



Australian Government

MEM21017 Service and repair clock timepieces

Release: 1

MEM21017 Service and repair clock timepieces

Modification History

Release 1. Supersedes and is equivalent to MEM21017A Service and repair clock timepieces

Application

This unit of competency defines the skills and knowledge required to service wall, floor or shelf clock timepieces that have a running time of eight days or thirty hours.

Where the clock is to be installed at the client's premises after service and repair unit MEM21016 Install and set up clocks should also be selected.

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

Band: A

Unit weight: 6

Pre-requisite Unit

MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information

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 requirements and liaise with customer	1.1	Follow standard operating procedures (SOPs)
		1.2	Comply with work health and safety (WHS) requirements at all times
		1.3	Identify clock origin and case and movement construction and function
		1.4	Verify clock condition and performance concerns with customer

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
	1.5 Prepare written and verbal quotations 1.6 Agree with customer on recommended service procedures 1.7 Prepare clock for handover 1.8 Record and document repair process 1.9 Source replacement parts from industry suppliers
2 Disassemble clock, case and movement components for servicing	2.1 Establish an appropriate clean and safe work environment 2.2 Select and use appropriate personal protective equipment (PPE) in accordance with SOPs 2.3 Handle components without damaging or marking 2.4 Remove clock movements in sequence considering case design and construction 2.5 Select and use appropriate hand and bench tools 2.6 Verify condition and completeness of clock case 2.7 Perform power release in a safe manner 2.8 Dismantle clock movement in correct sequence
3 Service and repair movement, sub-assemblies and components	3.1 Inspect movement, sub-assemblies and components, and identify condition and faults 3.2 Confirm servicing and repair requirements 3.3 Replace or repair faulty or worn component parts, movement or sub-assemblies 3.4 Use appropriate hand tools and equipment for servicing and repair 3.5 Clean clock components at appropriate stages using cleaning and finishing methods

Elements describe the essential outcomes.

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

		3.6	Verify condition of components after cleaning
4	Service clock cases	4.1	Verify completeness of clock case
		4.2	Repair and replace missing or damaged components
		4.3	Clean internals and refinish/refurbish exterior with appropriate materials and techniques
5	Reassemble clock movement and case components	5.1	Reassemble clock movement and case components
		5.2	Assemble motion work and verify and adjust hand setting tension
		5.3	Check and adjust component operations and clock functioning
		5.4	Select and apply lubricants according to component design and estimated frictional load
		5.5	Apply clock assembly inspections and precautions
		5.6	Install and secure movement in case
6	Bench test and adjust clock functions	6.1	Verify function of clock movement
		6.2	Set up, operate mechanical clock timing machine and interpret readings
		6.3	Verify clock performance and rate testing
		6.4	Adjust rate according to performance and design characteristics

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.

Clock origin, case and movement construction and function includes one (1) or more of the following:

- clocks from all countries of manufacture
- clocks manufactured during the 19th and 20th Centuries
- clock cases made from timber, metal, natural stone and composite materials
- movement components made from brass and steel
- pendulum or balance oscillating systems
- timepiece only mechanisms
- motive force (mainspring or weight driven)
- gear train for transmitting of power
- escapement for release power
- oscillator for controlling the speed of release of power
- winding (by key)
- time setting (by key or direct movement of hands)

Clock handover includes the following:

- informing customer of features and characteristics of clock
- demonstrating winding and setting procedures for clock
- inform customer of operation and switching of any automatic night silent, or shut-off for chiming or striking mechanism
- warranty information
- date of installation

Record and document repair process includes one (1) or more of the following:

- extent and date of repair recorded
- tracking of subcontractors
- cost of replacement parts
- time spent on procedure

Appropriate working environment includes the following:

- clean bench and working area
- adequate lighting and ventilation
- tools and equipment organised and in good condition
- ergonomic seating, including bench height

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

- originality of components
- corrosion
- cleanliness
- wear
- damaged or failed components

Faulty or worn components include one (1) or more of the following:

- barrel and mainspring:
 - hooking
 - teeth
 - bearings
- gear trains:
 - bearings
 - pivots
 - pinions
- pendulum escapements:
 - pallets and escape wheels engagement drop
 - locking and impulse
- oscillators pendulum type:
 - rod
 - crutch engagement
 - suspension spring fittings
 - bob security
- oscillators balance type:
 - balance spring
 - balance staff
 - roller
- winding mechanisms:
 - key fitting
 - click
 - ratchet wheel
 - click spring
- setting hand tension or centre wheel friction

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.

Hand tools and equipment include one (1) or more of the following:

- clock repairers' hand tools:
 - tweezers
 - screwdrivers
 - eyeglasses
- clock mainspring winder
- clock re-bushing tool
- reamers and smoothing broaches
- lathe
- oilstones and burnishers
- movement supports for clock movements
- oilers and oil pots
- cleaning brushes, peg wood, solutions, rinses and solvents
- clock timing machine (this includes any type of machine that provides frequency count or indication of daily rate)

Verify and adjust hand setting tension includes one (1) or more of the following:

- test for correct friction (power to escape wheel)
- adjustment of motion work friction

Select and apply lubricants include one (1) or more of the following:

- correct lubricants for escapements, bearings, barrels and mainsprings
- techniques for lubricating

Clock assembly inspections and precautions include one (1) or more of the following:

- gear train end shake, backlash, lubrication
- mainspring engagement, hooking, tension, lubrication
- escapement operation, depthing, lubrication
- pendulum oscillator (amplitude, crutch engagement or suspension function)
- balance oscillators (end shake or balance spring condition, correct lubrication)

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.

Performance and design characteristics include one (1) or more of the following:

- source of motive force
- escapement type
- oscillator and pendulum construction

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM21017A Service and repair clock timepieces

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 MEM21017 Service and repair clock timepieces

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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 and safe work practices
- identifying clock origin, case and movement
- liaising with customer and verifying condition and performance
- identifying repair costs and preparing written quotation
- dismantling and reassembling clock movement and components in an appropriate work environment
- identifying and rectifying wear and faults in escapement, bearings, arbors, wheels and pinions
- safely handling of clock mainsprings, including using mainspring handling equipment
- using appropriate hand tools and equipment for servicing and repairs
- safely cleaning clock components using appropriate methods and media
- selecting and applying correct lubricants for escapements, bearings, barrels and mainsprings and using appropriate lubrication techniques
- performing function and performance testing
- recording and documenting repairs.

Knowledge 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 and safe work practices
- identifying clock origin, case and movement
- liaising with customer and verifying condition and performance
- identifying repair costs and preparing written quotation
- dismantling and reassembling clock movement and components in an appropriate work environment
- identifying and rectifying wear and faults in escapement, bearings, arbors, wheels and pinions
- safely handling of clock mainsprings, including using mainspring handling equipment
- using appropriate hand tools and equipment for servicing and repairs

- safely cleaning clock components using appropriate methods and media
- selecting and applying correct lubricants for escapements, bearings, barrels and mainsprings and using appropriate lubrication techniques
- performing function and performance testing
- recording and documenting repairs.

Assessment Conditions

- Assessors must:
 - have vocational competency in servicing and repairing clock timepieces 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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