

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0094399 -Session-1989-90
-Superclass- XS

**-Title- SPARK IGNITION (BREAKERLESS SYSTEM):
CONDITION ASSESSMENT AND FAULT DIAGNOSIS
(x¹/₂)**

-DESCRIPTION-

Purpose This module is designed to develop the skills and knowledge required to diagnose faults in spark ignition (breakerless systems) and to accurately assess the condition of related components.

It is aimed at those intending to pursue a career in the motor vehicle repair industry. The module is also designed to complement RTITB module LV117C Spark Ignition (Breakerless Systems): Condition Assessment and Fault Diagnosis and will provide the student with the necessary knowledge and skills to prepare for the RTITB Skills Test. It should be noted however that adequate supporting industrial experience will also be necessary.

Preferred Entry Level 94398 Spark Ignition (Breakerless System): Removal, Replacement and Adjustment of Components

Learning Outcomes The student should:

1. visually inspect and report ignition system defects;
2. test the operation of automatic advance and retard mechanisms;
3. use electrical measuring instruments to compare component performance;
4. use electronic diagnostic equipment;
5. recognise ignition system faults.

Content/ Context	Safety regulations, safe working practices and procedures should be observed at all times. <u>Corresponding to Learning Outcomes 1-3:</u> 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 assessing the condition and diagnosing defects in vehicle ignition systems, as a means of promoting vehicle safety, prolonging operational life and maintaining to original specification.
Suggested Learning and Teaching Approaches	This module should be undertaken in a service workshop with an adequate range of vehicles and/or running engines and components to be covered. Students should have full access to relevant service publications, special tools and test equipment for the satisfactory performance of the tasks.
Assessment Procedures	Acceptable performance in the module will be satisfactory achievement of all the performance criteria specified for each Learning Outcome. The following abbreviations are used below: LO Learning Outcome IA Instrument of Assessment PC Performance Criteria
LO1	VISUALLY INSPECT AND REPORT IGNITION SYSTEMS DEFECTS PC The student: (a) inspects and reports on pulse generator for common faults; (b) inspects and reports on condition of vacuum advance/retard; (c) visually checks and reports on the operation of the mechanical advance/retard mechanism; (d) inspects components for possible causes of shorting and tracking.

IA Practical Exercise

The student will be presented with a series of practical exercises set in a workshop environment to test the application of knowledge and skills involved in the visual inspection of ignition systems. The exercises will consist of visual inspection and report on the following:

- (i) two types of pulse generator
- (ii) two vacuum advance/retard units;
- (iii) two mechanical advance/retard units;
- (iv) shorting and tracking e.g. plug leads/terminals distributor cap, rotor arm, coil tower and main H T leads.

One item of each of the categories (i) to (iv) should have a defect.

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by correct identification of faults of the defective components and accurate completion of a report on the defective components.

LO2**TEST THE OPERATION OF AUTOMATIC ADVANCE AND RETARD MECHANISMS**

PC The student:

- (a) uses literature to obtain mechanical and vacuum advance and retard specifications;
- (b) uses instruments to check and adjust idling speed and timing;
- (c) uses instruments to check mechanical advance at recommended speeds;
- (d) uses instruments to check vacuum and total advance.

IA Practical Exercise

The student will be presented with a series of practical exercises set in a workshop environment to test the application of knowledge and skills involved in the testing of automatic advance and retard mechanisms.

The exercise will consist of obtaining and recording technical data, measuring and recording the following:

- (i) idling speed and ignition timing
- (ii) mechanical, vacuum and total advance

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by accurate recording of manufacturers data, and readings obtained for performance criteria 'b', 'c' and 'd' above.

LO3

USE ELECTRICAL MEASURING INSTRUMENTS TO COMPARE COMPONENT PERFORMANCE

PC The student:

- (a) uses literature to obtain recommended, current, resistance and voltage readings;
- (b) measures current consumption;
- (c) measures component resistance;
- (d) measures terminal voltages;
- (e) measures voltage drop.

IA Practical Exercise

The student will be presented with a series of practical exercises set in a workshop environment to test the application of knowledge and skills involved in the use of electrical measuring instruments. The test will consist of obtaining, recording and measuring the following:

- (i) primary current consumption
- (ii) component resistance's to include HT Leads, high/low voltage coils (both windings),
- (iii) terminal voltages to include battery and coil (LT)

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by accurate recording of manufacturers' data and readings obtained for performance criteria 'b', 'c', 'd' and 'e' above.

LO4

USE ELECTRONIC DIAGNOSTIC EQUIPMENT

PC The student:

- (a) demonstrates the ability to connect the equipment to the vehicle;
- (b) completes a full sequence of primary circuit tests as given in equipment manufacturers instructions;
- (c) completes a full sequence of secondary circuit tests as given in equipment manufacturers instructions;
- (d) identifies primary and secondary circuit faults;
- (e) follows all safe working practices relevant to the task;
- (f) uses vehicle protection appropriate to the task.

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 use of electronic diagnostic equipment in accordance with recommended procedures. These procedures may be found in a variety of technical publications including equipment manufacturers' manuals and service bulletins. A minimum of one fault should be present in the primary and secondary circuits which must allow the engine to run and be measurable and indicate on the test equipment used.

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by the student producing a completed assignment sheet/equipment manufacturers' customer report with comments on faults found.

LO5

RECOGNISE IGNITION SYSTEMS FAULTS

PC

The student:

- (a) identifies common ignition system faults;
- (b) identifies effects of ignition system faults;
- (c) identifies causes of ignition system faults.

IA Structured Question

The student will be presented with a structured question to test the understanding of knowledge relating to the recognition and diagnosis of ignition system faults.

The test will consist of 1 structured question relating to the faults in ignition systems. The question will have 3 parts allocated as follows:

- (a) identification of 5 faults
- (b) effects of 5 faults
- (c) causes of 5 faults

The following common faults should be covered:

- (i) poor starting
- (ii) misfiring
- (iv) hesitation
- (v) detonation and knocking
- (vi) high fuel consumption
- (vii) low power
- (viii) over heating
- (ix) running on
- (x) radio interference

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by the student producing at least 4 correct responses for each of (a), (b) and (c) above.

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