National Unit Specification: general information

UNIT Automotive: Steering and Suspension Systems (Higher)

NUMBER D22Y 12

COURSE

SUMMARY
A unit designed to develop knowledge of the steering and suspension systems fitted to vehicles and the operation of the main components within the systems, and to enable constructive reasoning/interpretation of possible faults from identified symptoms.

OUTCOMES
1 Explain the operation of suspension system main components.
2 Explain the operation of power assisted steering system main components.
3 Identify for given suspension system symptoms the possible fault(s).
4 Identify for given power assisted steering system symptoms the possible fault(s).
5 Demonstrate the procedure for the measurement of steering and suspension geometry.

RECOMMENDED ENTRY
Access to this unit is at the discretion of the centre. However, it would be beneficial if the candidate had achieved the unit Automotive: Steering Systems (2210278) and Automotive: Suspension Systems (2210288) at Intermediate 2.

CREDIT VALUE
2 Credits at Higher.

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, 1999).

Administrative Information

Superclass: XR

Publication date: August 1999

Source: Scottish Qualifications Authority 1999

Version: 01

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National Unit Specification: statement of standards

UNIT Automotive: Steering and Suspension Systems (Higher)

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
Explain the operation of suspension system main components.

Performance criteria
a) The explanation of a suspension system damper operation is correct.
b) The explanation of a hydropneumatic suspension system operation is correct.

Note on range for the outcome
Damper: telescopic; self-levelling.
System: hydropneumatic

Evidence requirements
Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

OUTCOME 2
Explain the operation of power assisted steering system main components.

Performance criteria
a) The explanation of the operation of power steering pump components is correct.
b) The explanation of the operation of power steering rack components is correct.
c) The explanation of the operation of power steering box components is correct.

Note on range for the outcome
Pump: rotor; relief valve.
Rack: torsion bar; spool valve; ram.
Steering box: spool valve; ram cylinder.

Evidence requirements
Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

National Unit Specification: statement of standards (cont)

UNIT Automotive: Steering and Suspension Systems (Higher)

OUTCOME 3
Identify for given suspension system symptoms the possible fault(s).

Performance criteria
a) Correctly identify for a given symptom suspension, damper faults.
b) Correctly identify for a given symptom suspension, system faults.

Note on range for the outcome
Dampers: fluid loss; knocking; excessive roll.
System: trim height high; trim height low; bottoming.

Evidence requirements
Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

OUTCOME 4
Identify for given power assisted steering system symptoms the possible fault(s).

Performance criteria
a) Correctly identify for a given symptom, pump faults.
b) Correctly identify for a given symptom, rack faults.
c) Correctly identify for a given symptom, steering box faults.

Note on range for the outcome
Pump: fluid leakage; noisy; inadequate assistance; judder.
Rack: kick back; pulls to one side; lacks feel.
Steering box: fluid loss; inadequate assistance; poor self centring effect.

Evidence requirements
Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

National Unit Specification: statement of standards (cont)

UNIT Automotive: Steering and Suspension Systems (Higher)

OUTCOME 5
Demonstrate the procedure for the measurement of steering and suspension geometry.

Performance criteria

a) Correctly carry out castor, camber, swivel axis inclination, measurement procedures.
b) Evaluate accurately castor, camber, swivel axis inclination readings to establish possible deviations.
c) Correctly carry out wheel alignment and toe out on turns measurement procedures.
d) Evaluate accurately wheel alignment and toe out on turns readings to establish possible deviations.

Evidence requirements
Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

EVIDENCE REQUIREMENTS FOR THE UNIT

Outcome 1
Written and/or oral evidence of the candidate's ability to correctly explain the operation of suspension system main components.

Satisfactory achievement of the outcome will be based on all the performance being met. This will be demonstrated by the candidate producing for:

PC (a) correct explanation of the operation of 1 telescopic and 1 self-levelling suspension system damper.
PC (b) correct explanation of the operation of 1 hydropneumatic suspension system.

Outcome 2
Written and/or oral evidence of the candidate's ability to correctly explain the operation of steering system main components.

Satisfactory achievement of the outcome will be based on all the performance being met. This will be demonstrated by the candidate producing for:

PC (a) correct explanation of the operation of 2 Power Assisted Steering pump main components.
PC (b) correct explanation of the operation of 2 Power Assisted Steering rack main components.
PC (c) correct explanation of the operation of 2 Power Assisted Steering gearbox main components.

National Unit Specification: statement of standards (cont)

UNIT Automotive: Steering and Suspension Systems (Higher)

Outcome 3
Written and/or oral evidence of the candidate's ability to correctly identify for given suspension system symptoms the possible fault(s).

Satisfactory achievement of the outcome will be based on all the performance being met. This will be demonstrated by the candidate producing for:

PC (a) correct identification of a possible damper fault for 2 given symptoms.
PC (b) correct identification of a possible system fault for 2 given symptoms.

Outcome 4
Written and/or oral evidence of the candidate's ability to correctly identify for given power assisted steering symptoms the possible fault(s).

Satisfactory achievement of the outcome will be based on all the performance being met. This will be demonstrated by the candidate producing for:

PC (a) correct identification of a possible pump fault for 3 given symptoms.
PC (b) correct identification of a possible rack fault for 2 given symptoms.
PC (c) correct identification of a possible steering box fault for 2 given symptoms.

Outcome 5
Practical evidence of the candidate's ability to measure steering and suspension geometry. Written and/or oral evidence of the candidate's ability to evaluate readings which deviate from specification.

Satisfactory achievement of the outcome will be based on all the performance being met. This will be demonstrated by the candidate's ability.

PC (a) correctly carry out the measurement procedure.
PC (b) correctly evaluate the readings.
PC (c) correctly carry out the measurement procedures.
PC (d) correctly evaluate the readings.

National Unit Specification: support notes

UNIT Automotive: Steering and Suspension Systems (Higher)

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 80 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

The main types of suspension damping arrangements to be considered could be taken from the following: leaf spring, McPherson strut, parallel link, transverse link, torsion bar, rubber; hydropneumatic (hydro-gas) and fixed mass air assembly.

The main types of power steering arrangements to be considered could be taken from the following: rack and pinion, recirculating ball, speed-related power steering systems.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Manual or electronic measuring equipment could be used to evaluate steering and suspension geometry. Angles could include; castor, camber and swivel axis inclination.

The candidate should be given the opportunity to examine section models, vehicles and participate in practical examination of vehicle steering and suspension systems and should be given the opportunity to examine components and vehicles which are outwith specification.

Demonstrations of methods/techniques used to determine wear, defects, measurement and pressurisation can be used to reinforce learning. Front and/or rear steering and suspension geometry readings may be taken.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcome 1
Written/graphical exercise.

Outcome 2
Written/graphical exercise.

Outcome 3
Written/graphical exercise.

Outcome 4
Written/graphical exercise.

Outcome 5
Direct observation in conjunction with specified criteria for the task.

National Unit Specification: support notes (cont)

UNIT Automotive: Steering and Suspension Systems (Higher)

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 and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA).