



Australian Government

Department of Education, Employment and Workplace Relations

MEM21020A Service and repair clock chiming mechanisms

Release: 1

MEM21020A Service and repair clock chiming mechanisms

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency covers servicing of mechanical floor, wall and shelf clocks which are fitted with chiming mechanisms.
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Application of the Unit

Application of the unit	<p>This unit of competency applies to servicing and repair work on mechanical clock chiming mechanisms undertaken in clock service and repair workshops.</p> <p>This unit has been developed for watch and clock service and repair apprenticeship training and the recognition of trade-level skills in watch and clock servicing and repair.</p> <p>Band: A</p> <p>Unit weight: 6 points</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
	MEM21019A	Service and repair clock striking mechanisms
	MEM21017A	Service and repair clock timepieces

Prerequisite units		

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 and liaise with customer	1.1. Identify functions and types of chiming system 1.2. Verify clock condition and performance concerns with customer 1.3. Prepare written and verbal quotations 1.4. Agree with customer on recommended service procedures 1.5. Prepare clock for handover 1.6. Record and document repair process 1.7. Source replacement parts from industry suppliers
2. Service and repair chiming mechanisms	2.1. Remove and replace movement considering case design and chiming system employed 2.2. Confirm design and operation of the chime corrector mechanism 2.3. Determine service procedure for particular movement design 2.4. Inspect condition of chime release, activation and sound generation, and identify wear and faults 2.5. Dismantle and clean chiming components 2.6. Verify orientation of gear trains, strike and chime detents 2.7. Confirm servicing and repair requirements 2.8. Repair and rectify faults in chiming components 2.9. Reassemble chiming mechanism and verify correct setup, operation and performance 2.10. Select and apply lubricants to chime components
3. Bench test and adjust chime functions	3.1. Verify and confirm function of chiming mechanism 3.2. Verify clock operation over 24 hour period 3.3. Determine and rectify faults in chiming mechanism
4. Apply industry workshop standards to perform work	4.1. Use hand and bench tools and equipment safely and correctly 4.2. Establish appropriate working environment 4.3. Handle components without damaging or marking 4.4. 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:

- identifying country of origin with respect to count wheel or locking plate chiming mechanism
- identifying various mechanical clocks by chiming features
- dismantling and reassembling chiming clock assemblies and movements
- identifying and rectifying wear and faults in chiming systems
- setting up chiming mechanisms for correct warning and chime corrector operation
- setting up and synchronising chime tunes for correct resonant sound generation
- lubrication including selecting and applying correct amount, type, cleanliness and point of application

Required knowledge

Required knowledge includes:

- types of clock chiming systems and chime correcting mechanisms
- differences between designs from various manufacturers
- application of gong rod, bells and hammers to achieve correct resonant sound generation
- dismantling and reassembling techniques for chiming mechanisms
- correct amount of warning and chime corrector operation
- fault-finding techniques for ensuring chime does not impact on clock operation
- occupational health and safety (OHS) regulations and procedures

Evidence Guide

EVIDENCE GUIDE	
<p>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.</p>	
<p>Overview of assessment</p>	<p>A person who demonstrates competency in this unit must be able to service mechanical chiming clocks to industry standards, manufacturer specifications and in accordance with safety regulations and procedures.</p>
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>Assessors must be satisfied that the candidate can competently and consistently:</p> <ul style="list-style-type: none"> • dismantle and reassemble clocks with chiming mechanisms • fault-find clocks with chiming mechanisms • repair/replace worn or damaged components • perform correct set-up, operation and performance testing on chiming clocks • adjust chiming clock mechanisms for correct operation/synchronisation with hands and sound generation/tonality • apply lubrication techniques (e.g. correct type and amount) • diagnose faults relating to chime mechanisms • verify operation of chime correctors.
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • 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.
<p>Method of assessment</p>	<ul style="list-style-type: none"> • 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

EVIDENCE GUIDE	
	<p>workplace relevant contexts) together with application of underpinning knowledge.</p> <ul style="list-style-type: none"> • Assessment methods must be by direct observation of 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	
<p>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.</p>	
Functions and types of chiming system	<p>Functions and types of chiming system may include:</p> <ul style="list-style-type: none"> • chiming clocks of various movement design (e.g. count wheel or locking plate, rack or combinations of control systems) • long case and mantle clocks • motive force (e.g. mainsprings or weights) • gear trains (e.g. components of each train) • chime release mechanism (e.g. control functions - chime and strike) • chime and strike fans (e.g. control speed of

RANGE STATEMENT	
	<p>trains)</p> <ul style="list-style-type: none"> • hand setting and synchronisation with chimes and strike • winding systems in chiming clocks • night shut-off switch types • chime correcting mechanisms • types of chimes by hammers and sequences for tunes (e.g. 4 or 8 hammer) • tunes played (e.g. Westminster, St. Michaels and Whittington) • chiming media (e.g. gongs, tubes and bells)
Record and document repair process	<p>Record and document repair process may include:</p> <ul style="list-style-type: none"> • date and extent of repair • cost of replacement parts • time spent on procedure
Design and operation of chiming corrector mechanism	<p>Design and operation of chiming corrector mechanism may include:</p> <ul style="list-style-type: none"> • double detent • spring loaded catch • rocking locking plate • bell crank • pivoted detent
Inspect condition	<p>Inspect condition may include:</p> <ul style="list-style-type: none"> • originality of components • corrosion • cleanliness • wear • hand setting tension • function and safety of winding mechanism • gear train end shake/backlash/lubrication • mainspring engagement/hooks/tension/lubrication • adjustment of chime and striking functions • verification of chime corrector functions • synchronised chime release with operations of hands at the four quarters • amount of warning for chime train • strike release mechanism operation • sound of chimes and strike monitored

RANGE STATEMENT	
	<ul style="list-style-type: none"> • gong rods, bells, tubes alignment and security including attachment to case • hammer head inserts (e.g. condition - worn or aged)
Chime components	<p>Chime components may include:</p> <ul style="list-style-type: none"> • four quarter cam • lifter • chime flirt or detents • strike flirt or detent • chime locking plate • chime corrector • chime gear train (e.g. warning wheel) • ratio wheel (e.g. transmission) • chime pin barrel • gong rods, bells and tubes • hammers
Faults in chime components	<p>Faults in chime components may include:</p> <ul style="list-style-type: none"> • mounting security (e.g. gong rods, bells and tubes) • warning and locking pin security and detent mountings • hammer condition • worn arbors and bearings • broken or worn chime components
Correct set-up	<p>Correct set-up may include:</p> <ul style="list-style-type: none"> • synchronised chime release with hands • amount of warning • chime corrector operation • correct tune sequence • sounds of chime
Hand tools and equipment	<p>Hand tools and equipment may include:</p> <ul style="list-style-type: none"> • clock repairers' hand tools (e.g. tweezers, screwdrivers and eyeglasses) • universal shifter, sockets and spanners • pliers, end cutters, files and levers • movement holders, stands and wall brackets • stakes for supporting removal/replacement of components (e.g. gathering pallet, cannon

RANGE STATEMENT	
	pinions and chime locking plate) <ul style="list-style-type: none"> • lathe for pivot and arbor repairs and finishing • clock bushing tool and replacement bushes • lubrication (e.g. oiler, oil pots and greases) • hand cleaning (e.g. pith, peg wood and rodico solvents jar)
Appropriate working environment	Appropriate working environment may include: <ul style="list-style-type: none"> • clean bench and working area • adequate lighting and ventilation • tools and equipment organised and in good condition • ergonomic seating, including bench height
Clean and safe work environment	Clean and safe work environment may be specified through: <ul style="list-style-type: none"> • 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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