

National Unit Specification: general information

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| UNIT | Automotive: Spark Ignition Systems (Intermediate 2) |
| NUMBER | DE41 11 |
| COURSE | Scottish Progression Award (SPA) in Vehicle Maintenance Repair |

SUMMARY

This unit will be suitable for candidates who need to develop and apply skills and knowledge associated with the repair, servicing and maintenance of vehicles at Intermediate 2 level. The unit will enable the candidate to acquire essential skills in the identification of modern vehicle ignition systems and the name and function of the components e.g. high-tension coil, distributor, spark plug, etc. It also includes the identification of test equipment / tooling etc, and the necessary safety precautions to be observed when maintaining such systems.

The unit is derived from Automotive Skills' National Occupational Standards Units:

- Unit 10 – Remove and replace units and components
- Unit 11 – Carry out routine vehicle maintenance
- Unit 19 – Inspect vehicles

It also applies to the units relating to vehicle maintenance and repair S/NVQs and Modern Apprenticeships.

It is designed to meet the knowledge requirements of Automotive Skills' Technical Certificate Specification (Phase 1):

LV09 – Ignition systems (1)

and to provide progression towards the related S/NVQs and Modern Apprenticeships.

OUTCOMES

1. Identify the components of electronic distributor and distributor-less ignition systems.
2. Explain the operation of distributor and distributor-less electronic ignition systems.

Administrative Information

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| Superclass: | XS |
| Publication date: | August 2003 |
| Source: | Scottish Qualifications Authority |
| Version: | 01 |

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National Unit Specification: general information (cont)

RECOMMENDED ENTRY

Entry is at the discretion of the centre, but a good standard of communication skills would be desirable. It would also be beneficial for candidates to have a practical aptitude for vehicle maintenance and repair.

CREDIT VALUE

0.5 credits at Intermediate 2 (3 SCQF points at SCQF level 5*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

CORE SKILLS

Information on the automatic certification of any core skills in this unit is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, publication code BA0906).

National Unit Specification: statement of standards

UNIT Automotive: Spark Ignition Systems (Intermediate 2)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Identify the components of electronic distributor and distributor-less ignition systems.

Performance criteria

- a) Correctly identify the components of an electronic distributor ignition system.
- b) Correctly identify the components of a distributor-less ignition system.
- c) Correctly identify spark plug leads, seat type, sealing, and reach.

OUTCOME 2

Explain the operation of distributor and distributor-less electronic ignition systems.

Performance criteria

- a) Correctly explain the operation of an electronic distributor ignition system.
- b) Correctly explain the operation of a “wasted spark” distributor-less ignition system.
- c) Correctly explain the operation of high voltage ignition coils and the effects of electro/magnetic induction.
- d) State what safety precautions must be observed when working on a high voltage ignition system.

EVIDENCE REQUIREMENTS FOR THE UNIT

Written evidence of the candidate’s ability to:

- (a) identify the components of distributor and distributor-less ignition systems.
- (b) correctly explain the operation of distributor and distributor-less ignition systems.

The candidate should produce sufficient correct responses to achieve an overall pass of 70% for the unit.

National Unit Specification: support notes

UNIT Automotive: Spark Ignition Systems (Intermediate 2)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This unit has been designed to provide the underpinning knowledge for Phase I of Automotive Skills' Modern Apprenticeship (MA), and to operate in conjunction with the SVQ level II Vehicle Mechanical, building the underpinning knowledge which will assist in the attainment of the SVQ.

Outcome 1

Identify:

- H.T. coils: static coil packs (coil & plug) dual or twin static coil units (wasted spark).
- pulse generators (hall effect, optical & inductive types), and crankshaft position and phase sensors.
- ignition distributors, rotors, high-tension leads / distributor caps.
- ignition modules, electronic control units,
- ignition advance: mechanical / vacuum / mapped and “knock sensor”

Outcome 2

Explanation of the operation of:

- high-tension coil – electro / magnetic induction.
- ignition switching components, “Hall effect” / inductive pulse generator.
- ignition distributor, dwell angles and dynamic ignition timing (Stroboscopic)
- spark advance: mechanical / vacuum / mapped
- high tension leads / interference suppression,
- spark plugs: heat range, gap, electrode, reach, seat type, torque settings
- direct ignition (coil and plug) supporting components:
 1. cylinder reference / phase sensor
 2. static coil and module
 3. crankshaft position sensor

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Corresponding to both outcomes:

The candidate could be given the opportunity in a practical situation/location, to work on actual vehicles, simulation rigs with actual components/assemblies, and to experience practical demonstrations, in order to examine the components, to develop knowledge and understanding of the operation and maintenance requirements of conventional and modern automotive ignition systems.

For clarity, the term “conventional ignition” relates only to early contact breaker and transistorised systems, which should only be used as supported delivery for the unit.

National Unit Specification: support notes (cont)

UNIT Automotive: Spark Ignition Systems (Intermediate 2)

A “hands on” approach by the candidate would reinforce their knowledge and develop the practical skills / practice required in the maintenance routines of these systems.

Outcome 1

Candidates could be given the opportunity to examine in a practical location, distributor type ignition components and their layout, also the specific components of “wasted spark” and “direct ignition” systems.

Outcome 2

Candidates could be given the opportunity in a practical location, to develop their knowledge of the operation of ignition systems, components, and their respective layouts, including the maintenance checks required. The use of simulation rigs and diagnostic equipment, wiring diagrams, multimeters, and on board diagnostics (EOBD), would help reinforce knowledge, and develop the skills required for diagnosis of faults and the routine maintenance requirements of such systems.

Correct explanation of the safety precautions to be observed when working on electronic ignition systems such as:

- consulting manufacturer’s data / circuit diagrams
- wearing appropriate Personal Protective Equipment (PPE)
- selecting correct test equipment / tooling
- awareness of the high voltages / current operating in such systems

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Assessment of the knowledge could take the form of a multiple-choice test to cover both outcomes.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, publication code AA0645).