Qualification at a glance

<table>
<thead>
<tr>
<th>Subject area</th>
<th>Auto Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>City &amp; Guilds number</td>
<td>4270</td>
</tr>
<tr>
<td>Age group approved</td>
<td>16+</td>
</tr>
<tr>
<td>Entry requirements</td>
<td>There are no entry requirements</td>
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<tr>
<td>Assessment</td>
<td>Online multiple choice tests (graded Pass, Merit, Distinction), assignments (graded Pass) and portfolio of evidence</td>
</tr>
<tr>
<td>Fast track</td>
<td>Not available; automatic approval applies in some cases</td>
</tr>
<tr>
<td>Support materials</td>
<td>Centre handbook, SmartScreen, Exam Success book, Online practice tests, Practical assessment workbook, Practical training workbook</td>
</tr>
<tr>
<td>Registration and certification</td>
<td>See online catalogue/Walled Garden for last dates.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title and level</th>
<th>City &amp; Guilds number</th>
<th>Accreditation number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2 Diploma in Auto Electrical and Mobile Electrical Competence</td>
<td>4270-62</td>
<td>501/0133/X</td>
</tr>
<tr>
<td>Level 3 Diploma in Auto Electrical and Mobile Electrical Competence</td>
<td>4270-63</td>
<td>501/0129/8</td>
</tr>
<tr>
<td>Level 3 Diploma in Auto Electrical and Mobile Electrical Competence (Aftermarket Enhancement)</td>
<td>4270-63</td>
<td>501/0129/8</td>
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<table>
<thead>
<tr>
<th>Version and date</th>
<th>Change detail</th>
<th>Section</th>
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</thead>
<tbody>
<tr>
<td>2.0 Feb 2013</td>
<td>Amendments made to units (053,218,407,454,456)</td>
<td>Structure / Units</td>
</tr>
<tr>
<td>2.1 Oct 2013</td>
<td>Unit supporting information updated with introductory text</td>
<td>Units</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Unit 403</td>
<td>Competency in the overhauling of electrical units</td>
</tr>
<tr>
<td>Unit 404</td>
<td>Competency in diagnosing and rectifying engine electrical faults</td>
</tr>
<tr>
<td>Unit 405</td>
<td>Competency in diagnosing and rectifying transmission and chassis electrical faults</td>
</tr>
<tr>
<td>Unit 406</td>
<td>Competency in diagnosing and rectifying vehicle auxiliary electrical faults</td>
</tr>
<tr>
<td>Unit 407</td>
<td>Competency in fitting auxiliary locks and security devices (electrical &amp; mechanical)</td>
</tr>
<tr>
<td>Unit 408</td>
<td>Competency in inspecting vehicles using prescribed methods</td>
</tr>
<tr>
<td>Unit 409</td>
<td>Competency in identifying suitability, installation and configuration of vehicle electrical enhancements and security systems</td>
</tr>
<tr>
<td>Unit 410</td>
<td>Competency in conducting vehicle enhancement and installation consultations with customers in the motor vehicle environment</td>
</tr>
<tr>
<td>Unit 451</td>
<td>Knowledge of locating and correcting simple electrical faults in the automotive workplace</td>
</tr>
<tr>
<td>Unit 452</td>
<td>Knowledge in enhancing vehicle electrical systems</td>
</tr>
<tr>
<td>Unit 453</td>
<td>Knowledge of the overhauling of electrical units</td>
</tr>
<tr>
<td>Unit 454</td>
<td>Knowledge of diagnosis and rectification of engine electrical faults</td>
</tr>
<tr>
<td>Unit 455</td>
<td>Knowledge of diagnosis and rectification of transmission and chassis electrical faults</td>
</tr>
<tr>
<td>Unit 456</td>
<td>Knowledge of diagnosis and rectification of vehicle auxiliary electrical faults</td>
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<tr>
<td>Unit 457</td>
<td>Knowledge of fitting auxiliary locks and security devices (electrical &amp; mechanical)</td>
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<tr>
<td>Unit 458</td>
<td>Knowledge of inspecting vehicles using prescribed methods</td>
</tr>
<tr>
<td>Unit 459</td>
<td>Knowledge of the suitability, installation and configuration of vehicle electrical enhancements and security systems</td>
</tr>
<tr>
<td>Unit 460</td>
<td>Knowledge of conducting vehicle enhancement and installation consultations with customers in the motor vehicle environment</td>
</tr>
<tr>
<td>Appendix 1</td>
<td>Sources of general information</td>
</tr>
</tbody>
</table>
1 Introduction

This document tells you what you need to do to deliver the qualifications:

<table>
<thead>
<tr>
<th>Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who are the qualifications for?</td>
<td>They are for candidates wanting to develop some of the key skills and understanding in motor vehicle electrical systems. Successful candidates will have the basic skills needed to apply for an automotive apprenticeship or similar engineering pathway.</td>
</tr>
<tr>
<td>What do the qualifications cover?</td>
<td>They allow candidates to learn, develop and practise the skills required for employment and/or career progression in the automotive industry.</td>
</tr>
<tr>
<td>Are the qualifications part of a framework or initiative?</td>
<td>These qualifications are part of the Automotive Maintenance and Repair Young and Intermediate Apprenticeship Frameworks (framework 1) which will replace current framework 4 from April 2011.</td>
</tr>
<tr>
<td>Who did we develop the qualifications with?</td>
<td>They were developed in collaboration with the Institute of the Motor Industry (IMI) the sector skills council for the automotive retail industry and other awarding organisations.</td>
</tr>
</tbody>
</table>
| What opportunities for progression are there? | They allow candidates to progress into employment or to the following City & Guilds qualifications:  
- 4290-62 Level 2 Diploma in Auto Electrical and Mobile Electrical Principles  
- 4290-63 Level 3 Diploma in Auto Electrical and Mobile Electrical Principles |

Structure

<table>
<thead>
<tr>
<th>Qualification title</th>
<th>Total credits</th>
<th>Units required</th>
</tr>
</thead>
</table>
| Level 2 Diploma in Auto Electrical and Mobile Electrical Principles (4290-62) | 88 | 81 credits from mandatory units: 001, 003, 004, 051, 053, 054, 103, 153, 401, 402, 408, 451, 452, 458  
Plus a minimum of 7 credits from: 218 and 268 or 403 and 453 or 407 and 457 |
Level 3 Diploma in Auto Electrical and Mobile Electrical Competence (4290-63)

76

49 credits from mandatory units:
001, 003, 004, 051, 053, 054, 406, 408, 456, 458
Plus 23 credits from:
409, 410, 459, 460
Plus a minimum of 4 credits from:
(006 and 056), (008 and 058), (037 and 087), (404 and 454), (405 and 455), (407 and 457), (218 and 268)

Level 3 Diploma in Auto Electrical and Mobile Electrical Competence (4290-63)

85

49 credits from the mandatory units:
001, 003, 004, 051, 053, 054, 406, 408, 456, 458
Plus 32 credits from:
404, 405, 454, 455
Plus a minimum of 4 credits from:
(006 and 056), (008 and 058), (037 and 087), (407 and 457), (409 and 459), (410 and 460), (218 and 268)

<table>
<thead>
<tr>
<th>Unit accreditation number</th>
<th>City &amp; Guilds unit</th>
<th>Unit title</th>
<th>Credit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/601/6338</td>
<td>001</td>
<td>Competency in health, safety and good housekeeping in the automotive environment</td>
<td>7</td>
</tr>
<tr>
<td>K/601/6366</td>
<td>003</td>
<td>Competency in supporting job roles in the automotive work environment</td>
<td>5</td>
</tr>
<tr>
<td>Y/601/6279</td>
<td>004</td>
<td>Skills in materials, fabrication, tools and measuring devices used in the automotive environment</td>
<td>7</td>
</tr>
<tr>
<td>Y/601/6380</td>
<td>006</td>
<td>Competency in making learning possible through demonstration and instruction</td>
<td>5</td>
</tr>
<tr>
<td>K/601/6383</td>
<td>008</td>
<td>Competency in identifying and agreeing motor vehicle customer service needs</td>
<td>5</td>
</tr>
<tr>
<td>R/601/6393</td>
<td>037</td>
<td>Competency in supporting customer service improvements in the automotive sector</td>
<td>2</td>
</tr>
<tr>
<td>D/601/6171</td>
<td>051</td>
<td>Knowledge of health, safety and good housekeeping in the automotive environment</td>
<td>3</td>
</tr>
<tr>
<td>T/601/6175</td>
<td>053</td>
<td>Knowledge of support for job roles in the automotive work environment</td>
<td>3</td>
</tr>
<tr>
<td>K/601/6237</td>
<td>054</td>
<td>Knowledge of materials, fabrication, tools and measuring devices used in the automotive environment</td>
<td>4</td>
</tr>
<tr>
<td>T/601/6242</td>
<td>056</td>
<td>Knowledge of how to make learning possible through demonstration and instruction</td>
<td>5</td>
</tr>
<tr>
<td>R/601/6247</td>
<td>058</td>
<td>Knowledge of how to identify and agree motor vehicle customer service needs</td>
<td>5</td>
</tr>
<tr>
<td>Code</td>
<td>Number</td>
<td>Title</td>
<td>Credits</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>M/601/6255</td>
<td>087</td>
<td>Knowledge of supporting customer service improvements in the automotive sector</td>
<td>2</td>
</tr>
<tr>
<td>Y/601/3771</td>
<td>103</td>
<td>Competency in removing and replacing light vehicle electrical units and components</td>
<td>10</td>
</tr>
<tr>
<td>T/601/3731</td>
<td>153</td>
<td>Knowledge of removing and replacing light vehicle electrical units and components</td>
<td>6</td>
</tr>
<tr>
<td>K/601/6108</td>
<td>218</td>
<td>Competency in removing and fitting basic light vehicle mechanical, electrical and trim (MET) components and non permanently fixed vehicle body panels</td>
<td>5</td>
</tr>
<tr>
<td>J/601/3751</td>
<td>268</td>
<td>Knowledge of removing and fitting basic light vehicle mechanical, electrical and trim (MET) components and non permanently fixed vehicle body panels</td>
<td>2</td>
</tr>
<tr>
<td>H/601/6057</td>
<td>401</td>
<td>Competency in locating and correcting simple electrical faults in the automotive workplace</td>
<td>10</td>
</tr>
<tr>
<td>K/601/6061</td>
<td>402</td>
<td>Competency in enhancing vehicle electrical systems</td>
<td>10</td>
</tr>
<tr>
<td>J/601/6066</td>
<td>403</td>
<td>Competency in the overhauling of electrical units</td>
<td>10</td>
</tr>
<tr>
<td>Y/601/6069</td>
<td>404</td>
<td>Competency in diagnosis and rectifying engine electrical faults</td>
<td>10</td>
</tr>
<tr>
<td>D/601/6073</td>
<td>405</td>
<td>Competency in diagnosing and rectifying transmission and chassis electrical faults</td>
<td>10</td>
</tr>
<tr>
<td>L/601/3749</td>
<td>406</td>
<td>Competency in diagnosing and rectifying vehicle auxiliary electrical faults</td>
<td>10</td>
</tr>
<tr>
<td>D/601/6106</td>
<td>407</td>
<td>Competency in fitting auxiliary locks and security devices (electrical &amp; mechanical)</td>
<td>5</td>
</tr>
<tr>
<td>T/601/6046</td>
<td>408</td>
<td>Competency in inspecting vehicles using prescribed methods</td>
<td>3</td>
</tr>
<tr>
<td>H/601/6110</td>
<td>409</td>
<td>Competency in identifying suitability, installation and configuration of vehicle electrical enhancements and security systems</td>
<td>10</td>
</tr>
<tr>
<td>M/601/6112</td>
<td>410</td>
<td>Competency in conducting vehicle enhancement and installation consultations with customers in the motor vehicle environment</td>
<td>5</td>
</tr>
<tr>
<td>K/601/6013</td>
<td>451</td>
<td>Knowledge of locating and correcting simple electrical faults in the automotive workplace</td>
<td>6</td>
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<tr>
<td>F/601/6017</td>
<td>452</td>
<td>Knowledge in enhancing vehicle electrical systems</td>
<td>6</td>
</tr>
<tr>
<td>L/601/6022</td>
<td>453</td>
<td>Knowledge of the overhauling of electrical units</td>
<td>6</td>
</tr>
<tr>
<td>R/601/6023</td>
<td>454</td>
<td>Knowledge of diagnosis and rectification of engine electrical faults</td>
<td>6</td>
</tr>
<tr>
<td>Y/601/6024</td>
<td>455</td>
<td>Knowledge of diagnosis and rectification of transmission and chassis electrical faults</td>
<td>6</td>
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</table>

City & Guilds Level 2 and 3 Diploma in Auto Electrical and Mobile Electrical Competence (4270-62/63)
<table>
<thead>
<tr>
<th>Code</th>
<th>Unit</th>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>A/601/3746</td>
<td>456</td>
<td>Knowledge of diagnosis and rectification of vehicle auxiliary electrical faults</td>
<td>5</td>
</tr>
<tr>
<td>K/601/6027</td>
<td>457</td>
<td>Knowledge of fitting auxiliary locks and security devices (electrical &amp; mechanical)</td>
<td>3</td>
</tr>
<tr>
<td>M/601/6028</td>
<td>458</td>
<td>Knowledge of inspecting vehicles using prescribed methods</td>
<td>1</td>
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<tr>
<td>T/601/6029</td>
<td>459</td>
<td>Knowledge of the suitability, installation and configuration of vehicle electrical enhancements and security systems</td>
<td>6</td>
</tr>
<tr>
<td>M/601/6031</td>
<td>460</td>
<td>Knowledge of conducting vehicle enhancement and installation consultations with customers in the motor vehicle environment</td>
<td>2</td>
</tr>
</tbody>
</table>

Full qualification certificates will be awarded to successful candidates on completion of the required combinations of units. Candidates completing one or more units, rather than the full qualification(s), will receive a Certificate of Unit Credit (CUC).
2 Centre requirements

Approval
Centres already approved to offer the Level 2 NVQ in Maintenance and Repair – Auto Electrical (4101-04) will be automatically approved to register and certificate candidates on the 4270-62 (unless the centre is already subject to sanctions).

Centres already approved to offer the Level 3 NVQ in Maintenance and Repair – Auto Electrical (4101-09) will be automatically approved to register and certificate candidates on the 4270-63 (unless the centre is already subject to sanctions).

For all other cases, centres will need to gain both centre and qualification approval. Please refer to the Centre Manual - Supporting Customer Excellence for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualifications before designing a course programme.

Physical resources and site agreements
Centres must have access to sufficient equipment in the college, training centre or workplace to ensure candidates have the opportunity to cover all of the practical activities.

Centre staffing
Staff delivering this qualification must be able to demonstrate that they meet the following occupational expertise requirements. They should:
- be occupationally competent or technically knowledgeable in the areas for which they are delivering training and/or have experience of providing training. This knowledge must be to the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.

Centre staff may undertake more than one role, eg tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Assessors and internal verifiers
All assessors must:
- have sufficient and relevant technical/occupational competence in the unit, at or above the level of the unit being assessed
• have in depth knowledge of the qualification or credit based unit evidence requirements.

• hold or be working towards a relevant assessors' award as specified by the Sector Skills Council. This will include, but not be limited to the Assessor qualifications, Level 3 Award in Understanding the Principles and Practices of Assessment, Level 3 Award in Assessing Competence in the Work Environment, Level 3 Award in Assessing Vocationally Related Achievement, Level 3 Certificate in Assessing Vocational Achievement. (and by implication legacy Assessor units A1, A2 and D32/33 unit) but may be an appropriate equivalent as defined by the SSC).

  • assessors working towards a relevant assessor qualification must achieve their qualification within 12 months.

• demonstrate knowledge and understanding of the competencies that a learner is required to demonstrate for the qualification that they are undertaking

• provide evidence of completing 5 days working/job shadowing in industry within their professional area in a 24 month period.

• provide evidence of 30 hours of technical/qualification related CPD within a 12 month period. (This is in additional to working / job shadowing).

All internal verifiers must:

• have in-depth knowledge of the occupational standards and credit based unit evidence requirements.

• be occupationally aware of the relevant industry sector being internally verified

• hold or be working towards a relevant verifier award as specified by the Sector Skills Council. This will include, but not be limited to the Quality Assurance qualifications Level 4 Award in Understanding the Internal Quality Assurance of Assessment Processes and Practice, Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practice, Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice, (and by implication legacy Internal Verifier unit V1 D34 unit) but may be an appropriate equivalent as defined by the Sector Skills Council.

• achieve their relevant verifier qualification within 12 months.

• provide evidence of CPD totalling not less than 30 hours from within their professional area within a 12 month period.

**Continuing professional development (CPD)**

Centres must support their staff to ensure that they have current knowledge of the occupational area, that delivery, mentoring, training, assessment and verification is in line with best practice, and that it takes account of any national or legislative developments.
Candidate entry requirements
City & Guilds does not set entry requirements for these qualifications. However, centres must ensure that candidates have the potential and opportunity to gain the qualifications successfully.

Please note that for funding purposes, candidates should not be entered for a qualification of the same type, content and level as that of a qualification they already hold.

Age restrictions
There is no age restriction for these qualifications unless this is a legal requirement of the process or the environment.

Guidance on risk management of pre-16 candidates
Centres offering these qualifications to learners under the age of 16 must assume responsibility for the safe delivery of the qualification. This will include those units that require using and working with power tools and machinery and using and working under lifts and hoists.

In order to ensure that the risk related to the delivery and assessment of this qualification is managed appropriately, City & Guilds requires the Head of Centre to provide a satisfactory risk assessment. The risk assessment should outline those activities within the units which, specific to the centre, may pose a risk or hazard to the safety of the candidate and identify how these risks/hazards will be managed to reduce or alleviate risk.

The risk assessment should be forwarded to your local City & Guilds regional office to be held on file. A copy should be retained by the centre and made available to a City & Guilds external verifier or representative on request.
3 Delivering the qualification

Initial assessment and induction
An initial assessment of each candidate should be made before the start of their programme to identify:

- if the candidate has any specific training needs
- support and guidance they may need when working towards their qualification
- any units they have already completed, or credit they have accumulated which is relevant to the qualification
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the candidate fully understands the requirements of the qualification, their responsibilities as a candidate, and the responsibilities of the centre. This information can be recorded on a learning contract.

Support materials
The following resources are available for these qualifications:

<table>
<thead>
<tr>
<th>Description</th>
<th>How to access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre handbook</td>
<td><a href="http://www.cityandguilds.com/automotive">www.cityandguilds.com/automotive</a></td>
</tr>
<tr>
<td>Practical assessment workbook</td>
<td><a href="http://www.cityandguilds.com/automotive">www.cityandguilds.com/automotive</a></td>
</tr>
<tr>
<td>Practical training workbook</td>
<td><a href="http://www.cityandguilds.com/automotive">www.cityandguilds.com/automotive</a></td>
</tr>
<tr>
<td>Exam Success book</td>
<td>Walled Garden (TL024290)</td>
</tr>
<tr>
<td>Online practice tests</td>
<td>Walled Garden</td>
</tr>
<tr>
<td>SmartScreen</td>
<td><a href="http://www.smartscreen.co.uk">www.smartscreen.co.uk</a></td>
</tr>
</tbody>
</table>
4 Assessment

City & Guilds has written the following assessments to use with this qualification:

- Assignments (practical assessment workbooks) comprising of practical tasks and knowledge based questions to cover learning outcomes. Graded Pass only.
- Online multiple choice tests graded as Pass, Merit, Distinction.

Assignments can be downloaded from [www.cityandguilds.com/automotive](http://www.cityandguilds.com/automotive). These assessments are carried out in centres and must be completed to current industry standards and practice. It is important to note that although the units within these qualifications bear a close relationship to the VCQ units, they do not imply occupational competence.

**Time constraints**

The following must be applied to the assessment of this qualification: Candidates must complete their assessments within their registration period.

**Test specifications**

Summary test specifications for all 4270 online tests can be found in the ‘Automotive online test specifications’ document, downloadable from the 4270 website.
5 Units

Structure of units
These units each have the following:
- City & Guilds reference number
- unit accreditation number (UAN)
- title
- level
- credit value
- unit aim
- relationship to NOS
- learning outcomes which are comprised of a number of assessment criteria
- unit range.
Unit 001 Competency in health, safety and good housekeeping in the automotive environment

UAN: A/601/6338
Level: 2
Credit value: 7
GLH: 60
Relationship to NOS: This unit is linked to G1 Contribute to Housekeeping in Motor Vehicle Environment and G2 Reduce Risks to Health and Safety in the Motor Vehicle Environment.

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit helps the learner to develop the skills required to carry out the routine maintenance and cleaning of the automotive environment and to use resources economically. Also to adhere to health and safety legislation and duties of everyone in the motor vehicle environment.

It will provide an appreciation of significant risks in the automotive environment and how to identify and deal with them. Once completed the learner will be able to identify hazards and evaluate and reduce risk.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>be able to use correct personal and vehicle protection within the automotive work environment</td>
</tr>
</tbody>
</table>

Assessment criteria

The learner can:

1.1 select and use personal protective equipment throughout activities. To include appropriate protection of:
   a. eyes
   b. ears
   c. head
   d. skin
   e. feet
   f. hands
   g. lungs

1.2 select and use vehicle protective equipment throughout all activities.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to carry out effective housekeeping practices in the automotive work environment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
</tr>
<tr>
<td>2.2</td>
</tr>
<tr>
<td>2.3</td>
</tr>
<tr>
<td>2.4</td>
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<td>2.5</td>
</tr>
<tr>
<td>2.6</td>
</tr>
<tr>
<td>2.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to recognise and deal with dangers in order to work safely within the automotive workplace</td>
</tr>
</tbody>
</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
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<tbody>
<tr>
<td>3.1</td>
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<td>3.4</td>
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<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>4.</td>
<td>be able to conduct themselves responsibly</td>
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</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
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</thead>
<tbody>
<tr>
<td>4.1</td>
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<td>4.2</td>
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</table>
# Unit 003

**Competency in supporting job roles in the automotive work environment**

<table>
<thead>
<tr>
<th>UAN:</th>
<th>K/601/6366</th>
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<tbody>
<tr>
<td>Level:</td>
<td>3</td>
</tr>
<tr>
<td>Credit value:</td>
<td>5</td>
</tr>
<tr>
<td>GLH:</td>
<td>40</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to G3 Maintain Working Relationships in the Motor Vehicle Environment.</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
</tbody>
</table>

**Aim:**

This unit will help the learner develop the skills required to keep good working relationships with all colleagues and customers in the automotive work environment by using effective communication and support.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>be able to work effectively within the organisational structure of the automotive work environment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

1.1 respond promptly and willingly to requests for assistance from customers and colleagues

1.2 refer customers and colleagues to the correct person should requests fall outside their responsibility and capability.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to obtain and use information in order to support their job role within the automotive work environment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

2.1 select and use legal and technical information, in an automotive work environment.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to communicate with and support colleagues and customers effectively within the automotive work environment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

- 3.1 use methods of communication with customers and colleagues which meet their needs
- 3.2 give customers and colleagues accurate information
- 3.3 make requests for assistance from or to customers and colleagues clearly and courteously.
- 3.4 report any anticipated delays in completion to the relevant persons promptly

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to develop and keep good working relationships in the automotive work environment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

- 4.1 contribute to team work by initiating ideas and co-operating with customers and colleagues
- 4.2 treat customers and colleagues in a way which shows respect for their views and opinions
- 4.3 make and keep achievable commitments to customers and colleagues
- 4.4 inform colleagues promptly of anything likely to affect their own work.
Unit 004  
Skills in materials, fabrication, tools and measuring devices in the automotive environment

<table>
<thead>
<tr>
<th>UAN:</th>
<th>Y/601/6279</th>
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</thead>
<tbody>
<tr>
<td>Level:</td>
<td>2</td>
</tr>
<tr>
<td>Credit value:</td>
<td>7</td>
</tr>
<tr>
<td>GLH:</td>
<td>60</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to G4 Use of hand tools and equipment in motor vehicle engineering.</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
</tbody>
</table>

**Aim:**
This unit helps the learner to develop the skills required for:
- the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment
- the correct preparation and use of common work environment equipment
- the correct selection and fabrication of materials used when modifying and repairing
- the correct application of automotive engineering fabrication and fitting principles.

**Learning outcome**
The learner will:

1. be able to select, maintain and use hand tools and measuring devices in the automotive environment

**Assessment criteria**
The learner can:

1.1 select, maintain and use suitable hand tools safely when fabricating and fitting in the automotive workplace
1.2 select, maintain and use suitable measuring devices safely when fabricating and fitting in the automotive environment
1.3 select, maintain and use suitable PPE for fabrication, repair and fitting in the automotive environment
1.4 select, maintain and use suitable electrical measuring tools safely when repairing vehicles and components.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to prepare and use common workshop equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 use suitably maintained workshop equipment safely
2.2 use correct interpretation of ‘safe working load’ on lifting and supporting equipment
2.3 report any faulty or damaged tools and equipment to the relevant persons clearly and promptly
2.4 store work tools and equipment in a safe manner which permits ease of access and identification for use.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to select materials when fabricating, modifying and repairing vehicles and fitting components</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 select and use appropriate materials whilst constructing, fitting, modifying or repairing vehicles and components.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

4.1 use correct procedures when:
   a. filing
   b. tapping threads
   c. cutting plastics and metals
   d. drilling plastics and metals
   e. fitting
4.2 use appropriate techniques when fabricating, repairing and modifying vehicles and components
4.3 select and use:
   a. gaskets
   b. seals
   c. sealants
   d. fittings and fasteners
4.4 apply modification and repair techniques to automotive electrical circuits
4.5 select and use locking, fixing and fastening devices.
Unit 006 Competency in making learning possible through demonstrations and instruction

<table>
<thead>
<tr>
<th>UAN:</th>
<th>Y/601/6380</th>
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</thead>
<tbody>
<tr>
<td>Level:</td>
<td>3</td>
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<tr>
<td>Credit value:</td>
<td>5</td>
</tr>
<tr>
<td>GLH:</td>
<td>40</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to G4 Use of hand tools and equipment in motor vehicle engineering.</td>
</tr>
</tbody>
</table>

**Assessment requirements specified by a sector or regulatory body:**
This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

**Aim:**
This unit covers the skills needed in order to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners’ progress and giving feedback.

**Learning outcome**

<table>
<thead>
<tr>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. be able to demonstrate skills and methods to learners</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

1.1 perform demonstrations based on an analysis of the skills needed and the order in which they must be learned
1.2 perform demonstrations that are accurate and realistic
1.3 perform structured demonstrations so that the learner can get the most out of it
1.4 perform demonstrations whilst encouraging learners to ask questions and get explanation at appropriate stages in the demonstration
1.5 provide positive feedback to learners whilst they are being given the opportunity to practice the skills that have been demonstrated
1.6 perform additional demonstrations of skills being taught to reinforce learning
1.7 perform demonstrations in a safe environment which also allows learners to see clearly
1.8 respond to the needs of the learners during demonstrations
1.9 reduce distractions and disruptions as much as possible.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to instruct learners</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 implement instruction which is matched to the needs of learners
2.2 use identified learning outcomes which can be achieved through instruction
2.3 perform instruction, ensuring that the manner, level and speed of the instruction encourages learners to take part
2.4 perform instruction whilst regularly checking that the learners understand and adapt instruction as appropriate
2.5 give learners positive feedback on the learning experience and the outcomes achieved
2.6 carry out a review with the learners to identify anything that prevented learning and adapt instruction as appropriate.
Unit 008  Competency in identifying and agreeing motor vehicle customer service needs

<table>
<thead>
<tr>
<th>UAN:</th>
<th>K/601/6383</th>
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</thead>
<tbody>
<tr>
<td>Level:</td>
<td>3</td>
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<tr>
<td>Credit value:</td>
<td>5</td>
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<tr>
<td>GLH:</td>
<td>40</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to G8 Identify and agree the motor vehicle customer needs.</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
</tbody>
</table>

**Aim:**
This unit is about the competency required to: gain information from customers on their perceived needs; give advice and information and agree a course of action; contract for the agreed work and complete all necessary records and instructions.

**Learning outcome**
1. be able to obtain relevant information from the customer

**Assessment criteria**
The learner can:
1.1 obtain and interpret sufficient, relevant information, from the customer to make an assessment of their needs
1.2 clarify customer and vehicle needs by referring to vehicle data and operating procedures.

**Learning outcome**
2. be able to provide relevant information to the customer

**Assessment criteria**
The learner can:
2.1 provide customers with accurate, current and relevant advice and information, in a form that the customer will understand
2.2 demonstrate techniques which encourage customers to ask questions and seek clarification during conversation.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to agree work undertaken with the customer</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 summarise and record work agreed with the customer, before accepting the vehicle
3.2 implement confirmation of the agreement by ensuring customer understanding.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to ensure recording systems are implemented correctly</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

4.1 use recording systems which are accurate and complete, in the required format and signed by the customer where necessary
4.2 perform the next stage in the process by passing on completed records to the correct person promptly
4.3 demonstrate correct procedures for customer approval where the contracted agreement is likely to be exceeded.
# Unit 037

**Competency in supporting customer service improvements in the automotive sector**

<table>
<thead>
<tr>
<th><strong>UAN:</strong></th>
<th>R/601/6393</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level:</strong></td>
<td>2</td>
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<tr>
<td><strong>Credit value:</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>GLH:</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>Relationship to NOS:</strong></td>
<td>This unit is linked to G37C Demonstrating Competence in Supporting Customer Service Improvements in the Automotive Sector</td>
</tr>
<tr>
<td><strong>Assessment requirements specified by a sector or regulatory body:</strong></td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>This unit will enable the learner develop competency in Supporting Customer Service Improvement in the Automotive Sector.</td>
</tr>
</tbody>
</table>

## Learning outcome

The learner will:

1. use feedback to identify potential customer service improvements

## Assessment criteria

The learner can:

1.1 gather informal feedback from their customers
1.2 use customer feedback procedures to collect information from the customers
1.3 use the information from customers to develop a better understanding of the customer’s experience
1.4 identify ways the service they give could be improved based on information they have gathered
1.5 share their ideas for improving customer service with colleagues.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
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<tbody>
<tr>
<td>2.</td>
<td>implement changes in customer service</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 identify a possible change that could be made to improve customer service
2.2 present their idea for improving customer service to a colleague with the appropriate authority to approve the change
2.3 carry out changes to customer service procedures based on their own idea or proposed by the organisation
2.4 keep their customers informed of changes to customer service
2.5 give customers a positive impression of changes that have been made
2.6 work positively with others to support customer service changes.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>3.</td>
<td>assist with the evaluation of changes in customer service</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 discuss with others how changes to customer service are working
3.2 work with others to identify any negative effects of changes and how these can be avoided.
Unit 051  
Knowledge of health, safety and good housekeeping in the automotive environment

<table>
<thead>
<tr>
<th>UAN:</th>
<th>D/601/6171</th>
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<tbody>
<tr>
<td>Level:</td>
<td>2</td>
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<tr>
<td>Credit value:</td>
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</tr>
<tr>
<td>GLH:</td>
<td>30</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to G1 Contribute to Housekeeping in Motor Vehicle Environment and G2 Reduce Risks to Health and Safety in the Motor Vehicle Environment.</td>
</tr>
</tbody>
</table>

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit enables the learner to develop an understanding of:

- routine maintenance and cleaning of the automotive environment and using resources economically
- health and safety legislation and duties of everyone in the motor vehicle environment. It will provide an appreciation of significant risks in the automotive environment and how to identify and deal with them. Once completed the learner will be able to identify hazards and evaluate and reduce risk.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>understand the correct personal and vehicle protective equipment to be used within the automotive environment</td>
</tr>
</tbody>
</table>

Assessment criteria
The learner can

1.1 explain the importance of wearing the types of PPE required for a range automotive repair activities
1.2 identify vehicle protective equipment for a range of repair activities
1.3 describe vehicle and personal safety considerations when working at the roadside.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td>understand effective housekeeping practices in the automotive environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner can</td>
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<td>2.7</td>
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<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>3.</td>
<td>understand key health and safety requirements relevant to the automotive environment</td>
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</table>

<table>
<thead>
<tr>
<th>Assessment criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner can</td>
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<tr>
<td>3.1</td>
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<tr>
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<td>3.3</td>
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<td>3.4</td>
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<tr>
<td>Learning outcome</td>
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<tr>
<td>4.</td>
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</tbody>
</table>

**Assessment criteria**

The learner can

4.1 identify key hazards and risks in an automotive environment  
4.2 describe policies and procedures for reporting hazards, risks, health and safety matters in the automotive environment  
4.3 state precautions and procedures which need to be taken when working with vehicles, associated materials, tools and equipment  
4.4 identify fire extinguishers in common use and which types of fire they should be used on  
4.5 identify key warning signs and their characteristics that are found in the vehicle repair environment  
4.6 state the meaning of common product warning labels used in an automotive environment.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>5.</td>
<td>understand personal responsibilities</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

5.1 explain the importance of personal conduct in maintaining the health and safety of the individual and others  
5.2 explain the importance of personal presentation in maintaining health safety and welfare.
Unit 051 Knowledge of health, safety and good housekeeping in the automotive environment

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Economic use of resources
a. Consumable materials eg grease, oils, split pins, locking and fastening devices.

Requirement to maintain work area effectively
a. Cleaning tools and equipment to maximise workplace efficiency.
b. Requirement to carry out the housekeeping activities safely and in a way that minimises inconvenience to customers and staff.
c. Risks involved when using solvents and detergents.
d. Advantages of good housekeeping.

Spillages, leaks and waste materials
a. Relevance of safe systems of work to the storage and disposal of waste materials.
b. Requirement to store and dispose of waste, used materials and debris correctly.
c. Safe disposal of special / hazardous waste materials.
d. Advantages of recycling waste materials.
e. Dealing with spillages and leaks.

Basic legislative requirements
a. Provision and Use of Work Equipment Regulations 1992
b. Power Presses Regulations 1992
c. Pressure Systems and Transportable Gas Containers Regulations 1989
d. Electricity at Work Regulations 1989
e. Noise at Work Regulations 1989
g. Health and Safety (Display Screen Equipment) Regulations 1992
h. Abrasive Wheel Regulations
i. Safe Working Loads
j. Working at Height Regulations.

Routine maintenance of the workplace
a. Trainee’s personal responsibilities and limits of their authority with regard to work equipment.
b. Risk assessment of the workplace activities and work equipment.
c. Workplace person responsible for training and maintenance of workplace equipment.
d. When and why safety equipment must be used.
e. Location of safety equipment.
f. Particular hazards associated with their work area and equipment.
g. Prohibited areas.
h. Plant and machinery that trainees must not use or operate.
i. Why and how faults on unsafe equipment should be reported.
j. Storing tools, equipment and products safely and appropriately.
k. Using the correct PPE.
l. Following manufacturers' recommendations.
m. Location of routine maintenance information e.g. electrical safety check log.

**Legislation relevant to Health and Safety**

a. HASAWA  
b. COSHH  
c. EPA  
e. PPE Regulations 1992.

**General regulations to include an awareness of:**

a. Health and Safety (Display Screen Equipment) Regulations 1992  
b. Health and Safety (First Aid) Regulations 1981  
c. Health and Safety (Safety Signs and Signals) Regulations 1996  
d. Health and Safety (Consultation with Employees) Regulations 1996  
f. Confined Spaces Regulations 1997  
g. Noise at Work Regulations 1989  
h. Electricity at Work Regulations 1989  
i. Electricity (Safety) Regulations 1994  
j. Fire Precautions Act 1971  
k. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985  
l. Pressure Systems Safety Regulations 2000  
m. Waste Management 1991  
n. Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002  
o. Control of Asbestos at Work Regulations 2002.

**Legislative duties**

a. The purpose of a Health and Safety Policy.  
b. The relevance of the Health and Safety Executive.  
c. The relevance of an initial induction to Health and Safety requirements at your workplace.  
d. General employee responsibilities under the HASAWA and the consequences of non-compliance.  
e. General employer responsibilities under the HASAWA and the consequences of non-compliance.
f. The limits of authority with regard to Health and Safety within a personal job role.

g. Workplace procedure to be followed to report Health and Safety matters.

**Precautions to be taken when working with vehicles, workshop materials, tools and equipment including electrical safety, pneumatics and hydraulics**

a. Accessing and interpreting safety information.
b. Seeking advice when needed.
c. Seeking assistance when required.
d. Reporting of unsafe equipment.
e. Storing tools, equipment and products safely and appropriately.
f. Using the correct PPE.
g. Following manufacturers’ recommendations.
h. Following application procedures e.g. hazardous substances.
i. The correct selection and use of extraction equipment.

**PPE to include:**

a. Typical maintenance procedures for PPE equipment to include:
   i. typical maintenance log
   ii. cleaning procedures
   iii. filter maintenance
   iv. variation in glove types
   v. air quality checks.
b. Choice and fitting procedures for masks and air breathing equipment.
c. Typical workplace processes which would require the use of PPE to include:
   i. welding
   ii. sanding and grinding
   iii. filling
   iv. panel removal and replacement
   v. drilling
   vi. cutting
   vii. chiselling
   viii. removal of broken glass
   ix. removal of rubber seals from fire damaged vehicles
   x. removal of hypodermic needles
   xi. servicing activities
   xii. roadside recovery.
d. Unserviceable PPE.
e. PPE required for a range of automotive repair activities. To include appropriate protection of:
   i. eyes
   ii. ears
   iii. head
   iv. skin
   v. feet
   vi. hands
   vii. lungs.

**Fire and extinguishers**
a. Classification of fire types.
b. Using a fire extinguisher effectively.
c. Types of extinguishers:
   i. foam
   ii. dry powder
   iii. CO2
   iv. water
   v. fire blanket.

**Action to be taken in the event of a fire to include:**

a. The procedure as:
   i. raise the alarm
   ii. fight fire only if appropriate
   iii. evacuate building
   iv. call for assistance.

**Product warning labels to include:**

a. Reasons for placing warning labels on containers.
b. Warning labels in common use
   i. toxic
   ii. corrosive
   iii. poisonous
   iv. harmful
   v. irritant
   vi. flammable
   vii. explosive.

**Warning signs and notices**

a. Colours used for warning signs:
   i. red
   ii. blue
   iii. green.
b. Shapes and meaning of warning signs:
   i. round
   ii. triangular
   iii. square.
c. The meaning of prohibitive warning signs in common use.
d. The meaning of mandatory warning signs in common use.
e. The meaning of warning notices in common use.
f. General design of safe place warning signs.

**Hazards and risks to include:**

a. The difference between a risk and a hazard.
b. Potential risks resulting from:
   i. the use and maintenance of machinery or equipment
   ii. the use of materials or substances
   iii. accidental breakages and spillages
   iv. unsafe behaviour
   v. working practices that do not conform to laid down policies
   vi. environmental factors
   vii. personal presentation
viii. unauthorised personnel, customers, contractors etc entering the work premises
ix. working by the roadside
x. vehicle recovery.
c. The employee's responsibilities in identifying and reporting risks within their working environment.
d. The method of reporting risks that are outside own limits of authority.
e. Potential causes of:
   i. fire
   ii. explosion
   iii. noise
   iv. harmful fumes
   v. slips
   vi. trips
   vii. falling objects
   viii. accidents whilst dealing with broken down vehicles.

Personal responsibilities
a. The purpose of workplace polices and procedures on:
   i. the use of safe working methods and equipment
   ii. the safe use of hazardous substances
   iii. smoking, eating, drinking and drugs
   iv. emergency procedures
   v. personal appearance.
b. The importance of personal appearance in the control of health and safety.

Action to be taken in the event of colleagues suffering accidents
a. The typical sequence of events following the discovery of an accident such as:
   i. make the area safe
   ii. remove hazards if appropriate i.e. switch off power
   iii. administer minor first aid
   iv. take appropriate action to re-assure the injured party
   v. raise the alarm
   vi. get help
   vii. report on the accident.
b. Typical examples of first aid which can be administered by persons at the scene of an accident:
   i. check for consciousness
   ii. stem bleeding
   iii. keep the injured person's airways free
   iv. place in the recovery position if injured person is unconscious
   v. issue plasters for minor cuts
   vi. action to prevent shock i.e. keep the injured party warm
   vii. administer water for minor burns or chemical injuries
   viii. wash eyes with water to remove dust or ingress of chemicals (battery acid)
   ix. need to seek professional help for serious injuries.
c. Examples of bad practice which may result in further injury such as:
   i. moving the injured party
ii. removing foreign objects from wounds or eyes
iii. inducing vomiting
iv. straightening deformed limbs.
Unit 053  Knowledge of support for job roles in the automotive work environment

<table>
<thead>
<tr>
<th>UAN:</th>
<th>T/601/6175</th>
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</thead>
<tbody>
<tr>
<td>Level:</td>
<td>3</td>
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<tr>
<td>Credit value:</td>
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<tr>
<td>GLH:</td>
<td>20</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to G3 Maintain Working Relationships in the Motor Vehicle Environment.</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
<tr>
<td>Aim:</td>
<td>This unit enables the learner to develop an understanding of how to keep good working relationships with all colleagues in the automotive work environment by using effective communication and support skills.</td>
</tr>
</tbody>
</table>

**Learning outcome**  | **The learner will:**
--- | ---
1. understand key organisational structures, functions and roles within the automotive work environment

**Assessment criteria**

The learner can:

1.1 identify the purpose of the different sections of a typical automotive work environment
1.2 explain organisational structures and lines of communication within the automotive work environment
1.3 explain levels of responsibility within specific job roles in an automotive workplace. To include:
   a. trainee
   b. skilled technician
   c. supervisor
   d. manager.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. understand the importance of obtaining, interpreting and using information in order to support their job role within the automotive work environment</td>
<td></td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 explain the importance of different sources of information in an automotive work environment

2.2 explain how to find, interpret and use relevant sources of information

2.3 describe the main legal requirements relating to the vehicle, including road safety requirements

2.4 explain the importance of working to recognised procedures and processes

2.5 explain when replacement units and components must meet the manufacturers’ original equipment specification

2.6 explain how to use identification codes.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. understand the importance of different types of communication within the automotive work environment</td>
<td></td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 explain where different methods of communication would be used within the automotive environment

3.2 explain the factors which can determine their choice of communication

3.3 explain how the communication of information can change with the target audience to include informed and uninformed people.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>4. understand communication requirements when carrying out vehicle repairs in the automotive work environment</td>
<td></td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

4.1 explain how to report using written and verbal communication

4.2 explain the importance of documenting information relating to work carried out in the automotive environment

4.3 explain the importance of working to agreed timescales.
## Learning outcome

The learner will:

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>understand how to develop good working relationships with colleagues and customers in the automotive workplace</td>
</tr>
</tbody>
</table>

## Assessment criteria

The learner can:

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>describe how to develop positive working relationships with colleagues and customers</td>
</tr>
<tr>
<td>5.2</td>
<td>explain the importance of developing positive working relationships</td>
</tr>
<tr>
<td>5.3</td>
<td>explain the importance of accepting other peoples' views and opinions</td>
</tr>
<tr>
<td>5.4</td>
<td>explain the importance of making and honouring realistic commitments to colleagues and customers.</td>
</tr>
</tbody>
</table>
Unit 053 Knowledge of support for job roles in the automotive work environment

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The structure of a typical vehicle repair business
a. How these areas relate to each other within the business:
   i. body shop
   ii. vehicle repair workshop
   iii. paint shop
   iv. valeting
   v. vehicle parts store
   vi. main office
   vii. vehicle sales
   viii. reception.

Sources of information:
 a. other staff
 b. manuals
 c. parts lists
 d. computer software and the internet
 e. manufacturer
 f. diagnostic equipment.

Communication requirements when carrying out vehicle repairs
a. Locating and using correct documentation and information for:
   i. recording vehicle maintenance and repairs
   ii. vehicle specifications
   iii. component specifications
   iv. oil and fluid specifications
   v. equipment and tools
   vi. identification codes.

b. Procedures for:
   i. referral of problems
   ii. reporting delays
   iii. additional work identified during repair or maintenance
   iv. keeping others informed of progress.
c. Methods of communication:
  i. verbal
  ii. signs and notices
  iii. memos
  iv. telephone
  v. electronic mail
  vi. vehicle job card
  vii. notice boards
  viii. SMS text messaging
  ix. letters.

d. Organisational and customer requirements:
  i. importance of time scales to customer and organization
  ii. relationship between time and costs
  iii. meaning of profit.

e. Choice of communication
  i. distance
  ii. location
  iii. job responsibility.

f. Importance of maintaining positive working relationships:
  i. morale
  ii. productivity
  iii. company image
  iv. customer relationships
  v. colleagues.
Unit 054  Knowledge of materials, fabrication, tools and measuring devices in the automotive environment

UAN: K/601/6237
Level: 2
Credit value: 4
GLH: 40
Relationship to NOS: This unit is linked to G4 Use of hand tools and equipment in Motor Vehicle Engineering.

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit enables the learner to develop an understanding of:
- the correct selection, care and use of key hand tools and measuring devices for modification, fabrication and repair in the automotive environment
- the correct preparation and use of common work environment equipment
- the correct selection and fabrication of materials used when modifying and repairing
- the correct application of automotive engineering fabrication and fitting principles

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>understand how to select, use and care for hand tools and measuring devices in the automotive environment</td>
</tr>
</tbody>
</table>

Assessment criteria

The learner can:
1.1 identify and explain the use of common types of hand tools used for fabricating and fitting in the automotive environment
1.2 identify and explain the use of common measuring devices used for fabrication and fitting in the automotive environment
1.3 describe, within the scope of their responsibilities, how to select, prepare and maintain hand tools, measuring devices and PPE used for fabrication, repair and fitting in the automotive environment
1.4 state the limitations of common hand tools and measuring devices used for fabricating, repair and fitting in the automotive workplace
# Learning outcome The learner will:

## 2. understand how to prepare and use common workshop equipment

### Assessment criteria

The learner can:

- 2.1 describe the preparation and safe use of workshop equipment
- 2.2 explain the term: safe working load.

## Learning outcome The learner will:

### 3. understand how to select materials when fabricating, modifying and repairing vehicles and fitting components

### Assessment criteria

The learner can:

- 3.1 describe the properties, application and limitations of ferrous and non-ferrous metals, including their safe use
- 3.2 describe the properties, application and limitations of common non-metallic materials, including their safe use
- 3.3 define common terms relating to the properties of materials

## Learning outcome The learner will:

### 4. understand how to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components

### Assessment criteria

The learner can:

- 4.1 describe how to tap threads, file, cut and drill plastics and metals when modifying or repairing vehicles
- 4.2 describe how to measure, mark out, shape and join materials when fabricating
- 4.3 describe the selection and fitting procedures of the following:
  - a. gaskets and seals
  - b. sealants and adhesives
  - c. fittings and fasteners
  - d. electrical circuit components
- 4.4 identify locking, fastening and fixing devices
- 4.5 state the importance of current operating specifications for limits, fits and tolerances in the automotive environment.
Unit 054 Knowledge of materials, fabrication, tools and measuring devices in the automotive environment

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

**Common types of hand tools used for fabricating and fitting in the automotive workplace** to include:

a. files
b. hacksaws and snips
c. hammers
d. screwdrivers
e. pliers
f. spanners
g. sockets
h. punches
i. types of drill and drill bits
j. taps and dies
k. stud removers
l. marking out tools.

**Common measuring devices used for fabrication and fitting in the automotive environment**. To include:

a. rule or tape
b. callipers
c. feeler gauge
d. volume measures
e. micrometer
f. dial gauges
g. torque wrenches
h. depth gauges

**Common electrical measuring tools used in the repair of vehicles and components**. To include:

a. ammeter
b. voltmeter
c. ohmmeter
d. multi-meter.

**Common electrical terms when measuring**:
a. voltage
b. current
c. resistance.

Workshop equipment (including appropriate PPE) to include:

a. hydraulic jacks
b. axle stands
c. pillar drills
d. air tools
e. vehicle lifts
f. cranes
g. hoists
h. electrical power tools.

The properties, application and limitations (to include safe use) of ferrous and non-ferrous metals used when constructing, modifying and repairing vehicles and components

Materials to include:

a. carbon steels
b. alloy steels
c. cast iron
d. aluminium alloys
e. brass
f. copper
g. lead.

Properties, application and limitations (to include safe use) of non-metallic materials used when constructing, modifying and repairing vehicles and components. Materials to include:

a. glass
b. plastics (inc. GRP)
c. Kevlar
d. rubber.

Terms relating to the properties of materials to include:

a. hardness
b. toughness
c. ductility
d. elasticity
e. tenacity
f. malleability
g. plasticity.
### Unit 056

**Knowledge of how to make learning possible through demonstrations and instruction**

<table>
<thead>
<tr>
<th>UAN:</th>
<th>T/601/6242</th>
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<tbody>
<tr>
<td><strong>Level:</strong></td>
<td>Level 3</td>
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<tr>
<td><strong>Credit value:</strong></td>
<td>5</td>
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<tr>
<td><strong>GLH:</strong></td>
<td>45</td>
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<tr>
<td><strong>Relationship to NOS:</strong></td>
<td>This unit is linked to G6 Enable Learning through Demonstration and Instruction.</td>
</tr>
<tr>
<td><strong>Assessment requirements specified by a sector or regulatory body:</strong></td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>This unit enables the learner to develop an understanding of how to carry out demonstrations and instruction which will help the learner to learn. It includes demonstrating equipment, showing skills, giving instruction, deciding when to use demonstration or instruction, potential of technology based learning, checking on learners' progress and giving feedback.</td>
</tr>
</tbody>
</table>

### Learning outcome

**The learner will:**

1. understand the nature and role of demonstrations and instruction

### Assessment criteria

The learner can:

1.1 classify the separate areas of demonstrations which encourage learning
1.2 identify which types of learning are best achieved and supported through demonstrations
1.3 explain how to identify and use different learning opportunities
1.4 explain how to structure demonstrations and instruction sessions
1.5 explain how to choose from a range of demonstration techniques.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>2.</td>
<td>understand the principles and concepts of demonstration and instruction</td>
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</table>

**Assessment criteria**

The learner can:

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>2.1</td>
<td>describe how to put learners at ease and encourage them to take part</td>
</tr>
<tr>
<td>2.2</td>
<td>justify the choice between demonstration and instruction as a learning method</td>
</tr>
<tr>
<td>2.3</td>
<td>explain how to identify individual learning needs</td>
</tr>
<tr>
<td>2.4</td>
<td>clarify which factors are likely to prevent learning and how to overcome them</td>
</tr>
<tr>
<td>2.5</td>
<td>explain how to check learners' understanding and progress</td>
</tr>
<tr>
<td>2.6</td>
<td>explain how to choose and prepare appropriate materials</td>
</tr>
<tr>
<td>2.7</td>
<td>explain the separate areas of instructional techniques which encourage learning</td>
</tr>
<tr>
<td>2.8</td>
<td>describe which types of learning are best achieved and supported through instruction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>3.</td>
<td>understand the external factors influencing human resource development</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

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<tbody>
<tr>
<td>3.1</td>
<td>explain how to make sure everybody acts in line with health, safety and environmental protection, legislation and best practice</td>
</tr>
<tr>
<td>3.2</td>
<td>analyse developments in technology based learning and new ways of delivery.</td>
</tr>
</tbody>
</table>
Unit 056  Knowledge of how to make learning possible through demonstrations and instruction

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Separate areas of demonstration which encourage learning to include:

a. Demonstration is particularly applicable to learning manual skills.
b. Learning to do something usually involves:
   i. purpose – the aim or objective
   ii. procedure - the most effective way of completing the task
   iii. practice – all skills require practice to improve
c. Practical tasks are more quickly learnt through demonstration.
d. Emphasis is required to body movements when demonstrating.
e. The demonstrator should encourage learners to ask questions.
f. Emphasis should be placed upon key points whilst demonstrating.
g. Any demonstration should ensure that all safety aspects are covered.

Types of learning which are best achieved and supported through demonstrations to include:

a. Types of learning:
   i. psychomotor – measurement of manual skill performance
   ii. cognitive – learning involving thought processes
   iii. affective – demonstration of feelings, emotions or attitudes.
b. Demonstration - involves learning to do something (Psychomotor Domain).
c. Combination of instruction and practical demonstrations are very effective means of learning practical skills.

How to structure demonstration and instruction sessions to include:

a. Before the demonstration and/or instruction ensure that the following good practice is recognised:
   i. identify key points
   ii. relate theoretical underpinning knowledge to key points
   iii. rehearse to ensure that all equipment is working
   iv. ensure all students can see even small equipment and processes
   v. time the demonstration
   vi. consider how to make students participate
   vii. consider how to emphasise safe working practices.
b. During the demonstration and/or instruction good practice is to:
   i. give a clear introduction
   ii. identify any tools/equipment
   iii. determine the current audience level of knowledge
   iv. complete the demonstration correctly (do not show how not to do it)
   v. stress key points and show links between them
   vi. monitor safety aspects
   vii. check learner understanding.

c. After the demonstration (if possible)
   i. enable the audience to practice the techniques
   ii. provide feedback on their performance.

**How to identify individual learning needs**

a. Diagnose the learning needs of your audience to include:
   i. what competencies they already have
   ii. what experience they have of the subject area
   iii. what competencies they need to achieve
   iv. what demonstration techniques are best suited to their needs
   v. how you will assess their needs have been met.

**What factors are likely to prevent learning** to include:

a. language barriers
b. physical barriers
c. specialist knowledge
d. pace of learning
e. method of delivery
f. environmental factors
g. teaching styles
h. dyslexia.

**How to check learner’s understanding and progress**

a. Questionnaires.
b. Verbal questioning.
c. Observation.
d. Assessment.
e. Role play.
f. Projects/assignments.
g. Multi-choice questions.
h. Simulation.
i. Tests.

**How to organise information and prepare materials**

a. Identify the course aim.
b. Identify the subject aim.
c. Identify the lesson aim.
d. Complete a lesson plan - plan the teaching.
e. Identify a series of ‘cues’ to be used during the lesson.
f. Logically organise the information.
g. Use suitable resources and equipment to maximise learning opportunities.

h. Assess the learner’s progress and understanding.

**Instructional techniques**

a. Types of instructional techniques to include:
   i. lectures
   ii. handouts
   iii. team teaching
   iv. peer teaching
   v. discussion – individual, group and peer
   vi. question and answer
   vii. multimedia
   viii. seminars
   ix. case studies
   x. project/assignments

**Environmental factors that affect learning**

a. Environmental factors that should be considered before demonstration/instruction to include:
   i. loud noises
   ii. bright colours
   iii. bright lights
   iv. strong smells
   v. atmosphere
   vi. temperature
   vii. classroom seating
   viii. classroom layout

**Health and safety factors that affect learning**

a. Health and safety factors that should be considered before demonstration/instruction to include:
   i. assessment of risk and hazards
   ii. condition of electrical/electronic equipment
   iii. position of cables and wires
   iv. safety of equipment used in demonstration/instruction
   v. condition of classroom equipment/furniture/structure
   vi. suitable protective clothing/equipment.

**Analysis of demonstration/instruction**

a. Analysis of demonstration/instruction to include:
   i. feedback from students
   ii. feedback from colleagues
   iii. organisational quality assessment
   iv. feedback from external organisations
   v. awarding body requirements.
Developments in learning. To include:
  a. multimedia based materials
  b. web based materials
  c. interactive materials.

How to choose and prepare appropriate materials. To include:
  a. putting information in order
  b. deciding whether the language used is appropriate
  c. type of material i.e. paper and technology based.
Unit 058 Knowledge of how to identify and agree motor vehicle customer service needs

UAN: R/601/6247
Level: 3
Credit value: 5
GLH: 45
Relationship to NOS: This unit is linked to G8 Identify and agree the motor vehicle customer needs.

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit enables the learner to develop an understanding of how to gain: information from customers on their perceived needs; give advice and information and agree a course of action; contract for the agreed work and complete all necessary records and instructions.

Learning outcome The learner will:

1. understand legislative and organisational requirements and procedures

Assessment criteria

The learner can:

1.1 describe the fundamental legal requirements of current consumer legislation and the consequences of their own actions in respect of this legislation
1.2 describe the content and limitations of company and product warranties for the vehicles dealt with by their company
1.3 explain the limits of their own authority for accepting vehicles
1.4 explain the importance of keeping customers informed of progress
1.5 describe their workplace requirements for the completion of records
1.6 explain how to complete and process all the necessary documentation.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>2.</td>
<td>understand how to communicate and care for customers</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 explain how to communicate effectively with customers
2.2 describe how to adapt their language when explaining technical matters to non-technical customers
2.3 explain how to use effective questioning techniques
2.4 describe how to care for customers and achieve customer satisfaction.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>3.</td>
<td>understand company products and services</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 describe the range of options available to resolve vehicle problems
3.2 describe the range and type of services offered by their company
3.3 explain the effect of resource availability upon the receipt of customer vehicles and the completion work
3.4 explain how to access costing and work completion time information.
Unit 058  Knowledge of how to identify and agree motor vehicle customer service needs

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Organisational requirements
a. Explain the organisation's terms and conditions applicable to the acceptance of customer vehicles.
b. Explain the content and limitations of vehicle and component warranties for the vehicles dealt with by your organisation.
c. Detail what, if any, limits there are to the authority for accepting vehicles.
d. Detail why it is important to keep customers advised of progress and how this is achieved within the organisation.
e. Detail the organisation’s procedures for the completion and processing of documentation and records, including payment methods and obtaining customer signatures as applicable.

Principles of customer communication and care
a. First impressions.
b. Listening skills – 80:20 ratio.
c. Eye contact and smiling.
d. Showing interest and concern.
e. Questioning techniques and customer qualification.
f. Giving clear non-technical explanations.
g. Confirming understanding (statement/question technique, reflective summary).
h. Written communication – purpose, content, presentation and style.
i. Providing a high quality service – fulfilling (ideally exceeding) customer expectations within agreed time frames.
j. Obtaining customer feedback and corrective actions when dissatisfaction expressed.
k. Dealing with complaints.

Company products and services
a. Service standards:
   i. national
   ii. manufacturer
   iii. organisational.
b. The range and type of services offered by the organisation:
   i. diagnostic
   ii. servicing
   iii. repair
   iv. warranty
   v. MOT testing
   vi. fitment of accessories/enhancements
   vii. internal.

c. The courses of action available to resolve customer problems:
   i. the extent and nature of the work to be undertaken
   ii. the terms and conditions of acceptance
   iii. the cost
   iv. the timescale
   v. required payment methods.

d. The effect of resource availability upon the receipt of customer vehicles and the completion of work:
   i. levels and availability of equipment
   ii. levels and availability of technicians
   iii. workshop loading systems.

e. How to access costing and work completion time information:
   i. manuals
   ii. computer based.

Vehicle information systems, servicing and repair requirements
a. Accessing technical data including diagnostics.
b. Servicing to manufacturer requirements/standards.
c. Repair/operating procedures.
d. MOT standards/requirements.
e. Quality controls – interim and final.
f. Requirements for cleanliness of vehicle on return to customer.
g. Handover procedures.

Consumer legislation to include:
a. consumer protection
b. sale of goods
c. data protection
d. product liability
e. health and safety
f. discrimination.
Unit 087  
Knowledge of supporting customer service improvements in the automotive sector

<table>
<thead>
<tr>
<th>UAN:</th>
<th>M/601/6255</th>
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<tbody>
<tr>
<td>Level:</td>
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<td>GLH:</td>
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<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
<tr>
<td>Aim:</td>
<td>This unit will enable the learner develop knowledge in Supporting Customer Service Improvement in the Automotive Sector.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>understand how to support customer service improvements</td>
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</table>

<table>
<thead>
<tr>
<th>Assessment criteria</th>
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</thead>
<tbody>
<tr>
<td>The learner can:</td>
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<td>1.1</td>
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<td>1.2</td>
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<td>1.3</td>
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<td>1.4</td>
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</tbody>
</table>
Unit 103  Competency in removing and replacing light vehicle electrical units and components

UAN:  Y/601/3771
Level:  2
Credit value:  10
GLH:  90
Relationship to NOS:  This unit is linked to LV03 Remove and Replace Light Vehicle Electrical Units and Components.

Assessment requirements specified by a sector or regulatory body:  This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim:  This unit allows the learner to develop skills to remove and replace light vehicle engine system components. It also covers the evaluation of performance of the replaced units and systems.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>be able to work safely when carrying out removal and replacement activities</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can
1.1 use suitable personal protective equipment and vehicle coverings when working on light vehicle electrical systems and components
1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can
2.1 select suitable sources of technical information to support light vehicle electrical unit and component removal and replacement activities including:
   a. vehicle technical data
   b. removal and replacement procedures
   c. legal requirements
2.2 use technical information to support light vehicle electrical unit and component removal and replacement activities.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to use appropriate tools and equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

3.1 select the appropriate tools and equipment necessary for removal and replacement of motor vehicle electrical system components
3.2 ensure that equipment has been calibrated to meet manufacturers’ and legal requirements
3.3 use the tools and equipment in the way specified by manufacturers to remove and replace motor vehicle electrical systems.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to carry out removal and replacement of light vehicle electrical units and components.</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

4.1 remove and replace the motor vehicle’s electrical systems and components, adhering to the specifications and tolerances for the vehicle and following:
   a. the manufacturer's approved removal and replacement methods
   b. recognised researched repair methods
   c. health and safety requirements
4.2 ensure that replacement motor vehicle electrical units and components conform to the vehicle operating specification and any legal requirements
4.3 use suitable testing methods to evaluate the performance of the reassembled system
4.4 ensure that the reassembled motor vehicle electrical systems perform to the vehicle operating specification and meets any legal requirements.
4.5 complete all the system diagnostic activities within the agreed timescale

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>5.</td>
<td>be able to record information and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
5.2 make suitable and justifiable recommendations for cost effective repairs
5.3 identify and report any expected delays in completion to the relevant person(s) promptly in the format required
5.4 record and report any additional faults noticed during the course of their work promptly in the format required.
Unit 153  Knowledge of removing and replacing light vehicle electrical units and components

UAN: T/601/3731
Level: 2
Credit value: 6
GLH: 45
Relationship to NOS: This unit is linked to LV03 Remove and Replace Light Vehicle Electrical Units and Components.

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit enables the learner to develop an understanding of the principles, construction and operation and testing methods of common electrical and electronic systems and components. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

Learning outcome The learner will:
1. understand light vehicle electrical and electronic principles

Assessment criteria
1.1 identify electrical symbols and units found in light vehicle circuits
1.2 describe how to interpret simple light vehicle wiring diagrams
1.3 describe the operation of key light vehicle circuit protection devices and why these are necessary
1.4 describe earthing principles and earthing methods
1.5 identify the use of different cables and connectors used in light vehicle circuits
1.6 describe the operation of electrical and electronic sensors and actuators and their application
1.7 describe the key electrical and electronic control principles that are related to light vehicle electrical circuits
1.8 state common terms used in light vehicle electrical circuits.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>2.</td>
<td>understand how light vehicle batteries, starting and charging systems operate</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

2.1 identify light vehicle batteries, starting and charging system components
2.2 describe the construction and operation of light vehicle batteries, starting and charging system components
2.3 describe how to remove and replace batteries, starting and charging system units and components
2.4 compare light vehicle batteries, starting and charging system components and assemblies against alternatives to identify differences in construction and operation
2.5 state common terms used in conjunction with light vehicle batteries, starting and charging systems.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>understand how light vehicle auxiliary electrical systems operate</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

3.1 identify light vehicle auxiliary system components
3.2 describe the construction and operation of light vehicle auxiliary systems. Auxiliary systems to include:
   a. lighting
   b. wiper
   c. security and alarm
   d. comfort and convenience
   e. information and entertainment
   f. telephone and two-way communication
   g. electric window
   h. monitoring and instrumentation
3.3 compare key light vehicle auxiliary system components and assemblies against alternatives to identify differences in construction and operation
3.4 state common terms used in light vehicle auxiliary system design.
<table>
<thead>
<tr>
<th><strong>Learning outcome</strong></th>
<th><strong>The learner will:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>understand how to check, replace and test light vehicle electrical systems and components</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

4.1  describe how to remove and replace light vehicle electrical system units and components

4.2  describe common types of testing methods used to check the operation of light vehicle electrical systems and components and their purpose

4.3  explain how to test and evaluate the performance of replacement units against specifications

4.4  identify common faults found in light vehicle electrical systems and components.
Unit 153  Knowledge of removing and replacing light vehicle electrical units and components

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Electrical/electronic principles

a. Electrical units:
   i. volt (electrical pressure)
   ii. ampere (electrical current)
   iii. ohm (electrical resistance)
   iv. watt (power).

b. The requirements for an electrical circuit:
   i. battery
   ii. cables
   iii. switch
   iv. current consuming device
   v. continuity.

c. The direction of current flow and electron flow.

d. Series and parallel circuits to include:
   i. current flow
   ii. voltage of components
   iii. volt drop
   iv. resistance.
   v. the effect on circuit operation of open circuit component(s).

e. Earth and insulated return systems.

f. Cable sizes and colour codes.

g. Different types of connectors, terminals and circuit protection devices.

h. Common electrical and electronic symbols.

i. The meaning of:
   i. short circuit
   ii. open circuit
   iii. bad earth
   iv. high resistance
   v. electrical capacity.

j. The principles of vehicle electronic systems and components.

k. Interpret vehicle wiring diagrams to include:
   i. vehicle lighting
   ii. auxiliary circuits
iii. indicators
iv. starting and charging systems.
l. Function and construction of electrical components including:
i. circuit relays
ii. bulb types
iii. fan and heater
iv. circuit protection.
m. The safety precautions when working on electrical and electronic systems to include:
i. disconnection and connection of battery
ii. avoidance of short circuits
iii. power surges
iv. prevention of electric shock
v. protection of electrical and electronic components
vi. protection of circuits from overload or damage.
n. The set-up and use of:
i. digital and analogue multi-meters
ii. voltmeter
iii. ammeter
iv. ohmmeter
v. oscilloscope
vi. manufacturer’s dedicated test equipment.
o. Electrical and electronic checks for electrical and electronic systems to include:
i. connections
ii. security
iii. functionality
iv. performance to specifications
v. continuity, open circuit
vi. short circuit
vii. high resistance
viii. volt drop
ix. current consumption
x. output patterns (oscilloscope).
p. Symptoms and faults associated with electrical and electronic systems to include:
i. high resistance
ii. loose and corroded connections
iii. short circuit
iv. excessive current consumption
v. open circuit
vi. malfunction
vii. poor performance
viii. battery faults to include flat battery
ix. failure to hold charge
x. low state of charge
xi. overheating
xii. poor starting.

**Battery and charging**
a. The construction and operation of vehicle batteries including:
   i. low maintenance and maintenance free
   ii. lead acid and nickel cadmium types
   iii. cells
   iv. separators
   v. plates
   vi. electrolyte.

b. The operation of the vehicle charging system:
   i. alternator
   ii. rotor
   iii. stator
   iv. slip ring
   v. brush assembly
   vi. three phase output
   vii. diode rectification pack
   viii. voltage regulation
   ix. phased winding connections
   x. cooling fan
   xi. alternator drive system.

Starting
a. The layout, construction and operation of engine starting systems:
   inertia and pre-engaged principles.

b. The function and operation of the following components:
   i. inertia and pre-engaged starter motor
   ii. starter ring gear
   iii. pinion
   iv. starter solenoid
   v. ignition/starter switch
   vi. starter relay (if appropriate)
   vii. one-way clutch (pre-engaged starter motor).

Lighting
a. Function and construction of electrical components including:
   i. front and tail lamps
   ii. main and dip beam headlamps
   iii. fog and spot lamps
   iv. lighting and dip switch
   v. directional indicators.

b. The circuit diagram and operation of components for:
   i. side and tail lamps
   ii. headlamps
   iii. interior lamps
   iv. fog and spot lamps
   v. direction indicators.

c. The statutory requirements for vehicle lighting when using a vehicle
   on the road.

d. Headlamp adjustment and beam setting.

Auxiliary systems
a. Function and construction of electrical components including:
   i. central door locking
   ii. anti theft devices
   iii. manual locking and dead lock systems
   iv. window winding
   v. demisting systems
   vi. door mirror operation mechanisms
   vii. interior lights and switching
   viii. sun roof operation.

b. The circuit diagram and operation of components for:
   i. central door locking
   ii. anti theft devices
   iii. manual locking and dead lock systems
   iv. window winding
   v. demisting systems
   vi. door mirror operation mechanisms
   vii. sun roof operation.

c. Comfort and convenience systems to include:
   i. heated seats
   ii. electrically adjusted seats
   iii. heated screens
   iv. electric mirrors
   v. heating
   vi. climate control
   vii. air conditioning.

**General**

a. The preparation, testing and use of:
   i. tools and equipment
   ii. electrical meters and equipment used for dismantling
   iii. removal and replacement of electrical and electronic systems and components.

b. Appropriate safety precautions:
   i. PPE
   ii. vehicle protection when dismantling
   iii. removal of and replacing electrical and electronic components and systems.

c. The importance of logical and systematic processes.

d. Preparation of replacement units for re-fitting or replacement electrical and electronic components and systems.

e. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance, safety requirements.

f. Refitting procedures.

g. The inspection and testing of units and systems to ensure compliance with manufacturer’s, legal and performance requirements.

h. Inspection and re-instatement of the vehicle following repair to ensure:
   i. customer satisfaction
   ii. cleanliness of vehicle interior and exterior
   iii. security of components and fittings
   iv. re-instatement of components and fittings.
Unit 218 Competency in removing and fitting basic light vehicle mechanical, electrical and trim (MET) components and non permanently fixed vehicle body panels

<table>
<thead>
<tr>
<th>UAN:</th>
<th>J/601/3751</th>
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</thead>
<tbody>
<tr>
<td>Level:</td>
<td>2</td>
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<tr>
<td>Credit value:</td>
<td>5</td>
</tr>
<tr>
<td>GLH:</td>
<td>40</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to BP18 Remove and Fit Basic Motor Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Motor Vehicle Body Panels.</td>
</tr>
</tbody>
</table>

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit allows the learner to demonstrate they can carry out a range of removal and fitting of basic mechanical, electrical and trim (MET) components and non permanently fixed light vehicle body panels. It also covers the evaluation of the operation of the components when fitted.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>1.</td>
<td>be able to work safely when carrying out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels</td>
</tr>
</tbody>
</table>

Assessment criteria

The learner can

1.1 use suitable personal protective equipment and vehicle coverings throughout all light vehicle removal and fitting of basic MET components and non-permanently fixed light vehicle body panels

1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.
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<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

2.1 select suitable sources of technical information to support light vehicle removal and fitting activities including:
   a. vehicle technical data
   b. removal and fitting procedures
   c. legal requirements

2.2 use technical information to support light vehicle removal and fitting activities.

<table>
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<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>3.</td>
<td>be able to use appropriate tools and equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

3.1 select the appropriate tools and equipment necessary for carrying out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels

3.2 ensure that equipment has been calibrated to meet manufacturers’ and legal requirements

3.3 use the correct tools and equipment in the way specified by manufacturers when carrying out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels.

<table>
<thead>
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<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>4.</td>
<td>be able to carry out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

4.1 remove and fit basic MET components and non-permanently fixed light vehicle body panels

4.2 ensure that the removal and fitting of basic MET components and non-permanently fixed light vehicle body panels conforms to the vehicle operating specification and any legal requirements

4.3 ensure no damage occurs to other components when carrying out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels

4.4 ensure all components and panels are stored safely and in the correct location.

4.5 complete all activities within the agreed timescale.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>5.</td>
<td>be able to record information and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

- **5.1** produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
- **5.2** make suitable and justifiable recommendations for cost effective repairs
- **5.3** identify and report any expected delays in completion to the relevant person(s) promptly in the format required
- **5.4** record and report any additional faults noticed during the course of their work promptly in the format required.
Unit 268  Knowledge of removing and fitting basic light vehicle mechanical, electrical and trim (MET) components and non permanently fixed vehicle body panels

<table>
<thead>
<tr>
<th>UAN:</th>
<th>F/601/3747</th>
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<tbody>
<tr>
<td>Level:</td>
<td>2</td>
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<tr>
<td>Credit value:</td>
<td>2</td>
</tr>
<tr>
<td>GLH:</td>
<td>20</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to BP18 Remove and Fit Basic Motor Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Motor Vehicle Body Panels.</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
</tbody>
</table>

Aim: This unit enables the learner to develop an understanding of carrying out a range of removal and fitting of basic mechanical, electrical and trim (MET) components and non-permanently fixed light vehicle body panels. It also covers the evaluation of the operation of the components when fitted.

Learning outcome | The learner will:
1. understand how to carry out removal and fitting of basic light vehicle mechanical electrical and trim (MET) components

Assessment criteria

The learner can
1.1 identify the procedures involved in carrying out the systematic removal and fitting of basic light vehicle MET components to the standard required including:
   a. bumpers
   b. headlamp units
   c. road wheels
   d. batteries
   e. bonnet and boot trim
   f. interior trim components
   g. exterior trim components
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>understand how to carry out removal and fitting of basic light vehicle non permanently fixed vehicle body panels</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

<table>
<thead>
<tr>
<th>2.1</th>
<th>identify the procedures involved in carrying out the systematic removal and fitting of basic light vehicle non-welded, non-structural body panels to the standard required including:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. wings</td>
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<tr>
<td></td>
<td>b. doors</td>
</tr>
<tr>
<td></td>
<td>c. bonnets</td>
</tr>
<tr>
<td></td>
<td>d. boot lids and tailgates</td>
</tr>
<tr>
<td></td>
<td>e. bumper bars, covers and components</td>
</tr>
<tr>
<td>2.2</td>
<td>identify the procedures involved in working with supplementary safety systems when fitting basic light vehicle non-welded, non-structural body panels</td>
</tr>
<tr>
<td>2.3</td>
<td>explain the methods and procedures for storing removed light vehicle non-welded, non-structural body panels</td>
</tr>
<tr>
<td>2.4</td>
<td>identify the different types of fastenings and fixings used when removing and fitting light vehicle non-welded, non-structural body panels</td>
</tr>
<tr>
<td>2.5</td>
<td>explain the reasons for the use of different types of fastenings and fixings used in light vehicle non-welded, non-structural body panels</td>
</tr>
<tr>
<td>2.6</td>
<td>explain the procedures, methods and reasons for ensuring correct alignment of light vehicle non-welded, non-structural body panels</td>
</tr>
<tr>
<td>2.7</td>
<td>identify the quality checks that can be used to ensure correct alignment and operation of light vehicle non-welded, non-structural body panels</td>
</tr>
<tr>
<td>2.8</td>
<td>identify correct conformity of vehicle systems against light vehicle specification and legal requirements on completion</td>
</tr>
<tr>
<td>2.9</td>
<td>explain the procedure for reporting cosmetic damage to light vehicle non-welded, non-structural body panels.</td>
</tr>
</tbody>
</table>
Unit 268 Knowledge of removing and fitting basic light vehicle mechanical, electrical and trim (MET) components and non permanently fixed vehicle body panels

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Describe procedures to prevent damage to the vehicle, components and contents when removing, storing and refitting basic MET components
a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage:
   i. bumpers
   ii. headlamp units
   iii. road wheels
   iv. batteries
   v. bonnet and boot trim
   vi. interior trim components
   vii. exterior trim components.
b. The procedures for the correct storage of vehicle contents.
c. The process for the reporting of extra damage and items that may have broken when removed or refitted.

The processes involved when handling batteries
a. The procedure for the removal, storage and refitting of lead acid batteries.
b. The procedure for the disposal of lead acid batteries.
c. Battery checks:
   i. electrolyte
   ii. discharge
   iii. specific gravity.
d. The charging process and procedures:
   i. trickle charge
   ii. normal charge
   iii. boost/start.
e. The health and safety issues involved when charging (explosive gases).

Types of clips and fixings
a. The following types of clips and identify reasons and limitations for their use:
   i. speed
b. The following types of fixings and identify reasons and limitations for their use:
   i. pop rivet
   ii. plastic rivet
   iii. plastic capture nut
   iv. nut and bolt
   v. souldor bolt
   vi. ‘Nyloc’ type nuts
   vii. washers
   viii. ‘Spring’ type washers
   ix. self tapping screws and bolts
   x. quick release plastic trim fastenings
   xi. trim tapes
   xii. adhesives and sealers.

The processes involved when carrying out quality checks
a. Items that may have been ‘workshop’ soiled and describe processes for rectifying:
   i. door cards
   ii. seats
   iii. carpets
   iv. boot and bonnet trims
b. Methods for checking gaps.
   c. The process for checking and aligning headlamps:
      i. address handling procedures for halogen bulbs
      ii. address handling and health and safety issues relating to xenon bulbs and systems.
d. Operational checks and rectification methods to include:
   i. lights
   ii. washers and wipers
   iii. SRS systems (checking not rectification)
   iv. charging system (checking not rectification)
   v. horn
   vi. fluid levels
   vii. interior switches
   viii. operation of door lock mechanisms.

Removing and Fitting Non-Structural Body Panels
a. Find, interpret and use sources of information applicable to the removal and fitting of basic non welded non-structural body panels.
b. Select check and use all the tools and equipment required to remove and fit basic non welded non-structural body panels including:
   i. hinge pin removers
   ii. spanners
   iii. screwdrivers.
c. The different types of mechanical fixings for non welded non-structural body panels and when and why they should be used including:
   i. bolts
ii. self tapping bolts
iii. speed nuts
iv. washers.

d. The correct procedures and processes for removing and fitting of non-welded non-structural body panels.

e. The need for correct alignment of panels and methods to achieve this:
   i. aperture gaps
   ii. alignment of panel features
   iii. best fit of components to panels
   iv. vehicle geometry
   v. operation of openings such as doors, tailgates, bonnets etc.

f. The types of quality control checks that can be used to ensure correct alignment and contour of panels and operation of components to manufacturer's specification.

g. The method of storing removed panels and the importance of storing them correctly.
Unit 401  Competency in locating and correcting simple electrical faults in the automotive workplace

<table>
<thead>
<tr>
<th>UAN:</th>
<th>H/601/6057</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level:</td>
<td>2</td>
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<tr>
<td>Credit value:</td>
<td>10</td>
</tr>
<tr>
<td>GLH:</td>
<td>90</td>
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<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to AE01S</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
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</tbody>
</table>

Aim: This unit will help the learner to demonstrate and conduct a range of routine electrical tests and identifying simple faults on a variety of basic electrical components and undertaking suitable correction activities.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>be able to work safely when carrying out electrical testing techniques and rectification activities</td>
</tr>
</tbody>
</table>

Assessment criteria

The learner can
1.1 use suitable personal protective equipment and vehicle coverings throughout when carrying out vehicle electrical testing and rectification activities
1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

Assessment criteria

The learner can
2.1 select suitable sources of technical information to support the identification of electrical faults, by reviewing:
   a technical data
   b diagnostic test procedures
2.2 use technical information to support the identification of electrical faults.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to use appropriate tools and equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can
3.1 select the appropriate tools and equipment necessary for carrying out electrical testing techniques and rectification activities
3.2 ensure that equipment has been calibrated to meet manufacturers’ and legal requirements
3.3 use the correct tools and equipment in the way specified by manufacturers when carrying out electrical testing techniques and rectification activities.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to carry out electrical testing techniques and activities</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can
4.1 carry out a functionality test of the electrical system and or component
4.2 use electrical testing methods that are suitable for assessing the performance of the electrical system and or components concerned
4.3 carry out all diagnostic and rectification activities following:
   a. manufacturers’ instructions
   b. recognised researched repair methods
   c. workplace procedures
   d. health and safety requirements
4.4 ensure all electrical testing techniques clearly identifies the cause of the identified faults
4.5 seek assistance of the relevant person promptly where the results of the testing are unclear
4.6 ensure all repaired and replaced electrical components are secure and function as specified by the manufacturer or any legal requirements
4.7 dispose of any removed electrical components safely to comply with legal requirements and workplace procedures.
4.8 complete all electrical fault location and correction activities within the agreed timescale.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>be able to record information and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can
5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
5.2 make suitable and justifiable recommendations for cost effective repairs
5.3 record and report any additional faults noticed during the course of their work promptly in the format required
5.4 record and report any additional faults noticed during the course of their work promptly in the format required
Unit 402  Competency in enhancing vehicle electrical systems

UAN: K/601/6061
Level: 2
Credit value: 10
GLH: 90
Relationship to NOS: This unit is linked to AE02S.

Assessment requirements specified by a sector or regulatory body:
This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim:
This unit will help the learner to develop the skills required to demonstrate they can carry out a range of vehicle enhancement activities to improve the original vehicle features and specification and to meet customer requirements.

Learning outcome The learner will:
1. be able to work safely when carrying out vehicle electrical enhancement activities

Assessment criteria
The learner can:
1.1 use suitable personal protective equipment and vehicle coverings throughout when carrying out vehicle electrical enhancement activities
1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome The learner will:
2. be able to use relevant information to carry out the task

Assessment criteria
The learner can:
2.1 select suitable sources of technical information to support the vehicle enhancement activities, by reviewing manufacturer:
   a. technical data
   b. fitting procedures
   c. legal requirements
2.2 use technical information to support the vehicle enhancement activities.
### Learning outcome | The learner will:
--- | ---
3. | be able to use appropriate tools and equipment

### Assessment criteria
The learner can:
- 3.1 select the appropriate tools and equipment necessary for carrying out vehicle enhancement activities:
- 3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements
- 3.3 use the correct tools and equipment in the way specified by manufacturers when carrying out vehicle enhancement activities.

### Learning outcome | The learner will:
--- | ---
4. | be able to carry out vehicle electrical enhancement activities

### Assessment criteria
The learner can:
- 4.1 ensure prior to fitment that components are compatible with the vehicle specification and the customers requirements
- 4.2 carry out all vehicle enhancement activities following:
  - a. manufacturers’ instructions
  - b. legal requirements
  - c. workplace procedures
  - d. health and safety requirements
- 4.3 ensure when necessary that adjustments to components and systems are carried out to ensure correct and effective operation
- 4.4 ensure all enhanced vehicle electrical components are secure and function as specified by the manufacturer or any legal requirements.
- 4.5 complete all overhaul enhancement activities with agreed timescales

### Learning outcome | The learner will:
--- | ---
5. | be able to record information and make suitable recommendations

### Assessment criteria
The learner can:
- 5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
- 5.2 make suitable and justifiable recommendations for cost effective repairs
- 5.3 identify and report any expected delays in completion to the relevant persons promptly in the format required.
- 5.4 record and report any additional faults noticed during the course of their work promptly in the format required.
# Unit 403  Competency in the overhauling of electrical units

<table>
<thead>
<tr>
<th>UAN:</th>
<th>J/601/6066</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level:</td>
<td>2</td>
</tr>
<tr>
<td>Credit value:</td>
<td>10</td>
</tr>
<tr>
<td>GLH:</td>
<td>90</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to AE03S.</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
</tbody>
</table>

**Aim:** This unit will help the learner to develop the skills required to demonstrate overhaul of starting and charging units.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>be able to work safely when overhauling electrical components.</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

1.1 use suitable personal protective equipment and vehicle coverings throughout when overhauling vehicle electrical components

1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 select suitable sources of technical information to support the electrical overhaul activities, by reviewing manufacturers:

a. technical data  
b. manufacturers overhauling procedures  
c. test procedures

2.2 use technical information to support the electrical overhaul activities.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to use appropriate tools and equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 select the appropriate tools and equipment necessary for carrying out the electrical overhaul activities

3.2 check that equipment has been calibrated to meet manufacturers’ and legal requirements

3.3 use the correct tools and equipment in the way specified by manufacturers when carrying out electrical overhaul activities.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to overhaul electrical components.</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

4.1 ensure initial assessment and testing methods of electrical units identifies accurately the condition and suitability for reconditioning, repair or replacement

4.2 use electrical testing methods which are suitable for assessing the performance of the type of electrical unit being tested

4.3 carry out all electrical overhauling activities following:
   - a. manufacturers’ instructions
   - b. recognised researched repair methods
   - c. health and safety requirements

4.4 ensure when necessary that adjustments to components are carried out to ensure correct and effective operation

4.5 ensure all repaired alternators and starters are secure and function as specified by the manufacturer or any legal requirements

4.6 complete all the electrical overhaul activities within the agreed timescale.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>be able to record information and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required

5.2 make suitable and justifiable recommendations for cost effective repairs

5.3 record and report any additional faults noticed during the course of their work promptly in the format required

5.4 record and report any additional faults noticed during the course of their work promptly in the format required.
### Unit 404

**Competency in diagnosing and rectifying engine electrical faults**

<table>
<thead>
<tr>
<th>UAN:</th>
<th>Y/601/6069</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level:</td>
<td>3</td>
</tr>
<tr>
<td>Credit value:</td>
<td>10</td>
</tr>
<tr>
<td>GLH:</td>
<td>90</td>
</tr>
</tbody>
</table>

**Relationship to NOS:**
This unit is linked to AE04C Demonstrating Competency in Diagnosis and Rectification of Engine Electrical Faults

**Assessment requirements specified by a sector or regulatory body:**
This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

**Aim:**
This unit will help the learner to develop the skills required to demonstrate they can diagnose and rectify engine electrical system faults. It also covers the evaluation of performance of the replaced or repaired units and systems. This includes SI, CI, hybrid and alternative fuel vehicles

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>be able to work safely when carrying out engine electrical diagnostic and rectification activities</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

1.1 use suitable personal protective equipment and vehicle coverings throughout when carrying out engine electrical diagnostic and rectification activities

1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 select suitable sources of technical information to support engine electrical diagnostic and rectification activities including:

2.2 vehicle technical data

2.3 diagnostic test procedures

2.4 use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of engine electrical system faults.
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to use appropriate tools and equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

- 3.1 select the appropriate tools and equipment necessary for diagnostic and rectification activities
- 3.2 ensure that equipment has been calibrated to meet manufacturers’ and legal requirements
- 3.3 use the equipment required, correctly and safely throughout all engine electrical diagnostic and rectification activities.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to carry out engine electrical diagnosis, rectification and test activities</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

- 4.1 use diagnostic methods that are relevant to the symptoms presented
- 4.2 evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately
- 4.3 carry out all diagnostic and rectification activities following:
  - 4.4 manufacturers’ instructions
  - 4.5 recognised researched repair methods
  - 4.6 workplace procedures
  - 4.7 health and safety requirements
  - 4.8 ensure all repaired and replaced components and units conform to the vehicle operating specification and any legal requirements
  - 4.9 when necessary carry out adjustments to components and units correctly to ensure that they operate to meet system requirements
  - 4.10 use testing methods that are suitable for assessing the performance of the system rectified
  - 4.11 ensure the engine electrical system rectified performs to the vehicle operating specification and any legal requirements
  - 4.12 complete all system diagnostic activities within the agreed timescale.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>be able to record information and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

- 5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
- 5.2 make suitable and justifiable recommendations for cost effective repairs
- 5.3 identify and report any expected delays in completion to the relevant person(s) promptly in the format required
- 5.4 record and report any additional faults noticed during the course of their work promptly in the format required.
### Unit 405

**Competency in diagnosing and rectifying transmission and chassis electrical faults**

<table>
<thead>
<tr>
<th>UAN:</th>
<th>D/601/6073</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level:</td>
<td>3</td>
</tr>
<tr>
<td>Credit value:</td>
<td>10</td>
</tr>
<tr>
<td>GLH:</td>
<td>90</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to Unit AE05C Demonstrating Competency in Diagnosis and Rectification of Transmission and Chassis Electrical Faults</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VCQs.</td>
</tr>
</tbody>
</table>

**Aim:**

This unit will enable the learner to demonstrate competency in diagnosing and rectifying transmission and chassis electrical system faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

#### Learning outcome

**The learner will:**

1. **be able to carry out transmission and chassis electrical diagnosis, rectification and test activities**

#### Assessment criteria

1. **use suitable personal protective equipment and vehicle coverings throughout when carrying out transmission and chassis electrical diagnostic and rectification activities**
2. **work in a way which minimises the risk of damage or injury to the vehicle, people and the environment**

#### Learning outcome

**The learner will:**

2. **be able to record information and make suitable recommendations**

#### Assessment criteria

2.1 **select suitable sources of technical information to support transmission and chassis electrical diagnostic and rectification activities including:**
   a. vehicle technical data
   b. diagnostic test procedures
2.2 **use technical information to support transmission and chassis electrical diagnostic and rectification activities**
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to use appropriate tools and equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 select the appropriate tools and equipment necessary for diagnostic and rectification activities

3.2 ensure that equipment has been calibrated to meet manufacturers’ and legal requirements

3.3 use the equipment required, correctly and safely throughout all transmission and chassis electrical diagnostic and rectification activities.

---

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

4.1 select suitable sources of technical information to support transmission and chassis electrical diagnostic and rectification activities including:
   a. vehicle technical data
   b. diagnostic test procedures

4.2 use technical information to support transmission and chassis electrical diagnostic and rectification activities.

---

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>be able to work safely when carrying out transmission and chassis electrical diagnostic and rectification</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

5.1 use suitable personal protective equipment and vehicle coverings throughout when carrying out transmission and chassis electrical diagnostic and rectification activities

5.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.
Unit 406  Competency in diagnosing and rectifying vehicle auxiliary electrical faults

UAN: L/601/3749
Level: 3
Credit value: 10
GLH: 90
Relationship to NOS: This unit is linked to Unit AE06C Demonstrating Competency in Diagnosis and Rectification of Auxiliary Equipment Electrical Faults

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit will enable the learner to demonstrate competency in diagnosing and rectifying automotive vehicle auxiliary electrical system faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

Learning outcome The learner will:
1. be able to work safely when carrying out automotive vehicle auxiliary electrical diagnostic and rectification activities

Assessment criteria
The learner can:
1.1 use suitable personal protective equipment and vehicle coverings throughout when carrying out auxiliary electrical diagnostic and rectification activities
1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome The learner will:
2. be able to use relevant information to carry out the task

Assessment criteria
The learner can:
2.1 select suitable sources of technical information to support automotive vehicle diagnostic and rectification activities including:
2.2 vehicle technical data
2.3 diagnostic test procedures
2.4 use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of automotive auxiliary electrical system faults
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to use appropriate tools and equipment</td>
</tr>
</tbody>
</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 select the appropriate tools and equipment necessary for diagnostic and rectification activities</td>
</tr>
<tr>
<td>3.2 ensure that equipment has been calibrated to meet manufacturers' and legal requirements</td>
</tr>
<tr>
<td>3.3 use the equipment required, correctly and safely throughout all automotive auxiliary electrical diagnostic and rectification activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>be able to carry out automotive vehicle auxiliary electrical diagnosis, rectification and test activities</td>
</tr>
</tbody>
</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 use diagnostic methods that are relevant to the symptoms presented</td>
</tr>
<tr>
<td>4.2 evaluate your assessment of dismantled sub-assemblies and identify their condition and suitability for repair or replacement accurately</td>
</tr>
<tr>
<td>4.3 carry out all diagnostic and rectification activities following:</td>
</tr>
<tr>
<td>4.4 manufacturers’ instructions</td>
</tr>
<tr>
<td>4.5 recognised researched repair methods</td>
</tr>
<tr>
<td>4.6 workplace procedures</td>
</tr>
<tr>
<td>4.7 health and safety requirements</td>
</tr>
<tr>
<td>4.8 ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements</td>
</tr>
<tr>
<td>4.9 adjust components and units correctly to ensure that they operate to meet system requirements</td>
</tr>
<tr>
<td>4.10 use testing methods that are suitable for assessing the performance of the system rectified</td>
</tr>
<tr>
<td>4.11 ensure the rectified automotive auxiliary electrical system performs to the vehicle operating specification and any legal requirements</td>
</tr>
<tr>
<td>4.12 complete all system diagnostic activities within the agreed timescale.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>be able to record information and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</td>
</tr>
<tr>
<td>5.2 make suitable and justifiable recommendations for cost effective repairs</td>
</tr>
<tr>
<td>5.3 identify and report any expected delays in completion to the relevant person(s) promptly in the format required</td>
</tr>
<tr>
<td>5.4 record and report any additional faults noticed during the course of their work promptly in the format required.</td>
</tr>
</tbody>
</table>
Unit 406  Competency in diagnosing and rectifying vehicle auxiliary electrical faults

Supporting information

Evidence Requirements
Systems to be diagnosed and rectified to include the following:
a. lighting systems
b. heated seats
c. electrically adjusted seats
d. heated screens
e. electric mirrors
f. electric sunroofs
g. electric windows
h. climate control/air conditioning
i. infotainment
j. SRS
k. wash wipe
l. locking systems
m. security and warning systems

Equipment to be used to include the following:
a. voltmeters
b. ammeters
c. ohmmeters
d. multi-meters
e. battery testing equipment
f. dedicated and computer based diagnostic equipment
g. oscilloscopes
Unit 407 Competency in fitting auxiliary locks and security devices (electrical & mechanical)

<table>
<thead>
<tr>
<th>UAN:</th>
<th>D/601/6106</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level:</td>
<td>2</td>
</tr>
<tr>
<td>Credit value:</td>
<td>5</td>
</tr>
<tr>
<td>GLH:</td>
<td>45</td>
</tr>
<tr>
<td>Relationship to NOS:</td>
<td>This unit is linked to AE07C.</td>
</tr>
</tbody>
</table>

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit will enable the learner to demonstrate competency in carrying out a range of vehicle enhancement activities fitting auxiliary locks and security devices. It also covers the evaluation of performance of the fitted auxiliary locks and security devices.

Learning outcome The learner will:

1. be able to work safely when carrying out the fitting of auxiliary locks and security devices

Assessment criteria

The learner can:

1.1 use suitable personal protective equipment and vehicle coverings throughout when fitting auxiliary locks and security devices

1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

Learning outcome The learner will:

2. be able to use relevant information to carry out the task

Assessment criteria

The learner can:

2.1 select suitable sources of technical information to support the fitting of auxiliary locks and security devices including:
   a. vehicle technical data
   b. manufacturers fitting procedures

2.2 use technical information to support the fitting of auxiliary locks and security devices.
### Learning outcome | The learner will:
--- | ---
3. | be able to use appropriate tools and equipment

### Assessment criteria
The learner can:

- **3.1** select the appropriate tools and equipment necessary for the fitting of auxiliary locks and security devices
- **3.2** check that equipment has been calibrated to meet manufacturers’ and legal requirements
- **3.3** use the equipment required, correctly and safely throughout all of the fitting activities.

### Learning outcome | The learner will:
--- | ---
4. | be able to carry out the overhauling of light vehicle steering and suspension units

### Assessment criteria
The learner can:

- **4.1** ensure fitment of components are compatible with the vehicle specification and the customers requirements
- **4.2** carry out all vehicle fitting activities following:
  - a. manufacturers’ instructions
  - b. legal requirements
  - c. workplace procedures
  - d. health and safety requirements
- **4.3** ensure when necessary that adjustments to components and systems are carried out to ensure correct and effective operation
- **4.4** ensure all auxiliary locks and security devices conform to the vehicle operating specification and are secure and function as specified by the manufacturer or any legal requirements
- **4.5** complete all vehicle fitting activities within the agreed timescale.

### Learning outcome | The learner will:
--- | ---
5. | be able to record information and make suitable recommendations

### Assessment criteria
The learner can:

- **5.1** produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
- **5.2** make suitable and justifiable recommendations for cost effective repairs
- **5.3** identify and report any expected delays in completion to the relevant person(s) promptly in the format required.
- **5.4** Record and report any additional faults noticed during the course of their work promptly in the format required.
## Unit 408

**Competency in inspecting vehicles using prescribed methods**

<table>
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<tr>
<th>UAN:</th>
<th>K/601/6108</th>
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</thead>
<tbody>
<tr>
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<td>Relationship to NOS:</td>
<td>This unit is linked to AE0</td>
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<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
</tbody>
</table>

**Aim:**
This unit will enable the learner to demonstrate competency in carrying out a range of light vehicle inspections on vehicles using a variety of prescribed testing and inspection methods.

### Learning outcome

<table>
<thead>
<tr>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>1. be able to work safely when carrying out light vehicle inspections using prescribed methods</td>
</tr>
</tbody>
</table>

### Assessment criteria

The learner can:

- 1. use suitable personal protective equipment and vehicle coverings throughout when carrying out vehicle inspection activities
- 1.2 work in a way which minimises the risk of damage or injury to the vehicle, people and the environment.

### Learning outcome

<table>
<thead>
<tr>
<th>The learner will:</th>
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<tbody>
<tr>
<td>2. be able to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

### Assessment criteria

The learner can:

- 2.1 select suitable sources of technical information to support light vehicle inspection activities including:
  - a. vehicle technical data
  - b. inspection procedures
  - c. legal requirements
- 2.2 use technical information to support light vehicle inspection activities.
### Learning outcome | The learner will:
---|---
3. | be able to use appropriate tools and equipment

#### Assessment criteria

The learner can:

3.1 | select the appropriate tools and equipment necessary for carrying out a range of inspections on light vehicle systems
3.2 | use tools and equipment in the way specified by manufacturers when carrying out a range of inspections on light vehicle systems including:

### Learning outcome | The learner will:
---|---
4. | be able to carry out light vehicle inspections using prescribed methods

#### Assessment criteria

The learner can:

4.1 | carry out light vehicle inspections using prescribed methods, adhering to the specifications and tolerances for the vehicle and following:
   a. the manufacturer's approved inspection methods
   b. recognised researched inspection methods
   c. health and safety requirements
   d. prescribed documentation
4.2 | ensure that inspected light vehicle conforms to the vehicle operating specification and any legal requirements
4.3 | ensure any comparison of the vehicle against specification accurately identifies any:
   a. differences from the vehicle specification
   b. vehicle appearance and condition faults
4.4 | use suitable testing methods to evaluate the performance of the inspected systems
4.5 | work to the specified timescale for the activity.

### Learning outcome | The learner will:
---|---
5. | be able to record information and make suitable recommendations

#### Assessment criteria

The learner can:

5.1 | produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
5.2 | make suitable and justifiable recommendations for cost effective repairs
5.3 | identify and report any expected delays in completion to the relevant person(s) promptly in the required format.
5.4 | record and report any additional faults noticed during the course of their work promptly in the format required.
Unit 409

Competency in identifying suitability, installation and configuration of vehicle electrical enhancements and security systems

<table>
<thead>
<tr>
<th>UAN:</th>
<th>H/601/6110</th>
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<td>Level:</td>
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<td>Relationship to NOS:</td>
<td>This unit is linked to AE09</td>
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<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs</td>
</tr>
</tbody>
</table>

Aim:

This unit will enable the learner to demonstrate competency in identifying suitability and installation of vehicle electrical enhancements and vehicle electrical security systems to improve the original vehicle features or specification and to meet customer requirements.

Learning outcome | The learner will:
--- | ---
1. | be able to work safely when carrying out vehicle electrical enhancement and security activities

Assessment criteria

The learner can:

1.1 | use suitable personal protective equipment and vehicle coverings throughout when carrying out vehicle electrical enhancement and vehicle electrical security systems activities
1.2 | work in a way which minimises the risk of damage or injury to the vehicle, people and the environment
### Learning outcome | The learner will:
---|---
2. be able to use relevant information to carry out the task

#### Assessment criteria

The learner can:

<table>
<thead>
<tr>
<th>2.1</th>
<th>select suitable sources of technical information to support the vehicle electrical enhancement and security activities, by reviewing</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>technical data</td>
</tr>
<tr>
<td>b.</td>
<td>fitting procedures</td>
</tr>
<tr>
<td>c.</td>
<td>legal requirements</td>
</tr>
<tr>
<td>d.</td>
<td>customer requirements</td>
</tr>
</tbody>
</table>

| 2.2 | use technical information to support the vehicle electrical enhancement and security activities |

### Learning outcome | The learner will:
---|---
3. be able to use appropriate tools and equipment

#### Assessment criteria

The learner can:

| 3.1 | select the appropriate tools and equipment necessary for carrying out vehicle electrical enhancement and security activities |
| 3.2 | ensure that equipment has been calibrated to meet manufacturers’ and legal requirements |
| 3.3 | use the correct tools and equipment in the way specified by manufacturers when carrying out electrical enhancement and security activities |

### Learning outcome | The learner will:
---|---
4. be able to install vehicle electrical enhancement and vehicle electrical security systems

#### Assessment criteria

The learner can:

<p>| 4.1 | ensure fitment of components are compatible with the vehicle specification and the customer requirements |
| 4.2 | carry out all vehicle enhancement activities following: |
| a. | manufacturers’ instructions |
| b. | legal requirements |
| c. | workplace procedures |
| d. | health and safety requirements |
| 4.3 | ensure when necessary that adjustments to components and systems are carried out to ensure correct and effective operation |
| 4.4 | ensure all vehicle electrical components are secure and function as specified by the manufacturer or any legal requirements |
| 4.5 | complete all vehicle electrical enhancement and security activities within the agreed timescale |</p>
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>5.</td>
<td>be able to record information and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required</td>
</tr>
<tr>
<td>5.2 agree the next course of action with the relevant person if any issues arose during the enhancement of the vehicle</td>
</tr>
<tr>
<td>5.3 identify and report any expected delays in completion to the relevant person(s) promptly in the format required</td>
</tr>
<tr>
<td>5.4 record and report any additional faults noticed during the course of their work promptly in the format required</td>
</tr>
<tr>
<td>5.5 explain to customers any action that has been taken regarding their vehicle in non technical terms to give a clear understanding of the work carried out</td>
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</tbody>
</table>
Unit 410 Competency in conducting vehicle enhancement and installation consultations with customers in the motor vehicle environment

<table>
<thead>
<tr>
<th>UAN:</th>
<th>M/601/6112</th>
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<td>Level:</td>
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<td>Credit value:</td>
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<td>GLH:</td>
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</table>

**Relationship to NOS:**
This unit is linked to Unit AE10C – Demonstrating Competency in Conducting Installation and System Consultations with Customers

**Assessment requirements specified by a sector or regulatory body:**
This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VCQs.

**Aim:**
This unit will enable the learner to demonstrate competency in conducting installation and system consultations with customers to improve the original vehicle features/specification and to meet customer requirements. It also includes making recommendations to ensure that the customers concerns are addressed and explaining the outcomes that the enhancements will achieve so that customers fully understand the work that will be undertaken.

