National Unit Specification: General Information

UNIT Automotive: Transmission Systems (Intermediate 2)

NUMBER 2210298

COURSE

SUMMARY
A unit designed to develop knowledge of transmission systems and the associated components fitted to a vehicle, how they operate on the vehicle, and the areas of potential failure. The candidate will be able to deliver constructive reasoning/interpretation of the components that could be subject to wear and possible failure of the system, the need for clearance settings, end float, alignment of components prior to and during assembly and the methods used for correct and safe removal and replacement.

OUTCOMES

1 Identify the main components of a transmission system.
2 Explain the operation of the components in relation to the transmission system.
3 Indicate the components that are subject to wear and/or failure.
4 Demonstrate the procedure for removal and fitting of a transmission component.

RECOMMENDED ENTRY
Access to this unit is at the discretion of the centre, however no entry prerequisites are envisaged.

CREDIT VALUE
0.5 credit at Intermediate 2.

CORE SKILLS
Information on the automatic certification of the core skills in this unit is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999)

Administrative Information

Superclass: XS

Publication date: Session 1998-99

Source: Scottish Qualifications Authority

Version: 1

National unit specification: statement of standards

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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 main components of a transmission system.

Performance Criteria
a) The main components of the clutch and operating mechanism are correctly identified.
b) The main components of the gearbox and operating mechanism are correctly identified.
c) The main components of the final drive are correctly identified.
d) The main components of the drive line are correctly identified.

Evidence Requirements
Written and/or oral evidence of the candidate's ability to correctly identify from diagrams, slides, video or actual units the main components of a transmission system.

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

PC a) correct identification of 3 clutch and 2 operating mechanisms/components.
PC b) correct identification of 6 gearbox and 3 operating (linkage) mechanisms/components.
PC c) correct identification of 2 final drive components
PC d) correct identification of 2 drive line components.

OUTCOME 2
Explain the operation of the components in relation to the transmission system.

Performance Criteria
a) The operation of the clutch is correctly explained.
b) The operation of the gearbox is correctly explained
c) The operation of the final drive is correctly explained.
d) The operation of the drive line is correctly explained.

Evidence Requirements
Written and/or oral evidence of the candidate's ability to correctly explain from diagrams, slides, video or actual units, the operation of the components in relation to the transmission system.

National unit specification: statement of standards (cont)

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

PC a) correct explanation of the clutch operation.
PC b) correct explanation of the gearbox operation.
PC c) correct Explanation of the final drive operation.
PC d) correct explanation of the drive line operation.

OUTCOME 3
Indicate the components that are subject to wear and/or failure.

Performance Criteria
a) The components subject to wear in the clutch are indicated correctly.
b) The components subject to wear in the gear box are indicated correctly.
c) The components subject to wear in the final drive are indicated correctly.
d) The components subject to wear in the drive shaft/universal joint are indicated correctly.

Evidence Requirements
Written and/or oral evidence of the candidate's ability to correctly identify from diagrams, slides, video or actual units, the components that are subject to wear and/or failure.

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

PC (a) correct indication of 3 clutch components that are subject to wear and/or failure.
PC (b) correct indication of 4 gearbox components that are subject to wear and/or failure.
PC (c) correct indication of 2 final drive components that are subject to wear and/or failure.
PC (d) correct indication of 2 drive line components that are subject to wear and/or failure.

OUTCOME 4
Demonstrate the procedure for removal and fitting of a transmission component.

Performance Criteria

a) The tools/equipment are used in accordance with manufacturer's or companies' set procedures.
b) The removal and fitting task is carried out correctly.
c) The torque setting, to set specifications for the given task, is carried out correctly.
d) The alignment of components is correct.
e) The relevant/set safety requirements are adhered to for the given task.

National unit specification: statement of standards (cont)

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Evidence Requirements

Evidence of actual performance of the candidate's ability to follow instructions (manufacturers or company set procedures), use tools, observe relevant/set safety requirements for the given task and meet set time scales within defined criteria.

National unit specification: support notes

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This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

GUIDANCE ON CONTENT AND CONTEXT

A unit designed to operate in conjunction with the SVQ Level II, 'Vehicle Mechanical Unit Replacement' to develop the knowledge necessary in building the underpinning theory which will assist in the attainment of the SVQ, the PDA Certificate in Motor Vehicle Systems, Intermediate level 2 of the Higher Still programme or as a freestanding unit.

The types of vehicle to be covered throughout the unit are front wheel drives and rear wheel drives.

GUIDANCE ON TEACHING AND LEARNING APPROACHES

Corresponding to outcomes 1, 2, 3.

Candidates could be given the opportunity to examine, in a practical location, transmission systems, to identify the main components, layout, the principle of operation/components and the power flow through the system.

Transmission Systems

Identification of the need for lubrication of the gear box, clutch cable and gear change mechanisms.

The principle of operation and power flow could be demonstrated in a practical situation/location with video and other demonstration aids used as reinforcement to the practical demonstration.

