

Specification of Competency Standards
for the Automotive Industry
Unit of Competency

Functional Area - Vehicle Servicing

Title	Master the complicated techniques of electrical and electronic systems
Code	108738L4
Range	This unit of competency is applicable to technicians working at vehicle servicing and inspection departments. Practitioners should be able to master the working principles of electrical and electronic systems as well as multiplexing, and their effects on vehicle performance to enhance the efficiency and accuracy of inspection and diagnosis of vehicle systems.
Level	4
Credit	9 (For Reference Only)
Competency	<p>Performance Requirements</p> <p>1. Knowledge (Relevant electrical and electronic systems)</p> <ul style="list-style-type: none"> • Master the operating principles and output characteristics of different types of electric motors and electric generators, such as torque, speed and generation of electricity. • Good understanding of the controlling methods of starting and charging system • Master the operating principles of various types of electrical and electronic sub-systems (including related components and control systems) • Good understanding of the applications of analogy and digital devices, and their systems, such as integrated circuits, analogy/digital converters, amplifiers, comparators and microprocessors. • Master the structure, operating principles, output characteristics and applications of sensors and actuators applied on vehicles, such as temperature sensing, pressure responsive, photosensitive, air current, position and electromagnetic solenoids of various functions. • Master electronic control principle, such as closed-loop control • Good understanding of the principle and application of multiplexing, such as the controller-area network. • Good understanding of the operating principles and applications of various types of electronic control systems (including related components): <ul style="list-style-type: none"> ○ Engine management systems ○ Transmission control systems ○ Chassis stability control systems ○ Cruise control systems ○ Air bag control • Master the application and data analysis skills of various types of measuring/ diagnosis equipment, such as oscilloscopes and on-board diagnostic devices. <p>2. Performance (Inspection, fault diagnosis and analysis of electrical and electronic systems)</p> <ul style="list-style-type: none"> • Conduct inspection, fault diagnosis and analysis procedures according to fault symptoms (including recurrent or intermittent defects) of electronic control systems, such as: <ul style="list-style-type: none"> ○ Power system defects, such as stalling, weak accelerating, rough engine running or excessive fuel consumption, ○ Transmission system defects, such as incorrect shift points, incorrect power splitting and harsh gear shifting, ○ Chassis stability control system defects, such as inoperative anti-lock brake, acceleration skidding and instable high-speed cornering, etc ○ Cruise control system defects, such as inoperative speed control • Conduct inspection, fault diagnosis and analysis procedures according to fault symptoms (including recurrent or intermittent defects) of multiplexing systems and

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	<p>related components, such as failure or distortion of signal. transmission and optical fibre damages.</p> <ul style="list-style-type: none"> • Conduct inspection, fault diagnosis and analysis procedures according to fault symptoms (including recurrent or intermittent phenomena, and visual warnings, etc.) of electrical systems, such as starting system, charging system, heating, ventilation and air conditioning system, and vehicle body electrical devices. • Review the causes of defects and diagnostic methods; submit report to seniors covering preventive measures, instructions on inspection and maintenance as well as suggestions for improvement.
<p>Assessment Criteria</p>	<p>The integrated outcome requirements of this unit of competency are that the practitioner being assessed shall prove that he/she is:</p> <ul style="list-style-type: none"> • Capable of mastering the structure, functions, controlling and operating principles of various electrical and electronic systems to enhance the efficiency and accuracy of inspection and complicated fault diagnosis; • Capable of mastering electrical and electronic theories as well as impact of the application of multiplexing on electronic systems to solve the complicated technical problems, such as engine stall, heating, ventilation and air conditioning failure etc., effectively and accurately; and • Capable of compiling reports covering preventive measures, instructions on inspection and maintenance as well as providing suggestions for improvement, etc. according to the specific defects relating to respective electrical and electronic systems.
<p>Remark</p>	<p>The credit for this competency unit assumes that the practitioner already has possessed extensive knowledge of automotive, vehicle repair and testing procedures.</p>