**Learning outcome**
<table>
<thead>
<tr>
<th>The learner will:</th>
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<tbody>
<tr>
<td>1. be able to use relevant information to carry out the consultation with customers</td>
</tr>
</tbody>
</table>

**Assessment criteria**
The learner can:

<p>| 1.1 select suitable sources of technical information to support the vehicle electrical enhancement activities |
| 1.2 interpret technical information to support the vehicle electrical enhancement activities. |</p>
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>be able to conduct pre-work vehicle electrical enhancement consultations with customers</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 explain clearly the implications of any vehicle enhancement
2.2 respond to customers concerns in a positive and friendly manner
2.3 give a positive impression of yourself and your organisation when dealing with customers
2.4 obtain sufficient, detailed information using suitably structured questions
2.5 provide customers with accurate, current and relevant advice and information on any further investigation that is needed
2.6 give technical advice clearly and accurately and in a manner which the customer will understand
2.7 liaise with the customer and or other relevant person to agree your recommendations for the next course of action.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>be able to carry out post work consultations and make suitable recommendations</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 explain clearly to customers the action that has been taken regarding their vehicle
3.2 produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required
3.3 suggest possible methods for improving the customer care process to your manager, when necessary.
Unit 451  Knowledge of locating and correcting simple electrical faults in the automotive workplace

<table>
<thead>
<tr>
<th>UAN:</th>
<th>K/601/6013</th>
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<td>Relationship to NOS:</td>
<td>This unit is linked to AE01k</td>
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</table>

Assessment requirements specified by a sector or regulatory body:

This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim:

This unit enables the learner to develop an understanding in conducting a range of routine electrical tests, identifying simple faults on a variety of basic electrical components and undertaking suitable correction activities.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td></td>
<td>1. understand the use of electrical testing equipment and measurements taken</td>
</tr>
</tbody>
</table>

Assessment criteria

The learner can

1.1 identify commonly used electrical test equipment
1.2 describe how to use and operate electrical test equipment
1.3 describe the safety and operational checks that should be carried out on tools and equipment required to remove and replace electrical components
1.4 describe how to measure voltage, resistance, current, and specific gravity in determining simple circuit faults
1.5 describe when and where to use voltage, ohm, amp and specific gravity measurements in determining simple circuit faults
1.6 describe the fundamental operation of motors, capacitors, resistors, semi-conductors, transistors, actuators and sensors (including active or self-generating and passive or modulating).
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td>understand how to carry out electrical testing techniques</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>2.1</td>
<td>describe common types of testing methods used to check the operation of vehicle electrical/electronic circuits and components</td>
</tr>
<tr>
<td>2.2</td>
<td>describe how to determine component condition and suitability based upon calculations using ohms law</td>
</tr>
<tr>
<td>2.3</td>
<td>describe how to conduct tests following electrical safety and workplace procedures</td>
</tr>
<tr>
<td>2.4</td>
<td>explain how to evaluate and interpret test results found in diagnosing simple electrical circuit faults against vehicle manufacturer specifications and settings</td>
</tr>
<tr>
<td>2.5</td>
<td>describe how and the importance of making recommendations for rectification based upon the analysis of the test information gained</td>
</tr>
<tr>
<td>2.6</td>
<td>explain how to identify common faults and their causes found in fundamental electrical systems and components</td>
</tr>
<tr>
<td>2.7</td>
<td>explain how to evaluate the performance of any replaced electrical components against vehicle specification and the importance of doing so</td>
</tr>
<tr>
<td>2.8</td>
<td>describe the procedures for disposing of any removed electrical components.</td>
</tr>
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</table>
Unit 451  Knowledge of locating and correcting simple electrical faults in the automotive workplace

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Basic electrical principles
a. Explain the direction of current flow and electron flow.
b. These principles must include:
   i. volts
   ii. amps
   iii. ohms
   iv. power
   v. AC/DC
   vi. magnetism
   vii. electromagnetism
   viii. electromotive force
   ix. electromagnetic induction
   x. electrical heating effect
c. The terms used within these principles:
   i. volt (electrical pressure)
   ii. ampere (electrical current)
   iii. ohm (electrical resistance)
   iv. watt (power)
d. Calculations for the basic principles:
   i. amps
   ii. Ohms
   iii. volts
   iv. watts
e. Circuit principles to include:
   i. series circuits
   ii. parallel circuits
   iii. current flow
   iv. voltage of components
   v. voltm drop
   vi. resistance
   vii. the effect on circuit operation of open circuit component(s)
f. Earth and insulated return systems.
g. Cable sizes and colour codes.
h. Different types of connectors, terminals and circuit protection devices.
i. Meaning of and checks for:
   i. short circuit
   ii. open circuit
   iii. bad earth
   iv. high resistance
v. security
vi. functionality
vii. performance to specific

Vehicle and electrical unit wiring diagrams
a. Describe and identify vehicle and unit electrical symbols
b. Interpret information from vehicle wiring diagrams.
i. vehicle systems
ii. electrical units
iii. wire colour and size
iv. earth locations
v. wiring junction locations
vi. fuse size and location
vii. connection pin numbers

Safety procedures and precautions when working on electrical and electronic systems
a. Safety precautions when working on electrical and electronic systems to include:
i. avoidance of short circuits
ii. power surges
iii. prevention of electric shock
iv. protection of electrical and electronic components.
v. protection of circuits from overload or damage

Electrical test equipment, its function and correct use
a. Equipment to include:
i. voltmeters
ii. ammeters
iii. ohmmeters
iv. lock torque testers
v. regulator testers
vi. insulation testers
vii. oscilloscopes
viii. specialist test equipment

Different types of batteries
a. Identify various types
i. lead acid – conventional
ii. maintenance free
iii. gel
iv. alkaline
v. sodium.

Battery structure and chemical composition
a. Lead-acid and alkaline batteries:
i. construction
ii. capacity
iii. rating
iv. reserve capacity
v. cranking rating
vi. polarity
vii. electrochemical action
viii. electrolyte type
Battery maintenance and charging

a. Maintenance including:
   i. cleaning terminals and battery tops
   ii. protecting terminals
   iii. cell top-up for non-sealed units
   iv. securing to the vehicle
   v. removal and refitting procedures

b. Charging to include:
   i. trickle charging
   ii. boost charging
   iii. charging rates
   iv. safe charging techniques
   v. charging equipment

Lead-acid battery testing techniques and identify basic battery faults

a. Testing techniques for:
   i. testing of electrolyte
   ii. high rate discharge testing
   iii. testing equipment.

b. Faults including:
   i. low charge
   ii. battery not holding charge
   iii. sulphating
   iv. battery voltage drop during different component operation
   v. damaged plates and insulators

Different types of generators

a. Dynamos and regulators.

b. Alternators with internal and external regulators.

Charging principles and function of generators

a. Charging principles:
   i. supply current demands
   ii. battery charging
   iii. constant voltage at different engine speeds

Components of generators

a. Dynamo and alternator components:
   i. field coils
   ii. armature
   iii. brush assemblies
   iv. alternator stator
   v. rotor
   vi. slip rings
   vii. rectifier
   viii. end frame packs
   ix. bearings
   x. regulator
   xi. drive system
Basic testing procedures and identify charging system faults

a. Basic test procedures:
   i. testing of generator outputs (under and off load)
   ii. testing for rectification and regulation
   iii. removal and fitting procedure
   iv. bench testing
   v. vehicle testing

b. Faults to include:
   i. slipping drive belt
   ii. corroded or loose connections
   iii. secure mounting
   iv. not charging
   v. noisy operation

Types, structure and operating principles of starter motors

a. Starter motor types:
   i. pre-engaged
   ii. permanent magnet for heavy and diesel vehicles add gear reduction to starter motor types.

b. Components to include:
   i. solenoid
   ii. armature
   iii. commutator
   iv. brush assemblies
   v. drive systems
   vi. ignition switches

Basic common faults and testing procedures for starter motors

a. Basic test to include:
   i. pre-engaged
   ii. permanent magnet for heavy and diesel vehicles and light vehicle
   iii. gear reduction starters
   iv. iv wiring related to the circuits
   v. ignition switches
   vi. removal and refitting procedures

b. Faults to include:
   i. starter not engaging
   ii. slow engine cranking speed
   iii. insecure mounting

Types of ignition systems and ignition fundamentals

a. Ignition system types:
   i. conventional
   ii. electronic
   iii. programmed
   iv. distributorless

b. Ignition system functional requirements.
The function of ignition components
a. Components to include:
   i. ignition switch
   ii. coil
   iii. distributor
   iv. spark plugs
   v. leads
   vi. ballast resistor
   vii. contact breakers
   viii. condenser
   ix. electronic systems

Testing procedures and basic common faults relating to the ignition system
a. Testing procedures relating to the ignition system and components including:
   i. wiring
   ii. connections
   iii. switching of the primary circuit
   iv. removal and refitting procedures.
b. Failing to start and running erratic

The operating principles of the fuel system
Different fuel types and the relevant combustion process.
a. Fuel and air mix
b. Compression ratios
c. Exhaust emissions.

The different types of fuel system and components
a. Petrol fuel systems and components:
   i. carburettor
   ii. choke
   iii. fuel cut off
   iv. stepper motors
   v. sensors
   vi. injectors
   vii. fuel pumps
   viii. relays
   ix. cold start
   x. anti run on solenoid
   xi. lambda sensors
   xii. idle control actuators
   xiii. single and multipoint injection systems
b. Compression ignition systems:
   i. engine stop solenoid
   ii. injectors
   iii. fuel pumps
   iv. relays
   v. heater plugs
   vi. injection pumps
   vii. filters
Test procedures and basic common faults associated electronic elements of fuel systems and components

a. Basic testing procedures:
   i. diesel engine failing to start
   ii. failing to stop when switched off
   iii. petrol engine not starting
   iv. difficult to start when cold

The function of the engine management system and its components

a. Describe the engine management working processes:
   b. System component including:
      i. pulse, hall, optimum inductive generators
      ii. ECU
      iii. control modules
   c. Sensors including:
      i. crankshaft
      ii. manifold
      iii. temperature
      iv. knock

Different types of components

a. Components to include:
   i. constant energy systems
   ii. pulse generators
   iii. hall effect generators
   iv. optimum inductive pulse generators
   v. modules
   vi. ECU
   vii. sensors

Basic common faults and testing methods associated with engine management systems

a. Basic faults and tests to include:
   i. engine fails to start
   ii. erratic running
   iii. poor fuel consumption
   iv. poor connections
   b. Removal and replacement procedures.

The different lighting system components

a. Components to include:
   i. side and tail lights
   ii. brake lights
   iii. reverse lights
   iv. rear and front fog lights
   v. headlights
   vi. driving lights
   vii. spot lights
   viii. indicators
   ix. headlamp trim motors
   x. index lights
The function of component parts
a. Components to include:
   i. lamp holders
   ii. bulbs
   iii. relays
   iv. switches
   v. warning systems
   vi. trim motors

Basic common faults and testing methods associated with external lighting system
a. Faults relating to:
   i. switches
   ii. relays
   iii. lamp holders
   iv. wiring
   v. connections
   vi. fuses and fuse ratings
   vii. headlamp alignment

The operating principles of external lighting systems
a. Principles including:
   i. side and tail lights
   ii. brake lights
   iii. reverse lights
   iv. rear and front fog lights
   v. headlights
   vi. spot lights
   vii. indicators
## Unit 452

### Knowledge in enhancing vehicle electrical systems

<table>
<thead>
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<th>UAN:</th>
<th>F/601/6017</th>
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<tr>
<td><strong>Level:</strong></td>
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<td><strong>Credit value:</strong></td>
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<td><strong>GLH:</strong></td>
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<td><strong>Relationship to NOS:</strong></td>
<td>This unit is linked to AE02k</td>
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<td><strong>Assessment requirements specified by a sector or regulatory body:</strong></td>
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</table>

### Aim:
This unit enables the learner to develop an understanding of the operation and fitting of electrical enhancement components and systems to improve the original vehicle features and specification to meet customer requirements.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>1.</td>
<td>understand how electrical enhancement systems and components operate</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

| 1.1               | identify commonly fitted electrical enhancement systems and components |
| 1.2               | describe the function and operation of the electrical enhancement systems and components |
| 1.3               | describe how the enhancement may be limited by the existing vehicle systems and fitments |
| 1.4               | compare the advantages and disadvantages of carrying out the vehicle electrical customisation. |

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td>understand how to fit electrical enhancement systems and components</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

<p>| 2.1               | describe the procedures involved in fitting vehicle enhancement systems and components |
| 2.2               | describe how to follow manufacturers requirements relating to the components that are fitted |
| 2.3               | compare the differences in fitting a tow bar between a light vehicle and a draw bar on a heavy vehicle. |</p>
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>3.</td>
<td>understand how to carry out checks to any electrical enhancement systems and components fitted</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

3.1 describe the checks that are made to make sure the components are compatible with the vehicle specification and the customer requirements

3.2 explain how to test and evaluate the performance of any electrical enhancements fitted against vehicle specification and the importance of doing so

3.3 explain how to make adjustments to components and to any surrounding systems to ensure effective operation.
Unit 452  
Knowledge in enhancing vehicle electrical systems

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The different types of I.C.E. systems and components
a. Systems and components to include:
   i. radio/CD players
   ii. multi-play CD players
   iii. DVD
   iv. MP3 players
   v. speakers
   vi. aerial systems
   vii. amplifiers
   viii. visual display screens
   ix. satellite navigation
   x. mobile communication units

The function of component parts in the I.C.E. systems
a. Components include:
   i. radio
   ii. CD
   iii. video
   iv. DVD players
   v. aerial systems
   vi. speakers
   vii. amplifiers
   viii. visual display screens
   ix. mobile communication systems

The operating principles of I.C.E systems
a. Operation of entertainment systems speaker systems and aerial systems.

The relevant legislation relevant to I.C.E systems
a. Find and apply all relevant legislation for the fitment and use of I.C.E systems.

Basic common faults and testing methods associated I.C.E. systems
a. Test and procedures for the following:
   i. radio/CD players
   ii. speakers
   iii. aerial systems
   iv. amplifiers
   v. wiring
   vi. connections
vii. relays
viii. fuses
ix. removal and refitting procedures

**Types of security/warning systems and components**
a. Components to include:
   i. control units
   ii. alarm modules
   iii. audible warning units
   iv. immobiliser units
   v. sensing units
   vi. horn
   vii. audible warning speakers

**The function of component parts in security and warning systems**
a. Components to include:
   i. control units
   ii. alarm modules
   iii. audible warning units
   iv. interior sensing systems
   v. immobiliser units
   vi. relays
   vii. diodes
   viii. horns

**The operating principles of security and warning systems**
a. Operation of alarm systems and audible warning units.

**The relevant legislation relevant to security and warning systems**
a. Find and apply all relevant legislation for the fitment and use of security and warning systems.

**Basic common faults and testing methods associated security and warning systems**
a. Components to include:
   i. control units
   ii. audible warning units
   iii. immobiliser units
   iv. horns
   v. relays
   vi. diodes
   vii. wiring
   viii. connections and protection devices
   ix. removal and refitting procedures

**The different types of safety fitment systems and components**
a. Components to include:
   i. reversing aids and systems
   ii. working lamps
   iii. driving lamps
   iv. additional fog lights
   v. fuel cut off switches
   vi. engine cut off switches
The function of component parts in safety fitment systems
a. Components to include:
   i. reversing aids and systems
   ii. working lamps
   iii. driving lamps
   iv. additional fog lights
   v. fuel cut off switches
   vi. engine cut off switches

The operating principles of safety fitment systems
a. The following safety fitments:
   i. reversing aids and systems
   ii. working lamps
   iii. driving lamps
   iv. additional fog lights
   v. fuel cut off switches
   vi. engine cut off switches

The relevant legislation relevant to safety fitment systems
a. Find and apply all relevant legislation for the fitment and use of safety fitment systems.

Basic common faults and testing methods associated with safety fitment systems
a. To include the following systems and components:
   i. control units
   ii. components
   iii. horns
   iv. relays
   v. diodes
   vi. wiring
   vii. connections
   viii. protection devices
   ix. removal and refitting procedures

The different types of towing systems and components
a. Components to include:
   i. reversing aids and systems
   ii. towbar mounting systems
   iii. single and double plug wiring systems
   iv. audible warning systems
   v. split charging systems
   vi. trailer lighting board

The function of component parts in towing systems
a. Components must include:
   i. reversing aids
   ii. towbar
   iii. wiring connectors
   iv. audible warning systems
   v. visible warning systems
   vi. split charge control units
   vii. relays
   viii. lighting boards
The operating principles of towing systems
a. Principles to include:
   i. reversing aids
   ii. 7 pin plug systems
   iii. vehicle lighting systems
   iv. audible warning systems
   v. visible warning systems
   vi. split charge systems

The relevant legislation relevant to Towbar systems
a. Find and apply all relevant legislation for the fitment and use of towbar systems.

Basic common faults and testing methods associated with towing systems
a. Basic faults and tests to include:
   i. lighting systems
   ii. split charge systems
   iii. warning systems
   iv. reversing aid systems
   v. earth faults
   vi. voltage test methods
   vii. resistance testing
   viii. functional tests
Unit 453  Knowledge of the overhauling of electrical units

<table>
<thead>
<tr>
<th>UAN:</th>
<th>L/601/6022</th>
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<td>Relationship to NOS:</td>
<td>This unit is linked to AE03k.</td>
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<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
<tr>
<td>Aim:</td>
<td>This unit enables the learner to develop an understanding of the repair and overhauling of electrical units.</td>
</tr>
</tbody>
</table>

**Learning outcome** The learner will:

1. understand how to use appropriate electrical testing equipment

**Assessment criteria**
The learner can:

1.1 identify specialist electrical test equipment used for overhauling electrical units

1.2 describe how to use and operate specialist electrical test equipment used for overhauling electrical units

1.3 describe how to prepare, assess and test the accuracy and operation of all the electrical repair and testing equipment.

2. understand how to find, select and use sources of overhaul information

**Assessment criteria**
The learner can:

2.1 identify suitable sources of technical information to support electrical repair procedures including:

   a. technical data
   b. manufacturers instructions
   c. legal requirements
   d. industry recognised repair methods

2.2 explain how to interpret and use technical information to support the electrical repair procedures.
### Learning outcome
The learner will:

3. understand how to carry out testing to electrical systems and components

### Assessment criteria
The learner can:

3.1 describe how to test and evaluate the performance of vehicles electrical systems against vehicle specification
3.2 explain how to interpret test results and carry out electrical efficiency calculations
3.3 identify common symptoms, causes and faults found in vehicle charging and starting systems
3.4 explain methods used to identify vehicle charging and starting systems faults
3.5 describe how the condition of the components are assessed within charging and starting systems to find faults
3.6 describe how to test the following alternator components:
   a. diode pack
   b. rotor field
   c. stator windings
3.7 describe the purpose and when to use torque, resistance, insulation and visual tests
3.8 explain the suppression requirements applicable to electrical components and the types of faults which can occur in charging, starting and motor systems.

### Learning outcome
The learner will:

4. understand how to overhaul starting, charging, motor and actuator systems

### Assessment criteria
The learner can:

4.1 describe how to overhaul charging, starting, motor and actuator systems
4.2 describe how to carry out a solder repair
4.3 explain the procedures to make suitable adjustments to the starter drive setting
4.4 describe how to evaluate the operation of components and systems following overhaul.
Unit 453 Knowledge of the overhauling of electrical units

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The various types of generators fitted to motor vehicles
a. Generators must include:
   i. alternator with an internal regulator
   ii. alternator with an external regulator
   iii. alternator with a separate regulator
   iv. DC generators

The operating principles of each generator
a. Generators must include:
   i. alternators with an internal regulator
   ii. alternators with an external regulator
   iii. alternators with a separate regulator
   iv. DC generators

The components and how they function within each type of generator
a. Generators must include:
   i. alternators with an internal regulator
   ii. alternators with an external regulator
   iii. alternators with a separate regulator
   iv. DC generators
b. Components must include:
   i. rotors
   ii. stators
   iii. rectifiers
   iv. regulator
   v. slip rings
   vi. bearings
   vii. housings
   viii. fans and pulleys
   ix. armatures
   x. field windings
   xi. brushes and brush boxes
   xii. surge protection diode

Test each component within each type of generator
a. Generators must include:
   i. alternators with an internal regulator
   ii. alternators with an external regulator
   iii. alternators with a separate regulator
   iv. DC generators
b. Components must include:
   i. rotors
   ii. stators
   iii. rectifiers
iv. regulator  
v. slip rings  
vi. bearings  
vii. housings  
viii. fans and pulleys  
ix. armatures  
x. field windings  
xi. brushes and brush boxes  
xii. surge protection diode  
c. Tools must include:  
i. voltmeters  
ii. ammeters  
iii. ohmmeters  
iv. insulation testers  
v. regulator testers  

Symptoms and faults associated with basic generators  
a. Generators must include:  
i. alternators with an internal regulator  
ii. alternators with an external regulator  
iii. alternators with a separate regulator  
iv. DC generators  

Test procedures for the repaired generators and evaluate the results  
a. Generators must include:  
i. alternators with an internal regulator  
ii. alternators with an external regulator  
iii. alternators with a separate regulator  
iv. DC generators  
b. Tools must include:  
i. voltmeters  
ii. ammeters  
iii. specialist test equipment  

The various types of starter motor fitted to motor vehicles  
a. Starter motors must include:  
i. inertia starter motors  
ii. pre-engaged starter motors  
iii. axial starter motors  
iv. co-axial starter motors  

The operating principles of each type of starter motor  
a. Starter motors must include:  
i. pre-engaged starter motors  
ii. axial starter motors  
iii. co-axial starter motors  
iv. gear reduction starters  

The components and how they function within each type of starter motor  
a. Starter motors must include:  
i. pre-engaged starter motors  
ii. axial starter motors  
iii. co-axial starter motors  
iv. gear reduction starters
b. Components must include:
   i. armatures
   ii. field windings
   iii. brushes and brush boxes
   iv. bearings and bushes
   v. solenoids
   vi. drive gears and clutches
   vii. housings
   viii. fans and pulleys
   ix. reduction gears

Test each component within each type of starter motor
a. Starter motors must include:
   i. pre-engaged starter motors
   ii. axial starter motors
   iii. co-axial starter motors
   iv. gear reduction starters
b. Components must include:
   i. armatures
   ii. field windings
   iii. brushes and brush boxes
   iv. bearings and bushes
   v. solenoids
   vi. drive gears and clutches
   vii. housings
   viii. fans and pulleys
   ix. reduction gears

c. Tools must include:
   i. voltmeters
   ii. ammeters
   iii. ohmmeters
   iv. insulation testers

Symptoms and faults associated with starter motors
a. Starter motors must include:
   i. pre-engaged starter motors
   ii. axial starter motors
   iii. co-axial starter motors
   iv. gear reduction

Tests and adjustment procedures for the repaired starter motors
and evaluate the results
a. Starter motors must include:
   i. pre-engaged starter motors
   ii. axial starter motors
   iii. co-axial starter motors
   iv. gear reduction

b. Tools must include:
   i. voltmeters
   ii. ammeters
   iii. specialist test equipment
   iv. lock torque testers
Unit 454  Knowledge of diagnosis and rectification of engine electrical faults

<table>
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<th>UAN:</th>
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<td>GLH:</td>
<td>45</td>
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<td>Relationship to NOS:</td>
<td>This unit is linked to Unit AE04K Knowledge of Diagnosis and Rectification of Engine Electrical Faults.</td>
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<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
<tr>
<td>Aim:</td>
<td>This unit enables the learner to develop an understanding of diagnosis and rectification of engine electrical system faults. It also covers the evaluation of performance of the systems. This includes SI, CI, Hybrid and Alternative fuel vehicles.</td>
</tr>
</tbody>
</table>

### Learning outcome  The learner will:

1. understand how engine electrical systems operate

### Assessment criteria

The learner can:

1.1 identify engine electrical system components

1.2 explain the construction and operation of engine electrical systems, to include:
   a. starting systems
   b. charging systems
   c. engine management systems
   d. electrical components of the cooling system

1.3 explain the interaction between electrical, electronic and mechanical components within the system defined

1.4 explain how the electrical systems interlink and interact, including multiplexing and fibre optics

1.5 explain how to dismantle and reassemble the electrical and electronic units of engine electrical systems
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>2.</td>
<td>understand how to find, select and use sources of information</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 identify suitable sources of technical information to support engine electrical repair and diagnostic procedures including:
   - technical data
   - manufacturers instructions
   - legal requirements
   - industry recognised repair methods

2.2 explain how to interpret and use technical information to support the engine electrical repair and diagnostic procedures

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>3.</td>
<td>understand how to diagnose and rectify faults in engine electrical systems</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 analyse symptoms and causes of faults found in engine electrical systems to include:
   - starting systems
   - charging systems
   - engine management systems
   - electrical components of the cooling system

3.2 explain how to select the most appropriate diagnostic testing method for the symptoms present

3.3 explain systematic diagnostic techniques used in identifying engine electrical system faults to include:
   - verify the fault
   - collect further information
   - evaluate the evidence
   - carry out further tests in a logical sequence
   - rectify the problem
   - check all systems

3.4 explain how to examine, measure and make suitable adjustments to components including:
   - settings
   - input and output values
   - voltages
   - current consumption
   - resistance
   - output patterns with oscilloscope
   - condition
   - wear and performance

3.5 explain how to evaluate and interpret test results found in diagnosing engine electrical system faults against vehicle manufacturer specifications and settings

3.6 explain how to carry out the rectification activities in order to
<table>
<thead>
<tr>
<th><strong>3.7</strong></th>
<th>correct the faults in the engine electrical systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.7</strong></td>
<td>explain the engine electrical and unit replacement procedures and the circumstances which will necessitate replacement and or other possible courses of action</td>
</tr>
<tr>
<td><strong>3.8</strong></td>
<td>make suitable and justifiable recommendations for cost effective repairs.</td>
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Unit 454  Knowledge of diagnosis and rectification of engine electrical faults

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Advanced battery technology
a. Batteries must include:
   i. maintenance free
   ii. sodium-nickel-chloride
   iii. fuel cell
   iv. sodium sulphur and swing lead acid
   v. fuel cell
b. Electrochemistry
c. Calculation on battery efficiency/rating.

