

# **Pearson BTEC Level 2 and 3 Diploma in Light Vehicle Maintenance and Repair Principles**

# **Pearson Edexcel Level 2 and 3 Diploma in Light Vehicle Maintenance and Repair Competence**

## **Specification**

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This specification is Issue 2. Key changes are listed in the summary table on the next page of the document. We will inform centres of any changes to this issue. The latest issue can be found on the Pearson website: [qualifications.pearson.com](http://qualifications.pearson.com)

These qualifications were previously entitled:

Edexcel BTEC Level 2 Diploma in Light Vehicle Maintenance and Repair Principles (QCF)

Edexcel BTEC Level 2 Diploma in Light Vehicle Maintenance and Repair Competence (QCF)

Edexcel BTEC Level 3 Diploma in Light Vehicle Maintenance and Repair Principles (QCF)

Edexcel BTEC Level 3 Diploma in Light Vehicle Maintenance and Repair Competence (QCF)

The QNs remain the same

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## **Summary of Pearson BTEC Level 2 and 3 Diploma in Light Vehicle Maintenance and Repair Principles specification Issue 2 changes**

## **Summary of Pearson Edexcel Level 2 and 3 Diploma in Light Vehicle Maintenance and Repair Competence specification Issue 2 changes**

<b>Summary of changes made between previous issue and this current issue</b>	<b>Page number</b>
<b>All references to QCF have been removed throughout the specification</b>	<b>All</b>
<b>Definition of TQT added</b>	<b>9</b>
<b>Definition of sizes of qualifications aligned to TQT</b>	<b>9</b>
<b>TQT value added</b>	<b>9</b>
<b>GLH range removed and replaced with lowest GLH value for the shortest route through the qualification</b>	<b>All</b>
<b>QCF references removed from unit titles and unit levels in all units</b>	<b>All</b>
<b>Guided learning definition updated</b>	<b>21</b>

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# Introducing Pearson BTEC Specialist qualifications

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## What are BTEC Specialist qualifications?

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BTEC Specialist qualifications are work-related qualifications available from Entry to Level 3 in a range of sectors. They give learners the knowledge, understanding and skills they need to prepare for employment in a specific occupational area. The qualifications also provide career development opportunities for those already in work. The qualifications may be offered as full-time or part-time courses in schools or colleges. Training centres and employers may also offer these qualifications.

## Sizes of Specialist qualifications

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For all regulated qualifications, we specify a total number of hours that learners are expected to undertake in order to complete and show achievement for the qualification – this is the Total Qualification Time (TQT). The TQT value indicates the size of a qualification.

Within the TQT, we identify the number of Guided Learning Hours (GLH) that a centre delivering the qualification needs to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study.

As well as guided learning, there may be other required learning that is directed by tutors or assessors. This includes, for example, private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

As well as TQT and GLH, qualifications can also have a credit value – equal to one tenth of TQT, rounded to the nearest whole number.

TQT and credit values are assigned after consultation with users of the qualifications.

BTEC Specialist qualifications are available in the following sizes:

- Award – a qualification with a TQT value of 120 or less (equivalent to a range of 1–12 credits)
- Certificate – a qualification with a TQT value in the range of 121–369 (equivalent to a range of 13–36 credits)

Diploma – a qualification with a TQT value of 370 or more (equivalent to 37 credits and above).



## Qualification titles covered by this specification

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This specification gives you the information you need to offer the Pearson Principles and Competence qualifications in Light Vehicle Maintenance and Repair at Level 2 and Level 3.

<b>Qualification title</b>	<b>Qualification Number (QN)</b>	<b>Operational start date</b>
Pearson BTEC Level 2 Diploma in Light Vehicle Maintenance and Repair Principles	501/0269/2	01/09/2010
Pearson Edexcel Level 2 Diploma in Light Vehicle Maintenance and Repair Competence	501/0196/1	01/09/2010
Pearson BTEC Level 3 Diploma in Light Vehicle Maintenance and Repair Principles	501/0193/6	01/09/2010
Pearson Edexcel Level 3 Diploma in Light Vehicle Maintenance and Repair Competence	501/0248/5	01/09/2010

These qualifications have been accredited and are eligible for public funding as determined by the Department for Education (DfE) under Section 96 of the Learning and Skills Act 2000.

The qualification titles listed above feature in the funding lists published annually by the DfE and the regularly updated website. They will also appear on the Learning Aim Reference Application (LARA), where relevant.

You should use the Qualification Number (QN), when you wish to seek public funding for your learners. Each unit within a qualification will also have a unique unit reference number, which is listed in this specification.

The qualification title and unit reference numbers will appear on the learners' final certification document. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson .

# Key features of the Pearson Principles and Competence qualifications in Light Vehicle Maintenance and Repair at Level 2 and Level 3

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These qualifications:

- are nationally recognised
- are based on the Maintenance & Repair – Light Vehicle National Occupational Standards (NOS). The NOS, assessment strategy and qualification structure(s) are owned by the Sector Skills Council, The Institute of the Motor Industry (IMI).

The Pearson Edexcel Level 2 Diploma in Light Vehicle Maintenance and Repair Competence and the Pearson BTEC Level 2 Diploma in Light Vehicle Maintenance and Repair Principles have been approved as components in the Intermediate apprenticeship framework in Vehicle Maintenance and Repair.

The Pearson Edexcel Level 3 Diploma in Light Vehicle Maintenance and Repair Competence and the Pearson BTEC Level 3 Diploma in Light Vehicle Maintenance and Repair Principles have been approved as components in the Advanced apprenticeship framework in Vehicle Maintenance and Repair.

## What is the purpose and benefits of these qualifications?

These qualifications provide learners with flexible access to industry supported Level 2 and 3 skills programmes, which act as a real alternative to academic qualifications for those who prefer this style of learning and achievement. As part of apprenticeship frameworks, the qualification supports learners in providing a career pathway into jobs and training at technician level and higher.

Learners will have the opportunity to learn and demonstrate their skills, knowledge and competence in routine light vehicle maintenance and inspections including servicing, repairing and replacing faulty parts and maintaining records.

## Who are these qualifications for?

These qualifications are for all learners aged 16 and above who are capable of reaching the required standards.

Pearson's policy is that the qualifications should:

- be free from any barriers that restrict access and progression
- ensure equality of opportunity for all wishing to access the qualification(s)

Centres should be aware that within the Level 2 qualifications in this specification, learners will be required to meet the demands of unit(s) at Level 3. Centres are advised to consider the support, guidance and opportunities they give to learners to meet the demands of the higher level units during delivery and assessment of the qualification.

**What are the potential job roles for those working towards these qualifications?**

- Light Vehicle Service Technician (Level 2)
- Light Vehicle Diagnostic Technician (Level 3)

**What progression opportunities are available to learners who achieve these qualifications?**

Learners can progress on to other Pearson automotive apprenticeship programmes and/or related qualifications detailed in *Annexe A*. Other progression routes include; further work or work experience, academic qualification(s) such as one or more GCSEs, Higher Education and or Foundation Degree, or employment into a range of jobs at Level 2 and 3.

# What is the qualification structure for the Pearson BTEC Level 2 Diploma in Light Vehicle Maintenance and Repair Principles?

In order to achieve this qualification, learners must achieve 78 credits (780 TQT): 29 credits from the 6 mandatory generic units (Group A) 44 credits from the 10 mandatory specialist units (Group B) and a minimum of 5 credits from 1 optional group (Groups D, E, F, G, H, I or J) ensuring all components within the selected group are achieved.

Individual units can be found in the *Units* section.

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group A – Mandatory generic units</b>				
Learners must achieve 29 credits from this group.				
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
2	Y/601/7254	Skills in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
3	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
4	J/601/6262	Skills in Supporting Job Roles in the Automotive Work Environment	5	3
5	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
6	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
<b>Group B – Mandatory specialist units</b>				
Learners must achieve 44 credits from this group.				
9	F/601/3716	Knowledge of Routine Light Vehicle Maintenance	3	2
10	H/601/3871	Skills in Routine Light Vehicle Maintenance	2	2
11	R/601/3719	Knowledge of Light Vehicle Engine Mechanical, Lubrication and Cooling System Units and Components	3	2

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group B – Mandatory specialist units (<i>continued</i>)</b>				
Learners must achieve 44 credits from this group.				
12	H/601/3725	Knowledge of Light Vehicle Fuel, Ignition, Air and Exhaust System Units and Components	3	2
13	K/601/3872	Skills in Removing and Replacing Light Vehicle Engine Units and Components	5	2
14	T/601/3731	Knowledge of Removing and Replacing Light Vehicle Electrical Units and Components	6	2
15	T/601/3874	Skills in Removing and Replacing Light Vehicle Electrical Units and Components	5	2
16	A/601/3732	Knowledge of Removing and Replacing Light Vehicle Chassis Units and Components	6	2
17	F/601/3876	Skills in Removing and Replacing Light Vehicle Chassis Units and Components	5	2
18	Y/601/3740	Knowledge of Light Vehicle Transmission and Driveline Units and Components	6	2
<b>Optional Groups</b>				
Learners must achieve a minimum of 5 credits from 1 optional group. All sub-components of the chosen group must be completed.				
<b>Group D – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
22	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3
23	M/601/6286	Skills to Identify and Agree Motor Vehicle Customer Service Needs	5	3
<b>Group E – Optional units</b>				
If this group is chosen, learners must achieve 8 credits.				
24	H/601/3742	Knowledge of Inspecting Light Vehicles Using Prescribed Methods	4	2
25	A/601/3889	Skills in Inspecting Light Vehicles using Prescribed Methods	4	2

<b>Group B – Mandatory specialist units</b>				
Learners must achieve 44 credits from this group.				
<b>Group F – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
26	R/601/3736	Knowledge of Overhauling Light Vehicle Engine Units	3	3
27	L/601/3881	Skills in Overhauling Light Vehicle Engine Mechanical Units	2	3
<b>Group G – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
28	Y/601/3737	Knowledge of Overhauling Light Vehicle Transmission Units	3	3
29	D/601/3884	Skills in Overhauling Light Vehicle Transmission Units	2	3
<b>Group H – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
30	D/601/3738	Knowledge of Overhauling Light Vehicle Steering and Suspension Units	3	3
31	H/601/3885	Skills in Overhauling Light Vehicle Steering and Suspension Units	2	3
<b>Group I – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
32	K/601/3886	Skills in Removing and Replacing Light Vehicle Driveline Units and Components	5	2
<b>Group J – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
33	F/601/3747	Knowledge of Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	2	2
34	K/601/3869	Skills in Removing and Fitting of Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	3	2



# What is the qualification structure for the Pearson Pearson Edexcel Level 2 Diploma in Light Vehicle Maintenance and Repair Competence?

In order to achieve the qualification learners must achieve a minimum of 98 credits (980 TQT): 29 credits from the 6 mandatory generic units (Group A) 64 credits from the 10 mandatory specialist units (Group B) and a minimum of 5 credits from 1 optional group (Groups D, E, F, G, H, I or J) ensuring all components within the selected group are achieved.

Individual units can be found in the *Units* section.

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group A – Mandatory generic units</b>				
Learners must achieve 29 credits from this group.				
7	A/601/6338	Competency in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
8	K/601/6366	Competency in Supporting Job Roles in the Automotive Work Environment	5	3
3	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
5	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
6	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
<b>Group B – Mandatory specialist units</b>				
Learners must achieve 64 credits from this group.				
57	L/601/3766	Competency in Routine Light Vehicle Maintenance	7	2
9	F/601/3716	Knowledge of Routine Light Vehicle Maintenance	3	2

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group B – Mandatory specialist units (<i>continued</i>)</b>				
Learners must achieve 64 credits from this group.				
11	R/601/3719	Knowledge of Light Vehicle Engine Mechanical, Lubrication and Cooling System Units and Components	3	2
12	H/601/3725	Knowledge of Light Vehicle Fuel, Ignition, Air and Exhaust System Units and Components	3	2
19	D/601/3769	Competency in Removing and Replacing Light Vehicle Engine Units and Components	10	2
20	Y/601/3771	Competency in Removing and Replacing Light Vehicle Electrical Units and Components	10	2
14	T/601/3731	Knowledge of Removing and Replacing Light Vehicle Electrical Units and Components	6	2
21	K/601/3774	Competency in Removing and Replacing Light Vehicle Chassis Units and Components	10	2
16	A/601/3732	Knowledge of Removing and Replacing Light Vehicle Chassis Units and Components	6	2
18	Y/601/3740	Knowledge of Light Vehicle Transmission and Driveline Units and Components	6	2
<b>Optional Groups</b>				
Learners must achieve a minimum of 5 credits from 1 optional group. All sub-components of the chosen group must be completed.				
<b>Group D – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
35	K/601/6383	Competency in Identifying and Agreeing Motor Vehicle Customer Service Needs	5	3
22	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group E – Optional units</b>				
If this group is chosen, learners must achieve 14 credits.				
36	M/601/3792	Competency in Inspecting Light Vehicles Using Prescribed Methods	10	2
24	H/601/3742	Knowledge of Inspecting Light Vehicles Using Prescribed Methods	4	2
<b>Group F – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
37	D/601/3786	Competency in Overhauling Light Vehicle Engine Mechanical Units	2	3
26	R/601/3736	Knowledge of Overhauling Light Vehicle Engine Units	3	3
<b>Group G – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
38	H/601/3787	Competency in Overhauling Light Vehicle Transmission Units	2	3
28	Y/601/3737	Knowledge of Overhauling Light Vehicle Transmission Units	3	3
<b>Group H – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
39	K/601/3788	Competency in Overhauling Light Vehicle Steering and Suspension Units	2	3
30	D/601/3738	Knowledge of Overhauling Light Vehicle Steering and Suspension Units	3	3
<b>Group I – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
40	M/601/3789	Competency in Removing and Replacing Light Vehicle Driveline Units and Components	10	2

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group J – Optional units</b>				
If this group is chosen, learners must achieve 7 credits.				
41	J/601/3751	Competency in Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	5	2
33	F/601/3747	Knowledge of Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	2	2

# What is the qualification structure for the Pearson BTEC Level 3 Diploma in Light Vehicle Maintenance and Repair Principles?

In order to achieve the qualification, learners must achieve a minimum of 73 credits, (730 TQT): 29 credits from the 6 mandatory generic units (Group A) 39 credits from the 7 mandatory specialist units (Group B) and a minimum of 5 credits from 1 optional group (Groups D, E, F, G, H, I, J or K) ensuring all components within the selected group are achieved.

Individual units can be found in the *Units* section.

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group A – Mandatory generic units</b>				
Learners must achieve 29 credits from this group.				
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
2	Y/601/7254	Skills in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
3	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
4	J/601/6262	Skills in Supporting Job Roles in the Automotive Work Environment	5	3
5	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
6	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
<b>Group B – Mandatory specialist units</b>				
Learners must achieve 39 credits from this group.				
43	A/601/3746	Knowledge of Diagnosis and Rectification of Vehicle Auxiliary Electrical Faults	6	3
44	H/601/3868	Skills in Diagnosing and Rectifying Vehicle Auxiliary Electrical Faults	5	3
45	F/601/3733	Knowledge of Diagnosis and Rectification of Light Vehicle Engine Faults	6	3
46	J/601/3877	Skills in Diagnosing and Rectifying Light Vehicle Engine Faults	5	3

Unit Number	Unit Reference Number	Unit Title	Credit	Level
47	L/601/3735	Knowledge in Diagnosis and Rectification of Light Vehicle Chassis Faults	6	3
48	R/601/3879	Skills in Diagnosing and Rectifying Light Vehicle Chassis System Faults	5	3
49	D/601/3741	Knowledge of Diagnosis and Rectification of Light Vehicle Transmission and Driveline Faults	6	3
<b>Optional Groups</b>				
<b>Learners must achieve a minimum of 5 credits from 1 optional group. All sub-components of the chosen group must be completed.</b>				
<b>Group D – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
50	T/601/6242	Knowledge of how to Make Learning Possible through Demonstrations and Instruction	5	3
51	Y/601/6282	Skills in how to Make Learning Possible through Demonstrations and Instruction	5	3
<b>Group E – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
22	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3
23	M/601/6286	Skills to Identify and Agree Motor Vehicle Customer Service Needs	5	3
<b>Group F – Optional units</b>				
If this group is chosen, learners must achieve 8 credits.				
24	H/601/3742	Knowledge of Inspecting Light Vehicles Using Prescribed Methods	4	2
25	A/601/3889	Skills in Inspecting Light Vehicles using Prescribed Methods	4	2
<b>Group G – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
26	R/601/3736	Knowledge of Overhauling Light Vehicle Engine Units	3	3
27	L/601/3881	Skills in Overhauling Light Vehicle Engine Mechanical Units	2	3

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group H – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
28	Y/601/3737	Knowledge of Overhauling Light Vehicle Transmission Units	3	3
29	D/601/3884	Skills in Overhauling Light Vehicle Transmission Units	2	3
<b>Group I – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
30	D/601/3738	Knowledge of Overhauling Light Vehicle Steering and Suspension Units	3	3
31	H/601/3885	Skills in Overhauling Light Vehicle Steering and Suspension Units	2	3
<b>Group J – Optional units</b>				
If this group is chosen, learners must achieve 5 credits				
42	T/601/3888	Skills in Diagnosing and Rectifying Light Vehicle Transmission and Driveline Faults	5	3
<b>Group K – Optional units</b>				
If this group is chosen, learners must achieve 5 credits				
33	F/601/3747	Knowledge of Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	2	2
34	K/601/3869	Skills in Removing and Fitting of Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	3	2

## What is the qualification structure for the Pearson Pearson Edexcel Level 3 Diploma in Light Vehicle Maintenance and Repair Competence?

In order to achieve the qualification learners must achieve a minimum of 88 credits (880 TQT) : 29 credits from the 6 mandatory generic units (Group A), 54 credits from the 7 mandatory specialist units (Group B) and a minimum of 5 credits from 1 optional group (Groups D, E, F, G, H, I, J or K) ensuring all components within the selected group are achieved.

Individual units can be found in the *Units* section.

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group A – Mandatory generic units</b>				
Learners must achieve 29 credits from this group.				
7	A/601/6338	Competency in Health, Safety and Good Housekeeping in the Automotive Environment	7	2
1	D/601/6171	Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment	3	2
8	K/601/6366	Competency in Supporting Job Roles in the Automotive Work Environment	5	3
3	T/601/6175	Knowledge of Support for Job Roles in the Automotive Work Environment	3	3
5	K/601/6237	Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	4	2
6	Y/601/6279	Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment	7	2
<b>Group B – Mandatory specialist units</b>				
Learners must achieve 54 credits from this group.				
52	L/601/3749	Competency in Diagnosing and Rectifying Vehicle Auxiliary Electrical Faults	10	3
43	A/601/3746	Knowledge of Diagnosis and Rectification of Vehicle Auxiliary Electrical Faults	6	3
53	J/601/3779	Competency in Diagnosing and Rectifying Light Vehicle Engine Faults	10	3
45	F/601/3733	Knowledge of Diagnosis and Rectification of Light Vehicle Engine Faults	6	3



Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group B – Mandatory specialist units (<i>continued</i>)</b>				
Learners must achieve 54 credits from this group.				
54	Y/601/3785	Competency in Diagnosing and Rectifying Light Vehicle Chassis System Faults	10	3
47	L/601/3735	Knowledge in Diagnosis and Rectification of Light Vehicle Chassis Faults	6	3
49	D/601/3741	Knowledge of Diagnosis and Rectification of Light Vehicle Transmission and Driveline Faults	6	3
<b>Optional Groups</b>				
Learners must achieve a minimum of 5 credits from 1 optional group. All sub-components of the chosen group must be completed.				
<b>Group D – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
55	Y/601/6380	Competency in Making Learning Possible through Demonstrations and Instruction	5	3
50	T/601/6242	Knowledge of how to Make Learning Possible through Demonstrations and Instruction	5	3
<b>Group E – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
35	K/601/6383	Competency in Identifying and Agreeing Motor Vehicle Customer Service Needs	5	3
22	R/601/6247	Knowledge of how to Identify and Agree Motor Vehicle Customer Service Needs	5	3
<b>Group F – Optional units</b>				
If this group is chosen, learners must achieve 14 credits.				
36	M/601/3792	Competency in Inspecting Light Vehicles Using Prescribed Methods	10	2
24	H/601/3742	Knowledge of Inspecting Light Vehicles Using Prescribed Methods	4	2

Unit Number	Unit Reference Number	Unit Title	Credit	Level
<b>Group G – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
37	D/601/3786	Competency in Overhauling Light Vehicle Engine Mechanical Units	2	3
26	R/601/3736	Knowledge of Overhauling Light Vehicle Engine Units	3	3
<b>Group H – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
38	H/601/3787	Competency in Overhauling Light Vehicle Transmission Units	2	3
28	Y/601/3737	Knowledge of Overhauling Light Vehicle Transmission Units	3	3
<b>Group I – Optional units</b>				
If this group is chosen, learners must achieve 5 credits.				
39	K/601/3788	Competency in Overhauling Light Vehicle Steering and Suspension Units	2	3
30	D/601/3738	Knowledge of Overhauling Light Vehicle Steering and Suspension Units	3	3
<b>Group J – Optional units</b>				
If this group is chosen, learners must achieve 10 credits.				
56	K/601/3791	Competency in Diagnosing and Rectifying Light Vehicle Transmission and Driveline Faults	10	3
<b>Group K – Optional units</b>				
If this group is chosen, learners must achieve 7 credits.				
41	J/601/3751	Competency in Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	5	2
33	F/601/3747	Knowledge of Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels	2	2

## How are the qualifications graded and assessed?

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The overall grade for the qualifications is a 'pass'. The learner must achieve all the required units within the specified qualification structure.

To pass a unit the learner must:

- achieve **all** the specified learning outcomes
- satisfy **all** the assessment criteria by providing sufficient and valid evidence for each criterion
- show that the evidence is their own.

The qualifications are designed to be assessed:

- in the workplace or
- in conditions resembling the workplace, as specified in the assessment requirements/strategy for the sector, or
- as part of a training programme.

### Assessment strategy for Competence based qualifications (VCQs)

The assessment strategy for the competence qualifications (VCQ) has been included in *Annexe C*. It has been developed by IMI in partnership with employers, training providers, awarding organisations and the regulatory authorities. The assessment strategy includes details on:

- criteria for defining realistic working environments
- roles and occupational competence of assessors, expert witnesses, internal verifiers and standards verifiers
- quality control of assessment
- evidence requirements.

Evidence of competence may come from:

- **current practice** where evidence is generated from a current job role
- a **programme of development** where evidence comes from assessment opportunities built into a learning/training programme whether at or away from the workplace
- the **Recognition of Prior Learning (RPL)** where a learner can demonstrate that they can meet the assessment criteria within a unit through knowledge, understanding or skills they already possess without undertaking a course of learning. They must submit sufficient, reliable and valid evidence for internal and standards verification purposes. RPL is acceptable for accrediting a unit, several units or a whole qualification
- a **combination** of these.

It is important that the evidence is:

<b>Valid</b>	relevant to the standards for which competence is claimed
<b>Authentic</b>	produced by the learner
<b>Current</b>	sufficiently recent to create confidence that the same skill, understanding or knowledge persist at the time of the claim
<b>Reliable</b>	indicates that the learner can consistently perform at this level
<b>Sufficient</b>	fully meets the requirements of the standards.

## Types of evidence

To successfully achieve a unit the learner must gather evidence which shows that they have met the required standard in the assessment criteria. Evidence can take a variety of different forms including the examples below. Centres should refer to the assessment strategy for information about which of the following are permissible.

Centres should also refer to the assessment strategy (for competence based qualifications (VCOs) and the assessment requirements/evidence requirements section within each individual unit.

- direct observation of the learner's performance by their assessor (O)
- outcomes from oral or written questioning (Q&A)
- products of the learner's work (P)
- personal statements and/or reflective accounts (RA)
- outcomes from simulation, where permitted by the assessment strategy (S)
- professional discussion (PD)
- assignment, project/case studies (A)
- authentic statements/witness testimony (WT)
- expert witness testimony (EWT)
- evidence of Recognition of Prior Learning (RPL).

The abbreviations may be used for cross-referencing purposes.

Learners can use one piece of evidence to prove their knowledge, skills and understanding across different assessment criteria and/or across different units. It is, therefore, not necessary for learners to have each assessment criterion assessed separately. Learners should be encouraged to reference the assessment criteria to which the evidence relates.

Evidence must be made available to the assessor, internal verifier and Pearson standards verifier. A range of recording documents is available on the Pearson website [qualifications.pearson.com](http://qualifications.pearson.com). Alternatively, centres may develop their own.

# Centre recognition and approval

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## Centre recognition

Centres that have not previously offered Pearson qualifications need to apply for and be granted centre recognition as part of the process for approval to offer individual qualifications. New centres must complete both a centre recognition approval application and a qualification approval application.

Existing centres will be given 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by the new qualification and the conditions for automatic approval are met. Centres already holding Pearson approval are able to gain qualification approval for a different level or different sector.

## Approvals agreement

All centres are required to enter into an approvals agreement which is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and any linked codes or regulations. Pearson will act to protect the integrity of the awarding of qualifications, if centres do not comply with the agreement. This could result in the suspension of certification or withdrawal of approval.

## Quality assurance

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Quality assurance is at the heart of vocational qualifications. Assessment on BTEC and Competency qualifications is completed by your centre. You use quality assurance to ensure that your managers, internal verifiers and assessors are standardised and supported. We use quality assurance to check that all centres are working to national standards. It gives us the opportunity to identify and provide support where it is needed in order to safeguard certification. It also allows us to recognise and support good practice.

For the qualifications in this specification, the Pearson quality assurance model will follow one of the three processes listed below.

- 1 Delivery of the **Competence and Principles** qualifications as part of a BTEC apprenticeship (single click registration)
  - integrated annual visits by a Standards Verifier to review centre-wide quality assurance systems and sampling of internal verification and assessor decisions

- 2 Delivery of the Competence qualification outside the apprenticeship
  - annual visits to centres by a Centre Quality Reviewer to review centre-wide quality assurance systems
  - annual visits by a Standards Verifier for sampling of internal verification and assessor decisions for the qualification
- 3 Delivery of the Principles qualification outside the apprenticeship
  - annual visits to centres by a Centre Quality Reviewer to review centre-wide quality assurance systems
  - Lead Internal Verifier accreditation. This involves online training and standardisation of Lead Internal Verifiers using our OSCA platform. Please note that not all qualifications are covered by Lead Internal Verifier accreditation. Where this is the case we will annually allocate a Standards Verifier to conduct postal sampling of internal verification and assessor decisions for the Principal Subject Area.

For further details, go to the UK BTEC Quality Assurance Handbook 2011-12 [qualifications.pearson.com](http://qualifications.pearson.com)

## What resources are required?

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Each qualification is designed to support learners working in the automotive sector. Physical resources need to support the delivery of the qualifications and the assessment of the learning outcomes and must be of industry standard.

For competence based qualifications (VCOs), centres must meet any specific resource and staff requirements outlined in *Annexe C: Assessment strategy*.

# Unit format

Each unit in this specification contains the following sections.

<b>Unit title:</b>					The unit title forms the words that will appear on the learner's Notification of Performance (NOP).
<b>Unit reference number:</b>					This code is a unique reference number for the unit.
<b>Level:</b>					All units and qualifications have a level assigned to them that represents the level of achievement. There are nine levels of achievement, from Entry level to level 8. Where appropriate the NOS and/or other sector/professional have been mapped across the qualification.
<b>Credit value:</b>					All units have a credit value. The minimum credit value is one, and credits can only be awarded in whole numbers. Learners will be awarded credits when they achieve the unit.
<b>Guided learning hours:</b>					Guided Learning Hours (GLH) is the number of hours that a centre delivering the qualification needs to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study.
<b>Unit summary:</b>					This provides a summary of the purpose of the unit.
<b>Assessment requirements/evidence requirements:</b>					The assessment/evidence requirements are determined by the SSC. Learners must provide evidence for each of the requirements stated in this section.
<b>Learning outcomes:</b>	<b>Assessment criteria:</b>	<b>Evidence type:</b>	<b>Portfolio reference:</b>	<b>Date:</b>	
			The learner should use this box to indicate where the evidence can be obtained eg portfolio page number.	The learner should give the date when the evidence has been provided.	
Learning outcomes state exactly what a learner should know, understand or be able to do as a result of completing a unit.		The assessment criteria of a unit specify the standard a learner is expected to meet to demonstrate that a learning outcome, or a set of learning outcomes, has been achieved.		Learners must reference the type of evidence they have and where it is available for quality assurance purposes. The learner can enter the relevant key and a reference. Alternatively, the learner and/or centre can devise their own referencing system.	





# Units



**Unit 1: Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment**

**Unit reference number:** D/601/6171

**Level:** Level 2

**Credit value:** 3

**Guided learning hours:** 30

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### **Unit Summary**

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.

### **Assessment Requirements/Evidence requirements:**

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### **Economic use of resources**

- a consumable materials eg grease, oils, split pins, locking and fastening devices etc

#### **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
- f Manual Handling Operations Regulations 1992
- g Health and Safety (Display Screen Equipment) Regulations 1992
- h Abrasive Wheel Regulations (current)
- i Safe Working Loads
- j Working at Height Regulations (current)

### **Routine maintenance of the workplace**

- a trainees 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 eg electrical safety check log

### **Legislation relevant to health and safety**

- a HASAWA
- b COSHH
- c EPA
- d Manual Handling Operations Regulations 1992
- 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
- e Employers Liability (Compulsory Insurance) Act 1969 and Regulations 1998
- 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**

- a electrical safety, pneumatics and hydraulics
- b accessing and interpreting safety information
- c seeking advice when needed
- d seeking assistance when required
- e reporting of unsafe equipment

- f storing tools, equipment and products safely and appropriately
- g using the correct PPE
- h following manufacturers recommendations
- i following application procedures eg hazardous substances
- j 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 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. 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, to include:
  - 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:
  - iv the use and maintenance of machinery or equipment
  - v the use of materials or substances
  - vi accidental breakages and spillages
  - vii unsafe behaviour
  - viii working practices that do not conform to laid down policies
  - ix environmental factors
  - x personal presentation
  - xi unauthorised personal, customers, contractors etc entering your work premises
  - xii working by the roadside
  - xiii 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 your 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 policies 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 ie 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 ie 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

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the correct personal and vehicle protective equipment to be used within the automotive environment	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			
2	Understand effective housekeeping practices in the automotive environment	2.1	describe why the automotive environment should be properly cleaned and maintained			
		2.2	describe requirements and systems which may be put in place to ensure a clean automotive environment			
		2.3	describe how to minimise waste when using utilities and consumables			
		2.4	state the procedures and precautions necessary when cleaning and maintaining an automotive environment			
		2.5	describe the selection and use of cleaning equipment when dealing with general cleaning, spillages and leaks in the automotive environment			
		2.6	describe procedures for correct disposal of waste materials from an automotive environment			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.7	describe procedures for starting and ending the working day which ensure effective housekeeping practices are followed			
3	Understand key health and safety requirements relevant to the automotive environment	3.1	list the main legislation relating to automotive environment health and safety			
		3.2	describe the general legal duties of employers and employees required by current health and safety legislation			
		3.3	describe key, current health and safety requirements relating to the automotive environment			
		3.4	describe why workplace policies and procedures relating to health and safety are important			
4	Understand about hazards and potential risks relevant to the automotive environment	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			
5	Understand personal responsibilities	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 2: Skills in Health, Safety and Good Housekeeping in the Automotive Environment

Unit reference number: Y/601/7254

Level: Level 2

Credit value: 7

Guided learning hours: 60

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### Unit Summary

This unit will enable the learner to develop the skills required to:

- carry out day to day work area cleaning, clearing away, dealing with spillages and disposal of waste, used materials and debris
- identify hazards and risks in the automotive environment and complying with relevant legislation and good practice
- work safely at all times within the automotive environment, both as an individual and with others.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements as set out below:

#### **You must:**

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 produce evidence of use of personal and vehicle protection, cleaning the work environment and disposal of waste on **two** separate **occasions**
- 5 produce evidence of identifying risks which may result from at least **two** of the items listed below:
  - the use and maintenance of machinery or equipment
  - the use of materials or substances
  - working practices which do not conform to laid down policies
  - unsafe behaviour
  - accidental breakages and spillages
  - environmental factors

- 6 produce evidence of identifying risks
- 7 produce evidence of following at least **two** of the workplace policies listed below:
  - the use of safe working methods and equipment
  - the safe use of hazardous substances
  - smoking, eating, drinking and drugs
  - what to do in the event of an emergency
  - personal presentation
- 8 produce evidence of following workplace policies.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to use correct personal and vehicle protection within the automotive environment	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			
2	Be able to carry out effective housekeeping practices in the automotive environment	2.1	select and use cleaning equipment which is of the right type and suitable for the task			
		2.2	use utilities and appropriate consumables, avoiding waste			
		2.3	use materials and equipment to carry out cleaning and maintenance duties in allocated work areas, following automotive work environment policies, schedules and manufacturer's instructions			
		2.4	perform housekeeping activities safely and in a way which minimizes inconvenience to customers and staff			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.5	keep the work area clean and free from debris and waste materials			
		2.6	keep tools and equipment fit for purpose by regular cleaning and keeping tidy			
		2.7	dispose of used cleaning agents, waste materials and debris to comply with legal and workplace requirements			
3	Be able to recognise and deal with dangers in order to work safely within the automotive workplace	3.1	name and locate the responsible persons for health and safety in their relevant workplace			
		3.2	identify and report working practices and hazards which could be harmful to themselves or others			
		3.3	carry out safe working practices whilst working with equipment, materials and products in the automotive environment			
		3.4	rectify health and safety risks encountered at work, within the scope and capability of their job role			
4	Be able to conduct themselves responsibly	4.1	show personal conduct in the workplace which does not endanger the health and safety of themselves or others			
		4.2	display suitable personal presentation at work which ensures the health and safety of themselves and others at work			



Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 3: Knowledge of Support for Job Roles in the Automotive Work Environment

Unit reference number: T/601/6175

Level: Level 3

Credit value: 3

Guided learning hours: 20

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### **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
- b sources of information
  - i other staff
  - ii manuals
  - iii parts lists
  - iv computer software and the internet
  - v manufacturer
  - vi 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

### **Methods of communication**

- a verbal
- b signs and notices
- c memos
- d telephone
- e electronic mail
- f vehicle job card
- g notice boards
- h SMS text messaging
- i letters

### **Organisational and customer requirements:**

- a importance of time scales to customer and organization
- b relationship between time and costs
- c meaning of profit

### **Choice of communication**

- a distance
- b location
- c job responsibility

**Importance of maintaining positive working relationships:**

- a morale
- b productivity
- c company image
- d customer relationships
- e colleagues

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand key organisational structures, functions and roles within the automotive work environment	1.1	identify the purpose of 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 automotive workplace. To include: a trainee b skilled technician c supervisor d manager			
2	Understand the importance of obtaining, interpreting and using information in order to support their job role within the automotive work environment	2.1	explain the importance of different sources of information in a 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.5	explain when replacement units and components must meet the manufacturers' original equipment specification			
		2.6	explain the purpose of how to use identification codes			
3	Understand the importance of different types of communication within the automotive work environment	3.1	explain where different methods of communication would be used within the automotive environment			
		3.2	explain the factors which can determine your choice of communication			
		3.3	explain how the communication of information can change with the target audience to include uninformed and informed people			
4	Understand communication requirements when carrying out vehicle repairs in the automotive work environment	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			
5	Understand how to develop good working relationships with colleagues and customers in the automotive workplace	5.1	describe how to develop positive working relationships with colleagues and customers			
		5.2	explain the importance of developing positive working relationships			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		5.3	explain the importance of accepting other peoples' views and opinions			
		5.4	explain the importance of making and honouring realistic commitments to colleagues and customers			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



**Unit 4:** Skills in Supporting Job Roles in the Automotive Work Environment

**Unit reference number:** J/601/6262

**Level:** Level 3

**Credit value:** 5

**Guided learning hours:** 40

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

**You must:**

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy. Produce witness testimony from your peers **and** supervisor **or** tutor that you have worked well with others
- 4 produce evidence carrying out the above whilst performing your normal duties.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work effectively within the organisational structure of the automotive work environment	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			
2	Be able to obtain and use information in order to support their job role within the automotive work environment	2.1	select and use legal and technical information, in an automotive work environment			
3	Be able to communicate with and support colleagues and customers effectively within the automotive work environment	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			
4	Be able to develop and keep good working relationships in the automotive work environment	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.3	make and keep achievable commitments to customers and colleagues			
		4.4	inform colleagues promptly of anything likely to affect their own work			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

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Date: \_\_\_\_\_

*(if sampled)*



## Unit 5: Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Unit reference number: K/601/6237

Level: Level 2

Credit value: 4

Guided learning hours: 40

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### Unit Summary

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 automotive environment equipment
- the correct selection and fabrication of materials used when modifying and repairing
- the correct application of automotive engineering fabrication and fitting principles.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### **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 workplace. To include:**

- a rule/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

**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

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how to select, use and care for hand tools and measuring devices in the automotive environment	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			
		1.5	explain how common hand tools and measuring devices used for fabricating, repair and fitting in the automotive environment should be stored and maintained			
		1.6	identify common electrical measuring tools used in the repair of vehicles and components			
		1.7	explain the preparation and safe and correct use of common electrical tools when measuring voltage, current and resistance			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Understand how to prepare and use common workshop equipment	2.1	describe the preparation and safe use of workshop equipment			
		2.2	explain the term: safe working load			
3	Understand how to select materials when fabricating, modifying and repairing vehicles and fitting components	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			
4	Understand how to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.4	identify locking, fastening and fixing devices			
		4.5	state the importance of correct operating specifications for limits, fits and tolerances in the automotive environment			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 6: Skills in Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Unit reference number: Y/601/6279

Level: Level 2

Credit value: 7

Guided learning hours: 60

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (Annexe C).

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as detailed below:

#### You must

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy

- 4 produce evidence of undertaking basic routine checks of hand tools, measuring devices and workshop equipment covering all of those listed below:
  - electrical
  - mechanical
  - pneumatic
  - hydraulic
- 5 produce evidence of fabricating **at least one** item from suitable materials to known tolerances, which includes the following processes:
  - filing
  - tapping threads
  - cutting
  - drilling
  - joining
- 6 be observed by your assessor carrying out routine checks and during stages of fabrication.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to select, maintain and use hand tools and measuring devices in the automotive environment	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			
2	Be able to prepare and use common workshop equipment	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Be able to select materials when fabricating, modifying and repairing vehicles and fitting components	3.1	select and use appropriate materials whilst constructing, fitting, modifying or repairing vehicles and components			
4	Be able to apply automotive engineering, fabrication and fitting principles when modifying and repairing vehicles and components	4.1	use correct procedures when: <ul style="list-style-type: none"> <li>a filing</li> <li>b tapping threads</li> <li>c cutting plastics and metals</li> <li>d drilling plastics and metals</li> <li>e fitting</li> </ul>			
		4.2	use appropriate techniques when fabricating, repairing and modifying vehicles and components			
		4.3	select and use: <ul style="list-style-type: none"> <li>a gaskets</li> <li>b seals</li> <li>c sealants</li> <li>d fittings and fasteners</li> </ul>			
		4.4	apply modification and repair techniques to automotive electrical circuits			
		4.5	select and use locking, fixing and fastening devices			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*





## Unit 7: Competency in Health, Safety and Good Housekeeping in the Automotive Environment

Unit reference number: A/601/6338

Level: Level 2

Credit value: 7

Guided learning hours: 60

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### Unit Summary

This unit will enable the learner to develop competency in order to:

- carry out day to day work area cleaning, clearing away, dealing with spillages and disposal of waste, used materials and debris
- identify hazards and risks in the automotive environment and complying with relevant legislation and good practice
- work safely at all times within the automotive environment, both as an individual and with others.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### **You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of use of personal and vehicle protection, cleaning the work environment and disposal of waste on **3** separate occasions
- 5 be observed by your assessor on at least **1** occasion carrying out the above

- 6 produce evidence of identifying risks which may result from at least **2** of the items listed below:
  - the use and maintenance of machinery or equipment
  - the use of materials or substances
  - working practices which do not conform to laid down policies
  - unsafe behaviour
  - accidental breakages and spillages
  - environmental factors
- 7 be observed by your assessor on at least **1** occasion carrying out the above
- 8 produce evidence of following at least **4** of the workplace policies listed below:
  - the use of safe working methods and equipment
  - the safe use of hazardous substances
  - smoking, eating, drinking and drugs
  - what to do in the event of an emergency
  - personal presentation
- 9 be observed by your assessor following workplace policies on at least **1** occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to use correct personal and vehicle protection within the automotive environment	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			
2	Be able to carry out effective housekeeping practices in the automotive environment	2.1	select and use cleaning equipment which is of the right type and suitable for the task			
		2.2	use utilities and appropriate consumables, avoiding waste			
		2.3	use materials and equipment to carry out cleaning and maintenance duties in allocated work areas, following automotive work environment policies, schedules and manufacturer's instructions			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.4	perform housekeeping activities safely and in a way which minimizes inconvenience to customers and staff			
		2.5	keep the work area clean and free from debris and waste materials			
		2.6	keep tools and equipment fit for purpose by regular cleaning and keeping tidy			
		2.7	dispose of used cleaning agents, waste materials and debris to comply with legal and workplace requirements			
3	Be able to recognise and deal with dangers in order to work safely within the automotive workplace	3.1	name and locate the responsible persons for health and safety in their relevant workplace			
		3.2	identify and report working practices and hazards which could be harmful to themselves or others			
		3.3	carry out safe working practices whilst working with equipment, materials and products in the automotive environment			
		3.4	rectify health and safety risks encountered at work, within the scope and capability of their job role			
4	Be able to conduct themselves responsibly	4.1	show personal conduct in the workplace which does not endanger the health and safety of themselves or others			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.2	display suitable personal presentation at work which ensures the health and safety of themselves and others at work			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

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Assessor signature: \_\_\_\_\_

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Date: \_\_\_\_\_

*(if sampled)*



## Unit 8: Competency in Supporting Job Roles in the Automotive Work Environment

Unit reference number: K/601/6366

Level: Level 3

Credit value: 5

Guided learning hours: 40

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### Unit Summary

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

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence that you have worked well with others in the automotive industry
- 5 be observed by your assessor on at least **3** occasions carrying out the above whilst performing your normal work duties.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work effectively within the organisational structure of the automotive work environment	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			
2	Be able to obtain and use information in order to support their job role within the automotive work environment	2.1	select and use legal and manufacturers information, in an automotive work environment			
3	Be able to communicate with and support colleagues and customers effectively within the automotive work environment	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			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to develop and keep good working relationships in the automotive work environment	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

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*(if sampled)*



## Unit 9: Knowledge of Routine Light Vehicle Maintenance

Unit reference number: F/601/3716

Level: 2

Credit value: 3

Guided learning hours: 20

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### Unit Summary

This unit enables the learner to develop an understanding of conducting routine maintenance, adjustment and replacement activities as part of the periodic servicing of light vehicles

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

- a vehicle maintenance, inspection and adjustment and record findings
- b vehicle inspection techniques used in routine maintenance including:
  - 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 procedures used for inspecting the condition and serviceability of the following:
  - i filters
  - ii drive belts
  - iii wiper blades
  - iv brake linings
  - v pads

- vi tyres
- vii lights
- d preparation and use appropriate use of equipment to include:
  - i test instruments
  - ii emission equipment
  - iii wheel alignment
  - iv beam setting equipment
  - v tyre tread depth gauges
- e procedures for checking and replenishing fluid levels:
  - i oil
  - ii water
  - iii hydraulic fluids
- f procedures for checking and replacement of lubricants:
  - i replace oil filters
  - ii check levels
  - iii types of oil
  - iv cleanliness
  - v disposal of old oil and filters
- g procedures for carrying out adjustments on vehicle systems or components:
  - i clearances
  - ii settings
  - iii alignment
  - iv operational performance (engine idle, exhaust gas)
- h procedures for checking electrical systems:
  - i operation
  - ii security
  - iii performance
  - iv importance and process of detailed inspection procedures:
  - v following inspection checklists
  - vi checking conformity to manufacturer's specifications
  - vii UK and European legal requirements

- i importance and process of completing all relevant documentation relating to routine maintenance:
  - i inspection records
  - ii job cards
  - iii vehicle repair records
  - iv in-vehicle service history
- j the need to use vehicle protection prior to repair
- k requirements and methods used for protecting:
  - i vehicle body panels
  - ii paint surfaces
  - iii seats
  - iv carpets and floor mats
- l the need to check the vehicle following routine maintenance
- m the need to inspect the vehicle following routine maintenance:
  - i professional presentation of vehicle
  - ii customer perceptions
- n the checks of vehicle following routine maintenance:
  - i removal of oil and grease marks
  - ii body panels
  - iii paint surfaces
  - iv seats
  - v carpets and floor mats
  - vi re-instatement of components

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how to carry out routine light vehicle maintenance	1.1	explain how to conduct a scheduled light vehicle routine examination and assessment against the vehicle manufacturers specification			
		1.2	identify the assessment methods used to check for conformity			
		1.3	identify the different systems to be inspected while carrying out light vehicle routine maintenance a engine b chassis c wheels and tyres d transmission and driveline e electrical and electronic f exterior vehicle body g vehicle interior			
		1.4	describe the procedures used for checking the condition and serviceability of light vehicle units and components			
		1.5	describe the procedures for checking and replenishing fluid levels			
		1.6	describe the procedures for checking and replacing lubricants			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.7	identify adjustments that need to be carried out on a light vehicle routine maintenance			
		1.8	explain the procedure for reporting cosmetic damage to vehicle components and units outside normal service items			
		1.9	identify the operating specifications for the systems being checked while carrying out light vehicle routine maintenance			
2	Understand the importance of carrying out light vehicle maintenance	2.1	describe the requirements of correct maintenance in order to maintain the vehicle in a roadworthy and legal condition			
		2.2	describe the importance of correct maintenance for warranty purposes			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

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*(if sampled)*





## Unit 10: Skills in Routine Light Vehicle Maintenance

Unit reference number: H/601/3871

Level: 2

Credit value: 2

Guided learning hours: 20

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### Unit Summary

This unit allows the learner to develop skills they can carry out light vehicle routine maintenance, adjustments and replacement activities as part of the periodic servicing of vehicles.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### **You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 be observed by your assessor successfully carrying out servicing activities on at least 1 vehicle which collectively covers the Learning Outcomes.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle routine maintenance	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle routine maintenance activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle routine maintenance activities including: a vehicle technical data b maintenance procedures c legal requirements			
		2.2	use technical information to support light vehicle inspection activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for carrying out routine maintenance			
		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 routine maintenance			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle routine maintenance	4.1	carry out light vehicle maintenance using prescribed methods, adhering to the correct 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			
		4.2	carry out adjustments, replacement of vehicle components and replenishment of consumable materials following the manufacturer's current specification			
		4.3	ensure the examination methods identify accurately any vehicle system and or component problems falling outside the maintenance schedule are specified			
		4.4	ensure any comparison of the vehicle against specification accurately identifies any: a differences from the vehicle specification b vehicle appearance and condition faults c variation from legal requirements			
		4.5	use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

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Date: \_\_\_\_\_

*(if sampled)*

**Unit 11:** Knowledge of Light Vehicle Engine Mechanical, Lubrication and Cooling System Units and Components

**Unit reference number:** R/601/3719

**Level:** 2

**Credit value:** 3

**Guided learning hours:** 20

### Unit Summary

This unit enables the learner to develop an understanding of the construction and operation of common engine mechanical, lubrication and cooling systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### Engines

- a engine types and configurations:
  - i inline
  - ii flat
  - iii vee
  - iv four-stroke cycle and two-stroke cycle for spark ignition and compression ignition engines
  - v naturally aspirated and turbo-charged engines
  - vi hybrid fuel engines
- b relative advantages and disadvantages of different engine types and configurations
- c engine components and layouts:
  - i single (OHC) and multi camshaft (DOHC)
  - ii single and multi cylinder (2, 4, 6, 8 cylinder types)
- d cylinder head layout and design, combustion chamber and piston design

- e calculate compression ratios from given data
- f the procedures used when inspecting engines
- g the procedures to assess:
  - i serviceability
  - ii wear
  - iii condition
  - iv clearances
  - v settings
  - vi linkages
  - vii joints
  - viii fluid systems
  - ix adjustments
  - x operation and functionality
  - xi security
- h symptoms and faults associated with mechanical engine operation:
  - i poor performance
  - ii abnormal or excessive mechanical noise
  - iii erratic running
  - iv low power
  - v exhaust emissions
  - vi abnormal exhaust smoke
  - vii unable to start
  - viii exhaust gas leaks to cooling system
  - ix exhaust gas leaks

### **Lubrication**

- a the advantages and disadvantages of wet and dry systems
- b engine lubrication system:
  - i splash and pressurised systems
  - ii pumps
  - iii pressure relief valve
  - iv filters
  - v oil ways
  - vi oil coolers

- c terms associated with lubrication and engine oil:
  - i full-flow
  - ii hydrodynamic
  - iii boundary
  - iv viscosity
  - v multi-grade
  - vi natural and synthetic oil
  - vii viscosity index
  - viii multi-grade
- d the requirements and features of engine oil:
  - i operating temperatures
  - ii pressures
  - iii lubricant grades
  - iv viscosity
  - v multi-grade oil
  - vi additives
  - vii detergents
  - viii dispersants
  - ix anti-oxidants inhibitors
  - x anti-foaming agents
  - xi anti-wear
  - xii synthetic oils
  - xiii organic oils
  - xiv mineral oils
- e symptoms and faults associated with lubrication systems:
  - i excessive oil consumption
  - ii oil leaks
  - iii oil in water
  - iv low or excessive pressure
  - v oil contamination
- f the procedures used when inspecting lubrication system

### **Cooling, Heating and Ventilation**

- a the components, operating principles, and functions of engine cooling systems

- b procedures used to remove, replace and adjust cooling system components
  - i cooling fans and control devices
  - ii header tanks, radiators and pressure caps
  - iii heater matrix's and temperature control systems
  - iv expansion tanks hoses, clips and pipes
  - v thermostats impellers and coolant
  - vi ventilation systems
- c the preparation and method of use of appropriate specialist equipment used to evaluate system performance following component replacement
  - i system pressure testers
  - ii pressure cap testers
  - iii hydrometer, or anti-freeze testing equipment
  - iv chemical tests for the detection of combustion gas
- d the layout and construction of internal heater systems
- e the controls and connections within internal heater system
- f symptoms and faults associated with cooling systems:
  - i water leaks
  - ii water in oil
  - iii internal heating system: efficiency, operation, leaks, controls, air filtration, air leaks and contamination
  - iv excessively low or high coolant temperature
- g the procedures used when inspecting
  - i internal heating system
  - ii cooling system

### **General**

- a the preparation, testing and use of tools and equipment used for:
  - i dismantling
  - ii removal and replacement of engine units and components
- b appropriate safety precautions:
  - i PPE
  - ii vehicle protection when dismantling
  - iii removal and replacing engine units and components
- c the important of logical and systematic processes
- d the inspection and testing of engine units and components
- e the preparation of replacement units for re-fitting or replacement



- f the reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance and safety requirements
- g refitting procedures
- h the inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements
- i the inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:
  - i cleanliness of vehicle interior and exterior
  - ii security of components and fittings
  - iii re-instatement of components and fittings

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how the main light vehicle engine mechanical systems operate	1.1	identify light vehicle engine mechanical system components			
		1.2	describe the construction and operation of light vehicle engine mechanical systems a four stroke b spark ignition c compression ignition d rotary			
		1.3	compare key light vehicle engine mechanical system components and assemblies against alternatives to identify differences in construction and operation			
		1.4	identify the key engineering principles that are related to light vehicle engine mechanical systems a compression ratio's b cylinder capacity c power d torque			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.5	state common terms used in light vehicle engine mechanical system design a TDC b BDC c stroke d bore			
2	Understand how light vehicle engine Lubrication systems operate	2.1	identify light vehicle engine lubrication system components			
		2.2	describe the construction and operation of light vehicle engine lubrication components and systems a full flow b by pass c wet sump d dry sump			
		2.3	compare key light vehicle engine lubrication system components and assemblies to identify differences in construction and operation			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.4	identify the key engineering principles that are related to light vehicle engine lubrication systems a classification of lubricants b properties of lubricants c methods of reducing friction			
		2.5	state common terms used in light vehicle engine lubrication system design			
3	Understand how light vehicle engine cooling, heating and ventilation systems operate	3.1	identify light vehicle engine cooling, heating and ventilation system components			
		3.2	describe the construction and operation of light vehicle engine cooling, heating and ventilation systems			
		3.3	compare key light vehicle engine cooling, heating and ventilation system components and assemblies against alternatives to identify differences in construction and operation			
		3.4	identify the key engineering principles that are related to light vehicle engine cooling, heating and ventilation systems a heat transfer b linear and cubical expansion c specific heat capacity d boiling point of liquids			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.5	state common terms used in key light vehicle engine cooling, heating and ventilation system design			
4	Understand how to check, replace and test light vehicle engine mechanical, lubrication and cooling systems system units and components	4.1	describe how to remove and replace engine mechanical, lubrication and cooling system units and components			
		4.2	describe common types of testing methods used to check the operation of engine mechanical, lubrication and cooling systems and their purpose			
		4.3	describe how to test and evaluate the performance of replacement units against vehicle specification			
		4.4	identify common faults found in light vehicle engine mechanical, lubrication and cooling systems and their causes			

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**Unit 12: Knowledge of Light Vehicle Fuel, Ignition, Air and Exhaust System Units and Components**

**Unit reference number:** H/601/3725

**Level:** 2

**Credit value:** 3

**Guided learning hours:** 20

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**Unit Summary**

This unit enables the learner to develop an understanding of the construction and operation of common fuel, ignition, air and exhaust systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

**Assessment Requirements/Evidence requirements:**

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

**Fuel – Petrol**

- a the function and layout of petrol injection systems:
  - i single and multi-point systems
  - ii injection components
  - iii injection pump
  - iv pump relay
  - v injector valve
  - vi air flow sensor
  - vii throttle potentiometer
  - viii idle speed control valve
  - ix coolant sensor
  - x MAP and air temperature sensors
  - xi mechanical control devices
  - xii electronic control units

- b the operation of single and multi-point petrol injection systems and components:
  - i injection pump
  - ii pump relay
  - iii injector valve
  - iv air flow sensor
  - v throttle potentiometer
  - vi idle speed control valve
  - vii coolant sensor
  - viii MAP and air temperature sensors
  - ix electronic control units
  - x fuel pressure regulators
  - xi fuel pump relays
  - xii LAMBDA exhaust sensors
  - xiii flywheel and camshaft sensors
  - xiv air flow sensors (air flow meter and air mass meter)
  - xv EGR valve
- c the procedures used when inspecting petrol system

### **Fuel – Diesel**

- a the layout and construction of inline and rotary diesel systems
- b the principles and requirements of compression ignition engines
  - i combustion chambers (direct and indirect injection)
- c the function and operation of diesel fuel injection components:
  - i fuel filters
  - ii sedimenters
  - iii injectors
  - iv injector types (direct and indirect injection)
  - v single
  - vi multi-hole and pintle nozzle types
  - vii governors
  - viii fuel pipes
  - ix glow plugs
  - x cold start devices
  - xi fuel cut-off solenoid



- d the purpose and operation of:
  - i turbochargers
  - ii construction
  - iii use of inter-coolers
- e explain the procedures for injection pump timing and bleeding the system
- f the procedures used when inspecting diesel system

### **Fuel**

- a the meaning of terms related to:
  - i hydro-carbon fuels
  - ii volatility
  - iii calorific value
  - iv flash point
  - v octane value
  - vi cetane value
- b the composition of hydro-carbon fuels:
  - i % hydrogen and carbon in petrol and diesel fuels
- c the composition of air (% nitrogen, oxygen), % of oxygen
- d the chemically correct air/fuel ratio for petrol engines as 14.7:1 (lambda, stoichiometric ratio)
- e weak and rich air/fuel ratios for petrol engines
- f exhaust composition and by-products for chemically correct, rich and weak air/fuel ratios of petrol engines:
  - i water vapour (H<sub>2</sub>O)
  - ii nitrogen (N)
  - iii carbon monoxide (CO)
  - iv carbon dioxide (CO<sub>2</sub>)
  - v carbon (C)
  - vi hydrocarbon (HC)
  - vii oxides of nitrogen (NO<sub>x</sub>, NO<sub>2</sub>, NO) and particulates
- g the relative advantages and disadvantages of diesel and petrol engines
- h symptoms and faults associated with fuel systems
  - i diesel fuel system: air in fuel system, water in fuel, filter blockage, leaks, difficult starting, erratic running, excessive smoke (black, blue, white), engine knock, turbocharger faults
  - ii petrol injection system: leaks, erratic running, excessive smoke, poor starting, poor performance, poor fuel economy, failure to start, exhaust emissions, running-on, excessive fuel consumption and surging

## Ignition

- a the layout of electronic ignition systems, advantages over conventional systems (points)
- b electronic ignition circuits and components:
  - i LT Circuit
  - ii battery
  - iii ignition switch
  - iv electronic trigger devices
  - v capacitor
  - vi HT Circuit
  - vii spark plugs (reach, heat range, electrode features and electrode polarity)
  - viii rotor arm
  - ix distributor (if applicable)
  - x distributor cap
  - xi ignition leads
  - xii ignition coil
  - xiii ignition timing advance system
- c the operation electronic system components:
  - i amplifiers
  - ii triggering systems
  - iii inductive pick-ups
  - iv hall generators
  - v optical pulse generators
  - vi control units
- d the operation of amplifier units
  - i ignition terminology:
  - ii dwell angle
  - iii dwell time
  - iv dwell variations
  - v advance and retard of ignition timing
  - vi static and dynamic ignition timing

- e the operation of electronic ignition systems under various conditions and loads to include:
  - i engine idling
  - ii during acceleration
  - iii under full load
  - iv cruising
  - v overrun
  - vi cold starting
- f the principles of engine management systems:
  - i closed loop system
  - ii integrated ignition
  - iii injection systems
  - iv sensors
- g the procedures used when inspecting
  - i ignition system
  - ii engine management
  - iii sensors
- h symptoms and faults associated with ignition system operation
- i failure to start hot or cold, erratic running, poor performance, misfire, exhaust emissions misfiring and ignition noise (pinking)

### **Air supply and exhaust systems**

- a the construction and purpose of air filtration systems
- b the operating principles of air filtration systems
- c the construction and purpose of the exhaust systems
- d the operating principles of the systems
- e exhaust system design to include silencers and catalytic converters
- f the procedures used when inspecting induction, air filtration and exhaust systems
- g symptoms and faults associated with air and exhaust systems
  - i exhaust gas leaks
  - ii air leaks

### **General**

- a the preparation, testing and use of tools and equipment used for:
  - i dismantling
  - ii removal and replacement of engine units and components

- b appropriate safety precautions:
  - i PPE
  - ii vehicle protection when dismantling
  - iii removal and replacing engine units and components
- c the important of logical and systematic processes
- d the inspection and testing of engine units and components
- e the preparation of replacement units for re-fitting or replacement
- f the reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance and safety requirements
- g refitting procedures
- h the inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements
- i the inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:
  - i cleanliness of vehicle interior and exterior
  - ii security of components and fittings
  - iii re-instatement of components and fittings

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how light vehicle engine fuel systems operate	1.1	identify light vehicle engine fuel system components			
		1.2	describe the construction and operation of light vehicle engine fuel systems a multi point injection b single point injection			
		1.3	compare key light vehicle engine fuel system components and assemblies against alternatives to identify differences in construction and operation			
		1.4	identify the key engineering principles that are related to light vehicle engine fuel systems a properties of fuels b combustion processes c exhaust gas constituents			
		1.5	state common terms used in light vehicle engine fuel system design			
2	Understand how light vehicle engine ignition systems operate	2.1	identify light vehicle engine ignition system components			
		2.2	describe the construction and operation of light vehicle engine ignition systems a distributor ignition systems b distributor less ignition systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.3	compare key light vehicle engine ignition system components and assemblies against alternatives to identify differences in construction and operation			
		2.4	identify the key engineering principles that are related to light vehicle engine ignition systems a flame travel b ignition timing			
		2.5	state common terms used in key light vehicle engine ignition system design			
3	Understand how light vehicle engine air supply and exhaust systems operate	3.1	identify light vehicle engine air supply and exhaust system components			
		3.2	describe the construction and operation of light vehicle engine air supply and exhaust systems a supercharging b turbocharging c exhaust gas recirculation (EGR) d secondary air injection e catalytic converters			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.3	compare key light vehicle engine air supply and exhaust system components and assemblies against alternatives to identify differences in construction and operation			
		3.4	identify the key engineering principles that are related to light vehicle engine air supply and exhaust systems a sound absorption b reduction of harmful emissions			
		3.5	state common terms used in key light vehicle engine air supply and exhaust system design			
4	Understand how to check, replace and test light vehicle engine fuel system units and components	4.1	describe how to remove and replace engine fuel, air supply and exhaust system units and components			
		4.2	describe common types of testing methods used to check the operation of engine fuel, air supply and exhaust system systems and their purpose			
		4.3	explain how to evaluate the performance of replacement units against vehicle specification			
		4.4	Explain common faults found in light vehicle fuel, air supply and exhaust systems and their causes			

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## Unit 13: Skills in Removing and Replacing Light Vehicle Engine Units and Components

Unit reference number: K/601/3872

Level: 2

Credit value: 5

Guided learning hours: 45

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre.
- 3 be observed by an assessor as defined by the IMI Assessment Strategy.
- 4 be observed by your assessor successfully carrying out the removal and replacement of engine mechanical units and components from 3 different systems out of the 5 listed below:
  - a engine mechanical systems
  - b cooling systems
  - c air supply and exhaust systems
  - d engine management
  - e lubrication systems (not including standard external filters)

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle engine unit and component removal and replacement activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle engine 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 engine unit and component removal and replacement activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for removal and replacement of light vehicle engine systems			
		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 to remove and replace light vehicle engine systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out removal and replacement of light vehicle engine mechanical, lubrication and cooling units and components	4.1	remove and replace the light vehicle's engine systems and components, adhering to the correct 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 replaced light vehicle engine 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 light vehicle engine systems performs to the vehicle operating specification and meets any legal requirements			
5	Be able to record information and make suitable recommendations	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			

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## Unit 14: Knowledge of Removing and Replacing Light Vehicle Electrical Units and Components

Unit reference number: T/601/3731

Level: 2

Credit value: 6

Guided learning hours: 45

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### 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 component
- 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 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

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand light vehicle electrical and electronic principles	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			
2	Understand how light vehicle batteries, starting and charging systems operate	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			
3	Understand how light vehicle auxiliary electrical systems operate	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			
4	Understand how to check, replace and test light vehicle electrical systems and components	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			

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## Unit 15: Skills in Removing and Replacing Light Vehicle Electrical Units and Components

Unit reference number: T/601/3874

Level: 2

Credit value: 5

Guided learning hours: 45

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### Unit Summary

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

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

You must:

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 produce evidence of carrying out the removal and replacement of vehicle electrical units and components from:
  - a engine starting systems
  - b engine charging systems
  - c **PLUS** 2 different systems out of the 8 listed below:
    - i lighting
    - ii wiper
    - iii security and alarm
    - iv comfort and convenience
    - v information and entertainment
    - vi telephone and two-way communication
    - vii electric window systems
    - viii monitoring and instrumentation systems

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	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			
2	Be able to use relevant information to carry out the task	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			
3	Be able to use appropriate tools and equipment	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			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out removal and replacement of light vehicle electrical units and components	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 performs to the vehicle operating specification and meets any legal requirements			
5	Be able to record information and make suitable recommendations	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			

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## Unit 16: Knowledge of Removing and Replacing Light Vehicle Chassis Units and Components

Unit reference number: A/601/3732

Level: 2

Credit value: 6

Guided learning hours: 45

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### Unit Summary

This unit enables the learner to develop an understanding of the construction and operation of common steering, suspension and braking systems (including wheels and tyres). It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### Steering

- a the action and purpose of steering geometry:
  - i castor angle
  - ii camber angle
  - iii kingpin or swivel pin inclination
  - iv negative offset
  - v wheel alignment (tracking) (toe in and toe out)
  - vi toe out on turns
  - vii steered wheel geometry
- b the following terms associated with steering:
  - i Ackerman principle
  - ii slip angles
  - iii self-aligning torque oversteer and understeer
  - iv neutral steer

- c the components and layout of hydraulic power steering systems:
  - i piston and power cylinders
  - ii drive belts and pumps
  - iii hydraulic valve (rotary, spool and flapper type)
  - iv hydraulic fluid
- d the advantages of power assisted steering
- e the operation of hydraulic power steering
- f the principles of electronic power steering systems
- g the procedures used for inspecting the serviceability and condition of:
  - i manual steering
  - ii power steering
- h steering system defects to include:
  - i uneven tyre wear
  - ii wear on outer edge of tyre
  - iii wear on inner edge of tyre
  - iv uneven wear
  - v flats on tread
  - vi steering vibrations
  - vii wear in linkage
  - viii damage linkage
  - ix incorrect wheel alignment
  - x incorrect steering geometry

### **Suspension**

- a the layout and components of suspension systems:
  - i non-independent suspensions
  - ii independent front suspension (IFS)
  - iii independent rear suspension (IRS)
  - iv hydraulic
  - v hydro-pneumatic
  - vi rigid axle types
- b the operation of suspension systems and components:
  - i leaf and coil springs
  - ii torsion bar
  - iii rubber springs
  - iv Macpherson strut system
  - v hydraulic

- vi hydro-pneumatic
  - vii hydraulic dampers
  - viii trailing arms
  - ix wish bones
  - x ball joints
  - xi track control arms
  - xii bump stops
  - xiii anti-roll bars
  - xiv stabiliser bars
  - xv swinging arms
  - xvi parallel link
  - xvii swinging half-axles
  - xviii transverse link
  - xix semi-swinging arms
- c the advantages of different systems including:
- i non-independent
  - ii independent suspension (IFS)
  - iii independent suspension (IRS)
  - iv hydraulic
  - v hydro-pneumatic
  - vi rigid axle
- d the principles of electronic suspensions systems
- e the forces acting on suspension systems during braking, driving and cornering
- f the methods of locating the road wheels against braking, driving and cornering forces
- g the methods of controlling cornering forces by fitting anti-roll torsion members
- h suspension terms:
- i rebound
  - ii bump
  - iii float
  - iv dive
  - v pitch
  - vi roll
  - vii compliance

