



**Australian Government**

# **MEM21015 Perform precision watch timing and adjustment**

**Release: 1**

# MEM21015 Perform precision watch timing and adjustment

## Modification History

Release 1. Supersedes and is equivalent to MEM21015A Perform precision watch timing and adjustment

## Application

This unit of competency defines the skills and knowledge required to make fine adjustments to high-grade mechanical watches in order to achieve precision timing (chronometer performance).

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

Band: A

Unit weight: 6

## 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                                   |
| MEM21009 | Inspect, diagnose, adjust and repair mechanical watches      |
| MEM21012 | Service and repair watch oscillating systems                 |
| MEM21013 | Service, test and adjust watch escapements                   |

## Competency Field

Horology

## Elements and Performance Criteria

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

| Elements describe the essential outcomes.                                     | Performance criteria describe the performance needed to demonstrate achievement of the element.  |
|---|--|
| <p>1     <b>Determine servicing requirements and liaise with customer</b></p> | <p>1.1    Follow standard operating procedures (SOPs)</p> <p>1.2    Comply with work health and safety (WHS) requirements at all times</p> <p>1.3    Identify high-grade mechanical watch characteristics</p> <p>1.4    Prepare written quotation and inform customer of watch condition and performance concerns, outlining recommended service procedures to be undertaken to remedy identified faults and accuracy of timekeeping</p> <p>1.5    Verify and agree on servicing requirements with customer</p> <p>1.6    Prepare watch for handover</p> <p>1.7    Record and document repair process</p>  |
| <p>2     <b>Analyse watch performance</b></p>                                 | <p>2.1    Establish an appropriate clean and safe work environment</p> <p>2.2    Select and use appropriate personal protective equipment (PPE) in accordance with SOPs</p> <p>2.3    Use hand tools and equipment in safe and correct manner</p> <p>2.4    Handle components without damaging or marking</p> <p>2.5    Assess condition and ability of watch to achieve chronometer performance</p> <p>2.6    Conduct performance analysis of mechanical watch</p> <p>2.7    Adapt servicing techniques to meet manufacturer performance specifications (chronometer certified rating)</p> <p>2.8    Assess oscillator and balance spring condition</p> <p>2.9    Analyse positional errors in mechanical watch</p> |
| <p>3     <b>Adjust</b></p>  | <p>3.1    Adjust mechanical watch to minimise positional errors</p>  |

Elements describe the essential outcomes.

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

|                                     |   |  |
|-------------------------------------|---|--|
| <b>mechanical watch performance</b> | 3.2   | Adjust mechanical watch to minimise variations in balance amplitude/performance/rate           |
|                                     | 3.3   | Adjust oscillator and balance spring to minimise positional errors and perform dynamic poising |
|                                     | 3.4   | Repeat and confirm all adjustments   |
| 4                                   | <b>Test mechanical watch function and performance</b> | 4.1  |
|                                     |   | Verify instantaneous watch performance and rate testing  |
|                                     | 4.2   | Perform longitudinal testing to confirm watch performance                                      |
|                                     | 4.3   | Determine intermittent timing faults and adjustments   |

## 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.

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.

**High-grade mechanical watch characteristics include one (1) or more of the following:**

- finish of components:
  - bevelling
  - graining
  - level of polish
- type of materials used for movement and case construction:
  - non-magnetic alloys
  - precious metals
- quality of components used:
  - balance spring
  - escapement
  - balance wheel
- certification chronometer
- brand name
- number of jewels

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

- date and extent of repair
- cost of replacement part
- time spent on procedure

**Performance analysis includes one (1) or more of the following:**

- watch subjected to various testing positions:
  - dial up
  - dial down
  - crown up
  - crown down
  - crown right
  - left
- states of winding:
  - partly wound
  - half wound
  - fully wound
- temperature variation
- factors affecting isochronism (equal time of vibration)

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.

**Oscillator and balance spring condition includes one (1) or more of the following:**

- static poise of balance wheel:
  - balance spring condition
  - concentric
  - flatness
  - beating evenly between curb pins

**Dynamic poising includes one (1) or more of the following:**

- set up and determine out-of-poise/balance wheel using a timing machine
- identify and locate point of adjustment
- methods of adjustment (with cutters or milling tools)

**Confirm all adjustments includes the following:**

- ensuring required accuracy is obtained and timekeeping is in accordance with manufacturer specifications

**Watch performance and rate testing includes one (1) or more of the following:**

- in-beat
- rate adjustment
- amplitude
- effect or influence of escapement
- temperature
- effect of positional errors
- effect of balance wheel poise
- effect of balance spring
- states of winding

**Longitudinal testing includes the following:**

- testing over extended time period by wearing or simulator machine

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

- mechanical watch timing machine
- poising tools
- balance wheel cutters
- case opening and closing tools

**Working environment includes the following:**

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

## Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM21015A Perform precision watch timing and adjustment

## Links

Companion Volume implementation guides are found in VETNet -

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