Battery condition and faults
a. Faults including:
   i. battery not holding charge
   ii. unwanted drain
   iii. diluted electrolyte
   iv. Impurities in electrolyte
   v. excessive gassing
   vi. low state of charge
   vii. sulphating
   viii. excessive volt drop during component operation
   ix. open circuit cell
   x. overcharging
   xi. temperature related faults

Operating principles charging systems
a. Charging systems should include:
   i. alternators with internal and external regulators
   ii. water cooled alternators
   iii. integrated alternators (ISAD)
   iv. dynalto systems.
b. Electrical loads imposed by vehicle systems.
c. Rectification and regulation

Test procedures for diagnosing faults with charging systems
a. Stages in the fault finding process to include:
   i. hand and eye checks
   ii. supply voltage
iii. generator outputs
iv. under and off load testing for rectification and regulation
v. bench testing
vi. vehicle testing

Symptoms of faults found on charging systems
a. Faults to include:
   i. charging light inoperative
   ii. charging light staying on all the time
   iii. battery discharges during normal operation
   iv. high resistance in charging circuits
   v. loose broken wiring/connections
b. Internal faults:
   i. diode open circuit
   ii. worn brushes
   iii. regulator faults
   iv. rotor open circuit
   v. stator open circuit

Advanced charging system technology
a. Charge balance calculation.
b. Charging system problems and solutions including:
   i. upgrading alternator
   ii. power management systems
   iii. two stage
   iv. dual voltage systems

Advanced starting system technology
a. Outputs in relation to engine size:
   i. speed
   ii. torque
   iii. power
   iv. efficiency
b. System design characteristics:
   i. DC motor characteristics
   ii. parallel
   iii. shunt
   iv. compound
   v. series
c. Electronic starter control
d. High voltage systems.
e. Inhibitor circuits.
f. Starter types to include:
   i. pre – engaged
   ii. permanent magnet for heavy and diesel vehicles
   iii. integrated starters
Faults and diagnostic procedures for starting systems
a. Components to include:
   i. solenoid
   ii. armature
   iii. commutator
   iv. brush assemblies
   v. drive systems
   vi. ignition switches
   vii. torque drive systems
b. Faults to include:
   i. battery
   ii. wiring
   iii. starter switch
   iv. inhibitor switch
   v. pinion
   vi. flywheel
   vii. bearings
   viii. internal starter components
c. Identify stages of fault finding

Ignition system technology
a. Components to include:
   i. ignition switch
   ii. oil packs
   iii. spark plugs and leads
   iv. distributors and amplifier units
   v. knock sensor
   vi. engine speed sensor
   vii. manifold sensor
   viii. coolant sensor
   ix. ECU
b. Materials used in component manufacture
c. Systems to include:
   i. constant energy systems
   ii. hall effect
   iii. inductive pulse
   iv. open and closed loop
   v. distributorless ignition
   vi. direct ignition
   vii. advance angle timing
   viii. integrated ignition circuit

The construction of ignition components
a. Spark plugs including:
   i. heat range
   ii. electrode gap
   iii. choosing correct plug
b. Ignition components to include:
   i. ignition switch
   ii. coil packs and leads
iii. resistors
iv. amplifier units
v. electronic systems

Faults and diagnostic procedures for ignition systems
a. Diagnostic equipment and procedures relating to the ignition system and components including:
   i. wiring, and connections
   ii. code readers
   iii. oscilloscopes
   iv. ohmmeter
   v. volt meter
   vi. other dedicated equipment
   vii. testing sequences
b. Faults to include:
   i. no spark
   ii. cold and hot starting problems
   iii. erratic running
   iv. damp components
   v. worn components
   vi. incorrect plug gaps
   vii. high resistance in circuit
   viii. intermittent connections
   ix. incorrect timing
   x. coil or distributor cap tracking
   xi. HT breaking down
   xii. running on when switched off
   xiii. pinking and knocking
   xiv. misfire
   xv. erratic idle
   xvi. lack of power
   xvii. backfire and fouling

The operation and requirements of fuel systems
a. Fuel systems to include:
   i. single point
   ii. multi point control layout
   iii. sequential multi point
   iv. diesel fuel injection
   v. petrol injection
   vi. computer controlled
   vii. lean burn
   viii. common rail
   ix. catalytic converters
b. Theories and terms to include:
   i. combustion
   ii. burn range and rate
   iii. detonation
   iv. mixture strength effects
   v. air-fuel ratios
vi. fuelling and emissions
vii. CoNo_x
viii. HC
ix. exhaust emission regulations

The function of fuel system components and the relationship between components
a. Petrol fuel systems:
   i. stepper motors
   ii. sensors
   iii. injectors
   iv. fuel pumps
   v. relays
   vi. cold start
   vii. lambda sensors
   viii. idle control actuators
   ix. single and multipoint injection systems
   x. throttle valve potentiometer
   xi. phase sensor
b. Compression ignition systems:
   i. engine stop solenoid
   ii. injectors
   iii. fuel pumps
   iv. relays
   v. heater plugs
   vi. injection pumps
   vii. high pressure pumps
   viii. filters
c. Block, flow and circuit diagrams

Faults and diagnostic procedures for fuel system systems
a. The stages of fault finding
b. Diagnostic procedures including:
   i. the use of fault code readers
   ii. oscilloscopes
   iii. break out boxes
   iv. on-board diagnostics
   v. other dedicated equipment
c. Faults:
   i. no fuel
   ii. filters dirty or blocked
   iii. fuel pump
   iv. hot and cold start
   v. erratic idle
   vi. misfire
   vii. stalling
   viii. lack of power
   ix. backfire
   x. incorrect co
   xi. air leaks
The operation of engine management components and relationship with vehicle systems

a. Components:
   i. ECU units
   ii. input sensors
   iii. output actuators

b. Data flow, distribution and interconnection
c. Control of phases:
   i. starting
   ii. enrichment
   iii. cold running
   iv. idle
   v. full load
   vi. acceleration
   vii. deceleration
   viii. engine speed limitation
d. CANBUS.
e. Performance mapping implications.
f. Block, flow and circuit diagrams

Faults and diagnostic procedures for engine management systems

a. The stages of fault finding.
b. Diagnostic procedures including:
   i. the use of fault code readers
   ii. oscilloscope
   iii. break out boxes
   iv. on-board diagnostics
   v. other dedicated equipment
c. Faults:
   i. engine fails to start
   ii. hot and cold start
   iii. erratic idle
   iv. misfire
   v. hesitation under acceleration or constant speed
   vi. knock
   vii. poor response
   viii. poor fuel consumption
   ix. incorrect CO
   x. poor performance
   xi. limp home mode
   xii. fuses

Adjustments to components are:

a. settings
b. input and output values
c. voltages
d. current consumption
e. resistance
f. output patterns with oscilloscope
g. condition
h. wear and performance
Unit 455  Knowledge of diagnosis and rectification of transmission and chassis electrical faults

UAN: Y/601/6024
Level: 3
Credit value: 6
GLH: 45

Relationship to NOS: This unit is linked to Unit AE05K Knowledge of Diagnosis and Rectification of Transmission and Chassis Electrical Faults.

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit enables the learner to develop an understanding of diagnosis and rectification of transmission and chassis electrical system faults. It also covers the evaluation of performance of the systems.

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<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>1.</td>
<td>understand how transmission and chassis electrical systems operate</td>
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</table>
### Learning outcome | The learner will:
--- | ---
2. | understand how to find, select and use sources of information

### Assessment criteria

<table>
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<th>The learner can:</th>
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<tbody>
<tr>
<td>2.1 identify suitable sources of technical information to support transmission and chassis electrical repair and diagnostic procedures including:</td>
</tr>
<tr>
<td>a. technical data</td>
</tr>
<tr>
<td>b. manufacturers instructions</td>
</tr>
<tr>
<td>c. legal requirements</td>
</tr>
<tr>
<td>d. industry recognised repair methods</td>
</tr>
<tr>
<td>2.2 explain how to use technical information to support the transmission and chassis electrical repair and diagnostic procedures</td>
</tr>
</tbody>
</table>

### Learning outcome | The learner will:
--- | ---
3. | understand how to diagnose and rectify faults in transmission and chassis electrical systems

### Assessment criteria

<table>
<thead>
<tr>
<th>The learner can:</th>
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<tbody>
<tr>
<td>3.1 describe symptoms and causes of faults found in engine electrical systems</td>
</tr>
<tr>
<td>3.2 explain how to select the most appropriate diagnostic testing method for the symptoms present</td>
</tr>
<tr>
<td>3.3 explain systematic diagnostic techniques used in identifying transmission and chassis electrical system faults</td>
</tr>
<tr>
<td>3.4 explain how to examine, measure and make suitable adjustments to components</td>
</tr>
<tr>
<td>3.5 explain how to evaluate and interpret test results found in diagnosing transmission and chassis electrical system faults against vehicle manufacturer specifications and settings</td>
</tr>
<tr>
<td>3.6 explain how to carry out the rectification activities in order to correct the faults in the transmission and chassis electrical systems</td>
</tr>
<tr>
<td>3.7 explain the transmission and chassis electrical and unit replacement procedures and the circumstances which will necessitate replacement and or other possible courses of action</td>
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Unit 455  Knowledge of diagnosis and rectification of transmission and chassis electrical faults

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Identification of various types of electrical/electronic transmission control systems
a. Electronic clutch control, torque converter control systems.
b. Electronically controlled manual transmission/powershift.
c. Electronically controlled automatic transmission.
d. Retarders and diff-lock systems

The function and operating principles of each of these areas
a. Electronic clutch control, torque converter control systems.
b. Electronically controlled manual transmission/powershift.
c. Electronically controlled automatic transmission.
d. Retarders and diff-lock systems.

Common faults and basic tests for these systems
a. Hand held diagnostics, meters and oscilloscopes.
b. Electronic Clutch Control, torque converter control systems.
c. Electronically controlled manual transmission/powershift.
d. Electronically controlled automatic transmission.
e. Retarders and diff-lock systems.

The function and operating principles of the following systems
a. ABS
b. Traction control.

Identification of components and their function within the system
a. Sensors, actuators, modulators and the control system for ABS.
b. Sensors, actuators, modulators and the control system for traction control.

Common faults and basic tests for these systems
a. ABS
b. Traction control

Function and operating principles of steering systems
a. Electro/hydraulic systems.
b. Speed sensitive systems.
c. Full electric assistance systems.
d. 4 Wheel steering systems.

**Identification of all components and their function within the steering system**
a. Sensors, actuators and control systems for each system.

**Common faults and basic tests for these steering systems**
a. Electro/hydraulic systems.
b. Speed sensitive systems.
c. Full electric assistance systems.

**Function and operating principles of electric/electronic suspension control**
a. Sensors, actuators and control systems
b. Hydra-electric systems
c. Pneumatic electric

**Identification of all components and their function within the suspension systems**
a. Sensors, actuators and control systems
b. Hydra-electric systems
c. Pneumatic electric

**Common faults and basic tests for these suspension systems**
a. Sensors, actuators and control systems
b. Hydra-electric systems
c. Pneumatic electric

**How the below systems come together to create a stability control system**
a. Aerodynamic control systems
b. Transmission systems
c. ABS/traction control systems
d. Steering systems
e. Suspension systems
f. Engine management system

**Identification and description of how all these systems unite to create stability control**
a. Aerodynamic control systems
b. Transmission systems
c. ABS/traction control systems
d. Steering systems
e. Suspension systems
f. Engine management system

**Common faults and basic tests for these combined systems**
a. Aerodynamic control systems
b. Transmission systems
c. ABS/traction control systems
d. Steering systems
e. Suspension systems
f. Engine management system
## Unit 456 Knowledge of diagnosis and rectification of vehicle auxiliary electrical faults

<table>
<thead>
<tr>
<th>UAN:</th>
<th>A/601/3746</th>
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<td>Level:</td>
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<td>Credit value:</td>
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<td>Relationship to NOS:</td>
<td>This unit is linked to Unit AE06K Knowledge of Diagnosis and Rectification of Vehicle Auxiliary Electrical Faults</td>
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<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
</tr>
<tr>
<td>Aim:</td>
<td>This unit enables the learner to develop an understanding of diagnosis and rectification of vehicle auxiliary electrical systems and their units. It also covers the evaluation of performance of the systems. This includes SI, CI, hybrid and alternative fuel vehicles</td>
</tr>
</tbody>
</table>

### Learning outcome

The learner will:

1. understand vehicle electrical and electronic principles

### Assessment criteria

The learner can:

1.1 explain the principles of electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics

1.2 explain the principles of sensor inputs, computer processing and actuator outputs

1.3 identify sensor types (passive and active)

1.4 identify the electrical principles that are related to light vehicle electrical circuits
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>understand how light vehicle auxiliary electrical systems operate</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 identify advanced automotive auxiliary electrical system components
2.2 explain the construction and operation of automotive auxiliary electrical systems
2.3 explain the interaction between electrical, electronic and mechanical components within the system defined
2.4 explain the operation of the electrical and electronic systems for electric, hybrid and alternative fuel vehicles including regenerative braking systems
2.5 explain how electrical systems interlink and interact, including multiplexing and fibre optics
2.6 compare automotive auxiliary electrical system components and assemblies against alternatives to identify differences in construction and operation.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>understand how to diagnose and rectify faults in auxiliary electrical systems</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 explain the symptoms and causes of faults found in automotive auxiliary electrical systems
3.2 explain systematic diagnostic techniques used in identifying automotive auxiliary electrical system faults
3.3 explain how to examine, measure and make suitable adjustments to components
3.4 explain how to carry out the rectification activities in order to correct the faults in the automotive auxiliary electrical systems
3.5 explain how to select, prepare and use diagnostic and rectification equipment for automotive auxiliary electrical systems
3.6 explain how to evaluate and interpret test results found in diagnosing automotive auxiliary electrical system faults against vehicle manufacturer specifications and settings.
3.7 Explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance.
Unit 456  
Knowledge of diagnosis and rectification of vehicle auxiliary electrical faults

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The electrical principles that are related to light vehicle electrical circuits:
- Ohms law
- Voltage
- Power
- Current (AC and DC)
- Resistance
- Magnetism
- Electromagnetism and electromagnetic induction
- Digital and fibre optic principles
- Electrical units and symbols
- Electrical and electronic terminology
- Relevant electrical safety

Battery and Charging
- The construction and operation of vehicle batteries including:
  - low maintenance and maintenance free
  - lead acid and nickel cadmium types
  - cells
  - separators
  - plates
  - electrolyte
- The operation of the vehicle charging system:
  - alternator
  - rotor
  - stator
  - slip ring
  - brush assembly
  - three phase output
  - diode rectification pack
  - voltage regulation
  - phased winding connections
  - cooling fan
  - alternator drive system

Starting
- The layout, construction and operation of engine starting systems: inertia and pre-engaged principles.
- The function and operation of the following components:
i. inertia and pre-engaged starter motor
ii. starter ring gear
iii. pinion
iv. starter solenoid
v. ignition/starter switch
vi. starter relay (if appropriate)
vii. one-way clutch (pre-engaged starter motor)

**Lighting systems and technology**

a. lighting systems should include:
   i. Xenon lighting
   ii. gas discharge lighting
   iii. ballast system
   iv. LED
   v. intelligent front lighting
   vi. blue lights
   vii. complex reflectors
   viii. fibre optic
   ix. optical patterning

**Lighting circuits and the relationship between each circuit**

a. circuits must include:
   i. sidelights including number plate lights and marker lights
   ii. dipped beam
   iii. main beam
   iv. dim/dip
   v. indicators and hazard lights
   vi. high intensity and fog light

**Common faults and testing methods associated with external lighting system**

a. fault diagnosis for:
   i. lighting systems failing to operate correctly
   ii. switches
   iii. relays
   iv. bulbs failing to operate

**The operating principles of external lighting systems and multiplexing systems**

a. to include all external lighting systems and a good knowledge of multiplexing systems.

**The different types of electric windows, and mirror systems and components**

a. components should include:
   i. window
   ii. mirror motors
   iii. multi-functional switches
   iv. relays
   vi. total closure modules
The function of component parts in the electric window and mirror systems
  a. components must include:
     i. motors
     ii. relays
     iii. interfaces
     iv. modules
     v. switches

The operating principles of electric windows and mirror systems
  a. operating principles of the following:
     i. motors
     ii. interfaces
     iii. switches
     iv. modules

Common faults and testing methods associated with electric windows and mirror systems
  a. fault diagnosis for:
     i. electric windows failing to open or close
     ii. electric mirrors fail to adjust
     iii. slow operation on both systems

The different types of screen heating systems and components
  a. systems must include:
     i. heated front screens
     ii. heated rear screens
     iii. heated mirrors

The function and operating principles of components for heated screen and mirror systems
  a. components must include:
     i. front screen elements
     ii. mirror elements
     iii. time control relays
     iv. multifunction relays and switches

Common faults and testing methods associated with heated screen and mirror systems
  a. faults must include:
     i. screen elements not operating
     ii. timer relays not operating and staying on permanently
The different types of In Car Entertainment (I.C.E.) systems and components
a. systems and components must include:
   i. radio CD and multi play units
   ii. DVD players
   iii. MP3 players
   iv. speakers
   v. aerial systems
   vi. amplifiers
   vii. V.D.U. screens
   viii. Satellite Navigation
   ix. communication units

The function of components in I.C.E. systems
a. systems include:
   i. radios
   ii. CD players
   iii. video players
   iv. DVD players
   v. aerial systems
   vi. speakers
   vii. amplifiers
   viii. VDU screens
   ix. mobile communication units

The operating principles of I.C.E. systems
a. operation of entertainment systems speaker and aerial systems

Common faults and testing methods associated with I.C.E. systems
a. faults to include:
   i. entertainment and navigation units not operating
   ii. speaker, aerial and amplifier systems not functioning correctly
   iii. excessive radio interference (suppression)
   iv. use of diagnostic computers and systems

The different types of integrated security/warning systems and components
a. components to include:
   i. control units
   ii. alarm modules
   iii. audible warning units
   iv. immobiliser units
   v. sensing units
   vi. horn
   vii. audible warning speakers
The function of component parts in integrated security and warning systems
a. components to include
   i. control units
   ii. alarm modules
   iii. audible warning units
   iv. interior sensing systems
   v. immobiliser units
   vi. relays
   vii. LEDs
   viii. horns

The operating principles of integrated security and warning systems
a. operation of alarm systems and audible warning units.