- i the procedures used for inspecting the serviceability and condition of the suspension system
- j suspension system defects:
  - i wheel hop
  - ii ride height (unequal and low)
  - iii wear
  - iv noises under operation
  - v fluid leakage
  - vi excessive travel
  - vii excessive tyre wear
  - viii bounce
  - ix poor vehicle handling
  - x worn dampers
  - xi worn joints
  - xii damaged linkages

### **Brakes**

- a the construction and operation of drum brakes:
  - i leading and trailing shoe construction
  - ii self-servo action
  - iii automatic adjusters
  - iv backing plates
  - v parking brake system
- b the construction and operation of disc brakes:
  - i disc pads
  - ii calliper
  - iii brake disc
  - iv ventilated disc
  - v disc pad retraction
  - vi parking brake system
  - vii electrical and electronic components
  - viii wear indicators and warning lamps

- c the construction and operation of the hydraulic braking system:
  - i single and dual line layout
  - ii master cylinders
  - iii wheel cylinders
  - iv disc brake calliper & pistons
  - v brake pipe
  - vi brake servo
  - vii warning lights
  - viii parking brakes
  - ix equalising valves
- d the principles and components of electronic ABS systems, electrical and electronic components
- e the requirements and hazards of brake fluid:
  - i boiling point
  - ii hygroscopic action
  - iii manufacturer's change periods
  - iv fluid classification and rating
  - v potential to damage paint surfaces
- f terms associated with mechanical and hydraulic braking systems:
  - i braking efficiency
  - ii brake fade
  - iii brake balance
  - iv ABS
- g the procedures used for inspecting the serviceability and condition of the braking system
- h braking system defects:
  - i worn shoes or pads
  - ii worn or scored brake surfaces
  - iii abnormal brake noises
  - iv brake judder
  - v fluid contamination of brake surfaces
  - vi fluid leaks
  - vii pulling to one side
  - viii poor braking efficiency
  - ix lack of servo assistance
  - x brake drag

xi brake grab

xii brake fade

### **Wheel and Tyres**

a the construction of different types of tyre:

i radial

ii cross ply

iii bias belted

iv tread patterns

v tyre mixing regulations

vi tyre applications

b tyre markings:

i tyre and wheel size markings

ii speed rating

iii direction of rotation

iv profile

v load rating

vi ply rating

vii tread-wear indicators

c wheel construction:

i light alloy

ii pressed steel and wire wheels

iii flat-edge and double hump rims

d types of wheel bearing arrangements:

i non-driving

e types of bearing used for wheel bearing arrangements:

i roller

ii taper roller

iii needle

iv ball and plain

f the procedures used for inspecting the serviceability and condition of:

i tyres & wheels

ii bearings



- g the defects associated with tyres and wheels:
  - i abnormal tyre wear
  - ii cuts
  - iii side wall damage
  - iv wheel vibrations
  - v tyre noise (squeal during cornering)
  - vi tyre over heating (low pressure)
  - vii tread separation

### **General**

The procedures for dismantling, removal and replacement of chassis system components

- a the preparation:
  - i testing and use of tools and equipment
  - ii electrical meters and equipment used for dismantling
  - iii removing and replacing chassis systems and components
- b appropriate safety precautions:
  - i PPE
  - ii vehicle protection when dismantling
  - iii removing and replacing chassis systems and components
- c the importance of logical and systematic processes
- d the inspection and testing of chassis systems and components
- e the preparation of replacement units for re-fitting or replacement of chassis systems or components
- f identify the reasons why replacement components and units must meet the original specifications (OES):
  - i warranty requirements
  - ii to maintain performance
  - iii safety requirements
- g refitting procedures
- h the inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements
- i the inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:
  - i cleanliness of vehicle interior and exterior
  - ii security of components and fittings
  - iii re-instatement of components and fittings

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how light vehicle steering and suspension systems operate	1.1	identify light vehicle steering and suspension system components			
		1.2	describe the construction and operation of light vehicle steering and suspension systems			
		1.3	compare key light vehicle steering and suspension system components and assemblies against alternatives to identify differences in construction and operation			
		1.4	identify the key engineering principles that are related to light vehicle steering and suspension systems a steering angles b hydraulic forces c stress and strain			
		1.5	state common terms used in light vehicle steering and suspension system design			
2	Understand how light vehicle braking systems operate	2.1	identify light vehicle braking system components			
		2.2	describe the construction and operation of light vehicle braking systems			
		2.3	compare key light vehicle braking system components and assemblies against alternatives to identify differences in construction and operation			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.4	identify the key engineering principles that are related to light vehicle braking systems a laws of friction b hydraulics c pneumatics d properties of fluids e properties of air f braking efficiency			
		2.5	state common terms used in light vehicle braking system design			
3	Understand how light vehicle wheel and tyres systems operate	3.1	identify light vehicle wheel and tyre components			
		3.2	describe the construction and operation of light vehicle wheels and tyres			
		3.3	compare key light vehicle wheel and tyre components and assemblies against alternatives to identify differences in construction and operation			
		3.4	identify the key engineering principles that are related to light vehicle wheel and tyre systems a friction b un-sprung weight c dynamic and static balance			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.5	state common terms used in light vehicle wheel and tyre design			
4	Understand how to check, replace and test light vehicle chassis units and components	4.1	describe how to remove and replace chassis units and components			
		4.2	describe common types of testing methods used to check the operation of chassis units and components and their purpose			
		4.3	explain how to evaluate the performance of replacement units against vehicle specification			
		4.4	identify common faults found in light vehicle chassis units and components			

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## Unit 17: Skills in Removing and Replacing Light Vehicle Chassis Units and Components

Unit reference number: F/601/3876

Level: 2

Credit value: 5

Guided learning hours: 45

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### Unit Summary

This unit allows the learner to develop skills to remove and replace light vehicle steering, suspension and braking units (including wheels and tyres). It also covers the evaluation of performance of the replaced units and systems.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre.
- 3 be observed by an assessor as defined by the IMI Assessment Strategy.
- 4 be observed by your assessor successfully carrying out the removal and replacement of 3 different units or components – one from each system. Your evidence must include demonstration of skill in each aspect of mechanical and hydraulic/fluid units or component removal and replacement.
  - a steering
  - b suspension
  - c braking

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle chassis unit and component removal and replacement activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle chassis 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 chassis unit and component removal and replacement activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for removal and replacement of light vehicle chassis systems including: a steering b suspension c braking d wheels & tyres			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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 to remove and replace light vehicle chassis systems			
4	Be able to carry out removal and replacement of light vehicle chassis units and components.	4.1	remove and replace the light vehicle's chassis systems and components, adhering to the correct 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 light vehicle chassis 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 light vehicle chassis system performs to the vehicle operating specification and meets any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

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## Unit 18: Knowledge of Light Vehicle Transmission and Driveline Units and Components

Unit reference number: Y/601/3740

Level: 2

Credit value: 6

Guided learning hours: 45

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### Unit Summary

This unit enables the learner to develop an understanding of the construction and operation of common transmission and driveline systems. It also covers the procedures involved in the removal and replacement of system components and the evaluation of their performance

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### The operation of clutch operating systems

- a clutch operating mechanisms
  - i pedal and lever
  - ii hydraulic operated
  - iii mechanical
  - iv cable operated
  - v hydraulic components
  - vi master cylinder
  - vii slave cylinder
  - viii hydraulic pipes
  - ix electrical and electronic components (fluid level indicators)

### **The operation of friction clutches**

- a the reasons for fitting a clutch
- b the construction and operation of:
  - i hydraulically and cable operated clutches
  - ii coil spring clutches
  - iii diaphragm spring clutches
  - iv single plate clutches
  - v multi plate clutches

### **The operation of manual gearboxes**

- a the reasons for fitting gearboxes, to provide neutral, reverse, torque multiplication
- b different gearbox types: transverse and inline layouts
- c the layout and construction of gears and shafts for 4, 5 and 6 speed gearbox designs, sliding mesh, constant mesh and synchromesh gearboxes reverse gear
- d the construction and operation of:
  - i gear selection linkages
  - ii selector forks and rods
  - iii detents and interlock mechanisms
- e the construction and operation of synchromesh devices
- f the arrangements for gearbox bearings:
  - i bushes
  - ii oil seals
  - iii gaskets and gearbox lubrication
  - iv speedometer drive
- g the electrical and electronic components including reverse lamp switch
- h calculate gear ratios and driving torque for typical gearbox specifications

### **The operation of driveline components**

- a the layout and construction of propshafts and drive shafts used in front wheel, rear wheel and four-wheel drive systems
- b the reasons for using flexible couplings and sliding joints in transmissions systems
- c the reason for using constant velocity joints in drive shafts incorporating steering mechanisms

- d the construction and operation of:
  - i universal joints
  - ii sliding couplings
  - iii constant velocity joints
- e the simple stresses applied to shafts: torsional, bending and shear
- f the construction and operation of:
  - i final drive units
  - ii crown wheel & pinion
  - iii bevel
  - iv hypoid and helical gears
  - v differential gears
  - vi sun & planet gears
  - vii lubricants
  - viii lubrication bearings and seals
  - ix limited slip differential
- g the reasons for fitting a differential
- h calculate final drive gear ratios
- i calculate the overall gear ratio from given data (gearbox ratio x final drive ratio)

### **The testing and inspection techniques used for light vehicle transmission systems**

- a the techniques and procedures used for inspecting and testing clutches and clutch mechanisms including:
  - i clearances
  - ii pedal and lever settings
  - iii cables & linkages
  - iv hydraulic system
  - v leaks
  - vi adjustments
  - vii travel
- b the techniques and procedures used for inspecting and testing gearboxes including:
  - i leaks
  - ii gear selection
  - iii synchromesh operation
  - iv abnormal noise

- a the techniques and procedures used for inspecting and testing drive line systems (prop & drive shafts, couplings) including:
  - i security
  - ii serviceability of rubber boots
  - iii leaks
  - iv alignment
  - v balance weights (where applicable)
- b the techniques used when inspecting and testing final drive systems including:
  - i fluid levels
  - ii leaks
  - iii noise

### **The faults and symptoms associated with vehicle transmissions systems**

- a the faults and symptoms associated with transmission systems:
  - i clutch faults
  - ii gearbox faults
  - iii drive line faults (propshaft, drive shaft
  - iv universal and constant velocity joints)
  - v universal joint alignment
  - vi final drive faults
- b faults and symptoms to include mechanical, electrical and hydraulic systems

### **The procedures for dismantling, removal and replacement of transmission units and components**

- a the preparation, testing and use of tools and equipment, electrical meters and equipment used for dismantling removing and replacing transmission systems and components
- b appropriate safety precautions:
  - i PPE
  - ii vehicle protection when dismantling
  - iii removing and replacing transmission systems and components
- c the importance of logical and systematic processes
- d the inspection and testing of transmission systems and components
- e the preparation of replacement units for re-fitting or replacement of transmission systems or components

- f the reasons why replacement components and units must meet the original specifications (OES):
  - i warranty requirements
  - ii to maintain performance
  - iii safety requirements
- g refitting procedures
- h the inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements
- i the inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:
  - i cleanliness of vehicle interior and exterior
  - ii security of components and fittings
  - iii re-instatement of components and fittings
- j types of wheel bearing arrangements:
  - i driven wheels
  - ii fully floating
  - iii three quarter floating
  - iv semi floating axles

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how light vehicle clutch systems operate	1.1	identify light vehicle clutch system components			
		1.2	describe the construction and operation of light vehicle clutch systems			
		1.3	compare key light vehicle clutch system components and assemblies against alternatives to identify differences in construction and operation			
		1.4	identify the key engineering principles that are related to light vehicle clutch systems to include: a principles of friction b principle of levers c torque transmission			
		1.5	state common terms used in light vehicle clutch system design			
2	Understand how light vehicle manual gearbox systems operate	2.1	identify light vehicle manual gearbox system components			
		2.2	describe the construction and operation of light vehicle manual gearbox systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.3	compare key light vehicle manual gearbox system components and assemblies against alternatives to identify differences in construction and operation			
		2.4	identify the key engineering principles that are related to light vehicle manual gearbox systems a gear ratios b torque multiplication			
		2.5	state common terms used in light vehicle manual gearbox system design			
3	Understand how light vehicle driveline systems operate	3.1	identify light vehicle driveline components			
		3.2	describe the construction and operation of light vehicle driveline systems			
		3.3	compare key light vehicle driveline components and assemblies against alternatives to identify differences in construction and operation			
		3.4	identify the key engineering principles that are related to light vehicle driveline systems a final drive and overall gear ratios b simple stresses			
		3.5	state common terms used in light vehicle driveline design			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Understand how to check, replace and test transmission and driveline units and components	4.1	describe how to remove and replace transmission and driveline system units and components			
		4.2	describe common types of testing methods used to check the operation of transmission and driveline systems and their purpose			
		4.3	explain how evaluate the performance of replacement units against vehicle specification			
		4.4	identify common faults found in light vehicle transmission and driveline systems and their causes			

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*(if sampled)*



## Unit 19: Competency in Removing and Replacing Light Vehicle Engine Units and Components

Unit reference number: D/601/3769

Level: 2

Credit value: 10

Guided learning hours: 90

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### Unit Summary

This unit enables the learner to demonstrate competency in removing and replacing light vehicle engine system components. It also covers the evaluation of performance of the replaced units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of removing and replacing units or components from 4 of the 5\* systems listed below. The evidence must come from work in your normal workplace:
  - a engine mechanical systems
  - b cooling systems
  - c air supply and exhaust systems
  - d engine management system
  - e lubrication systems (not including standard external filters)

5 be observed by your assessor on at least 1 occasion removing and replacing components or units

\*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of all the systems listed above.

Evidence from simulated activities is not acceptable for this unit.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle engine unit and component removal and replacement activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle engine 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 engine unit and component removal and replacement activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for removal and replacement of light vehicle engine systems			
		3.2	ensure that equipment has been calibrated to meet manufacturers' and legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.3	use the correct tools and equipment in the way specified by manufacturers to remove and replace light vehicle engine systems			
4	Be able to carry out removal and replacement of light vehicle engine mechanical, lubrication and cooling units and components	4.1	remove and replace the light vehicle's engine systems and components, adhering to the correct specifications and tolerances for the vehicle and following: <ul style="list-style-type: none"> <li>a the manufacturer's approved removal and replacement methods</li> <li>b recognised researched repair methods</li> <li>c health and safety requirements.</li> <li>d workplace procedures</li> </ul>			
		4.2	ensure that replacement light vehicle engine 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 light vehicle engine systems performs to the vehicle operating specification and meets any legal requirements			
		4.5	complete all system diagnostic activities within the agreed timescale			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

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*(if sampled)*



## Unit 20: Competency in Removing and Replacing Light Vehicle Electrical Units and Components

Unit reference number: Y/601/3771

Level: 2

Credit value: 10

Guided learning hours: 90

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### Unit Summary

This unit enables the learner to demonstrate competency in removing and replacing motor vehicle electrical system components. It also covers the evaluation of performance of the replaced units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of removing and replacing at least 5 units or components, each from a different electrical system. At least 4 of these 5 pieces of evidence must come from work in your normal workplace
- 5 be observed by your assessor on at least 1 occasion in your normal workplace carrying out the removal and replacement of at least 1 of the following\*:
  - a engine starting
  - b battery charging

6 be observed by your assessor on **at least 1 occasion in your normal workplace** successfully carrying out the removal and replacement of electrical units and components \*:

- 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 systems
- h monitoring and instrumentation systems

\*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of **all** the systems listed above

Simulated activities **will be** acceptable to assess candidates' removal and replacement competence on no more than **1** occasion.



## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	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			
2	Be able to use relevant information to carry out the task	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			
3	Be able to use appropriate tools and equipment	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 a auxiliary			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out removal and replacement of light vehicle electrical units and components	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 performs to the vehicle operating specification and meets any legal requirements			
		4.5	complete all the system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 21: Competency in Removing and Replacing Light Vehicle Chassis Units and Components

Unit reference number: K/601/3774

Level: 2

Credit value: 10

Guided learning hours: 90

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### Unit Summary

This unit enables the learner to demonstrate competency in removing and replacing light vehicle steering, suspension and braking units (including wheels and tyres). It also covers the evaluation of performance of the replaced units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### **You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of removing and replacing 3 different units or components in total which must include items from steering, suspension and braking systems. Your evidence must include demonstration of competence in each aspect of mechanical, electrical and hydraulic/fluid units or component removal and replacement

- 5 be observed in your normal workplace on at least 1 occasion successfully removing and replacing units and components from one of the following systems:
  - a steering
  - b suspension
  - c braking

Evidence from simulated activities is not acceptable for this unit.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle chassis unit and component removal and replacement activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle chassis 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 chassis unit and component removal and replacement activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for removal and replacement of light vehicle chassis systems including: a steering b suspension c braking d wheels & tyres			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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 to remove and replace light vehicle chassis systems			
4	Be able to carry out removal and replacement of light vehicle chassis units and components	4.1	remove and replace the light vehicle's chassis systems and components, adhering to the correct 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 light vehicle chassis 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 light vehicle chassis system performs to the vehicle operating specification and meets any legal requirements			
		4.5	complete all system diagnostic activities within the agreed timescale			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 22: Knowledge of How to Identify and Agree Motor Vehicle Customer Service Needs

Unit reference number: R/601/6247

Level: 3

Credit value: 5

Guided learning hours: 45

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### 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

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand legislative and organisational requirements and procedures	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			
2	Understand how to communicate and care for customers	2.1	explain how to communicate effectively with customers			
		2.2	describe how to adapt your 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
3	Understand company products and services	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*





## Unit 23: Skills to Identify and Agree Motor Vehicle Customer Service Needs

Unit reference number: M/601/6286

Level: 3

Credit value: 5

Guided learning hours: 40

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### Unit Summary

This unit helps the learner to develop the skills 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.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### You must:

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out as managed and organised by an approved centre.
- 3 be observed by an assessor as defined by the .
- 4 produce evidence, including records, to show that you have dealt with **3 different customers**.
- 5 be observed by your assessor on at least **1** occasion

Evidence from real activity **or role-play is acceptable** for this unit

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to obtain relevant information from the customer	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			
2	Be able to provide relevant information to the customer	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			
3	Be able to agree work undertaken with the customer	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			
4	Be able to ensure recording systems are implemented correctly	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

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Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 24 Knowledge of Inspecting Light Vehicles Using Prescribed Methods

Unit reference number: H/601/3742

Level: 2

Credit value: 4

Guided learning hours: 40

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### 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 inspection procedures following inspection checklists

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how to carry out inspections on light vehicle using prescribed methods	1.1	explain the difference between the various prescribed light vehicle inspection methods to include: a pre-work b post-work c pre-delivery d maintenance inspection (brake, seasonal and tyre)			
		1.2	identify the different systems to be inspected when using the prescribed inspection methods			
		1.3	identify the procedures involved in carry 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 25: Skills in Inspecting Light Vehicles using Prescribed Methods

Unit reference number: A/601/3889

Level: 2

Credit value: 4

Guided learning hours: 40

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### Unit Summary

This unit allows the learner to develop skills to carry out a range of light vehicle inspections on vehicles using a variety of prescribed testing and inspection methods.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### **You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 be observed by your assessor successfully carrying out at least 1 different inspection from the following:
  - a Pre and post — work inspection
  - b Pre-delivery inspection
  - c Pre-purchase inspection
  - d Pre-MOT test inspection
  - e Safety inspection
  - f Post repair inspection

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle inspections using prescribed methods	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle inspection activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	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			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for carrying out a range of inspections on light vehicle systems			
		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 a range of inspections on light vehicle systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle inspections using prescribed methods	4.1	carry out light vehicle inspections using prescribed methods, adhering to the correct 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			
		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			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 26 Knowledge of Overhauling Light Vehicle Engine Units

Unit reference number: R/601/3736

Level: 3

Credit value: 3

Guided learning hours: 20

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### Unit Summary

This unit enables the learner to develop an understanding of the construction and operation and overhaul of engines units.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### How the units and assemblies being overhauled operate

- a identify unit components
- b understand unit construction
- c describe unit operation

#### How units are dismantled and reassembled

- a the dismantling procedure
- b tools and equipment used for stripping and rebuilding units and assemblies
- c methods of safe storage for removed components during overhaul activities
- d the process for assessing the condition of sub-assemblies including:
  - i fit
  - ii tolerances
  - iii permitted limits
- e the rebuild procedure for units and assemblies
- f adjustment procedures during re-assembly

### **Unit and assembly testing and evaluation procedures**

- a appropriate testing and evaluation procedures prior to dismantling units
- b appropriate testing and evaluation procedures of components after dismantling units
- c how to use overhauling and test equipment for the task
- d the cost-benefit relationship between reconditioning, repair and replacement of components within units
- e how to test and evaluate the performance of the overhauled units against the operating specification
- f how to interpret test results
- g adjustment procedures during final evaluation

### **Faults associated with units and assemblies being overhauled**

- a causes of faults and failures within units and assemblies
- b the faults associated with units and assemblies
- c how to make adjustments to meet final specification after testing and evaluation of assembled units and assemblies

### **The procedures for dismantling, removal and replacement of units and components**

- a the preparation, testing and use of:
  - i tools and equipment
  - ii removal and replacement of electrical and electronic systems and components
- b appropriate safety precautions:
  - i PPE
  - ii vehicle protection when dismantling
  - iii removal and replacing electrical and electronic components and systems
- c the importance of logical and systematic processes
- d the reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance, safety requirements
- e refitting procedures
- f the inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements
- g 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
- v cancelling of any fault codes and warning lights

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how to overhaul light vehicle engine units	1.1	identify light vehicle engine unit components			
		1.2	describe the construction and operation of light vehicle engine units			
		1.3	explain how to prepare, use and assess all of the overhauling equipment			
		1.4	explain how light vehicle engine units are dismantled, overhauled and reassembled			
		1.5	explain common symptoms, causes and faults found in light vehicle engine units			
		1.6	explain methods used to identify engine unit faults			
		1.7	explain how to examine, measure and make suitable adjustments to light vehicle engine components			
		1.8	explain how to evaluate and interpret test results found in diagnosing light vehicle engine unit faults and compare with manufacturers specifications and settings			
		1.9	explain how to evaluate the operation of components and systems following overhauling units to confirm system performance			



Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



**Unit 27: Skills in Overhauling Light Vehicle Engine Mechanical Units**

**Unit reference number:** L/601/3881

**Level:** 3

**Credit value:** 2

**Guided learning hours:** 20

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**Unit Summary**

This unit allows the learner to demonstrate skills in overhauling engines. It also covers the evaluation of performance of the overhauled units and systems

