

**-SQA-SCOTTISH QUALIFICATIONS AUTHORITY**

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**NATIONAL CERTIFICATE MODULE DESCRIPTOR**

**-Module Number- 0084404 -Session-1988-89**  
**-Superclass- XS**

**-Title- SPARK IGNITION ENGINE: IGNITION SYSTEMS 1**  
**(x<sup>1</sup>/<sub>2</sub>)**

**-DESCRIPTION-**

**Purpose** This module is designed to develop the skills and knowledge required to service the ignition systems fitted to the general range of spark ignition engines. The module is suitable for a wide range of vocational areas e.g. agricultural engineers, industrial and marine engineers, transport engineers and is particularly appropriate for those following a career associated with mobile plant maintenance.

**Preferred Entry Level** 74003 Fundamentals of Technology  
64020 Assembly Skills  
74415 Prime Movers  
64730 Fastening and Joining: Non Thermal Methods

**Learning Outcomes** The student should:

1. know the principles of a coil ignition system;
2. know the location, function and operation of ignition system components;
3. know ignition system faults and possible causes;
4. use service procedures to dismantle, assemble and adjust coil ignition units.

**Content/ Context** Safety regulations and safe working practices and procedures should be observed at all times.

Corresponding to Learning Outcomes 1-4:

1. Requirements of ignition system. Transformer action of high tension (HT) coil. Construction and operation of coil ignition circuit with contact breaker.

2. Construction of distributor. Operation of electrical components including: (a) single contact breaker circuits; (b) twin contact breaker circuits; (c) ballast resistor circuits. Importance of ignition timing and dwell angle. Operation of automatic timing control by:

- (a) speed;
- (b) load.

Construction and selection of sparking plugs.

3. Factors affecting ignition HT voltage, symptoms of defects. Faults in low and HT circuits and affect on general performance.
4. Removal and assembly of ignition system components. Use of dwell meter and delay stroboscope. Testing of ignition circuits. Sparking plug cleaning and examination. Use of cathode-ray oscilloscope (CRO) to check operation of ignition systems. Awareness of the dangers associated with ignition HT voltages and running engines.

Suggested Learning and Teaching Approaches

This module should be partly undertaken in a classroom where students would be expected to produce a folio of information from formal and participative directed learning experiences. The use of visual aids, audio visual materials and text books is highly recommended. Practical activities should be undertaken in a service workshop with an adequate range of running engines equipped with the ignition systems to be covered. Students should have full access to relevant service publications, specialist tools and test equipment.

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 KNOW THE PRINCIPLES OF A COIL IGNITION SYSTEM

PC The student:

- (a) states two fundamental requirements of the coil ignition system;
- (b) explains the basic action of the coil ignition system;

- (c) correctly describes low and high tension circuit arrangements for a contact breaker ignition system.

#### IA Short Answer Questions

The student will be presented with questions which test recall of knowledge related to the fundamental action of a contact breaker coil ignition system.

The test will consist of 10 questions allocated as follows:

- |   |   |
|---|---|
| (a) fundamental requirements of system  | 2 |
| (b) basic action                        | 4 |
| (c) description of circuit arrangements | 4 |

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing the following correct responses:

1 from (a); and 3 from each of (b) and (c).

#### LO2 KNOW THE LOCATION, FUNCTION AND OPERATION OF IGNITION SYSTEM COMPONENTS.

PC The student:

- (a) correctly identifies all electrical components of a contact breaker ignition system;
- (b) correctly identifies all mechanical components of a distributor;
- (c) outlines the function of all electrical components in the ignition system;
- (d) describes the operation of all mechanical components of the distributor;
- (e) explains the importance of dwell angle in respect of engine speed and performance;
- (f) explains the importance of ignition timing in respect of engine speed and performance.

#### IA Short Answer Questions

The student will be presented with questions which test recall of knowledge related to the location function and operation of ignition system components.

Diagrams, photographs, and actual components may be used in the test.

The test will consist of 24 questions allocated as follows:

- |     |   |   |
|-----|---|---|
| (a) | Identification of electrical components | 6 |
| (b) | identification of mechanical components | 4 |
| (c) | function of components                  | 6 |
| (d) | description of distributor operation    | 4 |
| (e) | dwell angle                             | 2 |
| (f) | ignition timing                         | 2 |

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing the following correct responses:

5 from each of (a) and (c);  
3 from each of (b) and (d); and  
1 from each of (e) and (f).

### LO3 KNOW IGNITION SYSTEM FAULTS AND POSSIBLE CAUSES

PC The student:

- (a) correctly identifies three ignition system faults from given symptoms;
- (b) selects three possible causes for three ignition faults.

### IA Multiple Choice Questions

The student will be presented with questions which test the recall of knowledge related to the identification of ignition system faults and causes.

Each question should consist of a stem plus 4 possible responses.

The test will consist of 6 questions allocated as follows:

- |     |                          |   |
|-----|--------------------------|---|
| (a) | identification of faults | 3 |
| (b) | selection of causes      | 3 |

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing 2 correct responses to each of (a) and (b).

### LO4 USE SERVICE PROCEDURES TO DISMANTLE, ASSEMBLE AND ADJUST COIL IGNITION UNITS

PC The student:

- (a) accurately interprets service information for an ignition system;

- (b) removes and replaces one example of each of the following components:
  - (i) distributor contact breaker assembly;
  - (ii) capacitor;
  - (iii) base plate;
  - (iv) actuating cam;
  - (v) spark plug;
- (c) accurately measures and adjusts dwell angle to specification;
- (d) accurately adjusts and checks ignition timing with stroboscopic lamp;
- (e) identifies one high tension and two low tension faults from CRO patterns;
- (f) follows safe working practices relevant to the task.

#### IA Practical Exercise

The student will complete a practical exercise set under workshop conditions to demonstrate the application of knowledge and skills required to dismantle, assemble and adjust an ignition distributor and test an ignition system.

The practical test will be carried out from given instructions using data sheets, specialist tools and equipment and supported by the use of a checklist to specify the required skills and record the student's performance.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student gaining all 10 essential items (E) plus at least 1 desirable item (D) from the following checklist.

#### CHECKLIST

##### Interprets service information

- 1. Interprets and records information appropriate to ignition system E

##### Dismantles and assembles distributor

- 2. Uses correct tools D
- 3. Works methodically D
- 4. Removes components in a logical sequence E
- 5. Assembles components in a logical sequence E

##### Dwell Angle

- 6. Adjusts dwell angle to specification and records reading E

Ignition timing

- 7. Adjusts ignition timing to specification  
E
- 8. Measures mechanical advance and records reading  
D
- 9. Measures advance at specified engine speed and  
records reading E

Patterns

- 10. Identifies two low tension faults from CRO pattern E
- 11. Identifies one high tension fault from CRO pattern E

Safety requirements

- 12. Observes safety procedures associated with ignition  
systems and running engines E
- 13. Observes statutory regulations E

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