



Australian Government

Department of Education, Employment and Workplace Relations

MEM21009A Inspect, diagnose, adjust and repair mechanical watches

Release: 1

MEM21009A Inspect, diagnose, adjust and repair mechanical watches

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency covers repair techniques for inspecting and evaluating the condition of mechanical watches, diagnosing problems, making repairs and adjusting mechanical watch movements and sub-assemblies. It builds on skills and knowledge required to service mechanical watches.
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Application of the Unit

Application of the unit	This unit applies to fault-finding and repair work undertaken by a watch repair tradesperson on mechanical watches. Work would normally be undertaken in watch service and repair centres and jewellery stores where watch service and repair is offered. Band: A Unit weight: 4 points
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
	MEM18001C	Use hand tools
	MEM21008A	Service mechanical watches

Employability Skills Information

Employability skills	This unit contains employability skills.
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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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Establish servicing requirements	1.1. Identify watch construction, function and characteristics 1.2. Source manufacturer technical guidance information to determine correct tolerances and specifications 1.3. Prepare watch for handover 1.4. Record and document repair process
2. Inspect mechanical watches	2.1. Undertake inspections of watch movements in accordance with manufacturer tolerances and procedures 2.2. Make accurate observations of the condition and function of components and sub-assemblies 2.3. Remove and replace components and sub-assemblies in a sequence designed to accurately assess condition and faults during the process of dismantling and assembling 2.4. 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 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

ELEMENT	PERFORMANCE CRITERIA
6. Apply industry workshop standards to perform work	6.1. Use hand tools and equipment safely and correctly 6.2. Handle components without damaging or marking 6.3. Establish a clean and safe work environment

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills include:

- good manual dexterity
- assembling and dismantling in accordance with procedures and manufacturer guidelines of mechanical watches including movements
- undertaking inspection and adjustment of watch mechanisms and sub-assemblies, including:
 - escapement end shake and freedom checks
 - observation of gear train backlash
 - wear checks
- performing timekeeping analysis and adjustment techniques

Required knowledge

Required knowledge includes:

- function and operating principles of mechanical watches:
 - mainspring
 - gear train
 - escapement
 - oscillator
 - winding and setting mechanisms
- procedures for fault-finding and inspection of watch mechanisms and sub-assemblies
- manufacturer specifications and tolerances for performance and timekeeping

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 inspect and evaluate the condition and performance of mechanical watches, diagnose faults and make repairs and adjustments to industry standards, manufacturer specifications and in accordance with safety regulations and procedures.

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

Assessors must be satisfied that the candidate can competently and consistently:

- apply dextrous hand skills to manipulate components and sub-assemblies
- select and use appropriate bench tools when adjusting
- interpret readings and make accurate observations to recognise faults
- determine appropriate sequence to accurately assess condition and faults during the process of dismantling and assembly.

Context of and specific resources for assessment

- Assessment may occur on the job or in a simulated working environment. Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and information on workplace practices and OHS practices.
- Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.
- Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

Method of assessment

- Assessment must satisfy the endorsed Assessment Guidelines of the MEM05 Metal and Engineering Training Package.
- Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge.
- Assessment methods must be by direct observation of

EVIDENCE GUIDE	
	tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application. • Assessment may be applied under project-related conditions (real or simulated) and require evidence of process. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. • Assessment may be in conjunction with assessment of other units of competency where required.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

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.	
Watch construction, function and characteristics	Watch construction, function and characteristics may include: • mainspring variation of motive force • gear train freedom (e.g. end shakes, side shakes and backlash) • escapement operation performance • oscillator amplitude, balance spring positional changes and influences • winding and setting mechanisms
Condition and faults	Condition and faults may include: • end shakes, side shakes and clearances of operating components • oscillators balance spring condition, shock

RANGE STATEMENT	
	protection operation, condition and component replacement • functioning, clearances and safety action of the escapement system • mainspring and barrel assembly condition • gear train (e.g. pivot, pinions and bearings conditions - wear and corrosion) • winding and setting components (e.g. wear and end shake freedom) • lubrication including type, application, quantity and cleanliness
Timekeeping performance	Timekeeping performance may include: • regulating system components adjustment • balance spring condition (e.g. flat, concentric, beating evenly between curb pins) • beat error diagnosis and adjustment
Sub-assemblies and components	Sub-assemblies and components may include: • balance and cock assembly (e.g. shock spring replacement) • escapement components (e.g. pallet and escape wheel) • barrel and mainspring assembly (e.g. barrel arbor, barrel wall hooking device) • gear train (e.g. observe backlash) • winding and setting mechanisms, including motion work and canon pinion • hand setting tension (e.g. cannon pinions and friction wheel) • shock-resistance system • calendar, winding system and other mechanisms • power reserve
Watch performance/rate testing	Watch performance and rate testing may include: • in-beat adjustment without movable stud holder • rate adjustment • amplitude evaluation of watches performance
Hand tools and equipment	Hand tools and equipment may include: • timing machine

RANGE STATEMENT	
	• staking set • jewel press • eyeglass, screwdrivers and tweezers • case opening and closing tools
Clean and safe work environment	Clean and safe work environment may be specified through: • relevant legislation and regulations • enterprise operating procedures • 5S housekeeping related principles and procedures (e.g. sort, straighten, shine, standardise, sustain)

Unit Sector(s)

Unit sector	Horology
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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