**Assessment Requirements/Evidence requirements:**

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

**You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 be observed by your assessor overhauling 1 unit which includes cylinder head and block.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when overhauling light vehicle engine mechanical units	1.1	use suitable personal protective equipment and vehicle coverings when overhauling light vehicle engine units			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the overhauling of light vehicle engine units including: a vehicle technical data b overhauling procedures c legal requirements			
		2.2	use technical information to support the overhauling of light vehicle engine units			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for overhauling light vehicle engine units			
		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 overhaul light vehicle engine units			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out the overhauling of light vehicle engine mechanical units	4.1	carry out all overhauling of light vehicle engine mechanical units, adhering to the specifications and tolerances for the vehicle and following: a the manufacturer's approved overhauling methods b recognised researched repair methods c health and safety requirements			
		4.2	ensure the assessment of the dismantled unit identifies accurately its condition and suitability for overhaul			
		4.3	inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform			
		4.4	use testing methods that comply with the manufacturer's requirements			
		4.5	adjust the unit's components correctly where necessary to ensure that they operate to meet the vehicle operating requirements			
		4.6	ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 28: Knowledge of Overhauling Light Vehicle Transmission Units

Unit reference number: Y/601/3737

Level: 3

Credit value: 3

Guided learning hours: 20

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### Unit Summary

This unit enables the learner to develop an understanding of the construction and operation and overhaul of gearboxes and final drive assemblies.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### How the units and assemblies being overhauled operate

- a identify unit components
- b understand unit construction
- c describe unit operation

#### How units are dismantled and reassembled

- a the dismantling procedure
- b tools and equipment used for stripping and rebuilding units and assemblies
- c methods of safe storage for removed components during overhaul activities
- d the process for assessing the condition of sub-assemblies including:
  - i fit
  - ii tolerances
  - iii permitted limits
- e the rebuild procedure for units and assemblies
- f adjustment procedures during re-assembly

### **Unit and assembly testing and evaluation procedures**

- a appropriate testing and evaluation procedures prior to dismantling units
- b appropriate testing and evaluation procedures of components after dismantling units
- c how to use overhauling and test equipment for the task
- d the cost-benefit relationship between reconditioning, repair and replacement of components within units
- e how to test and evaluate the performance of the overhauled units against the operating specification
- f how to interpret test results
- g adjustment procedures during final evaluation

### **Faults associated with units and assemblies being overhauled**

- a causes of faults and failures within units and assemblies
- b the faults associated with units and assemblies
- c how to make adjustments to meet final specification after testing and evaluation of assembled units and assemblies

### **The procedures for dismantling, removal and replacement of units and components**

- a the preparation, testing and use of:
  - i tools and equipment
  - ii removal and replacement of electrical and electronic systems and components
- b appropriate safety precautions:
  - i PPE
  - ii vehicle protection when dismantling
  - iii removal 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
  - v cancelling of any fault codes and warning lights

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how to overhaul light vehicle gearbox and final drive units	1.1	identify light vehicle gearbox and final drive unit components			
		1.2	describe the construction and operation of light vehicle gearbox and final drive units			
		1.3	explain how to prepare, use and assess all of the overhauling equipment			
		1.4	explain how light vehicle gearbox and final drive units are dismantled, overhauled and reassembled			
		1.5	explain common symptoms, causes and faults found in light vehicle gearbox and final drive units			
		1.6	explain methods used to identify gearbox and final drive unit faults			
		1.7	explain how to examine, measure and make suitable adjustments to light vehicle gearbox and final drive components			
		1.8	explain how to evaluate and interpret test results found in diagnosing light vehicle gearbox and final drive unit faults and compare with manufacturers specifications and settings			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.9	explain how to evaluate the operation of components and systems following overhauling units to confirm system performance			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 29: Skills in Overhauling Light Vehicle Transmission Units

Unit reference number: D/601/3884

Level: 3

Credit value: 2

Guided learning hours: 20

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### Unit Summary

This unit allows the learner to demonstrate skills in overhauling gearboxes and final drive assemblies. It also covers the evaluation of performance of the overhauled units and systems.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### **You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 be observed by your assessor overhauling 1 unit which includes either a Gearbox or a Final Drive unit.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when overhauling light vehicle transmission units	1.1	use suitable personal protective equipment and vehicle coverings when overhauling light vehicle transmission units			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the overhauling of light vehicle transmission units including: a vehicle technical data b overhauling procedures c legal requirements			
		2.2	use technical information to support the overhauling of light vehicle transmission units			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for overhaul of light vehicle transmission systems			
		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 overhaul light vehicle transmission unit			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out the overhauling of light vehicle transmission units	4.1	carry out all overhauling of light vehicle transmission units, adhering to the specifications and tolerances for the vehicle and following: a the manufacturer's approved overhauling methods b recognised researched repair methods c health and safety requirements			
		4.2	ensure the assessment of the dismantled unit identifies accurately its condition and suitability for overhaul			
		4.3	inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform			
		4.4	use testing methods that comply with the manufacturer's requirements			
		4.5	adjust the unit's components correctly where necessary to ensure that they operate to meet the vehicle operating requirements			
		4.6	ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 30: Knowledge of Overhauling Light Vehicle Steering and Suspension Units

Unit reference number: D/601/3738

Level: 3

Credit value: 3

Guided learning hours: 20

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### Unit Summary

This unit enables the learner to develop an understanding of the construction and operation and overhaul of steering and suspension units.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### **How the units and assemblies being overhauled operate**

- a identify unit components
- b understand unit construction
- c describe unit operation

#### **How units are dismantled and reassembled**

- a the dismantling procedure
- b tools and equipment used for stripping and rebuilding units and assemblies
- c methods of safe storage for removed components during overhaul activities
- d the process for assessing the condition of sub-assemblies including:
  - i fit
  - ii tolerances
  - iii permitted limits
- e the rebuild procedure for units and assemblies
- f adjustment procedures during re-assembly

### **Unit and assembly testing and evaluation procedures**

- a appropriate testing and evaluation procedures prior to dismantling units
- b appropriate testing and evaluation procedures of components after dismantling units
- c how to use overhauling and test equipment for the task
- d the cost-benefit relationship between reconditioning, repair and replacement of components within units
- e how to test and evaluate the performance of the overhauled units against the operating specification
- f how to interpret test results
- g adjustment procedures during final evaluation

### **Faults associated with units and assemblies being overhauled**

- a causes of faults and failures within units and assemblies
- b the faults associated with units and assemblies
- c how to make adjustments to meet final specification after testing and evaluation of assembled units and assemblies

### **The procedures for dismantling, removal and replacement of electrical and electronic units and components**

- a the preparation, testing and use of:
  - i tools and equipment
  - ii removal and replacement of electrical and electronic systems and components
- b appropriate safety precautions:
  - i PPE
  - ii vehicle protection when dismantling
  - iii removal 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
  - v cancelling of any fault codes and warning lights

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how to overhaul light vehicle steering and suspension units	1.1	light vehicle steering and suspension unit components			
		1.2	describe the construction and operation of light vehicle steering and suspension units			
		1.3	explain how to prepare, use and assess all of the overhauling equipment			
		1.4	explain how light vehicle steering and suspension units are dismantled, overhauled and reassembled			
		1.5	explain common symptoms, causes and faults found in light vehicle steering and suspension units			
		1.6	explain methods used to identify steering and suspension unit faults			
		1.7	explain how to examine, measure and make suitable adjustments to light vehicle steering and suspension components			
		1.8	explain how to evaluate and interpret test results found in diagnosing light vehicle steering and suspension unit faults and compare with manufacturers specifications and settings			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.9	explain how to evaluate the operation of components and systems following overhauling units to confirm system performance			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 31: Skills in Overhauling Light Vehicle Steering and Suspension Units

Unit reference number: H/601/3885

Level: 3

Credit value: 2

Guided learning hours: 20

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### Unit Summary

This unit allows the learner to demonstrate skills in overhauling steering and suspension units. It also covers the evaluation of performance of the overhauled units and systems.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### **You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 be observed by your assessor overhauling 2 units which includes 1 steering unit and 1 suspension unit.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when overhauling light vehicle steering and suspension units	1.1	use suitable personal protective equipment and vehicle coverings when overhauling light vehicle steering and suspension units			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the overhauling of light vehicle steering and suspension units including: a vehicle technical data b overhauling procedures c legal requirements			
		2.2	use technical information to support the overhauling of light vehicle steering and suspension units			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for overhauling light vehicle steering and suspension units			
		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 for overhauling light vehicle steering and suspension units			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out the overhauling of light vehicle steering and suspension units	4.1	carry out all overhauling of light vehicle steering and suspension units, adhering to the specifications and tolerances for the vehicle and following:  a the manufacturer's approved overhauling methods  b recognised researched repair methods  c health and safety requirements.			
		4.2	ensure the assessment of the dismantled unit identifies accurately its condition and suitability for overhaul			
		4.3	inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform			
		4.4	use testing methods that comply with the manufacturer's requirements			
		4.5	adjust the unit's components correctly where necessary to ensure that they operate to meet the vehicle operating requirements			
		4.6	ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements			
5	Be able to record information and make suitable recommendations	5.1	produce work records that are accurate, complete and passed to the relevant person(s) promptly in the format required			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 32: Skills in Removing and Replacing Light Vehicle Driveline Units and Components

Unit reference number: K/601/3886

Level: 2

Credit value: 5

Guided learning hours: 45

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### Unit Summary

This unit allows the learner to develop skills in removing and replacing light vehicle transmission and driveline units. It also covers the evaluation of performance of the replaced units and systems.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### **You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy
- 4 be observed by your assessor successfully carrying out the removal and replacement of 1 unit or component from 2 of the areas as listed below:
  - a clutch
  - b gearbox
  - c drive line (shafts, couplings, hubs and bearings)
  - d final drive
- 5 produce evidence of removing and replacing 1 unit or component on 2 separate occasions.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle transmission and driveline unit and component removal and replacement activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle transmission and driveline 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 transmission and driveline unit and component removal and replacement activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for removal and replacement of light vehicle transmission and driveline systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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 to remove and replace light vehicle transmission and driveline systems			
4	Be able to carry out removal and replacement of light vehicle transmission and driveline units and components	4.1	remove and replace the light vehicle's transmission and driveline systems and components, adhering to the correct 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 light vehicle transmission and driveline 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 light vehicle transmission and driveline system performs to the vehicle operating specification and meets any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

**Unit 33: Knowledge of Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels**

Unit reference number: F/601/3747

Level: 2

Credit value: 2

Guided learning hours: 20

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

#### **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 gasses)

### **Types of clips and fixings**

- a the following types of clips and identify reasons and limitations for their use:
  - i speed
  - ii 'c'
  - iii 'd'
  - iv 'j' type captive nut
  - v 'r'
  - vi 'u' type captive nut
  - vii cable clip
  - viii trim clips
- 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 soulder 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:
- f aperture gaps
- g alignment of panel features
- h best fit of components to panels
- i vehicle geometry
- j operation of openings such as doors, tailgates, bonnets etc
- k 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
- l the method of storing removed panels and the importance of storing them correctly

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how to carry out removal and fitting of basic light vehicle mechanical electrical and trim (MET) components	1.1	identify the procedures involved in carry out the systematic removal and fitting of basic light vehicle MET components to the standard required including: <ul style="list-style-type: none"> <li>a bumpers</li> <li>b headlamp units</li> <li>c road wheels</li> <li>d batteries</li> <li>e bonnet and boot trim</li> <li>f interior trim components</li> <li>g exterior trim components</li> </ul>			
		1.2	identify the procedures involved in working with supplementary safety systems when fitting basic light vehicle MET components			
		1.3	identify the procedures involved in working with gas discharge headlamp systems when fitting basic light vehicle MET components			
		1.4	explain the methods and procedures for storing removed light vehicle MET components			
		1.5	identify the different types of fastenings and fixings used when removing and fitting light vehicle MET components			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.6	explain the reasons for the use of different types of fastenings and fixings used in light vehicle MET components			
		1.7	explain the procedures, methods and reasons for ensuring correct alignment of light vehicle MET components			
		1.8	identify the quality checks that can be used to ensure correct alignment and operation of light vehicle MET components			
		1.9	identify correct conformity of vehicle systems against light vehicle specification and legal requirements on completion			
		1.10	explain the procedure for reporting cosmetic damage to light vehicle MET components and units			
2	Understand how to carry out removal and fitting of basic light vehicle non permanently fixed vehicle body panels	2.1	<p>identify the procedures involved in carry out the systematic removal and fitting of basic light vehicle non-welded, non-structural body panels to the standard required including:</p> <ul style="list-style-type: none"> <li>a wings</li> <li>b doors</li> <li>c bonnets</li> <li>d boot lids and tailgates</li> <li>e bumper bars, covers and components</li> </ul>			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.2	identify the procedures involved in working with supplementary safety systems when fitting basic light vehicle non-welded, non-structural body panels			
		2.3	explain the methods and procedures for storing removed light vehicle non-welded, non-structural body panels			
		2.4	identify the different types of fastenings and fixings used when removing and fitting light vehicle non-welded, non-structural body panels			
		2.5	explain the reasons for the use of different types of fastenings and fixings used in light vehicle non-welded, non-structural body panels			
		2.6	explain the procedures, methods and reasons for ensuring correct alignment of light vehicle non-welded, non-structural body panels			
		2.7	identify the quality checks that can be used to ensure correct alignment and operation of light vehicle non-welded, non-structural body panels			
		2.8	identify correct conformity of vehicle systems against light vehicle specification and legal requirements on completion			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.9	explain the procedure for reporting cosmetic damage to light vehicle non-welded, non-structural body panels			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

**Unit 34:** Skills in Removing and Fitting of Basic Motor Mechanical, Electrical and Trim (MET) Components and non Permanently Fixed Vehicle Body Panels

**Unit reference number:** K/601/3869

**Level:** 2

**Credit value:** 3

**Guided learning hours:** 20

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

**You must:**

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence from your normal workplace of removing and replacing 4 of the 12 units or components from the list below on at least 2 occasions
  - a bumpers
  - b headlamp units
  - c road wheels
  - d batteries
  - e bonnet fittings
  - f interior trim components

- g exterior trim components
- h wings
- i doors
- j bonnets
- k boot lids and tailgates
- l bumper bars, covers and components



## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels	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			
2	Be able to use relevant information to carry out the task	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			
3	Be able to use appropriate tools and equipment	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.3	use the correct tools and equipment in the way specified by manufacturers when carrying removal and fitting of basic MET components and non-permanently fixed light vehicle body panels			
4	Be able to carry out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels	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 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			
5	Be able to record information and make suitable recommendations	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		5.3	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 35: Competency in Identifying and Agreeing Motor Vehicle Customer Service Needs

Unit reference number: K/601/6383

Level: 3

Credit value: 5

Guided learning hours: 40

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### Unit Summary

This unit helps the learner to develop competency in order 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.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy.
- 4 produce evidence, including records, to show that you have dealt with **3 different customers**.
- 5 be observed by your assessor in your normal workplace dealing with **at least 1 customer**

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to obtain relevant information from the customer	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			
2	Be able to provide relevant information to the customer	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			
3	Be able to agree work undertaken with the customer	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			
4	Be able to ensure recording systems are implemented correctly	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*





## Unit 36: Competency in Inspecting Light Vehicles Using Prescribed Methods

Unit reference number: M/601/3792

Level: 2

Credit value: 10

Guided learning hours: 80

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### Unit Summary

This unit enables 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.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of carrying out at least 3 different inspections from the following:
  - a Pre and post — work inspection
  - b Pre-delivery inspection
  - c Pre-purchase inspection
  - d Pre-MOT test inspection
  - e Safety inspection
  - f Post repair inspection

- 5 be observed by your assessor in your normal workplace successfully carrying out an inspection on at least 1 occasion

Evidence from simulated activities is not acceptable for this unit.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle inspections using prescribed methods	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle inspection activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	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			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for carrying out a range of inspections on light vehicle systems			
		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 a range of inspections on light vehicle systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle inspections using prescribed methods	4.1	carry out light vehicle inspections using prescribed methods, adhering to the correct 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			
		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	complete all system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 37: Competency in Overhauling Light Vehicle Engine Mechanical Units

Unit reference number: D/601/3786

Level: 3

Credit value: 2

Guided learning hours: 20

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### Unit Summary

This unit enables the learner to demonstrate competency in overhauling engines, It also covers the evaluation of performance of the overhauled units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of overhauling 2 complete engine units to include cylinder head and block
- 5 overhaul 1 of the above units in your normal workplace
- 6 be observed by your assessor overhauling 1 unit.

Simulated activity will be acceptable to assess candidates' competence in overhaul on no more than 1 occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when overhauling light vehicle engine mechanical units	1.1	use suitable personal protective equipment and vehicle coverings when overhauling light vehicle engine units			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the overhauling of light vehicle engine units including: a vehicle technical data b overhauling procedures c legal requirements			
		2.2	use technical information to support the overhauling of light vehicle engine units			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for overhauling light vehicle engine units			
		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 overhaul light vehicle engine units			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out the overhauling of light vehicle engine mechanical units	4.1	carry out all overhauling of light vehicle engine mechanical units, adhering to the specifications and tolerances for the vehicle and following: a the manufacturer's approved overhauling methods b recognised researched repair methods c health and safety requirements d workplace procedures.			
		4.2	ensure the assessment of the dismantled unit identifies accurately its condition and suitability for overhaul			
		4.3	inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform			
		4.4	use testing methods that comply with the manufacturer's requirements			
		4.5	adjust the unit's components correctly where necessary to ensure that they operate to meet the vehicle operating requirements			
		4.6	ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements			
		4.7	complete all system diagnostic activities within the agreed timescale			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 38: Competency in Overhauling Light Vehicle Transmission Units

Unit reference number: H/601/3787

Level: 3

Credit value: 2

Guided learning hours: 20

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### Unit Summary

This unit enables the learner to demonstrate competency in overhauling gearboxes and final drive assemblies. It also covers the evaluation of performance of the overhauled units and systems

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of overhauling 2 Gearbox and 2 Final Drive unit
- 5 overhaul 3 of the above units in your normal workplace
- 6 be observed by your assessor overhauling 1 unit.

Simulated activity will be acceptable to assess candidates' competence in overhaul on no more than 1 occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when overhauling light vehicle transmission units	1.1	use suitable personal protective equipment and vehicle coverings when overhauling light vehicle transmission units			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the overhauling of light vehicle transmission units including: a vehicle technical data b overhauling procedures c legal requirements			
		2.2	use technical information to support the overhauling of light vehicle transmission units			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for overhaul of light vehicle transmission systems			
		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 overhaul light vehicle transmission unit			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out the overhauling of light vehicle transmission units	4.1	carry out all overhauling of light vehicle transmission units, adhering to the specifications and tolerances for the vehicle and following: a the manufacturer's approved overhauling methods b recognised researched repair methods c health and safety requirements d workplace procedures			
		4.2	ensure the assessment of the dismantled unit identifies accurately its condition and suitability for overhaul			
		4.3	inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform			
		4.4	use testing methods that comply with the manufacturer's requirements			
		4.5	adjust the unit's components correctly where necessary to ensure that they operate to meet the vehicle operating requirements			
		4.6	ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.7	complete all system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 39: Competency in Overhauling Light Vehicle Steering and Suspension Units

Unit reference number: K/601/3788

Level: 3

Credit value: 2

Guided learning hours: 20

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### Unit Summary

This unit enables the learner to demonstrate competency in overhauling steering and suspension units. It also covers the evaluation of performance of the overhauled units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of overhauling 2 steering and 2 suspension units
- 5 overhaul 3 of the above units in your normal workplace
- 6 be observed by your assessor overhauling at least 2 units, 1 of which must be in your normal workplace.

Simulated activity will be acceptable to assess candidates' competence in overhaul on no more than 1 occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when overhauling light vehicle steering and suspension units	1.1	use suitable personal protective equipment and vehicle coverings when overhauling light vehicle steering and suspension units			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support the overhauling of light vehicle steering and suspension units including: a vehicle technical data b overhauling procedures c legal requirements			
		2.2	use technical information to support the overhauling of light vehicle steering and suspension units			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for overhauling light vehicle steering and suspension units			
		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 for overhauling light vehicle steering and suspension units			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out the overhauling of light vehicle steering and suspension units	4.1	<p>carry out all overhauling of light vehicle steering and suspension units, adhering to the specifications and tolerances for the vehicle and following:</p> <ul style="list-style-type: none"> <li>a the manufacturer's approved overhauling methods</li> <li>b recognised researched repair methods</li> <li>c health and safety requirements.</li> <li>d workplace procedures</li> </ul>			
		4.2	ensure the assessment of the dismantled unit identifies accurately its condition and suitability for overhaul			
		4.3	inform the relevant person(s) promptly where an overhaul is uneconomic or unsatisfactory to perform			
		4.4	use testing methods that comply with the manufacturer's requirements			
		4.5	adjust the unit's components correctly where necessary to ensure that they operate to meet the vehicle operating requirements			
		4.6	ensure the overhauled units and assemblies conform to the vehicle operating specification and any legal requirements			
		4.7	complete all system diagnostic activities within the agreed timescale			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

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Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 40: Competency in Removing and Replacing Light Vehicle Driveline Units and Components

Unit reference number: M/601/3789

Level: 2

Credit value: 10

Guided learning hours: 90

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### Unit Summary

This unit enables the learner to demonstrate competency in removing and replacing light vehicle transmission and driveline units. It also covers the evaluation of performance of the replaced units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of removing and replacing 3 units or components from 2 different vehicles from the systems listed below:
  - a clutch
  - b gearbox
  - c drive line (shafts, couplings, hubs and bearings)
  - d final drive
- 5 be observed by your assessor in your normal workplace on at least 1 occasion removing and replacing units and components from 1 of the following systems

Simulated activity will be acceptable to assess candidates' competence in removal and replacement on no more than 1 occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and replacement activities	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle transmission and driveline unit and component removal and replacement activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle transmission and driveline 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 transmission and driveline unit and component removal and replacement activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for removal and replacement of light vehicle transmission and driveline systems			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		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 to remove and replace light vehicle transmission and driveline systems			
4	Be able to carry out removal and replacement of light vehicle transmission and driveline units and components.	4.1	remove and replace the light vehicle's transmission and driveline systems and components, adhering to the correct 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 light vehicle transmission and driveline 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 light vehicle transmission and driveline system performs to the vehicle operating specification and meets any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.5	complete all system diagnostic activities with the agreed timescale			
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

**Unit 41: Competency in Removing and Fitting Basic Light Vehicle Mechanical, Electrical and Trim (MET) Components and Non Permanently Fixed Vehicle Body Panels**

**Unit reference number:** J/601/3751

**Level:** 2

**Credit value:** 5

**Guided learning hours:** 40

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**Unit Summary**

This unit enables the learner to demonstrate competency in removing and fitting 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.

