Australian Government

Department of Education, Employment and Workplace Relations

MEA353A Maintain basic light aircraft engines and propellers

Revision Number: 2

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Modification History

Minor formatting and editorial changes made. Prerequisite unit version code updated.

Unit Descriptor

This unit of competency is part of the Mechanical Certificate IV (Aircraft Maintenance Stream) training pathway. It covers the competencies required to maintain basic light fixed and rotary wing aircraft piston engines and fixed pitch propellers.

Where a CASA licensing outcome is sought this unit forms part of the CASA requirement for the granting of the applicable Aircraft Maintenance Engineer Licence under CASR Part 66, in accordance with the licensing provisions in Section 3, Assessment Guidelines.

Application of the Unit

This unit requires application of hand skills, the use of maintenance publications and knowledge of piston engine and system theory to inspect, test and troubleshoot, remove and install normally aspirated piston engines and engine system components The unit also covers the inspection, maintenance, removal and installation of fixed pitch propellers.

Applications include normally aspirated piston engines of basic light fixed wing aircraft and basic rotary wing aircraft, and fixed pitch propellers.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEA101B	Interpret occupational health and safety practices in aviation maintenance
MEA103B	Plan and organise aviation maintenance work activities
MEA105C	Apply quality standards applicable to aviation maintenance processes
MEA107B	Interpret and use aviation maintenance industry manuals and specifications
MEA108B	Complete aviation maintenance industry documentation
MEA109B	Perform basic hand skills, standard trade practices and fundamentals in aviation maintenance

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1. Inspect piston engine system and components/systems	1.1. Isolation tags already attached to the system or related systems are checked and aircraft/engine configured for safe system inspection and operation in accordance with applicable maintenance manual
	1.2. ***Piston engine and components/systems*** are visually or physically checked for external and internal signs of defects in accordance with applicable maintenance manual
2. Test piston engine	2.1. Aircraft and engine are correctly prepared in accordance with applicable maintenance manual
	2.2. Assistance is provided with ***engine and/or system operation*** during prescribed test procedures to establish serviceability and correct function in accordance with applicable maintenance manual
3. Troubleshoot piston engine	3.1. Available information from maintenance documentation and inspection and test results is used, where necessary, to assist in fault determination
	3.2. Maintenance manual fault diagnosis guide and logical processes are used to ensure efficient and accurate ***troubleshooting***
	3.3. Specialist advice is obtained, where required, to assist with the troubleshooting process
	3.4. Piston engine faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required
	3.5. Fault rectification requirements are determined to assist in planning the repair
4. Remove piston engine and engine system components	4.1. Aircraft is prepared and supported and rendered safe in accordance with the applicable maintenance manual and isolation tags are fitted, where necessary, to ensure the safety of personnel and freedom from damage during engine removal
	4.2. Removal is carried out in accordance with the applicable maintenance manual
	4.3. Engine is tagged and prepared for transport or storage in accordance with the specified procedures
	4.4. Required maintenance documentation is completed and processed in accordance with standard enterprise procedures
5. Install piston engine and engine system components	5.1. Engine to be installed is checked to confirm correct part or model numbers, modification status and serviceability
	5.2. Installation is carried out in accordance with the

	applicable maintenance manual
	5.3. Support/safety equipment is removed at the appropriate time to ensure personnel safety and freedom from structural damage
	5.4. Required maintenance documentation is completed and processed in accordance with standard enterprise procedures
6. Inspect and maintain fixed pitch propeller	6.1. Engine is rendered safe for propeller inspection in accordance with maintenance manual or enterprise procedures
	6.2. ***Fixed pitch propeller*** is inspected for security, damage and deterioration in accordance with the applicable maintenance manual
	6.3. Metal propeller nicks and dents within damage limits are blended out in accordance with maintenance manual procedures
7. Remove fixed pitch propeller	7.1. Engine is rendered safe and the aircraft is prepared for propeller removal in accordance with maintenance manual or enterprise procedures
	7.2. Propeller is removed in accordance with maintenance manual procedures
	7.3. Removed propeller is tagged and prepared for transport or storage in accordance with specified procedures
	7.4. Required maintenance documentation is completed and processed in accordance with standard enterprise procedures
8. Install fixed pitch propeller	8.1. Engine is rendered safe and the aircraft is prepared for propeller installation in accordance with maintenance manual or enterprise procedures
	8.2. Propeller to be installed is checked to confirm correct part or number, modification status and serviceability
	8.3. Installation is carried out in accordance with the applicable maintenance manual
	8.4. Required maintenance documentation is completed and processed in accordance with standard enterprise procedures

Required Skills and Knowledge

Required skills

Look for evidence that confirms skills in:

