มาตรฐานอาชีพและคุณวุฒิวิชาชีพ

Occupational Standard and Professional Qualifications

Of Aircraft Mechanics

จัดทำโดย Thailand Professional Qualification Institute (Public Organization)

1. ชื่อมาตรฐานอาชีพ

Of Aircraft Mechanics

2. ประวัติการปรับปรุงมาตรฐาน

1/2021

3. ทะเบียนอ้างอิง (Imprint)

N/A

4. ข้อมูลเบื้องต้น

Basics need for establishing a professional qualification standard for an occupation of an aircraft mechanics arises from the highly demands and supplys of social, industial economic, and personnal needs.

5. ประวัติการปรับปรุงมาตรฐานในแต่ละครั้ง

1/2021

6. ครั้งที่

- Review of qualifications according to the 8-level professional qualifications framework.
- Review of qualification pathway.

7. คุณวุฒิวิชาชีพที่ครอบคลุม (Professional Qualifications included)

สาขาวิชาชีพการบิน

สาขางานเทคนิคและฝึกอบรม

Aircraft Mechanics : Avionics ช่างอากาศยาน (เอวิโอนิกส์) ระดับ 4

8. คุณวุฒิวิชาชีพที่เกี่ยวข้อง (Related Professional Qualifications)

N/A

9. หน่วยสมรรถนะทั้งหมดในมาตรฐานอาชีพ (List of All Units of Competence within this Occupational Standards)

รหัสหน่วยสมรรถนะ	เนื้อหา
101401	Use computers in aviation maintenance-related integrated logistic support.
103401	Inspect, test and troubleshoot basic aircraft electrical systems and components.
103402	Inspect aircraft electrical systems and components.
103403	Inspect aircraft instrument systems and components.
103404	Inspect fixed wing aircraft automatic flight control systems and components.
103405	Inspect aircraft electronic systems and components.
103406	Test and troubleshoot aircraft electrical systems and components.
103407	Test and troubleshoot aircraft instrument systems and components.
103408	Test and troubleshoot aircraft radio frequency navigation and communications.
103409	Test and troubleshoot fixed wing aircraft automatic flight control systems and components.
103410	Inspect, test and troubleshoot rotary wing aircraft automatic flight control systems and components.
103411	Test and troubleshoot aircraft pulse systems and components.

10. ระดับคุณวุฒิ

10.1 สาขาวิชาชีพการบิน สาขางานเทคนิคและฝึกอบรม Aircraft Mechanics : Avionics ช่างอากาศยาน (เอวิโอนิกส์) ระดับ 4

คุณลักษณะของผลการเรียนรู้ (Characteristics of Outcomes)

A person with specialize skill and technique who is capable working as an aircraft mechanic. The one can handle much more complicated tasks by applying theory, basic knowledge, and necessary tools by his own experiences.

Characteristics of Outcomes

Capable of inspecting, testing, and analyzing all minor and major component of the aircraft through a technical manual.

การเลื่อนระดับคุณวุฒิวิชาชีพ (Qualification Pathways)

1. The minimum age for person who wants to qualify this level is 18 years old.
2. Legitimates one of the following:

2.1 Holds a minimum Vocational Certificate or equivalence, and at least six years working experiences in aircraft maintenance with an official verification letter.

2.2 Holds a High Vocational Certificate, completed in aircraft maintenance course and at least two years working experiences in aircraft maintenance with an official verification letter.

2.3 Holds a High Vocational Certificate or equivalence, and at least four years working experiences in aircraft maintenance with an official verification letter.

2.4 Holds a Bachelor's Degree, completed in aircraft maintenance course or equivalence and at least two years working experiences in aircraft maintenance with an official verification letter.

2.5 Holds a Bachelor's Degree or equivalence, and at least three years working experiences in aircraft maintenance with an official verification letter.

2.6 Holds a Professional Qualification Certificate level 3, and at least two years experiences in aircraft maintenance with an official verification letter.

หลักเกณฑ์การต่ออายุหนังสือรับรองมาตรฐานอาชีพ

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กลุ่มบุคคลในอาชีพ (Target Group)

Aircraft Mechanics: Avionics

หน่วยสมรรถนะ (หน่วยสมรรถนะทั้งหมดของคุณวุฒิวิชาชีพนี้)

101401 Use computers in aviation maintenance-related integrated logistic support.
103401 Inspect, test and troubleshoot basic aircraft electrical systems and components.
103402 Inspect aircraft electrical systems and components.
103403 Inspect aircraft instrument systems and components.
103404 Inspect fixed wing aircraft automatic flight control systems and components.
103405 Inspect aircraft electronic systems and components.
103406 Test and troubleshoot aircraft electrical systems and components.
103407 Test and troubleshoot aircraft instrument systems and components.
103408 Test and troubleshoot aircraft radio frequency navigation and communications.
103409 Test and troubleshoot fixed wing aircraft automatic flight control systems and components.

103410 Inspect, test and troubleshoot rotary wing aircraft automatic flight control systems and components.

103411 Test and troubleshoot aircraft pulse systems and components.

ตารางแผนผังแสดงหน้าที่

1. ตารางแสดงหน้าที่ 1

ประกาศใช้ ณ 14/12/2566

ตาราง 1 : FUNCTIONAL MAP แสดง KEY PURPOSE , KEY ROLES , KEY FUNCTION

ความมุ่งหมายหลัก Key Purpose	บทบาทหลัก Key Roles		หน้าที่หลัก Key Function	
คำอธิบาย	รหัส	คำอธิบาย	รหัส	คำอธิบาย
To promote and support aircraft maintenance of a aircraft mechanics group	10	Aircraft Mechanics	101	Aircraft Mechanics: Airplane
			103	Aircraft Mechanics Avionics

คำอธิบาย ตารางแผนผังแสดงหน้าที่เป็นแผนผังที่ใช้วิเคราะห์หน้าที่งานเพื่อให้ได้หน้าที่หลัก (Key Function)

2. ตารางแสดงหน้าที่ 1 (ต่อ)

ประกาศใช้ ณ 14/12/2566

ตาราง 2 : FUNCTIONAL MAP แสดง KEY FUNCTION , UNIT OF COMPETENCE , ELEMENT OF COMPETENCE

หน้าที่หลัก Key Function		หน่วยสมรรถนะ Unit of Competence		หน่วยสมรรถนะย่อย Element of Competence	
รหัส	**คำอธิบาย**	**รหัส**	**คำอธิบาย**	**รหัส**	**คำอธิบาย**
101	Aircraft Mechanics: Airplane	101401	Use computers in aviation maintenance-related integrated logistic support.	10140 1.01	Use word processing, spreadsheets, and databases software.
				101401 .02	Use project-planning software, internet and store backup copies of data.
103	Aircraft Mechanics Avionics	103401	Inspect, test and troubleshoot basic aircraft electrical systems and components.	10340 1.01	Inspect DC aircraft electrical systems and components.
				103401 .02	Test/adjust DC aircraft electrical systems.
				103401 .03	Troubleshoot DC aircraft electrical systems.
		103402	Inspect aircraft electrical systems and components.	10340 2.01	Inspect electrical systems and components.
				103402 .02	Inspect electrical components.
		103403	Inspect aircraft instrument systems and components.	10340 3.01	Inspect instrument systems and components.
				103403 .02	Identify and record Defects.
		103404	Inspect fixed wing aircraft automatic flight control systems and components.	10340 4.01	Isolate tags control for automatic flight control systems and components.
				103404 .02	Inspect automatic flight control systems and components.
		103405	Inspect aircraft electronic systems and components.	10340 5.01	Isolate tags control for electronic systems and components.
				103405 .02	Inspect electronic systems and components.
		103406	Test and troubleshoot aircraft electrical systems and components.	10340 6.01	Test/adjust electrical systems.
				103406 .02	Troubleshoot electrical systems.
		103407	Test and troubleshoot aircraft instrument systems and components.	10340 7.01	Prepare for troubleshooting, Test/adjust instrument and display systems.
				103407 .02	Troubleshoot instrument and display systems.
		103408	Test and troubleshoot aircraft radio frequency navigation and communications.	10340 8.01	Test/adjust RF navigation and communications systems.