**Assessment Requirements/Evidence requirements:**

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

**You must:**

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence from your normal workplace of removing and replacing 6 of **the 12** units or components from the list below on at **least 2 occasions**
  - a bumpers
  - b headlamp units
  - c road wheels

- d batteries
  - e bonnet fittings
  - f interior trim components
  - g exterior trim components
  - h wings
  - i doors
  - j bonnets
  - k boot lids and tailgates
  - l bumper bars, covers and components
- 5 be observed by your assessor on at least 2 occasions, each observation covering the removal and replacement of **different** units
- Evidence from simulated activities is acceptable for this unit on no more than 20% in line with the IMI VCQ Assessment Strategy.



## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels	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			
2	Be able to use relevant information to carry out the task	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			
3	Be able to use appropriate tools and equipment	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.3	use the correct tools and equipment in the way specified by manufacturers when carrying removal and fitting of basic MET components and non-permanently fixed light vehicle body panels			
4	Be able to carry out removal and fitting of basic MET components and non-permanently fixed light vehicle body panels	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 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

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*(if sampled)*



## Unit 42: Skills in Diagnosing and Rectifying Light Vehicle Transmission and Driveline Faults

Unit reference number: T/601/3888

Level: 3

Credit value: 5

Guided learning hours: 45

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### Unit Summary

This unit allows the learner to develop skills in diagnosing and rectifying light vehicle gearboxes, hubs and bearings, driveline shafts, clutches, differentials and final drive unit faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre
- 3 be observed by an assessor as defined by the IMI Assessment Strategy.
- 4 be observed by your assessor successfully carrying out the diagnosis and rectification of faults occurring in 2 of the systems listed. The fault should involve a 2 or more step diagnostic activity. The evidence must include demonstration of skill in at least 2 of the following: mechanical, electrical/electronic and hydraulic units or components:
  - a clutch
  - b gearbox
  - c drive line (shafts, couplings, hubs and bearings)
  - d final drive

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle transmission and driveline diagnostic and rectification activities	1.1	use suitable personal protective equipment and vehicle coverings when using light vehicle diagnostic methods and carrying out rectification activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people or environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of light vehicle transmission and driveline system faults			
3	Be able to use appropriate tools and equipment	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		3.3	use the equipment required, correctly and safely throughout all light vehicle transmission and driveline diagnostic and rectification activities			
4	Be able to carry out light vehicle transmission and driveline diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented			
		4.2	evaluate dismantled sub-assemblies for their condition and suitability for repair or replacement			
		4.3	carry out all diagnostic and rectification activities following: a manufacturers' instructions b recognised researched repair methods c health and safety requirements			
		4.4	ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.7	ensure the light vehicle transmission and driveline system rectified performs to the vehicle operating specification and any legal requirements			
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 43: Knowledge of Diagnosis and Rectification of Vehicle Auxiliary Electrical Faults

Unit reference number: A/601/3746

Level: 3

Credit value: 6

Guided learning hours: 45

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### The electrical principles that are related to light vehicle electrical circuits:

- a Ohms law
- b voltage
- c power
- d current (AC and DC)
- e resistance
- f magnetism
- g electromagnetism and electromagnetic induction
- h digital and fibre optic principles
- i electrical units and symbols
- j electrical and electronic terminology
- k relevant electrical safety

## **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 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
  - v 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 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 (ICE) 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 ICE 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 ICE systems**

- a operation of entertainment systems speaker and aerial systems

### **Common faults and testing methods associated with ICE 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 LED's
  - 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 LED's
  - 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 wiper 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
  - i 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 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

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand vehicle electrical and electronic principles	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			
2	Understand how light vehicle auxiliary electrical systems operate	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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.6	compare automotive auxiliary electrical system components and assemblies against alternatives to identify differences in construction and operation			
3	Understand how to diagnose and rectify faults in auxiliary electrical systems	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

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Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 44: Skills in Diagnosing and Rectifying Vehicle Auxiliary Electrical Faults

Unit reference number: H/601/3868

Level: 3

Credit value: 5

Guided learning hours: 45

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### Unit Summary

This unit will help the learner to develop the skills required to demonstrate they can diagnose and rectify automotive vehicle auxiliary electrical system faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre.
- 3 be observed by an assessor as defined by the IMI Assessment Strategy.
- 4 be observed by an assessor carrying out diagnosis and rectification activities from 3 different systems out of the 14 listed below, which covers the learning outcomes. The fault should involve a 2 or more step diagnostic activity.
  - a lighting systems
  - b heated seats
  - c electrically adjusted seats
  - d heated screens
  - e electric mirrors
  - f electric sunroofs
  - g electric windows
  - h heating and ventilation systems
  - i information and entertainment systems

- j communication systems
- k SRS
- l wash wipe
- m locking systems
- n security and warning systems



## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out automotive vehicle auxiliary electrical diagnostic and rectification activities	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			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support automotive vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of automotive auxiliary electrical system faults			
3	Be able to use appropriate tools and equipment	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 automotive auxiliary electrical diagnostic and rectification activities			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out automotive vehicle auxiliary electrical diagnosis, rectification and test activities	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: a manufacturers' instructions b recognised researched repair methods c health and safety requirements			
		4.4	ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			
		4.7	ensure the rectified automotive auxiliary electrical system performs to the vehicle operating specification and any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



**Unit 45: Knowledge of Diagnosis and Rectification of Light Vehicle Engine Faults**

**Unit reference number:** F/601/3733

**Level:** 3

**Credit value:** 6

**Guided learning hours:** 45

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**Unit Summary**

This unit enables the learner to develop an understanding of diagnosis and rectification of engine mechanical, electrical, hydraulic and fluid systems. It also covers light vehicle engine systems and the evaluation of their performance.

**Assessment Requirements/Evidence requirements:**

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

**Single and Multi-Point Petrol Injection Systems**

- a the operation and construction of single and multi-point injection systems including:
  - i types of air flow sensor
  - ii fuel supply system
  - iii fuel pump
  - iv filter
  - v fuel regulator
  - vi injectors
  - vii sequential injection
  - viii continuous injection
  - ix semi-continuous injection
  - x electronic control unit (ECU)
  - xi injector pulse width
  - xii sensors

- b the operation of each system under various operating conditions including:
  - i cold starting
  - ii warm up
  - iii hot starting
  - iv acceleration
  - v deceleration
  - vi cruising
  - vii full load
- c engine speed limiting and knock sensing

### **Engine Management**

- a the function and purpose of engine management systems
- b the difference between analogue, digital, programmable and non programmable systems
- c open loop and closed loop control, types of input and output devices
- d the function and operation of digital components and systems
- e the operation of engine management systems under various conditions

### **Valve Mechanisms**

- a the reasons for variable valve timing and multi-valve arrangements and the effect on performance
- b layout of multi-valve arrangements, components, operation and drive arrangements
- c construction features and operation of variable valve timing engines and electronic control

### **Pressure Charged Induction Systems**

- a the meaning of volumetric efficiency; explain the effect of volumetric efficiency on engine performance, torque and power
- b the methods used to improve volumetric efficiency:
  - i variable valve timing
  - ii turbo-charging
  - iii supercharging
  - iv intercoolers
- c the operation of turbo-chargers and the purpose of:
  - i turbo-charging
  - ii supercharging
  - iii intercoolers
  - iv waste gates
  - v exhaust gas recirculation

d advantages and disadvantages of pressure charging induction systems

**Terms associated with combustion**

a flame travel, pre-ignition and detonation

b fuel properties:

i octane rating

ii flash point

iii fire point

iv volatility

v composition of petrol and diesel fuels

vi hydro-carbon content

c composition of carbon fuels (petrol and diesel):

i % hydrogen and carbon

ii composition of air

iii % oxygen

iv % nitrogen

d combustion process for spark ignition and compression ignition engines:

i air fuel ratio

ii lambda ratio

iii stoichiometric ratio

e the by-products of combustion for different engine conditions and fuel mixtures:

i CO

ii CO<sub>2</sub>

iii O

iv N

v H<sub>2</sub>O

vi NO<sub>x</sub>

f describe the legal requirements for exhaust emissions:

i MOT requirements

ii EURO 3

iii 4 & 5 regulations

## **Assessment, repair and restoration of mechanical engine components**

- a how engine mechanical components are assessed and measured for wear and serviceability:
  - i cylinder bores
  - ii cylinder heads
  - iii crankshaft journals
  - iv valve faces
  - v valve guides
  - vi valve seats
  - vii camshafts
- b the methods used for the repair and restoration of engine components

## **Cooling, Heating and Ventilation**

- a the components, operating principles, and functions of engine cooling systems
- b procedures used to remove, replace and adjust cooling system components
  - i cooling fans and control devices
  - ii header tanks, radiators and pressure caps
  - iii heater matrix's and temperature control systems
  - iv expansion tanks hoses, clips and pipes
  - v thermostats impellers and coolant
  - vi ventilation systems
- c the preparation and method of use of appropriate specialist equipment used to evaluate system performance following component replacement
  - i system pressure testers
  - ii pressure cap testers
  - iii hydrometer, or anti-freeze testing equipment
  - iv chemical tests for the detection of combustion gas
- d the layout and construction of internal heater systems
- e the controls and connections within internal heater system
- f symptoms and faults associated with cooling systems:
  - i water leaks
  - ii water in oil
  - iii internal heating system: efficiency, operation, leaks, controls, air filtration, air leaks and contamination
  - iv excessively low or high coolant temperature



- g the procedures used when inspecting
  - i internal heating system
  - ii cooling system

### **Air conditioning systems**

- a the operation of air conditioning components including:
  - i compressors
  - ii condensers
  - iii receivers
  - iv dryers
  - v connections
  - vi valves
  - vii hoses
  - viii thermostats
  - ix refrigerants
- b the layout and operation of air conditioning systems

### **Climate control systems**

- a identify components used in climate control systems including:
  - i sensors
  - ii speed controls
  - iii control systems
  - iv servomotors
  - v electronic components
- b the layout of climate control systems
- c the operation of climate control system

### **Symptoms and Faults in Engine Mechanical Systems and Components**

- a symptoms and faults related to:
  - i worn cylinders
  - ii cylinder liners
  - iii pistons
  - iv piston rings
  - v crankshaft
  - vi camshaft
  - vii bearings
  - viii cylinder head and gasket

- ix valves
- x valve seats and valve guides
- xi cambelts
- xii lubrication system and components
- xiii oil pump
- xiv relief valve
- xv filter
- xvi turbo-charger
- xvii supercharger

### **Diagnosis of faults in engine mechanical systems and components**

- a interpret information for:
  - i diagnostic tests
  - ii manufacturer's vehicle and equipment specifications
  - iii use of equipment
  - iv testing procedures
  - v test plans
  - vi legal requirements
- b the preparation of tools and equipment for use in diagnostic testing and assessment
- c systematic assessment, testing and inspection of engine components and systems including:
  - i mechanical system & component condition
  - ii engine balance
  - iii power balance
  - iv performance and operation
  - v wear
  - vi run out
  - vii alignment
- d use of appropriate tools and equipment including:
  - i compression gauges
  - ii leakage testers
  - iii cylinder balance tester
  - iv pressure gauges
  - v micrometers
  - vi vernier gauges

- e evaluate and interpret test results from diagnostic testing
- f compare test result and values with vehicle manufacturer's specifications and settings
- g the procedures for dismantling, components and systems and the use of appropriate equipment and procedures
- h assess, examine and measure components including:
  - i settings
  - ii values
  - iii condition
  - iv wear and performance of components and systems
- i probable faults
  - i malfunctions
  - ii incorrect settings
  - iii wear
- j rectification or replacement procedures
- k evaluate operation of components and systems following diagnosis and repair to confirm system performance

### **Faults and symptoms in ignition systems**

- a ignition system failure or malfunctions including:
  - i no spark
  - ii misfiring
  - iii backfiring
  - iv cold or hot starting problems
  - v poor performance
  - vi pre-ignition
  - vii detonation
  - viii exhaust emission levels
  - ix fuel consumption
  - x low power
  - xi unstable idle speed

### **Faults and symptoms in electronic petrol and diesel injection systems**

- a petrol and diesel injection system failures or malfunctions including:
  - i cold or hot starting problems
  - ii poor performance
  - iii exhaust emissions
  - iv high fuel consumption

- v erratic running
- vi low power
- vii unstable idle speed

### **Faults and symptoms in engine management systems**

- a engine management system failure or malfunctions including:
  - i misfiring
  - ii backfiring
  - iii cold or hot starting problems
  - iv poor performance
  - v pre-ignition
  - vi detonation
  - vii exhaust emission levels
  - viii fuel consumption
  - ix low power
  - x unstable idle speed

### **Diagnosis of faults in electronic ignition, petrol and diesel injection and engine management systems**

- a locate and interpret information for:
  - i diagnostic tests
  - ii manufacturer's vehicle and equipment specifications
  - iii use of equipment
  - iv testing procedures
  - v test plans
  - vi fault codes
  - vii legal requirements
- b the preparation of tools and equipment for use in diagnostic testing and assessment
- c conduct systematic assessment, testing of engine systems including:
  - i component condition and performance
  - ii component settings
  - iii component values
  - iv electrical and electronic values
  - v system performance and operation
  - vi use of appropriate tools and equipment including gauges
  - vii multi-meter
  - viii breakout box

- ix oscilloscope
- x diagnostic tester
- xi manufacturer's dedicated equipment
- xii exhaust gas analyser
- xiii fuel flow meter
- xiv pressure gauges
- d evaluate and interpret test results from diagnostic testing
- e compare test result, values and fault codes with vehicle manufacturer's specifications and settings
- f the procedures for dismantling, components and systems using appropriate equipment
- g assess, examine and measure components including:
  - i settings
  - ii input and output values
  - iii voltages
  - iv current consumption
  - v resistance
  - vi output patterns with oscilloscope
  - vii condition
  - viii wear and performance of components and systems
- h identify probable faults and indications of:
  - i faults
  - ii malfunctions
  - iii incorrect settings
  - iv wear
  - v values
  - vi inputs and outputs
  - vii fault codes
  - viii rectification or replacement procedures
  - ix evaluation and the operation of components and systems following diagnosis and repair to confirm system performance

### **Faults and symptoms in vehicle comfort systems**

- a system failure, malfunction or ineffectiveness of internal heating system, air conditioning system or climatic control system including:
  - i leaks
  - ii abnormal noise
  - iii ineffective operation

- iv failure to operate
- v control faults
- vi inadequate operation

### **Diagnosis of faults in vehicle comfort systems**

- a locate and interpret information for:
  - i diagnostic tests
  - ii manufacturer's vehicle and equipment specifications
  - iii use of equipment
  - iv testing procedures
  - v test plans
  - vi fault codes
  - vii legal requirements
- b the preparation of tools and equipment for use in diagnostic testing and assessment
- c conduct systematic assessment and testing of comfort systems including:
  - i component condition and performance
  - ii component settings
  - iii component values
  - iv electrical and electronic values
  - v system performance and operation
  - vi drive belts
  - vii controls
  - viii compressors
  - ix condensers
  - x receivers
  - xi dryers
  - xii connections
  - xiii valve
  - xiv hoses
  - xv thermostats and refrigerants
  - xvi sensors
  - xvii speed controls
  - xviii control systems
  - xix servomotors

- d use of appropriate tools and equipment including:
  - i pressure gauges
  - ii multi-meter
  - iii breakout box
  - iv oscilloscope
  - v diagnostic tester
  - vi manufacturer's dedicated equipment
  - vii flow meter
- e evaluate and interpret test results from diagnostic testing
- f compare test result, values and fault codes with vehicle manufacturer's specifications and settings
- g how to dismantle, components and systems using appropriate equipment and procedures
- h how to assess, examine and measure components including: settings, input and output values, voltages, current consumption, resistance, output patterns with oscilloscope, pressures, condition, wear and performance of components and systems
- i identification of probable faults and indications of faults, malfunctions, incorrect settings, wear, values, inputs and outputs, fault codes, pressures and leaks
- j rectification or replacement procedures
- k evaluation and operation of components and systems following diagnosis and repair to confirm system performance

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how the light vehicle engine systems operate	1.1	explain the construction and operation of light vehicle engine systems to include: <ul style="list-style-type: none"> <li>a SI fuel systems</li> <li>b CI fuel systems</li> <li>c ignition systems</li> <li>d engine management</li> <li>e valve mechanisms</li> <li>f pressure charged induction systems</li> <li>g exhaust emission reduction systems</li> <li>h heating, ventilation and cooling</li> </ul>			
		1.2	explain the interaction between electrical, electronic and mechanical components within light vehicle engine systems			
		1.3	explain how electrical systems interlink and interact, including multiplexing and fibre optics			
		1.4	compare light vehicle engine system components and assemblies against alternatives to identify differences in construction and operation			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.5	identify the engineering principles that are related to light vehicle engine systems a volumetric efficiency b flame travel, pre ignition and detonation c fuel properties d composition of carbon fuels e combustion process f legal requirements for exhaust emissions			
2	Understand how to diagnose and rectify faults in light vehicle engine systems	2.1	describe how to analyse symptoms and causes of faults found in light vehicle engine systems to include: a engine mechanical components b ignition systems c fuel systems d engine management system e pressure charged induction systems f heating, ventilation and cooling			
		2.2	explain systematic diagnostic techniques used in identifying engine system faults			

Learning outcomes		Assessment criteria	Evidence type	Portfolio reference	Date
		2.3 explain how to examine, measure and make suitable adjustments to the components including: <ul style="list-style-type: none"> <li>a settings</li> <li>b input and output values</li> <li>c voltages</li> <li>d current consumption</li> <li>e resistance</li> <li>f output patterns with oscilloscope</li> <li>g pressures</li> <li>h condition</li> <li>l wear and performance</li> </ul>			
		2.4 explain how to carry out the diagnosis and rectification activities in order to correct the faults in the light vehicle engine systems			
		2.5 explain how to select, prepare and use diagnostic and rectification equipment for light vehicle engine systems			
		2.6 explain how to evaluate and interpret test results found in diagnosing light vehicle engine system faults against vehicle manufacturer specifications and settings			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.7	explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance			

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Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 46: Skills in Diagnosing and Rectifying Light Vehicle Engine Faults

Unit reference number: J/601/3877

Level: 3

Credit value: 5

Guided learning hours: 45

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### Unit Summary

This unit allows the learner to develop skills to diagnose and rectify light vehicle engine mechanical, electrical, hydraulic and fluid systems faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre.
- 3 be observed by an assessor as defined by the IMI Assessment Strategy.
- 4 be observed by your assessor successfully carrying out the diagnosis and rectification of faults occurring in 3 out of the 5 engine systems listed. The faults should involve a 2 or more step diagnostic activity.
  - a engine mechanical components
  - b engine management system
  - c pressure charged induction systems
  - d exhaust emission reduction systems
  - e heating, ventilation and cooling

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle engine diagnostic and rectification activities	1.1	use suitable personal protective equipment and vehicle coverings when using light vehicle diagnostic methods and carrying out rectification activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of light vehicle engine system faults			
3	Be able to use appropriate tools and equipment	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 light vehicle engine diagnostic and rectification activities			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle engine diagnosis, rectification and test activities	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: a manufacturers' instructions b recognised researched repair methods c health and safety requirements			
		4.4	ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			
		4.7	ensure the rectified light vehicle engine system performs to the vehicle operating specification and any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

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## Unit 47: Knowledge in Diagnosis and Rectification of Light Vehicle Chassis Faults

Unit reference number: L/601/3735

Level: 3

Credit value: 6

Guided learning hours: 45

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### Unit Summary

This unit enables the learner to develop an understanding of diagnosis and rectification of braking steering and suspension systems. It also covers light vehicle chassis systems and the evaluation of their performance.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCO) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### Electrical and electronic principles of light vehicle chassis systems

- a the operation of electrical and electronic systems and components related to light vehicle chassis systems including:
  - i ECU
  - ii sensors and actuators
  - iii electrical inputs
  - iv voltages
  - v oscilloscope patterns
  - vi digital and fibre optic principles
- b the interaction between the electrical/electronic system and mechanical components of chassis systems
- c electronic and electrical safety procedures

### Operation of electronic ABS and EBD braking systems

- a layout of:
  - i ABS and EBD braking systems
  - ii anti-lock braking

- iii anti-skid control systems
- iv warning systems
- b operation of:
  - i hydraulic and electronic control units
  - ii wheel speed sensors
  - iii load sensors
  - iv hoses
  - v cables and connectors
- c advantage of ABS and EBD braking systems over conventional braking systems
- d the relationship and interaction of ABS braking with and other vehicle systems – traction control

### **Steering geometry for light vehicle applications**

- a non-steered wheel geometry settings
- b front/rear wheel geometry:
  - i castor
  - ii camber
  - iii kingpin or swivel pin inclination
  - iv negative offset
  - v wheel alignment (tracking)
  - vi toe in and toe out
  - vii toe out on turns and steered wheel geometry
  - viii Ackerman principle
  - ix slip angles
  - x self-aligning torque
  - xi oversteer and understeer
  - xii neutral steer
- c the operation and layout of rear and four wheel steering
- d the construction and operation of power assisted steering systems:
  - i hydraulic system
  - ii power cylinders
  - iii drive belts and pumps
  - iv hydraulic valve (rotary, spool and flapper type)
- e the operation of:
  - i electronic power steering systems (EPS)
  - ii electrical and electronic components

### **Components and operation of self-levelling suspension**

- a the components, construction and operation of a self levelling suspension system
- b the operation of self -levelling suspension system under various conditions:
  - i self-energising
  - ii pump operated self-levelling suspension

### **Operation of fitting ride-controlled systems**

- a the reasons for fitting ride controlled systems
- b the operation of driver controlled and ride controlled systems

### **Symptoms and faults in braking systems**

- a symptoms and faults associated with conventional braking systems, ABS, and EBD systems:
  - i mechanical
  - ii hydraulic
  - iii electrical and electronic systems
  - iv fluid leaks
  - v warning light operation
  - vi poor brake efficiency
  - vii wheel locking under braking