The relevant legislation relevant to security and warning systems
a. find and apply all relevant legislation for the fitment and use of security and warning systems.

Common faults and testing methods associated with security and warning systems
a. components to include:
   i. control units
   ii. audible warning units
   iii. immobiliser units
   iv. horns
   v. relays
   vi. LEDs
   vii. wiring
   viii. connections and protection devices
   ix. removal and refitting procedures
   x. using computer diagnostics to identify faults
   xi. use of manufacturers diagnostic equipment

The different wiper system components
a. components must include:
   i. wiper motors
   ii. washer motors
   iii. wiper linkage
   iv. multifunction relays
   v. headlamp wash/wipe

The function of component wiper and washer components
a. components and systems must include:
   i. wiper motors
   ii. intermittent wash wipe relays
   iii. parking systems
The operating principles, faults and testing methods of wiper and washer systems
a. principles, fault diagnosis and testing for:
   i. wiper motors failing
   ii. damaged linkages
   iii. incorrect operation of intermittent and parking systems
   iv. earth faults
   v. control unit failure

The different heater, cooling system components and air con.
a. components include:
   i. heater motors
   ii. speed rheostats,
   iii. switches
   iv. valves
   v. radiator cooling fan motors
   vi. relays
   vii. air conditioning units

The function of component heater, cooling parts and air conditioning
a. components include:
   i. heater motors
   ii. rheostats
   iii. valves
   iv. switches
   v. relays
   vi. cooling fan motors
   vii. air conditioning units
   viii. thermostatic switches

The operating principles of heater, cooling systems and air conditioning
a. principles to include:
   i. conduction
   ii. convection
   iii. radiation
   iv. circulation
   v. boiling points
   vi. states of matter (Gas, liquid, solid)
   vii. temperature control
   viii. antifreeze mixtures
   ix. heat transfer

Common faults and testing methods associated with heater, cooling systems and air conditioning
a. fault diagnosis for:
   i. heater motor failing to operate on all/one speed
   ii. radiator cooling fan not operating
   iii. valves
   iv. relays
   v. switches not operating
   vi. electrical related faults on the air conditioning system
The different types of locking system components
a. door locking actuators, solenoids, deadlocking actuators, anti-theft modules.

The function of component parts in the locking system
a. solenoids, actuators (electrical and pneumatic), multifunctional relays, anti-theft modules and release systems.

The operating principles of locking systems
a. doors and cabs.

Common faults and testing methods associated with locking systems
a. door locking actuators, solenoids, connections, wiring, relays, and protection devices/fuses

The different types of Supplementary Restraint and Airbag systems
a. components include:
   i. control units
   ii. sensors
   iii. seat belt pretensioners
   iv. airbag assemblies
   v. wiring systems
   vi. warning systems

The function of component parts in the Supplementary Restraint and Airbag systems
a. components include:
   i. control units
   ii. interfaces
   iii. sensors
   iv. airbag units
   v. pretensioners

The operating principles of Supplementary Restraint and Airbag systems
a. operation of the sensors.
b. operation of the airbag unit.
c. operation of the various types of pretension.
d. safe handling procedures and regulations.

Common faults and testing methods associated with Supplementary Restraint and Airbag systems
a. fault diagnosis for Airbag and SRS faults:
   i. fault code identification
   ii. wiring faults
   iii. component failure
   iv. earth problems
   v. sensor faults

How to examine, measure and make suitable adjustments to components are:
   a. Settings
b. Input and output values
c. Voltages
d. Current consumption
e. Resistance
f. Input and output patterns with oscilloscope (including frequency and duty cycle measurements)
g. Condition
h. Wear and performance

**How to select, prepare and use diagnostic and rectification equipment for automotive auxiliary electrical systems:**

a. Voltmeters
b. Ammeters
c. Ohmmeters
d. Multi-meters
e. Battery testing equipment
f. Dedicated and computer based diagnostic equipment
g. Oscilloscopes
### Unit 457  
**Knowledge of fitting auxiliary locks and security devices (electrical & mechanical)**

<table>
<thead>
<tr>
<th>UAN:</th>
<th>K/601/6027</th>
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<td>Level:</td>
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<td>Credit value:</td>
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<td>25</td>
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<td>Relationship to NOS:</td>
<td>This unit is linked to AE07k. Knowledge of Fitting Auxiliary Locks and Security Devices (Electrical &amp; Mechanical)</td>
</tr>
<tr>
<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
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</table>

**Aim:**  
This unit enables the learner to develop an understanding of the operation and fitting of auxiliary locks and security devices to improve the original features and specification of the vehicle and to meet customer requirements.

### Learning outcome | The learner will:
---|-------------------
1. | understand how auxiliary locks and security devices operate

### Assessment criteria

<table>
<thead>
<tr>
<th>The learner can:</th>
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</thead>
<tbody>
<tr>
<td>1.1 identify auxiliary locks and security devices including:</td>
</tr>
<tr>
<td>a. electronic and electro mechanical lock mechanisms</td>
</tr>
<tr>
<td>b. additional auxiliary mechanical door locks using cylinder type locks</td>
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<tr>
<td>c. additional auxiliary mechanical door and aperture locks using external locking systems</td>
</tr>
<tr>
<td>d. mechanical window protection devices (internal and external)</td>
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<tr>
<td>e. replacement security windows and window security films</td>
</tr>
<tr>
<td>f. pneumatic locking systems</td>
</tr>
<tr>
<td>1.2 describe the function and operation of the auxiliary locks and security devices</td>
</tr>
<tr>
<td>1.3 describe how the fitment may be limited by the existing vehicle systems and fitments</td>
</tr>
<tr>
<td>1.4 compare the advantages and disadvantages of carrying out the fitting of auxiliary locks and security devices</td>
</tr>
<tr>
<td>1.5 describe the interaction between electrical and electronic and mechanical components within auxiliary locks and security devices.</td>
</tr>
<tr>
<td>Learning outcome</td>
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<td>2.</td>
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**Assessment criteria**

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<td>2.3</td>
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</table>

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>understand how to carry out checks to auxiliary locks and security devices fitted</td>
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</table>

**Assessment criteria**

<table>
<thead>
<tr>
<th>The learner can:</th>
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<tr>
<td>3.1</td>
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<td>3.2</td>
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<td>3.3</td>
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<tr>
<td>3.4</td>
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</tbody>
</table>
Unit 457  Knowledge of fitting auxiliary locks and security devices (electrical & mechanical)

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The identification of different types of auxiliary locks and security devices components
a. Systems and components to include:
   i. electronic/electro mechanical lock mechanisms
   ii. additional auxiliary mechanical door locks using cylinder type locks
   iii. additional auxiliary mechanical door/aperture locks using external locking systems
   iv. mechanical window protection devices (internal and external)
   v. replacement security windows/ window security films
   vi. pneumatic locking systems

The function of components in the auxiliary locks and security devices components
a. Components include:
   i. electronic/electro mechanical lock mechanisms
   ii. additional auxiliary mechanical door locks using cylinder type locks
   iii. additional auxiliary mechanical door/aperture locks using external locking systems
   iv. mechanical window protection devices (internal and external)
   v. replacement security windows/ window security films
   vi. pneumatic locking systems

The operating principles of auxiliary locks and security systems
a. Systems include:
   i. electronic/electro mechanical lock mechanisms
   ii. additional auxiliary mechanical door locks using cylinder type locks
   iii. additional auxiliary mechanical door/aperture locks using external locking systems
   iv. mechanical window protection devices (internal and external)
   v. replacement security windows/ window security films
   vi. pneumatic locking systems

The relevant legislation relevant to the auxiliary locks and security systems
a. Find and apply all relevant legislation for the fitment and use of auxiliary locks and security systems.

Faults and testing methods associated with auxiliary locks and security systems
a. Test and procedures for the following:
   i. lock mechanisms
ii. cylinder locks
iii. external locks
iv. window protection devices
v. pneumatic locks
### Unit 458 Knowledge of inspecting vehicles using prescribed methods

<table>
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<th>UAN:</th>
<th>M/601/6028</th>
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<td>Relationship to NOS:</td>
<td>This unit is linked to AE08k</td>
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<td>Assessment requirements specified by a sector or regulatory body:</td>
<td>This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.</td>
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</table>

**Aim:** This unit enables the learner to develop an understanding of carrying out a range of inspections on light vehicles using a variety of prescribed testing and inspection methods.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>understand how to carry out inspections on light vehicles using prescribed methods</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can

1.1 explain the difference between the various prescribed light vehicle inspection methods to include:
   a. pre-work
   b. installed system functional check
   c. post-work
   d. vehicle handover inspection

1.2 identify the different systems to be inspected when using the prescribed inspection methods

1.3 identify the procedures involved in carrying out the systematic inspection of the prescribed inspection methods on light vehicles

1.4 identify correct conformity of vehicle systems and condition on light vehicles inspections

1.5 compare test and inspection results against light vehicle specification and legal requirements

1.6 explain how to record and complete the inspection results in the format required

1.7 identify the recommendations that can be made based on results of the light vehicle inspections

1.8 explain the implications of failing to carry out light vehicle inspections activities correctly
1.9 explain the implications of signing workplace documentation and vehicle records
1.10 explain the procedure for reporting cosmetic damage to light vehicle components and units outside normal inspection items.
Unit 458  
Knowledge of inspecting vehicles using prescribed methods

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

Pre and post work vehicle inspections and record findings
a. PPE and vehicle protection relating to:
   i. vehicle body panels
   ii. paint surfaces
   iii. seats
   iv. carpets and floor mats prior to conduction vehicle inspections
b. Pre and post work vehicle inspection procedures:
   i. aural
   ii. visual and functional assessments on engine
   iii. engine systems
   iv. chassis systems
   v. wheels and tyres
   vi. transmission system
   vii. electrical and electronic systems
   viii. exterior vehicle body
   ix. vehicle interior
c. The methods for carrying out inspections for: damage, corrosion, fluid leaks, wear, security, mounting security and condition to include;
   i. engines and engine systems
   ii. chassis systems
   iii. brakes
   iv. steering
   v. suspension
   vi. wheels
   vii. tyres
   viii. body panels
   ix. electrical and electronic systems and components
   x. vehicle seating and vehicle interior
   xi. vehicle instrumentation
   xii. driver controls
d. Check conformity to manufacturer's specifications and legal requirements.
e. Completion of documentation to include:
   i. inspection records
   ii. job cards
   iii. vehicle records
f. Make recommendations based on results of vehicle inspections.
g. The checks necessary to ensure customer satisfaction for:
   i. vehicle body panels
   ii. paint surfaces
   iii. seats
iv. carpets and floor mats following pre or post vehicle inspections
h. Prepare and use appropriate inspection equipment and tools.
   i. Inspection procedures following inspection checklists.
Unit 459  
Knowledge of the suitability, installation and configuration of vehicle electrical enhancements and security systems

<table>
<thead>
<tr>
<th>UAN:</th>
<th>T/601/6029</th>
</tr>
</thead>
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Relationship to NOS: This unit is linked to Unit AE09K Knowledge of the Suitability, Installation and Configuration of Vehicle Electrical Enhancements and Security Systems.

Assessment requirements specified by a sector or regulatory body: This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

Aim: This unit enables the learner to develop an understanding of identifying the suitability and installation of vehicle electrical enhancements, electrical security and tracking systems to improve the original vehicle features and specification to meet customer requirements.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>1.</td>
<td>understand how vehicle electrical enhancement and vehicle electrical security systems operate</td>
</tr>
</tbody>
</table>

Assessment criteria

The learner can

1.1 identify the vehicle electrical enhancement systems and components fitted in:
   a. in car entertainment
   b. audio systems
   c. communication equipment
   d. vehicle handover inspection
   e. body electrical systems
   f. data logging

1.2 identify the vehicle electrical security systems and components fitted in:
   a. alarm systems
   b. immobiliser systems
   c. location tracking systems
   d. electronic deadlocking systems

1.3 explain the function and operation of the vehicle electrical
<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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</thead>
<tbody>
<tr>
<td>2.</td>
<td>understand how to use relevant information to carry out the task</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

2.1 explain how to find, interpret and use technical information to support the vehicle electrical enhancement and security activities, by reviewing manufacturer and workshop information.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>3.</td>
<td>understand how to specify and fit vehicle electrical enhancement and vehicle electrical security systems</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

3.1 explain the procedures involved in fitting electrical vehicle enhancement equipment and security systems

3.2 explain how to follow manufacturers requirements relating to the components that are fitted

3.3 explain the interaction between electrical, electronic and mechanical components within the system defined

3.4 explain how electrical systems interlink and interact, including multiplexing and fibre optics

3.5 explain how installed electrical enhancements can interact with factory fitted electrical components including network systems

3.6 explain how to use dedicated and computer based equipment to configure vehicle electronic controlled systems to operate correctly

3.7 explain how to prepare and reconfigure electronically controlled vehicle enhancement systems to allow them to function correctly with factory fit vehicle systems.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tr>
<td>4.</td>
<td>understand how to carry out checks to vehicle electrical enhancement and vehicle electrical security systems fitted</td>
</tr>
</tbody>
</table>

**Assessment criteria**

The learner can:

4.1 describe the checks that are made to make sure the components are compatible with the vehicle specification and the customer requirements

4.2 explain how to test and evaluate the performance of any electrical enhancements fitted against vehicle specification and the importance of doing so

4.3 explain how to make adjustments to components and to any surrounding systems to ensure effective operation
Unit 459 Knowledge of the suitability, installation and configuration of vehicle electrical enhancements and security systems

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The different types of electrical enhancement systems and components
a. Systems and components to include:
   i. radio/CD players
   ii. multi-play CD players
   iii. DVD
   iv. MP3 players
   v. speakers
   vi. aerial systems
   vii. amplifiers
   viii. visual display screens
   ix. satellite navigation
   x. mobile communication units
   xi. networking systems
   xii. body electrical systems
   xiii. data logging

The function of component parts in the electrical enhancement systems
a. Components include:
   i. Radio
   ii. CD
   iii. Video
   iv. DVD players
   v. aerial systems
   vi. speakers
   vii. amplifiers
   viii. visual display screens
   ix. mobile communication systems
   x. networking systems
   xi. body electrical systems
   xii. data logging

The operating principles of electrical enhancement systems
   i. in car entertainment
   ii. audio systems
iii. communication systems
iv. networking systems
v. body electrical systems

The relevant legislation relevant to the electrical enhancement systems
a. Find and apply all relevant legislation for the fitment and use of I.C.E. systems

Faults and testing methods associated electrical enhancement systems
a. Test and procedures for the following:
   i. radio/CD players
   ii. speakers
   iii. aerial systems
   iv. amplifiers
   v. wiring
   vi. connections
   vii. relays
   viii. fuses
   ix. removal and refitting procedures
   x. networking systems
   xi. body electrical systems
   xii. data logging

Types of security/warning systems and components
   ii. control units
   iii. alarm modules
   iv. audible warning units
   v. immobiliser units
   vi. location/tracking units
   vii. electronic deadlocking units
   viii. sensing units
   ix. horn
   x. audible warning speakers

The function of component parts in security and warning systems
a. Components to include:
   i. control units
   ii. alarm modules
   iii. audible warning units
   iv. interior sensing systems
   v. immobiliser units
   vi. location/tracking units
   vii. electronic deadlocking units
   viii. relays
   ix. diodes
   x. horns

The operating principles of security and warning systems
a. Operation of alarm systems and audible warning units.
b. Immobiliser systems
c. Location/tracking systems
d. Electronic deadlocking systems

The relevant legislation relevant to security and warning systems
a. Find and apply all relevant legislation for the fitment and use of security and warning systems.

Faults and testing methods associated security and warning systems
a. Components to include:
   i. control units
   ii. audible warning units
   iii. immobiliser units
   iv. horns
   v. relays
   vi. diodes
   vii. wiring
   viii. connections and protection devices
   ix. removal and refitting procedures
Unit 460  Knowledge of conducting vehicle enhancement and installation consultations with customers in the motor vehicle environment

UAN: M/601/6031

| Level: | 3 |
| Credit value: | 2 |
| GLH: | 20 |

**Relationship to NOS:** This unit is linked to Unit AE10K Knowledge of Conducting Vehicle Enhancement and Installation Consultations with Customers in the Motor Vehicle Environment

**Assessment requirements specified by a sector or regulatory body:** This unit was developed by the IMI, the sector skills council for the automotive retail industry. All assessments have been developed in accordance with the IMI Assessment Requirements for VRQs.

**Aim:** This unit enables the learner to develop an understanding of conducting installation and system consultations with customers to improve the original vehicle features/specification and to meet customer requirements. It also includes making recommendations to ensure that the customers concerns are addressed and explaining the outcomes that the enhancements will achieve so that customers fully understand the work that will be undertaken.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>The learner will:</th>
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<tbody>
<tr>
<td>1.</td>
<td>understand how to conduct installation and system consultation with customers</td>
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</table>

**Assessment criteria**
The learner can

<p>| 1.1 | explain how to give straightforward presentations to customers on vehicle enhancements |
| 1.2 | identify and explain suitable communication methods to use when working with customers |
| 1.3 | explain how to present yourself in a positive and professional manner to customers |
| 1.4 | identify and explain different methods of handling customers who react differently |</p>
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<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1.5</td>
<td>explain how to adapt language when explaining technical matters to customers</td>
</tr>
<tr>
<td>1.6</td>
<td>describe how to use effective questioning techniques with customers</td>
</tr>
<tr>
<td>1.7</td>
<td>identify and explain how to care for customers and achieve customer satisfaction</td>
</tr>
<tr>
<td>1.8</td>
<td>explain the organisational requirements for personal appearance and conduct when dealing with customers.</td>
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</table>
Unit 460  Knowledge of conducting vehicle enhancement and installation consultations with customers in the motor vehicle environment

Supporting information

Candidates will be assessed on the assessment criteria as specified within the unit. The following information has been provided by IMI SSC and is included to support centres in terms of teaching and delivery.

The identification of different types of electrical enhancement systems and components
a. Systems and components to include:
   i. radio/CD players
   ii. multi-play CD players
   iii. DVD
   iv. MP3 players
   v. speakers
   vi. aerial systems
   vii. amplifiers
   viii. visual display screens
   ix. satellite navigation
   x. mobile communication units
   xi. networking systems
   xii. body electrical systems

The function of component parts in the electrical enhancement systems
a. Components include:
   i. radio
   ii. CD
   iii. video
   iv. DVD players
   v. aerial systems
   vi. speakers
   vii. amplifiers
   viii. visual display screens
   ix. mobile communication systems
   x. networking systems
   xi. body electrical systems
   xii. data logging

The operating principles of electrical enhancement systems
a. Operation of electrical enhancement systems
i. in car entertainment
ii. audio systems
iii. communication systems
iv. networking systems
v. body electrical systems

The relevant legislation relevant to the electrical enhancement systems
a. Find and apply all relevant legislation for the fitment and use of electrical enhancement systems.

Show positive personal image
a. The importance of achieving and maintaining a physical appearance suitable for the motor industry
b. Why it is important to maintain good personal appearance whilst working in the motor industry
c. The use of simple body language such as body posture, eye contact and smiling and recognize it in others
d. How to meet and greet customers and recognize the importance of making a customer feel welcome
e. How to start conversations.

Respond to different types of motor industry customer
a. Why it is important to be able to assist all customers equally
b. How best to assist customers with physical needs
c. How best to assist customers with sensory needs
d. How best to assist customers with learning needs
e. How best to assist customers from other cultures
f. The communication methods best suited to the needs of the individual customer

Respond to a motor industry customer by telephone
a. The importance of using the correct greeting for incoming calls
b. The correct methods for dealing with telephone enquiries
c. The importance of obtaining and providing names
d. The importance of creating a positive impression on the telephone
e. Why it is important to record information
f. Select the correct questioning techniques used to obtain information over the telephone
g. The correct procedures for dealing with telephone calls.

Handle motor industry customer complaints
a. The variety of emotions customers may display when complaining
b. Identify that some customers are experienced at complaining and will need to be assisted in a specific manner
c. Explain that some unhappy customers may be reluctant to complain and they will need to be made to feel comfortable to do so
d. Explain why it is important to try to resolve a customer’s complaint
e. Identify the importance of active listening
f. Explain how to approach a customer
g. Recognise the limits of their own authority and who to refer to when customer requests are outside own limitations.
Appendix 1  Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the Centres and Training Providers homepage on www.cityandguilds.com.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve ‘approved centre’ status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- Regulatory Arrangements for the Qualifications and Credit Framework (2008)
- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.
Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The centre homepage section of the City & Guilds website also contains useful information such as:

- **Walled Garden**: how to register and certificate candidates online
- **Qualifications and Credit Framework (QCF)**: general guidance about the QCF and how qualifications will change, as well as information on the IT systems needed and FAQs
- **Events**: dates and information on the latest Centre events
- **Online assessment**: how to register for e-assessments.
## Useful contacts

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<th><strong>International learners</strong></th>
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