หน้าที่หลัก Key Function		หน่วยสมรรถนะ Unit of Competence		หน่วยสมรรถนะย่อย Element of Competence	
รหัส	**คำอธิบาย**	**รหัส**	**คำอธิบาย**	**รหัส**	**คำอธิบาย**
103	Aircraft Mechanics Avionics	103408	Test and troubleshoot aircraft radio frequency navigation and communications.	10340 8.02	Troubleshoot RF navigation and communications systems.
		103409	Test and troubleshoot fixed wing aircraft automatic flight control systems and components.	10340 9.01	Prepare for troubleshooting, Test/adjust automatic flight control system.
				103409 .02	Troubleshoot automatic flight control system.
		103410	Inspect, test and troubleshoot rotary wing aircraft automatic flight control systems and components.	10341 0.01	Inspect automatic flight control system and components.
				103410 .02	Test/adjust and Troubleshoot automatic flight control system.
		103411	Test and troubleshoot aircraft pulse systems and components.	10341 1.01	Test/adjust pulse systems.
				103411 .02	Troubleshoot pulse systems.

คำอธิบาย

ตารางแผนผังแสดงหน้าที่ (ต่อ) เป็นแผนผังที่ใช้วิเคราะห์หน้าที่งานหลังจากได้หน้าที่หลัก (Key Function) เพื่อให้ได้ หน่วยสมรรถนะ (Unit of Competence) และหน่วยสมรรถนะย่อย (Element of Competence)

1. รหัสหน่วยสมรรถนะ 101401

2. ชื่อหน่วยสมรรถนะ Use computers in aviation maintenance-related integrated logistic support.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of skills and knowledge relating to the use of the internet, word processing, spreadsheets, databases and project planning software to perform tasks relating to integrated logistic support (ILS) activities associated with aviation maintenance, including aircraft technical records and compliance with regulatory requirements relating to the compilation and safeguarding of data during scheduled or unscheduled maintenance.

7. สำหรับระดับคุณวุฒิ

1	2	3	4	5	6	7	8
☐	☐	☐	☑	☐	☐	☐	☐

8. กลุ่มอาชีพ (Sector)

10 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

101 Aircraft Maintenance: Airplane
102 Aircraft Maintenance:Helicopter
103 Aircraft Maintenance: Avionic

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
101401.01 Use word processing, spreadsheets, and databases software.	101401.01.01 Correspondence is drafted using word processing software and spreadsheets used within the enterprise are used to obtain data. 101401.01.02 Databases used for maintenance-related ILS activities within the enterprise are used to obtain data.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน
101401.02 Use project-planning software, internet and store backup copies of data.	101401.02.01 Project-planning software is used to monitor the progress of a task and regulatory information is obtained from applicable internet websites. 101401.02.02 Backup copies of data are made and are updated as required by regulatory requirements, and organisational policies and procedures.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

N/A

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit should be of interest and meet all requirements of the elements and performance criteria under the specified conditions assessment at least once, and must include:

- Use of word processing software.
- Development and use of spreadsheets.
- Populating and obtaining data from databases.
- Use of project planning software.
- Use of the internet to obtain regulatory and technical data.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit should be of interest and meet all requirements of the elements and performance criteria and include knowledge of:

- Types of word processing software commonly used in the maintenance-related ILS environment.
- Development and use of spreadsheets.
- Database usage in the maintenance-related ILS environment.
- Use of project planning software and the types of task management software used by maintenance organisations.
- Internet websites relating to regulatory requirements, standards and specifications.
- Use of internet search engines to obtain technical and commercial data.
- Procedures for backing up and storing data.

(c) Assessment recommendation

N/A

Assessmen methods

15. ขอบเขต (Range Statement)

(a) Recommendation

This field allows different environments and working conditions that can affect the performance. the essential operating conditions that may be present (depending on the work situation, accessibility requirements, the candidate of the topic, and local industry and regional contexts) are included.

ILS-related spreadsheet applications include:	• Costing a maintenance task or proposed modification. • Assessing the economic value of a proposed repair. • Costing a training program for maintenance personnel. • Management of items of aeronautical product both on and off aircraft. • Management of life critical parts. • Maintenance programs.
Databases used for maintenance-related ILS activities include:	• Life cycle costing data. • Baselines for reliability, availability and maintainability. • Life support analysis record data. • Personnel task authorisations and training records. • Management of items of aeronautical product both on and off aircraft. • Management of life critical parts. • Maintenance programs.
Maintenance-related ILS tasks using project planning software include:	• Planning an aircraft maintenance task. • Planning a modification program. • Planning a maintenance personnel training program.
Technical data includes:	• Standards. • Specifications. • Vendor data on materials, piece parts and components. • Engineering data.

Required media for backup copies of data are specified in:	• Regulations. • Organisational policies and procedures. • Contract requirements.
Regulatory requirements, and organisational policies and procedures include:	• Civil Aviation Safety Regulations (CASRs), Manuals of Standards and associated Acceptable Means of Compliance and Guidance Material. • Maintenance organisation expositions. • Continuing airworthiness management organisation expositions. • Aircraft maintenance programs. • Quality manuals. • Procedures manuals. • Work instructions Manual. • Defence Regulations and instructions. • Standing instructions. • Maintenance management plan. • Applicable overseas airworthiness regulations, such as Federal Aviation Regulations and European Aviation Safety Regulations.

(b) Description

N/A

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.This unit may be assessed on the job, off the job or a combination of both inside and outside of work. Where assessment occurs outside of work, ie, the candidate is not in productive work, an appropriate simulation should be used in the range of conditions of the workplace reflects realistic situations involving the use of computers in related activities ILS maintenance.

• The candidate must have access to all equipment, materials and documentation required and must be permitted to refer to all relevant site procedures, product specifications and manufacturing, codes, standards, manuals and reference materials. The assessment environment should not harm the candidate.

• Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including the necessary knowledge, and be able to apply competition in new and different situations and contexts.

• The assessors must meet a series of tests that is valid, sufficient, current and authentic. The preferred method is the records of Competition Registration Maintenance Management. Where the individual has no record of proficiency testing can be obtained through a variety of ways, including direct observation, reports supervisor, project work, samples and interrogation.

• Interrogation techniques should not require language, reading, writing and arithmetic in addition to those required in this competition unit.

• The assessors must meet the requirements of the National Education and Vocational Regulator.

1. รหัสหน่วยสมรรถนะ 103401

2. ชื่อหน่วยสมรรถนะ Inspect, test and troubleshoot basic aircraft electrical systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires the application of manual skills and the use of the knowledge system / components and equipment applicable to inspect, test and troubleshoot systems direct current (DC) electric aircraft and aircraft components rotary wing test fixed and having only DC electrical systems during scheduled or unscheduled maintenance. The work can be done individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

1	2	3	4	5	6	7	8
☐	☐	☐	☑	☐	☐	☐	☐

8. กลุ่มอาชีพ (Sector)

10 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

103 Aircraft Maintenance: Avionic

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103401.01 Inspect DC aircraft electrical systems and components.	103401.01.01 Documentation for maintenance and modification status, including reports of system defects if any, are used to identify specific inspection requirements. Isolation tags are checked and aircraft configured for safe system inspection and operation in accordance with the applicable maintenance manual. 103401.01.02 DC electrical system visually or physically checked for external signs of defects in accordance with the maintenance manual applicable to observe all safety requirements (WHS) and the relevant occupational health, and defects are correctly identified and reported.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103401.02 Test/adjust DC aircraft electrical systems.	103401.02.01 Aircraft and system are prepared in accordance with applicable maintenance manual for the application of power system operation. 103401.02.02 Electrical system is functionally tested in accordance with maintenance manual for evidence of serviceability or malfunction , and system calibration or adjustments are performed in accordance with maintenance manual, as appropriate.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน
103401.03 Troubleshoot DC aircraft electrical systems.	103401.03.01 Available information from maintenance documentation and inspection and test results is used, where necessary, to assist in fault determination. Maintenance manual fault diagnosis guides and logic processes are used to ensure efficient and accurate troubleshooting to line replacement level. 103401.03.02 Specialist advice is obtained, where required, to assist with the troubleshooting process. system failures are and the causes of faults are clearly identified and recorded properly in the maintenance documentation, where necessary and in accordance with standard procedures for companies, and rectification requirements are determined.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

