

**-SQA- SCOTTISH QUALIFICATIONS AUTHORITY**

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**NATIONAL CERTIFICATE MODULE DESCRIPTOR**

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**-Module Number- 2210340**  
**-Superclass- XS**

**-Session-1990-91**

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**-Title- PETROL INJECTION AND AIR SUPPLY SYSTEMS:  
REMOVAL, REPLACEMENT AND ADJUSTMENT OF  
COMPONENTS**

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**-DESCRIPTION-**

**Purpose** This module is designed to develop the necessary skills and knowledge required to carry out removal, replacement and adjustment of petrol injection and air supply systems.

It is aimed at those intending to pursue a career in the motor vehicle repair industry. The module is also designed to complement R.T.I.T.B Module LV109B Petrol Injection and Air Supply Systems: Removal, Replacement and Adjustment of Components and will provide the student with the necessary knowledge and skills to prepare for the RTITB skills test. It should be noted that adequate supporting industrial experience will also be necessary.

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**Preferred Entry Level** Modules numbered 94370 through 94378 inclusive

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**Outcomes** The student should:

1. identify petrol injection system components by name, function and location;
2. outline the operation of a petrol injection system;
3. remove and replace petrol injection system components;
4. inspect and service a petrol injection system.

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**Assessment Procedures** Acceptable performance in the module will be satisfactory achievement of all the Performance

Criteria specified for each Outcome.

The following abbreviations are used below:

PC Performance Criteria  
IA Instrument of Assessment

**Note:** The Outcomes and PCs are mandatory and cannot be altered. The IA may be altered by arrangement with SQA. (Where a range of performance is indicated, this should be regarded as an extension of the PCs and is therefore mandatory.)

**OUTCOME 1 IDENTIFY PETROL INJECTION SYSTEM COMPONENTS BY NAME, FUNCTION AND LOCATION**

- PCs
- (a) The components of the petrol injection system are accurately named.
  - (b) The function and location of petrol injection components are correctly stated.

IA Objective Test

The student will be presented with an objective test to assess the recall of knowledge relating to fuel injection and air supply components layout and functions.

The test will consist of 15 items allocated as follows:

- (a) Name of 5 components
- (b) Function of 5 components- different from (a)
- (c) Location of 5 Components- different from (a) and (b).

Items may be taken from the following list:

- (i) injector
- (ii) fuel pump
- (iii) electronic control unit
- (iv) accumulator
- (v) fuel pressure regulator
- (vi) fuel distributor
- (vii) fuel temp. sensor
- (viii) air flow sensor
- (ix) air flow regulator
- (x) inertia switch
- (xi) air temp. sensor
- (xii) coolant temperature
- (xiii) engine speed sensor
- (xiv) crankshaft sensor
- (xv) cold start devices
- (xvi) auto. air control valve

Satisfactory achievement of the Outcome will be based on all Performance Criteria being met. This will be demonstrated by the student producing 4 correct responses from (a), (b) and (c).

**OUTCOME 2****OUTLINE THE OPERATION OF A PETROL INJECTION SYSTEM**

PCs

- (a) The air/fuel ratios for different engine requirements are correctly stated.
- (b) The design principles of a fuel injection system are outlined.
- (c) The methods of varying air/fuel ratios according to engine requirements are stated.
- (d) The principles of air supply systems are outlined.

**IA Objective Test**

The student will be presented with an objective test to assess the recall of knowledge relating to fuel injection and air supply components operation.

The test will consist of 10 questions allocated as follows:

- (i) air/fuel requirements
- (ii) use of sensor
- (iii) pressure regulators
- (iv) inertia switch
- (v) cold starting
- (vi) fuel pumps
- (vii) air supply
- (viii) accumulators
- (ix) injectors
- (x) fuel distributor

Satisfactory achievement of the Outcome will be based on all Performance Criteria being met. This will be demonstrated by the student producing 8 correct responses.

**OUTCOME 3****REMOVE AND REPLACE PETROL INJECTION SYSTEM COMPONENTS**

PCs

- (a) Recommended procedures outlined in the technical data for carrying out each task are followed.
- (b) Safe working practices relevant to the task are followed.
- (c) Vehicle protection as appropriate to the task is used.
- (d) Tools appropriate to the task are used.

## IA Practical Exercise

The student will be presented with a series of practical exercises in a workshop environment to test the application of knowledge and skills relating to the removal and replacement of fuel system components. Each student should undertake 10 tasks from the following list.

Removal and replacement of:

Air Cleaner	Air flow regulator
Manifold	Fuel distributor
Inlet manifold	Fuel Temp. Sensor
Automatic Air Control Valve	Air flow sensor
Manifold Heater	Air Temp. Sensor
E.C.U.	Coolant temp. sensor
Fuel rail/lines	Engine speed sensor
Fuel tank and filler	Crankshaft sensor
Injector	Inertia switch
Fuel Pump	Cold start device
Accumulator	Cable connections
Fuel pressure regulator	

Satisfactory achievement of the Outcome will be based on all Performance Criteria being met. This will be demonstrated by the student correctly removing and replacing 10 items.

**OUTCOME 4****INSPECT AND SERVICE A PETROL INJECTION SYSTEM**

PCs

- (a) Recommended procedures outlined in the technical data for carrying out each task are followed.
- (b) Safe working practices relevant to the task are followed.
- (c) Vehicle protection as appropriate to the task is used.
- (d) Tools appropriate to the task are used.

## IA Practical Exercise

The student will be presented with a series of practical exercises in a workshop environment to test the application of knowledge and skills relating to inspecting and servicing fuel system components in accordance with recommended procedures. These procedures may be found in a variety of technical publications including manufacturers' workshop manuals and service bulletins. Each student should undertake both of the following tasks:

- (i) measure and adjust engine speeds;
- (ii) measure and adjust exhaust emissions.

Satisfactory achievement of the Outcomes will be based on all Performance Criteria being met. A checklist may be used to record the completion of the requisite tasks.

**The following sections of the descriptor are offered as guidance.  
They are not mandatory.**

### CONTENT/CONTEXT

Safety regulations, safe working practices and procedures should be observed at all times.

Corresponding to Outcomes 1-4:

This module should be taught in the context most suited to the students particular needs.

This module is intended to give students an understanding of the reasons for servicing of vehicle petrol injection and air supply systems, as a means of promoting vehicle safety, prolonging operational life and maintaining to original specification.

Students should be made aware of the general trends in automotive technology and reminded that any particular manufacturer may utilise specialised equipment which is not common throughout the whole industry.

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### SUGGESTED LEARNING AND TEACHING APPROACHES

This module should be undertaken in a service workshop with an adequate range of vehicles equipped with the components to be covered. Students should have full access to relevant service publications for the satisfactory performance of the tasks.

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