National Unit Specification: General Information

UNIT Automotive: Braking Systems (Intermediate 2)

NUMBER 2210198

COURSE

SUMMARY
A unit designed to develop a knowledge of the main braking system components fitted to a vehicle, how they operate, the areas of potential failure or wear, the need for settings and adjustment including removal and replacement techniques.

OUTCOMES
1 Identify the main components of a braking system.
2 Explain the operation of a braking system's main hydraulic and mechanical components.
3 Explain the adjustment and servicing procedures for braking systems.
4 Demonstrate the procedure for removing and fitting a braking system 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 any 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

UNIT Automotive: Braking 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 main components of a braking system.

Performance Criteria
a) The main components of a hydraulic braking system are identified correctly.
b) The main components of a mechanical (parking) braking system are identified correctly.

Evidence Requirements
Written and /or oral evidence of the candidate's ability to identify the main components of a braking system.

Satisfactory achievement will be evidenced by the candidate producing for:

a) correct identification of 7 main braking system components.
b) correct identification of 4 mechanical components.

OUTCOME 2
Explain the operation of a braking system's main hydraulic and mechanical components.

Performance Criteria
a) Explanation of the operation of the master cylinder is correct.
b) Explanation of the operation of a disc brake is correct.
c) Explanation of the operation of a drum brake is correct.
d) Explanation of the operation of the servo is correct.
e) Explanation of the operation of an automatic brake adjuster is correct.

Evidence Requirements
Written and/or oral evidence of the candidate's ability to explain the operation of a braking system and itemised braking system components.

Satisfactory achievement will be evidenced by the candidate producing for:

a) correct explanation of 1 master cylinder operation.
b) correct explanation of 1 disc brake operation
c) correct explanation of 1 drum brake operation.
d) correct explanation of 1 servo operation.
e) correct explanation of 1 automatic brake adjuster.

National unit specification: statement of standards (cont)

UNIT Automotive: Braking Systems (Intermediate 2)

OUTCOME 3
Explain the adjustment and servicing procedures for braking systems.

Performance Criteria
a) The explanation of the procedures for expelling air from the system is correct.
b) The explanation of the procedures for adjusting shoe drum clearance is correct.
c) The identification of service and parking brake efficiencies is correct and in accordance with current legislation.

Evidence Requirements
Written and/or oral evidence of the candidate's ability to explain the need for adjusting and servicing braking systems.

Satisfactory achievement will be evidenced by the candidate producing for:

a) correct explanation of 1 air expulsion procedures from a hydraulic system.
b) correct explanation of 1 adjustment procedures.
c) service and handbrake efficiencies are correctly identified in accordance with current legislation.

OUTCOME 4
Demonstrate the procedure for removing and fitting a braking system component.

Performance Criteria
a) The tools/equipment are used in accordance with manufacturers' or companies' set procedures.
b) The removal and fitting of the component is carried out correctly.
c) The torquing specifications for the given task are carried out correctly.
d) The alignment of components/mechanisms is correct.
e) The relevant safety requirements are correctly adhered to for the given task.

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

National unit specification: support notes

UNIT Automotive: Braking Systems (Intermediate 2)

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

This unit is designed to operate in conjunction with the SVQ Level II Vehicle Mechanical: Unit Replacement, building the underpinning theory which will assist in the attainment of the SVQ, the PDA Certificate in Motor Vehicle Systems, Intermediate 2 of Higher Still programme, or as a freestanding unit. The unit should cover hydraulic and mechanical components of disc and drum brakes.

1 The main components of a braking system could include the following:

Brake pads; discs; calipers; metal pipes; flexible hoses; master cylinder; wheel cylinders; hand brake cables; compensation devices; brake shoes; brake drums; manual brake adjusters; automatic brake adjusters; servo unit; pressure limiting devices; parking brake lever; brake pedal.

Brake shoe arrangements could include: leading and trailing, twin leading, and duo servo.
Caliper arrangements could include: twin piston, single piston, four piston.
Wheel cylinders.
Braking system layouts could include: single line, diagonally split, 'L' split.

The components fitted to a hydraulic system which are operated by mechanical means should be identified/highlighted.

2 The operations could include: friction, heat generated when stopping, brake cooling, brake fade, principle of moments, centre of gravity, load transference.
Terms relating to brake fluid should include: hygroscopic, wet and dry boiling points, viscosity, D.o.T. gradings. The function of a brake to convert kinetic energy into heat energy is identified correctly. The function of a mechanical brake to hold the vehicle stationary and act as an emergency brake is identified correctly. Self-servo effect is correctly identified. The need for servo assistance is correctly identified. The factors that affect brake fluid performance should be identified here.

National unit specification: support notes (cont)

UNIT Automotive: Braking Systems (Intermediate 2)

3 Service/adjustment could include: pad wear, shoe wear, warning lights, disc wear, drum wear, chafing/bulges/cracks to pipes/hoses. Cable fraying measurement techniques could include disc/drum minimum thickness warping/runout pad/shoe minimum thickness, fluid warning lights.

Braking efficiencies should include: service, parking brakes and overall efficiencies for single/split line hydraulic systems. Use of brake test equipment to establish efficiencies - factors affecting braking efficiency should be explored.

The need for lubrication to prevent seizures is explained correctly. Methods of measuring braking system components are identified correctly. Calculate service and parking brake efficiencies to current legislation.

4 The candidate demonstrates the ability to remove and replace braking system components from a hydraulic braking system.

Awareness of the dangers associated when working on braking systems: dust, heat generated, safe disposal of braking system components with regard to current legislation under the environmental protection act.

GUIDANCE ON TEACHING AND LEARNING APPROACHES

The candidate should be given the opportunity to examine in a practical location disc and drum braking assemblies to identify the components, their layout and operation.

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

Demonstration of the methods used to service/adjust braking systems and check for wear.

Demonstration of the appropriate equipment used to measure brakes for wear.

Department of Transport legislation regarding the efficiency of parking/service brakes should be demonstrated with the appropriate brake tester and efficiencies calculated.

A practical task is to be completed by the candidate meeting all of the performance criteria.

National unit specification: support notes (cont)

UNIT Automotive: Braking Systems (Intermediate 2)

GUIDANCE ON APPROACHES TO ASSESSMENT

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 and or vehicles, which allows the candidate to identify braking system components.

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 operation of a braking system.

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 explain the adjustment and servicing procedures for a braking system.

Outcome 4
Practical Task.

Satisfactory achievement of this outcome will be demonstrated by the candidate completing a task designated by the lecturer which demonstrates the candidate's ability to remove and replace hydraulic and mechanical braking system component.