N/A

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Recognition system components and defects / external damage, correct installation, connection plugs, terminals, attaching hardware (including cabling / harnesses) and safety:

- DC power generation systems, including regulation, distribution and control.
- Battery installations.
- Piston engine ignition and starting systems and components:
- Magnetos or coils.
- Starter motors.
- Ulgnition switches/start switches.
- Ignition harnesses.
- Low tension wiring.
- Spark plugs.
- Auxiliary starting devices.
- Gas turbine engine ignition and starting systems (where applicable to the enterprise):
- Starter motors and starter/generators.
- High energy ignition units.
- Control units.
- Switches.
- Batteries and associated mounting equipment, including related anti-vibration aids.
- Motors and actuators in DC electrical systems.
- Internal/external lighting systems, including controls.
- Flap systems.
- Landing gear systems.
- Applying logic processes, taking and interpreting electrical measurements, and using test equipment and appropriate wiring diagrams and manuals to isolate malfunctions in the above systems.
- Performing system functional tests and checks to isolate system faults and assess post-maintenance serviceability.

Aapplying relevant WHS practices, including those relating to gas turbine engine high energy ignition units.

It is essential that the system test procedures, cleaning requirements and safety measures applicable to electrical system are maintained are fully observed, understood and respected. Ability to interpret procedures and specifications (allowable limits) inspection and apply them in practice through a series of inspections, testing and troubleshooting applications (including the appropriate involvement of supervisors and other trades) is critical. Evidence of transferability of skills and knowledge related to the inspection, testing and troubleshooting is essential. This is to be demonstrated by the application in a wide range of aircraft electrical systems and components listed in the range of conditions.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit should be of interest and meet all requirements of the elements and performance criteria and include basic knowledge of:

- DC circuit theory.
- Electrical system maintenance requirements and troubleshooting procedures.
- The basic layout (block diagram level), function and operation of:
- Single generator DC power generation and distribution systems and components, including:
- DC generators.
- Alternator/rectifier generators.
- Starter/generators.
- Voltage regulators.
- Circuit protection devices.
- Bus bars.
- Piston engine ignition and starting systems and components, including:
- Magnetos or coils.
- Starter motors.
- Ignition switches/start switches.
- Ignition harnesses.
- Low tension wiring.
- Spark plugs.
- Auxiliary starting devices.
- Gas turbine igniter and starting systems and components, including specific WHS precautions:
- Starter motors and starter/generators.
- High energy ignition units.
- Control units.
- Switches.
- Landing gear and flap systems and components, including:

Mmotors.

- Actuators.
- Selector switches.
- Micro switches.
- Internal and external lighting systems and components.
- Batteries and associated mounting equipment, including related anti-vibration aids.
- Relevant WHS practices.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

(c) Assessment recommendation

N/A

Assessmen methods

15. ขอบเขต (Range Statement)

(a) Recommendation

This field allows different environments and working conditions that can affect the performance. the essential operating conditions that may be present (depending on the work situation, accessibility requirements, the candidate of the topic, and local industry and regional contexts) are included.	
DC electrical systems/components include:	DC generators and alternator/rectifier generators, and components of related single generator regulation and distribution systems. • Piston engine ignition and starting system components. • Specific components of DC electrical systems, such as flaps and landing gear, including related motors and actuators. • Gas turbine engine igniter and starting systems and components (where applicable to the enterprise). • Aircraft lighting. • Aircraft main batteries.
Procedures and requirements include:	• Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

(b) Description

N/A

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.Competition should be assessed in the workplace or place of work simulated using tools and equipment specified in the maintenance manuals. It is also expected that the tools of general and special purpose test equipment and ground support would be used where appropriate.

- The application of the test procedures should clearly indicate the knowledge of system operation, the relationship of the individual components and linkages with other systems (if applicable) within the limits of the failure of the aircraft / search system guidance before taking any action. The work plan should take into account the applicable safety requirements and quality in accordance with industry and regulatory standards.
- A person can not be assessed as competent until they can demonstrate to the satisfaction of the assessor workplace relevant elements and performance criteria of competence unit is carried out under routine monitoring in power looms, cables and connecting hardware, and each set in the range of conditions and at least one (1) main / online replaceable component unit (LRU), in each case as follows:
- DC generators and generators alternator / rectifier current, and control system components single generator and related distribution.
- System components engine ignition and starting piston.
- Specific components of electrical current systems, such as flaps and landing gear, including motors and actuators.
- Lighter gas turbine engine and commissioning of systems and components (can be omitted if not applicable to the company).
- Lighting aircraft.
- The main aircraft batteries (competition can be demonstrated by conducting a review of the battery).
- This is done through the records in the register of industrial experience and achievement or, where appropriate, a guide equivalent Industry Evidence (for details see the companion volume Assessment Guidelines).
- People who have already reached evaluated Keep MEA274 light aircraft electrical systems and core components have met the requirements of this unit with respect to the common range of varying conditions. The Registry of industry experience and accomplishments related records Keep MEA274 be accepted as meeting the requirements of evidence for this unit in public areas apply the basic light aircraft electrical systems and components.

1. รหัสหน่วยสมรรถนะ 103402

2. ชื่อหน่วยสมรรถนะ Inspect aircraft electrical systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency applies hand skills and employs system/component knowledge and applicable maintenance publications in the inspection of aircraft electrical systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. This work may be carried individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

1	2	3	4	5	6	7	8
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8. กลุ่มอาชีพ (Sector)

10 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103402.01 Inspect electrical systems and components.	103402.01.01 Isolation tags are checked and aircraft configured for safe system inspection and operation according to the applicable maintenance manual. 103402.01.02 Electrical system components are visually or physically checked for external signs of defects according to applicable maintenance manual while noticing all relevant work health and safety (WHS) requirements. Defects are correctly identified and recorded according to standard enterprise procedures.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน
103402.02 Inspect electrical components.	103402.02.01 Isolation tags are checked and aircraft configured for safe system inspection and operation according to the applicable maintenance manual. 103402.02.02 Electrical hardware are visually or physically checked for external signs of defects according to applicable maintenance manual while noticing all relevant work health and safety (WHS) requirements. Defects are correctly identified and recorded according to standard enterprise procedures.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103302Remove and install advanced aircraft electrical system components

101403 Fabricate and/or repair aircraft electrical components or parts

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

- Applying relevant WHS practices.
- Using approved maintenance documentation and aircraft publications relating to the avionic system being maintained.
- Recognition of system and electrical component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in:
- AC and DC power generation systems, including regulation, distribution, control and Cooling.
- Battery installations and inverters.
- Flight control and/or electro-hydraulic systems.
- Engine ignition, starting, fuel distribution and control systems.
- Internal/external lighting systems, including controls.
- Doors.
- Landing gear systems.
- Anti-skid braking systems.
- Master caution and warning systems.
- Auxiliary systems (including ice/rain protection, fire detection, environmental control and pressurisation, waste and water, equipment and furnishings).

It is crucial that inspection procedures, requirements for cleanliness and safety precautions relevant to the maintained system are fully perceived, understood and complied with.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice (including the timely involvement of supervisors or other trades).

Transferability Evidence of skills and knowledge relevant to inspection is important This is to be demonstrated through application across a range of aircraft electrical systems, components and hardware as specified in the Assessment Conditions.