The methods used to determine wear on the bearings, gears and thrust. The methods used to check/set adjustments, such as clutch pedal clearance, automatic tensioners, pre loads, end float and the importance of correct/accurate adjustment and need for correct torque of bolts etc. should be stressed and the possible result if this is not done.

The selection of lubricant for the gear box, clutch cable and gear change mechanisms could be explored during this part of the unit as part of the prevention of wear and service requirements.

Practical exercise could be on bench mounted assembly or a vehicle where the candidate can, from a given task relating to the transmission system, such as clutch replacement, gearbox replacement, drive shaft, CV joint, universal joint removal/replacement, demonstrate the procedure for fitting a transmission component. Working practices should be carried out in a safe manner and according to the recommended procedures which may be found in a variety of technical publications including manufacturers' manuals and service bulletins.

National unit specification: support notes (cont)

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The main components could be identified from the following transmission system components:

flywheel, clutch friction plate, pressure plate, release bearing, master cylinder, slave cylinder, cable, gearbox inputshafts, layshaft, main shaft, 1, 2, 3, 4 and 5th speed gears, baulking rings/syncro cones, splines, crown wheel, differential gears, half shafts, propeller shaft, universal joint, constant velocity joints, road wheels, hubs, engine mountings, bellhousing and bolts, gearbox mountings.

Corresponding to outcome 4

The candidate should be dressed as specified in the assessment standards (specifications), and demonstrate a safe working practice before, during and at the end of the given task.

The candidate should be given a practical exercise/task where the candidate can carry out the removal and refitting of a transmission system component.

Removal and fitting of a transmission system component according to the recommended procedures which may be found in a variety of technical publications including manufacturers' manuals and service bulletins.

Demonstrations of the methods used to check/set adjustments, such as wheel alignment pre loads, end float and the importance of correct/accurate adjustment should be stressed. The ability of the candidate to follow instructions, select the correct information, select the correct tools and or equipment, check that the tools are in a safe condition to use or report that the tools are suspect, calibrate if required the tools before use to achieve a correct reading or setting, connect the equipment and/or tools in accordance with laid down/set out instructions/procedures, correctly and consciously align components as per laid down/set out instructions/procedures, and work in a manner that promotes safety to themselves, especially when dealing with transmission components, others and the vehicle.

At the end of the task, all tools and equipment cleaned and replaced in the approved manner in the store or stored area, and the work area is cleaned and left safe to meet health and safety at work regulations.

Reference to "equipment/tools" within the performance criteria means that in some tasks specialist tools or equipment or both may be used.

Note: The criteria or the critical points, (what the candidate must do for each performance criteria, to achieve that performance criteria when doing the task – the Instruments or specifications for the task), relating to performance criteria (a) to (e), against which the candidate is measured in order to achieve the outcome should be clearly set out and the candidate's results recorded on a checklist.

National unit specification: support notes (cont)

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GUIDANCE ON APPROACHES TO ASSESSMENT
All assessment packs should contain the following:

- Clear indication that the assessment and the Marking schedule have undergone internal verification.

- Main assessment (or first assessment) – A clear statement of what the candidate must do to achieve a pass.

- Marking schedule for the Main assessment, of all the required and acceptable responses against which the assessor will mark the candidate.

- Reassessment (or second, third etc assessment depending on centre policy), indicating clearly that it is re-assessment, again, with a clear statement of what the candidate must do to achieve a pass.

- Marking schedule of all the required and acceptable responses against which the assessor will mark the candidate.

Outcome 1

Written and/or oral evidence which may be in the form of multi choice type questions, a matching exercise, from diagrams, slides, video or actual units/vehicles, which allows the candidate to identify the transmission components such as the flywheel, clutch, friction plate, pressure plate, release bearing, master cylinder, slave cylinder, clutch cable, gearbox input shafts, layshaft, main shaft, 1, 2, 3, 4, and 5th speed gears, baulking rings/syncro cones, crown wheel, differential gears, half shafts, propeller shaft, universal joint, constant velocity joints.

Outcome 2

Written and/or oral evidence which may be in the form of multi choice type questions, short answer or gapped responses could be used which allows the candidate to explain the critical points of transmission.

National unit specification: support notes (cont)

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Outcome 3
Written and/or oral evidence which may be in the form of multi choice type questions, short answer or gapped responses could be used which allows the candidate to identify components that could be subject to wear such as the flywheel, clutch friction plate, pressure plate, release bearing, clutch cable, master cylinder, slave cylinder, gearbox inputshafts bearings, layshaft bearings, main shaft bearings, 1, 2, 3, 4 and 5th speed gears/bearings, baulking rings/syncro cones, crown wheel, differential gears/bearings, universal joint, constant velocity joints.

Outcome 4
A practical exercise either in the candidate's normal place of work, when being assessed during his/her SVQ, or in the centre on actual units or vehicles, with access to all the relevant tools, equipment, data and clean/safe work area.

Set tasks should have direct specifications against which he/she will be measured, directly related to the task that the candidate must achieve to pass.

The candidate should be encouraged to identify the need for clearance settings, alignment, end float and torque settings, and the importance of correct alignment if clutch drive (friction) plate and drive lines prior to re-assembly.