### **Diagnosis and faults in braking systems**

- a locate and interpret information for:
  - i diagnostic tests
  - ii vehicle and equipment specifications
  - iii use of equipment
  - iv testing procedures
  - v test plans
  - vi fault codes
  - vii legal requirements
- b prepare equipment for use in diagnostic testing
- c conduct systematic testing and inspection of:
  - i braking system
  - ii ABS
  - iii EBD
  - iv mechanical
  - v hydraulic
  - vi electrical and electronic systems

- d using appropriate tools and equipment including:
  - i multi-meters
  - ii oscilloscope
  - iii pressure gauges
- e evaluate and interpret test results from diagnostic testing
- f compare test result and values with vehicle manufacturer's specifications and settings
- g how to dismantle, components and systems using appropriate equipment and procedures
- h assess, examine and evaluate the operation, settings, values, condition and performance of components and systems
- i probable faults, malfunctions, incorrect settings
- j rectification or replacement procedures
- k operation of systems following diagnosis and repair to confirm operation and performance

### **Symptoms and faults associated with steering systems**

- a symptoms and faults associated with steering systems:
  - i mechanical
  - ii hydraulic
  - iii electrical and electronic
  - iv steering boxes (rack and pinion, worm and re-circulating ball)
  - v steering arms and linkages
  - vi steering joints and bushes
  - vii idler gears
  - viii bearings
  - ix steering columns (collapsible and absorbing)
  - x power steering system

### **Diagnosis and faults in steering systems**

- a locate and interpret information for:
  - i diagnostic tests
  - ii vehicle and equipment specifications
  - iii use of equipment
  - iv testing procedures
  - v test plans
  - vi fault codes
  - vii legal requirements
- b how to prepare equipment for use in diagnostic testing

- c conduct systematic testing and inspection of:
  - i steering systems
  - ii mechanical
  - iii hydraulic
  - iv electrical and electronic systems
  - v power steering system
- d using appropriate tools and equipment including:
  - i multi-meters
  - ii oscilloscope
  - iii pressure gauges
  - iv wheel alignment equipment
  - v steering geometry equipment
- e evaluate and interpret test results from diagnostic testing
- f compare test result and values with vehicle manufacturer's specifications and settings
- g how to dismantle, components and systems using appropriate equipment and procedures
- h assess, examine and evaluate the:
  - i operation
  - ii settings
  - iii values
  - iv condition and performance of components and systems
- i probable faults, malfunctions, and incorrect settings
- j rectification or replacement procedures
- k operation of systems following diagnosis and repair to confirm operation and performance

### **Symptoms and faults associated with suspension systems**

- a symptoms and faults associated with suspension systems:
  - i mechanical
  - ii hydraulic
  - iii electrical and electronic
  - iv conventional
  - v self-levelling and ride controlled suspension systems
  - vi ride height (unequal and low)
  - vii wear
  - viii noises under operation

- ix fluid leakage
- x excessive travel
- xi excessive tyre wear

### **Diagnosis and faults in suspension systems**

- a locate and interpret information for:
  - i diagnostic tests
  - ii vehicle and equipment specifications
  - iii use of equipment
  - iv testing procedures
  - v test plans
  - vi fault codes
  - vii legal requirements
- b how to prepare equipment for use in diagnostic testing
- c how to conduct systematic testing and inspection of:
  - i suspension systems
  - ii mechanical
  - iii hydraulic
  - iv electrical and electronic systems
  - v conventional
  - vi self-levelling and ride controlled suspension systems
- d using appropriate tools and equipment including:
  - i multi-meters
  - ii oscilloscope
  - iii pressure gauges
  - iv alignment equipment
  - v geometry equipment
- e evaluate and interpret test results from diagnostic testing
- f compare test result and values with vehicle manufacturer's specifications and settings
- g how to dismantle, components and systems using appropriate equipment and procedures
- h assess, examine and evaluate the operation, settings, values, condition and performance of components and systems
- i probable faults, malfunctions and incorrect settings
- j rectification or replacement procedures
- k operation of systems following diagnosis and repair to confirm operation and performance

**Measurements on components to include:**

- a settings
- b input and output values
- c voltages
- d current consumption
- e resistance
- f output patterns with oscilloscope
- g pressures
- h condition
- i wear and performance

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how the light vehicle chassis systems operate	1.1	explain the construction and operation of light vehicle chassis systems to include: <ul style="list-style-type: none"> <li>a electronic braking</li> <li>b front and rear wheel geometry</li> <li>c four wheel steer</li> <li>d hydraulic power steering</li> <li>e electronic power steering</li> <li>f self levelling suspension</li> <li>g ride control system</li> </ul>			
		1.2	explain the interaction between electrical, electronic and mechanical components within light vehicle chassis systems			
		1.3	explain how light vehicle chassis electrical systems interlink and interact, including multiplexing			
		1.4	compare light vehicle chassis system components and assemblies against alternatives to identify differences in construction and operation			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		1.5	identify the engineering principles that are related to light vehicle chassis systems a inertia force, mass and acceleration b laws of friction c static's (springs and torsion bars) d hydraulic machines			
2	Understand how to diagnose and rectify faults in light vehicle chassis systems	2.1	explain symptoms and causes of faults found in light vehicle chassis systems			
		2.2	explain systematic diagnostic techniques used in identifying chassis system faults			
		2.3	explain how to examine, measure and make suitable adjustments to the components			
		2.4	explain how to carry out the diagnosis and rectification activities in order to correct the faults in the light vehicle chassis systems			
		2.5	explain how to select, prepare and use diagnostic and rectification equipment for light vehicle chassis systems			
		2.6	explain how to evaluate and interpret test results found in diagnosing light vehicle chassis system faults against vehicle manufacturer specifications and settings			
		2.7	explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance			

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## Unit 48: Skills in Diagnosing and Rectifying Light Vehicle Chassis System Faults

Unit reference number: R/601/3879

Level: 3

Credit value: 5

Guided learning hours: 45

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### Unit Summary

This unit allows the learner to develop skills to diagnose and rectify light vehicle braking steering and suspension systems faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre.
- 3 be observed by an assessor as defined by the IMI Assessment Strategy.
- 4 be observed by your assessor successfully carrying out the diagnosis and rectification of 1 fault occurring in each system listed. The fault should involve a 2 or more step diagnostic activity. The evidence must include demonstration of skill in at least 1 of each: mechanical, electrical/electronic or hydraulic units or components.
  - a Steering systems
  - b Suspension systems
  - c Braking systems

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle chassis diagnostic and rectification activities	1.1	use suitable personal protective equipment and vehicle coverings when using light vehicle diagnostic methods and carrying out rectification activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of light vehicle chassis system faults			
3	Be able to use appropriate tools and equipment	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 light vehicle chassis diagnostic and rectification activities			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle chassis diagnosis, rectification and test activities	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: a manufacturers' instructions b recognised researched repair methods c health and safety requirements			
		4.4	ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			
		4.7	ensure the rectified light vehicle chassis system performs to the vehicle operating specification and any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to record information and make suitable recommendations	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			

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**Unit 49: Knowledge of Diagnosis and Rectification of Light Vehicle Transmission and Driveline Faults**

Unit reference number: D/601/3741

Level: 3

Credit value: 6

Guided learning hours: 45

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### Unit Summary

This unit enables the learner to develop an understanding of diagnosis and rectification of light vehicle gearboxes, hubs and bearings, driveline shafts, clutches, differentials and final drive units. It also covers the evaluation of performance of the systems.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### Electrical and electronic principles related to light vehicle transmission systems

- a the operation of electrical and electronic systems and components related to light vehicle transmission systems including:
  - i ECU
  - ii sensors and actuators
  - iii electrical inputs & outputs
  - iv voltages
  - v oscilloscope patterns
  - vi digital and fibre optic principles
- b the interaction between the electrical/electronic system, hydraulic system and mechanical components of the transmission systems
- c electronic and electrical safety procedures

### **The operation light vehicle clutches and fluid couplings**

- a the construction and operation of friction clutches (coil spring, diaphragm) including single and twin clutch designs
- b the construction and operation of fluid couplings including:
  - i fluid flywheel
  - ii torque converter (torque multiplication, efficiency)
  - iii benefits of fluid couplings
  - iv benefits of torque converter over fluid flywheel

### **The operation of light vehicle transmissions and driveline systems**

- a the construction and operation of manual gearboxes:
  - i 4, 5 & 6 speed gearboxes
  - ii gear arrangements
  - iii shaft and bearing arrangements
  - iv synchromesh devices
  - v interlock mechanisms
  - vi linkages
  - vii overdrive
  - viii lubrication
- b the construction and operation of automatic gearboxes including hydraulic and electronic control systems: operations of epicyclic gears (sun, planet, annulus and carrier), method for achieving different gear ratios using epicyclic gearing; hydraulic control systems, components and operation; electronic control system, components and operation
- c the construction and operation of continuously variable transmissions (CVT) and the benefits of this type of gearbox design
- d the construction and operation of the sequential manual gearbox (SMG)
- e the construction and operation of final drive systems including:
  - i conventional crown wheel and pinion
  - ii differential gears
  - iii limited slip differential
- f the construction and operation of light vehicle 4 wheel drive systems including third differential and differential locks
- g the operation of light vehicle traction control systems and launch control
- h the construction and operation of light vehicle hub arrangements:
  - i the construction and operation of:
  - ii drive shafts
  - iii prop shafts including flexible joints and couplings



- iv universal joints
- v constant velocity joints
- vi sliding joints

### **Symptoms and faults in light vehicle transmissions and drive-line systems**

- a clutch and coupling faults:
  - i abnormal noises
  - ii vibrations
  - iii fluid leaks
  - iv slip
  - v judder
  - vi grab
  - vii failure to release
- b gearbox faults:
  - i abnormal noises
  - ii vibrations
  - iii loss of drive
  - iv difficulty engaging or disengaging gears
  - v automatic gear box types
  - vi abnormal noises
  - vii vibrations
  - viii loss of drive
  - ix failure to engage gear
  - x failure to disengage gear
  - xi leaks
  - xii failure to operate
  - xiii incorrect shift patterns
  - xiv electrical and electronic faults
- c final drive faults:
  - i abnormal noises
  - ii vibrations
  - iii loss of drive
  - iv oil leaks
  - v failure to operate
  - vi electrical and electronic faults

- d drive-lines and couplings:
  - i abnormal noises
  - ii vibrations
  - iii loss of drive

### **Faults in light vehicle transmission systems**

- a interpret information for diagnostic tests, vehicle and equipment specifications, use of equipment, testing procedures, test plans, fault codes and legal requirements
- b how to prepare equipment for use in diagnostic testing
- c how to conduct systematic testing and inspection of transmission system, mechanical, hydraulic, electrical and electronic systems using appropriate tools and equipment including, multimeter, oscilloscope and pressure gauges
- d how to carry out workshop based and road testing of vehicle and transmission system
- e evaluate and interpret test results from diagnostic and/or road testing
- f compare test result and values with vehicle manufacturer's specifications and settings
- g how to dismantle, components and systems using appropriate equipment and procedures
- h assess, examine and evaluate the operation, settings, values, condition and performance of components and systems
- i probable faults, malfunctions and incorrect settings
- j rectification or replacement procedures

### **Operation of systems following diagnosis and repair to confirm operation and performance. Measurements on components to include:**

- a settings
- b input and output values
- c voltages
- d current consumption
- e resistance
- f output patterns with oscilloscope
- g pressures
- h condition
- i wear and performance

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand how the light vehicle transmission and driveline systems operate	1.1	explain the construction and operation of light vehicle transmission and driveline systems			
		1.2	explain the interaction between electrical, electronic and mechanical components within light vehicle transmission and driveline systems			
		1.3	explain how electrical systems interlink and interact, including multiplexing			
		1.4	compare light vehicle transmission and driveline system components and assemblies against alternatives to identify differences in construction and operation			
		1.5	identify the engineering principles that are related to light vehicle transmission and driveline systems <ul style="list-style-type: none"> <li>a friction</li> <li>b torque transmission</li> <li>c materials</li> <li>d fluids &amp; energy</li> <li>e potential &amp; kinetic energy</li> </ul>			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Understand how to diagnose and rectify faults in light vehicle transmission and driveline systems	2.1	explain the symptoms and causes of faults found in light vehicle transmission and driveline systems			
		2.2	explain systematic diagnostic techniques used in identifying transmission and driveline system faults			
		2.3	explain how to examine, measure and make suitable adjustments components			
		2.4	explain how to carry out the rectification activities in order to correct the faults in light vehicle transmission and driveline systems			
		2.5	explain how to select, prepare and use diagnostic and rectification equipment for light vehicle transmission and driveline systems			
		2.6	explain how to evaluate and interpret test results found in diagnosing light vehicle transmission and driveline system faults against vehicle manufacturer specifications and settings			
		2.7	explain how to evaluate the operation of components and systems following diagnosis and repair to confirm system performance			

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## Unit 50: Knowledge of how to Make Learning Possible through Demonstrations and Instruction

Unit reference number: T/601/6242

Level: 3

Credit value: 5

Guided learning hours: 45

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

If this unit is offered within a competence qualification (VCQ) it must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*).

This unit must adhere to the IMI Knowledge Unit Syllabus as set out below:

### 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 learners 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 learners 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 effect 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
  - ix bright lights

### **Health and safety factors that effect 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 ie paper and technology based etc

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the nature and role of demonstrations and instruction	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			
2	Understand the principles and concepts of demonstration and instruction	2.1	describe how to put learners at ease and encourage them to take part			
		2.2	justify the choice between demonstration and instruction as a learning method			
		2.3	explain how to identify individual learning needs			
		2.4	clarify which factors are likely to prevent learning and how to overcome them			
		2.5	explain how to check learners' understanding and progress			
		2.6	explain how to choose and prepare appropriate materials			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		2.7	explain the separate areas of instructional techniques which encourage learning			
		2.8	describe which types of learning are best achieved and supported through instruction			
3	Understand the external factors influencing human resource development	3.1	explain how to make sure everybody acts in line with health, safety and environmental protection, legislation and best practice			
		3.2	analyse developments in technology based learning and new ways of delivery			

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Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 51: Skills in How to Make Learning Possible through Demonstrations and Instruction

Unit reference number: Y/601/6282

Level: 3

Credit value: 5

Guided learning hours: 40

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### Unit Summary

This unit will help the learner to develop the skills required 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.

### Assessment Requirements/Evidence requirements:

This unit must adhere to the IMI Skills Unit Assessment Requirements developed for the unit as set out below:

#### You must:

- 1 produce evidence to show you meet **all** of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your training workshop as managed and organised by an approved centre.
- 3 be observed by an assessor as defined by the IMI Assessment Strategy.
- 4 provide **1 record** of an activity which has been a combination of demonstration and instruction.
- 5 provide records of an **observation**, which covers **a combination of demonstration and instruction**.

It is expected that the **records** must include evidence to show how you:

- a decided on the sequence of the demonstration
- b ensured that the demonstration was accurate and realistic
- c identified which learning outcomes were achieved
- d ensured a safe environment for the demonstration and allowed all learners to see the demonstration clearly

In preparing the record you should consider:

- a which types of learning are best achieved and supported through demonstrations
- b how to choose between instruction and demonstration as learning methods
- c how to identify individual learning needs
- d which factors are likely to prevent learning and how to overcome them
- e how to choose and prepare appropriate materials, including technology based materials
- f which types of learning are best achieved through instruction
- g how to make sure everybody acts in line with health, safety and environmental protection legislation and best practice
- h how to analyse developments in learning and new ways of delivery, including technology based learning

It is also expected that evidence from your observations **will show** how you:

- a structured the demonstration so that the learner got the most out of it
- b encouraged learners to ask questions and get explanations at appropriate stages in the demonstration
- c gave learners the opportunities to practice the skill being demonstrated
- d gave learners positive feedback
- e reinforced learning by repeating demonstration
- f responded to the needs of learners during the demonstration
- g reduced distractions and disruptions as much as possible
- h matched instruction to the needs of learners
- i ensured that the manner, level and speed of the instruction encourages learners to take part
- j regularly check that learners understand and adapt instruction as appropriate
- k gave learners positive feedback on the learning experience and the outcome achieved
- l identified anything that prevented learning and reviewed this with the learner

Evidence from **real** or **simulated** activities and **role play is** acceptable for this unit.



## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to demonstrate skills and methods to learners	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 practise 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Be able to instruct learners	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Unit 52: Competency in Diagnosing and Rectifying Vehicle Auxiliary Electrical Faults

Unit reference number: L/601/3749

Level: 3

Credit value: 10

Guided learning hours: 90

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### Unit Summary

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.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy
- 4 produce evidence of carrying out diagnosis and rectification activities from 4 different systems out of the 16 listed below \* One of which must be alternator or a starter motor The fault should involve a 2 or more step diagnostic activity At least 3 pieces of evidence must come from work carried out in your normal workplace
  - a lighting systems
  - b heated seats
  - c electrically adjusted seats
  - d heated screens
  - e electric mirrors

- f electric sunroofs
  - g electric windows
  - h heating and ventilation systems
  - i information and entertainment systems
  - j communication systems
  - k SRS
  - l wash wipe
  - m locking systems
  - n security and warning systems
  - o alternators
  - p starter motors
- 5 be observed by your assessor on **at least 1 occasion**, covering the diagnosis and rectification of a fault.
- \*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of faults occurring in all the types of electrical systems.
- Simulated activity **will be** acceptable to assess candidates' competence in diagnosis and rectification on no more than **1** occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out automotive vehicle auxiliary electrical diagnostic and rectification activities	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			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support automotive vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of automotive auxiliary electrical system faults			
3	Be able to use appropriate tools and equipment	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 automotive auxiliary electrical diagnostic and rectification activities			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out automotive vehicle auxiliary electrical diagnosis, rectification and test activities	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: a manufacturers' instructions b recognised researched repair methods c workplace procedures d health and safety requirements			
		4.4	ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.7	ensure the rectified automotive auxiliary electrical system performs to the vehicle operating specification and any legal requirements			
		4.8	complete all system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*





## Unit 53: Competency in Diagnosing and Rectifying Light Vehicle Engine Faults

Unit reference number: J/601/3779

Level: 3

Credit value: 10

Guided learning hours: 90

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### Unit Summary

This unit enables the learner to demonstrate competency in diagnosing and rectifying light vehicle engine mechanical, electrical, hydraulic and fluid systems faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy.
- 4 use a 2 or more step diagnostic activity
- 5 produce evidence of diagnosing and rectifying faults occurring in 4 out of the 6\* engine systems listed, at least 3 of which must come from work carried out in your normal workplace.
  - a engine mechanical components
  - b cooling
  - c engine management system
  - d pressure charged induction systems
  - e exhaust emission reduction systems
  - f heating, and ventilation

6 be observed by your assessor on at least 2 occasions, each observation covering the diagnosis and rectification of a fault in different systems. Both of these observations must be carried out in your normal workplace.

\*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of faults occurring in all the types of engine systems.

Simulated activity will be acceptable to assess candidates' competence in diagnosis and rectification on no more than 1 occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle engine diagnostic and rectification activities	1.1	use suitable personal protective equipment and vehicle coverings when using light vehicle diagnostic methods and carrying out rectification activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of light vehicle engine system faults			
3	Be able to use appropriate tools and equipment	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 light vehicle engine diagnostic and rectification activities			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle engine diagnosis, rectification and test activities	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: a manufacturers' instructions b recognised researched repair methods c workplace procedures d health and safety requirements			
		4.4	ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.7	ensure the rectified light vehicle engine system performs to the vehicle operating specification and any legal requirements			
		4.8	complete all system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 54: Competency in Diagnosing and Rectifying Light Vehicle Chassis System Faults

Unit reference number: Y/601/3785

Level: 3

Credit value: 10

Guided learning hours: 90

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### Unit Summary

This unit enables the learner to demonstrate competency in diagnosing and rectifying light vehicle braking steering and suspension systems faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy.
- 4 use a 2 or more step diagnostic activity.
- 5 produce evidence of diagnosing faults from each of the following areas:
  - a Steering systems
  - b Suspension systems
  - c Braking systems

2 pieces of evidence must come from work carried out in your normal workplace.

Your evidence must include the following areas: mechanical, electrical and hydraulic.

- 6 be observed by your assessor on at least 2 occasions, each observation covering the diagnosis and rectification of a fault in a different chassis system.

Simulated activity will be acceptable to assess candidates' competence in diagnosis and rectification on no more than 1 occasion.



## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle chassis diagnostic and rectification activities	1.1	use suitable personal protective equipment and vehicle coverings when using light vehicle diagnostic methods and carrying out rectification activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of light vehicle chassis system faults			
3	Be able to use appropriate tools and equipment	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 light vehicle chassis diagnostic and rectification activities			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle chassis diagnosis, rectification and test activities	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: a manufacturers' instructions b recognised researched repair methods c workplace procedures d health and safety requirements			
		4.4	ensure all repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			
		4.7	ensure the rectified light vehicle chassis system performs to the vehicle operating specification and any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.8	complete all system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	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	Be able to record information and make suitable recommendations	5.4	record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 55: Competency in Making Learning Possible through Demonstrations and Instruction

Unit reference number: Y/601/6380

Level: 3

Credit value: 5

Guided learning hours: 40

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### Unit Summary

This unit will help the learner to develop competency 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.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy **or** by a witness who has been previously agreed with the assessor prior to the observation taking place.
- 4 provide at least 1 record of an activity which has been demonstrated.
- 5 provide records of at least **2 observations**, **1** of which **must be** by your assessor, which cover at least **1 demonstration** and **1 instruction or a combination of both**.

