

Title	Demonstrate knowledge of heavy duty starter motor operation		
Level	4	Credits	4

Purpose	People credited with this unit standard are able to demonstrate knowledge of: axial and co-axial-type starter motors; sliding gear-type starter motors; and reduction-type heavy duty starter motors.
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Classification	Motor Industry > Automotive Electrical and Electronics
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Available grade	Achieved
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Guidance Information

Definitions

Heavy duty starter motor refers to starter motors used in heavy equipment, vehicles and machines.

Service information may include but is not limited to – technical information of a vehicle, machine, or product detailing operation; installation and servicing procedures; manufacturer instructions and specifications; technical terms and descriptions; and detailed illustrations. This can be accessed in hard copy or electronic format and is normally sourced from the manufacturer.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of axial and co-axial-type starter motors.

Performance criteria

- 1.1 Construction of axial and co-axial-type starter motors is described in accordance with service information.
- Range armature assembly, pinion drive assembly, commutator end frame, field yoke assembly, drive end frame.
- 1.2 Circuit layout for a starting system using axial-type starter motors is described, and the function of each main part defined, in accordance with service information.

- 1.3 Circuit diagrams for starter motor operation are plotted to show current flow and armature movement.
- Range starter switch is in the first stage position when pinion meshes with ring gear, in second stage position when engine is cranked.
- 1.4 Axial drive operation is explained in terms of delivering torque to the engine flywheel.
- Range axial movement; activation of auxiliary, holding, and main windings; clutch operation; de-meshing.

Outcome 2

Demonstrate knowledge of sliding gear-type starter motors.

Performance criteria

- 2.1 Construction of a sliding gear-type starter motor is described in accordance with service information.
- Range armature assembly, pinion drive assembly, commutator end frame, field yoke assembly, drive end frame, solenoid.
- 2.2 Circuit layout for a starting system using sliding gear-type starter motors is described, and the function of each main part defined, in accordance with service information.
- 2.3 Circuit diagrams for starter motor operation are plotted to show current flow and pinion movement.
- Range first switching stage, when starter pinion meshes with ring gear, second switching stage, switch off process.
- 2.4 Sliding gear operation is explained in terms of delivering torque to the engine flywheel.
- Range movement of pinion, clutch disc assembly operation, de-meshing, braking.
- 2.5 Starter motors operating in parallel are described in accordance with service information.
- Range double starting relay operation, starting process.

Outcome 3

Demonstrate knowledge of reduction-type heavy duty starter motors.

Performance criteria

- 3.1 Construction of reduction-type starter motor is described in accordance with service information.
- Range armature assembly, reduction gear assembly, clutch and solenoid assemblies, commutator end frame, field yoke assembly.
- 3.2 Circuit layout for a starting system using reduction-type starter motors is described, and the function of each main part defined, in accordance with service information.
- Range armature, field coils, solenoid switch, reduction gears (internal gear type, external gear type) overrunning clutch, starter relay, safety relay.
- 3.3 Circuit diagrams for starter motor operation are plotted to show current flow and pinion movement.
- Range when starter switch is in start position, when starter pinion engages with ring gear, when starter switch is in off position.
- 3.4 Reduction gear operation is explained in terms of delivering torque to the engine flywheel.
- Range armature, drive pinion, idler gear, clutch, pinion.

Planned review date	31 December 2023
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	31 October 1995	31 December 2020
Review	2	29 March 1999	31 December 2020
Review	3	25 January 2008	31 December 2020
Review	4	30 August 2018	N/A

Consent and Moderation Requirements (CMR) reference	0014
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact MITO New Zealand Incorporated info@mito.org.nz if you wish to suggest changes to the content of this unit standard.