- applying relevant OHS procedures, including the use of MSDS and PPE
- using relevant maintenance documentation and aircraft manuals
- recognising external and internal signs of defects in piston engines, components and system components visual/physical inspection
- assisting with testing of piston engine and engine system operation, be able to operate systems, monitor indications, record parameters and recognise correct function
- compiling engine condition monitoring records
- rigging and adjusting engine controls and systems
- using fault diagnosis guides and equivalent data to accurately and efficiently troubleshoot the causes of unserviceabilities in piston engines and engine systems, clearly record details and identify the required rectification actions
- correctly removing and installing piston engine, engine components and fixed pitch propellers, including spinners
- inspecting propellers for security, damage and deterioration
- blending out metal propeller nicks and dents that are within maintenance manual limits

Required knowledge

Look for evidence that confirms knowledge of:

- OHS procedures associated with engine and propeller maintenance, including lifting and handling of heavy objects
- how to obtain MSDS
- use of PPE
- relevant maintenance manuals
- relevant regulatory requirements and standard procedures
- fault diagnosis techniques
- piston engine and engine system layout and operation:
  - four stroke engine theory of operation and performance
  - cylinder configurations
  - construction (components and materials)
  - carburettors and air induction systems
  - fuel injection systems
  - fuels and their characteristics
  - ignition systems
  - lubricating systems and lubricants
  - cooling systems
  - exhaust systems
  - accessory drives and mounts

    - normally aspirated piston engine maintenance requirements and troubleshooting procedures
- system component operation, including electrical and instrument system interfaces:
    - magnetos and ignition harnesses
    - spark plugs
    - fuel pumps
    - fuel filters
    - oil pumps
    - oil filters
    - oil tanks
    - vacuum pumps
    - generators
    - starter motors
    - oil pressure gauges (direct reading)
    - temperature gauges (direct reading)
    - tachometers
    - manifold pressure gauges
    - maintenance requirements and troubleshooting procedures
- removal and installation procedures for piston engines and engine components:
    - removal procedures and handling
    - control linkages
    - electrical wiring
    - engine instrument connections
    - installation and rigging
    - ground running
    - system component removal, installation and system testing
- propellers, materials and damage and deterioration criteria:
    - fixed pitch propeller types, terminology and theory:
        - tractor/pusher
        - matching to engine and aircraft
        - leading edge/trailing edge
        - blade stations
        - forces acting on a propeller
        - propeller balance
    - materials and construction methods:
        - metal propeller metals, construction and surface protection
        - wooden propeller materials, construction and surface protection
        - composite propeller materials, construction and surface protection
        - damage and deterioration
    - methods of blending out of minor damage to metal propellers

- propeller removal and installation procedures

Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	A person who demonstrates competency in this unit must be able to apply hand skills, use maintenance publications and engine and system theory knowledge to maintain fixed pitch propellers and to inspect, test, troubleshoot, remove and install piston engines and engine system components on fixed or rotary wing aircraft while applying all relevant safety precautions.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	The underlying skills inherent in this unit should be transferable across a range of inspection, testing, troubleshooting and removal and installation tasks (including the timely involvement of supervisor or other trades) associated with engines, engine systems and fixed pitch propellers. It is essential that system testing procedures take into account all safety precautions associated with piston engine system operation, and that awareness be demonstrated of dual inspection requirements associated with work on engine controls. Evidence of transferability of skills and knowledge related to inspection, testing and troubleshooting is essential. This may be demonstrated through application across a number of engine systems or types and propellers made from different materials. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice is critical. The application of testing procedures and functional rigging checks should also indicate knowledge of system operation. Engine system operation knowledge, the relationship of individual components and the links with other systems will be necessary to supplement evidence of ability to carry out rigging checks and troubleshoot the system 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. A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements of the unit of competency are being achieved under routine supervision on at least one item from each of Groups 1 to 6 listed in

	the Range Statement (Group 6 may be omitted where not applicable to the enterprise), and on at least one type of fixed pitch propeller. This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.
Context of and specific resources for assessment	Competency should be assessed in the work environment or simulated work environment using tools and equipment specified in maintenance documentation. It is also expected that general purpose tools and test equipment found in most routine situations would be used where appropriate.
Method of assessment	
Guidance information for assessment	

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Note	Range statements listed below are numbered to facilitate specification of the assessment requirements included in the Evidence Guide
Piston engines and components/systems	Piston engines and components/systems may include: 1. Normally aspirated engine (all types), main components and accessories/drives 2. Control system 3. Starter system 4. Fuel, air systems 5. Exhaust system 6. Oil system (if dry sump)
Engine and/or system operation	Engine and/or system operation: • testing of engines fitted to helicopters (where auxiliary drive is not available) may be carried out through the applicant directing a pilot qualified on type
Troubleshooting	Troubleshooting involves the use of test sets, downloaded maintenance data and fault-finding charts or similar, to line replacement level
Fixed pitch propellers	Fixed pitch propeller may include a spinner and the propeller may be made from: • metal • composite • wood
Application	Application of this unit may relate to: • scheduled or unscheduled maintenance • individual or team-related activities
Procedures and requirements	Refer to industry standard procedures specified by manufacturers, regulatory authorities or the enterprise

Unit Sector(s)

Aviation maintenance

Competency field

Co-requisite units

Not applicable