It is expected that the **records** must include evidence to show how you:

- a decided on the sequence of the demonstration
- b ensured that the demonstration was accurate and realistic
- c identified which learning outcomes were achieved
- d ensured a safe environment for the demonstration and allowed all learners to see the demonstration clearly

In preparing the records you should consider:

- a which types of learning are best achieved and supported through demonstrations
- b how to choose between instruction and demonstration as learning methods
- c how to identify individual learning needs
- d which factors are likely to prevent learning and how to overcome them
- e how to choose and prepare appropriate materials, including technology based materials.
- f which types of learning are best achieved through instruction
- g how to make sure everybody acts in line with health, safety and environmental protection legislation and best practice
- h how to analyse developments in learning and new ways of delivery, including technology based learning

It is also expected that evidence from your observations **will show** how you:

- a structured the demonstration so that the learner got the most out of it
- b encouraged learners to ask questions and get explanations at appropriate stages in the demonstration
- c gave learners the opportunities to practice the skill being demonstrated
- d gave learners positive feedback
- e reinforced learning by repeating demonstration
- f responded to the needs of learners during the demonstration
- g reduced distractions and disruptions as much as possible
- h matched instruction to the needs of learners
- i ensured that the manner, level and speed of the instruction encourages learners to take part
- j regularly check that learners understand and adapt instruction as appropriate
- k gave learners positive feedback on the learning experience and the outcome achieved
- l identified anything that prevented learning and reviewed this with the learner

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to demonstrate skills and methods to learners	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 practise 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			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Be able to instruct learners	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 56: Competency in Diagnosing and Rectifying Light Vehicle Transmission and Driveline Faults

Unit reference number: K/601/3791

Level: 3

Credit value: 10

Guided learning hours: 90

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### Unit Summary

This unit enables the learner to demonstrate competency in diagnosing and rectifying light vehicle gearboxes, hubs and bearings, driveline shafts, clutches, differentials and final drive unit faults. It also covers the evaluation of performance of the replaced or repaired units and systems.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy.
- 4 use a 2 or more step diagnostic activity.
- 5 produce evidence of diagnosing and rectifying at least 3 faults occurring in 3 of the 4 systems listed\*.
  - a clutch
  - b gearbox
  - c drive line (shafts, couplings, hubs and bearings)
  - d final drive

2 pieces of evidence must come from work carried out in your normal workplace in at least 2 of the following areas: mechanical, electrical or hydraulic.

- 6 be observed by your assessor on at least 1 occasion carrying out the diagnosis and rectification of a fault in a transmission or drive line system.

\*However, you must prove to your assessor that you have the necessary knowledge and understanding to be able to perform competently in respect of faults occurring in all the types of engine systems.

Simulated activity will be acceptable to assess candidates' competence in diagnosis and rectification on no more than 1 occasion.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle transmission and driveline diagnostic and rectification activities	1.1	use suitable personal protective equipment and vehicle coverings when using light vehicle diagnostic methods and carrying out rectification activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people or environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle diagnostic and rectification activities including: a vehicle technical data b diagnostic test procedures			
		2.2	use sufficient diagnostic information in a systematic way to enable an accurate diagnosis of light vehicle transmission and driveline system faults			
3	Be able to use appropriate tools and equipment	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 light vehicle transmission and driveline diagnostic and rectification activities			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle transmission and driveline diagnosis, rectification and test activities	4.1	use diagnostic methods that are relevant to the symptoms presented			
		4.2	evaluate dismantled sub-assemblies for their condition and suitability for repair or replacement			
		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 repaired or replacement components and units conform to the vehicle operating specification and any legal requirements			
		4.5	adjust components and units correctly to ensure that they operate to meet system requirements			
		4.6	use testing methods that are suitable for assessing the performance of the system rectified			
		4.7	ensure the light vehicle transmission and driveline system rectified performs to the vehicle operating specification and any legal requirements			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.8	complete all system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	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	Be able to record information and make suitable recommendations	5.4	Record and report any additional faults noticed during the course of their work promptly in the format required			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*



## Unit 57: Competency in Routine Light Vehicle Maintenance

Unit reference number: L/601/3766

Level: 2

Credit value: 7

Guided learning hours: 60

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### Unit Summary

This unit enables the learner to demonstrate competency in carrying out routine light vehicle maintenance, adjustments and replacement activities as part of the periodic servicing of vehicles.

### Assessment Requirements/Evidence requirements:

This unit must be assessed in accordance with the IMI Assessment Strategy (*Annexe C*) and adhere to the IMI Competency Unit Assessment Requirements as detailed below:

#### You must:

- 1 produce evidence to show you meet all of the Learning Outcomes
- 2 produce performance evidence resulting from work you have carried out on real vehicles in your normal workplace or as defined within the IMI VCQ Assessment Strategy as managed and organised by an approved centre when naturally occurring performance evidence does not occur at frequent intervals in your normal workplace or when safety is at risk.
- 3 be observed by an assessor as defined in the IMI VCQ Assessment Strategy.
- 4 you must produce evidence of competently carrying out servicing activities on at least 3 different vehicles which collectively cover the learning outcomes.
- 5 your assessor must physically observe you in your normal workplace carrying out a range of servicing activities on at least 1 occasion.
- 6 evidence from simulated activities is not acceptable for this unit.

## Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to work safely when carrying out light vehicle routine maintenance	1.1	use suitable personal protective equipment and vehicle coverings throughout all light vehicle routine maintenance activities			
		1.2	work in a way which minimises the risk of damage or injury to the vehicle, people and the environment			
2	Be able to use relevant information to carry out the task	2.1	select suitable sources of technical information to support light vehicle routine maintenance activities including: a vehicle technical data b maintenance procedures c legal requirements			
		2.2	use technical information to support light vehicle inspection activities			
3	Be able to use appropriate tools and equipment	3.1	select the appropriate tools and equipment necessary for carrying out routine maintenance			
		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 routine maintenance			



Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to carry out light vehicle routine maintenance	4.1	carry out light vehicle maintenance using prescribed methods, adhering to the correct specifications and tolerances for the vehicle and following: <ul style="list-style-type: none"> <li>a the manufacturer's approved inspection methods</li> <li>b recognised researched inspection methods</li> <li>c health and safety requirements</li> <li>d workplace procedures</li> </ul>			
		4.2	carry out adjustments, replacement of vehicle components and replenishment of consumable materials following the manufacturer's current specification			
		4.3	ensure the examination methods identify accurately any vehicle system and or component problems falling outside the maintenance schedule are specified			
		4.4	ensure any comparison of the vehicle against specification accurately identifies any: <ul style="list-style-type: none"> <li>a differences from the vehicle specification</li> <li>b vehicle appearance and condition faults</li> <li>c variation from legal requirements</li> </ul>			
		4.5	use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems accurately			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
		4.6	complete all system diagnostic activities within the agreed timescale			
5	Be able to record information and make suitable recommendations	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			

Learner name: \_\_\_\_\_

Date: \_\_\_\_\_

Learner signature: \_\_\_\_\_

Date: \_\_\_\_\_

Assessor signature: \_\_\_\_\_

Date: \_\_\_\_\_

Internal verifier signature: \_\_\_\_\_

Date: \_\_\_\_\_

*(if sampled)*

## Further information

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Our customer service numbers are:

BTEC and NVQ	0844 576 0026
GCSE	0844 576 0027
GCE	0844 576 0025
The Diploma	0844 576 0028
DiDA and other qualifications	0844 576 0031

Calls may be recorded for training purposes.

## Useful publications

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Related information and publications include:

- *Centre Handbook for Edexcel NVQs and Competence-based Qualifications* published annually
- functional skills publications – specifications, tutor support materials and question papers
- *Regulatory Arrangements for the Qualification and Credit Framework* (published by Ofqual, August 2008)
- the current Pearson publications catalogue and update catalogue.

Pearson publications concerning the Quality Assurance System and the internal and standards verification of vocationally related programmes can be found on the Pearson website.

NB: Some of our publications are priced. There is also a charge for postage and packing. Please check the cost when you order.

## How to obtain National Occupational Standards

To obtain the National Occupational Standards go to [www.ukstandards.org.uk](http://www.ukstandards.org.uk).

# Professional development and training

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Pearson supports UK and international customers with training related to NVQ and BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building functional skills into your programme
- building effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website ([qualifications.pearson.com](http://qualifications.pearson.com)). You can request customised training through the website or by contacting one of our advisers in the Training from Pearson team via Customer Services to discuss your training needs.

The training we provide:

- is active
- is designed to be supportive and thought provoking
- builds on best practice
- may be suitable for those seeking evidence for their continuing professional development.

## Annexe A: Progression pathways

### The Pearson qualification framework for the Automotive sector

Level	BTEC vocationally-related qualifications	BTEC specialist qualification/ professional	NVQ/competence
5	BTEC Level 5 HND Diploma in Vehicle Operations Management		
4	BTEC Level 4 HNC Diploma in Vehicle Operations Management		
3		Pearson BTEC Level 3 Diploma in Light Vehicle Maintenance and Repair Principles Pearson BTEC Level 3 Diploma in Heavy Vehicle Maintenance and Repair Principles Pearson BTEC Level 3 Diploma in Auto Electrical and Mobile Electrical Principles Pearson BTEC Level 3 Diploma in Vehicle Fitting Supervisory Principles Pearson BTEC Level 3 Diploma in Vehicle Accident Repair Body Principles Pearson BTEC Level 3 Diploma in Vehicle Accident Repair Paint Principles	Pearson Edexcel Level 3 Diploma in Light Vehicle Maintenance and Repair Competence Pearson Edexcel Level 3 Diploma in Heavy Vehicle Maintenance and Repair Competence Pearson Edexcel Level 3 Diploma in Auto Electrical and Mobile Electrical Competence Pearson Edexcel Level 3 Diploma in Vehicle Fitting Supervisory Competence Pearson Edexcel Level 3 Diploma in Vehicle Accident Repair Body Competence Pearson Edexcel Level 3 Diploma in Vehicle Accident Repair Paint Competence

Level	BTEC vocationally-related qualifications	BTEC specialist qualification/ professional	NVQ/competence
3		Pearson BTEC Level 3 Diploma in Lift Truck Maintenance & Repair Principles Pearson BTEC Level 3 Diploma in Motorcycle Maintenance and Repair Principles Pearson BTEC Level 3 Diploma in Vehicle Sales Principles Pearson BTEC Level 3 Diploma in Body Building Principles	Pearson Edexcel Level 3 Diploma in Lift Truck Maintenance & Repair Competence Pearson Edexcel Level 3 Diploma in Motorcycle Maintenance and Repair Competence Pearson Edexcel Level 3 Diploma in Vehicle Sales Competence Pearson Edexcel Level 3 Diploma in Body Building Competence
2		Pearson BTEC Level 2 Diploma in Light Vehicle Maintenance and Repair Principles Pearson BTEC Level 2 Diploma in Heavy Vehicle Maintenance and Repair Principles Pearson BTEC Level 2 Diploma in Auto Electrical and Mobile Electrical Principles Pearson BTEC Level 2 Diploma in Vehicle Fitting Principles Pearson BTEC Level 2 Diploma in Vehicle Accident Repair Paint Principles Pearson BTEC Level 2 Diploma in Vehicle Accident Repair Body Principles	Pearson Edexcel Level 2 Diploma in Light Vehicle Maintenance and Repair Competence Pearson Edexcel Level 2 Diploma in Heavy Vehicle Maintenance and Repair Competence Pearson Edexcel Level 2 Diploma in Auto Electrical and Mobile Electrical Competence Pearson Edexcel Level 2 Diploma in Vehicle Fitting Competence Pearson Edexcel Level 2 Diploma in Vehicle Accident Repair Paint Competence Pearson Edexcel Level 2 Diploma in Vehicle Accident Repair Body Competence

Level	BTEC vocationally-related qualifications	BTEC specialist qualification/ professional	NVQ/competence
2		<p>Level 2 Diploma in Lift Truck Maintenance &amp; Repair Principles</p> <p>Pearson BTEC Level 2 Diploma in Motorcycle Maintenance and Repair Principles</p> <p>Pearson BTEC Level 2 Diploma in Vehicle Sales Principles</p> <p>Pearson BTEC Level 2 Diploma in Vehicle Accident Repair Mechanical, Electrical and Trim (MET) Principles</p> <p>Pearson BTEC Level 2 Diploma in Body Building Principles</p> <p>Pearson BTEC Level 2 Diploma in Heavy Vehicle Trailer Maintenance &amp; Repair Principles</p>	<p>Pearson Edexcel Level 2 Diploma in Lift Truck Maintenance &amp; Repair Competence</p> <p>Pearson Edexcel Level 2 Diploma in Motorcycle Maintenance and Repair Competence</p> <p>Pearson Edexcel Level 2 Diploma in Vehicle Sales Competence</p> <p>Pearson Edexcel Level 2 Diploma in Vehicle Accident Repair Mechanical, Electrical and Trim (MET) Competence</p> <p>Pearson Edexcel Level 2 Diploma in Body Building Competence</p> <p>Pearson Edexcel Level 2 Diploma in Heavy Vehicle Trailer Maintenance &amp; Repair Competence</p>
1			
Entry			





## Annexe B: Centre certification and registration

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Pearson Standards Verifiers will provide support, advice and guidance to centres to achieve Direct Claims Status (DCS). Pearson will maintain the integrity of Pearson NVQs through ensuring that the awarding of these qualifications is secure. Where there are quality issues identified in the delivery of programmes, Pearson will exercise the right to:

- direct centres to take action
- limit or suspend certification
- suspend registration.

The approach of Pearson in such circumstances is to work with the centre to overcome the problems identified. If additional training is required, Pearson will aim to secure the appropriate expertise to provide this.

### **What are the access arrangements and special considerations for the qualifications in this specification?**

Centres are required to recruit learners to Pearson qualifications with integrity.

Appropriate steps should be taken to assess each applicant's potential and a professional judgement should be made about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Pearson's policy on learners with particular requirements.

Pearson's policy on access arrangements and special considerations for Pearson qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the Equality Act 2010) without compromising the assessment of skills, knowledge, understanding or competence. Please refer to *Access Arrangements and Special Considerations for BTEC and Edexcel NVQ Qualifications* for further details. [qualifications.pearson.com](http://qualifications.pearson.com).

Please refer to Pearson's Equality Policy for further details, [qualifications.pearson.com](http://qualifications.pearson.com)





THE INSTITUTE OF THE MOTOR INDUSTRY

# Assessment Strategy

For

# Vocational Competency Qualifications (VCQs)

## Introduction

This document sets out the recommendations of IMI for the assessment of VCQ qualifications based on IMI developed National Occupational Standards (NOS). The Strategy is designed to operate across all four nations, bringing parity to all learners. Awarding Organisations wishing to operate VCQs in the retail motor sector must take full part in the IMI Awarding Body Forum.

This is the overarching strategy for the assessment and verification of competency based qualifications (VCQs) that are based upon National Occupational Standards from the IMI and will come into force on the 30<sup>th</sup> June 2010, it will apply to any new competence -based units and qualifications.

## Assessment

VCQs are a type of qualification which reflect the unique needs of the workplace. They should be assessed in a holistic way by technically competent assessors. The primary method of assessment should always be direct workplace observation. Some use of simulation is allowed (please see section, Workplace Assessment/Simulation).

Additionally Awarding Organisations are encouraged to make use of naturally occurring quality assurance and monitoring systems where they exist in workplace assessment environments.

The Institute of the Motor Industry require Awarding Organisations delivering VCQs to participate in an Awarding Body Forum. This will, as a minimum, involve an annual meeting to discuss issues of assessment and verification.

VCQ must attest to competence in an occupational role (where competence is defined as the ability to apply knowledge, understanding, practical and thinking skills to be effective in work: these skills will usually include problem-solving, being flexible to meet changing demands and the ability to work with or alongside others).

Any assessment must attest to competence in an occupational role (where competence is defined as the ability to apply knowledge, understanding, practical and thinking skills to be effective in work: these skills will usually include problem-solving, being flexible to meet changing demands and the ability to work with or alongside others)

## Evidence Requirements for VCQ

Candidates working towards a VCQ must provide evidence from the workplace that covers a minimum of a 4 month, (16 week), period.

All evidence for VCQs must be assessed by suitably qualified assessors and must adhere to the requirements for the units being assessed.

## Rules of combination

Rules of combination must be that determined by the IMI SSC.

## Evidence other than from direct workplace observation

### Workplace Assessment/Simulation.

IMI credit- based units are work/competency based and therefore candidates are to be assessed under normal workplace conditions. It is recognised however, that there are situations where the workplace may not be appropriate or that waiting for naturally occurring evidence is impractical. In these situations IMI will allow centres to set up or devise assessment situations.

These assessment situations can only be set up after:

- all possible routes for the collection of naturally occurring evidence have been exhausted
- the exact make up and content of the centre devised assessment has been agreed and approved by the external verifier
- the assessor can assure that the simulation will provide evidence that is valid reliable and authentic.

We suggest that centres seek written confirmation before proceeding with assessment. The need for simulation may result from consideration of:

- Safety
- Legislation
- Regulation
- Contingency
- Cost
- Frequency.

In addition, IMI recognises that candidates using these credit- based units in the context of a Level 1 qualification may be in a learning environment and not in a workplace. In these situations, centres may set up or devise assessment situations as required, with prior written agreement of the external verifier.

Any simulation must be carried out using actual vehicles; the use of engine rigs or electrical boards is not permitted.

IMI re-iterates that its credit- based units have been designed to be capable of assessment in the normal workplace and that subject to the arrangements for simulation described above this should be the case.

Simulation will be monitored by the Awarding Organisations and where it is found to be the 'norm' rather than the exception suitable action will need to be taken.

## Realistic Work Environment

The IMI requires that candidates are assessed within their normal workplace, or in exceptional circumstances as described previously via simulation. The use of approved simulation means therefore that RWE, Realistic Work Environment is not to be used.

## Expert Witnesses

The use of **witness testimony** and **expert witness testimony** are appropriate methods for assessors to collect supplementary evidence on candidates' performance.

**Witness testimonies** can be obtained from people that are occupationally competent and who may be familiar with the national occupational standards, such as the candidate's line manager.

The assessor must judge the validity of the witness testimony and these may vary depending on the source. Witness testimonies can only support the assessment process and may remove or reduce the need to collect supplementary evidence, however, the awarding organisation's/body's quality assurance requirements must be met. Additionally the person or persons providing the witness testimony evidence must make themselves available to the external verifier for confirmation of evidence validity if required.

## Remote Observation.

The use of direct observation from a remote location is permitted as long as the centre seeks and receives the approval of their awarding organisation prior to its use and the awarding organisation discusses and agree this with the IMI prior to its use.

## Assessor Requirements.

The assessment of VCOs must be carried out by approved industry competent assessors.

Assessors will be responsible for, and accountable for, the validity, reliability and authenticity of evidence.

The primary responsibility of the assessor is to ensure that candidates satisfy the requirements of the national occupational standards. It is important that an assessor can recognise occupational competence as specified by the national occupational standards. Assessors therefore need to have a thorough understanding of assessment and quality assurance practices, as well as have in depth technical competence related to the qualifications for which they are assessing candidates.

It will be the responsibility of the approved centre to select and appoint assessors.

It will be the responsibility of the Awarding Organisation to approve centre selected assessors.

To be an approved assessor the person 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 Institute of the Motor Industry. This will include, but not be limited to the Assessor qualifications, 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 IMI, 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 addition to working/job shadowing)
- be approved by the Awarding Organisation to carry out assessments for the VCQs they are competent in.

Approval of assessors can be **removed**.

Assessors **cannot** assess the VCQ if they are not currently approved by, or have had their approval removed by, the Awarding Organisation.

## Internal Verifier Requirements

VCQs must be underpinned by quality assurance appropriate to workplace based delivery. At a minimum this should reflect the principles outlined below.

Internal Verification of VCQ shall be the responsibility of approved industry competent internal verifiers.

The primary responsibility of the internal verifier is to assure the quality and consistency of assessments by the assessors for whom they are responsible. Internal verifiers therefore need to have a thorough understanding of quality assurance and assessment practices, as well as technical competence related to the qualifications that they are internally verifying.

Internal verifiers will be responsible for, and accountable for consistency, quality and reliability of evidence and assessors.

It will be the responsibility of the approved centre to select and appoint internal verifiers.

It will be the responsibility of the Awarding Organisation to approve centre selected internal verifiers.

To be an approved internal verifier the person 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 Institute of the Motor Industry. This will include, but not be limited to the Quality Assurance qualifications 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 SSC
- verifiers working towards a relevant qualification must achieve their qualification within 12 months
- provide evidence of CPD totalling not less than 30 hours from within their professional area within a 12 month period
- be approved by the Awarding Organisation to carry out internal verification for relevant VCQ(s)
- demonstrate knowledge and understanding of the quality assurance processes required by the centre and the awarding organisation

Approval of internal verifiers can be **removed**.

Internal Verifiers **cannot** verify the VCQ if they are not approved by, or have had their approval removed by the Awarding Organisation.

## Multi Discipline Assessors and Internal Verifiers

Assessors and Internal Verifiers who work across multi disciplines must agree to a programme of CPD that will, over an agreed period of time, show their competence across all areas that they assess.

The programme of CPD and the timescale must be agreed for each multi discipline assessor by their External Verifier and may be subject to scrutiny by the IMI.

It is the responsibility of the centre to keep a record of these agreements.



## External Verifier Requirements.

Awarding Organisations will be responsible for selection and appointment of external verifiers.

To be an approved external verifier or moderator the person must:

- hold or be working towards an appropriate qualification as specified by the Institute of the Motor Industry, confirming their competence to externally verify VCO assessments This will include, but not be limited to the Level 4 Award in Externally Assuring the Quality of Assessment Processes and Practice, Level 4 Certificate in Leading the External Quality Assurance of Assessment Processes and Practice, (and by implication legacy External Verifier unit V2 and D35 units) but may be an appropriate equivalent as defined by the SSC
- external verifiers working towards a relevant qualification must achieve their qualification within 12 months
- have experience of working within the automotive industry gained through current or prior employment in order to have an up- to- date technical awareness relevant to the VCO they are seeking to externally verify
- have a sound and in-depth knowledge of the VCO requirements
- demonstrate their commitment to maintaining their industry knowledge by providing evidence of CPD totalling not less than 30 hours from within their professional area within a 12 month period.

## External Quality Control.

It is expected that the awarding of qualifications will be underpinned by quality assurance appropriate to workplace based delivery. At a minimum this should reflect the principles outlined below.

External quality control of assessment is the responsibility of the Awarding Organisations, they must ensure that common approaches are employed and that consistent, high standards are achieved.

External verifiers will be required to implement rigorous risk management strategies consistently across all centres for which they are responsible.

IMI recommends that Awarding Organisations adopt a risk rating and risk management system for centres offering IMI VCOs.

IMI recommend that such systems identify:

- commercial risk – is there potential for commercial pressures to ensure that candidates achieve qualifications within unduly short time frames?
- assessment/verification risk – are factors apparent in the relationship between candidates, assessors and verifiers that might prejudice a fair and consistent assessment process?

Where risks or potential risks are identified, IMI expects that the Awarding Organisation, via the external verifier takes appropriate action to ensure that the credibility of the assessment process is not prejudiced.

Awarding Organisations will be responsible for and accountable for the quality of VCQs delivered and assessed by their approved assessment centres.

