



Australian Government

MEM21009 Inspect, diagnose, adjust and repair mechanical watches

Release: 1

MEM21009 Inspect, diagnose, adjust and repair mechanical watches

Modification History

Release 1. Supersedes and is equivalent to MEM21009A Inspect, diagnose, adjust and repair mechanical watches

Application

This unit of competency defines the skills and knowledge required to inspect and evaluate the condition of mechanical watches, diagnose problems, make repairs and adjust mechanical watch movements and sub-assemblies.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: A

Unit weight: 4

Pre-requisite Unit

MEM11011	Undertake manual handling
MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information
MEM18001	Use hand tools
MEM21008	Service mechanical watches

Competency Field

Horology

Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	Determine servicing	1.1	Follow standard operating procedures (SOPs)
		1.2	Comply with work health and safety (WHS)

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
	requirements		requirements at all times
		1.3	Identify watch construction, function and characteristics
		1.4	Source manufacturer technical guidance information to determine correct tolerances and specifications
		1.5	Prepare watch for handover
		1.6	Record and document repair process
2	Inspect mechanical watches	2.1	Select and use appropriate personal protective equipment (PPE) in accordance with SOPs
		2.2	Undertake inspections of watch movements in accordance with manufacturer tolerances and procedures
		2.3	Make accurate observations of the condition and function of components and sub-assemblies
		2.4	Remove and replace components and sub-assemblies in a sequence designed to accurately assess condition and faults during the process of dismantling and assembling
		2.5	Inspect lubrication quantity and condition
3	Diagnose faults in mechanical watches	3.1	Evaluate observations and watch performance characteristics to determine appropriate repair procedure
		3.2	Analyse timekeeping performance using appropriate techniques and equipment
		3.3	Make alterations in a logical sequence to diagnose faults
4	Repair and adjust mechanical watches	4.1	Select and use appropriate hand tools
		4.2	Undertake dismantling and reassembling of watch movements according to industry standard procedures and manufacturer guidelines
		4.3	Make precise corrections to sub-assemblies

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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| | | 4.4 | Remove, dismantle, replace and reassemble sub-assemblies and components in correct order without damaging or marking |
| | | 4.5 | Select appropriate replacement components |
| 5 | Test and adjust watch function and performance | 5.1 | Verify and confirm function of watch movement and sub-assemblies |
| | | 5.2 | Verify watch performance and rate testing |
| | | 5.3 | Adjust, as required, according to manufacturer specifications |
| | | 5.4 | Repeat testing, as required, to confirm performance |
| 6 | Apply industry workshop standards to perform work | 6.1 | Use hand tools and equipment in a safe and correct manner |
| | | 6.2 | Handle components without damaging or marking |
| | | 6.3 | Establish a clean and safe work environment |

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

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

Range of Conditions

This field 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.

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Watch construction, function and characteristics include one (1) or more of the following:

- mainspring variation of motive force
- gear train freedom, including:
 - end shakes
 - side shakes
 - backlash
- escapement operation performance
- oscillator amplitude, balance spring positional changes and influences
- winding and setting mechanisms

Condition and faults include one (1) or more of the following:

- end shakes, side shakes and clearances of operating components
- oscillators balance spring condition, shock protection operation, condition and component replacement
- functioning, clearances and safety action of the escapement system
- mainspring and barrel assembly condition
- gear train (including pivot, pinions or bearings conditions - wear and corrosion)
- winding and setting components (wear and end shake freedom)
- lubrication including type, application, quantity and cleanliness

Timekeeping performance includes one (1) or more of the following:

- regulating system components adjustment
- balance spring condition, including:
 - flat
 - concentric
 - beating evenly between curb pins
- beat error diagnosis and adjustment

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Sub-assemblies and components include one (1) or more of the following:	• balance and cock assembly • escapement components • barrel and mainspring assembly • gear train • winding and setting mechanisms, including motion work and canon pinion • hand setting tension • shock-resistance system • calendar, winding system and other mechanisms • power reserve
Watch performance/rate testing includes one (1) or more of the following:	• in-beat adjustment without movable stud holder • rate adjustment • amplitude evaluation of watches performance
Hand tools and equipment include one (1) or more of the following:	• timing machine • staking set • jewel press • eyeglass, screwdrivers and tweezers • case opening and closing tools
Appropriate working environment includes the following:	• clean bench and working area • adequate lighting and ventilation • tools and equipment are organised and in good condition • ergonomic seating • ventilation

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM21009A Inspect, diagnose, adjust and repair mechanical watches

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM21009 Inspect, diagnose, adjust and repair mechanical watches

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying various mechanical watches by construction, function and characteristics
- liaising with customer, verifying condition and performance, and identifying repair costs
- inspecting mechanical watches by manipulating components and sub-assemblies and assessing condition and faults during the process of dismantling and assembling
- interpreting readings and making accurate observations to recognise faults
- determining appropriate sequence to accurately assess condition and faults during the process of dismantling and assembly
- selecting and using appropriate bench tools when repairing and adjusting mechanical watches in a clean and safe environment
- undertaking inspection and adjustment of watch mechanisms and sub-assemblies
- performing timekeeping analysis and adjustment techniques
- undertaking function and watch performance and rate tests
- recording and documenting repairs.

Knowledge Evidence

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

- safe work practices and procedures and use of personal protective equipment (PPE)
- mechanical watch faults
- sequences used to accurately assess condition and faults during the process of dismantling and assembly
- tools used to repair and adjust mechanical watches
- adjustment methods for watch mechanisms and sub-assemblies
- watch performance and rate test requirements
- repair and adjustment procedures
- repair records and documentation procedures
- function and operating principles of mechanical watches

- procedures for fault finding and inspection of watch mechanisms and sub-assemblies
- manufacturer specifications and tolerances for performance and timekeeping.

Assessment Conditions

- Assessors must:
 - have vocational competency in inspecting, diagnosing, adjusting and repairing mechanical watches at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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