



Australian Government

Department of Education, Employment and Workplace Relations

MEM18031B Diagnose and rectify low voltage starting systems

Release: 1

MEM18031B Diagnose and rectify low voltage starting systems

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers assessing starting motor operation, and testing and repairing starting motors.
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Application of the Unit

Application of the unit	This unit covers engine electrical starting systems and would require extensive use of AVR test equipment. If soldering of wires is required, see Unit MEM05001B (Perform manual soldering/desoldering - electrical/electronic components). Band: A Unit Weight: 2
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM09002B	Interpret technical drawing
	MEM12023A	Perform engineering measurements
	MEM18001C	Use hand tools
	MEM18002B	Use power tools/hand held

Prerequisite units		
		operations
	MEM18055B	Dismantle, replace and assemble engineering components
	MEM18030B	Diagnose and repair low voltage electrical systems

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. Assess starting motor operation	1.1. Magnetism, induced voltage and electromagnetism and electric motor principles are understood. 1.2. Starting motor component functions and multi-pole/winding/shunt wiring arrangements are understood. 1.3. Cranking motor drive mechanism is correctly performance tested. 1.4. Starter locked armature current, voltage and torque are correctly determined.
2. Test and rectify starting motors	2.1. Starting motors are dismantled and assembled according to manufacturers' recommendations. 2.2. Testing is performed to determine shorts to ground, turn shorts, winding continuity, etc. 2.3. Solenoid, relays and over-temperature devices are correctly tested. 2.4. Starter engagement mechanism is tested and adjusted where possible i.e.: pinion clearance. 2.5. Starting system is free of excessive voltage drops. 2.6. Starting and charging circuit connections are correctly made, tightened and insulated. 2.7. Starter locked armature current, voltage and torque are correctly determined.

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: • reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • planning and sequencing operations • checking task-related information • identifying the construction of electric motors

REQUIRED SKILLS AND KNOWLEDGE

- testing the cranking motor drive mechanism
- using appropriate tools, techniques and equipment to dismantle and assemble given starting motors in accordance with manufacturers' recommendations/procedures
- checking given starting motors for electrical faults
- testing the solenoids, relays and over-temperature devices for given starting motors, for conformance to specification
- checking operation and conformance of the engagement mechanism for given starting motors
- checking the starting system of given starting motors for excessive voltage drops
- checking conformance of all circuit connections to specifications for given starting motors
- testing the repaired/overhauled starting motor to ensure that the locked armature current, voltage and torque conform to specifications

Required knowledge

Look for evidence that confirms knowledge of:

- the concepts of magnetism, electromagnetism and induced voltage
- the principles of operation of electric motors
- the components and functions of common starting motors
- the effect of multi-pole/winding/ shunt wiring arrangements on starting motor performance
- the tests and test procedures that can be used to check the performance of the cranking motor drive mechanism
- the hazards and control measures associated with testing the performance of cranking motor drive mechanisms, including housekeeping
- the concept of 'locked armature' in terms of current, voltage and torque
- the starter locked armature specifications
- the procedures, tools and equipment for determining locked armature current, voltage and torque
- the manufacturers' recommended dismantling/assembling procedures, tools and equipment for given starting motors
- the range of electrical tests that can be applied to starting motors and the purpose of these tests
- the equipment and procedures required to carry out the tests
- the function of solenoids, relays and over-temperature devices
- the procedures for testing solenoids, relays and over-temperature devices for correct operation
- the operational specifications of the solenoids, relays and over-temperature devices
- the procedures for testing and adjusting starter engagement mechanisms
- the specifications of the starter engagement mechanism
- the effect and causes of voltage drops on starting system operation/performance

REQUIRED SKILLS AND KNOWLEDGE

- the procedures for checking starting systems for excessive voltage drops
- the effect of loose, poorly joined and/or inappropriate insulation on starting motor performance/operation
- the specifications of all circuit connections
- safe work practices and procedures

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 test and rectify low voltage starting systems. 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 testing and rectifying low voltage starting systems 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 techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. 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.

Starting motor

Axial and coaxial type starters with drive arrangements such as Dyer, Positork, Sprag clutch, overrunning clutch and inertia drive

Unit Sector(s)**Unit sector****Co-requisite units****Co-requisite units**

Competency field

Competency field	Maintenance and diagnostics
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