



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **MEM19022B Perform precision micro-mechanism diagnosis and servicing**

**Release: 1**

## MEM19022B Perform precision micro-mechanism diagnosis and servicing

### Modification History

Not Applicable

### Unit Descriptor

|                        |                                                                                                                                                                          |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit descriptor</b> | This unit covers diagnosing and servicing precision micro-mechanisms including chronometer watch and clock components to achieve performance to original specifications. |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Application of the Unit

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Application of the unit</b> | <p>This unit covers the competencies required to diagnose and service precision micro-mechanisms including chronometer watch and clock components to achieve performance to original specifications.</p> <p>Work is undertaken autonomously or within a team environment using predetermined standards of quality, safety, workplace procedures and accepted workplace techniques/methods.</p> <p>The unit includes precision adjustment and testing to achieve timekeeping and water resistance of completed timepieces to minimise error in performance within specification/tolerance.</p> <p>If manufacturing of parts is required, the appropriate machining units should also be selected.</p> <p><b>Band: A</b></p> <p><b>Unit Weight: 6</b></p> |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Licensing/Regulatory Information

Not Applicable

## Pre-Requisites

| Prerequisite units |           |                                                        |
|--------------------|-----------|--------------------------------------------------------|
| Path 1             | MEM07005C | Perform general machining                              |
|                    | MEM09002B | Interpret technical drawing                            |
|                    | MEM12003B | Perform precision mechanical measurement               |
|                    | MEM12023A | Perform engineering measurements                       |
|                    | MEM18001C | Use hand tools                                         |
|                    | MEM18002B | Use power tools/hand held operations                   |
|                    | MEM18003C | Use tools for precision work                           |
|                    | MEM18055B | Dismantle, replace and assemble engineering components |
|                    | MEM19020B | Fault-find and maintain micro-mechanisms               |
|                    | MEM19021B | Diagnose and service micro-mechanisms                  |

## Employability Skills Information

|                             |                                          |
|-----------------------------|------------------------------------------|
| <b>Employability skills</b> | 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

| ELEMENT                                          | PERFORMANCE CRITERIA                                                                                                                                                                                                         |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Adjust timing of precision micro-mechanisms   | 1.1.Data for precision timing of micro-mechanisms is analysed and interpreted.<br>1.2.Compensation/adjustment is made to achieve a constant rate.                                                                            |
| 2. Diagnose precision micro-mechanisms           | 2.1.Detailed inspection techniques are applied to diagnose and identify performance faults, condition and repair/servicing requirements.<br>2.2.High tolerance/precision tools and equipment are handled and used correctly. |
| 3. Carry out precision micro-mechanism servicing | 3.1.Precision components are replaced as appropriate.<br>3.2.Components are adjusted to precision tolerances and specifications.                                                                                             |
| 4. Repair and adjust chronograph mechanisms      | 4.1.Functional elements are adjusted and tested.<br>4.2.Chronograph components are examined and re-finished as required.                                                                                                     |

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

#### Required skills

Look for evidence that confirms skills in:

- eliminating/minimising effects of internal external/external influences
- judging adequacy of accuracy
- making timing adjustments include balance spring, dynamic poising, static poising, truing balance (flat and round)
- making detailed observations using high-magnification optics
- testing functioning of components to high tolerances including the functioning of escapement and oscillating system
- removing and replacing assembly and subassembly components including balance staff, pallet staff, pallet jewels and other precision components
- adjusting pallet jewels, safety action of escapement, poise of balance, manipulation of balance spring to minimise error in performance
- tensioning chronograph wheel and minute wheel
- observing and adjusting depth of engagement and operating sequence of

**REQUIRED SKILLS AND KNOWLEDGE**

- functioning elements
- applying lubrication
- alignment of hands with dial
- re-finishing and matching components to existing components to ensure correct functioning
- fitting and adjusting new and repaired components to function within existing system

**Required knowledge**

Look for evidence that confirms knowledge of:

- physical limitations and condition of system and control factors influencing isochronism
- inherent influences in design, internal and external influences on rating variation
- adjustment procedures/techniques
- detailed inspection and analysis techniques for diagnosing precision micro-mechanisms
- acceptable tolerances, clearances and limits for precision components
- components suitable for precision outcomes
- effects of adjustment on performance and operation
- criteria for correct adjustment of balance spring and regulating system
- types of chronograph mechanisms and their functioning
- adjustment procedures for chronograph operation, including minute and hour recording systems

## Evidence Guide

### 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 perform precision micro-mechanism diagnosis and servicing. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

#### Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

#### Context of and specific resources for assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with preparing precision micro-mechanism diagnosis and servicing or other units requiring the exercise of the skills and knowledge covered by this unit.

#### Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning should not require language, literacy and numeracy skills beyond those required in this unit. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

**EVIDENCE GUIDE****Guidance information for assessment****Range Statement****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.

**Micro-mechanisms**

Mechanical and electric precision watches and clocks of recent manufacture, or restoration pieces. Includes chronometer timepieces. May include day/date, automatic winding or generating systems. Clock mechanisms may include alarm, striking and chiming mechanisms

**Repair/servicing requirements**

- Repairs and timing adjustments include balance spring, dynamic poising, static poising, truing balance (flat and round)
- Repair and adjustment of chronograph mechanisms to ensure correct operation of seconds, minute and hour recording systems

**Tools and equipment**

Range of precision mechanical/electronic tools and high-tolerance testing equipment for detailed observation diagnosis and servicing. Includes specialist service tools for adjusting oscillating systems and chronograph mechanisms

**Precision components**

- Timekeeping elements, including balance staff, pallet staff, pallet jewels, wheel trains and other precision components
- Power source, mechanical oscillating systems, motion work, calendar systems

**Specifications**

- Precision adjustment performed to detailed manufacturer specifications and tolerances
- Account made of inherent influences in design, internal and external influences on

| <b>RANGE STATEMENT</b> |                                                                                                                                                                                              |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | rating variation                                                                                                                                                                             |
| <b>Tests</b>           | <ul style="list-style-type: none"> <li>• Observations of high-tolerance clearances, fits and adjustments and functioning</li> <li>• Operation of systems and performance analysis</li> </ul> |

## Unit Sector(s)

|                    |  |
|--------------------|--|
| <b>Unit sector</b> |  |
|--------------------|--|

## Co-requisite units

|                           |  |  |
|---------------------------|--|--|
| <b>Co-requisite units</b> |  |  |
|                           |  |  |
|                           |  |  |

## Competency field

|                         |                           |
|-------------------------|---------------------------|
| <b>Competency field</b> | Jewellery and horological |
|-------------------------|---------------------------|