(b) Knowledge Evidence

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of:

- Component attachment methods and connection of hardware.
- Explaining the basic layout (block diagram level) and operation of:
- AC and DC power generation systems, including regulation, distribution, control and cooling.
- Battery installations and inverters.
- Flight control and/or electro-hydraulic systems.
- Engine ignition, starting, fuel distribution and control systems.
- Internal/external lighting systems, including controls.
- Doors.
- Landing gear systems.
- Anti-skid braking systems.
- Master caution and warning systems.
- Auxiliary systems (including ice/rain protection, fire detection, environmental control and pressurisation, waste and water, equipment and furnishings).
- WHS requirements applicable to the maintenance of aircraft electrical systems, including gas turbine engine high-energy ignition units.
- Electrical system maintenance requirements.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

(c) Assessment recommendation

N/A

15. ขอบเขต (Range Statement)

(a) Recommendation

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

(b) Description

Electrical systems and components include:

- Alternating current (AC) and/or direct current (DC).
- power generation, regulation and distribution systems.
- Battery installations and bus ties/interlocks.
- Rotary and static inverters and transformer rectifier (TR).
- Units.
- Air cycle air conditioning and pressurisation systems.
- Flight and engine control systems.
- Ignition and starting systems.
- Fire/smoke detection and extinguishing.
- Lighting.
- Master and caution warning systems.
- Equipment and furnishing.
- Equipment cooling and ventilation.
- Position indicating systems.
- Fuel storage and distribution.
- Propeller control systems (where applicable to the enterprise).
- Landing gear indication and. anti-skid (where applicable to the enterprise).
- Ice and rain protection (where applicable to the enterprise).
- Wastewater (where applicable to the enterprise).

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the workplace or simulated workplace using tools and equipment stated in the maintenance manuals. It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on a system and related components in the following groups:
- AC and/or DC power generation, regulation and distribution systems.
- Battery installations and bus ties/interlocks.
- Rotary and static inverters and TR units.
- Air cycle air conditioning and pressurisation systems.
- Flight and engine control systems.
- Ignition and starting systems.
- Fire/smoke detection and extinguishing.
- Lighting.
- Master and caution warning systems.
- Equipment and furnishing.
- Equipment cooling and ventilation.
- Position indicating systems.
- Fuel storage and distribution.
- Propeller control systems (may be omitted if not applicable to the enterprise).
- Landing gear indication and antiskid (may be omitted if not applicable to the enterprise).
- Ice and rain protection (may be omitted if not applicable to the enterprise).
- Wastewater (may be omitted if not applicable to the enterprise).

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103403

2. ชื่อหน่วยสมรรถนะ Inspect aircraft instrument systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of hand skills and the use of system/component knowledge and applicable maintenance publications to inspect aircraft instrument systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. Work may be completed individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

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8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103403.01 Inspect instrument systems and components.	103403.01.01 Able to attach isolation tags for safe instrument systems and components inspection. 103403.01.02 Able to check isolation tags and aircraft configured for safe system inspection and operation in accordance with the applicable maintenance manual.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน
103403.02 Identify and record Defects.	103403.02.01 Able to identify and record Defects correctly in accordance with standard enterprise procedures. 103403.02.02 Able to check Instrument system components visually or physically for external signs of defects in accordance with applicable maintenance manual while observing all relevant work health and safety (WHS) requirements.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103303 Remove and install advanced aircraft general instrument system components
101403 MInor repair for aircraft electrical components or parts

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

• Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

• Applying relevant WHS practices .

• Using approved maintenance documentation and aircraft publications relating to the instrument system being maintained .

• Recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in:

• Pitot/static systems and associated instruments and systems.

• Flight instruments.

• GPWS and FDR.

• Stall warning, angle of attack and stall avoidance systems.

• Navigation systems (compasses and AHRS) .

• Pressure measurement, position indicators, engine/auxiliary system indication systems, including fuel quantity and flow.

It is essential that inspection procedures, cleanliness requirements and safety precautions applicable to the instrument system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice (including the timely involvement of supervisors or other trades) is critical.

Evidence of transferability of skills and knowledge related to inspection is essential. This is to be demonstrated through application across a range of aircraft instrument systems and components listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

• Component attachment methods.

• Cnnection of hardware.

• Instrument system maintenance requirements .

• The basic layout (block diagram level), function and operation of:

• Flight instruments, including:

• ASIs.

• VSIs.

• Air data systems and components.

• Machmeters.

• Altimeters, including servo and encoding altimeters.

• Turn and slip indicators.

• Ahs.

• DGs.

• Angle of attack and stall warning/avoidance systems.

• Pitot/static systems.

• Navigation systems:

• Direct reading compasses.

• Gyro compasses.

• AHRS.

• GPWS .

• Turbine engine instruments, including:

• Temperature and pressure, including thermocouples, sensors and transmitters.

• Speed, including mechanical and electric tachometers.

• Thrust, including fan, propeller and jet.

• Torque.

• Fuel flow.

• Vibration.

• Auxiliary transmitter/indicator measuring systems, including:

• Hydraulic pressure and temperature.

• Pneumatic pressure.

• Transmission oil pressure and temperature.

• Fuel remaining/used.

• Fuel quantity indication.

• Component position (e.g. doors, flaps, speed brakes and landing gear).

• FDR systems.

• Relevant WHS practices.

• Instrument system maintenance requirements.

• Relevant maintenance manuals.

• Relevant regulatory requirements and standard procedures.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Instrument systems and components include:

- Flight instruments, including pitot/static systems, airspeed indicators (ASIs), vertical speed indicators (VSIs), altimeters, altitude alerting and reporting, turn and bank and slip/turn coordinators, directional gyros (DGs) and artificial horizons (AHs) (air and electrically driven).
- Machmeters, air data systems, angle of attack, stall warning and avoidance systems.
- Flight data recorders (FDRs).
- Engine indication systems.
- Magnetic compasses and attitude and heading reference system (AHRS).
- Miscellaneous instrument systems, including pressure measurement, fuel quantity, fuel flow, position indication, voltage and frequency, current and power.
- Ground proximity warning system (GPWS).

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals.

It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.

- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on a system and at least (1) one major system component/line replacement unit (LRU) from each of the following groups:
- Flight instruments, including pitot/static systems, ASIs, VSIs, altimeters, altitude alerting and reporting, turn and bank and slip/turn coordinators, DGs and AHs (air and electrically driven).
- machmeters, air data systems, angle of attack, stall warning and avoidance systems.
- FDRs.
- Engine indication systems.
- Magnetic compasses and AHRS.
- Miscellaneous instrument systems, including pressure measurement, fuel quantity, fuel flow, position indication, voltage and frequency, current and power.
- GPWS.
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103404

2. ชื่อหน่วยสมรรถนะ Inspect fixed wing aircraft automatic flight control systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of hand skills and the use of system/component knowledge and applicable maintenance publications to inspect aircraft automatic flight control systems and components of fixed wing aircraft that have automatic flight control systems during scheduled or unscheduled maintenance. Work may be completed individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

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8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103404.01 Isolate tags control for automatic flight control systems and components.	103404.01.01 Able to attach isolation tags for safe automatic flight control systems and components inspection. 103404.01.02 Able to check Isolation tags and aircraft configured for safe system inspection and operation in accordance with the applicable maintenance manual.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน
103404.02 Inspect automatic flight control systems and components.	103404.02.01 Able to check Automatic flight control system components visually or physically for external signs of defects in accordance with applicable maintenance manual while observing all relevant work health and safety (WHS) requirements. 103404.02.02 Able to correctly identify and record defects in accordance with standard enterprise procedures.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103305 Remove and install aircraft electronic system components
101403 Minor repair for aircraft electrical components or parts

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

N/A

(ข) ความต้องการด้านความรู้

N/A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- Applying relevant WHS practices.
- Using approved maintenance documentation and aircraft publications relating to the automatic flight control system being maintained.
- Recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in automatic fight control system and components.

It is essential that inspection procedures, cleanliness requirements and safety precautions applicable to the electrical system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice (including the timely involvement of supervisors or other trades) is critical.

Evidence of transferability of skills and knowledge related to inspection is essential. This is to be demonstrated through application across a range of aircraft automatic flight control systems and components listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

- Component attachment methods
- The basic layout (block diagram level), and operation of the system, including the interface with:
- Flight management systems.
- Navigation systems.
- Flight control actuators.
- Engine management systems.
- Relevant WHS practices.
- Maintenance requirements.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Automatic flight control systems and components include:

- Automatic pilots and associated integrated systems and components, including:
- Automatic pilot.
- Flight director.
- Automatic trim.
- Yaw damper.
- Automatic throttle and automatic landing (where applicable to the enterprise)

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals.

