Collect service comments using survey questionnaires; 3. Collect user comments through directly sending feedback information forms; 4. Collect user comments through telephone follow-up; 5. Collect user comments on installation and maintenance sites; 6. Collect user comments on product service platforms; 7. Collect user comments in online public opinions; 8. Collect and organize information; 9. Summarize the information; 10. Formulate a summary report.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Collect information from multiple channels; 1.2 Summarize information. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Collect information truthfully and reliably; 2.2 Collect extensive, comprehensive, and complete information; 2.3 Collect information and submit feedback timely. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Knowledge of data collection methods; 3.2 Knowledge of data classification and organization; 3.3 Legal knowledge of privacy. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills;

	4.4 Summarize skills; 4.5 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	User comments are collected through multiple channels.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of psychology; 2. Knowledge of behaviors; 3. Protection measures for information security.

TABLE 1: DACUM CHARTS FOR ELECTRONIC EQUIPMENT ASSEMBLY AND REPAIR TECHNICIAN - NTA 5

DUTIES	TASKS	ENABLERS
1.0 Semi-automatic mixing assembly of PCB	1.1 Assembly of PCB. 1.2 Cable processing. 1.3 Cabling.	**General skills and knowledge** · Communication skills and teamwork · Using of commonly-used tools · Interpreting technical documents · Knowledge and skills related to cable processing and wiring · Circumstantial Knowledge and skills related to electronic equipment assembly · Working principles of transistor · Knowledge of safe and civilized production **Tools and equipment** · Network cable crimpers · Wire cutters · Wire strippers · Cable openers · Wire stripping and crimpling pliers · Scissors · Measuring tapes · Files · Computers · Magnifiers · Marker pens · Testers · Distribution boards · Laptops · Gloves · Work clothes **Materials** · Cables · Pipes · Cable lugs · Cable straps · Sandpapers · Other accessories required for cable processing · Cable ties · Binding ropes · Cable sheaths

DUTIES	TASKS	ENABLERS
		· Conductor number sheath **Requirements for employees** · Dedication to work · Integrity · Teamwork spirit · Time management
2.0 Debugging of switching power supply	2.1 Reading of the schematic diagram, wiring diagram, and standard operation procedures for debugging of the switching power supply component. 2.2 Debugging of switching power supply.	**General skills and knowledge** · Circumstantial knowledge of computer · Underpinning knowledge of CAD drawing · Knowledge of electronic production processes · Underpinning knowledge of switching power supply · Use of commonly-used electronic instruments and apparatus · Interpreting technical documents · Knowledge of safe and civilized production **Tools and equipment** · Personal protective equipment such as gloves, work clothes, safety shoes and so on · Computer and software · Multimeters · AC / DC voltmeters · Oscilloscopes · Millvoltmeters · Screw drivers · Tweezers · Soldering irons **Materials** · Switching power supply circuit boards · Power cord · Dummy load · Cable lugs · Gloves and other related accessories **Requirements for employees**

DUTIES	TASKS	ENABLERS
		· Teamwork skills · Innovative spirit · Pursuit of excellence · Service spirit which puts customers first
3.0 Debugging of analog-digital hybrid circuits	3.1 Reading schematic diagrams of low-frequency analog circuits and digital circuits. 3.2 Construction of the debugging system of low-frequency analog circuits and digital circuits. 3.3 Low-frequency analog circuits and digital circuits debugging. 3.4 Reading software programming instructions. 3.5 Environment settings and status confirmation of software and hardware required for offline programming software. 3.6 Software programming and recording.	**General skills and knowledge** · Underpinning knowledge of analog circuits · Underpinning knowledge of digital circuits · Circumstantial knowledge of computer · Underpinning knowledge of CAD drawing · Knowledge of electronic production processes · Use of commonly-used electronic instruments and apparatus · Interpreting technical documents · Use of programming software · Knowledge of safe and civilized production **Tools and equipment** · Personal protective equipment such as gloves, work clothes, safety shoes and so on · Computer and software · Multimeters · AC / DC voltmeters · AC / DC ammeter · Oscilloscopes · Millvoltmeter · Screw drivers · Tweezers · Soldering irons · Adjustable DC voltage-stabilized power (1V-24V) · Logic analyzers · Programming tools **Materials** · Various kinds of insulating tapes · Various kinds of nylon ties

DUTIES	TASKS	ENABLERS
		· Various types of connecting wires · Dummy load · Cable lugs · Gloves and other related accessories **Requirements for employees** · Teamwork spirit, integrity, time management, innovative spirit, and striving for excellence
4.0 Installation and debugging of electronic equipment	4.1 Installation and debugging of office electronic equipment. 4.2 Installation and debugging of digital electronic equipment.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Underpinning knowledge of computers · Underpinning knowledge of digital electronic equipment · Underpinning knowledge of office electronic equipment · The use of commonly-used electronic detect instrument · Interpreting technical documents · Knowledge of safe and civilized production **Tools and equipment** · Personal protective equipment such as gloves, work clothes, safety shoes and so on · Oscilloscopes · Multimeters · Cable testers · Network cable crimpers · Common screwdriver tool kits **Materials** · Various kinds of insulating tapes · Various kinds of nylon ties · Heat-shrink tubes · Marker pens · Cables · Fasteners · Crystal heads

DUTIES	TASKS	ENABLERS
		· Network cables **Requirements for employees** · Teamwork spirit · Integrity · Time management · Civilized etiquette
5.0 Quality inspection and acceptance of electronic equipment installation	5.1 Inspection of the installation quality of office and digital electronic equipment. 5.2 Filling out the rework notice. 5.3 Collection of user feedback.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Circumstantial knowledge of computer · Installation of office and digital electronic equipment · Interpreting technical documents · Knowledge of safe and civilized production **Tools and equipment** · Personal protective equipment such as gloves, work clothes, safety shoes and so on · Multimeters · Oscilloscopes · Signal generators · The voltage supply · Computers · Telephones · Electrostatic protective equipment · Conventional testing instruments **Materials** · Information Feedback Form · Rework notice · Quality Inspection Report Form **Requirements for employees** · Teamwork spirit · Integrity · Time management · Civilized etiquette