It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.

- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one (1) item from each of the following groups:
- Automatic pilot.
- Flight director.
- Automatic trim.
- Yaw damper.
- Automatic throttle and automatic landing (may be omitted where it is not applicable to the enterprise).
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103405

2. ชื่อหน่วยสมรรถนะ Inspect aircraft electronic systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of hand skills and the use of system/component knowledge and applicable maintenance publications to inspect aircraft electronic systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. Work may be completed individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

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8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103405.01 Isolate tags control for electronic systems and components.	103405.01.01 Able to attach isolation tags for safe electronic systems and components inspection. 103405.01.02 Able to check isolation tags and configure aircraft for safe system inspection and operation in accordance with the applicable maintenance manual.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน
103405.02 Inspect electronic systems and components.	103405.02.01 Able to identify and record defects correctly in accordance with standard enterprise procedures. 103405.02.02 Able to check electronic system components visually or physically for external signs of defects in accordance with applicable maintenance manual while observing all relevant work health and safety (WHS) requirements.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103305 Remove and install aircraft electronic system components
101403 Minor repair for aircraft electrical components or parts

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- Applying relevant WHS practices.
- Using approved maintenance documentation and aircraft publications relating to the avionic system being maintained.
- Recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in:
- Multi-function display systems (interface units, display generators and display units), i.e. HUD, EICAS, FMS, ACARS, EFIS and ECAM.
- Integrated modular avionics (where applicable to the enterprise).
- INS and IRS.
- External communications systems:
  - HF.
  - UHF.
  - VHF.
  - SATCOM.
  - ELT.
- Internal communications systems:
  - Intercommunication.
  - Cabin intercommunication data systems.
  - Cabin network services.
  - CVR.
- Information systems, such as air traffic and information management systems, and network server systems (where applicable to the enterprise).
- RF navigation systems:
  - ILS.
  - VOR.
  - ADF.
  - GNS.
- Pulse systems that are applicable to the enterprise, including:
  - Primary radar (navigation/weather) components and interface.
  - ACAS components and interface.
  - Radio altimeter components and interface.
  - DME components and interface.
  - ATC transponders.
  - ADS-B

It is essential that inspection procedures, cleanliness requirements and safety precautions applicable to the electrical system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice (including the timely involvement of supervisors or other trades) is critical.
Evidence of transferability of skills and knowledge related to inspection is essential. This is to be demonstrated through application across a range of electronic systems and components listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

- Component attachment methods and connection of hardware.
- The basic layout (block diagram level) and operation of:.
  - Multi-function display systems (interface units, display generators and display units), i.e. HUD, ICAS, FMS, ACARS, EFIS and ECAM.
  - Integrated modular avionics.
  - INS and IRS.
  - External communications systems:.
  - HF.
  - UHF.
  - VHF.
  - SATCOM.
  - ELT.
  - Internal communications systems:
  - Intercommunication.
  - Cabin intercommunication data systems.
  - Cabin network services.
  - CVR.
  - Information systems, such as air traffic and information management systems, and network server systems.
  - RF navigation systems:
  - ILS.
  - VOR.
  - ADF.
  - GNS.
  - Primary radar (navigation/weather) components and interface.
  - ACAS components and interface.
  - Radio altimeter components and interface.
  - DME components and interface.
  - ATC transponders.
  - ADS-B.
- Relevant WHS practices.
- Maintenance requirements.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Electronic systems and components include:

- Electronic instrument displays – electronic flight instrument system (EFIS), engine indicating and crew alerting system (EICAS), flight management computer system (FMCS), electronic central aircraft monitor system (ECAM) and head-up display (HUD) (where applicable to the enterprise).
- Instrument navigation systems – inertial navigation system (INS), inertial reference system (IRS), compasses and attitude and heading reference system (AHRS).
- Communication systems – high frequency (HF), very high frequency (VHF), ultra-high frequency (UHF), satellite communications (SATCOM), intercom, data and cabin network services, emergency location transmitter (ELT) and cockpit voice recorder (CVR).
- Radio navigation systems – automatic direction finding (ADF), very high frequency omni-range (VOR), instrument landing system (ILS) and global navigation systems (GNS).
- Pulse operated systems – weather radar, navigation radar, air traffic control (ATC) transponder, automatic dependent surveillance-broadcast (ADS-B), radio altimeter (RADALT), distance measuring equipment (DME), doppler and airborne collision avoidance system (ACAS) (where applicable to the enterprise).
- Integrated modular avionics (where applicable to the enterprise).
- Information systems – air traffic and information management, network servers (where applicable to the enterprise).

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals. It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on each type of system listed in the following groups and on at least one (1) component for each listed system type:
- Electronic instrument displays – EFIS, EICAS, FMS, ECAM and HUD (where applicable to the enterprise).
- Instrument navigation systems – INS, IRS, compasses and AHRS.
- Communication systems – HF, VHF, UHF, SATCOM, intercom, data and cabin network services, ELT and CVR.
- Radio navigation systems – ADF, VOR, ILS and GNS.
- Pulse operated systems – weather radar, navigation radar, ATC transponder, ADS-B, RADALT, DME, doppler and ACAS (where applicable to the enterprise)
- Integrated modular avionics (where applicable to the enterprise).
- Information systems – air traffic and information management, network servers (where applicable to the enterprise).
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103406

2. ชื่อหน่วยสมรรถนะ Test and troubleshoot aircraft electrical systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency applies hand skills and employs system/component knowledge and applicable maintenance publications and test equipment in the testing and troubleshooting of aircraft electrical systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

1	2	3	4	5	6	7	8
☐	☐	☐	☑	☐	☐	☐	☐

8. กลุ่มอาชีพ (Sector)

Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103406.01 Test/adjust electrical systems.	103406.01.01 Aircraft and system are prepared according to applicable maintenance manual for the application of power/system operation. 103406.01.02 Electrical system is functionally tested according to maintenance manual for indication of serviceability or malfunction while observing all relevant work health and safety (WHS) requirements. System calibration or adjustments are carried out according to maintenance manual, as appropriate.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103406.02 Troubleshoot electrical systems.	103406.02.01 Relevant maintenance documentation and modification status, including system defect reports, where relevant, are employed to identify an unserviceability. Available information from maintenance documentation and inspection and test results is employed, where necessary, to assist in fault determination. 103406.02.02 Maintenance manual fault diagnosis guides and logic processes are employed to ensure efficient and accurate troubleshooting to line replacement level. Specialist advice is acquired, where required, to assist with the troubleshooting process. System faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required. Rectification requirements are determined.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

- Applying relevant WHS practices.
- Using approved maintenance documentation and aircraft publications relating to the electrical system being maintained.
- Recognition of system and electrical component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in:
- AC and DC power generation systems, including regulation, distribution, control andcooling.
- Battery installations.
- Flight control and/or electro-hydraulic systems.
- Engine ignition, starting, fuel distribution and control systems.
- Lnternal/external lighting systems, including controls.
- Landing gear systems.
- Anti-skid braking systems.
- Auxiliary systems, including ice/rain protection, fire detection, environmental control and pressurisation, water and waste, doors, propeller control, equipment and.
- Furnishings.
- Equipment cooling and ventilation systems.
- Master caution and warning systems.
- Applying logic processes, taking and interpreting electrical measurements, and using test equipment and appropriate wiring diagrams and manuals to isolate electrical system malfunctions of the above components and systems.
- Performing system functional tests and checks to isolate system faults and assess post-maintenance serviceability.

It is crucial that the system testing procedures, requirements for cleanliness and safety precautions relevant to the maintained electrical system are fully perceived, understood and complied with.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades).

Transferability evidence of skills and knowledge related to testing and troubleshooting is important. This is to be demonstrated through application across a range of aircraft electrical systems and components as specified in the Assessment Conditions.

(b) Knowledge Evidence

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of:

- Component attachment methods.
- Connection of hardware.
- Explaining the basic layout (block diagram level), function and operation of:
- AC and DC power generation systems, including regulation, distribution, control and cooling.
- Battery installations.
- Flight control and/or electro-hydraulic systems.
- Engine ignition, starting, fuel distribution and control systems.
- Lnternal/external lighting systems, including controls.
- Landing gear systems.
- Anti-skid braking systems.
- Auxiliary systems, including ice/rain protection, fire detection, environmental control and pressurisation, water and waste, doors, propeller control, equipment and furnishings.
- Equipment cooling and ventilation systems.

Mmaster caution and warning systems.

- Explaining basic principles/functions, relating to systems listed above and associated with:
- Basic AC and DC circuit theory.
- Digital fundamentals.
- Analogue fundamentals.
- AC and DC generator characteristics.
- Single and polyphase AC motors and DC motors.
- Rotary and static inverters.
- Air cycle air conditioning.
- Electrical sensing and transmitting devices.
- WHS requirements applicable to the maintenance of aircraft electrical systems, including gas turbine engine high-energy ignition units.
- Electrical system maintenance requirements and troubleshooting procedures.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

(c) Assessment recommendation

N/A

15. ขอบเขต (Range Statement)

(a) Recommendation

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

(b) Description

Electrical systems and components include:

- All related electrical hardware, looms and cables.
- Alternating current (AC) and/or direct current (DC) power.
- Generation, regulation and distribution systems.
- Rotary and static inverters and transformer rectifier (TR).
- Units.
- Air cycle air conditioning and pressurisation systems.
- Flight and engine control systems.
- Ignition and starting systems.
- Fire/smoke detection and extinguishing.
- Lighting (internal and external).
- Master and caution warning systems.
- Equipment cooling and ventilation.
- Equipment and furnishing.
- Position indicating systems..
- Fuel storage and distribution.
- Landing gear indication and anti-skid.
- Main batteries and battery bus ties/interlocks.
- Propeller control systems (where applicable to the enterprise).
- Ice and rain protection (where applicable to the enterprise).
- Wastewater (where applicable to the enterprise).

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the workplace or simulated workplace using tools and equipment stated in the maintenance manuals. It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate.
- Before undertaking any action, the application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide. The work plan should consider applicable safety and quality requirements in accordance with the industry and regulatory standards.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on a system and at least one (1) item from each of the following groups, including all related electrical hardware, looms and cables:
- AC and/or DC power generation, regulation and distribution systems.
- Rotary and static inverters and TR units.
- Air cycle air conditioning and pressurisation systems.
- Flight and engine control systems.
- Ignition and starting systems.
- Fire/smoke detection and extinguishing.
- Lighting (internal and external).
- Master and caution warning systems.
- Equipment cooling and ventilation.
- Equipment and furnishing.
- Position indicating systems.
- Fuel storage and distribution.
- Landing gear indication and anti-skid.
- Main batteries and battery bus ties/interlocks (including a battery check).
- Propeller control systems (may be omitted if not applicable to the enterprise).
- Ice and rain protection (may be omitted if not applicable to the enterprise).
- Wastewater (may be omitted if not applicable to the enterprise).

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103407

2. ชื่อหน่วยสมรรถนะ Test and troubleshoot aircraft instrument systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of hand skills, standard trade practices and systems knowledge in the testing and troubleshooting of aircraft instrument and display systems and components during both scheduled and unscheduled maintenance on both fixed and rotary wing aircraft. Work may be completed individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

1	2	3	4	5	6	7	8
☐	☐	☐	☑	☐	☐	☐	☐

8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103407.01 Prepare for troubleshooting, Test/adjust instrument and display systems.	103407.01.01 Able to interpret relevant maintenance documentation and modification status, including system defect/service difficulty reports, where relevant, to identify an unservice ability and prepare the aircraft and systems correctly in accordance with specified procedures for the application of power and system operation. 103407.01.02 Able to functionally test Instrument or display system is in accordance with specified procedures for evidence of serviceability or malfunction while observing all relevant work health and safety (WHS) requirements and perform system calibration or adjustments in accordance with specified procedures.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103407.02 Troubleshoot instrument and display systems.	103407.02.01 Able to use maintenance manual fault diagnosis guides and logic processes to ensure efficient and accurate troubleshooting to line replacement level and able to obtain specialist advice, where required, to assist with the troubleshooting process. 103407.02.02 Able to locate Instrument or display system faults and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required and able to determine fault rectification requirements to assist in planning the repair or adjustment.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103403 Inspect aircraft instrument systems and components

103405 Inspect aircraft electronic systems and components

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- Using hand skills, tools and test equipment in the testing, adjustment and troubleshooting of instrument and display systems.
- Recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) for the systems listed in Range of Conditions.
- Interpreting the information presented on instrument and display systems.
- Applying logic processes and using appropriate wiring diagrams and manuals to isolate instrument and display system malfunctions.
- Performing system functional tests and checks to isolate system faults and assess post-maintenance serviceability.
- Effectively using maintenance documentation and relevant fault diagnosis guides in the troubleshooting process.
- Applying standard procedures.
- Observing all relevant WHS procedures.

It is essential that system testing procedures, cleanliness requirements and safety precautions applicable to the instrument system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades) is critical.

Evidence of transferability of skills and knowledge related to testing and troubleshooting is essential. This may be demonstrated through application across a range of aircraft instrument and display systems (where display systems are applicable to the enterprise) listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

- Standard trade practices relating to tool and test equipment usage and installation/securing of system components
- The basic layout (block diagram level) of the systems listed in the Range of Conditions.
- The operating principles of the systems listed in the Range of Conditions and associated with:
- The properties and effects of atmospheric conditions on aircraft instruments and systems.
- Pressure and temperature sensing elements and their use in aircraft instruments.
- Gyroscopes and their use in aircraft instrument and reference systems.
- Electrical fundamentals and display screen generation.
- The various methods of navigation and how they are used by both conventional and electronic navigational instruments and systems.
- Maintenance requirements and troubleshooting procedures.
- WHS procedures relating to instrument and display systems and components.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures, including software management control.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Instrument or display systems include:

- Flight instruments – pitot/static systems, airspeed indicators (ASIs), machmeters, air data systems and instruments, vertical speed indicators (VSIs), altimeters, altitude alerting and reporting, turn and bank, directional gyros (DGs), artificial horizons (AHs), angle of attack, stall warning/avoidance, ground proximity warning system (GPWS) and flight data recorders (FDRs).
- Engine instruments – engine speed, pressure, temperature, performance, vibration and torque.
- Instrument navigation systems – inertial navigation system (INS), inertial reference system (IRS), compasses and attitude and heading reference system (AHRS).
- Miscellaneous – pressure, fuel quantity, fuel flow, position, voltage, frequency, current and power.
- Display systems – electronic flight instrument system (EFIS), engine indicating and crew alerting system (EICAS), flight management computer system (FMCS), electronic central aircraft monitor system (ECAM) and head-up display (HUD) (where applicable to the enterprise).

- Integrated modular avionics (where applicable to the enterprise)

  Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the work environment or simulated work environment, using procedures, tools and equipment specified in maintenance documentation. It is also expected that general purpose tools, test and ground support equipment found in most routine situations would be used where appropriate. The level of troubleshooting is limited in its application to the use of fault diagnosis guides or other similar information to enable troubleshooting to line replaceable item level.
- The application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of this unit of competency are being achieved under routine supervision on a system and on at least one (1) major system component of each of the following groups:
- Flight instruments – pitot/static systems, ASIs, machmeters, air data systems and instruments, VSIs, altimeters, altitude alerting and reporting, turn and bank, DGs, AHs, angle of attack, stall warning/avoidance, GPWS and FDRs.
- Engine Instruments – engine speed, pressure, temperature, performance, vibration and torque.
- Instrument navigation systems – INS, IRS, compasses and AHRS.
- Miscellaneous – pressure, fuel quantity, fuel flow, position, voltage, frequency, current and power.
- Display systems – EFIS, EICAS, FMCS, ECAM and HUD (may be omitted if not applicable to the enterprise).
- Integrated modular avionics (may be omitted if not applicable to the enterprise).
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103408

2. ชื่อหน่วยสมรรถนะ Test and troubleshoot aircraft radio frequency navigation and communications.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of hand skills and the use of system/component knowledge and applicable maintenance publications and test equipment to test and troubleshoot communication and radio frequency (RF) navigation systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. Work may be completed individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

1	2	3	4	5	6	7	8
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8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103408.01 Test/adjust RF navigation and communications systems.	103408.01.01 Able to prepare Aircraft and system in accordance with applicable maintenance manual for the application of power/system operation. 103408.01.02 Able to functionally test RF navigation or communication system in accordance with maintenance manual for evidence of serviceability or malfunction while observing all relevant work health and safety (WHS) requirements and perform system calibration or adjustments in accordance with maintenance manual, as appropriate.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103408.02 Troubleshoot RF navigation and communications systems.	103408.02.01 Able to use available information from maintenance documentation and inspection and test results, where necessary, to assist in fault determination and able to use maintenance manual fault diagnosis guides and logic processes to ensure efficient and accurate troubleshooting to line replacement level. 103408.02.02 Able to obtain specialist advice, where required, to assist with the troubleshooting process, locate RF navigation or communication system faults and the causes are clearly identified and correctly recorded in maintenance documentation, where required.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103405 Inspect aircraft electronic systems and components

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- Applying relevant WHS practices.
- Using approved maintenance documentation and aircraft publications relating to the RF and communications system being maintained.
- Recognition of system and component defects/external damage, correct installation, and attaching hardware (including cabling/harnesses/transmission lines) and security in:
- External communications systems:
- HF.
- UHF.
- VHF.
- SATCOM and microwave.
- Internal communications systems, including:
- Intercommunication.
- Cabin intercommunication data systems.

(where applicable to the enterprise).

- Cabin network services (where applicable to the enterprise).
- CVR.
- Information systems, such as air traffic and information management systems, and network server systems (where applicable to the enterprise).
- RF navigation systems:
- ILS.
- VOR.
- ADF.
- GNS.
- ACARS.
- ELT systems.
- Applying logic processes, taking and interpreting system measurements to accurately and effectively isolating malfunctions within the systems.
- Performing system testing to isolate system faults and assess post-maintenance serviceability.

It is essential that system testing procedures, cleanliness requirements and safety precautions applicable to the aircraft communication and RF navigation system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades) is critical.

Evidence of transferability of skills and knowledge related to testing and troubleshooting is essential. This is to be demonstrated through application across a range of aircraft communication and RF navigation systems and components listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

- Component attachment methods.
- Explaining the basic layout (block diagram level), function and operation of:
- External communications systems:
- HF.
- UHF.
- VHF.
- SATCOM and microwave.
- Internal communications systems, including:
- Intercommunication.
- Cabin intercommunication data systems (where applicable to the enterprise).
- Cabin network services (where applicable to the enterprise).
- CVR.
- Information systems, such as air traffic and information management systems, and network server systems.
- RF navigation systems:
- ILS.
- VOR.
- ADF.
- GNS.
- ACARS.
- ELT systems.
- Explaining basic principles/functions relating to the above systems and associated with:
- Electromagnetic radiation and propagation.
- Basic AC and DC circuit theory.
- Digital fundamentals.
- Analogue fundamentals.
- Antenna characteristics.
- Transmission line characteristics.
- WHS requirements.
- System and component maintenance requirements and troubleshooting procedures.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

- RF navigation or communication systems include:
- Control and sensing associated with cockpit radio, ground and flight crew communications including frequency modulation (FM) and amplitude modulation (AM) modes of operation in the high frequency (HF), ultra-high frequency (UHF), and very high frequency (VHF) bands, microwave systems and satellite communications (SATCOM).
- Passenger communications, cockpit voice recorder (CVR), audio integration system, cabin intercommunication data systems and cabin network services (where applicable to the enterprise).
- Information systems, such as air traffic and information management systems, and network server systems (where applicable to the enterprise).
- Instrument landing system (ILS), very high frequency Omni-range (VOR), automatic direction finding (ADF), global navigation system (GNS), emergency beacons and aircraft communications addressing and reporting system (ACARS).
- Antennae, impedance audio matching devices, microphones and headphones, transmission lines, computer controls, line replaceable units, transmitters/receivers and indicators.
- Procedures and requirements include:
- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals. It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate.
- The application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one (1) system and its major components from each of the following groups:
- Control and sensing associated with cockpit radio, ground and flight crew communications including FM and AM modes of operation in the HF, UHF, and VHF bands, microwave systems and SATCOM.
- Passenger communications, CVR, audio integration system, cabin intercommunication data systems and cabin network services (may be omitted if not applicable to the enterprise).
- Information systems, such as air traffic and information management systems, and network server systems (may be omitted if not applicable to the enterprise).
- ILS, VOR, ADF, GNS, emergency beacons and ACARS.
- and the following general associated components:
- Antennae, impedance audio matching devices, microphones and headphones, transmission lines, computer controls, line replaceable units, transmitters/receivers and indicators.

This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103409

2. ชื่อหน่วยสมรรถนะ Test and troubleshoot fixed wing aircraft automatic flight control systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of hand skills and the use of system/component knowledge and applicable maintenance publications to test and troubleshoot aircraft automatic flight control systems and components of fixed wing aircraft that have automatic flight control systems during scheduled or unscheduled maintenance. Work may be completed individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

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8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103409.01 Prepare for troubleshooting, Test/adjust automatic flight control system.	103409.01.01 Able to use relevant maintenance documentation and modification status, including system defect reports, where relevant, to identify an unserviceability and able to prepare aircraft and system in accordance with applicable maintenance manual for the application of power/system operation. 103409.01.02 Able to functionally test Automatic flight control system in accordance with maintenance manual for evidence of serviceability or malfunction while observing all relevant work health and safety (WHS) requirements and perform system calibration or adjustments in accordance with maintenance manual, as appropriate.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103409.02 Troubleshoot automatic flight control system.	103409.02.01 able to use available information from maintenance documents and inspection and test results, where necessary, to assist in fault determination and able to use maintenance manual fault diagnosis guides and logic processes to ensure efficient and accurate troubleshooting to line replacement level. 103409.02.02 Able to obtain specialist advice, where required, to assist with the troubleshooting process and able to locate automatic flight control system faults and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103404 Inspect fixed wing aircraft automatic flight control systems and components

101403 Minor repair for aircraft electrical components or parts

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- Applying relevant WHS practices .
- Using approved maintenance documentation and aircraft publications relating to the automatic flight control system being maintained.
- Recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in:
- Flight director components and interface.
- Flight control components and interface.
- Automatic throttle components and interface (where applicable to the enterprise).
- Automatic pilot system and interface.
- Applying logic processes, taking and interpreting system measurements, using test equipment and appropriate wiring diagrams and manuals to accurately and effectively isolate malfunctions in the above systems.
- Performing system testing to isolate system malfunctions and assess post-maintenance serviceability.

It is essential that system testing procedures, cleanliness requirements and safety precautions applicable to the automatic flight control system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades) is critical. Evidence of transferability of skills and knowledge related to testing and troubleshooting is essential. This is to be demonstrated through application across a range of aircraft automatic flight control systems and components listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

- Component attachment methods.
- Explaining the basic layout (block diagram level), function and operation of:
- Flight director components and interface.
- Flight control components and interface.
- Automatic throttle components and interface.
- Automatic pilot system and interface.
- Flight management system interface.
- Navigation system interfaces.
- Explaining basic principles/functions, relating to the above systems and associated with:
- Basic AC and DC circuit theory.
- Digital fundamentals.
- Analogue fundamentals.
- Fixed wing flight theory.
- Inner and outer loop control.
- Ffixed wing flight control system (mechanical, hydraulic and electro-mechanical types, trim and stabilization).
- Flight control modes/channels.
- WHS requirements .
- System and component maintenance requirements and troubleshooting procedures.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Automatic flight control systems include:

- Automatic pilot.
- Flight director.
- Automatic trim.
- Yaw damper.
- Automatic throttle and automatic landing (where applicable to the enterprise).

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals. It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate.
- The application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one item from each of the following groups:
- Automatic pilot.
- Flight director.
- Automatic trim.
- Yaw damper.
- Automatic throttle and automatic landing (may be omitted where not applicable to the enterprise).
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103410

2. ชื่อหน่วยสมรรถนะ Inspect, test and troubleshoot rotary wing aircraft automatic flight control systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

N/A

7. สำหรับระดับคุณวุฒิ

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8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

ICAO Doc 7192 / EASA Part 66

11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103410.01 Inspect automatic flight control system and components.	103410.01.01 Automatic flight control system is visually or physically checked for external signs of defects in accordance with applicable maintenance manual, defects are correctly identified and reported. 103410.01.02 Aircraft and system are prepared in accordance with applicable maintenance manual for the application of power/system operation, Automatic flight control system is functionally tested in accordance with maintenance manual for evidence of serviceability or malfunction while observing all relevant work health and safety (WHS) requirements.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103410.02 Test/adjust and Troubleshoot automatic flight control system.	103410.02.01 System calibration or adjustments are performed in accordance with maintenance manual, as appropriate and relevant maintenance documentation and modification status, including system defect reports, where relevant, are used to identify an unserviceability. 103410.02.02 Able to obtain specialist advice, use maintenance manual fault diagnosis guides and logic processes to ensure efficient and accurate troubleshooting to line replacement level and able to locate automatic flight control system faults and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103305 Remove and install aircraft electronic system components

101403 Minor repair for aircraft electrical components or parts

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- Applying relevant WHS practices.
- Using approved maintenance documentation and aircraft publications relating to the automatic flight control and data system being maintained.
- Recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in:
- Flight director components and interface.
- Flight control components and interface.
- Flight data recorders and interface.
- Applying logic processes, taking and interpreting system measurements, using test equipment and appropriate wiring diagrams and manuals to accurately and effectively isolate malfunctions in the above systems.
- Testing systems to isolate system malfunctions and assess post-maintenance serviceability.

It is essential that system testing procedures, cleanliness requirements and safety precautions applicable to the automatic flight control system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades) is critical. Evidence of transferability of skills and knowledge related to inspection, testing and troubleshooting is essential. This is to be demonstrated through application across a range of rotary wing automatic flight control systems and components listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and include:

- Component attachment methods.
- Explaining the basic layout (block diagram level), function and operation of:
- Flight director components and interface.
- Flight control components and interface.
- Flight data recorders and interface.
- Explaining basic principles/functions relating to the above systems and associated with:
- Basic AC and DC circuit theory.
- Digital fundamentals.
- Analogue fundamentals.
- Rotary wing flight theory.
- Inner and outer loop control.
- Rotary wing flight control system (mechanical, hydraulic and electro-mechanical types, trim and stabilization).
- Flight control modes/channels.
- WHS requirements .
- System and component maintenance requirements and troubleshooting procedures.
- Relevant maintenance manuals.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Automatic flight control systems include:

- Flight director –indicators, computers, control boxes and interfaces with other systems.
- Flight controls –servo actuators (roll, pitch, yaw and trim) computers and sensors.
- Autopilot system –computers, sensors (gyros and/or accelerometers), controllers, mode selectors and system interface, control wheel steering (CWS), disconnect, go around and trim switches.

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise .

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals. It is also expected that general and special purpose tools, and test and ground support equipment would be used where appropriate.
- The application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one (1) item from each of the following groups:
- Flight director –indicators, computers, control boxes and interfaces withother systems
- Flight controls –servo actuators (roll, pitch, yaw and trim) computers and sensors.
- Autopilot system –computers, sensors (gyros and/or accelerometers), controllers, mode selectors and system interface, CWS, disconnect, go around and trim switches.
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

1. รหัสหน่วยสมรรถนะ 103411

2. ชื่อหน่วยสมรรถนะ Test and troubleshoot aircraft pulse systems and components.

3. ทบทวนครั้งที่ N/A

4. สร้างใหม่ ☑ **ปรับปรุง** ☐

5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)

7232 Aircraft engine mechanics and fitters

6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)

This unit of competency requires application of hand skills and the use of system/component knowledge and applicable maintenance publications and test equipment to test and troubleshoot pulse systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. Work may be completed individually or as part of a team.

7. สำหรับระดับคุณวุฒิ

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8. กลุ่มอาชีพ (Sector)

7232 Aircraft Mechanics

9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)

N/A

10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)

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11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103411.01 Test/adjust pulse systems.	103411.01.01 Able to use relevant maintenance documentation and modification status, including system defect reports, where relevant, to identify an unserviceability and able to prepare aircraft and system in accordance with applicable maintenance manual for the application of power/system operation. 103411.01.02 Able to functionally test pulse system in accordance with maintenance manual for evidence of serviceability or malfunction while observing all relevant work health and safety (WHS) requirements and perform system calibration or adjustments in accordance with maintenance manual, as appropriate.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

สมรรถนะย่อย (Element)	เกณฑ์ในการปฏิบัติงาน (Performance Criteria)	วิธีการประเมิน (Assessment)
103411.02 Troubleshoot pulse systems.	103411.02.01 Able to use available information from maintenance documentation and inspection and test results, where necessary, to assist in fault determination and use Maintenance manual fault diagnosis guides and logic processes to ensure efficient and accurate troubleshooting to line replaceable level. 103411.02.02 Able to obtain specialist advice, where required, to assist with the troubleshooting process and locate pulse system faults and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required.	ข้อสอบข้อเขียน การสัมภาษณ์ การสาธิตการปฏิบัติงาน

12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)

103405 Inspect aircraft electronic systems and components

101403 MInor repair for aircraft electrical components or parts

13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

14. หลักฐานที่ต้องการ (Evidence Guide)

(a) Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- Applying relevant WHS practices
- Using approved maintenance documentation and aircraft publications relating to the pulse system being maintained
- Recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses/ transmission lines) and security in:
- Radar (navigation/weather) components and interface.
- ACAS components and interface.
- Radio altitude components and interface.
- DME components and interface.
- ATC transponders.
- ADS-B.
- Doppler navigation system.
- Applying logic processes, taking and interpreting system measurements to accurately and effectively isolate malfunctions within the systems.
- Performing system testing to isolate system malfunctions and assess systems post-maintenance serviceability.

It is essential that system testing procedures, cleanliness requirements and safety precautions applicable to the pulse system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades) is critical. Evidence of transferability of skills and knowledge related to testing and troubleshooting is essential. This is to be demonstrated through application across a range of aircraft pulse systems and components listed in the Assessment Description and Procedure.

(b) Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

- component attachment methods.
- explaining the basic layout (block diagram level), function and operation of:
- Radar (navigation/weather) components and interface.
- ACAS components and interface.
- Radio altitude components and interface.
- Distance measuring equipment components and interface.
- ATC transponders.
- ADS-B .
- Doppler navigation system.
- Explaining basic principles/functions relating to the above systems and associated with:
- Basic alternating current (AC) and direct current (DC) circuit theory.
- Digital fundamentals.
- Analogue fundamentals.
- Radar fundamentals.
- Transmission lines, waveguide and antenna characteristics.
- Pulse system maintenance requirements and troubleshooting procedures.
- Relevant WHS practices, including those relating to ground functional testing of radar systems.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

15. ขอบเขต (Range Statement)

This part allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Pulse systems and components include:

- Navigation radar.
- Weather radar.
- Radio altimeter (RADALT).
- Distance measuring equipment (DME).
- Air traffic control (ATC) transponder.
- Automatic dependent surveillance-broadcast (ADS-B).
- Doppler.
- Airborne collision avoidance system (ACAS).
- Displays, indicators, control boxes, antennae, waveguides, transmitters and receivers, and line replaceable units (LRUs).

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

16. หน่วยสมรรถนะร่วม (ถ้ามี)

N/A

17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)

N/A

18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals. It is also expected that general and special purpose tools, and test and ground support equipment would be used where appropriate.
- The application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- An individual cannot be evaluated as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least three (3) of the following systems:
- Navigation radar.
- Weather radar.
- RADALT.
- DME.
- ATC transponder.
- ADS-B.
- Doppler.
- ACAS.
- And on at least one (1) item from:
- Displays, indicators, control boxes, antennae, waveguides, transmitters and receivers, and line replaceable units (LRUs).
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.